THE CONTINENT OF ASIA

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TORONTO

THE CONTINENT OF ASIA

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TO

MY ASSISTANTS IN THE GEOGRAPHY DEPARTMENT,

UNIVERSITY COLLEGE, LONDON

JEAN CURNOW, MARGARET SHACKLETON

H. A. MATTHEWS, C. D. FORDE

PREFACE

I

In writing these lines I am thinking mainly of several thousands of old students, and specially of those among them who have been steadily pressing me during the past five years to do what I have at last contrived to do—finish a "Continent of Asia"; and so I am venturing to do also what they have wanted me to do—outline my own method of work.

This book has been written from the same standpoint, on the same lines, and in the same way, as **The Continent of Europe**; *but, as the conclusions here are so different, I propose to answer the questions asked by outlining my progress from the daughter peninsula to the mother continent.*

I had the good fortune to begin teaching Geography just after Dr. Mill had published his **General Geography**, *which was the best book of its kind ever written—so far as I know—and years ahead of its time; and fortunately I had enough sense of its value to adopt it as my text-book. From it I learnt, amid much else, two things that determined my main lines of work: that Europe should be studied as "a peninsula of peninsulas," and that South America was the easiest of all the continents to visualise.*

I set to work on Europe, and it took me between four and five years to make a satisfactory mental picture of it. By "satisfactory" I meant one that was so clear that it was no burden on my memory, as simple as simplification could make it without falsification, and true in the sense of corresponding with the phenomena as I had observed them. But they were selected phenomena, and so the picture did not pretend to be rigidly complete; and it was my selection, and so it might be prejudiced—though my prejudices, except on one point (my detestation of bullies), were emphatically not what so many reviewers have attributed to me.

What particular racial or national type occupies any particular region, in Europe or elsewhere, is a matter of perfect indifference to

me. All my vital interest is in seeing how each type corresponds with its environment, and I am equally interested in all types—in their proper place. But I look on steppe as a disharmonic intrusion in an oceanic peninsula, and should resent the intrusion of the Prussian steppe into Western Europe just as much if it was occupied by the particular steppe people for whom I have the greatest admiration and even affection, the Magyars. And, if steppe mentality—which seems to me to be entirely appropriate and immensely interesting in Asia—is associated with the steppe association, I resent it still more; but my resentment is based on artistic and not political grounds. I resent it as I should resent the most attractive "Punch and Judy" show in Westminster Abbey.

Once I had my mental picture "clear and simple and true," I wrote a description of it; and then I began to work at the pictured area regionally, guided always by what seemed to me to be the dominant lessons to be learnt from the picture. In the case of Europe, these were that peninsularity must mean particularity and individuality, variety and freedom, something of flux and change, attention to form and frame, indifference to size and numbers. For this reason one was forced to record anything grossly incompatible with that conception, e.g. *tyranny, uniformity, worship of bulk, as one was forced to record the presence of the steppe.*

As each region was finished, I wrote an account of it from the standpoint of this peninsularity; and then once every year for twelve years I went over each account, adding and altering—from a collection of some 200,000 newspaper and magazine cuttings. For such a purpose, magazines are much more useful than books, for they cover the whole world, and keep one up-to-date; and one has no hesitation about tearing out the pages that one wants, and destroying the rest. Very few books contain many pages that one really wants to keep, even if one could afford to tear them out; and the cost and the storage of an adequate and up-to-date library are quite prohibitive for the ordinary teacher.

As the old students who have used my cutting-portfolios—for essay and seminar work—know, such cuttings, especially from 20 or 30 magazines, are simply invaluable, but they are far from easy to handle. Even from the standpoint of storage alone, one must overhaul them about every four years[1]*; and I would suggest that the*

[1] *I was encouraged to recommend my practice by finding that Graham Wallas did, and recommended, exactly the same.*

wise thing is at each clearance to destroy every cutting which has been **proved**—*since the previous clearance—to be either definitely correct or definitely incorrect. The only drawback is that one sometimes forgets the actual source of a certain bit of information, and cannot trace it ; but, if one has once made that bit one's own, the reference is not often of serious importance.*

As the result of this regional work, I found occasionally that I had to modify some detail in my picture of the continent, and to revise very carefully any use that had been made of the original detail ; and, though all this makes the work appear to be very slow, it makes it incredibly easy to remember and to use one's results. The mass of **The Continent of Europe** *was in manuscript in this way twenty years before it was published.*

As soon as I had my mental picture of Europe clear, I began work on South America, working in exactly the same way ; and I still have a half-finished " Continent of South America "—as of all the other continents. I was much interested in it, but could not succeed in realising it **as a continent.** *Its geological youth, its oceanic climate, its short history, its " European " peoples, the ease with which one could visualise it, everything about it except the Brazil plateau, lacked the convincing idea of continentality. So I turned to North America.*

The sequel was a long struggle with North America, and the book did come nearer to completion than the South America had ; but, again, I could not visualise the area as a continent. Only the Canadian shield seemed really continental ; and so, with much reluctance, I turned away—to Africa.

Africa proved infinitely more satisfactory. The solid shape, the sheer bulk, the brooding plateau, the scale of the monotony, the uncanny personality, gripped one. Undoubtedly, this was a continent. Egypt was not horribly out of place here, as it would have been in North America, or as steppe is on the margin of the North Sea ; and yet the continent, though wholly satisfying **as far as it went,** *was almost devoid of certain significant World features. Its structure and relief showed no vast mountain system or anything really montane except a fragment stolen from Europe ; and its climate showed no range of temperature that really suggested continentality. Typical temperatures from every major Natural Region give a mean range of* **less than 17° F.** *for 80 places ; a similar mean even for India is above 21° F. The nearest similar figures give—for the Chinese*

dominions a mean of over 58° F., and for Russian Asia one of 77° F.!

I had left Egypt to the last, to be the culminating manifestation of the continent; but the more one pictured the Nile, the less happy one was over it. Had a great river nothing greater to do than once a year slop a chocolate flood gently over a mud bank? Of course, it had merits. It was imposing, dextrous, certain, punctual—coming 4000 miles and never being more than four days early or four days late; but it was a machine, as monotonous and mechanical and uninspiring as a Chicago sausage-factory, teaching only what it practised—an endless repetition of an endless formula. Its insensate routine had mummified Egypt.

Africa was certainly not a poor attempt of a large peninsula to pretend to be a continent; but it failed to be convincing about continentality, especially where it ought to have been most convincing—in what is, historically, the most ancient of lands. Before being content, one was constrained to try Asia; and to Asia I have tried to pay tribute in this book.

My mental picture of the continent took longer to form than the picture of any of the other continents had taken; but the regional work has taken about the same time, twelve years. Each year, of course, I went through each chapter at least once, altering and adding; but in this case I have never felt that my picture needed to be modified. Dr. Curnow tells me that she has a copy of a large part of the early (general) chapters, made 18 years ago, and that, except for additions, the two are practically identical. Professor Forde, who has been kind enough to read a good deal of the proof, and who also used the original manuscript in the old days, found it "verbally familiar."

With a fixed picture, however, I allowed myself to make all sorts of experiments, and worked out each region on any lines which appealed to me personally, so long as the regional "exception" was never allowed to overrule the continental "law." Different regions are, therefore, treated in very different ways, the particular way being generally decided by the human note. The collection of families that we call China, is presented mainly in little plots of economic analysis; that part of the old coast of the continent which now constitutes the kingdom of Japan—admitted as an island group with marked relations, climatic as well as historical, to the continent—is summarised historically; in Arabia I was thinking always of the Semitic type and tongue; in Mongolia—long before the recent discoveries—I was ob-

sessed with time as well as space. Perhaps, this explanation may be accepted as some apology for all that is omitted; whatever—from temperament or incapacity—I did not succeed in absorbing and making my own, I made no attempt to describe.

I will only add that there are worse ways of preparing to work out a theory of continentality as a climatic control than some study of the conception—monstrous politically alike in its tyranny and its territorial extension—under the influence of which Napoleon issued the first decree about his Continental System. It was issued from Berlin!

I have allowed myself the same kind of licence in the spelling of proper names. My "picture" here was of a conscientious student trying to find places in an atlas; and it seemed clear that the only thing that really mattered was the convenience of readers. The "New Spelling" enthusiasts have touched only the fringe of the subject, and some of their work seems to need revision, if older Semitic authorities are right; no atlas embodies this fringe, or will do so for some years, and by then it will have been revised; and the book could not afford complete maps of its own. I decided, therefore, with certain reservations, particularly with regard to India,—where they can scarcely cause trouble or confusion,—to follow the **Index** *of the* **Times Atlas.** *It does not always give the best spelling, and it is not always consistent; but it generally gives the better spelling in cases where names are spelled in different ways on different sheets of the atlas, and it is accessible to all University students.*

At the same time, I am glad personally to have such a good reason for not disfiguring my pages with some of the new obsessions. English is at least a great language; and, as a medium, it is far the most important in the world. Any one who was very anxious that Arabic or any other language should have all its sounds and letters properly valued and represented should have been equally anxious that English letters should have the same justice, even if some new symbol had to be invented for sounds alien to English.

II

I have two pleasant duties to discharge in connexion with the dedication of the book and with the debts which I owe.

It is a very great pleasure to dedicate it to my four assistants at University College, London, as the only way in which I can express

my gratitude to them for all that they did for me. No one could have wished for more congenial work, and no one could have had a more loyal and unselfish staff.

As to my debts, beyond all else I owe an immeasurable debt to the late Prince Kropotkin, especially for my idea of continentality and all that it means in human "response." If I have deviated here in some details from what he held, I can at least plead that I did the same—during his lifetime and without his definite disapproval—in revising his **Asia** *for Messrs. Chambers.*

My second debt is to Dr. Marion Newbigin. She seems to me more stimulating than all our other Geographers except Dr. Mill, and the one with the most truly geographical attitude of mind; and she couples this with a very happy gift for expressing clear ideas in lucid language—with attractive "seasoning." This made me turn to her for help and advice, which were given with great generosity, and for which I am as greatly indebted to her.

My third debt is to Dr. Matthews, without whose help the book would probably never have been finished. He undertook "to do everything to save me time and trouble"; and he has done so. Every piece of information, every reference or book or map, that I wanted was forthcoming; and he must have devoted untold hours to the work—without a word of protest, even when the request may have seemed unreasonable. He has read all the proofs, verified all the spellings, and done all the illustrations; and the "copy" which I submitted for some of these was simply crude beyond words. Indeed, only some one who had been first my student, and then my assistant, and always a friend, would have troubled or been able to make head or tail of them.

L. W. LYDE.

Yew Garth, Sandhurst, Berks,
October——, 1932.

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PART I

GENERAL

CHAPTER I

WORLD-RELATIONS

THE World-relations of a huge continent must include the relations of different parts of the unit to one another as well as those of the whole unit to the globe. For both purposes genetic descriptions are of special value to the geographer, as being at once essentially "true" and a great aid towards visualisation; but they are the proper work of the geologist rather than the geographer, and even have vital importance to the latter only when directly related to the distribution of relief or climatic phenomena or mineral wealth or some other decisive factor in human environment. **Genetic Descriptions.**

It is certainly not incumbent on the geographer to concern himself with principles and processes about which the geologists themselves are not fully agreed; but he may often usefully adopt—as a working hypothesis—any of their theories which do seem to cover and to be congruent with his complex of geographical material. If distinguished mathematicians assure him that there is no sound physics or dynamics behind the particular theory, he may console himself by remembering that there is no practical value—to him—in dozens of ingenious map-projections devised by the mathematicians.

Thus, it is of relatively little importance to the geographer whether vast continents of granite are floating on still vaster seas of basalt,—or, if so, why they split,—or how, in that case, their fragments drift apart. But it is of real interest and importance to him that the margins of such fragments may be rich in metal, and may remain relatively parallel with each other, as in the case of the Brazil coast of South America and the Guinea coast of Africa, or in that of the Siberian and the Manchurian scarps which make rough water-partings for the Amur basin. **Physical History.**

It may, therefore, be helpful to approach the study of a vast area in an attitude of mind prepared to find that its structural elements are arranged on a fairly definite and quite comprehensible plan. This may be swimming with the help of inflated bladders, which must presently be discarded—possibly, before one has learned

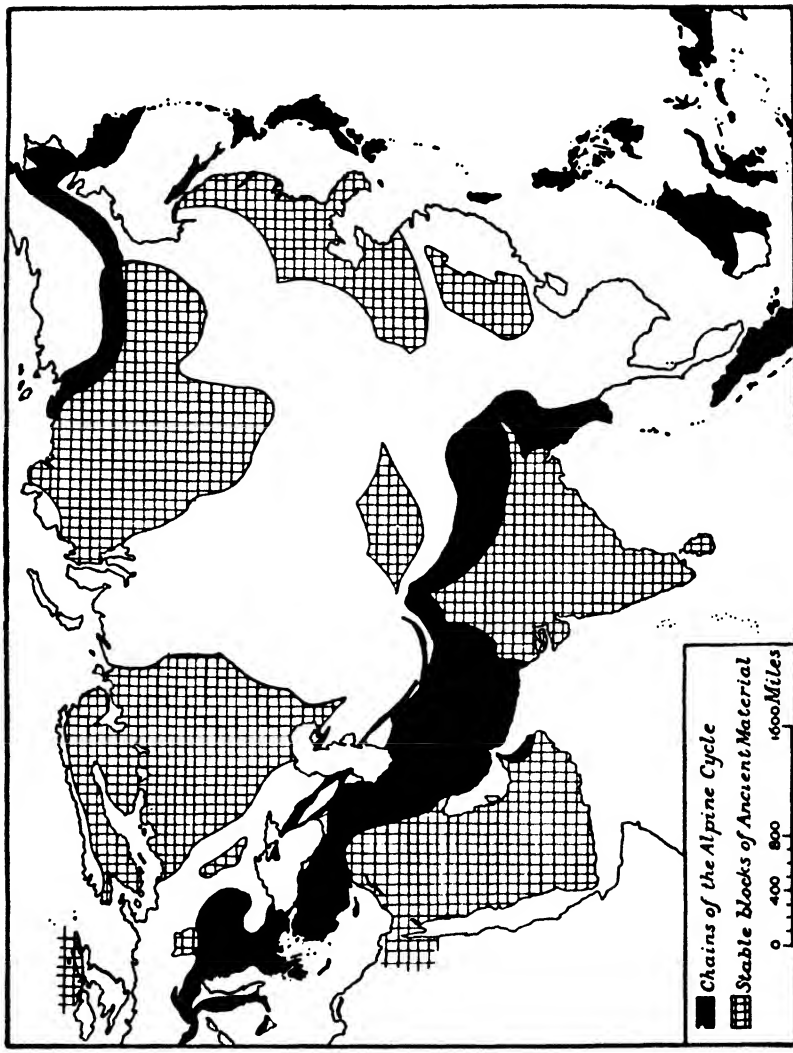

FIG. 1.—Structure of Asia (based on Argard).

The old massifs of Angaraland are clearly separated from the fragments of Gondwanaland by the parallel (40° N.) which links the Caspian Sea with the Chihli Gulf—the most interesting parallel also in both the mathematical and the historical geography of Asia.

to swim ; but it does give one a working picture as a unit—if only to criticise, and suggests lines along which one may begin to collect facts. When the collected facts are analysed and evaluated simply in and for themselves, the lines may prove to have been wrong ones or needlessly round-about ; but in the long run time is probably saved, not wasted, by having an immediate objective.

Position of Blocks.

For instance, the geographer ought surely to be concerned less with the physical history of Asia as required by Wegener, than with the value of his hypothesis as a practical basis for discussing the plan of the continent. It is certainly useful to regard the Dekkan as more intimately associated with the other blocks than it would have been owing only to simple foundering. It is equally useful to relate the broadening of Asia eastwards to the relative distances between the stable platforms. Longitude 50° E., except for scarcely 20 degrees of latitude, is always within 500 miles of an ocean coast, but this is not true of longitude 100° E. throughout 45 degrees of latitude ; and the west may usefully be regarded as a narrow zone between two converging blocks—Russian and Arabian, while the east may be regarded as a wide zone between two diverging blocks —Siberian and Indian.

Tetrahedral Deformation.

Obviously, the use of the World to Man depends on the relations of land (28 p.c.) and water (72 p.c.) ; and, if there is some " law " behind this, we have at once a background for otherwise more or less unrelated facts. Amongst the various theories is that of Tetrahedral Deformation ; and, from this point of view, it is interesting to relate the physique and the climate of the great continental units—on a working hypothesis—to the process by which a cooling sphere is slightly deformed towards the shape of a tetrahedron or pyramid. The application of the hypothesis to some areas, *e.g.* Europe, is simple ; for the whole area comes easily within a definite sector of the horizontal " triangle " of the slightly deformed Earth. It shows, therefore, a typical axial belt of old folded highland merging northward in a wide area of lowland and ridged southward by a narrow line of young folded mountains ; but it shows little evidence of the alternate stages through which—on the hypothesis—the rotating Earth must have passed, stages of collapse towards the tetrahedral, emphasising vertical lines, and stages of recovery towards the spherical, emphasising horizontal lines. Obviously, phenomena of stability are more likely to be associated with the horizontal lines, as in the Atlantic basin, than with vertical lines, as in the Pacific basin ; and we look normally to the younger lowlands for fertility, to the older highlands for mineral wealth.

With its vastly greater extent both latitudinally and longitudinally, Asia has a more complicated World-relation. The continent is so huge that it includes more than one pyramidal face or triangle,

and it is associated with a wide development of vertical as well as horizontal lines. This means that it should show a very marked contrast between what we might call the European and the non-European, and the distinction is implicit in the World-relations of a continent framed east and west by the 5000 miles of the North Pacific waters and 5000 miles of Eurafrican land; and, if we are approaching the unknown from the known, that contrast should

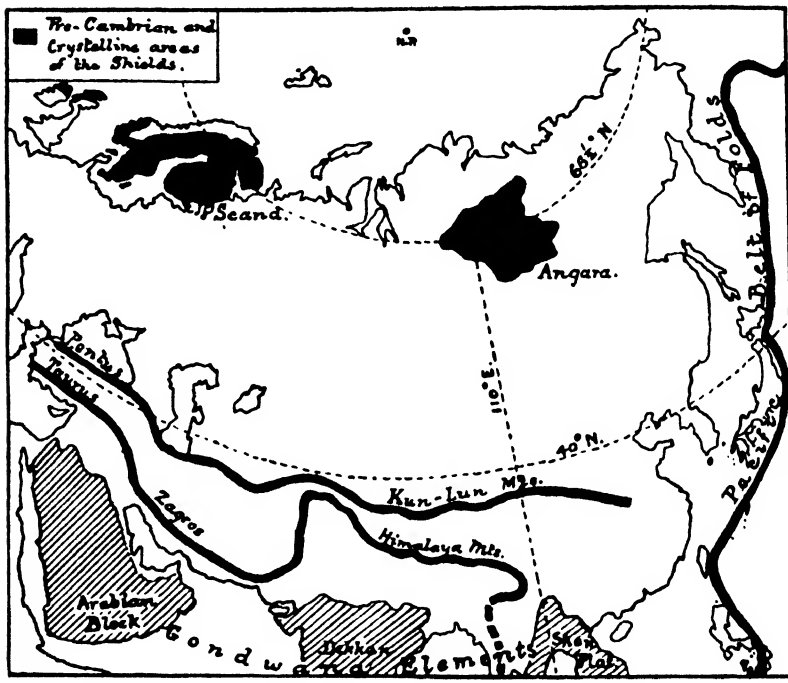

FIG. 2.—Coigns, Gondwana elements and fold lines on Tetrahedral hypothesis.

be the outstanding feature in our first picture of the continental background.

Double Background.

There is, in fact, such a marked contrast of aspects; and yet each aspect is equally typical of Asia. Its Arcto-Atlantic drainage repeats—on a huge scale—the typical horizontal phenomena of Europe, while its Indo-Pacific drainage is associated with vertical rather than horizontal lines. The Asiatic background, therefore, is a double one—on the vast Arcto-Atlantic hinterland endless leagues of lonely steppe, and on the abrupt Indo-Pacific hinterland the teeming marginal plains, the one flanked seaward by endless leagues of forest, and the other by that sharpest line of differentiation in the distribution of living creatures, the shore. On the one

a handful of nomads had an incredible mobility—which has caused their numbers to be immensely exaggerated,[1] but without economic strength; they could overrun, but not overwhelm; their ultimate work—incidentally—was stimulus, not destruction; and their hour—like that of their Patriarchal representatives in Europe—is past. But, between the ramparts of the great Mid-World mountain system and the Indo-Pacific ocean, there is a granary of economic strength, where 48 p.c. of the World's total population is concentrated on barely 5 p.c. of its land surface, having waited in a deceptive immobility—on both the Indian and the Pacific coasts—for the rise of Ocean Power; and, for these, their hour is not yet come—except, possibly, in the case of Japan.

Human Types.

These abrupt contrasts are, naturally enough, reflected in the whole history of Asia, as the Orient continent. On the one side, there emerges swarm after swarm of savage steppe men—Scythians, Sarmatians, Oghuz, Huns, Bulgars, Avars, Magyars, Mongols, Tatars, Kirghiz, Kalmucks, an interminable procession of raiders into Europe, meteoric in their movements, but in their effects most of them as ephemeral as the steppe grasses—for nomadism forbids accumulation. On the other side, there brood the creeds of calm and contemplation—Hinduism and Buddhism, immovable, with their metaphysical absorption in the Eternal, reverent pity for all perishable things, refuge even from the fever of personality. Thus the human spirit of Asia, like its terrestrial environment, has expressed itself in extremes; and virility on the one side, as humanity on the other, seems to have been born, like Aphrodite, of the sea-foam—from the days of the Admiral-Queen Artemisia, the wisest of Xerxes' counsellors, and of the Soldier-Queen Jingo, still worshipped by the chivalrous sailors of the Mikado.

Vast Size.

Behind these glaring World contrasts lies the fundamental truth that every morphological unit, whether huge or tiny, has its own relief control on Man, as—possibly, because—it has its own anatomic or topographical features; and the larger it is, the later will its political coherence usually be, and the stronger will be the contrasts between its extreme limits. In the case of Asia, its size alone—including nearly one-third of the land of the World—would differentiate it from all the other continents. Here, as in Africa, nature has developed certain features on a gigantic scale; but in Asia she has done it without, as in Africa, sacrificing variety, racial or other. In Asia, again, even more than in South America, there are prodigious extremes of relief; but in Asia there is room for them, so that there are in South America violent and inartistic contrasts in scenery, as in political phenomena, which are absent from Asia. Size gives proportion and perspective.

[1] Jenghiz Khan's army at his death was only 130,000 men; even in 1227 it was not more than 230,000.

But, however close the general resemblance to other land-masses may be, the scale for Asia is always magnificent, as when the panorama which is confined to some 70° of longitude between Nova Scotia and Vancouver Island is expanded to some 120° between Kurland and Sakhalin. Let us see how close is the similarity—except in scale!

Atlantic Unity.

From the Atlantic you enter both areas by a forested platform of old rock, Central Russia and Lower Canada; you cross a rough, rocky, forested belt of mineral wealth flanked by a great water-filled basin, the gold and platinum belt of the Urals north of the Caspian and the silver and gold belt of Ontario north of Lake Huron; with greater distance from the Atlantic you emerge on prairies, alike in origin and aspect, in climate and soil; still farther from the Atlantic you rise gently from these prairies, over sub-arid steppe terraces, to forested scarps flanked southward by great waterless basins, the Great Basin and the Gobi; and you descend, to an abrupt meeting of highland and ocean, over a typical narrow, island-flanked, mountain-fringed Pacific hinterland. But in the one case the distance is under 3000 miles, and in the other very nearly 5000.

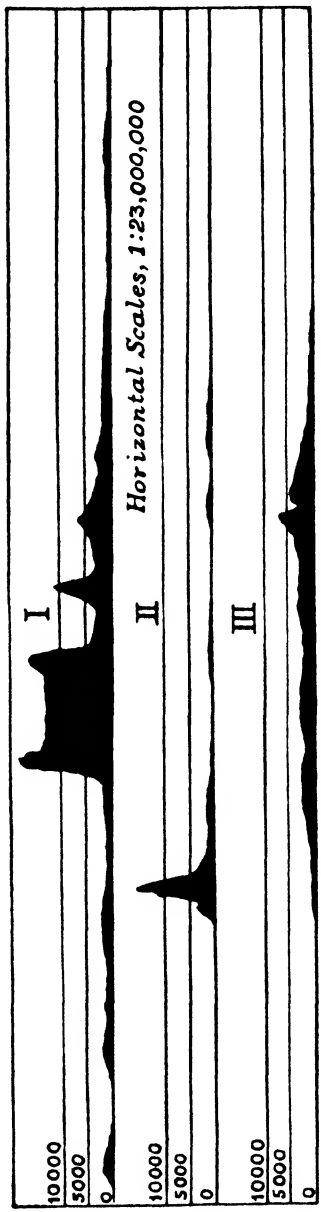

FIG. 3.—I. Meridional section of Asia along 80° East. II. Latitudinal section of S. America along the Equator. III. Latitudinal section of Africa along 10° South.

Asia *v.* Europe.

The relation of Asia to Europe is, of course, still more intimate; and it is much more intimate than it was—both physically and politically. It is more intimate physically than in the ages before the disappearance of the Aral-Arctic Gulf, and more intimate politically than before inroads into Europe from Asia by land

provoked European reaction towards Asia by sea. Now, physically, Europe is, of course, merely a peninsula of Asia; and, in its essentially peninsular half—west of the shortest line between the Black Sea and the Baltic—it is not much larger than two other peninsulas of Asia, the Indian and the Arabian. But, while Europe is physically a dependency of Asia, the latter has been politically more or less a dependency of Europe; and while, physically—even outside the threefold belt of the tetrahedral series—conspicuous units in the European physique reflect closely the characteristics of comparable units in Asia, the history of Europe, like its political and social phenomena, presents the strongest contrast with that of Asia.

Parallel Units.

Thus, the high, compact, barren tableland of the western peninsula of Arabia is more or less repeated in miniature in the Iberian meseta; and the central peninsula of India, with its arc of "Alpine" ramparts in the north, its low longitudinal plain below that arc, its high peninsular extension to the south, its terminal pearl of Ceylon, is more or less repeated in miniature in the central peninsula of Italy, though India has no "Apennines," and Italy has no "Dekkan." But the units of Asia are too far apart, in place and in conditions, to have had any common history; and the dominantly continental character of the whole area has deprived it of—or spared it from—the continual flux and change of a peninsular environment.

Boundaries of Europe.

It is precisely this contrast that lends special interest to the fact that the boundaries of Europe, apparently so satisfactory on the north, the west, and the south, seem to break down to the east, so that through the wide gap between the Caspian and the Urals the steppes of Asia communicate freely with the similar steppes of European Russia. So continuous and so uniform is the debatable land between the two that there is no consensus of opinion among geographers as to the precise frontier which it is desirable to adopt in this region. Indeed, as the Bosphorus, which is always considered an essential part of the eastern boundary of Europe, is only a sunken river-valley, the frontier might, with almost equal justice (and with more propriety *if* a frontier ought to be a belt), be drawn through the Thracian steppe behind the city of Stambul. Such facts as these afford an obvious justification for the statement that the traditional separation of Europe and Asia as continents has a political and historical, but no strictly geographical, basis.

Land Medium.

At the same time this only makes it more important to emphasise what we noticed above, the difference of medium in the earlier interrelations of the two areas. The Asiatic medium was land—a steppe route for horsemen (or sledge) over the northern plain, and a steppe route for camelmen over the plateau in the lower latitudes. The

latter was naturally the earlier used because of the earlier development to the south, and it led into a region where Man had also developed faster, and where there was quicker reaction; the Persian reached Thrace in 525 B.C., and Alexander was on the Indus in 325 B.C. Development in the north was slower, and the reaction was slower; from the fifth century to the thirteenth there was continuous intrusion from Asia into Europe, and there was no reaction till the Crusades, and none that was effective till the discovery of the Cape Route to India. Even then the reaction was by sea, not by land, and against the unoffending agriculturalists

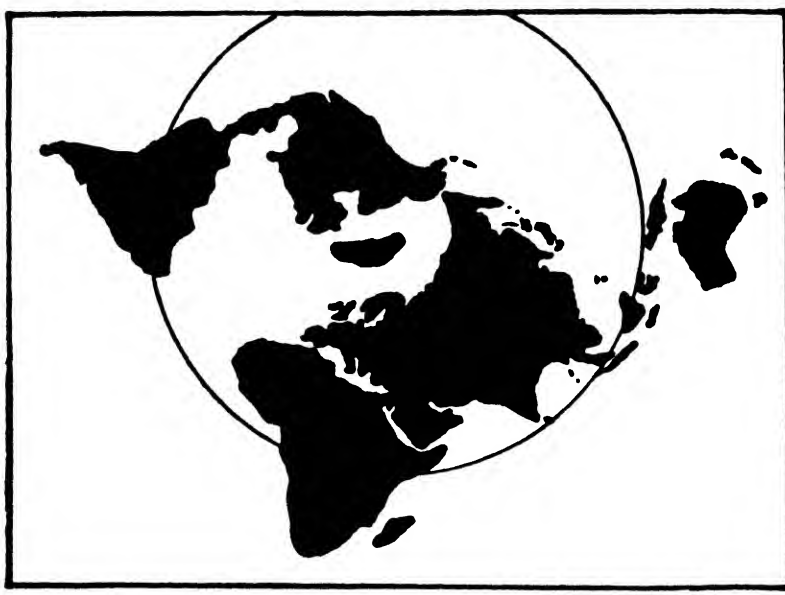

FIG. 4.—Asia and the Tri-Peninsular World (based on Griffith-Taylor).

on the flood plains of Southern Asia, not against the raiding nomads of the northern steppes.

Geological Survey. But now that the geological survey of the crust of the globe has become comprehensive, if not complete, geologists have been able to analyse the composition of the continental masses, and to trace their history in greater or less detail. They have consequently been able to show that the division of the great land-mass of the Old World into the three continents of Europe, Asia, and Africa does not, in its traditional form, correspond with the actual facts. These conclusions of purely geological research on the internal morphology and physical history of the crust provide definitely geographical information, and help us to form an accurate conception of the

nature of the surface in the various continents; they thus require to be taken into account by the geographer.

Young Folds.

We may note, in the first place, that those lofty chains of Young Folded Mountains, so striking a characteristic of Southern Europe, are continued, both through Asia Minor and across the depression of the Black Sea, into continental Asia, where they become loftier and more complex. But, though for the political geographer the Mediterranean Sea forms nominally the southern boundary of Europe, the same folded mountain chains appear on its southern shore, in the Atlas of Marocco, Algeria, and Tunis. We must, therefore, include this belt also in our great Eurasian land-mass, regardless of the fact that the western Mediterranean intervenes between these southern chains and those which skirt its northern shore. In this way we shift the southern boundary of Europe to the sands of the desert; Africa does not begin at the Pyrenees, but Europe ends at the Sahara, and the sea is a link.

Old Blocks.

South of the desert the geologist shows us the great plateau-land of Africa, built up of old rocks and devoid of folded mountain chains, the apparent marginal mountains being only the broken edge of the plateau where it overlooks the sea. This is a novelty to the European. But, travelling eastward, we find that western Asia is cut off in the same way by the Syrian desert from the plateau-land of Arabia, which is similar to Africa in structure, if not in vegetation. Still farther east, Peninsular India again presents the appearance of marginal mountains, owing to the way in which the upturned plateau rim is broken off short at the seaward margin; but it is structurally homologous with Arabia and Africa, and is partly isolated to landward by the Thar desert. We thus reach the conclusion that, if in Europe we are compelled to extend our frontiers southwards across the Mediterranean, in Asia, on the other hand, the traditional frontier should be moved northwards, so that Arabia and Peninsular India would lie outside the Eurasian land-mass, as determined by structure, and would help to form an Indo-African domain. From this re-arrangement there emerges a conception of a Eurasian continent built up of an enlarged Europe and a reduced Asia. The southern belt of this new unit is formed by a vast, complex, lofty system of mountain folds, which, though broken by deep depressions where earth-blocks have foundered, form the great ethnic and climatic "equator" of the Old World; but the frontier throughout, from Rio de Oro to Rajputana, is really the sands of the desert.

Foundering.

This foundering has been on the greatest scale in Europe, where the sea has flooded the sunk basins, and so the ocean and all its influences on climate and civilisation have been carried far inland, especially where Southern Europe has been given the priceless boon

of the great Mediterranean with its continuations and connexions. In Asia the sinking has been equally obvious, but on a smaller scale—even absolutely, much smaller relatively; and it has been much less continuous. Some of the sunken areas are covered with water, *e.g.* the Caspian Sea and Lake Baikal, where the lake-floor is 3000 feet below sea-level; but elsewhere, even if the area is itself below sea-level, as in the Turfan, it is either already dry or shrinking rapidly into a series of salt lakes. Always, therefore, in Asia the centres of such depressions tend to be, or to become, barren wastes, where water from the surrounding heights sinks into the parched sand, or is evaporated under the parching sun.

Unity v. Disunity. In Europe, then, whatever the nature of the hinterland, the centre of the depression is not a barren waste; it is generally water-filled, and its lake or sea is a link, not an obstacle; its margin is almost always well peopled, and its peripheral population approximates to a single type of civilisation. But in Asia the centre is almost always uninhabited and often uninhabitable, still less is there one type of population all round; the core is an obstacle, not a link; and the only signs of Man are found here and there on the lower slopes of the surrounding heights, where water can be captured and used before being lost in the desert. Here, therefore, at once we mark one note that is characteristic of the continent in many of its aspects—the note of isolation, aloofness, incoherence, in strong contrast with the unity, the gregariousness, the coherence of Europe.

Tethys Basin. What, in both cases, of the land to the north of the folded area? The essential fact is that, alike in Europe and in Asia, remnants of an old continent, the Angaraland of Suess, lie to the north, the Asiatic section being represented to-day by the upland core of ancient rocks which lies between the Yenisei and the Lena. Between the relics of this old northern continent of "Angaraland" and the great southern continent of "Gondwanaland"—which also remains now only in the form of the discontinuous units of Eastern Brazil, Africa south of the Atlas, Arabia, Peninsular India, and Australia—there once lay a great sea, which, before the formation of the present North Atlantic, extended westwards as far as the present Gulf of Mexico. Into this geosynclinal basin of "Tethys," or Indo-Mexican sea, was carried the waste of both the northern and the southern lands, and in Tertiary times mountain-forming movements took place over what had been its site. These movements of upfolding were accompanied by that foundering of earth-blocks, which gave rise indirectly to the present Mediterranean and to the depressions of Central Asia, while their direct result was the production of the mighty chain of mountains which runs right across the Eurasian land-mass. That

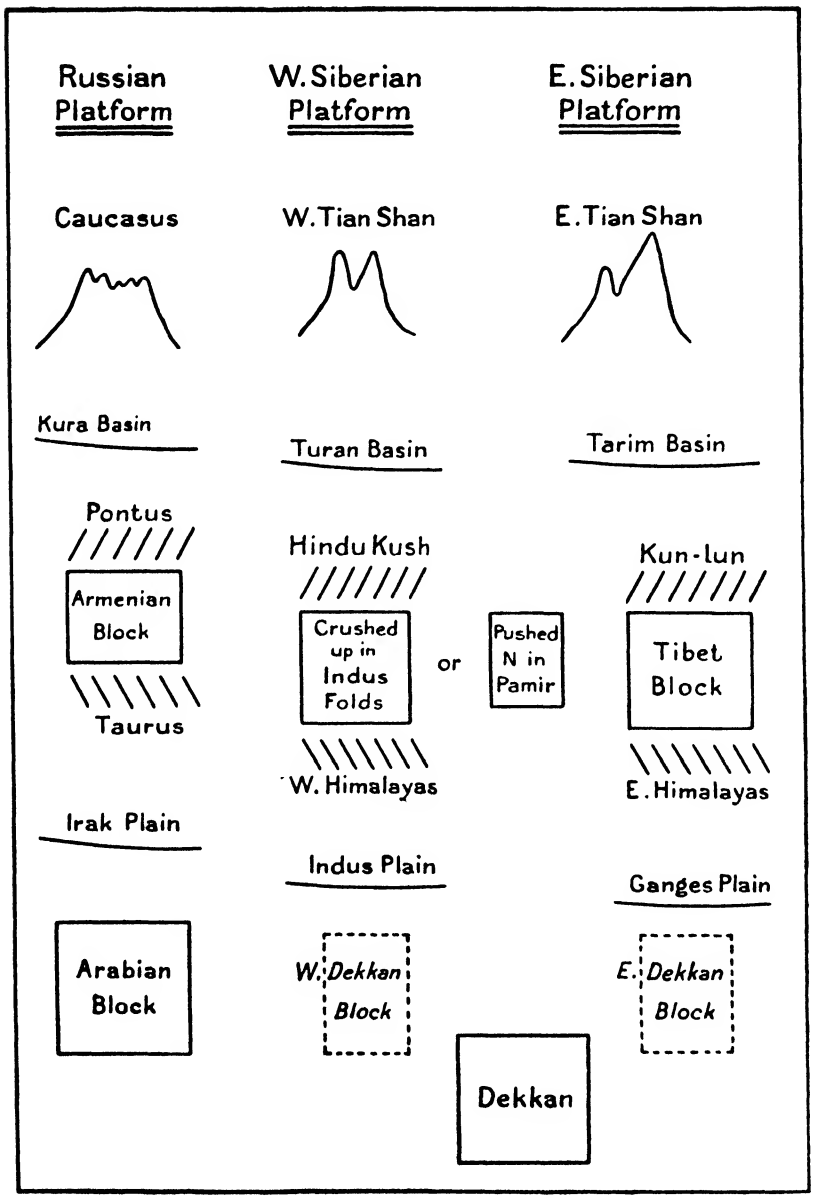

FIG. 5.—Blocks and buttresses.

is to say, narrow lines were folded up, while neighbouring blocks foundered, from the Atlantic to the Pacific.

Physical Geography.

Three features of the resultant distribution need further attention, as bearing directly on the differentiation of the continents. In the first place, the direction of the folds was—quite normally—controlled by the old Angara massif against which the earth-waves broke; then, one of their effects—to the east—was to join up the Arabian and Indian fragments of Gondwanaland to the northern continental area, thus forming the Asia of political geographers; but to the west the sinking of blocks between the northern and the southern folds was so extensive as to prevent a similar union between Europe and the plateau region of Africa, thus forming the Europe of political geographers.

Political Geography.

The result is of great importance. The Asia of political geography consists in great part of elements similar to those which constitute Europe—that is of a northern area of lowland containing remnants of ancient land-masses, and of a southern area of Young Folded Mountains containing and flanked by depressed areas; but Asia has a third element, consisting of fragments of Gondwanaland, and this gives the continent its characteristic extension by great terminal plateaus far into the tropics. At the same time, the peninsulas of Arabia and India, large though they are, are implicitly isolated, and have comparatively little influence on the articulation of Continental Asia; and most of the area in the tropics between the Red Sea and the Formosa Strait is not land at all, but water.

What, apart from these, are the chief contrasts between Europe and Asia in so far as geographical conditions are concerned? The notable contrasts may be regarded as due to four factors—(1) the size of Asia, (2) the height and width of its mountain belt, (3) its different relation to the sea, and (4) the amount of internal drainage.

Inland Drainage.

The last is very largely the result of the fact, already mentioned, that within the confines of Asia the foundering of earth-blocks in Tertiary times, though often sufficient to give rise to lakes and minor seas, was not on such a scale as to permit of the evolution of a Mediterranean like that which influences so profoundly the geography of Europe; but it cannot be divorced from the problem of natural aridity. In this connexion we need not distinguish meticulously between areas with no drainage and areas with no oceanic drainage, even if we associate the latter more with physical history and the former with latitudes in which the air is normally far from saturation. Both must be naturally limited to the land hemisphere and to large continents; and, as Asia is much the largest continent and wholly in the land hemisphere, it should stand first for both. But it is first for neither. Though its physical history is much more complicated and more catastrophic,

it has slightly less inland drainage than Africa, and, though it has actually more land along the Tropic, it has a considerably smaller rainless area. The average of several estimates (mainly Russian) gives us the following figures (in square miles):

	Inland Drainage		Rainless Area	
	Total	Percentage	Total	Percentage
Africa. .	5,500,000	52	4,200,000	40
Asia . .	5,000,000	35	3,400,000	24

Longitude. The most important aspect of the colossal size of Asia is in its notable extension in longitude. This is a primitive development typical of ages when the tendency to collapse was absent; a great extension in an east-to-west direction was a marked characteristic of all the early continents of the globe. Gondwanaland seems once to have extended, as Eurasia does now, over more than half the circumference of the earth—from Brazil through Africa to Australia, and it was only the foundering of intermediate blocks on an enormous scale that subsequently gave the southern continents their separate existence and what is now their characteristic north-to-south direction. Asia, though its extreme longitudinal extension without Europe is less than half the total circumference of the globe, still stretches through 164°, and may be justly said to retain in this respect a primitive feature.

Latitude. This longitudinal extension of land on a globe where the extension of water is typically latitudinal, and where the regular winds tend to blow from east or west, means that the interior is remote from sea-influences, whether climatic or commercial; and this is specially true where the continent lies wholly outside the tropics, *i.e.* where the regular planetary winds are from the west, and so blow from off a relatively narrow ocean. In any case, the total area of land in Asia that lies within the Tropics is only 24 p.c. of the aggregate. Asia suffers, then, from continentality, although to some extent it resembles Europe, and differs from Africa and Australia, in having a complex and fretted coast-line; and the great latitudinal extension of Asia (through some 78°) necessarily spoils the comparison with Europe.

Coast. Two further considerations convert the comparison into a contrast. In the first place, for its size, Asia has not a long coast; its ratio of square miles of surface to linear miles of coast is about 500 to 1, compared with less than 200 to 1 in Europe, and not much over 400 to 1 in the Americas; and nearly one-fifth (*c.* 7000 miles) of this coast is on the Arctic Ocean and, therefore, commercially useless for nearly all the year, and with the climatic value of land.

The eastern seas, also, are storm-swept [1] and unsheltered; some of them are ice-bound every winter; and all are little fitted to tempt the early navigator, as the Mediterranean gulfs and the Norwegian fiords tempted him.

Atlantic Influence.

Here then we have another notable contrast between Asia and Europe; here is the origin of one marked feature of its history

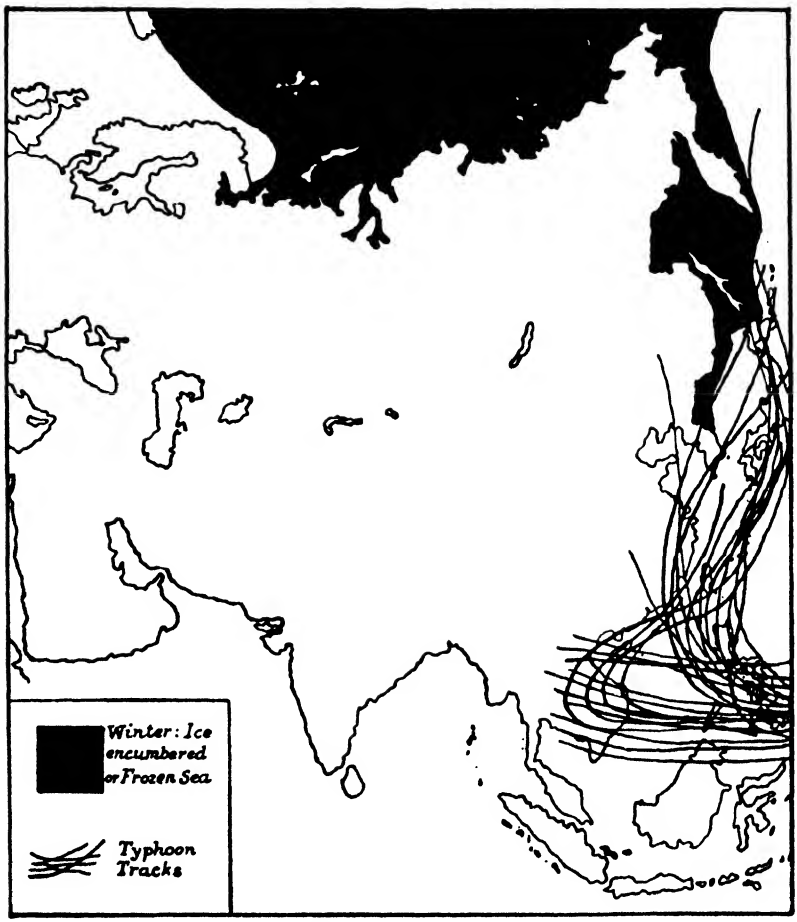

FIG. 6.—Extent of the ice-bound sea and main typhoon tracks.

and political development. From the warmth-giving and rain-bringing Atlantic it is shut off by Europe; no pocket of the ocean

[1] The typhoon season includes the whole of autumn, and the maximum fury is in those areas outside the equatorial belt where the island fringe has its maximum development. The Indonesian exploits were in more sou hern latitudes

penetrates deeply into its interior, extending the maritime climate far into the land, and so encouraging free communication and that exchange of ideas and products which is so favourable to civilisation; no unfrozen fiord coast has bred a hardy race of fishermen and navigators, prepared to launch out boldly on the unknown ocean. Here, generally, on the contrary, the ice-blocked or storm-ridden sea is truly "estranging" in its effects; it separates peoples, instead of linking them, as it has done so markedly in the west.

Let us turn next to the effect of the mountain chains! In Europe, the mountain folds swing round the old cores of the continental axis in great curves; they rebound, as it were, from one old block against another, which repels them in its turn. But, partly on account of the extensive foundering, partly on account of the severe glaciation of the Ice Age, partly on account of the essentially Alpine ("Peak and Pass") character of the sky-line, the mountain belt of Europe has not, historically, formed a great obstacle to north-and-south traffic. The existence of the narrow passage of the lower Rhone valley, the ice-worn passes, the way in which routes along the rivers of the plains can be followed to their origin in the mountains, and then on across an easy col to another plain beyond, all these factors combined to make cross traffic possible from very early times, and resulted in a profound mingling of Mediterranean and northern civilisations. Think even of the age of that juvenile track known as "The Amber Route"! **"Peak and Pass" Sky-line.**

In Asia it is quite otherwise. The changes of direction in the mountain folds have taken place on a far vaster scale; the mountains themselves are much loftier—two miles loftier; above all, between the great ridges lie plateaus or deserts—generally both—which are a far greater obstacle to communication than even the mountain chains. After all, a mountain chain can be tunnelled, but a plateau scarp must be climbed. In Asia, therefore, the marked relief, no less than the seas, has separated peoples, and has contributed largely to that development of isolated, indigenous civilisations, which is so marked a feature of the eastern, as contrasted with the western, segment of the Eurasian land-mass.

That is a dominant feature of Asia viewed from inside, but from outside we are presented with a very different impression. The wider World-outlook suggests that, though size and relief and climate have, all and each, been isolating agents internally, location has been a linking agent externally. If we regard the Pacific as the great divide, and think of the land of the World as grouped really round the Atlantic link, no other continent can compare with Asia in accessibility and World-connexions; no other peninsula on Earth can match, in its story, Anatolia, "the Land of the Dawn." Every other continent owes to Asia practically all its domestic **World Outlook.**

animals,—all its best food-crops except maize and potatoes, and perhaps even maize,—its letters, its numerals, and its dominant languages,—and its privilege of choice between the three great monotheistic religions that have been vouchsafed to Mankind.

Two illustrations in some detail may emphasise this fundamental dominancy of Asia, and they may usefully be taken from spheres as far apart as possible, the distribution of primeval Man and the ocean transport of to-day.

Man. Most of the experts seem to be agreed that the race-home of primeval Man was in that hinterland of the Arabian Sea much of which was itself, down to Tertiary times, a stretch of sea between the two Mesozoic—and even Palaeozoic—islands of Arabia and the Dekkan. For, as Professor Scott Elliott has insisted, very few regions in Pliocene times could have combined all the essentials necessary to promote that concurrent and simultaneous development of body and brain and character which is implied in the Birth of Man. Practically, there was only one such place, and the combination could only act once—in Western Asia and in Pliocene times, Man being the culminating product of the "Age of Mammals."

From this pivot, which we may probably locate not far from the traditional site of the Garden of Eden, our generalised ancestors—of a somewhat Piltdown type—radiated over all the Earth, as the three great monotheistic religions did in later ages; and we can trace lemur and anthropoid ape and primeval Man, through the haunts of gorilla and chimpanzee and Congo pygmy, to the southern edge of the old Gondwanaland, and through the haunts of orang and gibbon and Malayan pygmy, to its eastern edge. But it is worthy of note that only the two groups which matured into the Negro and the Australian types, moved southward—respectively, of course, south-westward and south-eastward; and in each case this seems to have led them to a domain where relative, if not positive, deterioration was an immediate or an ultimate certainty.

Movement Northward. All the other groups moved northward, three of them immediately, and the fourth ultimately. The latter at first moved due west, so remaining in practically the same climatic conditions as those of the common home, the forest environment of the Arboreal Primate; and perhaps this helps to account for its unique progress, so that for several thousand years it was far ahead of the other groups. But, as it came into the Mediterranean region, forest died out, or dried out, because summer rain gave place to summer drought; and, probably, the first great impulse towards movement northwards for any of this Mediterranean group was due to over-stimulation by the bright light of the dry summer.

Three Groups. The other groups seem to have moved northward before fanning out in three directions, and were eventually concentrated in three ice-ringed basins, which we may call, approximately, Mongol,

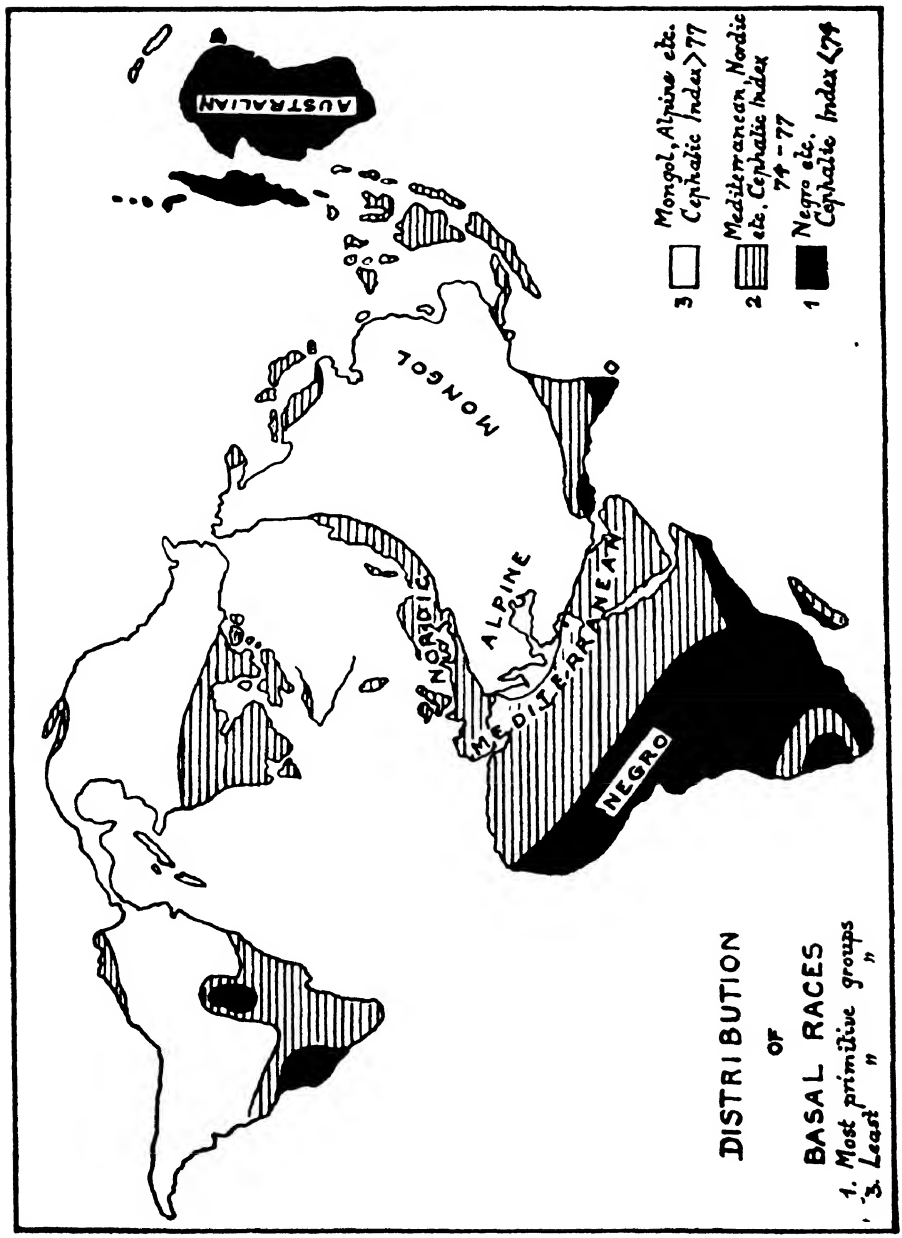

FIG. 7.—Distribution of Man (based on Griffith-Taylor).

Turki or Turan, and Caspian or Sarmatian; and, while thus isolated, they matured into what we call Mongol, Alpine, and Nordic types. In each case the western or Atlantic ice-wall of the basin melted before the eastern, and the farthest west would melt first; and so the Nordics would move earliest, and the Alpines would move in more southern latitudes than the Nordics, *i.e.* south of the Caspian. The eastern group had more chance of moving towards the Pacific than towards the Atlantic, and actually sent out a branch—perhaps tinctured with Alpine elements, for Alpines reached Japan—across Bering Strait into the Americas. So Asia has peopled the world.

Massacre of Fools.

But this has been done mainly *via* her peninsula of Europe, and the advantages of Europe were three—its small area, its nearness to the Atlantic, and the consequent large percentage of ice-covered surface in the Great Ice Age. For the native flora and fauna were simply decimated, thus affording Early Man great facilities for showing his unique powers of adaptability, and causing that "Massacre of Fools" which guaranteed rapid progress subsequently. In Gondwanaland there was *no* Pleistocene Ice Age, no such decimation, and no such progress for the quick-witted survivors.

Land *v.* Sea.

The aspects of this pre-historic development that have had most effect on Asia—and on the World as a whole—were associated with what is now one of the most sparsely peopled regions in the World, because it is in the drought-scourged core of the vastest land-mass; but dense population has become largely marginal, not only because heavy rainfall tends to be more or less marginal, but also because—though Man lives on land—he does the mass of his business on great waters. Here, again, size gives Asia such intimate World-relations that she becomes commercially the most important continent in the World so far as great routes are concerned.

Suez *v.* Panama.

In the south-west corner the typically Asiatic, desert-girt, sunk basin that forms the Suez route not only gives one of the most important inter-oceanic links in the World, but also carries the Great Circle from New Zealand to Nova Scotia, thus making the northern terminus of the Cape-to-Cairo route the strategic focus of the British Empire. In the south-east there is an almost equally important politico-economic focus. For the shortest route from the Panama zone, the other great inter-oceanic link, to the great Monsoon lands of our empire is by a Great Circle which touches San Francisco, and skirts both Japan and China, bringing Shanghai 1400 miles nearer to Panama *via* Yokohama and Vancouver than *via* Guam and Manila, and New York nearer than London to Yokohama and Shanghai; and the same progress in the science of navigation which has made it possible to follow a Great Circle regardless of winds and currents has also removed the economic focus from its old home

at Batavia to the British Island of Singapore. For the Malacca Strait is even more unfavourable to sailing vessels than Batavia was favourable — with N.E. and S.E. Trades, and N.W. and S.W. Monsoons, converging on it from China and Australia, from India and Mauritius.

Immense Distances.

There remain two or three features of the fold-lines which have had much influence upon the general physique of the continent. In the first place, the great distance (40° N. and S.) between the northern, or Angara, block and the southern, or Gondwana, block, as compared with the small distance (20° N. and S.) between the various blocks of Central Europe on the north and the great African blocks on the south, has permitted the Asiatic folds to develop more freely than the European ones. Thus, over a large part of the continent, the mountains of Asia are remarkable for their rectilinear direction over wide spaces, and for the width of the folded zone; the Alps lie between 6° and 10° E., the Himalayas between 70° and 90° E. In the second place, the position of the Angara and the Gondwana blocks in relation to each other has caused terrific constriction of the "natural" width of the folds where the two massifs approach each other most closely, in the region of the Pamirs; but eastwards of this point the complex, unimprisoned chain spreads out like a fan, its constituent elements having their directions modified by various minor earth-blocks in China, Farther India, etc. The result is to form an enormous area of elevated land, which shuts off India, with its special world-old civilisation, from the densely peopled plains of the other old, civilised area of Asia in China. Thus even to the east, where no normal desert intervenes between sub-tropical and tropical latitudes, we have the same story of isolation as is typical of other parts of Asia.

Lack of Symmetry.

Another very noticeable feature of the Asiatic folds is the tendency for the separate folds of a range to run alternately and not symmetrically, so that a normal pair of parallel arcs, whether convex or concave, is replaced by a pair, one of which is convex and the other concave. That is to say, there is what we may call a definitely *Asiatic* tendency for the folds to approach one another more or less closely at "nodes," and then to separate again, leaving a hill-girt basin between two separate ranges of mountains. Such basins are so frequent in Asia that they may be called a normal feature, and they stand at all levels. What follows? Partly because of the great height of the mountains, and partly because of the low rainfall of inner Asia, the streams which pour down the mountain sides rarely find a way through or over the basin rim; and thus the basin becomes an area of internal drainage. Further, when the mountains are high, not only does the basin tend to become difficult of access, but its rainfall may be exceedingly low;

and there is always a tendency for such basins to become deserts, whatever the height at which they stand. Of course, the Volga is an example of a European river that never reaches the ocean, but climatically south-eastern Russia is Asiatic; and it is true generally of Europe—true wholly of Western Europe—that any drop of

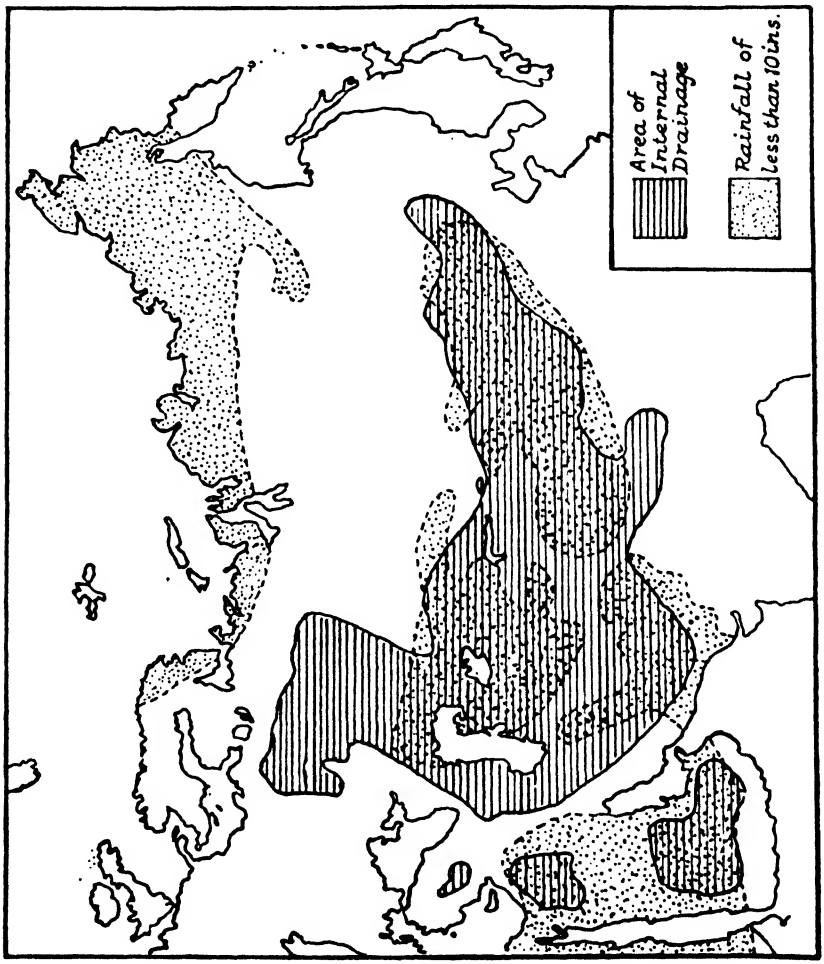

FIG. 8.—Areas of internal drainage and of a rainfall less than ten inches.

water which falls on the land may find its way to the sea. In other words, in the folded zone of Europe there exists no such tendency to the formation of closed basins, whether desert or not.

Isolation. The Plain of Lombardy might have been such a basin, if the sinking of the Adriatic had not given it an outlet to that sea; and

the Plain of Hungary may seem at first sight almost as mountain-ringed as the Tarim or as Central Persia. But the Danube has found strength to break through the mountain rim at the Iron Gates, and thus carry the water of the plain to the sea, while the formation of the Adriatic has narrowed the mountain rim to the south-west, and this narrowing enables the trade of the basin to rise, as it were, over the lip of the basin, and find an outlet by the ports of Trieste and Fiume. For Central Persia and the Tarim such solutions of the difficulty are impossible. In a word, that isolation of the separate parts of Asia, which is produced on a grand scale by the nature of the mountain folds, is repeated on a small scale, and even accentuated in detail, by the structure of the mountains themselves; and where relief is least adverse to movement, vast distances and the type of man bred by the barren steppe were factors eminently favourable to further isolation.

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These short lists are not intended to be in any way exhaustive, but only to suggest what seem to be the most stimulating of recent contributions to our subject.

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CHAPTER II

BROAD OUTLINES OF RELIEF

Relief Basis.

IT may be taken as axiomatic that the only sound basis for a geographical classification of land-forms is present relief; where relief is similar, we should link together, and where relief is different, we should differentiate. No doubt, such similarity or difference is, as a rule, intimately associated with similarity or difference of geological age and physical history; and genetic description is an immense aid towards making a true picture.

It is obvious that different agencies will shape different landscapes out of similar material, and similar agencies will shape different landscapes out of different material; but certain assumptions may be made, *e.g.* that homogeneous granite or chalk will always tend towards "rounded" surfaces, and ice will always cut in a different way from water. Our first business is to describe, and we can describe present form in terms which show, or suggest, how this form was produced; and this not only helps greatly towards making the description clear as well as true, but also gives us a right attitude of mind in approaching the area—even if that means no more than knowing generally the kind of landscape, the rough percentage of highland and lowland, etc.

Initial Picture.

Thus, we approach an old block, such as the Kobdo-Vitim plateau, more or less confident that it *must* be more or less maturely dissected, especially on its rainward scarp, and that its easiest lines of literal approach *must* be from the rainward west—up the relatively broad valleys of relatively graded rivers. On the contrary, the coastal plain of the Ob suggests a picture based on material laid down by a river in a sea,—on the persistence or encroachment of the sea in long branching bays,—on a great mixture of materials which *must* be very fertile if the area is not waterlogged.

Before one has finished enumerating the details, the picture is already clear and true, explaining itself; it will rise in one's mind at a moment's notice without doubt or difficulty, so that there is no burden on one's memory. And this is becoming steadily more important, as population tends to concentrate on small areas of mineral

wealth, and to need water-supply, etc. In other words, structure and physical history are entering more and more into our primary geographical pictures.

"Control." But it is not the concern of geography to sketch the chief phases in the structural history of the earth, nor is it legitimate to accept such a basis for the classification of present relief. Geographically, the vital consideration is the control exercised by the particular feature; we must—at least, for some important purposes—link together elements which exercise similar control, *e.g.* an Alpine range and a block ridge that is narrow enough to be tunnelled, and must distinguish between those which exercise different control, *e.g.* an Alpine range and the scarp—however highly dissected—of a great plateau.

Size. Before applying this principle to the general relief of Asia, it may be useful to emphasise the obvious pre-eminence of the continent in the two primary relations of size and altitude. It is, of course, much the largest continent in the World—four times the size of Europe, half as large again as Africa, larger than North America and South America put together, covering one-third of the land-surface of the globe; and the geographical control is exhibited as appropriately in the size of the political units as in the inevitable drought of the interior. Russian Asia alone is nearly twice as large as Europe, and Siberia alone is half as large again as Canada or the United States or Brazil; and many thousands of square miles in middle latitudes have an annual rainfall of under five inches.

Altitude. In altitude, again, Asia stands apart from the rest of the world —with an extreme range of about 30,000 feet, the culminating peaks being a mile higher than those of the Andes and the Rocky Mountains, while a large proportion of the whole area is above 5000 feet. And the consequent control is exhibited as appropriately in the variety of relief environment for Man as in the profound extremes of temperature. Sailor and shepherd, mountaineer and market gardener, and representatives of every other occupation, all can find congenial homes; and the extreme range of temperature in one place is that between ice and boiling water, while between Jacobabad in summer and Verkhoyansk in winter it is 220° F.!

Plateau Nucleus. The compelling feature in the relief of Asia is not, however, its unique altitudes. These, indeed, compared with the area of the continent, are relatively small; and many of the lower peaks, *e.g.* Lebanon and Adam's Peak, Ararat and Fujiyama, are so set that they make a much greater impression than the giants do. The compelling feature is the gigantic development of plateau, the generalised axis of which extends over some 9000 miles between the Aegean and the Bering Strait, while its widest cross-section—

between the Tarbagatai and the Liang-Shan (" Ridge Mountains ") —approaches 2000 miles. Its pivot is the Pamir (37° N., 73° E.); its waist is to westward in the 300 miles between Balkh and Peshawar; and westward again, in the 600 miles between Sarakhs and Sibi, it has a route offering no serious obstacle whatever to railway traffic between Europe and India.

Pamir Pivot.

This mighty plateau system, which occupies nearly two-fifths of the whole area, forms the essential nucleus of the continent; and the Pamir pivot divides it into two natural units—a lower, narrower, smaller western series, lying between the Aegean and the Indus valley, and a higher, broader, larger eastern series, lying between Bering Strait and the Ganges Valley. The bulk, the breadth, and the height of the system condemn it to a scanty population, mainly of pastoral nomads, and make it a tremendous barrier between the continuous Arcto-Atlantic lowland and the discontinuous Indo-Pacific lowlands. Its " Mohawk Gap " is in the Hari Rud valley.

It appears that, in the physical history of Asia, the mountains radiated from the great plateau core towards the Indo-Pacific ocean in obedience to an under-thrusting of the ocean-floor, which is reflected most clearly in the marginal arcs; and so towards the Pacific we find the marked broadening of the highland. Moreover, eastward of the longitude of the Pamir the broadening belt to the north is not Alpine, not even recently folded at all except for some small flanking ranges.

General Plan.

Each great lobe of plateaus lies in terraces of different level,—is edged by lofty bordering heights,—and is flanked by an "Alpine " zone; and each terrace is ribbed by sierra-like ridges, and usually marked off from its neighbour by border heights, so that the prevailing landscape is of a basin character. But, while the Western Lobe is mainly composed of more or less recently folded rocks, this is true of the Eastern Lobe only as far North as the Altai-Nanshan line; north of that, as east of it, recently folded rocks give place to rocks folded in ancient geological epochs. Moreover, while the brink of the Western Lobe drops abruptly to lowlands or the sea, *e.g.* in the Elburz and the Pontus, the Taurus and the Lebanon, the Zagros and the Sulaiman ranges, that of the Eastern Lobe is flanked—except above the Hindustan lowlands, where the two lobes meet—by high plains (1000–2500 feet). Except, too, in one place these plains maintain for 4000 miles on the north-west a curiously even longitudinal width of about 400 miles, but on the south-east they vary considerably; and exceptional expansion in the west—in the 750 miles westward from Lake Baikal—like exceptional contraction in the east—in the 100 miles westward from the Chihli Gulf—lies along a line drawn through Peking and Irkutsk. And this line, though naturally much inferior to the Afghan waist

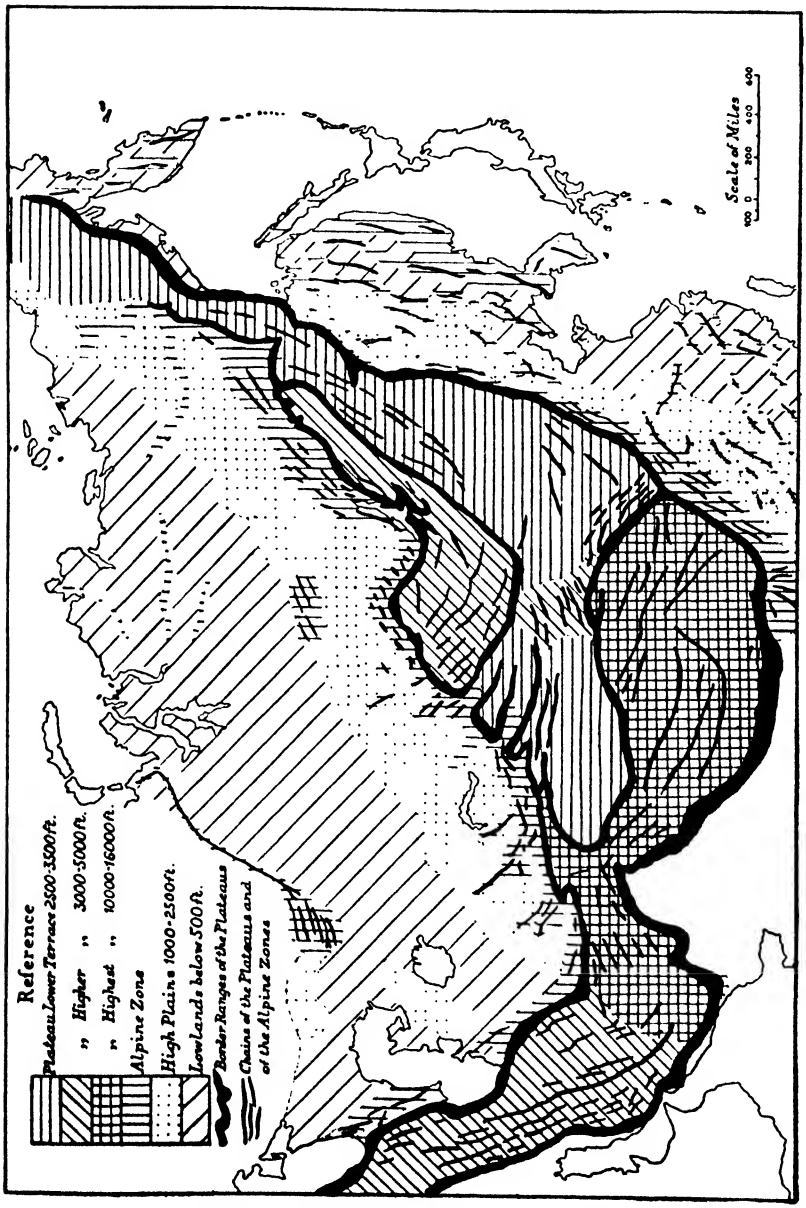

FIG. 9.—The Orography of Asia (based on Kropotkin).

—to-day, if not 3000 years ago—in geographical advantages, has been for centuries a busy thoroughfare, while the Afghan waist is still a deserted wilderness.

Eastern Lobe. The great Eastern Lobe occupies nearly a quarter of the total area of Asia, and it is distributed in three distinct levels. The highest, or Tibetan, level (10,000–16,000 feet) includes the Pamir, but otherwise lies entirely south of the Kun-lun, Altyn Tagh, Nan-shan line. The intermediate, or Kobdo-Vitim, level, which certainly does not average more than 5000 feet, lies mainly north of the Chinese Altai and west of the Yablonoi, ending in the Aldan plateau; but, just as Tibetan levels protrude north-westward in the Pamir, so these intermediate levels protrude south-westward in the Pei Shan plateau—with its "Flaming Cliffs"—between the Tarim and the Gobi depressions. The rest of the area, *i.e.* more than half the whole lobe, lies—at an average height of not more than 3000 feet—between the Altai and the Kun-lun in the west, and between the Khingan-Stanovoi and the Yablonoi scarps in the east, with the greater elevation in the west.

Its Scarps. In both lobes, however, especially in the eastern, it is quite typical that the Arcto-Atlantic scarp should have been weathered by ice and rain and wind into broad longitudinal trenches of gentle gradient, *e.g.* in the Zungarian basin north and south of the Tarbagatai, especially in the Irtysh valley [1] above Lake Zaisan (cf. the Ili drainage into Lake Balkash), and that the Pacific scarp should present almost a blank wall to the eastern plains, especially in the Khingan. The Amu, the Syr, the Chu, the Ili, the Irtysh, the Ob, the Yenisei, the Selenga, the Vitim, all supply more or less easy gradients of this kind up on to the plateau; and the Selenga-Uda valley is already followed by the Trans-Siberian railway between Lake Baikal and Chita, as the upper Amu and the upper Syr are by the Bukhara and Ferghana lines. No railway as yet threads either route through the Zungarian "Straits"; but they, too, have been thoroughfares for ages. Both routes have exceptional areas of water—relics of the days when Lake Balkash extended eastwards through the Kili (now dry), Sissyk, Ala, Ebi lakes, known as "kul" to the west and as "nor" to the east; and the Ili route *via* Kulja and Manass, Urumtsi and Barkul, was as obviously the right route to Sian and Hankow, as the Black Irtysh route through Zaisan Nor *via* Kobdo and Ulyasutai (or Urga) was to Kalgan and Peking. In the east, on the contrary, the 1400 odd miles of what we may call generally the Khingan scarp (35°–55° N.) are broken only by the Amur (-Zeya) and the Hwang-ho; and the value of the latter breach may be judged from the fact that the Great Wall of China runs across it! It adds to the importance of the relatively

[1] Jenghiz Khan's route to Europe.

easy " Atlantic " approach in the north that there the width of the higher terrace does not exceed 200 miles, and that in the Yablonoi region block-ridges between two rift valleys are sometimes so narrow as to be easily tunnelled—an aid to traffic that is normally confined to real Alpine folds where the obstacle is of any height.

Monotony "Control."

In all parts of this great Eastern Lobe there is—quite apart from the Border Heights—a considerable variety of level, and the lines of both elevation and depression have a markedly east-and-west trend, *e.g.* on the Tibet plateau in the Kanghin and Dangla ridges and in the Sin-kiang trough in the Tarim and Turfan sinks; but north of the Altai-Nanshan and east of the Arcto-Atlantic scarp even the heights show no typical Alpine or pseudo-Alpine variety of outline or climate, and so there is little variety of flora and fauna, *i.e.* of environment for Man, especially on the non-Atlantic slopes. This monotony of human environment is associated locally, if not causally, with a most marked monotony of human type, which might conceivably be held to discount danger to the World from the Yellow man. It is even conceivable that somewhat similar, though much less stringent, natural conditions in North America, and the conscious equalising activities of the White man there, may presently diminish the American predominance in enterprise and invention.

Border Heights.

The only break in the paralysing monotony is in the sharp separation, marked by the Border Heights, between one plateau and another, one terrace and another; and even this is, of course, much more remarkable from below and outside the limits of each terrace than from above and within them. And it was doubtless this fact that made Kropotkin give the name of " Border *Ranges* " to all the upturned ridges of the terraces. With further knowledge, we may suggest that in this northern part of the Eastern Lobe we should use the term " Border *Heights* " of both the edges of the lobe (or series of plateaus) and those of the separate terraces, and reserve the term " Border *Ranges* " for the Alpine ramparts to the south. At the same time, we must remember that the " Border Heights " and the plateau ridges to the north are sometimes so high, and so largely under monsoonal influences, that they are snow-clad; and their marginal valleys—at least in the west, where they all came very closely under the influence of the old " Ob Sea "—have been so deeply carved that the scenic effect from below is purely Alpine.

Western Lobe.

The Western Lobe presents the same fundamental features, but on a smaller scale and often in the opposite order. Thus, in strong contrast to the great feature-lines in the east, the generalised northern crest—in the Pontus, Elburz, Hindu Kush line—is higher, steeper, more continuous than the generalised southern crest—in the Taurus, Kurdistan, Zagros line; and the same is true of the Sulaiman crest compared with that behind the Aegean coast-land. But there is no marked separation between the different levels, though—again, in

contrast with the Eastern Lobe—the east is much higher than the west; and, of course, the extremes are not nearly so marked. Under the circumstances, we might expect that the monotony would be even worse; but in the greatly decreased area, there is even increased variety, *i.e.* less monotony in the human environment. Ararat is really more imposing than Everest. Above all, as the "Land of the Five Seas," the area has much better climate and much easier access to the outside world, advantages which have emphasised its importance as a bridge between Europe and Asia.

Great Plain. North-west of the great plateau shield of the continent the mass of the Arcto-Atlantic hinterland is, by structure and relief, a vast lowland, draining—like Canada—towards both the Arctic and the Atlantic; but, owing to the huge distances, the Turanian rivers, unlike the Canadian, do not reach the ocean from which they are still mainly fed. There are, however, some exceptions to this general statement as to structure and relief. For instance, in the Yenisei basin there is a large area of unfolded sedimentary rock of great age, such as is typical of European Russia; and there was in Tertiary times a wide outflow of basaltic lava, especially along the divide between the Archean and the Palaeozoic formations, which is followed by the Lower Tunguska from 60° N. to the Turukhansk confluence. Between the Lower Ob and the Lower Yenisei, too, a Mesozoic block causes the great westward detour of the Ob north of 60° N. to Beresov; and the Yenisei follows for a long way the line of differential erosion between the Mesozoic and the Palaeozoic. The Lower Lena has an exactly similar course, emptying—like the Yenisei—between Tertiary and Quaternary deposits.

Structure. At the same time, the mass of this Arcto-Atlantic hinterland is composed of quite recent alluvial and diluvial deposits, and its floor has emerged from under the sea only during the Quaternary epoch; indeed, the Caspian seals are still definitely "Arctic." The old conditions obviously favoured the formation of vast glaciers over the upper plateau levels, thus greatly accentuating the typical "Atlantic" weathering, and leaving glacial work much farther south to the east than to the west of longitude 90° E., especially in the Baikal "bay." The geologically rapid rise of this area must be taken into account in any discussion of desiccation in Central Asia during historic times.

Low Relief. Except in Central Siberia, where the ancient continental mass has not been submerged for ages, and where, therefore, we expect to find a more or less maturely dissected upland, the land is extraordinarily level and often absolutely stoneless, especially in the west, where the elevation is very slight. Even Semipalatinsk, 1000 miles from the Taz Gulf and 1500 miles from the Arctic ocean, is less than 400 feet above sea-level; and the lowland does not end at Semi-

palatinsk. By both the Kirghiz Gate and the Aral-Caspian Gate the Siberian plain is continued into Turania, as it is by the Ural-Caspian Gate into Europe; and the area between the three gates well deserves Mackinder's title of "The Geographical Pivot of History." The water-parting between feeders of the Irtysh and those Kirghiz streams which are lost in salt marsh, is the southern hilly frontier of the Akmolinsk and Semipalatinsk provinces—an extension of the Tarbagatai; and it is quite low except where the Tarbagatai (9000–10,000 feet) pushes out from the central highland. Though this coign of highland narrows the Kirghiz Gate, the whole area from the Persian scarp to the Taimyr peninsula remains, in

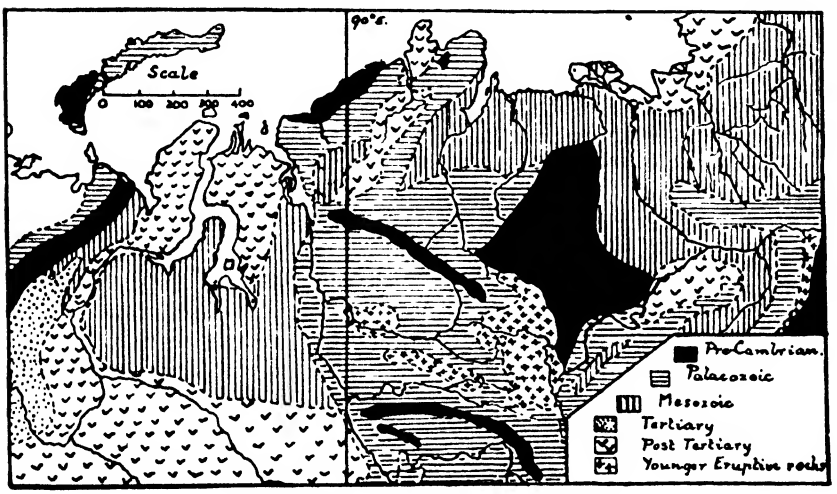

FIG. 10.—Geological sketch of Northern Siberia.

relief, a single surface feature; but the water-parting is a real divide in one respect, for Islam practically dies out upon it.

All these gates are really within the Kirghiz sphere, but the special name is given only to the lowland east of the Aral Sea. This was the historic route by which Kirghiz or Kalmuks drove a wedge into the Yeniseians, and divided them into two groups. Those driven northwards drifted eastward or westward as "Samoyeds" and as "Lapps," losing all their ancient "Minusinsk" culture; the rest took refuge in the forested upper basin of the Yenisei behind the Sayan and Tannu-ola ramparts, where they are known to-day by the significant name of Uriankhai, *i.e.* "Foresters." **Kirghiz "Gates."**

But, as we have seen, these vast plains mark the position of an old Arcto-Aral Gulf; and for long before the subsidence which admitted the Arctic waters as far south as the Caspian, the "West Siberian" area had been worn down to an almost dead level.

Physical History. While these plains formed the floor of that gulf, their surface could only be more minutely levelled; and, when they rose once more from under the waters, the movement was not accompanied by any disturbance of the planed surface. During the Ice Age, too, the climate was so dry that there was no ice-cap here; and so here there are no crumbling eskers or clayey drumlins or any other morainic relics to break the dead level, as they do in Finland and in Prussia.

Even this is not all the story; for the climate is still adverse to feature-making processes, such as we expect from running water. In winter practically the whole basin of each river is ice-bound; in spring the upper courses are freely flowing before the middle courses; and in early summer the middle courses are running free before the estuaries are open. Thus, there are constant floods, which cover the land for miles from each bank; and, with the consequent deposit of alluvium, the historic uniformity of the surface is steadily preserved, and even accentuated, right up into the Tundra belt.

Irak *v.* Hindustan. Of course, somewhat similar uniformity accompanied the soldering of the great terminal peninsulas to our Eurasian continent; but the area affected is relatively small, and human control of the Indus and the Ganges, if not also as yet of the Euphrates and the Tigris, has put a period to the process. Indeed, for various reasons the western trough has not been completely filled; for centuries little waste can have been carried into it from the Syrian and Arabian deserts, and the Armenian crown is both relatively low and drains to the Black Sea, the Caspian, and the Levant, as well as to the Persian Gulf. In strong contrast with these conditions the terrific waste from the mighty Himalayas is all concentrated on a single front. At the same time, though relatively small, the Mesopotamian and Hindustan lowlands are of great importance, for elsewhere the young folded mountains of Southern Asia come practically sheer up against the sea. The human importance, therefore, of the two exceptions to this must be immense.

Skeleton of Continent. The nucleus of the continent, as we have seen, is a great belt of plateaus, the northern edge of which forms a long arc from the Aegean to the Okhotsk Sea, while the southern edge is hung in festoons from the Levant to the China Sea. Throughout its longest extension due east-and-west, south of parallel 40° N., it consists of recently folded rock; and there is a more or less continuous spine of Alpine mountains from the Pontus *via* the Elburz, Hindu Kush, and Kun-lun, to the Tsin-ling. Both north and south of this spine there runs another series of heights, composed of the Border ridges and Border ranges of the terraces; and between each series and the spine there runs a belt of more or less alternate

block and basin. Between the spine and the northern line of heights, the conspicuous feature is the basin—*e.g.* the Black Sea, between the Pontus and the Yaila ranges, the relative depression of the Rion-Kura valley between the Armenian scarp and the Caucasus, the Tarim trough between the Tian Shan and the Kun-lun. Between the spine and the southern line of heights the conspicuous feature is the block—*e.g.* the Anatolian between the Pontus and the Taurus ranges, the Iranian between the Elburz and the Zagros in the west and the Hindu Kush and the Sulaiman in the east, and Tibet between the Kun-lun and the Himalayas.

Contrasts in Relations.

This essential contrast between the northern and the southern belts of the plateaus is, however, less important than the relation of each belt to the general character of the nearer scarp. Along the northern arc the blocks act as watersheds and the basins as

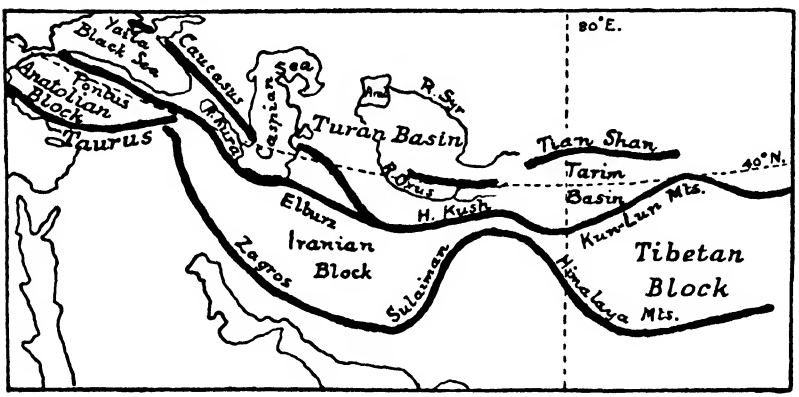

FIG. 11.—Blocks and Basins of the Central Mountain System.

lines of least resistance. The Altai is thus related to the Ob valley, the Sayan to the Yenisei, the Yablonoi to the Lena, the Khingan and the Stanovoi to the Amur; and the series is essentially longitudinal, the Baikal basin being balanced by the Okhotsk, as the Zungarian and the Gobi basins are by the Sea of Japan and the Tuscarora deep. In the south the significant feature is the looping up of the Alpine festoons round the northern apex of the blocks, *e.g.* of the Taurus and the Zagros round the Arabian block to overlook the Mesopotamian basin, of the Sulaimans and the Himalayas round the Dekkan block to overlook the Hindu basin, of the Annam and Tenasserim ranges round the Siam block to overlook the Menam basin.

Political Results.

In the north, then, we have just a huge continuous lowland, a more or less appropriate home for a single political unit, even if size must have greatly delayed political coherence; on the east, or

the foreign, side of this we have a relatively low scarp so weathered as to minimise the difficulties of approach from the west, or "home," side, and, therefore, very favourable for the expansion of the Slav eastward. In the south, on the contrary, the scarp is exceedingly high, lines of access to the interior are difficult and very rare, and the lowlands are not only discontinuous, but also cut off from one another politically and economically by mountains, deserts, and seas. The festoon-links, therefore, have become very important, especially in Armenia and on the Pamir ("The Plateau"). On the latter converge the gable-ends of the four great ranges—Himalayas, Kun-lun, Tian Shan, and Hindu Kush, thus giving to the "Plateau" its alternative title of Bam-i-Danya, "The Roof of the World"; and, as the climate allows the area to be a line of least resistance in peace and war, it was here that "the Three Empires" met—in relatively wide valleys where the snow is seldom deep and never packed, and where the dark soil heats up rapidly and greatly aids evaporation. Indeed, this is the refuge of the Kirghiz *in winter*.

"Bridges." This Pamir pivot, as a bridge-way between the Turan and the Hindu lowlands or between the Iran and the Tibetan highlands, is less than 600 miles across, *i.e.* about the same length as the Sarakhs-Sibi waist. The Armenian knot, as a bridge between the Caspian and the Mesopotamian lowlands or between the Iran and the Anatolian highlands, is not much over 300 miles, *i.e.* about the distance from Balkh to Peshawar over the Hindu Kush. Both are related to the critical parallel of 40° N., which marks roughly the site of Peking and Samarkand, Bukhara and Baku, Erzerum and the ruins of Troy.

Young Folds. To the west of the continent the great chains of mountains are a direct continuation of the European Alps, for the separating sunk basins are all "young"; but these are very important, especially the Black Sea and the Aegean, the latter having always been—from the earliest days of which we have any knowledge—a link, rather than a barrier, between Europe and Asia. When followed eastward, these chains make such changes in direction, as they swing round the old blocks, that we can make no useful general statement about their lie; but two things are worthy of note—the marked European trend east-and-west, and the marked Asiatic tendency to form elliptical basins. In Europe, as we have seen, such basins have complete, if circuitous, access to the ocean; but in Asia they are almost always basins of inland drainage with desert cores.

Alpine Spine. The great Alpine spine runs steadily eastward from the Pontic ranges, *via* the Elburz, Hindu Kush, and Kun-lun, to the Tsin-ling, always south of latitude 40° N. except for the first 500 miles; but even west of the Pamirs it is relatively unimportant except in the Hindu Kush, with its coal and iron fields and its destiny—according

to Dr. Trinkler—to be again, as it has been, the decisive factor in any overlordship of Asia. East of the Pamirs the spine has not a tithe of the importance attached to its two great wings—the Tian Shan and the Himalayas; but the Kun-lun is longer than the Himalayas, and has a greater average height, while the fact that the snow-line on its northern face seems to have *risen eastward* even in pre-historic ages, is suggestive as to the presence then of a large body of water to the west.

Core. The Tian Shan and the Himalayas may be considered the northern and the southern limits, as the Sarikol and the Pei-shan are the western and the eastern limits, of what may reasonably be called Central Asia—including in that term all the lands, whatever their character and climate, which are literally in the centre of inaccessibility in the continent. No doubt, nothing elsewhere in the world can rival Everest for height or Kanchenjunga as a spectacle, or the Karakoram block of mountains and glaciers with a dozen peaks higher than anything in the New World; but the Tian Shan is the true heart of Asia—in the very centre of that Aden-Okhotsk line which is said to be the divide between the Arcto-Atlantic "lowland-and-plateau" phenomena and the Indo-Pacific "mountain-and-plateau" phenomena of the continent.

95° E.-100° E. Between 90° and 100° E. Asia came under the influence of the Pacific, with its catastrophic origin and its narrow and mountainous hinterland; and the typical Atlantic east-and-west trend of the feature lines gives place to the typical Pacific north-and-south trend. The old "stable" trend can still be traced, *e.g.* in the Tsin-ling and Nan-shan ranges and in the middle courses of the Hwang-ho and the Yangtze, as in Java and the Sunda islands; but the new "unstable" lines are more conspicuous, *e.g.* in the Nicobar and Andaman islands, the Arakan ranges and the Khingan scarp, and all the Indo-Chinese rivers. Where latitude 40° N. crosses longitude 105° E., the Kara-naryn-ula also marks the generalised line of maximum meridional uplift; and from this line the land falls in typical terraces down to the Tuscarora Deep, successive belts being clearly marked by rapids on the Amur, the Hwang-ho, and the Yangtze.

N.E. Quadrant. Practically every feature of relief that is typical of Asia is illustrated to perfection in the north-eastern quadrant, which will need much detailed attention; but some general statements may be made about it. Once the actual line of the Yenisei course is crossed eastwards, we leave the very new for the very old, the very monotonous for the beautifully diversified. This diversity is associated with a complex structure as well as with relief, and we can divide the whole into a central upland and a hilly east. The upland, which lies between the Upper Yenisei and the Upper Lena, is unlike the western lowland in two respects—physical history and river trend.

It was never under any Tertiary sea, much of it never under any Secondary sea; the Upper Tunguska does traverse some Mesozoic areas, but mainly Palaeozoic and Archean, intermingled with volcanic patches. And its rivers do not follow the general slope of the continent to the north-west, but for a considerable part of their courses most of them agree in working north-eastward, in obedience to an apparent destiny in the Pacific.

E.-W. Line. Physically, this constancy of direction suggests that they are following primitive structural lines, such as can be traced, *e.g.* in the Vilui valley, as a continuation eastward of the Lower Tunguska; but the practical interest—climatically, politically, and economically—lies in the aid which this direction gives to east-and-west movement, *i.e.* towards access to and from the Pacific. It is partly the higher relief, with consequent decrease of swamp, but probably also, in part, climatic access from the Pacific, that extends the Taiga here both farther north and farther south, and so decreases the width of both the Tundra—which is quite immaterial, and the Steppe—which is a matter of importance.

Relief. Once the actual line of the Lena course is crossed, whether north-eastward in the north or south-eastward in the south, there is much more development of relief, especially in the great arc of Alpine ranges in the far north-east,—in the deep depression of which Lake Baikal forms the south-western extremity,—and in the pseudo-Alpine sky-line of the Border heights, the Yablonoi and Stanovoi—the "Cevennes of Asia." This region, at least for the greater part of it, is exceedingly old, and was the great block on which the earth-waves broke when the central folds were pushed up; and, as in Europe, it was too tough and too resistant to do anything but break, and then some blocks of crust sank, while others were pushed up. The "waves," which actually reached the "shore," were shattered into "breakers," while farther out "to sea" they remained unbroken "waves." So, here again, each morphological belt has its own topography—varying from apparent chaos to a simple swell.

Magnified Europe. Once again, apart from the southern plateaus, Asia is merely a magnified Europe, because both form parts—east and west of the same World unit, and the same morphological divisions have the same topographic details. But in the west the young folded mountains, *e.g.* the Carpathians, sink eastward to the vast uniform plains, while farther westward, *e.g.* in the Alps, they abut on broken plateaus, *e.g.* the Cevennes, or on sunk blocks, as in the Lower Rhone valley. In the east it is the vast uniform plains that are to the west, while eastward the expanded mountain belt breaks off above the Pacific deeps, or abuts on the fractured plateau round the Baikal rift.

Terminal Blocks. The two massive, peninsular, Indafrican blocks are separated from, or soldered to, the Eurasian continent by the discontinuous

lowlands of Mesopotamia and Hindustan; but, though in some of their features they are both typically Asiatic, they have been curiously isolated from the rest of the continent in almost every other way. In each, as in Siberia, there are large areas of basaltic lava, but otherwise the whole is of immense age; only the foundation rocks were ever violently folded,[1] the later ones simply lying on them in pockets almost undisturbed except by faulting; and both peninsulas are so large, and have such concordant and inarticulate coasts, as to negative entirely any typical peninsular control except their reaction to Sea Power in modern times. The third peninsula contains old fragments, but only fragments; it is relatively small, and most of it is of recent formation; and its relation to the Pacific is shown in its articulation, its relief, and its climate. It presents, also, as great a contrast to the other two in "control" as in structure, relief, and climate. The Malay may be Arab in creed, but is Polynesian in aptitudes.

We may divide the whole continent, then, into a minimum of five great physical units:

Natural Units.

(1) A vast mountain and plateau nucleus which widens eastward until it is almost impassable, but with two important "bridges" where Russian, Turkish, and Persian empires, and Russian, Chinese, and British empires have met in recent times, and with one important gully where Russian, Persian, and British empires have met; (2) a vast lowland of Atlantic type, sloping both northwards and westwards from the north-western scarp of the plateau nucleus; (3) a series of lowland valleys converging on the Indian Ocean from the southern scarp of the nucleus; (4) a Pacific hinterland falling in typical terraces from the eastern scarp; (5) three terminal peninsulas, of which two are large remnants of Archean Gondwanaland, and almost certainly included or enclosed the primeval cradle of Mankind.

Unity of Plan.

But behind this, at least, in what we may call "Old World" Asia, there is a fundamental unity of structural plan, dominated by primitive east-and-west lines and with its critical line again about 40° N. The sequence between the Arabian block and the Russian slab is exactly parallel with that between the Dekkan block and the Siberian slab; for the Armenian crown, with its young folded parapets, is repeated—on a large scale—in Tibet, with its Kun-lun and Himalayan parapets, while beyond the Rion-Kura trough the young Caucasian folds are built up against the Russian slab as beyond the Tarim trough the young Tian Shan folds are built up against the Siberian. Along given parallels, then, the structural element in the environment is practically identical in kind, if not in scale, while along given meridians it is similarly identical with regard to place relations. (See p. 13.)

[1] The coal basins show slight flexures, and have definite basin form.

Variety. Of course, uniformity of control is out of the question; the climatic differentiation alone would make any serious approach to uniformity impossible. Even on the Eurafrican flank, though the whole triangle north-west of our Aden-Okhotsk line may be condemned to drought in various degrees, this must be accompanied by extremes of cold in the northern half and extremes of heat in the southern; and, similarly, on the Indo-Pacific flank, though the whole may receive certain and sufficient rain, the south is likely to be associated with extremes of summer heat, while the east is associated with extremes of winter cold—a contrast beautifully illustrated in the inferiority "in coat" of Bengal to Korean tigers.

As the physical conditions of these Indo-Pacific lands are so much the more favourable to food-supply and consequent density of population, and yet the densely populated units are both remarkably isolated and widely different in their physical details, it is impossible to generalise about them as a whole, and unnecessary to make any separate survey of each; but we may profitably pay some detailed attention to the great diagonal belt, which is neither Arcto-Atlantic nor Indo-Pacific in character and development, for this will illustrate what is essentially typical of the continent, and will explain the historic isolation of the vital Indo-Japanese lands.

Human Note. But even in this diagonal belt we must differentiate between the natural sections, and must be guided by the human note in the amount of attention which we pay to each. Whatever the explorer, the knight-errant, or the record-breaker may do, the geographer must put the pass before the peak, for the human note is on the public road.

For that reason we must treat the south-western lobe differently from the north-eastern, and even the plateau parts of the south-western differently from its montane part; where the human note is at a maximum for the whole world, we may look into all sorts of even small details, while we may confine our attention simply to general structure and relief where the human note is at a minimum even for Asia. But the north-eastern half of the north-eastern lobe gives a wonderful picture of what is really typical of Asia in structure and relief, and gives this where there is practically no human note to distract our interest. In the south-western half of the south-western lobe, on the contrary, the human note is almost overwhelming; it reflects every age, every typical environment—from the Garden of Eden to the Garden of Allah, every vital aspect of human development—in civilisation and religion, in agriculture and craftsmanship. And its creeds and crafts and commodities have spread over the world; in every continent to-day many of the most valuable crops are derived from plants which seem to

have had their original home almost " within sight of the Mountain of the Ark."

Under such circumstances we not only may, but must, devote infinitely more attention to the details associated with the age-old Land of Story than even to the general features—however remarkable—of a storyless land.

Continuous Land.

Even this summary survey of Asia may be sufficient to convince us that we are dealing with what has a better right than any other land-mass in the world to be called a continent, for it is *continuous* on an unparalleled scale in both latitude and longitude; and this continuity must[1] make its climate purely " continental "—also to an unparalleled degree, and even beyond the actual limits of the continent. For, if a monsoon climate must be classified as genetically continental, any area with a purely monsoon climate—even islands such as Ceylon and Japan—may be justifiably included in what is intended to be specifically a study of continentality.

[1] The work of Dr. Brooks on continuity of area and changes of temperature demonstrates this mathematically.

REFERENCES.—KROPOTKIN, " The Orography of Asia " (*Geographical Journal*, volume xxiii., 1904); HOGARTH, *The Nearer East* (1905); HOLDICH, *India* (1908); LITTLE, *The Far East* (1905).

CHAPTER III

THE RELIEF OF THE SOUTH-WESTERN LOBE

(1) *The Terminal Plateaus*

40° N.
|
30° N.

THE towering ranges of the continent and its massive plateaus have more than local importance, and need more attention even as "Broad Outlines," for they are typical of the continent as a whole. Thus, the plateaus of this South-Western Lobe are, by relief or structure or both, exactly true to type; and the young folds include one of the great ribs of Asia. Indeed, the whole lobe suggests, by its likeness to the Mediterranean "lobe," another aspect of the World phenomena to which we have already paid some attention.

For, like the Mediterranean, it stretches over 45 degrees of longitude, and lies in two latitudinal belts. In the west the central line is not much south of 40° N.—one of the critical parallels of the World,—Madrid and Brindisi corresponding with Brusa and Tokat; in the east the central line is not much above 30° N., Tripoli and Cairo corresponding with Shiraz and Quetta.

Further, not only is the importance of the features more than local, it is also not confined to any one type of relationship, physical or climatic, political or economic. Indeed, in this case all four types are associated with the great spine of young folds which links up the 2500 miles between the Aegean and the Indus,—which was once, almost certainly, the Ethnic Equator in the differentiation of Man,—and which in 1913 gave frontiers to four empires, as it had done of old.

Natural Divisions.

The whole lobe belongs to the folded Alpine belt, but has three natural divisions; and neither as a unit nor in its divisions can it be entirely dissociated from the Gondwana block to the south of it. For the arc of corrugated crown in Armenia, the alignment of the Cilician Taurus, and the whole of the great Zagros system, are directly related to that; and two critical lines are related respectively to the link between Arabia and Irania—the one being the present 500-mile isthmus along 50° E. from the Persian Gulf at Dilam to the Caspian Sea at Resht, and the other being the old

350-mile isthmus from Resht to the original head of the gulf above Mosul.

The pivot of the lobe is this Armenian crown, which is flanked by the mountain plateaus of "Greek" Anatolia and "Persian" Irania, and faced by the block plateau of "Semitic" Arabia. The two flanks, though parts of the Alpine belt, are essentially plateaus in relief, and typically Asiatic; the pivot is montane. But the great spine of Asia runs right across the whole arc from the Pontus to the Hindu Kush ranges, lying to the north of 40° N. in the west, but to the south of it in the east; and even across the definitely plateau relief there are lines of elevation running generally east-and-west, parallel with the northern or the southern parapet. In the east these are not of vital significance, though they affect the distribution of population in Persia, and make guiding ramparts —in the Siah Koh and the Safed Koh—to the Hari Rud and the Kabul valleys in Afghanistan; but in the west the whole history of the Aegean coast is closely bound up with them. As a rule, however, only the actual Border ranges are really conspicuous, the Pontic and the Elburz, the Tauric and the Zagros, the northern line increasing in average height and in geographical importance eastward—to its climax and terminus in the Hindu Kush, while the southern line decreases into insignificance eastward—in the Makran range. **Feature-lines.**

In both the flanking plateaus there is a marked scarcity of coastal plains where the belt approaches any of the Five Seas; the Kizil Uzun (Safid Rud) gorge, north-west of Tehran, repeats that of the Kizil Irmak, north-west of Sivas, and Enzali and Resht are strictly comparable with Samsun and Trebizond,[1] except for the shelter given to the latter by the Caucasus. But the eastern area is the harder to approach and to enter, and much the harder to cross; indeed, the centre is filled by the twin deserts of Kavir and Lut, and this has caused a break in the human note such as is not found in Anatolia, though Roman "Asia" was bounded eastward by the central "desert." **Human Note.**

The same fundamental conditions lay behind the unity of political control by Turkey in the west, while the east was divided amongst three rulers; and, as Persia itself might really be divided into two by the Kavir-Lut basin, we may assume that the west must have geographically certain essential advantages over the east. At the same time, the political "unity" under Turkey was only unity of control, and concealed great variety and even disunity in several respects, the causes of which—even when not based on structure or relief or climate—date back to centuries long before the Turk was here.

From the geographical standpoint, however, the plateau half

[1] Trebizond, "Tableland," is a suggestive name for a port!

Plateau *v.* Mountain.

of the old Turkish unit must be divorced from the montane, and treated with the eastern plateau; and there is a historic as well as a physical justification for this. The Armenian crown is montane, with maximum heights latitudinally central and with marked longitudinal valleys, while on the Anatolian, as on the Iranian, plateau maximum heights are marginal, and the parallel valleys of the original structure have been filled up, and converted into a shallow central basin; and, historically, Anatolia has been closely associated with Europe and generally "Western" in outlook, while Armenia has been politically "Eastern" and economically a link between East and West. At the same time, Anatolia is the more typical of Asia physically.

The Western Plateau

Asia *Minor*.

Anatolia is a true Asia Minor, epitomising what is typical of the great highland nucleus of the continent. For it is a mountain-fringed plateau, with typical drainage problems, which are frequently exaggerated by the presence of very porous limestone, where rivers constantly disappear into swallow-holes (*duden*) and with a large area of inland drainage; and, as a whole, its conspicuous features are precisely the two belts of young folds which make the Pontic and the Tauric parapets, and the Axylon basin of inland drainage, with its core thinly covered by the salt waters of Tüz Göl ("Salt-Lake") at a height of about 2500 feet. Except for this central depression the plateau, as a whole, rises slightly, but steadily, eastward, especially east of the Kizil Irmak (Halys); and it narrows as it rises, from over 400 miles at the most to under 300 at the least.

Both to the Black Sea and to the Levant the parapets are typical Border ranges, coastal and concordant, with one foot up on the plateau and the other down at sea-level; and so we cannot expect to find either extensive lowlands or good ports along the seas, or to have good facilities for access inland from any roadsteads or artificial ports. The scarp must be climbed, and the minimum climb is 3000 feet.

Aegean Coast.

Of course, where these folds run out westward into the Aegean the case is quite different. There they present a transverse coast, and at once we do expect to find typical *ria* harbours. As a matter of fact, too, as the plateau sinks rapidly down westward by its most westerly "step" (*c.* 30° E.), the fundamental structure is not concealed, as it is eastward, by any later "cover"; and the slighter, non-marginal upfolds become quite visible, while the downfolds of the "step" have been deepened. The most conspicuous upfolds are the Baba Dagh (Latmos) and the Boz Dagh (Tmolus), and the most conspicuous downfolds are those of the Gediz (Hermes) and the Menderez (Meander) valleys. Westward from the foot of the "step" the rivers, naturally, deposit their burdens of silt, and

have built up rich flat plains, over which they wander in the way that has given us the word *meander*.

The Harbours.

This gives us a clue to the pre-eminence of this western coast over both the others. For these downfolds, with their *rias* and long valleys of gentle gradient, gave a series of fine harbours, with easy access inland and sheltered by the upfold promontories; and, though there was a time when the Cretan link with Greece made Rhodes at the southern extremity of the coast—as the shelter of Tenedos and the link with the Black Sea made Troy at the northern extremity—of supreme importance, ultimately supremacy was bound to lie with Smyrna, because commercially central and physically riverless—so that it could not be silted up, as Miletus was by the Meander and Ephesus by the Caÿster. And the supremacy of Smyrna, in turn, pointed to the Gediz valley as the route for rail-

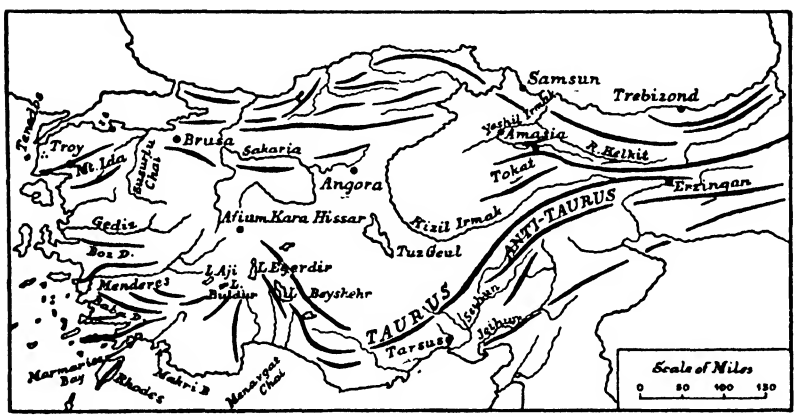

FIG. 12.—Feature-lines of Anatolia.

way connexion with the plateau (at Afium Kara Hissar), though the easier route was up the Menderes valley—past sleepy Laodicea. This was, however, the original caravan route; and the supremacy of Miletus was based on the ease with which, in its three ports, the caravan traffic of the plateau could meet the sea traffic of the Levant. For this purpose a position on the mainland was essential; and it is interesting that Miletus gave our European world its first geographers, its first historians, its first philosophers.

Concordant Coasts.

But, while the geographical conditions on this transverse coast are almost directly the opposite of those on the two concordant coasts, it does not follow that on these two they are identical; and they are not. For the whole plateau is tilted down to the north as well as to the west; and, while the folding energy in the north was spread over a series of folds, in the south it was concentrated on one or two complex axial lines. In the north, then, we have a broad

series of more or less parallel ranges, *en échelon*, making practically, if not structurally, a single long arc out into the Black Sea; in the south we have a narrow line, also *en échelon*, but crushed against the Gondwana block, and thus festooned in several short arcs out into the Levant. This results in one of the discordances which we have noticed as typical of Asia (cf. p. 21), causing alternate convergences and divergences; and stronger lateral compression involved greater vertical development, as weaker involved feebler uplift, even the Taurus dropping to 7000 feet where the plateau is broadest from north to south.

Drainage. From the tilt of the plateau we should expect water to gravitate northwards rather than southwards; and the presence of parallel downfolds in the north also involves the rivers in lengthy longitudinal reaches (where they are more or less navigable) with short transverse gorges, by which they drop into more northerly valleys, thus dividing the folds into a succession of ranges—a very important factor in any plans for the extension of transport between the plateau and the sea. This means that the rivers may attain considerable length, both the Kizil and the Sakaria being longer than the Thames, though rising within 75 miles of the Black Sea; it also means that the "steps" make access up the gorges difficult, and make the Pontic peaks look (from the sea) even lower than they really are, which is seldom over 8000 feet, though actually reaching 9000. On the contrary, the Taurus falls abruptly instead of in terraces or steps, and reaches 10,000–11,000 feet in both the east and the west; and so it looks (from the sea) higher than it really is, especially as its crest is more Alpine than that of the Pontus.

There is, however, one exception to this. For in the extreme north-west the frayed-out ends of the Pontic folds contain some lonely peaks, *e.g.* Olympus and Ida; and these look fully their real height, which is respectively rather over and rather under 6000 feet. The similar ends of the Taurus have been more resistant, and lonely peaks are replaced by landlocked bays, such as those of Marmarice and Makri, in the immediate hinterland of Rhodes.

Coastal Plains. In both cases, however, the descent is steep enough for the rivers to carry down heavy burdens of silt into the tideless seas, and the only lowlands along the coasts have been formed by these deltaic deposits. They are, of course, very fertile, especially where they contain volcanic elements; but they are a great obstacle to shipping, especially as they obviously block the approach to the only natural lines of access to the interior, *e.g.* by the Kizil valley from Samsun to Angŏra, by the Yeshil to Amasia and Tokat, and by its Kelkit tributary to Erzingan.

Cilicia. The Cilician plain is much the largest, and has certain advantages of position, access, and climate; but it is really three deltas, those of the Seihun and the Jeihun as well as that of the Cydnus,

which has converted the old harbour of Tarsus into a marsh. The joint work of the three rivers, too, has made a composite region, capable of being analysed into three distinct divisions—coastal marshes, a new coastal plain, and an old coastal plain. The last has been so vigorously dissected by natural agents that its roughness is more evident than its lowness, and it can scarcely be irrigated at all. Indeed, not more than one-third of the whole lowland (under 600 feet) is really useful. The Marmara lowland is fairly large; but here the Susurlu Chai has built up a Pontic downfold rather than deposited a delta. On the other hand, the Menavgat Chai, which is probably fed underground from Lake Beyshehr, is actually navigable for several miles; but it empties on the exposed side of the Adalian Gulf.

Plateau Lakes.

A somewhat similar process has obliterated the original relief of the plateau, for the whole core is the floor of an old lake, the relics of which—60 miles by 20, in winter—are now known as Tüz Göl, and they form the northern limit of the area of inland drainage. But this is rather complicated. For instance, towards the south-west there are some beautiful lakes amongst the foothills of the Taurus, *e.g.* Egerdir (2800 feet) and Beyshehr (3800), Aji (2600) and Buldur (2900), which seem to be obviously areas of internal drainage. Certainly, they have no obvious outlet; but some, if not all, of them must have subterranean access to the Levant, for they are fresh. This should give them a value far above that of the salt lakes of the really internal drainage.

The Eastern Plateau

Setting of Plateaus.

With the Anti-Taurus we leave plateau for mountain, and Armenia is strictly montane; but, with the Resht-Mosul "divide," we not only drop into lower latitudes, but return from the montane to the definitely plateau type. The general features and phenomena are essentially similar to those of Anatolia; but in detail there are several points of contrast, and some of these are vital. For this eastern plateau has three land fronts—to the Indian, the Turan, and the Mesopotamian lowlands; and, though it has also—like Anatolia—three sea fronts, the Arabian Sea has little or no local importance, and that of the Caspian and the Persian Gulf coasts has been minimised for ages. Nothing here in any way really resembles the Aegean coast of Anatolia, with its *rias* and its fertile valleys, its commercial and agricultural possibilities.

Relief.

The relief, too, is as different as the setting. Here the Border ranges are higher and more continuous, the folds are much more complex, the inland basins are much larger both positively and relatively, everything is on an exaggerated scale; indeed, the actual area (? 1,000,000 square miles) is four times the size of Anatolia as delimited eastward by the Anti-Taurus.

Economic Isolation. From the political and economic points of view the outstanding fact is that no other equal [1] area in Asia is so completely shut in by mountain walls or so completely cut off from its own sea-coasts and the neighbouring lowlands. This is due partly to the folds having been so free to develop that they keep the same general direction for hundreds of miles, and partly to the Border ranges everywhere being concordant with the surrounding low levels, whether land or sea. From the extreme south-east westward, then northward, and then eastward, there is a ring of rampart which for 2500 miles is not below 4000 feet; the Zagros belt alone averages 300 miles in width, and runs in an almost undeviating line from north-west to south-east for 900 miles.

Along each face of the plateau, too, the folds often bend back sharply on themselves (syntaxis), as though they had been forced to "dodge" some hidden obstacle; and, though this supplies some overstrained joints, where lines of least resistance for traffic have developed, it has more often only complicated the relief, *e.g.* by small basins of inland drainage.

The worst results of this have been in relation to the river-system. Where any rivers do reach the sea at all, it is by transverse gorges, such as we have seen in the Pontic folds, only more difficult and with more complicated alternation of lengthy longitudinal reach and short transverse "tang." The longitudinal valleys are often fairly open, very fertile, and well supplied with water from lateral tributaries; but they are cut off from their neighbours on each side by lofty and steep ridges, and yet the transverse gorge is often too difficult for a road or even a track.

The Zagros. The Zagros is probably more under-rated than any other mountain system in the world. It really includes the whole of western Persia, or as far east as the so-called Central Range—where the peaks still rise from 4000 to 6000 feet above the normal level of the plateau, *i.e.* to a total height of 11,000 feet above sea, with a few peaks—to the south—even approaching 13,000. To windward, *i.e.* the west, it is more dissected than in the drier east; and it is more complicated in the north than in the south, *e.g.* in the Zab and Diala basins than in the Karun basin. The average height of 8 or 10 parallel ranges seems to be about 10,000 feet, with peaks from 2000 to 5000 feet higher, especially in the Bakhtiari and the Faristan ranges; and in Kuh-i-Dina, from which the Karun flows, it approaches an extreme height of 18,000 feet. Yet not one-fifth of the Persian drainage finds its way out westward from this vast watershed.

The one serious break in the system is behind the Ormuz Strait, where the width is halved—a whole section of the older folds seeming to have been, so to say, transferred to the Oman side of the gulf—and where the consequent divergence of the (? central and the inner)

[1] Tibet is only three-quarters of the size.

folds has left the Bampur basin of inland drainage, with its "Sandy Desert." It was this halving of the great barrier that brought the port of Bandar Abbas into existence.

Khorasan Divide.

East of the axis of torsion, however, the folds draw together again in the Makran ranges, the downfolds of which give natural lines of movement to and from the Indus delta (cf. Alexander's route homeward), but there is a natural break on the Perso-Baluch frontier, where a 500-mile chain of heights running almost due south from Khorasan comes to the sea parallel with the Dasht and other river valleys. This chain forms the natural divide between the Lut and the Seistan basins, though neither the Afghan nor the Baluch frontier runs actually along the water-parting; nor does the Indo-Afghan frontier run along the line of subordinate heights which divides the Helmand and Zirreh series of "pans" (*hamun*, "a pan") from the series which ends eastward in the Kharan, fed from crests at least 12,000 feet high, *e.g.* in Kuh-i-Naushada.

Northern Ranges.

The northern ramparts are almost equally formidable, if in a rather different way. The Elburz-Paropamisus (Band-i-Baba)-Koh-i-Baba line is buttressed by the Balkan-Kopet Dagh line, at an angle which does give a line of approach from the Caspian—to Kushan and Meshed; and so, like the Zagros, it encroaches, except in the Elburz, far into the interior of the plateau. It also rises steadily eastward, except for the Hari Rud-Tejend defile, reaching nearly 17,000 feet in the Koh-i-Baba and over 18,000 in the Hindu Kush. More than half of Afghanistan is filled with this great system and its flanks, and so the Afghan and Baluch inland basins receive much more water than the Persian; but, except for the Kabul basin and the Sulaiman *wadis*, even here the whole area is one of inland drainage.

Inland Drainage.

The great mass of the Iranian plateau, then, tends to be an arid waste of inland drainage, probably aggregating 800,000 square miles, with all the climatic and other disadvantages of such areas. Apart from the five primary basins—Kavir, Lut, Bampur in Persia, the "Kharan" basin of the Mashkel drainage, shared by Persia and Baluchistan, and the Seistan basin of the Helmand drainage, shared by all three countries—there are thousands of *wadis* which maintain, seasonally or semi-permanently, hundreds of minor kavirs, *e.g.* the Great Salt Lake (Daria-i-Namak) between Tehran and Kum.

The Elburz.

While these are due mainly to the influence of the Zagros as a climatic barrier, the Elburz at least is of climatic importance, even if its political and commercial importance is greater. The great peak of Damavend (19,000 feet) is a volcanic cone; but the mass of the range has crests well over 8000 feet, and peaks rise to 13,000. Indeed, it would sever Tehran completely from the Caspian but for the difficult gorges of one or two rivers which do cut right

down through the range, *e.g.* the Kizil Uzen (Safid Rud) and the Hazar. As the gorges (*daras*) that drain the northern face of the Hindu Kush are even worse, one being 1500 feet deep and less than 100 wide, the only practicable approach for ordinary traffic in the north is round the ends of the Kopet Dagh wall, between the foot of which and the Kara Kum desert runs the Russian railway from Krasnovodsk to Merv and Sarakhs.

Access. As a whole, then, the Iranian plateau is a terrific barrier between the Russian and the Indian lowlands; and yet between Sarakhs and Quetta there is a natural line of least resistance along which there is no serious obstacle of any kind to the construction of a railway. That is to say, the easiest access to the plateau from both sides is along the same line, though Russia has access also in the extreme north-west *via* Julfa, and India in the extreme north-east *via* Peshawar.

Railway Routes. But this does not justify absurd estimates of the commercial advantages of such a railway, and still less the more absurd estimates about the alternative route *through* the Hindu Kush. The Russian and the Indian railway systems are certainly within 400 miles of each other here, and the cost of working the line—once made—should be less than that of one *via* Kushk, Herat, Girishk, Kandahar, New Chaman, etc.; but the shortest tunnel between the Kunduz and the Kabul basins would be full 13 miles, and its capacity would be small even if the metals were laid to carry the heaviest (military!) freight. The suggestion of "an immense through traffic which now of necessity goes by sea *via* the Suez Canal" is, of course, ridiculous; and to supplement the engaging fiction with the expectation of "a great trade development between Russia and India; for Russia is an immense consumer and India is a great producer of tea," seems an anti-climax, based on some miscalculation of the weight [1] of tea!

(2) *The Montane Centre*

Alpine Square. The two flanks present a marked contrast to what we have called the Armenian crown—a name which must not be allowed to suggest a circular area; for, as we have seen, this central section is purely montane, having been crushed by the convergence of its two parapets into a series of deep narrow valleys and steep narrow ridges. In its present form it is a square segment of the great mountain-system of the Old World, about 500 miles long and 500 wide, with an average height in the valleys of perhaps 5000 feet; and, though there has been much catastrophic interference with details of the relief, the area as a whole has this fundamental unity of genetic form. It has also a unity of function; for in all its most

[1] The total export to the whole world outside the Empire is less than 15,000 tons.

significant relations, political or historic or economic, it has been a bridge—quite literally, a viaduct.

Main Lines.

Four main lines of marked uplift cross it more or less arc-wise from west to east, and they may be distinguished as Pontic, Anti-Tauric, Dersim or Bingeul, and Tauric; but—apart from the catastrophic disturbances—the convergence of tectonic forces on the narrow "waist" (cf. p. 21) has not only crushed the folds up to a considerable height, but also complicated the topography. To-day it appears as a congeries of hollow oblongs, ridged by mountain ranges or dotted with conical heights, each oblong focussed on a centre from which it is usually named, *e.g.* Erzerum, Kars, Bayezid, and two of them being so much isolated that they have become areas of inland drainage, the Van and the Urumiya basins. Even on the Erivan section of the Anti-Tauric range the folded depression only just fails to be also a basin of inland drainage.

Montane "Control."

We have associated the narrowing of the whole lobe of plateau up to the Armenian knot with an increase in the height of the compressed folds and with a change from plateau to mountain relief, maximum heights being nodal instead of marginal; and it is of vital importance that here, where the southern flank is land and not sea, there is a steady slope down to the south, not—as in Anatolia—to the north, although the highest (non-volcanic) peaks are actually in the south-east. The results in Mesopotamia, however, do not concern us at present; but it is obvious that in this central section of the Alpine zone there can be no deserts,—the gradient of rivers in any meridional reaches must be very steep,—the natural lines of movement must be very obvious. Not only, then, do the Anatolian and the Iranian plateaus rise naturally and easily to this corrugated crown, but movement from them to it is positively invited and precisely guided. Thus, *e.g.* for 300 years in the Middle Ages, there was a constant succession of movements by nomads westwards through these nodal valleys as through an open door; and it was specially the pre-historic route of Alpines into Europe, and the historic route of Turki Seljuks and Osmanlis.

Symmetry.

In spite of the catastrophic disturbances the fundamental symmetry of the feature-lines is very distinct, especially to the north in the west and to the south in the east. The Anti-Taurus, which is a sierra of naked limestone with a very rough northern face, is the water-parting between the Black Sea and the Persian Gulf, the Kizil-Choruk drainage and that of the Euphrates, and the land-parting between Anatolia and Armenia, overhanging the old caravan route between Kaisarie and Kars. The Bingeul line divides the Kara from the Murad streams of the Upper Euphrates, the Erzingan-Erzerum route from the Kharput-Mush route. The Taurus divides Armenia from Mesopotamia, the Malatia-Kharput route from the Samsat-Diarbekr route, etc.; and, as it is flat-topped

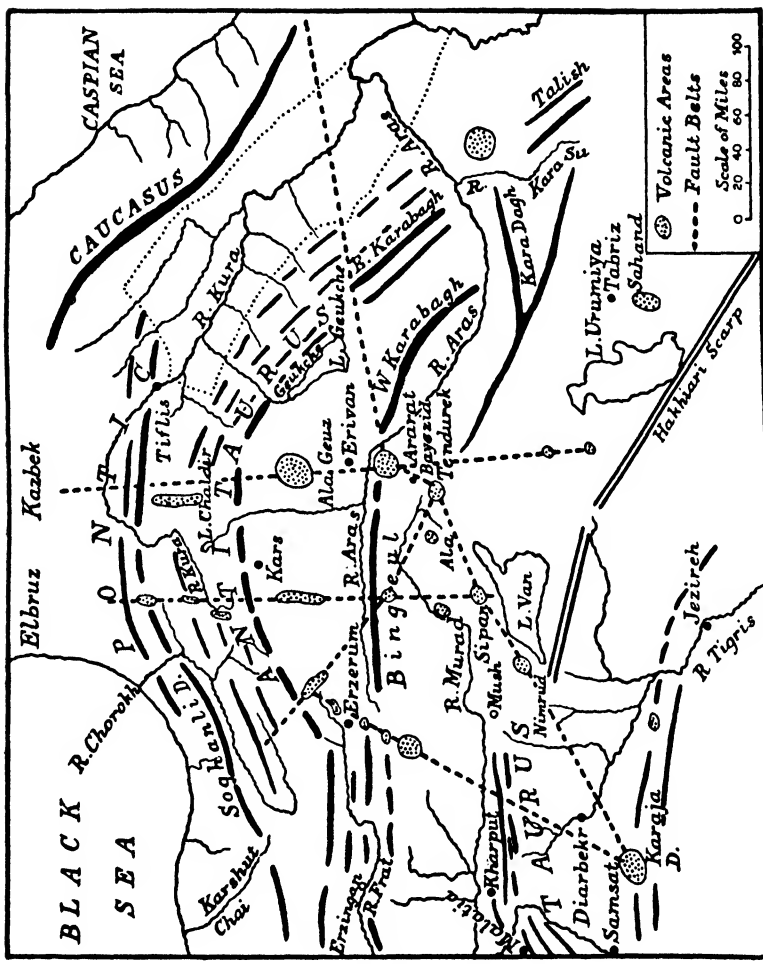

FIG. 13.—The Armenian Crown.

If this diagram is compared with the four other diagrams which are concerned with this great belt of mountain folds—Nos. 5 (p. 13), 11 (p. 33), 12 (p. 43), and 16 (p. 71)—the comparison brings out (1) the fundamental similarity of structure in the units, (2) exactly what is meant by the old description of the belt as "a string of gigantic beads," and (3) the importance of the asymmetry of the arcs, as discussed on p. 21.

The diagram shows the close connexion of the Karaja cone with the volcanic crown, and so the impropriety of divorcing the one from the other. See p. 268.

and square-shouldered, though not of very great or very regular height (5000–8000 feet), it is a serious obstacle.

Faulting and Vulcanism.

But across all the four lines of upfolds and downfolds there are two terrific transverse fault-zones, with the usual accompaniments, one from Elburz (18,500 feet) to Sipan, on the brink of Lake Van, *i.e.* west of the narrow plateau (an apparent continuation of the old north-and-south line of Ergene hills) which forms the water-parting between the Rion and the Kura, and the other from Kazbek to Ararat (17,000), on the brink of Lake Urumiya, *i.e.* east of the same line. The Nimrud cone guards the western flank of Lake Van, as the Sahend cone guards the eastern flank of Lake Urumiya; and there seems to be a double link between Nimrud and Ararat *via* Sipan and Ala *or* Tendurek, and this is continued south-west of Nimrud to the Karaja cone of the Tauric foothills.

The People.

The combination of such relief with a bridge and buffer position not only emphasised the tendency towards political separatism, which was encouraged alike by the physical isolation, by the hardiness of the typical Highlander population, and by the influence of such Lowlander refugees as found sanctuary amid the rugged fastnesses of the region; but it also offered those opportunities to the economic middleman which for centuries have made the Armenian a merchant and a money-lender. As the Armenians, unlike both the Arabs and the Kurds, are neither Moslems nor lacking in racio-political coherence, the Turkish hatred and fear of them were based on political and economic as well as on racial and religious prejudices. Of course, to-day the Armenians are only left in scattered fragments; and the Kurds have been decimated by war and disease and famine until they have become more or less negligible as raiders of the Fertile Crescent.

Nodality.

It is simply amazing that the catastrophic disturbances have not interfered far more with the symmetry of the relief; but no other area in Asia has quite such remarkable nodality. The physical nodality is illustrated by the radiation of rivers, lakes, and volcanoes, —the political nodality by the meeting of three empires in Little Ararat,—and the economic by the relations of Tabriz, Erivan, and Erzerum; and the one real pivot is the Bingeul massif.

The Spine.

In analysing the detailed relief we may emphasise the immense importance of the southward slope of practically the whole belt by treating the Pontic line as simply a watershed of the Rion-Kura depression; and then we can divide the essential feature-lines south of the Pontic ranges into three belts. The Central, though the least developed now, is the most continuous. With an average crest-height of probably 11,000 to 12,000 feet, it links up the Anatolian system with the Elburz. In the west it may be called generally the Dersim, but it has a variety of sectional names; as

the Munzur or Muzur, it makes a well-defined southern wall to the Euphrates above the Aghin-Pingen cañon; as the Merjan (11,000 feet), it looks down 7000 feet on to the narrow plain of Erzingan; and it ends as the Baghir. In the centre it may be called generally the Shatir or Shaitan, "the spine of Armenia"; but it is much concealed by the lavas of Ararat and Alageuz, and made incoherent by the great Kazbek-Ararat fracture, which runs under Alageuz. In the east it reappears in the very well defined Western Karabagh ranges (with a summit of almost 13,000 feet in Kapujik) as far as the transverse valley of the Aras, and is continued in the Kara Dagh to its junction with the Elburz.

Anti-Taurus. The northern or Anti-Tauric line, though the great water-parting, does not much exceed 9000 feet (in the Gurliuk and Deli ranges), and is very much disturbed by both the Elburz-Sipan and the Kazbek-Ararat faults, and by the associated volcanic phenomena that centre round Lake Chaldir; and its northern elements simply disappear at the transverse fault that cuts right across the upper basin of the Kura, though its southern elements here are well defined in the Geukche valley, the Eastern Karabagh and the Talish ranges, right up to the shore of the Caspian Sea, where, of course, they also disappear.

The area between these Anti-Tauric folds and the Central, especially between the great cones of Savelan and Alageuz, has been the scene of terrific disturbances; but it contains quite a number of typically longitudinal features in, *e.g.*, the Geukche valley and such tributaries of the Aras as the Kara Su, and it is typically rich in metals. The Geukche lake gives the alternative name to the so-called Little Caucasus, which is probably one of the richest metal-bearing regions on the face of the earth.

Taurus. The Tauric folds are very well defined in the transverse gorge of the Euphrates between Malatia and Samsat; and, as they narrow here from nearly 100 miles to not much over 30, and the passes drop from 6000 feet to 4000, this is a focus of relatively easy movement. The folds are equally well defined in the east, where they form the south-western rampart of the Van-Urumiya lakeland, though they are crossed by both the Elburz and the Kazbek faults; and then they are thrown up into the wild Hakhiari highland, rising from 9500 feet in the Sakh and 10,500 in both the Arnost and the Gilolokan to 13,500 in the Kokobuland and 14,500 in the Sat.

South of this main Tauric line there are outlying ranges, such as those which decided the location of Diarbekr, Mardin, and Nisibin, and which are broken in the west by the Karaja cone (from which the Khabur flows) and in the east by the transverse gorge of the Tigris above Jezireh. Similarly, north of the main Anti-Tauric line there are outlying ranges which mark the northern limit of the excessive volcanic development; but they are probably of Pontic

origin, and are interrupted by horsts, *e.g.* in the Lazistan arc. Both to the Black Sea and to the Rion valley these outlying folds are typical Border ranges, with one foot up on the plateau and the other at or near sea-level.

Bingeul Pivot.

The real pivot of the whole crown is found in the crescent-shaped massif of Bingeul, " The Thousand Lakes," which reaches a height of 11,000 feet just where the two great parapets converge nearest to each other. It is approached from the west by the Munzur series of ranges, all reaching nearly or fully 11,000 feet, and is linked eastward to the culminating cone of Ararat by the Ala Dagh (11,500). On the one side the parapet rises to fully 12,000 feet in the Vershambek, and on the other to 14,500 in the Sat. The scenery of this rugged [1] bulwark of Mesopotamia is ignored under the title of " the Kurd scarp " ; it would be emphasised if the whole line were spoken of as a vast arc of the Taurus, forming a real parapet above the plains and pierced by some huge cañons, *e.g.* one of the Zab, with a width of 12 miles and a depth of 9000 feet, below the peaks of Supe Durig and Kokobuland.

Drainage.

This crown, as a whole, gives the impression of lines of high rolling downs, fencing comparatively wide valleys, which have an average height of fully 5000 feet, *i.e.* about half the height of any normal crest of the Taurus and Anti-Taurus ; and over these widish valleys the larger rivers, especially the Kara and the Murad, the Choruk and the Aras, *meander* with a full but relatively sluggish current. There is, therefore, an extraordinary contrast between, *e.g.*, the Middle and the Lower Choruk or the Upper and the Middle Euphrates. The width of the plains varies considerably, especially in the Euphrates basin, for they are the floors of old lakes which overflowed by narrow lines of weakness ; and so now we have a series of relatively wide plains threaded on a line of narrow gorges by a river link. The Egin gorge on the Kara is typical, being a 200-foot gash in the limestone, with a 4000-foot climb within four miles on the one side and an 8000-foot climb within eight miles on the other side.

River Frontiers.

These rivers radiate from the pivot of the Bingeul massif ; and, owing to the slope of the zone, the northward are the more torrential, both because of the short journey to the sea and because of the heavier snow on the northern parapet. Indeed, when the snow is melting fast, the Aras (Araxes), though more than 600 miles long, is merely a typical mountain torrent the whole way, very dangerous to cross and carrying such a burden of sediment as fully accounts for the rapid growth of the Kura-Aras delta. It makes, therefore, a good frontier for Azerbaijan, as it has done for Russia and for Persia, and once did for Media. On an island in its bed, 14,000 feet

[1] Tiglath Pileser has left his opinion of it in a rock-inscription : " Here I, Tiglath Pileser, had to walk."

below the crest of Ararat, stood the citadel of Ataxata, which—from the heart of the great eastern " peninsula " within the frontier rivers of the Cyrus (Kura) and the Araxes—was for more than 200 years the capital of the old kingdom of Armenia.

The still more rapid Choruk (Lycus) falls 7000 feet in fifty miles, and is at once a geological and an ethnic frontier, separating the cretaceous formation from the igneous and the Georgian type from the Armenian.

The Rift. The southern rivers feed either enclosed basins or the one great system of the Euphrates, the details of which are entirely dominated by the longitudinal folds ; but across the folds there runs part of a weird terrestrial gash—including the rift or rift-like valleys of the Orontes and the Jordan, the Akaba Gulf, and Lake Tanganyika —and to this gash all the important rivers drain to be united in the Euphrates. The eastward streams, *e.g.* the Chalta Irmak and the Tokhma, are much shorter than the westward, *e.g.* the Kara and the Murad, but the lines, *e.g.*, of the Tokhma and the Murad, the Chalta and the Kara, are essentially continuous, as illustrated by the caravan routes from Erzerum *via* Erzingan and Zara to Sivas, or from Mush *via* Kharput and Malatia to Kaisarie.

Both troughs are relatively shallow, and east of 40° E. they contain large areas of open country, such as the so-called plains of Erzerum (6200 feet), Alashgird (5100), and Mush (4800), offering comparatively easy routes round Lake Van for caravans to and from Tabriz and Mosul. About 40° E., however, where the convergence of the folds is most marked, *e.g.* above Erzingan and Palu, both rivers begin to cut gorges down to the rift ; and in the rift itself, *e.g.* above the important bridges of Pingen and Egin, the " cañon " scenery is extremely savage. The profile is V-shaped, with hanging valleys ; and the length of the dry season (June 15–October 15) throws light on some typical cañon details.

The Euphrates. The Euphrates and the Tigris need further attention as the links between the crown and the southern lowlands, with their access to the sea. The (" Clear ") Murad is more than 400 miles in length, and rises—on and round the Ala Dagh—more than 10,000 feet above sea-level, while the (" Muddy ") Kara, or Frat, is less than 300 miles in length, and rises—on the Dumlu Dagh—less than 9000 feet above sea ; and, while the Kara receives no very important tributary from the leeward flank of the Dersim-Bingeul backbone, though there is always snow on the northern flank, the Murad receives the Peri from its windward flank. The Murad is, therefore, of much the greater volume as well as of much the greater length ; but its valley was never so important as a thoroughfare, and never formed a frontier for the Roman Empire.

Not only is the Kara route essentially the more marginal,

especially for inter-continental movement, but it is also the less circumscribed. Thus, movement north-westward is comparatively easy from Erzerum *via* the Kara valley to the Upper Choruk, *e.g.* Baiburt and Gumushk-Khane ("Silver-Place"), and from Erzingan to the Kelkit basin, *e.g.* to Shebin Kara Hissar; but movement north-westward from Kharput has to face either the whole Dersim system or the "cañons" of the rift valley. The latter are the easier, and the two great caravan routes westward from Kharput cross the united Euphrates respectively at the silver-lead mines of Keban (or Gaben) Maden ("Gorge Mines") for Sivas *via* Arabkir and at Porot for Kaisarie *via* Malatia. **The Open Road.**

A little below Porot the river forces its way down a series of boiling rapids and cataracts in the Ziarat-Bibol gorges—where even the main stream is within a dozen miles of the western headwaters of the Tigris on the Bilan Dagh,—and is usually said to bring its mountain course to an end, *i.e.* to leave the Armenian crown, at Samsat—after a fall of nearly 1000 feet in little more than 100 miles from the Kara-Murad confluence. It falls another 500 feet, however, to Birijik; even at the rail and river junction of Jerablus the right bank is still the scarp of a chalk range; and it does not leave the great rift until it reaches latitude 36° N. at Meskeneh. **The Gorges.**

The Tilek reach is of special interest, because it is a scene of great confusion, probably associated with a diversion of the Murad —by another great fault which seems to link Elburz with Karaja *via* Erzerum—from a direct south-westerly route *via* the Mamash-Geuljik lake-valley to its present circuitous route *via* Kharput, 160 miles instead of 40. Above Tilek the Kemur Khan cañon shows for 12 miles parallel straight walls of dark basalt and metamorphosed shale; and below it the river drops 100 feet in 6 miles before finally escaping by the Gergez gorge, scarcely 50 miles above Samsat.

The Tigris system also occupies two great longitudinal troughs, the northern lying roughly along 38° N. and the southern along 37° N. The former carries the eastward-flowing Tigris and the westward-flowing Boktan to their confluence at Til and the parallel caravan route between Diarbekr and Koskheir *via* Sairt; the latter carries the Tigris eastward from Jezireh and sections of the Zab drainage below the Sat range. There is here, therefore, a real monopoly of the Armenian ocean-drainage by the Tigris similar to that exercised by the Euphrates farther north, the Tigris proper rising within five miles of a tributary of the Euphrates proper and the Bitlis rising about the same distance from a tributary of the Murad, while the Boktan to the north-west and the Zab to the north-east of Bashkalsh, flowing southward on different flanks of the Kokobuland, have similar relations to the Van and the Urumiya inland drainage. **The Tigris.**

Euphrates v. Tigris. The details of the Euphrates and the Tigris systems present one or two contrasts. For instance, in the Upper Euphrates basin the open country is to the east, while here it is to the west, especially round Diarbekr; and, again, in the former cañon scenery is practically confined to the great rift, while here even longitudinal reaches, *e.g.* of the Bitlis and the Zab, present some of the finest (very typical) cañon scenery in the world, especially in the Old World. Then, the Tigris *régime*, especially in the Hakhiari highland, is subject to more violent variations; for instance, the narrowness, the steepness, and the height of the Zab gorges below Kokobuland make them subject to constant avalanches in spring, the volume of snow being sometimes sufficient even to dam the raging torrent at the bottom of the cañon. Of course, this means eventually a terrific flood, when the dam bursts, and the pace of the main river is already excessive. Indeed, even at Diarbekr (1900 feet) the Tigris is "rushing like an arrow" at the bottom of a 300-foot ravine in the basalt; and this is where, and why, it gets its second title of Shat ("Arrow").

Eden. The Van region, between the head-waters of the Murad (Euphrates), the Bitlis, the Zab (Tigris), and the Aras (Araxes) is, of course, the legendary site of the Garden of Eden; and the "flaming sword that turned every way—to the east of the garden" is, at least, well represented by the four great cones of Ala (N.W.), Ararat (N.E.), Tendurek (S.E.), and Sipan (S.W.).

The Climate. Without any formal treatment of the climate, a little anticipation may make clearer the *régime* of the rivers and all that it implies. For the climate is fundamentally Mediterranean, *i.e.* one of marked seasonal duality, but of an extreme type. Precipitation is confined more or less to the winter half of the year, and therefore—in such a latitude and at such a height—is largely in the form of snow. Even Ararat is less than 700 miles from the Levant, and the curve of the Taurus allows the typical cyclones a fairly clear path up to the Bingeul massif; and they bring very heavy falls of snow, which melts rapidly in spring (March–May). On Ararat itself, except on the side facing the Black Sea, the snow-line is as high as 14,000 feet; but farther west it is much lower, especially on non-conical crests, even the main roads round Erzerum being snow-bound for practically six months every year. "Noah's" Flood was probably due to the melting of immense quantities of snow precipitated by the minor glacial phase (Gschnitz), which affected Armenia about 4500 B.C.

Contrasts. The range of temperature is very great, and changes are very sudden, even sweltering summer days—when the relative humidity *seems* to be very high—being followed by actually cold nights; and the open country in the north-east is dreadfully exposed to

icy "Turanian" winds. The extreme north-east is subject also to terrific hailstorms, and there is a tendency to rains in summer as well as in winter; and these summer rains, even on the Aras lowlands, seem to have some relation to Low Pressure centres in Mesopotamia.

The Lakes.

While the rivers are associated directly with the folds, the lakes may be said to be associated with the volcanoes embossed on the folds, as their basins are largely closed by lava, and all of them have "sentinel cones." Of the three large lakes, Urumiya (4000 feet) and Van (5300) have completely closed basins, while Geukche (6300) may be closed in a long drought. The corners of the great lake triangle are guarded by Nimrud, Sahend, and Alageuz ("Motley"—from the belts of lava, obsidian, etc.); and the mass of the triangle is covered with very fertile volcanic soil. Indeed, it was the great fertility that made Van (or Dhuspas) the capital of the Urardhu empire; and it was a factor in the spread of Zoroaster's cult from Urumiya. Geukche is favoured not only by its greater altitude, but also by its northern latitude and by its isthmian position between the Black Sea and the Caspian; it gets enough inflow—mainly from melted snow—to overflow and so to remain fresh. Van and Urumiya, on the contrary, are too salt for fish—except for a shrimp that frequents Urumiya—and too dense for diving, and the floors of both "ooze" sulphurated hydrogen.

The western limit of excessive vulcanism is marked roughly by the Karaja-Elburz fault as far north as the west end of the Bingeul massif, and the southern limit by a line from Karaja *via* Nimrud, Sipan, and Tendurek to Ararat, while Alageuz (*c.* 13,400 feet) is the only great cone north of the Bingeul line.

Bingeul.

The Bingeul massif is crescent-shaped and concave to the south, with a longitudinal axis of about five miles and a height of 10,000 to 11,000 feet. It is faced to the south with a great bastion of lava to 8000 or 9000 feet above sea-level, *i.e.* at least 4000 feet above the famous Gushkar gorge; and it is pierced from the south by a number of other ravines and gorges, all smaller and some much smaller than the Gushkar, that lead up to the axis. Down each of these there flows a torrent from the line of peaty tarns—some 1000 feet below the crest of the bastion—from which it takes its name of Bingeul ("Thousand Lakes"). The convex face has, of course, a very different climatic exposure, and contains a pair of magnificent cirques, where snow lies even in August. The massif, therefore, illustrates admirably the work of both fire and ice.

Caucasus.

The Armenian crown sinks northward very steeply to the Rion-Kura furrow, which divides it from the Caucasus; and the Caucasus is no more part of Armenia than the Elburz and Kazbek cones are part of the folded system. But these cones, which are

soldered to the range, rise west of a very old ridge, the Meskes water-parting between the Rion and the Kura ; and this ridge does link Armenia with the range, and also allows easy movement east-and-west—by the Suram Pass, as the Dariel Pass allows it north-and-south across Georgia.

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CHAPTER IV

THE RELIEF OF THE NORTH-EASTERN LOBE

THIS area lies east of 90° E. and north of 50° N. except in the south-east, where it reaches 45° N.; and it is at least as typical of the continent as the South-Western Lobe, for its relief shows tiers of plateau with Border Heights, while its climate is so profoundly continental that it includes the World's "Pole of Cold." 90° E. 50° N.

The great plateau formation is represented, both in Siberia and in Mongolia, by a terraced block lying S.W.–N.E., as in the Baikal valley or the Stanovoi scarp; and the rivers, *e.g.* the Lena and the Aldan, follow for hundreds of miles structural lines with the same S.W.–N.E. trend. The block narrows longitudinally, and falls altitudinally, to the north-east. S.W.–N.E.

Each terrace of the block is fringed, both on the north-west and on the south-east, by Border Heights, *e.g.* the Yablonoi and the Stanovoi, which are simply the non-Alpine upturned edge of the terraces; and these, too, fall in height towards the north-east. But the whole system is flanked, both on the north-west and on the south-east, by Alpine folds, *e.g.* the Lena Alps and the Sungari Alps; and these, again, fall in height towards the north-east. At the same time, the series of ranges is much wider towards the broad continental interior than to the cramped ocean margin, and to the north-west the ranges drop to high plains while on the south-east they drop to low plains.

The Higher Terrace (*c.* 4000 feet) lies between the Upper Irtysh—where the Chinese Altai have one foot down in the Zungarian valley and the other up on the plateau—and the Upper Aldan; and, of course, it is quite normal in its S.W.–N.E. trend and in its loss of height and of width to the north-east. But, though old structural lines do carry the Selenga, the Lena, and the Aldan for a long way towards the north-east, the whole terrace slopes to the north-west, not the north-east. The Yablonoi scarp thus becomes the water-parting between the Arctic and the Pacific in the south, as the Stanovoi scarp becomes in the north; and the Olekma river, which drains the gap between the Yablonoi and the Stanovoi scarps, rises Higher Terrace.

on the *Pacific* flank—to join the Lena at Olekminsk. To the south-west, too, the Vitim very nearly does the same.

The surface of the terrace is so monotonously flat as to be very marshy, especially on the lower northern levels; and the rivers flow in wide open "valleys," which are equally monotonous. Indeed, the only touch of variety is in the cover. The extreme temperature and the low rainfall make the region mainly one of poor steppe, but there are patches and strips of larch forest and of birch. This, no doubt, accounts for the rather ill-founded assertion that "the Yablonoi Mountains (*sic*) are like the Black Forest."

The Scarps. The scarps of this higher terrace are alike in essentials, but differ in details. The western one has been much eroded by ice and wind, especially to the south-west, where it is still highest, and where it was nearest to the old Ob Gulf of the Arcto-Atlantic. The Sokhondo crest of the Yablonoi is well above 7000 feet, and the Munku Sardyk crest of the Sayan reaches 12,000; the floor of Lake Baikal is 3000 feet below sea-level; and the old fiord of the Selenga gives easy access to Kiakhta and Urga, as the old fiord of the Uda does to Chita and Nerchinsk.

The typical Border belt, 20 miles wide, has its north-western foot on the High Plains; it is almost unbroken between the Selenga and the Vitim, *i.e.* where it flanks the lake, but much broken in the Altai-Sayan, especially round the head waters of the Yenisei. Here, too, there is a lower snow-line; the Sailughem (8500 feet) link between the Altai and the Sayan has a very heavy snowfall. The south-eastern foot is on the Low Plains; and so, though the average height of the scarp is only *c.* 1000 feet, the gradient is very steep. This eastern scarp runs for over 1000 miles north-eastward from slightly south-west of Urga; but except in the Sokhondo, between the sources of the Shilka and the Argun, its crest seldom rises more than 600–700 feet above the surface of the Higher Plateau.

Lower Terrace. The Lower Terrace has the same orientation, the same feature lines, even the same essential details, as the higher, which it wraps around except on the Arctic face; but it is larger as well as lower, and it has deeper valleys. Over much of it, too, the steppe is very poor, and to the south-east it actually dries out to desert—in the Eastern Gobi.

Pacific Scarp. The scarp on the other, or Pacific, face in the Khingan and the Stanovoi, like that of the Yablonoi, is a typical Border belt of heights, with one foot up on the plateau and the other down on the Manchurian plain; it rises little above the normal plateau level, not exceeding 6000 feet above sea even in the extreme south, and scarcely reaching 4000 in the extreme north; but, as its face falls very steeply, some 1500 feet, especially to the sunken Okhotsk basin, it looks actually mountainous from below.

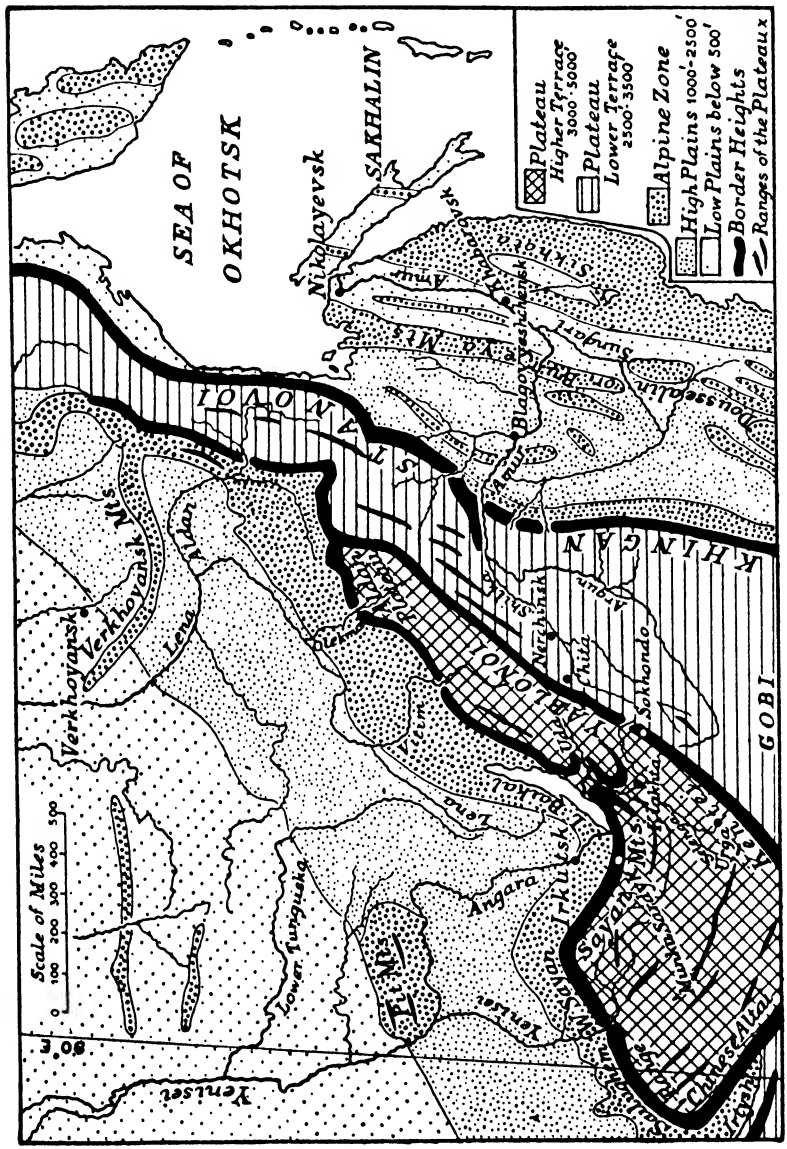

FIG. 14.—North-eastern Lobe (based on Kropotkin).

This whole eastern line runs almost unbroken from the Hwang-ho to the Amur, a distance of some 1400 miles; it trends more strictly north-and-south than the western line does; and it is very important climatically. Its steepness makes it practically (cf. p. 129) a longitudinal limit to the wet monsoon from the Pacific and to the Manchurian flora and fauna, while its direction gives a good deal of latitudinal extension to both.

Fringing Alps. The Alpine zones flank the north-western and the south-eastern margins of this two-storeyed plateau shield; and again we have similarity in general essentials, but difference in particular details, especially in the relation to the plateau.

On the north-west the Lena Alps are cut from the plateau by a longitudinal trench, the deepest part of which is filled with Lake Baikal. This is not the valley of a master river, but a series of valleys (cf. the Appalachian and the Californian valleys in U.S.A., and the Lotharingian Corridor in France), the rivers of which sometimes flow in opposite directions; thus the Upper Angara flows southward into the lake, while the Upper Aldan flows northward to the Lena (cf. Richelieu and Hudson, San Joaquin and Sacramento). In spite of this the whole "valley" maintains an approximate width of 20 miles, nearly all covered with lake and glacial *débris*.

The system consists of a series of parallel folds—as few as three, as many as nine, but usually about half a dozen; and the maximum height of the crests is about 6000 feet, while the minimum height of the intervening valleys is about 1000, the total width varying from about 150 to 300 miles. All the folds are cut across by large rivers, *e.g.* Yenisei, Angara, Vitim, Lena, Olekma; and their Arcto-Atlantic exposure accounts for the considerable amount of forest. The whole Lena Alps system is repeated in miniature in the Yenisei Alps, which reach a height of 3000 feet north-east of Yeniseisk in the Pit range; and a branch divides Lake Baikal, *via* Olkhon island, into a "Great Sea" and a "Little Sea."

High Plains. These Alps drop on the north-west to the High Plains, which have a level of some 2000 feet to the south, but only 1000 to the north; and, while the lower northern levels are forested, the higher southern ones are steppe. Throughout, the surface is undulating, but the rock is horizontal; and in the dry climate through this horizontal rock the rivers have cut steep-sided valleys, often to a depth of 500 feet.

On the south-eastern flank of the plateau there is no rift valley, but the Alpine zone comes up against the scarp except where the folds have sunk in the Okhotsk basin; and, as there are only two or three folds, the total width of the zone—like its maximum height (3000 feet)—is not great, being not more than 70 miles anywhere, and much less in the north. As it falls to low plains, and

faces seaward, it receives a good rainfall; and, as there are some areas of rich lava, much of the lowland makes fine prairie, and there are large stretches of dwarf-oak forest along the Nonni (especially near Tsitsihar) and along the Middle Amur (especially round Blagovyeshchensk).

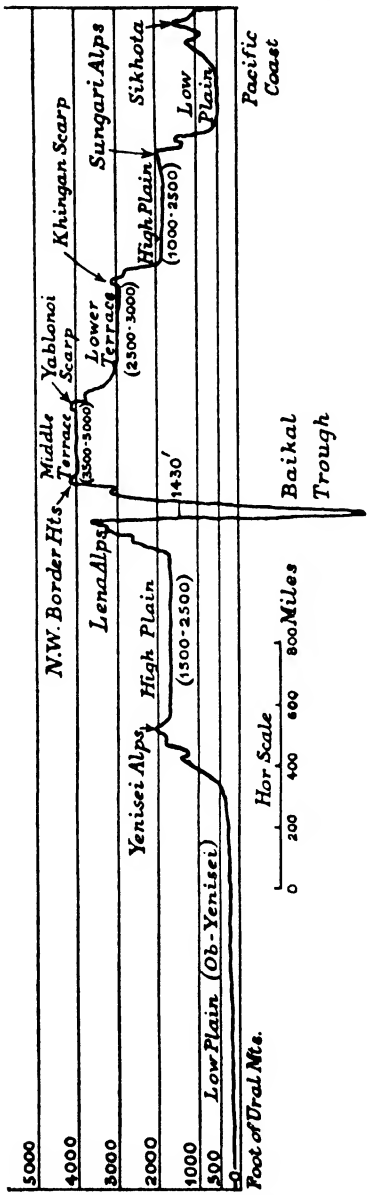

FIG. 15.—Section across Siberia.

Again, while the Lena Alps are repeated in miniature in the Yenisei Alps of the Middle Tunguska basin, this south-eastern zone is repeated on an exaggerated scale in the Bureya (4000 feet) and in the non-Alpine Sikhota Alin (5000 feet) of the Lower Amur basin, where they girdle the marshes of the Sungari, the Usuri, and the Amur.

Natural Regions.

The whole lobe may be divided into half a dozen physical regions, spread over half as many climatic provinces; but most of them are of little importance or significance at present. The Tundra region is the source of some mammoth ivory, and is so windy in winter that the warmer upper layers and the icy lower layers of the air mix; and so the climate is relative "mild"—a fact which may become important in connexion with reindeer-farming. The height of the Lena platform, and the fact that it is one of the World's great anti-cyclonic regions, no doubt account for the unexpectedly fine forest, though this has little value except as a source of very fine furs for the Yakutsk market; and the ease of navigation on the Lena in summer has encouraged the working of the gold in the Vitim and the Olekma valleys.

The central highland is valueless in itself except for possible

mineral wealth, but it is easily crossed, especially in the latitude of Irkutsh *via* Kiakhta and Chita. Kiakhta was, of course, the old capital because it was on the Chinese side of the lake, and so commanded the old caravan route to the south *via* Urga; but the Russian railway now makes for the Pacific, and so has raised the importance of Chita and the Amur valley.

Verkhoyansk. The Verkhoyansk basin and Kamchatka are markedly detached. The former—which may be taken to include the whole area north of the Verkhoyansk-Stanovoi arc—is of great interest climatically, but of no importance otherwise; and it presents a great contrast climatically to the Tundra and to Kamchatka. It contains three navigable rivers in the Yana, the Indigirka, and the Kolyma, varying from 1000 to 1200 miles in length; and it shows at least two Alpine arcs, both very formidable ramparts. The Verkhoyansk arc consists of four parallel chains, aggregating 250 miles in width and with crests above 8000 feet; the Cherski arc reaches 11,000, but the climate is too dry for very large glaciers—though there are glaciers on both faces, and traces of a much wider glaciation, and immense sheets of riverine ice, which makes travelling difficult and dangerous. In a gully of the Indigirka, only 63° N., *i.e.* not inside the Arctic Circle, but fully 200 miles farther than Verkhoyansk from the Arctic Ocean, Oimeka seems to be at least as cold as that place, though forest clothes the neighbouring ranges to a height of nearly 5000 feet.

Kamchatka. Kamchatka is as windy as the Tundra in winter, and much more so in summer—a land of blizzards in winter and "typhoons" in summer, of heavy snow and heavy rain. The high humidity so far neutralises the wind that the land is well forested, and the fur-trade seems to be flourishing; but the chief wealth is in the fish, especially the salmon of the Anadyr and other rivers. And the crater port of Petropavlovsk is, for half the year, an important Pacific coaling-station as well as a busy fishing centre.

Amuria. Amuria, alike from the physical, the political, and the economic standpoints, is an area of great interest and importance, recalling another mountain-fenced, island-flanked river valley—in British Columbia. North of 55° N. the Stanovoi scarp, like the Coast Range, meets the Pacific; but to the south the older continent shows, naturally, wider plains—in the Amur lowlands, and a lower crest—in the Yablonoi. For this reason the river resembles the St. Lawrence rather than the Fraser, giving some 2000 miles of fairly good navigation—up to Nerchinsk, 1000 miles directly from the ocean; and it has made a good political frontier, carrying the Trans-Siberian line on its northern or "home" margin. The lowlands, too, especially those of the Usuri tributary, have value agriculturally.

The one great drawback is the isolation of the region, which

accounts for its being still only a collecting ground, *e.g.* for fish, furs, and timber; and the timber, in these days, is of special interest. There is a large area of forest, almost untouched and easily accessible from the sea; along the Usuri it is mainly white cedar, worked from Khabarovsk, the best centre,—along the Middle Amur, *e.g.* round Blagovyeshchensk, it is mainly yellow pine,—and along the Lower Amur, *e.g.* at Nikolayevsk, *i.e.* 300 miles farther north, it is larch and spruce, while to the south, *e.g.* along the Middle Sungari, oak and maple creep in. **Timber.**

At the same time most of the forests are thin, and the timber is coarse; and tillage must encroach on the lowlands near the sea, though the population is still very scanty. At present, too, the shipping facilities are very poor. But Khabarovsk has a natural control of Amur, Usuri, and Sungari transport; and, if the two bars in the river were cut, it could be reached *via* Nikolayevsk by vessels drawing fully 16 feet of water and burning Sakhalin coke or oil—*not* the good timber along the Middle Sungari, which is being used as fuel in the area at present.

REFERENCES.—KROPOTKIN, *op. cit.*; D'ALMEIDA, *Russie d'Europe et d'Asie* (1933); OBRUCHEV, W. A., *Geologie von Siberien* (1926); OBRUCHEV, S., "The Discovery of a Great Range in North-Eastern Siberia" (*Geographical Journal*, volume lxx., 1927).

CHAPTER V

THE HEART OF ASIA

THE link between the two lobes is what we have called Central Asia, and it includes five important units, two of them interior and three peripheral; but it is useful to divide the eight constituent elements into two latitudinal belts, the southern four making up the great barrier and the northern four—highlands and lowlands alike—contributing sections to the great cross-roads of the continent.

Core. The core consists of two parallel belts, one a belt of relative depression along latitude 40° N., and the other a belt of marked upheaval along 35° N.; the ridged "roof" of Tibet maintains a height of at least 13,000 feet over at least half a million square miles, while the *Han-Hai* ("Dried Sea") spreads its shifting sands over another half-million in Sin-kiang at heights varying from 5000 feet to below sea-level. Both belts are wind-swept and drought-stricken, and salt lakes are as typical of one as of the other. Below its southern parapet Tibet has a valley of oceanic drainage 12,000 feet above sea-level, with 400 miles of navigation (by coracle) on the upper—or Tsan-po—reaches of the Brahmaputra; but even in the west it has salt lakes at a height of 19,000 feet, and the whole is so much blanketed by the Himalayan parapet that it seems never to have been ice-capped.

Pamir Link. This core is wrapt round on three sides by belts of young folds, with at least one crest on each flank reaching at least 24,000 feet; and the Pamir belt is at once the easiest link between Tibet and Sin-kiang and the only link between the Tian Shan and the Himalayas. If, then, the real geographic importance of such units depends on their human note, the most important unit here is this Pamir block of compressed folds; but we must examine the Great Barriers before the Great Passage-ways.

THE GREAT BARRIERS

Tibet

If the human note of Central Asia may be centred on the Pamirs, the hydrographic note is unquestionably centred on Tibet; for here

are at least three-quarters of a million square miles of plateau and parapet which not only provide the most important water-parting in Asia—between oceanic and inland drainage, and between the Indian Ocean and the Pacific,—but are also the mightiest watershed in all the world, far the greatest in temperate latitudes. The Yangtze is the longest river in Asia, and nearly half the population of the world—certainly over 45 p.c.—live between the Hwang-ho and the Indus.

Four Units.

If we may venture to make a tentative division of the region from the physiographic point of view, it may be a double division. In each case it is roughly between what is typical plateau, and what is typically montane; but the one is longitudinal and the other is latitudinal. This gives us three main regions—eastern, northern, and southern; and we must practically make a fourth region of the Kuku Nor-Tsaidam area, the one step down from the north-eastern corner of the high plateau. Cf. p. 70.

Northern Tibet.

The great mass of the region is the Chang-t'ang or "Northern Plateau," which lies along and parallel with latitude 35° N. for some 700 miles at an average height of 16,000 feet, and which has—on a large scale—some points of superficial resemblance to the Pamirs. It is a series of wide and shallow valleys, running parallel with the main axis and separated from one another by blunt-crested "mountain" ridges. These tend to be convex to the north in the north and to the south in the south, and their drainage collects on the valley-floors in innumerable lakes—some at a height of over 19,000 feet.[1] In any case the height and the inland position would have minimised any precipitation, but the gigantic mountain barrier to the south cuts off all normal sources of moisture except from the residual lakes in summer; the size and the relief combine to make it an area of inland drainage; and the terrific winds and the rapid evaporation make all this ultimately salt. The cold is, of course, intense; many of the innumerable hot springs issue from the top of high "chimneys" of ice! And it is very high sun-power under a cloudless sky that is responsible for the terrific winds between 11 o'clock A.M. and 4 o'clock P.M. The Chang-t'ang, then, is a *buran*-swept desert, with great range and sudden changes and extreme contrasts of temperature—the last in going from sunshine into shade or *vice versa*; and it sinks eastward slowly and almost imperceptibly into Eastern Tibet.

Eastern Tibet.

The eastern limit of this region should really be drawn where the plateau drops abruptly below the 12,000-foot contour just west of the longitude of Ta-tsien-lu; its northern limit should be in the latitude of the Dangla (33° N.); it has a natural southern limit about 27° N., where the Namkin range is the political frontier of Tibet; and, though its western limit may be associated with several stretches of meridian 95° E., it must be diverted far enough west to

[1] Dr. Oswald gives the height of Shemen-tso (*c.* 82° E., 34° N.) as fully 19,500.

include the head waters of the Yangtze, Mekong, and Salwin, even if these are really west of the meridian of Lhasa. In fact, the region is all that part of Tibet in which the meridional feature-lines of a typical Pacific hinterland admit the wet monsoon at least as far north as the 20,000-foot crest of Dangla.

Southern Tibet.

Southern Tibet presents us at once with the most remarkable example of mountain-building on the face of the earth, and with all that is essential and typical in the human note of the region, for even the pastoral lakeland of the south-eastern Chang-t'ang is more closely associated with the folded mountains than with the plateau. It consists of three concentric belts in an arc which stretches for 1500 miles, from about 37° N., 73° E., to about 27° N., 93° E.; the central belt is the Indus-Sutlej-Gogra-Brahmaputra trough, and the two other belts are its containing ramparts of the Himalayas and the Trans-Himalayas, both consisting of a number of parallel chains, and both cleanly fractured towards the trough at a height of about 22,000 feet. Cf. map on p. 373.

The two folded belts which face each other across this (Indus-) Brahmaputra trough, like the two Alpine belts which face each other across the Rhone- (Rhine) trough, are equally remarkable, but each in its own way. The Himalayas, like the Pennine Alps, have not only all the highest peaks and the spectacular challenge of such buttresses as Kanchenjunga and Nanga Parbat, but they also drop seaward to a lowland; and from the extreme north-west to the extreme north-east they are definitely concave to the plateau. The Trans-Himalayas, like the Bernese Oberland, drop landward to a plateau, and their peaks are lower than the Himalayan; but their average height is greater, and their passes seem to be about as much higher (3000 feet) than the Himalayan passes as their peaks are lower than the Himalayan peaks.

Trans-Himalayas.

Further, the Trans-Himalayas have a more complicated course, and are in some ways the mightier system; for they show some evidences of "Pacific" influences in both structure and climate. Between 80° E. and 85° E. their feature-lines run almost due north-and-south, terminated against the horizontal scarp of the plateau; but to the east they make an effort to recover the Old-World horizontal lines, in a series of arcs concave to the plateau, and with their eastern section parallel with the Brahmaputra in its great *north*-eastward bend. Both the relative lowness of the crest and the definitely "Pacific" tendency of the feature-lines to west and to east may, perhaps, be associated with the admission of "Pacific" moisture to the great lake-land at their northern foot, where all the lakes lie at a height of 15,000 to 16,000 feet; and some of these approach, or exceed, 1000 square miles in area, *e.g.* Dangra-yum, Ngang, and Tengri Nor.

The Kun-lun

The mighty Kun-lun system combines features similar to those of the Trans-Himalayas with features similar to those of the Himalayas and the Hindu Kush. Like the two latter, it is a parapet that drops to a " lowland " (4000–4500 feet); like the Hindu Kush, it is also part—indeed, the most important part—of the great spine of Asia; like the Trans-Himalayas, it is somewhat of sierra type. It is much the longest range in Asia, and has the greatest average height, with a blunt crest of fully 20,000 feet for hundreds of miles; it has the steepest continuous face in the continent, deeply cut into by inaccessible defiles eroded mainly by the power of light occasional rains in a very arid climate; and it falls over a wide gradient of stark gravel to the most mournful desert in the world. **"The Long Mountains."**

With a total length of 2500 miles, it is much longer than the Himalayas, and it is very much older. Its crests have been worn down during countless centuries by aerial denudation, and the intervening valleys have been levelled up with the waste, as in the Pamirs; but, though the crests preserve something like a sierra sky-line, quite a number of peaks reach from 22,000 to 25,000 feet.

Like the double Sarikol-Muztagh " Border Range " that crowns the great transverse fault-scarp of the Pamirs, the Kun-lun is a double " Border Range," divided from the Sarikol only by the gorge of the Upper Yarkand (Raskam); and its twin ranges may be conveniently named from the sections associated with the upper courses of the Khotan river, which skirts the southern foot of the Ultug-Tagh, and its Karakash tributary, which skirts the northern foot of the Suget-Tagh. In the inner line the Suget-Davan is nearly 18,000 feet; in the outer line the Sanju is over 16,000, and the Kyzyl very nearly 17,000. **Border Ranges.**

The lateral compression in " the Pamir Strait " (cf. p. 21) resulted in a relatively narrow (under 200 miles) belt of lofty ranges separated by deep defiles, and running steadily eastward along latitude 36° N. Even in longitude 82° E. there are four parallel ranges, in each of which there are crests of at least 22,000 feet. But the crest-level tends to fall eastward with an increase in the width of the system—to an ultimate 600 miles, and the change begins (*c.* 82° E.) with a great " Akkar-Chekyl " fault, which lies *north*-eastward from the eastern flank of the Upper Keria; and this direction is followed by the Tokus-Baban and still more markedly by the Altyn Tagh (-Nan Shan) arc.

At the same time, the essential Kun-lun spine is continued along 36° N., but with its energy concentrated in a single line; and, as the Arka Tagh, it reaches its extreme height of 25,300 feet (cf. Kungur and Muztagh-ata), in longitude 87° E. This—like the tendency of some of the eastern ranges, *e.g.* the Kalta (Columbus), **Relation to Climate.**

to rise in average height eastward—is of prime climatic importance; for it means a better precipitating medium in longitudes where the trend of the feature-lines begins to give access inland to wet south winds. Thus, the precipitation even in the Arka region is sufficient to " fix " loose detritus *in situ*, while " the Valley of the Winds " leads to an Altyn Tagh that is wind-scoured down to bare rock; immense herds of wild asses live to windward of the Kalta, " drinking " ice in winter; caravans regularly collect in the Kuku-Nor (" Blue Lake ") basin, where they may be held up for a week on end in July by continuous heavy rains, and its Holy Isle of Kuisu, with its cave oratories and circumambient fisheries, is a regular resort of Buddhist pilgrims; and parts of the Nan Shan, with its 20,000-foot peaks, are well forested and flank cultivated fields.

The Road. Even here, on the ancient Mongol thoroughfare, from below, the parapet looks a terrific Jacob's Ladder of parallel ranges; but, from above, this typically resolves itself into something like a trio of broad terraces with upturned edges. And, as normal lines of movement are, and have been, east-and-west, Mongols and Manchus must soon have realised that at this point the parapet was not as formidable an obstacle as it looked, or as it is for 1000 miles and more westward.

Place-names. The Nan Shan can have been called the *South* Mountains, as the *vis-à-vis* Pei Shan (or Bei Shan) can have been called the *North* Mountains, only by travellers along our critical fortieth parallel; and, as almost every stream brings down from the plateau sands so rich in gold that China has drawn supplies of gold from Tibet for centuries, any range might be called Altyn Tagh, " the Gold Mountains." But these travellers might naturally have also called this particular range Astin, " The Nearer," as they called the distant spine Arka, " The Farther."

The Himalayas

" The Great Mountains." The Himalayas are not, and are not likely to be, in any way underrated, for they are almost as accessible as the Alps from the outside world—even if often veiled in yellow dust or grey cloud; and, of course, they are in some ways unique and supreme—in magnitude and in majesty—beyond, as well as within, the limits of the continent. But they are not a primary water-parting, for the four greatest rivers of Hindustan—the " antecedent quartet " of Indus and Sutlej, Gogra and Brahmaputra—rise and flow for miles to the north of them, on what may be called the " Manasarowar " watershed, with its sweet water and swarms of hares; and they do not make a political or an ethnic divide—" Scythian " Baltistan is Little Tibet, and the Gurkhas are of Rajput origin, " irreconcilables " driven from Rajputana by the Moslem invasion.

The name is applied here to the system which runs as a great arc—of a true circle—from the Indus gorge (*c.* 36° N., 73° E.) to the

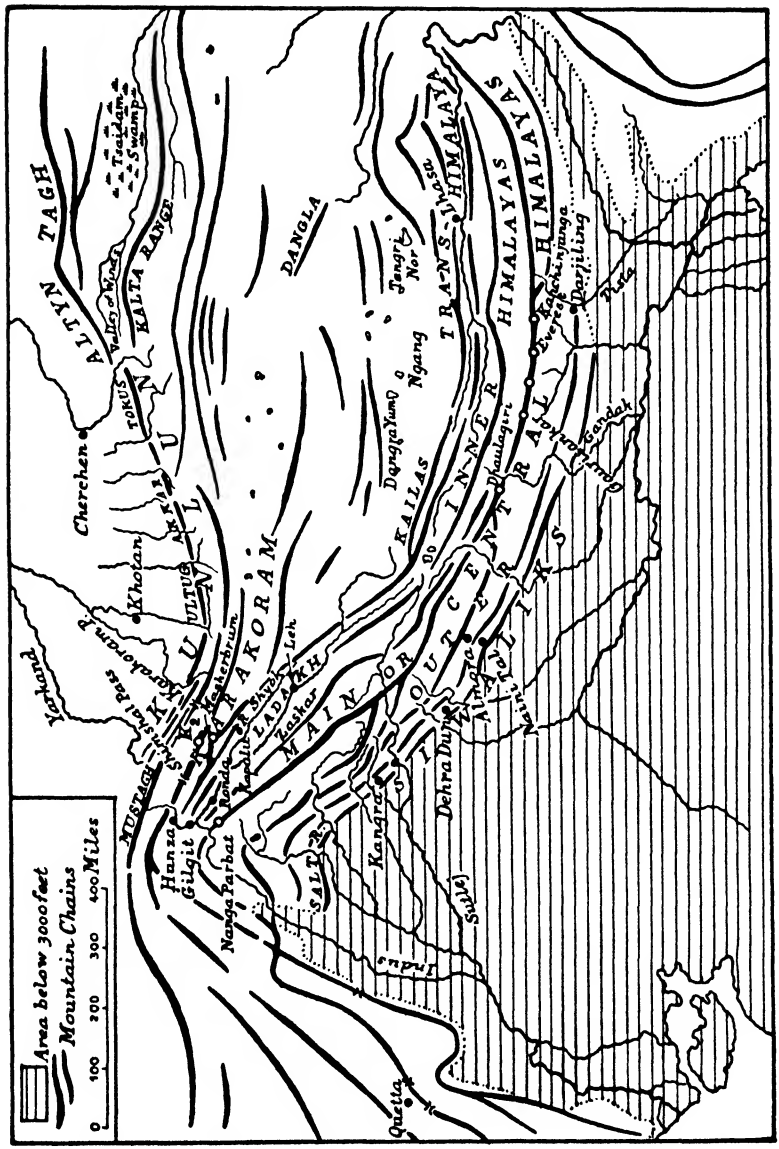

FIG. 16.—Tibeto-Himalayan Arcs.

For the structural details in longitudes 80°–85° E. (referred to on p. 68), see diagram on p. 373.

Brahmaputra gorge (*c.* 29° N., 94° E.), a distance of 1500 miles, but which persists intermittently across southern China into the Nan Shan. From its height, its exposure, and its orientation, it well earns its name "Abode of Snow"; but the snow-line in the specifically "Snowy" Range is not below 18,500 feet, and the proportion of snowy slope visible on most of the Giants is relatively small, *e.g.* compared with the Alps—though Kanchenjunga is a remarkable, and Nanga Parbat is a very remarkable, exception to this. Young mountains which can be seen easily from a right distance against an environment that suggests scale, and with a mantle that is the result of extremes of heat and cold on heavy snow, would be impressive and dramatic even if they had not immense height.

Watershed. While the system may be described as one of parallel ranges, these often lie obliquely to the general axis; and so rivers can escape from intermont valleys, as the Indus escapes round Nanga Parbat—without any of that "Pacific" interference which enables the Brahmaputra, *within 25 miles* measured directly along longitude 95° E., to plunge down from 9700 feet to 2500. No doubt, this is due in some cases to back-cutting, *e.g.* the Gandak; but there must be antecedent drainage in a mountain region where the geological sequence is almost entirely marine (Tethys), even if the antecedent development is obscure, and if back-cutting is also really important.

Three Divisions. These conditions make it easy to divide the system into three sections, which may be named from the significant river-lines—(*a*) the Indus-Sutlej, with the Shipki group of passes, which probably drew first attention to the site of Simla, (*b*) the Ganges-Gogra, with the Naini Tal-Almora group, and (*c*) the Gandak-Tista, with the three giants (Dhaulagiri, *c.* 26,800 feet, Mt. Everest, *c.* 29,140, and Kanchenjunga, *c.* 28,200) and the Sikhim group of passes, focussed on Darjiling. The Giants are all in the Main, or Central, or Zaskar, or Snowy Himalayas; but the Zaskar tributary of the Indus, like the Upper Sutlej, separates this Central range from the Inner or "Ladakh" range. Darjiling, at a height of *c.* 7200 feet, may represent the Outer, or Lower, Himalayas, which are separated by "Dun" depressions (*e.g.* Dehra and Kangra) from the Sub-Himalayan Salt Range and the Siwaliks. All the indeterminate drainage collects in the *Terai* swamp.

The Karakorams

The Limits. But we must distinguish both the Kun-lun and the Himalayas from the great complex which lies between the Tarim and the Indus basins west of the political frontier of Tibet. It lies roughly between 74° E. and 79° E., its physical limits being taken as the Hunza-Gilgit valley in the west and the Nubra-Shyok valley in the east; and its northern limit is rather the parapet above the Tarim basin than the Shimshal-Shaksgan depression, while a "straight" line

that can be drawn through Gilgit, Ronda, and Kapalu, never above 10,000 feet, makes an admirable southern limit. The Shimshal Pass, between the Yarkand and the Hunza basins, is under 15,000 feet; but it lies off the natural line of movement (from Yarkand, or even Khotan, to Leh), and is inferior from the climatic standpoint. The relatively easy Karakoram Pass, though fully 18,500, and the Saser, though fully 17,500, are the two vital points, the latter being the more critical.

The Character.

The focus of this complex is the Baltoro glacier, from which—apart from K^2 (28,250 feet)—ten other peaks radiate at heights between 23,000 and 28,000; and no equal area, even of the Himalayas, can rival this mass of glacier-mantled Giants. Though there is this special focus, there are three parallel ranges, that strike south-eastward from the Pamirs, thus facing essentially windward; and these may be distinguished most clearly and most easily as North, Central, and South, even if special features or historic names are associated with them, *e.g.* Aghil, Muztagh, Ladakh.

The "Label."

It is possible that the name Karakoram, "Black Rubble", was transferred here from Jenghiz Khan's old Mongol capital of Karakorum, which commanded the route (round the Khangai "Mountains") by the Kuliussai Pass between Ulyasutai and Kiakhta; and it is probable that at first it was given only to the pass. But it was natural for the Yarkandi traders to speak of the whole route as "the Karakoram route," and the name could easily spread to the containing country, even when this rose far above the snow-line into ice-clad peaks, or had patches of Sa-Ser "Yellow Ground." It seems advisable, then, to keep the name Karakoram—as a historic label, not as a descriptive adjective—for the whole region; and it is certainly helpful towards visualisation of the ranges to add the descriptive Muztagh, "Ice-Mountain," to those parts of the complex which deserve it.

Great Peaks.

This is specially true of the range which overhangs the Shaksgan valley. Here, within ten miles of the river, its western watershed in the first 30 miles of the river's course can show—three Teram Kangri peaks (24,200–24,500), two Gasherbrum (26,300–26,500), and two sentinels of K^2—Broad Peak (26,400) and Staircase Peak (24,750); and over the western water-parting Masherbrum (K^1) seems to have two peaks above 25,600, and Bride Peak is 25,100.

The Aghil ranges are in the Karakoram region, and have a number of peaks over 22,000, and at least one of 23,000; but historically, geologically, morphologically, they are distinct from the crystalline ranges to the south-west, and deserve some separate recognition, *e.g.* as the Aghil-Karakoram. The so-called Kailas do not deserve this; and, when the Manasarowar Kailas Peak is regarded by Hindus as the most sacred spot in the world—Siva's Paradise, it seems a pity to use the name in Kashmir.

The Great Passage-ways

The Pamirs

"Peak-foot." Though constantly spoken of as the Pamir plateau, it is no more a plateau than the Armenian crown, which it resembles in some essentials, if on a smaller scale; for it is a square segment of the folded belt, running about 150 miles both east-and-west and north-and-south. But, while the mass of the Armenian square is a real crown, from which the land falls in all directions, the Pamir is really a shallow bowl, overhung by the gable-ends of the Hindu Kush, the Tian Shan, the Kun-lun, and the Himalayas, and with its downfolds largely filled up by glacial and other deposits. These gable-ends justify its name, if that is really *Pai-mir* ("Peak-foot") and its alternative title of Bam-i-Dunya ("Roof of the World"); its character justifies the name *Pamir*, if that means "High Flat," the height suggesting that the flatness is largely of glacial origin.

Flatness. Flatness is the outstanding characteristic of the area—of the ridges as well as of the valleys; and the whole may be described as a partially peneplaned area in which wide, mature valleys are separated by residual ridges. No doubt, later glaciation further flattened the floors, but they had arrived at a primary form of sub-maturity before the "recent" elevation; and the terrific gorges at the ends of some of them reflect mainly the result of that elevation. Geographically, however, the essential fact is the typical flatness of the individual pamirs.

Though the Pamir square has been for many centuries a link between Sinkiang and Tibet, it is in no sense a Tibetan region. The two are not really akin physiographically, nor does one merge in the other. The Tibetan changs are not pamirs; though 2000 feet higher, they are not glacial; their water features are salt marshes, not fresh rivers; and they are comparable only in the character of their vegetation—where there is any.

Drainage. This series of pamirs, then, forms a corrugated square, which lies between the Trans-Alai and the Hindu Kush, and has its feature-lines parallel with theirs; but neither system in any way dominates the Pamir drainage. Indeed, the Trans-Alai, though reaching *c.* 23,400 feet in Kaufmann, feeds the Surghab and the Kashgar rather than the Upper Amu. The general slope is westward from the transverse axis of Sarikol, where both Muztagh-ata ("Father of Ice") and Kungur rise above 25,000 feet to crown the great fault scarp; and the particular destiny of the whole westward drainage seems to be decided by the ex-centric shoulder of the Karakoram west of Dapsang (27,000), for the whole of it is collected, westward and northward from this south-eastern corner, to the gorge in the north-western, where the Amu (Oxus) plunges down, as

a frontier to Afghanistan, to the head of Russian navigation at Khamiab.

The narrow parallel " valleys " usually vary from 5 to 10 miles in width ; and, with an average height of 12,000 to 13,000 feet, they are fenced northward and southward with blunt ridges of residual ranges—now largely mantled with glacial *débris*—that are 4000 to 5000 feet higher, with huge screes on both faces. The finer *débris* and alluvium have covered the filled-up troughs until they are almost dead-level ; and down each there is fresh water running from the snow and the ice of the ridges and the surrounding ranges, often expanding into a lake or into lateral peat-bogs. **The "Valleys."**

Practically all these streams feed the Oxus (*Aqua*, " Water ") or Ak-su (" White Water "). The Ak-Bilis-Wakhan-Pamir-Panj, of " the Afghan Finger," drains the Little and the Great Pamirs ; the Ghund drains the Alichur Pamir ; the Sares is drained by the Aksu-Murghab from above the Pamirski Post and round the Little and the Great Pamirs. All converge on gorges to the west, and so are dammed back into lakes ; but the largest lakes are to the east, where the drainage from the transverse axis first reaches the flats, *e.g.* the Rang Kul (" Goat Lake," but called by the Chinese the " Dragon Lake ") and the Victoria (Shive-kul) Lake of the Great Pamir, at a height of over 13,000 feet and with an area of 1000 square miles. The Kara Kul, or Khargosh Kul (120 square miles), is really a double lake, and does not properly belong to the Pamirs ; nor does the so-called Taghdumbash (" Supreme Peak " !) *Pamir*, with its stone houses and water-mills—fed from Kashmir—and fields of barley (*Tagharma*, " grain "). **The Lakes.**

The conspicuous feature of the climate is its dryness, not its extremes. The average temperature in winter scarcely falls below zero, and the average in summer generally rises above 57° F. ; Pamirski has a January average of −13° F., and a July average of 62° F., and the temperatures at the higher levels vary very little with the actual height. The great drawback is the violence of the winds in spring and summer, when sudden squalls are a real danger ; and so are the fogs, due to the dust (" loess ") whirled upwards by currents of hot air. **Climate.**

There is here a curiously close parallel with the coastal fogs of California—except for the difference of cause. For it is the thermal gradient that brings the strong west wind through the Golden Gate ; as the temperature falls, the wind falls, and so there is no longer a medium of transport for the cause of the fog.

Precipitation is, of course, very small—usually not more than the equivalent of 3 inches of rain ; but a definite percentage falls in June, and several factors combine to minimise the evil effect of the tiny fall. In such a relatively low latitude the summer day is relatively short, and at such a height in such a dry climate the summer night is very **Rainfall.**

cold; the snow and the ice are "permanent" from the end of October to the beginning of May, and the melting during the "short" summer day is not wasteful; the fineness of the surface layers of the flats leads to great absorption of water, and the trend of the ridges protects all the northward slopes. Further, the highest temperatures seem to be associated with what are almost monsoon phenomena, *e.g.* a temperature of 77° F. at Kizil Rabat on August 21 after 6 inches of snow had fallen in one day on the Beyik Pass (*c.* 15,000 feet).

Pastures. The total result is remarkable. There is never enough snow for the area to be snowed up, nor a cold enough summer for it to be "dried" up; fully one-tenth of the area seems to be reasonably described as "steppe," even if very poor steppe; and some of the coarse grasses are above the snow even in winter, while a large area is very rich in marsh grasses. The whole makes, therefore, a wide expanse of good pasturage, made all the better by the wide distribution of veils of salt, due to the rapid evaporation; but, of course, it is practically treeless. Cf. p. 34.

Fauna. This natural pasture must always have attracted an immense number of animals, especially in winter; the lonely parts still swarm with hares and goats, and the blunt crests of the ridges are so much more accessible than rocky crests for heavier animals that "Marco Polo's" sheep still survive there. And the Kirghiz regularly winter their domesticated sheep here when their lowland summer pastures are under snow. Indeed, as the lakes are rich in fish, and some flats can raise barley, *e.g.* Tagharma—at 15,000 feet, there is actually a "permanent" human population, estimated at about 1500 for the whole area (=Scotland).

Thoroughfare. Such an area in such a location was bound to become a thoroughfare, and was so probably 3000 years ago—certainly long before Alexander. It was most used between Eastern and Western Turkestan, especially for trade between Kashgar and Ferghana *via* Tashkurgan; but it formed a vital part of much longer routes, *e.g.* for Buddhist pilgrims between India and China, and even for Chinese armies, which certainly camped on the Wakhan Pamir in the seventh century. And, of course, Marco Polo used it. It is curious that the Buddhist pilgrims came specially from the Takla Makan cities, and they reached Chitral (Kashkar, as they called it) by the Baroghil Pass across the Hindu Kush.

Marginal Traffic. The best "roads" are those crossing the Greater and the Little Pamirs, the latter in places only 3 miles wide, but very level; the routes still associated with hares (Khargosh) and goats (Rang) may be assumed to be less easy, but it is a question of through traffic. The neglect of, *e.g.*, the Khargosh Pamir, has been due not to intrinsic inferiority, but to the impossibility of making a frontal attack on the terrific fault-scarp of the Sarikol, with three peaks above

25,000 feet; this had to be circumvented by the Kashgar and the Yarkand routes. Westward, too, there is something similar, for the easiest lines of approach are—towards the north from the Zarafshan (*e.g.* from Samarkand), and towards the south from the main Amu valley (*e.g.* from Balkh).

The Tarim Basin

Access. The Tibet block and the Tarim basin are complementary of each other, two parallel belts of stark desolation scattered over more than 1,000,000 square miles roughly between the meridians of 75° E. and 95° E.; but for many hundreds of miles the one has been an everlasting barrier between north and south, while the other has been a never idle road between east and west.

Cul de sac. The basin is really a gigantic *cul de sac*, with its open end in the east; and through this eastern gate for fully 3000 years man has worked his way westward in peace and war as naturally as sand has drifted westward before the persistent east wind. Of course, there was eastward movement as well, especially during the first 1000 years of our era; Stein found evidence that Greco-Buddhist art flourished over a 300-mile string of Buddhist oases on the Southern Silk Route (Khotan, Keria, Nia), and similar evidence was found round Kucha and Turfan. But the pressure was naturally greater from the open end of the *cul de sac*, even if the Uighur monarchs of Turfan were as tolerant—alike of race, of speech, and of creed—as the Mongols were intolerant; and we have in the Turfan one of those trifles which are of peculiar significance as evidence just because they are too insignificant to be false, for the *most westerly* settlement in the basin is Doksun, "Town 90"!

Its Fate. The wonderful preservation of these memorials of the past—in 17 languages and 24 scripts!—was the work of the drifting sand which blotted the civilisation out; but it was due to the conquest and the conscription of Jenghiz Khan that the land was so stripped of males that there was no longer man-power to deal with all the problems of sand and water involved in irrigation from the Tarim and its feeders. And eventual recovery from the Mongol paralysis was impossible, not only because the Sea Route to the East ruined the silk trade of the Land Route, but also because the whole genius of Islam was adverse to irrigation agriculture. There are no pastures on the floor of the Tarim basin; indeed, it was this lack of grazing that kept the basin relatively unharmed and even unvisited by the hordes.

Safe Passage. It was precisely the natural protection of its mountain and desert boundaries that made the basin so valuable to the Chinese as a safe route for commercial and political expansion, especially after they had acquired possession of Hami; and the abundant supplies of food for man and beast on the north-eastern flank of the Nan Shan,

at least as far as Suchow, were an actual invitation to start exploration north-westwards, especially for a people who never dreaded geographical difficulties so long as they were not complicated by political dangers.

Drainage. The symmetrical distribution of the surviving tributaries—Kashgar *v.* Yarkand, Aksu *v.* Khotan, Konche *v.* Cherchen—suggests that the region may reasonably be called the Tarim basin; but the river and its tributaries receive scarcely half of the total actual drainage. Indeed, from the southern watershed only one tributary, the Khotan, succeeds—for six weeks in the year!—in crossing the "Dry Sea" of dust and dune, salt and shifting sand, that we call the Takla-Makan Desert; and only one, the Cherchen, with its long fan of disused channels, makes any serious effort to skirt it, and so came to carry the old South Silk Road—Marco Polo's "Charchan route."

Dust and Dune. The essential cause of the desert lies in the relation of location to relief—in the inability of ocean winds to reach a mountain-ringed depression that is 1500 miles from the nearest sea (Yellow Sea) off which wet winds could reach it; and a perfect microcosm of the whole process is seen in the Turfan. The cause of the "sand," as dust or dune, lies in the violence and the persistence of the N.E. wind through the narrow gate (150 miles) between the Pei Shan and the Nan Shan; for this brings with it an immense and never-ending load from the rocky mountains between which it is compressed, and from the floor of the desert itself, over which it careers in mad gusts even at midnight. The sand is, naturally, dropped in a greater degree on the nearer area, *i.e.* over the south-eastern quadrant of the basin, where the dunes are higher (300–400 feet), longer, more regular, and separated by wind-graven *bayirs* in the clay floor. The dust is carried to the extreme west of the basin, where it is deposited—even at heights above 12,000 feet—in deep beds of loess; and in the west, too, the winds follow the curving mountain-wall round to the south, and make the dunes irregular and unstable in shape and size and direction. Everywhere dust and sand tend to collect, and so to form a series of self-contained drainage basins—all of them lying, like the oases, at heights from *c.* 3500 to *c.* 4500 feet.

The Tarim. The much-abused Tarim is far from being the main cause of the trouble. Primarily and fundamentally, the river is defensive rather than destructive; it has itself to fight an eternal battle with both the wind and the sand—a battle which becomes more and more desperate eastwards, and in which the water is gradually losing. Any material which the river does eventually provide for redistribution by the wind is brought almost entirely from the Tian Shan by the impetuous Ak-su, not from the Kun-lun or the Aghil-Karakorams by the sluggish main stream (Yarkand). Indeed, the real struggle scarcely begins till some 200 miles east of the Ak-su

confluence ; and in the whole " 700 " miles east of that confluence to the Kara-Koshan the river does not fall more than about 700 feet.

Of course, in all its 1000 miles from source to mouth, it is always cutting into its right bank, and it has already built up its bed to a level above that of the riparian lowlands ; but it is below—just below—4000 feet at the 77th meridian (Yarkand), and yet above—just above—3000 feet at the 87th, and is condemned thereby to much circuitous wandering—in some places a mile's meander to make 250 yards of nett progress eastward. Most of its 1000 miles, too, are threaded on that series of basins ; and, in its sinuous creep through these, it seems to acquire a habit of oscillating in time as well as in space. And so, when it once reaches delta level east of Karaul, its seasonal meandering is complicated by secular wandering, which may leave, and has left, its terminal home anywhere over the 150 miles between the Altyn Tagh and the Kuruk-Tagh. **A "Nomad."**

The part played by the wind must be very critical, if undeterminable ; for it is shut up within a basin three times as long (900 miles) as it is wide, and is always exaggerating the natural tendency of the river to cut into its right bank—until that bank is lined with a series of lakes and lagoons, that are often intentionally " locked," and so converted into fish-preserves. **Wind.**

Only the Kun-lun parapet feels the full blast of the grit-laden gales ; but these, whether N.E. winds for three-quarters of the year or N. winds for the winter quarter, do more than their obvious work. This is done on the floor of the basin—in miles of lofty dunes, lying parallel with the course of the N.E. winds, with steep butts to leeward and flanked by the wind-cleared *bayirs*. The work on the Kun-lun parapet is incalculable, *e.g.* on the higher slaty deposits or the lower shales ; but the piedmont is a wide (30–40 mile) bed of fine gravel and sand, which is useless for irrigation, and in which are lost irretrievably most of the ubiquitous torrents that scream down rocky gorges, crowned with glaciers grossly out of proportion to the amount of snowfall to-day, but overlaid with masses of detritus quite in proportion to the extreme range of temperature. Elsewhere in the basin, in spite of a possible quarter-million square miles of dunes, the more dominant note is in the dust and the dust-haze and the dust-fog—the last so beloved of " flies " as to have earned for the river bed the nickname of " Beelzebub's Nursery."

Man himself, too, is partly responsible for havoc worked by the river. As soon as the water begins to rise—in May, the drain on it for irrigation becomes so heavy that one-third of its volume is used up between the Ak-su confluence and the Kara-Koshan ; but two months before the river freezes—early in December, the temperature falls so low that all irrigation is stopped, canals—above ground or below (karez = " kanats ")—are neglected, and the river has to pour all the extra water into a channel paved with a whole season's load **Man.**

of fresh *débris*. A choked bed anywhere means an immediate overflow of flood down on to the riparian plains of loose sand, where there is nothing to control the water, still less anything to guide it into a permanent channel. We do not look at the map in vain for such tell-tale names for rivers as Yangi (" New ") or Kum (" Sandy ").

The Roads. But the conclusive vindication of the Tarim is in the relative importance of the North and the South Silk Roads to-day, in spite of the damage done by the spring flood from the melted river-ice and by the summer flood from the melted mountain-snow. Along and on the piedmont flank of the whole Yarkand-Tarim there are belts of natural and artificial vegetation—orchards and poplar or willow " lanes," fields of grain and fibres; but along the Kun-lun foot the skimped oases are few and far between, trees are as rare as rain and as brittle as glass, and such a famous historic market as Cherchen or Chakali (the junction for Urumtsi and Lhasa, Khotan and Suchow) is little more than a single street of mean hovels. At the same time, the fascines used in building the Great Wall were made of reeds or tarmarisk or poplar respectively in just those sections where to-day reeds or tarmarisk or poplar would naturally be available for similar purposes; but, now that the Great Silk Road is no longer a great trade route, its interest is mainly historical.

The Tian Shan

The containing wall of the basin on the north is much more than a wall, and needs more attention; and the nature of the problems involved is suggested by the fact that the old *North* Silk Road is really better known as the Nan Lu, " the *South* Road," but it is the " *Tian Shan* South Road."

Position. The most northerly of the four great mountain systems that radiate from the Pamirs must have certain advantages in both latitude and longitude. For its latitude must compensate for any little inferiority in altitude, and must give it a relatively long and a relatively temperate summer day, while its longitude leaves it with nothing reaching even 500 feet between it and the Caspian, and nothing reaching 1000 feet between it and the North Sea. As it lies roughly east-and-west, and has its maximum heights in the southern ranges, Arcto-Atlantic influences can reach practically the whole system, though it is in the very core of the largest continent in the world and on the line of the great mid-world deserts.

Character. In this respect its configuration, too, is an asset; for it is a flat arc wrapping round the Tarim basin on the north-west and the north-east as well as the north, *i.e.* working southwards at both ends. Consequently, the higher western half of the system shows enough flank to windward to make a great contrast between its northern

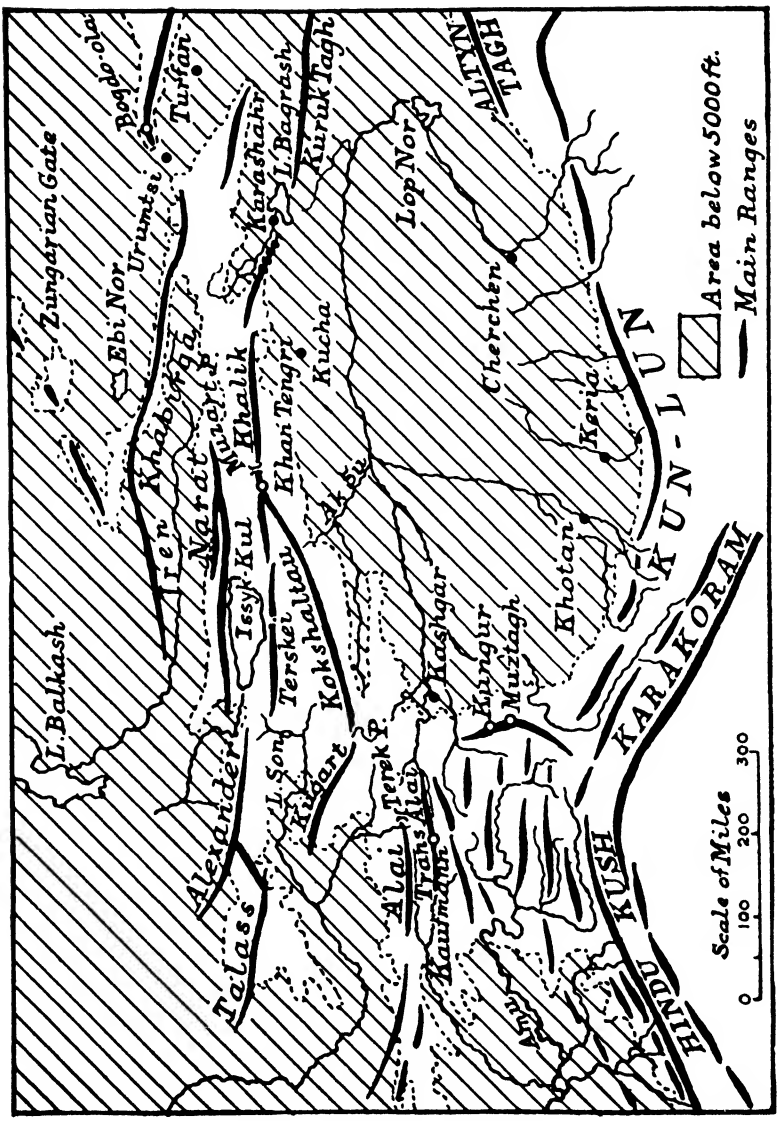

FIG. 17.—Tian Shan and Tarim Basin.

For details of the Karakorams and the Kun-lun, see p. 71, and for those of the Turan basin, see p. 85.

(N.W.) and its southern (S.E.) face, the former being exposed to the wet winds, but not to the fierce insolation.

Plateau Character. Structure and relief help to economise the precipitation, for the system is essentially a plateau—even if the "youth" implied in the word is due to recent resurrection of an ancient peneplain—of closely folded old limestone and slate, warped into shallow basins. These lie parallel with the axis, and are fringed by typical Border Ranges—from the advanced guard of the Pamirs in the Alai to Khan Tengri on the south, and the Narat range on the north, of the apex, and then southward to the Kuruk above Lop Nor to the south, and the Iren-Khabirga above Lake Bagrash to the north.

The most typical plateau development is over the 150 miles southward from the tectonic basin of Issyk-Kul, where there is an abrupt rise of 9000 feet from the lake to the top of the parapet; and the parapet here is formed of the finest of the Border Ranges, the Kok-tau and the Khalik, with their Khan Tengri link (*c.* 23,600 feet), where the scenery becomes Alpine. The two main arcs of the Iren-Khabirga and the "Khan Tengri" are flanked north-westward and north-eastward in a similar way by the Ala and the Bogdo-ola; and south-westward their Talass and Alai wings enclose the Ferghana drainage beyond the transverse Kugart range, as south-eastward their Karlik ("Snowy"!) and Kuruk ("Dry") wings enclose the Hami drainage beyond the transverse Karaschar trough.

The Roads. These broad shallow basins lie in "half a dozen" parallel belts, with an average height of 10,000 feet, *i.e.* well below the snow-line (12,000 feet); and the separating ridges are of about the same width (often a dozen miles), and rise to 3000–6000 feet above them. These ridges have an even sky-line, just notched into 1000-foot cracks that make passes, or articulated by faults with a "throw" of 2000 feet that divide the whole into a series of blocks; and so the through line of movement is very clear, and yet cross traffic is not difficult. This is true regionally as well as locally, for the approach to the outer passes from within is, of course, from the general plateau level; and this minimises the height of such passes as the Muzart and the Terek.

Height. The absolute height, as judged by the lake-levels, rises from north to south (Issyk 5200 feet, Son 9400, Chatyr 11,300), but the relative height, as judged by the rise of the ridges above the basins, falls from north to south—both in the main and in the flanking ranges; and so, though the snow-line is lower to the north, there is relatively easy access from north to south. Further, as maximum heights are in central longitudes, *c.* 80° E., there is relatively easy access to the core from either end. But, though the extreme height is seldom over 20,000 feet, and the average is under 15,000, the Border ranges have a very steep outward face, so that the snowfall is very heavy.

In spite of the montane structure the general "effect" is of plateau, looking level from above and lofty from below, and with streams at the bottom of gorges. Striking scenery is, therefore, largely confined to these gorges and to outward southern scarps, *e.g.* in the Kok-tau, where the early disappearance of the old protective glaciation and the greater range of temperature to leeward of a lofty crest have given rise to more rapid erosion, steepening slopes and sharpening peaks.

Drainage. The drainage is, of course, entirely continental; but it may be classified in a double way. As the system has great longitudinal extension (fully 1200 miles), and maximum heights are central, most of the rivers are longitudinal and of considerable length; and nearly all of these drain into lakes, the mass of the rainy western fan feeding the Aral Sea, while the mass of the rest feed Lake Balkash. In the east Lake Bagrash and the Lop Nor may be taken as representing—very feebly—these two western reservoirs.

A Race Home. Under these conditions of relief and climate we have one large area in Central Asia capable of supporting a nomad population from which "hordes" of raiders could radiate. The piedmont is a double belt of steppe (up to 1600 feet) and tillable (1600–4000), and then—above a deep belt of conifers—there is a belt of rich alp (8000–9500), especially to the north-west, though even in the Yulduz valley (*c.* 85° E.) it is almost equally good. Nearly everywhere, too, even along the great southern parapet, there are relatively easy passes, *e.g.* the Muzart, below Khan Tengri, only just touching the snow-line, and the "davan" just below Kaufmann being called Terek, "Poplar." To the south-east the Karaschar "Gate" is simply an open door, and the Ili valley is much the same to the north-west. In a word, then, there was almost everything here to attract the nomad; it was probably—*pace* Shirokogoroff—the race-home of the true Mongol, his area of precise characterisation; and through it—in later times—ran the Great North Road, *i.e.* the *Tian Shan* Pei Lu, to the Zungarian Gate, ever tempting him to wander windward in search of lands where rainfall never failed, and where pastures were always lush.

Imperial G.H.Q. But this was not the area of primary development. The "Turks" came to "High Tartary" from the steppes of Northern Mongolia, and found Zungaria a much richer land than their old home. Indeed, it was here that the central stock of all the Turkish tribes, the Uighurs, even settled down into agriculture; and it became the geometrical centre of Jenghiz Khan's empire when that stretched from the Dnieper to the Amur and from the Caspian to the Yellow Sea. But in the early days the rich and fertile Hwang-ho basin was "very near," and supplied all that the raiding instincts of the tribes wanted; and it was even the Hun control of the *natural* Silk Route *via* Hami and Urumtsi that

forced the Chinese to find the *unnatural* ones along the northern and the—still safer—southern margins of the Tarim basin, and that suggested to them the name of "*Tar-Tar*" (exactly the Greek "*Bar-Bar*-os") for the intruders. But the building of the Great Wall put a terrible obstacle in the way of the Huns' "short journeys," and its completion coincided with the start of their "long journeys."

The Turan Basin

It is impossible to dissociate the Turan flats, with their shifting sands and salt lakes, from the central highlands, for the basin links the Tian Shan and the Pamirs with the Hindu Kush, as the Tarim basin links them with the Kun-lun; and the relations of basin floor and containing highland are as much more intimate than in the Tarim basin as the Aral Sea is more alive than Lop Nor.

Size. The whole area from the Caspian to the Tian Shan and the Pamirs and from the Iran scarp to what may be called the Tarbagatai divide—for there is, south of the 50th parallel, a continuous extension of highland from that range to west of meridian 70° E.—approaches a million and a quarter square miles; and, though the mass of this consists of the desert flats, there are two other distinct types of country which monopolise the historic and the economic importance — the containing mountains and their piedmont platforms. These platforms have physically much in common with the flats and nothing in common with the mountains, but they are as closely associated with the mountains climatically and economically as they are dissociated from the flats. The vital factor is the climatic link, with its dependent transhumance.

Highlands. No doubt, the Tian Shan, with its fan of westward spurs—Kara, Alexander, Talass, etc.,—has been the most dominant of the containing highlands; but everywhere these are so high that there is great seasonal variation of climate and so of vegetational activity at different levels, the activity increasing in summer with the height. Of course, the mountains are typical Border ranges, with one foot up on the plateau, and so the passes are high (9000 feet and over), and the plainward gradient is very steep; but they carry a great deal of snow as well as many small glaciers (relics of large ones, *e.g.* 50 miles long and, in those days, descending to the 7000-foot contour), and the alp pasture is so rich that the upper levels have always been widely known and regularly used.

Moreover, in the critical Tian Shan latitudes, the ranges spread fan-wise westward, and are deeply carved by the valleys of Ili and Chu, Syr and Amu, so that movement between platform and plateau has been relatively easy quite apart from the facilities for longitudinal movement afforded by the Zungarian Gate. At the same time, the general trend of the system, *e.g.* in the Alai-Ala series of ranges,

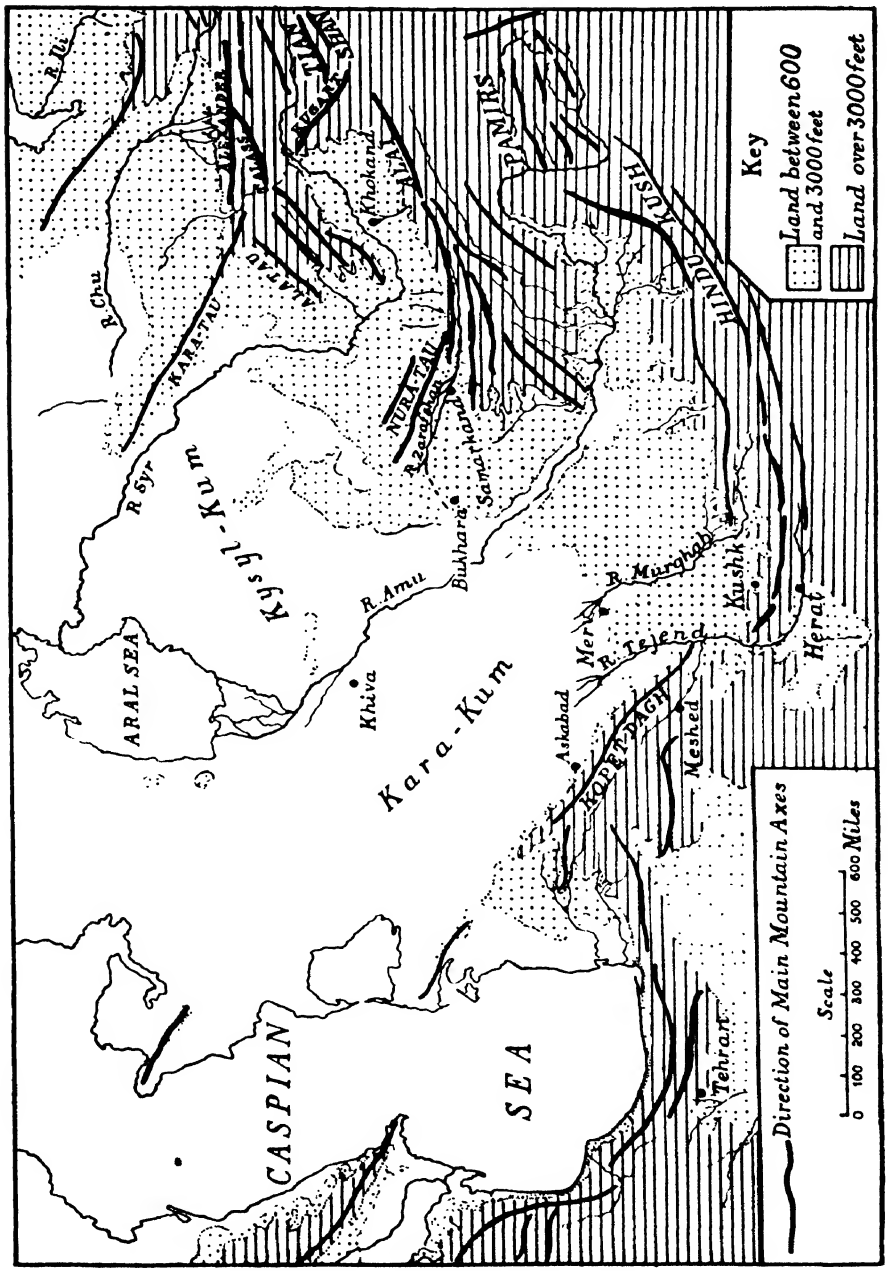

FIG. 18.—The relief of the Turanian Basin.

is north-eastward, a point of some importance climatically and in relation to continental lines of movement, even if the " fan " of the Khan, Kanduk, Kara, Kugart ranges is more important regionally. And it is worth notice that the " intermediate " features, such as the Talass and the Alexander ranges, are somewhat incoherent — a reason for classifying them with the general trend or the particular fan according to their physical history, *e.g.* the Alexander range being of the same age as the Tian Shan and so distinctly older than the Kara-tau, to which it leads.

40° N. Much the most important part of the platform is that lying between the Tarbagatai and the Nura-tau, on the critical 40th parallel; for south of the Kara-tau it is very narrow, and below the Kopet Dagh there is only a tiny strip. But everywhere it is free from salt, and the wide *syrts*[1] are even full of loess, which has been kept perfectly " sweet " by the limestone floor, while phosphates and gypsum are abundant in the cretaceous beds. On the mountain edge of this platform sprang up the famous oasis centres which have controlled the whole history of the basin and of lands far beyond it, and have marked for ages the only route between the central desert and its mountain ring, between the Caspian and the core of Asia.

The Oases. All the scarps, but especially in the heavily glaciated south-eastern section, send down hundreds of torrents; and nearly all of these are lost in the desert sands, but not before they have done their work for man, *e.g.* at Merv and Bukhara and Samarkand, whether he was Greek or Arab, Mongol or Slav. The Assyrians had a jade-route here from the Tarim; Timour fought nine battles round Merv, " the Eye of the World "—where the Bukhara-Meshed and the Khiva-Herat roads cross; and Russian railways now skirt both edges of the desert, and converge *via* Bukhara and Askabad on Merv and Kushk.

Their Story. The intrinsic importance of these oases must not be judged from their chequered story during the past millennium. In the dawn of history their natural security, their unfailing fertility, their adequate minimum of area, made them *a*—if not *the*—Home of Civilisation; but they " blocked " a thoroughfare, and wave after wave of invasion, especially of Mongols, swept away the old cities, with their libraries and other treasures. Of course, while the Mongol tyranny held, its whole empire made a single huge unit unhampered by political boundaries or barriers; but, when the Mongol power broke up, its minor natural units suffered. Then this Turan unit dissolved into a series of incoherent atoms on the separate oases, as they remained—except Khiva—till the day of the Russian railways.

Then, suddenly and artificially, they became stable and coherent, with an economic stability and a political coherence based on the

[1] Wide *river* valleys; *Syr*, " River."

railways. Land was held only by those with no conscientious objections to bearing arms in the service of the conquerors ; and political and military control of each centre was assured, at a minimum cost and with a minimum of trouble, by the careful fortification of the headquarters of the irrigation system on which life depended.

Desert Core.

The desert flats seldom rise above 400 feet, and even drop below sea-level in the west, where the Caspian is so " young " that the Amu never emptied into it—only into the " Ob " Gulf ; and the physical history of the land and its climate have left it a waste of sand, Kizil and Kara, " Red " and " Black " (really grey), with stray strips of loess—rendered useless by the climate. Only two rivers still hold their way across, and even they have lost all their chief tributaries, *e.g.* Tejend and Murghab, Zarafshan and Sary-Chu ; and so the Aral Sea is fast drying up—imperfectly fed, very low (though fully 200 feet above the Caspian), absorbed by a blazing sun, and with dry winds for ever sweeping across it.

Such variety as there is comes from the " cover," not from relief, and it is mainly latitudinal. The south is desert, south of 45° N. sand desert, of very fine sand, with sickle-shaped dunes that shift so constantly that they are not only plantless, but also lifeless—" petrified waves with a foam of drifting sand " ; and the sand is so deep that it is impossible to work down for stone to ballast the railway for quick heavy (military) traffic, and so mobile that even tamarisk and saxaul fences cannot prevent the line from being engulfed. It is even the cause of the dreaded " Turkestan fogs " in the Lower Volga basin. Farther north it is gravel desert, not quite so extensive and not wind-torn, which marks a transition belt to the steppe and signs of man.

Steppe Border.

Though the steppe at first is very poor and very salt, its scanty grass suits sheep admirably ; and, as the salt disappears northwards with the " increase " of rain and the " decrease " of heat, the loam-steppe is well grassed in spring and autumn, and even the driest parts can grow camel-thorn.

Unfortunately, spring and autumn are very short, for the Ob-Aral water-parting is really the climatic divide, and the land to the south of it is drought-stricken, with great extremes of temperature in the cloudless summer and the *buran*-cursed winter. There must be, therefore, a seasonal retreat for all nomads—at the worst, to the reed thickets by Aral, Ala Kul, etc., and at the best, to the mountain alp. Thus, even the flats are drawn into the economic unit of the platform and plateau, and form part of Central Asia ; and the nomads are seen to be less important, because less permanent, than the sedentary occupiers of the loess oases that skirt the surrounding scarps, whether Khorasan and Hindu Kush or Pamirs and Tian Shan. But the Sart occupier and his " hut " seem to be alien here ; for the word seems to be *Indian* (" trader "), and the huts are

substantially built—of mud brick,—and are as cool in summer as they are warm in winter.

The Sart. The middle courses of the two great rivers may have a maximum of non-human interest, with their vast diluvial deposits, deeply graven by " late " gorges with typically hard and clear outlines—the remains of tremendous avalanches of mud, and broad river-terraces broken by side-valleys of almost every possible shape and size. But the maximum of the human note is in the loess oases, where men of every race and every tongue become simply Sarts—the incarnation of the yellow dust, the yellow water, the yellow sunlight, with their huts perched on the brink of a river-cut ravine in the loess, while the lower levels teem with all sorts of animal life, that loves to lodge on, or to burrow into, the soft dry wall.

Climatic Focus. The basin, too, is one of the vital foci of the continent for the study of climatic stability; indeed, both longitudinally and latitudinally, it may even be considered the most vital in determining that the climatic distribution is not quite stable. For it has been established that during the last fifty years fundamental changes in pressure have caused changes in temperature and in rainfall. Increased pressure in and round the basin has resulted in an increase of the westerly and a decrease of the northerly component in the winds north of 40° N.; and this has been associated with an increase of temperature in the south-east of the continent, an increase of rainfall and a decrease of temperature north of 40° N., and a decrease of both temperature and rainfall throughout the south-west of the continent.

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CHAPTER VI

THE CLIMATE OF ASIA: GENERAL

Factors and Elements.

THREE factors are of outstanding import in determining the climate of Asia as a continental unit—size, latitude, and highland core; and, as we have paid considerable attention to this core, we may first give attention now to the two other factors, which are closely inter-related.

As land is the disturbing, and water is the ameliorating, factor in the distribution of climatic phenomena, we must expect to find most climatic disturbances in the Land Hemisphere of the world; and the mass of this lies in the North Temperate Zone. Here, too, we have the largest single expanse of land in the world, embracing one-third of the whole land surface of the globe—nearly half, if its European peninsula is included—and having a unique longitudinal extension, especially in so-called temperate latitudes. We expect, therefore, to find the most intemperate climates in these so-called temperate latitudes, with unique deviations from the normal planetary conditions. The problem of the climate of Asia must be a world problem; but the world seems to be one that is often contradicting itself, and behaving at times as a fixed star rather than as a rotating planet.

Of course, all the three causal factors in climate are definitely mathematical, and so ought to have constant values; but the values in this case must be greatly modified by the distribution of land and water. All the three resultant elements in climate involve this distribution of land and water; and in this case the relation of area to latitude, *i.e.* of actual size to length of day and intensity of insolation, is so important that it minimises in several ways the significance of relief, except in reference to the highland core as a terrific diagonal barrier, which rises steadily in latitude from the

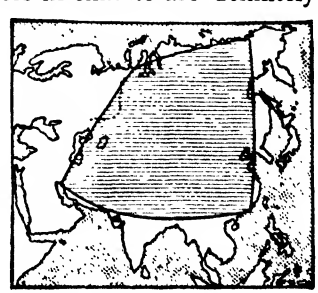

FIG. 19.—The Continental Shield of Asia.

south-west to the north-east of the continent between the Aegean and Bering Strait. The north-eastward trend of this diagonal is more important than the length, breadth, height, etc., of any single unit of relief, *e.g.* the Himalayas; it divides the continent approximately into equal halves, but gives them very different destinies.

Size. The size of Asia is reflected most significantly in the primitive feature of extension in longitude. At its smallest—narrow "Asia," —between the Aegean and Bering Strait, the continent extends from 26° E. to 170° W., *i.e.* some 6000 miles; and it measures nearly as much directly from east to west along the very critical parallel of 40° N. At its largest—as Eurasia—it extends to 10° W., *i.e.* an additional 36°, or 1600 miles, to windward along latitude 50° N. The latitudinal expansion is less marked, but the distance from Singapore to Cape Chelyuskin is over 78°, *i.e.* well over 5300 miles—from within 150 miles of the equator to within 700 miles of the North Pole. This happens to be along the central meridian of Asia proper, and this longitude 105° E. will prove to be as critical climatically between Atlantic and Pacific influences as latitude 40° N. is in so many other respects, especially historic and political. The land tendency towards extreme range of temperature must be at a maximum on this vast land-surface, where the mass of the area is at least 1000 miles from the ocean.

"Temperate" Latitudes. But to this land tendency towards extremes we have to add the tendency of temperate latitudes to be most intemperate in their climatic phenomena. Fully three-quarters of the whole continent lies north of the tropic, and most of the area south of that—between the Red Sea and the Formosa Strait—is not land, but water; and so the articulation of the continent in tropical latitudes actually emphasises the tyranny of the temperate latitudes. And between the Gulf of Bothnia and the Anadyr Gulf there lies an unbroken stretch of 5000 miles of land, flanked by an ocean which, for more than half the year, becomes land climatically. In any case, the total articulation of the continent gives a circumference only three times what the area would have even if it were a circle.

Monsoon Tendencies. So far, then, as land is dominant in the determination of climate, we must expect the climate of Asia to be wholly and uniquely monsoonal, in the wide but precise meaning of the word. The exciting factors must be such extremes of temperature as fully justify the word "continental" as applied to this largest of continents, and these will be associated with extremes of pressure; the obvious manifestation must be marked seasonal winds, blowing usually in abnormal directions—a determining fact,—but the northward winds trending eastward with instability and the southward winds trending westward and stable. There will be really only two seasons, winter and summer, spring and autumn being only short and stormy interludes at the two changes of season; the winter will be dry and

correspondingly cloudless, with terrific differences and ranges of temperature and with winds working their way to the surrounding ocean, and the summer will be wet and correspondingly cloudy, with close uniformity and slight range of temperature, and with winds

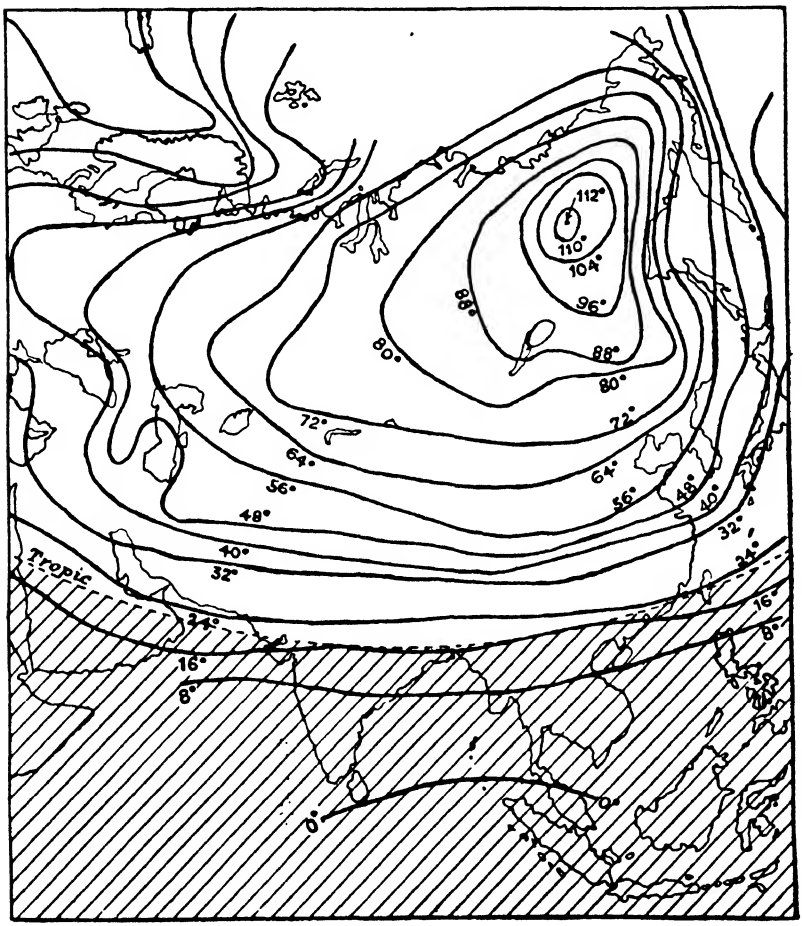

FIG. 20.—Temperature range over Asia (in degrees Fahrenheit).

working their way inland from that ocean. The low temperature will intensify, and spread, any areas of natural high pressure; and the high temperatures will neutralise, or dissipate, any such areas.

Local Modifications.

But we are prepared for modifications, small and great, local and regional, in the general continental scheme owing to high relief or to large bodies of inland or marginal sea. The Verkhoyansk Pole of Cold is developed at the bottom of a *cul-de-sac* within the Arctic

Circle; the Takla-Makan desert lies in a *cul-de-sac* in middle latitudes which wet winds cannot reach; and the ramparts which enclose India make Hindustan into a *cul-de-sac* which has to develop its own feeble high-pressure focus in winter, and its own fierce low-pressure focus in summer.

Atlantic Hinterland.

Relief, however, gives to more than half this vast area a typically Atlantic hinterland, at least half of which lies below 600 feet; typical Atlantic phenomena can be traced as far eastward as the Yablonoi scarp above Lake Baikal, and as far south as the Nejd and the Punjab; and the typical rains almost everywhere, winter and summer alike, are cyclonic. At the same time, the temperature effects are less favourable. The 5000 miles of Atlantic hinterland in high latitudes show almost no elevation above 1000 feet, while by far the greater part is under 500 feet. Distance from the ocean, then, is the prime factor in any great lowering of temperature in January or raising of it in July. Typical winter temperatures, in the latitude of Glasgow, vary from 32° F. at Copenhagen to 12° F. at Moscow, 2° F. at Ekaterinburg, −2° F. at Tomsk, −12° F. at Krasnoyarsk; in the latitude of the Shetlands, Yakutsk has a typical −46° F.

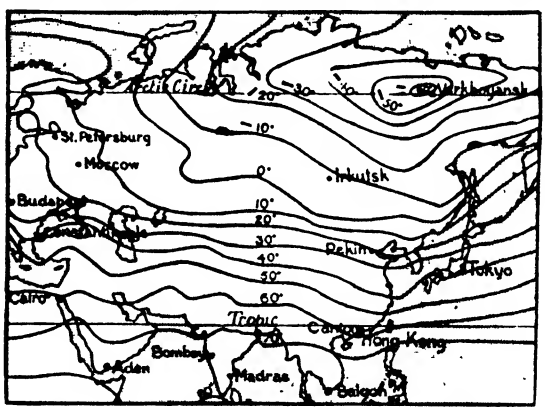

FIG. 21.—January Isotherms for Asia (after Buchan).

Pole of Cold.

The temperature minimum must naturally be found where ocean-influence and sun-power are at a minimum, especially if there can be found in the same place a basin to imprison the cold heavy air; and such a basin is found where the Orulgan, Verkhoyansk, and Stanovoi heights — reaching almost everywhere 3000 feet, and even 8000 in the Verkhoyansk, *i.e.* the southernmost, section—form a concave crescent hinterland to the New Siberian Islands, with their lower heights of 1000 to 1400 feet. Here, in the low gully of the Yana, within these containing heights, 300 miles from the Arctic waters or ice, and 700 miles across the Verkhoyansk barrier from the frozen coasts of the Okhotsk Sea, on the iced floor of the *cul-de-sac*, the town of Verkhoyansk has the lowest recorded temperature in the world—a temperature which would be fatal to Man if it were not always, and necessarily, associated with dead calm. The average temperature during the three winter months

is − 60° F., while the minimum is below − 90° F. (actually − 94° F.); and, as the maximum reaches 90° F., with an average of 60° F. during the three summer months, the range is equal to that from ice to boiling water.

Not Typical.

At the same time it must be kept in mind that the temperature of any one place, specially under conditions favourable to the collection of cold air or to the rapid heating of surface, must not be regarded as typical of the region; and on the open wind-swept Tundra 300 miles north of Verkhoyansk, but beyond the shelter of the Orulgan ranges, the mean January temperature seems to be *at least 20° F. higher* than at Verkhoyansk.

Indo-Pacific Lands.

The Indo-Pacific hinterland gives us phenomena that are quite comparable with these; its lack of "depth" and the character of the relief make them rather dissimilar in degree, but they are strictly similar in kind. A bare 1000 miles southward along meridian 90° E. from the Turfan sink takes us to the Ganges lowland, and some 1500 miles eastward takes us to the Chihli coast; but Lukchun has the greatest barometric range as yet recorded on the face of the earth, with a mean temperature range of more than 104° F., and Kaifeng is touched by the January isotherm of 32° F., a phenomenon unknown elsewhere along parallel 35° N. on a low plain beside the sea.

Spring *v.* Autumn.

Of course, a bowl below a block will always collect heavy-air drainage, and in the Turfan the barometer is below sea-level; and temperatures in a mountain-ringed *cul-de-sac* cannot be regarded as typical of the region, even when full allowance is made for a genuine inversion of temperature, such as makes many parts of the Central highlands[1] warmer in winter than the neighbouring lowlands. But there are two tests of real "continentality," which seem to be more trustworthy than either the relative annual range of temperature or the deviation of winter temperature from normal. One is the shortness of both spring and autumn, and the other is the superiority of spring over autumn in temperature—an impossibility where the conditions are sufficiently oceanic for the land to be covered deeply with snow in winter. Now, even on the Chihli lowland, in latitude 40° N. and 150 miles from the sea, the mean temperature rises 10° F. during the first fortnight of March; in the Turfan the mean of April is 21° F. above that for March; even at Delhi the difference between March and April is greater than that between any other two months in the year. Over all India, too,—at Darjiling as well as Bangalore, Poona as well as Patna,—April is warmer than October; even at Karachi the ocean cannot wholly neutralise the nearness to the Indian centres of both low and high pressure, and still April is warmer than October, while at Allahabad it is *10° F. warmer*. In the Pacific hinterland,

[1] Especially in the Pamirs and the Tian Shan.

especially to the north, the difference is still greater, *e.g.* being at least three times—often between four and five times—as great in the Gobi region as it is in the Turan region under similar conditions of location and relief.

High Pressure. Under such circumstances it is no wonder that Asia shows a high-pressure system far wider and far more intense than any other continent. The 30·6 isobar encloses as much area in Asia as the 30·2 does in North America; 30·4 reaches the mouth of the Peiho; and the 30·2—the isobar which encloses the North American nucleus—encloses here an area larger than the whole continent of North America!

The abnormality, too, is not restricted to the barometric records, but is reflected in the shape and the precise latitudes of the system. For the northward protrusion of the lobe of high pressure is slightly abnormal; and its "pear" shape, with the stalk trending north-eastward, reflects both the air "drainage" from the Tibetan plateau (with a normal pressure of less than 15°) and the temperature "drainage" from the Pole of Cold.

Outflow. So far as the scanty observations at our disposal suggest, the core of this terrific pressure seems to be in the Tarim-Gobi trough, the floor of which lies actually below sea-level in some places besides the Turfan, so that the pressure is fully 30·6; and its circumference stretches from the Tropic to the Arctic Circle and from the China Sea to the Caspian. From its centre, naturally, icy winds gravitate to every point of the compass, so far as relief allows, overriding almost all normal planetary movements; and for this reason it seems very desirable that the out-flowing winds—the icy N.W. wind that sweeps Korea, or the similar N.E. wind that sweeps the Kirghiz steppes, or the similar S.E. and S.W. winds that carry the lowest temperatures that Novaya Zemlya and the Liakhov Islands ever record—should be definitely known as Monsoons, and the whole movement as the Dry Monsoon.

Dry Monsoon. Those winds which move towards the equator are, no doubt, for that very reason, unusually stable and relatively non-cyclonic for monsoons, and some are not dry; but they are real monsoons. The northern part of the N.W. Monsoon is stone-dry till it crosses the 500 miles of the warm Japan Sea, but deposits yards of snow on the Japanese mountains—to protect the tea bushes; the southern part is stone-dry till it crosses the Yellow Sea, but in doing that it swings into a N.E. wind that carries 14 inches of winter rain to Shanghai and 11½ even to Hankow, *i.e.* respectively nearly 32 p.c. and 27 p.c. of their total annual rainfall. But this is associated with such temperatures as a typical − 2° F. at Harbin, in the latitude of Bordeaux, and of only 38° F. at Shanghai, in the latitude of Cairo, and with a seasonal or monsoonal character of the wind.

In the corresponding south-western quadrant of the whole

movement the S.E. winds are equally stone-dry, and pass over no large area of water, so that they could not collect vapour even if such water was not frozen; and their relation to precipitation on the

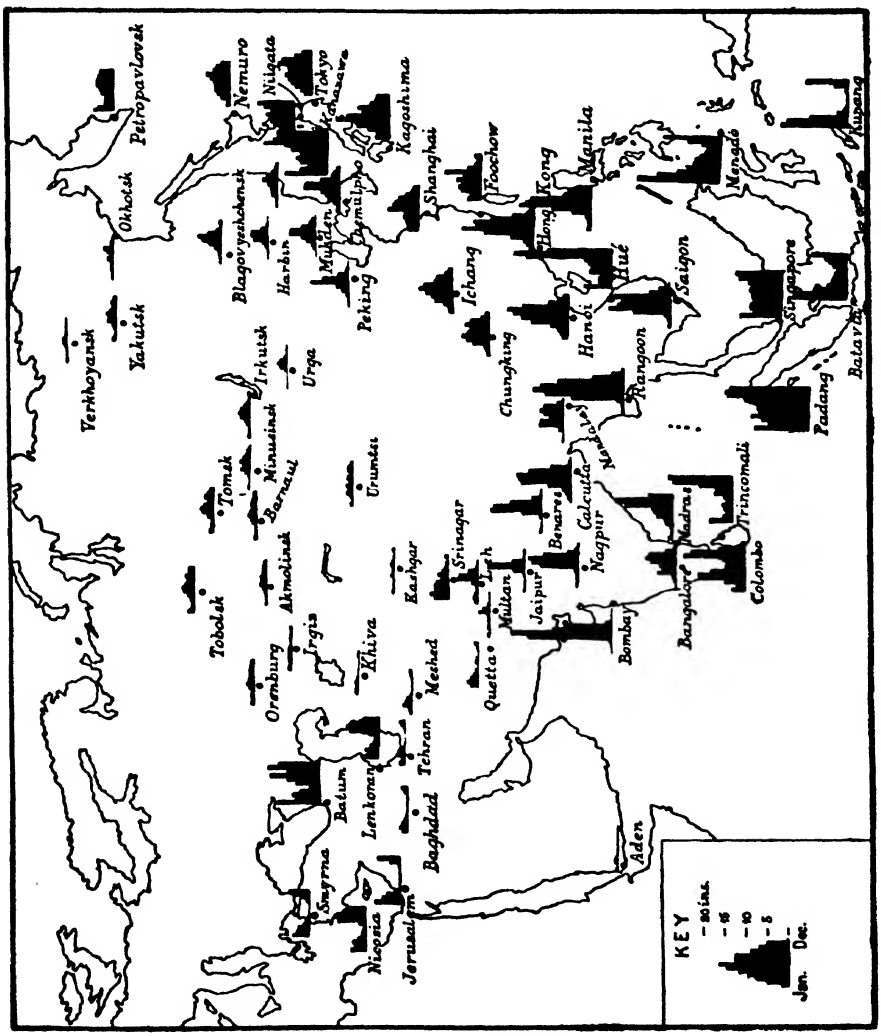

FIG. 22.—Rainfall Graphs.

wooded Urals and in north-western Siberia is quite indirect, due wholly to the fact that they arrest and divert northward the inflow of warm rain-bearing S.W. winds from the Atlantic *via* the Aegean.

Both the very high pressure and the very low temperature imply

Local Units. a minimum of water-vapour, which means very rapid radiation, very clear skies, very high solar values, sunburn in China being actually associated with winter; and there must be many secondary foci of local pressure and many continental sources of local rainfall, each with its own local *régime*. Some of these "orphans of the storm" may be quite near the coast, accentuated by cold currents, but not ameliorated by warm ones, so long as the air is moving outwards; and there are marked contrasts associated with them. For instance, on the meridian of Tokyo the fall of temperature from the Tropic to latitude 50° N. is in January from 70° F. to zero, but in July only from 75° F. to 65° F.

Origin of Moisture. The problem of the local sources of rainfall in the heart of Asia is one of the points on which Kropotkin has been most misrepresented, and it is one of those that illustrate best how seldom his geographical instinct erred. For we know now that no rain from either the Atlantic or the Pacific reaches the heart of the great eastern lobe of the Asiatic plateau. This lobe constitutes fully 25 p.c. of the total area of Asia; at its narrowest, in the Vitim plateau, where it does feel Pacific influences, its average height approximates to 5000 feet; at its broadest, between the Tarbagatai and the Liang-shan, it approximates to 2000 miles; and the average height of the peripheral scarps in the central latitudes must make them a final barrier to any water-bearing winds from either ocean. Over thousands of square miles, then, in this continental core the tiny precipitation must be, as Kropotkin suggested, derived wholly and directly from evaporation off rivers, swamps, and lakes that are fed from snow and ice lingering on from cycles of heavier precipitation in past ages; but in those days there was a different distribution of land and water, with the Tarbagatai overhanging the shore of a vast Arcto-Turanian sea. An attempt to put Kropotkin's suggestion into actual figures has resulted in an estimate of probably 2,500,000 square miles fed only from these relics of the Great Ice Age. This is continentality at its fiercest.

Extremes. Less than ever, then, need we wonder at the abnormality of the pressure systems. We have seen that the winter temperature is —practically everywhere outside the tropics—from 15° F. to 25° F. below the normal for similar latitudes elsewhere; and, though we may expect the extremes in these largely temperate latitudes to tend more to cold than to heat, the summer is almost as abnormal as the winter, the extremes being from 10° F. to 15° F. higher than in any similar latitudes elsewhere—a fact that would, of itself, mean wet summers over a vast area. The 29·7 isobar in July actually extends from Khartum to Yakutsk, the critical 29·5 stretches almost from the Red Sea to Lake Baikal—with a typical 90° F. temperature,—and the 29·4 from Maskat to Multan; and most of the total area,

whatever its altitude, has an actual temperature of at least 68° F., *i.e.* a temperature at which typical sub-tropical plants mature, and which is very favourable to most temperate plants *if* they can obtain water, and *if* the heat is not maintained too long.

Latitude.

Though these mean temperatures and pressures seem to have little reference to latitude, there are some peculiarities which may be related usefully to it, the North Tropic and the Arctic Circle being less significant than the parallel of 50° N., *i.e.* the line where periodic rain (really, spring rain) merges in rain at all seasons (the maximum coming in summer). South of the tropic the mean winter temperature is normally above 70° F., and north of 50° N. the mean summer temperature is normally below 70° F.; and so, if any place records a summer temperature of 70° F., as Vladivostok does, one would assume that it was south of 50° N., even if its midwinter temperature is only 8° F. Of course, on the eastern side of the high-pressure centre winds must be *north* winds, and so bring temperatures associated with the Pole of Cold; Peking, in approximately the same latitude as Lisbon and San Francisco, has a mean January temperature of 23·5° F.

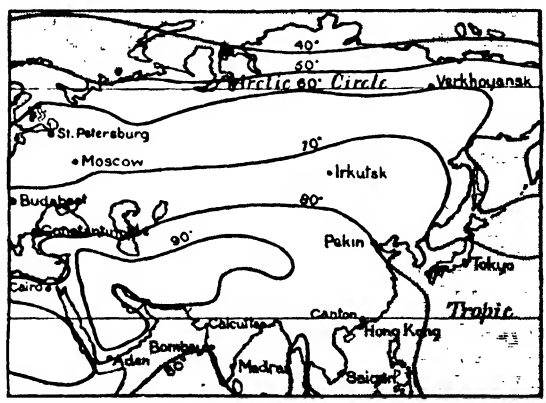

FIG. 23.—July Isotherms for Asia (after Buchan).

Dominant Factors.

Two details are of great importance. The first is that the continent itself is the dominant factor—far more dominant than any part of it, however much isolated and insolated. Even on the Indus plain, in spite of the terrific May temperatures, the Wet Monsoon cannot penetrate until not only the whole equatorial low-pressure belt has been filled up (? by air that has risen from the Indus basin), but also the whole arc of containing plateau, west, north, and east, has warmed up; indeed, the strong S.W. wind is blowing up the Helmand valley several weeks before it begins to blow up the Indus valley. The second is the vastly under-rated importance of the length of day in relation to the angle of solar incidence, especially in a continent with a unique extension in longitude. The theoretical heating-power of the midsummer sun at noon in Semipalatinsk is *not 7 p.c. less* than in Surat, while the accumulated total in a 2¼ hours longer day is about *12 p.c. more*; that is to say, along the

central parallel of the continent the altitude of the sun, even allowing 10 p.c. depreciation in the more oblique rays, is less important than the hours of sunlight. Again, it seems very desirable that all the in-flowing winds in summer, *e.g.* the strong west wind that crosses Europe during the last week in May, should be called a monsoon, and the whole movement known as the West Monsoon.

Reinforced Anti-Trade.

If it seems undesirable to call this particular wet wind a monsoon, it might at least be described as a reinforced Anti-Trade, just as the N.E. Monsoon in Madras is a reinforced Trade; the one has a positively low pressure immediately in front of it, as the other has a relatively high pressure immediately behind it. In any case, this western approach is the easiest of all to the core of the continent, even when that seems to belong to the Indo-Pacific hinterland; and the movement of the wind inland is marked by a distinct and progressive *fall* in temperature or in range of temperature from west to east, due to rise of humidity. The prevalence of west winds over the North European plain during the last week in May is 25 p.c., but during the first week in June it is 75 p.c.; and a range of 15° F. between April and May drops to one of 5° F. between May and June. It may be the influence of the wide and well-established inflow that causes the clear break *at the same time* in the eastern Mediterranean in the Etesian winds—between the "false Etesian" *Prodroms* ("Fore-runners") and the true Etesians.

North Monsoon.

At the same time, off the open Arctic Ocean, which is an integral part of the Atlantic basin, there begins a steady southward movement of moist air into Siberia, especially west of Cape Chelyuskin; this should be called the North Monsoon, and its sphere of influence shows the delay of maximum temperature till July,[1] a phenomenon as typical of the temperate monsoon as the arrival of the maximum in May is of the tropical monsoon. The only feature of the movement which is un-monsoonal is that the southward direction gives it so much stability that its rains are relief rains rather than cyclonic, or at least show the typical interaction of cyclonic and relief factors where the air is relatively stable; and, so far as the continent as a whole is concerned, this rise of humidity over the north-west quadrant is balanced by the widespread belt of summer drought over the south-west quadrant from the Mediterranean to—and beyond—the Zagros barrier.

[1] July seems to be the normal month for this in such a location.

REFERENCES.—HANN, *Handbuch der Klimatologie* (1910); ELIOT, *The Climatological Atlas of India* (1906).

CHAPTER VII

THE CLIMATE: SOME SPECIAL ASPECTS

We have associated with the word " monsoonal " (p. 90) a contrast between summer conditions of wonderful continental uniformity and winter conditions of wonderful regional diversities, *e.g.* the whole Arcto-Atlantic hinterland showing a maximum-temperature difference of well under 20° F. in July, and a minimum-temperature difference of well over 100° F. in January; and it seems to follow reasonably that we should pay more attention to the diversities than to the uniformity. We can see the latter illustrated in all its essential principles and processes by the familiar phenomena of the Wet Monsoon over India; and the essentials remain the same all over the continent.

Simple *v.* Complex.

If the monsoon is simply a gigantic land-and-sea breeze, dependent organically on the different rates at which land and sea heat and cool, it must be less vigorous where, and when, the temperatures of land and sea are most alike; and, if land is the disturbing factor, local depressions may develop wherever conditions of relief and surface-cover favour rapid heating, as in the Red Basin of China or the Tarim Basin. Thus, the relative strength of the wind in China during the Dry and the Wet Monsoons, or the regional distribution of rain, is determined with comparative ease and certainty; and the more or less purely " Mediterranean " phenomena of the south-western peninsula of the continent are equally simple. But the phenomena of the direct Arcto-Atlantic hinterland are complicated, and an examination of regional in relation to seasonal differences and movements brings out the peculiar importance of parallel 40° N. and meridian 105° E.

Cyclonic Normality.

North of 40° N. the continent is dominated, normally, by a circumpolar procession of alternating cyclones and anti-cyclones. The former are very active, and precipitate a relatively heavy rainfall; the latter are very sluggish, and the absence of precipitation and even of cloud gives unusual value to the solar control. The movements both of, and in, this belt are fundamentally normal: it swings with the sun; its pressure changes, especially over the

continental margins, are greatest in winter; and marked low-pressure centres are a dominant feature on almost any series of weather maps.

Continental Abnormalities.

But these perfectly normal conditions are modified, just as one would expect, by the continental control. The very low temperature of the interior is naturally associated with very high pressure; and the result is that the cyclones are shouldered off their natural path, and the importance of the anti-cyclonic intervals is greatly exaggerated. In a word, the dominant climatic factor is the sheer size of the continent, and this is reflected in abnormal conditions,

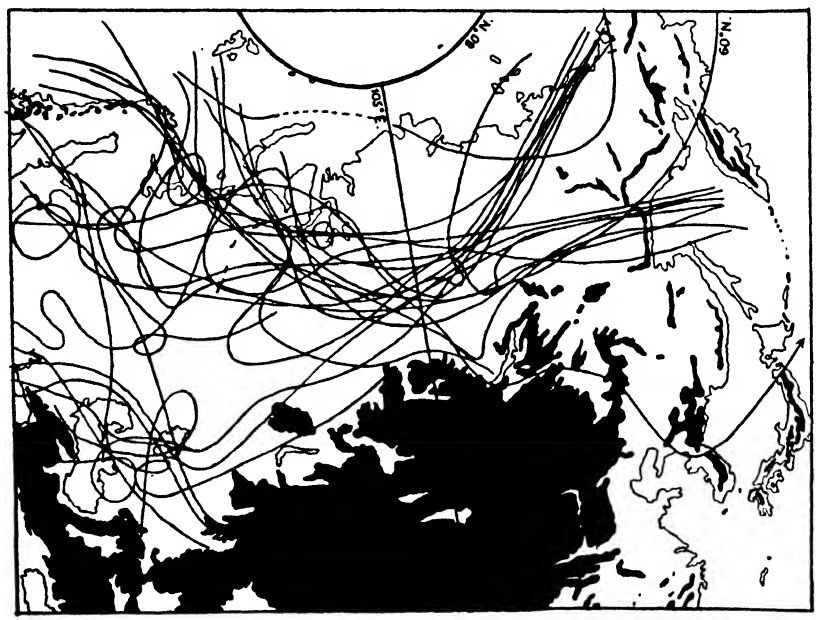

FIG. 24.—Cyclone tracks, December–January (total paths for three-year period, 1912–1914).

appropriate to the prevailing latitudes; they are, therefore, specially marked in winter to the north, and in summer to the south, of latitude 40° N.

Cyclonic Tracks.

Northern Asia, then, is normal in winter in the two respects that cyclones are more numerous than in summer, and that pressure changes are more marked; but it is abnormal in four respects. First, the cyclonic paths lie in very high latitudes—with one exception, north of 55° N., *i.e.* north of the latitude of Newcastle and Carlisle, of James Bay and Athabasca Landing; and the one exception only proves the rule, for in the extreme south-west the Mediterranean stream simply plunges northwards instead of persisting eastward. The cause is a double one—relief and the

high-pressure " shield " ; and their influence is practically identical, for the shield acts as a stationary and a more or less impenetrable barrier except in the upper air. Relief, then, and continentality combine to produce the anomaly of the cyclonic paths being in higher latitudes in winter than in summer.

Pressure.

A second feature is that, while the pressure changes are most marked in winter, the high pressure is more marked than the low pressure. Indeed, the troughs of the low pressure show an average of 29·7 ; that is to say, they are scarcely " low " at all. This involves two further abnormalities : there are actually more cyclones in spring than in winter ; and, in spite of the activity of the cyclonic conditions in winter, there is scarcely any precipitation. A perfectly typical week in the middle of January at Samarovsk (roughly 60° N., 70° E.) shows the following details of temperature (7 A.M.), wind, and precipitation :

Temp. (F.)	.	−24°	−6°	−11°	+10°	+1°	−6°	−2°	−27°
Wind	.	Calm	Calm	N.E.	*W.*	*W.*	E.	E.	Calm
Prec.	.	0	0	0	Snow	Snow	0	0	0

This shows how very low the absolute humidity is, and how potent Atlantic influences are even 2500 miles inland.

Lines of Entry.

The latter phenomenon is emphasised by the paths followed by the cyclones. For there are three definite lines of entry— Atlantic, Mediterranean, and Baltic ; the Atlantic line, *i.e.* north-west of Scandinavia, shows nearly three times as much activity as the Mediterranean and more than three times as much as the Baltic. The Mediterranean stream, though more active than the Baltic, is of less importance ; for its direct influence is purely " local," shown in a sprinkling of snow in the Turan basin, where most of the cyclones fill up or—as suggested by the kite experiments—climb the " wall " of the high-pressure shield, and cannot be traced with certainty, though they are almost certainly responsible for the relative warmth of the higher levels, *e.g.* of the Pamirs and the Tian Shan.

The Baltic stream moves quite normally over the line of " lakes " ; but the Atlantic stream, east of the North Cape, swings south-eastward over, and with, the warm drift along the Kola coast, and then seems to be guided by the Timan range—despite its low crest (*c.* 900 ft.)—still more southwards. But, once it has begun to move southwards, deflection must press it against the Timan range ; and eventually it joins the Baltic stream in crossing the Urals. The approaching gradient from the west to the Urals is relatively gentle, but the height of the crest (5100–5400 ft.) is sufficient to account for the thick forests, both coniferous and deciduous, for the föhn effect eastward on the course of isotherm 0° F., and for a " 7 % clouded sky " belt running *south* along meridian 40° E.

105° E. The path of the combined stream to the Pacific shows distinct differences east and west of the critical 105° E. meridian from Singapore to Cape Chelyuskin. To the west the path is determined obviously by both the relief and the continentality; the cyclones find great difficulty in climbing the gentle slope, they move—like those observed by the Michigan Expedition in Greenland—very slowly, and they constantly recurve to try a different path; they precipitate 3 feet of snow almost everywhere and 4 feet against the 600-foot contour at Tomsk; and their gentle and intermittent character, their warmth, and their relatively high humidity make them not unfavourable to forest-growth, especially as the very low temperature of the anti-cyclonic intervals is associated with an entire absence of wind. South of 55° N., however, in this western area the absence of cyclones implies an absence of snow and a steady drift of cold air from the north-east; and in the highest latitudes of the *buran* the forest must give place to steppe.

Föhn Effects. East of 105° E. the system seems to come at once under the influence of the Pacific, but otherwise is guided solely by relief. It begins to move rapidly, and there is no recurving; the steady descent into the Yakutsk basin is associated with a föhn effect, so that Yakutsk (*c.* 300 feet) gets only 14 p.c. of its annual precipitation (14 inches) in the three winter months; the Aldan valley gives a line of minimum resistance to both the Japan and the Okhotsk seas; and, again, the sharp descent from the Stanovoi scarp is associated with a strong föhn effect. The influence of the latter on the winds that pass over the Okhotsk sea is surely to be traced in the yards of snow which they deposit on the western slopes of the continuous 3000-foot meridional backbone of Kamchatka.

Relief Control. The relief control reminds us—from an exactly opposite standpoint—of the reaction of the Mediterranean stream to the high-pressure "wall" north-east of the Caspian. The mass of the movement is diverted sharply south-eastward by the Verkhoyansk mountain-wall, and then follows up eastward the very low valley of the Lena and its Aldan tributary to within 200 miles of the coast. This is reached across the narrowest and lowest section (Jurgur) of the Stanovoi scarp.

Summer *Régime*. In summer, again, northern Asia—outside the influence of the Pacific Monsoon—shows a curious mixture of the normal and the abnormal. The cyclones travel in normal latitudes—at least 5° farther south than in winter, and they are fewer and less intense; but their size and their effect are abnormal. For, though they are very shallow, they are much larger than in winter, and the high-pressure intervals are very slight—seldom over 30·2; and, though the cyclones are fewer, there is actually more rain. This relatively

heavy rainfall is due, of course, to the greater degree of absolute humidity in the higher temperature; but the Atlantic proper is no longer the only source of supply, for there is now a steady inflow of moisture from the Arctic waters on a typical North Monsoon. Cf. p. 98.

West Monsoon.

The relation of this to the West Monsoon—or reinforced Anti-Trade—from the Atlantic may, perhaps, be suggested by the distribution of rain in time and in place. Neither of them seems to have anything to do with the scanty (under 5 inches) spring rains over the Turan basin, which seem to be due directly to the very rapid heating of the sand-cover of the desert during March beneath a canopy of heavy cold air, with the consequent convectional over-turn that results in thunder-showers.

North of the Ob-Aral water-parting, however,—roughly 50° N.—it seems possible to distinguish between them; at least there are some significant data. In the first place, the rapid and continuous fall of relative humidity at Orenburg from the end of June, which allows the marked rise of temperature in July, seems to be significant; for it suggests that we can scarcely attribute to Atlantic influences very "heavy" rains a month or two later some 1000 or 2000 miles farther from the Atlantic. But, *e.g.* at places so far apart as Tobolsk and Barnaul, there is a steady rise in relative humidity *after* June, both of them showing 18 p.c. of their annual rainfall in July and 16 p.c. in August.

October Rains.

Tomsk and Yakutsk add an interesting detail. The former stands on the eastern limit of that "cloudy sky" in winter which reflects Atlantic influence in raising the relative humidity as the temperature falls; and it shows 15 p.c. and 12 p.c. of its total rainfall respectively for July and August. But it has also what looks like a typical *oceanic* fall in October—also of 12 p.c.; and, as the snowfall does not begin till November, this may reflect the last "burst" of the "retreating monsoon." The lateness is what we would expect, for the maximum influence of the Arctic Ocean, as of the Atlantic, cannot be felt till the end of summer; and in the higher latitudes the Arctic winds are so cool that they absorb rather than drop moisture. Yakutsk, more than 1600 miles farther from the Atlantic, has a still more marked rise of humidity and at a still later date, with 20 p.c. of its total rainfall in August and again a significant October rainfall (4 p.c.).

North Monsoon.

In the second place, we have to account for the persistent *north* winds over the southern half of the Arcto-Atlantic hinterland in summer. Naturally, these give up no rain in blowing over the lowlands; but on the highlands it is very different, and the distribution is at once significant. In the typical longitudinal valleys, *e.g.* the Kask valley, it is on the eastward flank that the dense forests of spruce, etc., are found, when Atlantic rain brought to

have rather affected the westward flank; and these forests are "drenched" (Colonel Schomberg's word) with rain in *August*. Perhaps more significant still is the similar drenching of places in gullies open to the north and yet farther from the Atlantic, *e.g.* Urumtsi, in the lee—*i.e.* eastward—of the Tori Bogdo (Dössmegen = ?20,000 feet).

Tian Shan. The Tian Shan seems to be the meeting-place of the two systems. The thick layers of loess on its western slopes must be due to the strong west winds in early summer, and its abundance of rain and the high absolute humidity (as high as in Paris) on its Turan piedmont can surely *not* be "associated with the Caspian and the Aral seas," as has been confidently asserted; but why is there a deep mantle of snow on the northern face of the Iren-Khabirga *only east of longitude* 83° E., *i.e.* after the range has begun to trend *south*-eastward? And how can the heavy snow-storms in August farther east still be associated with moisture from the west?

Summer Tracks. The path followed in summer by these Arcto-Atlantic cyclones is controlled partly by relief and partly by the continental low-pressure system, but again longitude 105° E. is a critical line, perhaps again related to the strength of the North Monsoon; for there is a practically continuous stretch of highland, from 1600 to 2000 feet, along the meridian of Irkutsk (104° E.) from that town to the Arctic Circle. With a wide entry from Europe they cover, north of 40° N., practically the whole lowland in the west; but, as they are seeking, not the Pacific, but the immediate continental focus, they move even more slowly than in winter, they constantly recurve, and are often "lost." East of 105° E. relief ceases to have the dominant control, and the cyclones sweep southward; but their objective is on land, not on sea. They take, therefore, the most westerly, not the most easterly, line of minimum resistance, some even working up the Uda "fiord" along the Trans-Siberian railway route, while the rest move by the Olekma valley; and this, no doubt, helps to account for the low precipitation on the western scarp of Kamchatka in summer and for the heavy precipitation at the same time on the western scarps of the Vitim and the Aldan plateaus.

Spring and Autumn. The transition seasons present some interesting features. The rapid heating of the land in early spring, while the cyclones are still relatively intense and moving in high latitudes, makes them much more important then than in autumn, when the rapidly cooling land tends to exclude them; indeed, as we have seen, they are more important in spring than even in winter. At the same time, the autumn cyclones show the typically Atlantic phenomenon of maximum precipitation in October; Tomsk shows a typical record for September, October, and November of 1·4, 2·4, 1·4

inches, *i.e.* 12 p.c. of its annual fall in October; and Yakutsk shows 1·2, 1·4, 0·6 inches, *i.e.* 10 p.c. of its total.

Indo-Pacific Lands.

The essential conditions on the Indian and the Pacific hinterlands are similar to those on the Atlantic and the Arctic hinterlands; but the regional phenomena often differ both in degree and in sequence, and the southern differ from the eastern. The tropical phenomena in India need careful relation to the Indian Ocean, while the temperate Sino-Japanese need rather relation to the vast diagonal Divide and the local relief; but south and east agree in the narrowness of their hinterlands, and both are cut off

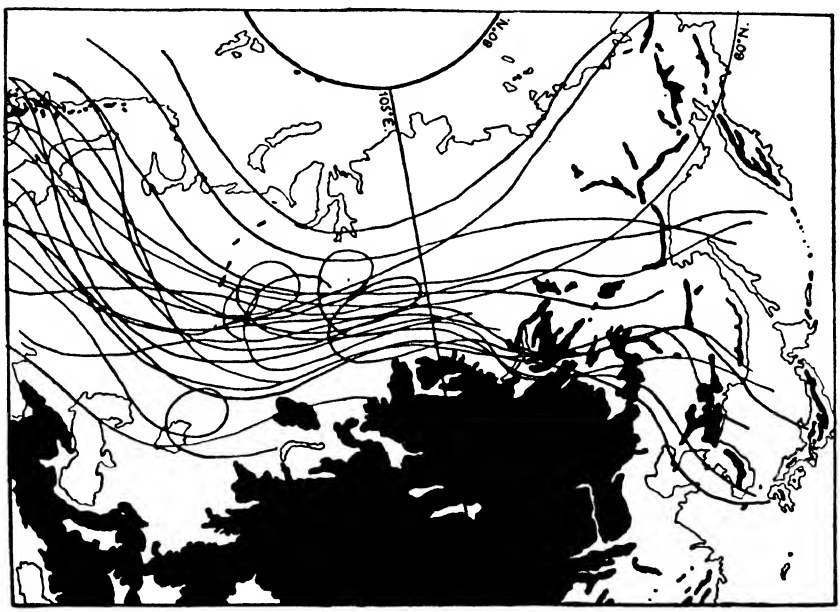

FIG. 25.—Cyclone tracks, June–July and August (total paths for three-year period, 1912–1914).

from the north and the west by hundreds of thousands of square miles where the tiny precipitation, if not directly or entirely local, owes nothing to the Indo-Pacific waters.

Indian Ocean.

The main differences between the southern and the eastern regions depend on differences of latitude and of oceanic relations. The Indian Ocean has been described as "only half an ocean"; it is not half the size of the Pacific; and the great mass of it is wholly within the tropics and flanked by tropical plateau. It is, therefore, both the most enclosed and the warmest ocean in the world, under a double land influence. These are conditions which would always favour the conversion of permanent planetary phenomena into periodic regional phenomena.

India.

Further, not only is the Northern Hemisphere the great land hemisphere, but it has its summer when the greater distance from the sun makes the earth revolve so much more slowly that solar values are higher, and the summer is a week longer than south of the equator. In any case, therefore, as the wind-system moves with the sun, the S.E. Trades would have to cross the mathematical equator to reach the thermal equator, and so would become S.W. Monsoons; and the thermal equator in Asia during July is 1000 miles north even of the tropic, running across a rainless desert, which has two and a half hours longer day—of ceaseless bright sunshine—than is possible in equatorial latitudes, where the sun is overhead only in spring and autumn. India must, therefore, be intimately related to the ocean in front of it, though its containing mountains prevent it from being intimately related to the continent behind it; and thus it is a terminus for ocean winds in summer and a starting-place for land winds in winter.

Dry Monsoon.

But winds that blow from a tropical high-pressure belt towards the equator are normal Trade winds; and so we may look upon India as normal in winter, and may begin our survey of the conditions during that season, even if we agree to speak of the Dry Monsoon. This Dry Monsoon season should be calculated as the whole time during which insolation is gaining over radiation, *i.e.* from the date of minimum temperature to that of maximum temperature, which is practically from the middle of December to the end of May; and we should distinguish the Trade wind, with its normal dryness and orographic rains, from wet east winds, which may reach the Golconda and Coromandel coasts in November and early December from the "advanced" quadrant of a typical cyclone in the Retreating Wet Monsoon.

Winter Temperatures.

But in Indian latitudes the midday sun is never really low, winter is certainly not cold (below 32° F.), scarcely even cool (below 50° F.); and, therefore, even on the lowest level in the highest latitude there cannot be any really high pressure, isobar 30·10 running north-eastward (from 30° N., 70° E.) parallel with the Ravi. The sky is clear, the weather is fine, and there is considerable range of temperature, which may drop below 32° F.; but the winds are quite light.

Pressure Focus.

The highest latitudes in which the altitude is still low are in the north-west, where, too, the relative humidity is very low; and from this relatively high pressure of 30·10 winds can gravitate in only two directions—down the Indus valley as N.E. winds, and down the Ganges valley as N.W. winds. The former reinforce at once the N.E. Trades over the Arabian Sea; and the N.W. Monsoon, as soon as it is free from the relief control of the Dekkan scarp, swings round to N., and then N.E., and reinforces the N.E. Trades over the Bay of Bengal. Between the two movements, in the lee of the

Satpuras, *i.e.* in the Khandesh, Berar, and the Central Provinces, there is a long wedge of "calm," with frequent mists, which are almost as useful to the wheat in the Tapti valley as the Trades in the Bay of Bengal are to the rice on the Madras coastlands.

Dry Season.

But, when Monsoon phenomena are so fundamentally associated with variations of temperature, such variations must always be important; and so the Dry Monsoon is divided into two parts, the Cool and the Hot. The former covers the three months from December to February—at the beginning of which the *wool*-market of Ludhiana may have night temperatures as low as 25° F. or 24° F.; and so the relative high pressure is associated with positively low temperature,[1] and winds gravitate out—in such directions as relief allows—from local causes as elsewhere in Asia from continental causes.

Anti-Trade Cyclones.

As soon as the heavy cold air begins to gravitate away, the normal Anti-Trade begins to be felt, and is still wet enough to deposit heavy snow on the Hindu Kush and the Western Himalayas —from 30 feet to 30 yards at the higher levels (15,000–20,000 feet). It is accompanied by normal, but shallow, cyclonic storms, heralded by cloud and warmth and ending in cold and dry N.W. winds (under clear skies), which are felt even as far south as Goa! These storms are of prime value to the Punjab wheat, and some of them actually reach Northern Bengal; and, of course, their trend and their behaviour are exactly the same as those of the S.W. Monsoon here. Indeed, the western ranges of Waziristan seem to have a normal rainfall of about 50 inches, divided equally between the Anti-Trade and the Monsoon; and the winter cyclones are at least as formidable as the summer ones—with, *e.g.* in the Seistan, a pace of 65 miles an hour continuously for 15 or 16 hours.

Hot Season.

The hot weather of March–May dissipates the high pressure, and there is no longer any heavy cold air to gravitate away; and, in the lee of the Sulaiman wall, the low, loose sands of the Pat desert heat with great rapidity, and Jacobabad may have a shade maximum above 120° F. in early afternoon during May. Of course, the sand may lose heat as rapidly; and the minimum is found in the same place before dawn, when the tail of a cyclone gives it a N.W. wind.

But, as the temperature rises, and the pressure falls, over India, the reverse is happening over the South Indian Ocean, so that the S.E. Trades are being reinforced at the time when the N.E. are being weakened; and May ends with low pressure over the whole of India, with fierce heat and drought and dust, and relative humidity occasionally down to *1 p.c.*, while over almost the whole ocean there is maximum pressure. Thus the local conditions give India temporarily a local indraught, especially off the enclosed Bay of Bengal; and this means 19 p.c. of its total rainfall for the Bengal

[1] Quetta (5000 feet) may have a January minimum of 0° F.

rice, and 30 p.c. (*c.* 30″) of its total for the Assam tea. But there is as yet no general inflow, though the famous "Hundred-and-Twenty-Days Wind"—which is believed to absorb nine-tenths of all the water in the Helmand basin—is already blowing up the Helmand valley; and in the "pause" excessive heat and moisture in the stagnant air are favourable to the development of tropical storms, as again during the November "pause." In the Arabian Sea during January–June there are twice as many cyclones in May as in any other month, 63 p.c. of the whole; and in the Bay of Bengal during July–December there are more than twice as many in November as in any other month, 41 p.c. of the whole.

African Influence. Lack of data about the Somali region in May seems to have encouraged neglect both of the great difference (over 1000 miles) in latitude between the Somali desert and the Thar desert and of the strong westerly component in the Wet Monsoon over the Arabian Sea in rounding the thin belt of relatively high pressure still lying between 5° and 10° N. It has also led to over-emphasis both on the trend of the coasts and other feature-lines, and the height of the hinterlands between Mombasa and Gwadar, and on the extension of the Asiatic low pressure south-westward rather than of the African low pressure north-eastward. But the influence of Africa is an obvious reason—as obvious as the high-pressure belt—for the western part of the movement being drawn so far north before working eastward—almost due eastward—to the Bombay coast, and for it not coming, like the eastern part, under the influence of rotational deflection as soon as it has crossed the equator.

Wet Monsoon. The Wet Monsoon movement in the Indian Ocean, then, has an Arabian section, which feeds (the Nile and) the Indus essentially from the west, and a Bay of Bengal section, which feeds the Bengal rivers essentially from the south; and the former has so long a course over the warmest stretch of ocean in the world, making the journey from Mauritius in about three weeks, that it has three times the strength and the water-load of the direct Bengal section. But its eastward trend sets it at right angles to the continuous scarp of the Western Ghats, where for many miles the average elevation is at least 5000 feet—a very critical height for rainfall in the tropics; and the rainfall probably reaches 300 inches on the crest of the scarp, with marked föhn effects eastward. But the Indian high-temperature focus is to the north-west, where the axis of the oval isobar 29·45 is almost identical with the trend of the 30·10 in January, and part of this Arabian current not only reaches the Delhi ridge (where it meets the Bengal current at the end of June), but works its way round Nanda Devi to feed the Manasarowar Lakes and to the flanks of Kamet to feed the two head-streams of the Ganges. There are heavy snowstorms in July here at the higher levels (*c.* 20,000 feet), and the northward slopes of longitudinal valleys, *e.g.* the Arwa, have

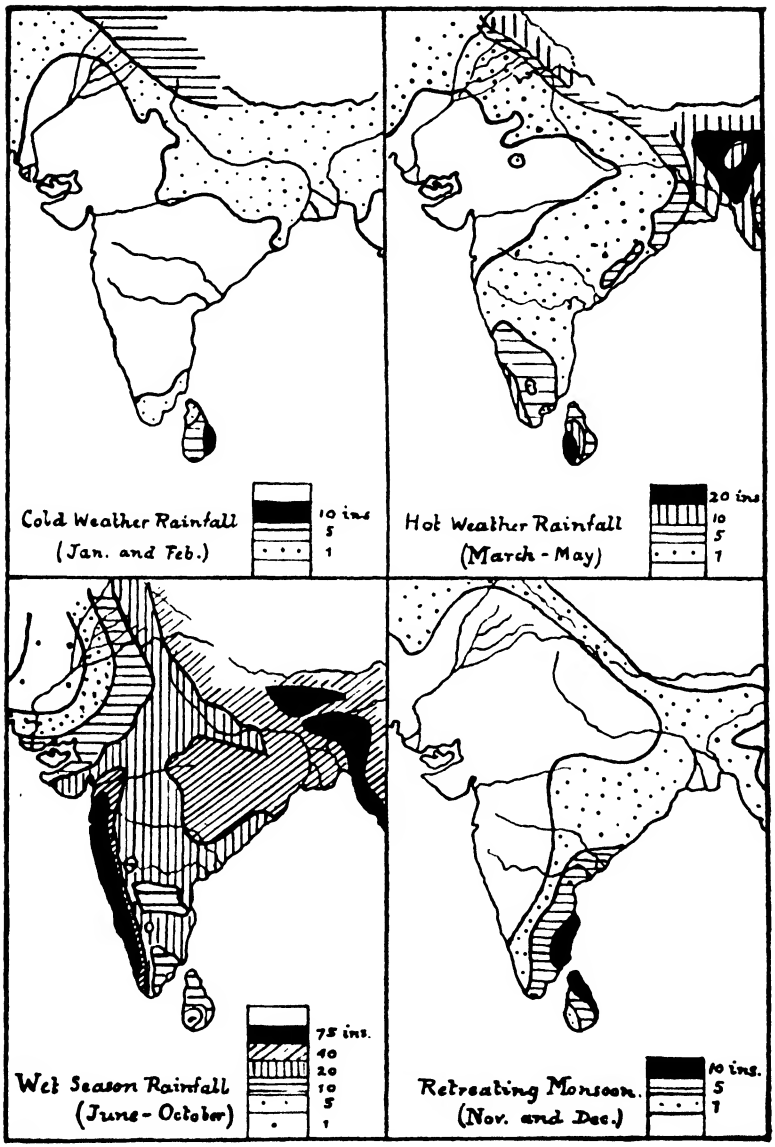

FIG. 26.—Indian Rainfall in the four seasons.

The variability concealed in the averages of the Wet Season diagram here is of immense importance economically, but its character seems to have been rather misunderstood. See p. 388.

a low snow-line; but the highest inhabited valleys seldom have more than a week of bad weather even at the height of the Wet Monsoon season, and only exceptional bursts take the Monsoon north of the Badrinath range and the Mana Pass.

Bengal Current. As the Bengal current can only approach between Ceylon and Sumatra, while the heat focus remains in the north-west, it is almost a due S. wind, and a third of it feeds Burma. The rest presses against the Arakan wall, and some of it (*c.* another third) is deflected into the *cul-de-sac* made by the Khasi and the Lushai Hills, giving Cherrapunji (4500 feet) its annual thirteen yards of rain. The remaining "third" works up the Ganges valley almost as an east wind, giving heavy relief rains to the outer ranges of the Himalayas and light rains on the plain, as it rises slightly, but steadily, in latitude and altitude, while its normal cyclones feed hills and plain alike. But again we have the same suggestion of a definite limit to the monsoon territory, the experience of Garhwal being repeated in Lhonak; the monsoon works its way up the Tista valley and round Kanchenjunga, only to peter out after assaulting the transverse Zema glacier. East of 91° E. *southward* tributaries (from the Lhasa ranges) of the Tsan-po are receiving monsoon rains at heights below 17,000 feet; and east of 92° E. the Bhutan Himalayas seem to have no peaks above 10,000 feet.

Advance v. Retreat. The Wet Monsoon, like the Dry, may be divided into two parts—the Advance, from the beginning of June to the beginning of September, and the Retreat, from then to the beginning of December; and again there is a debatable territory between the Dekkan and Hindustan—east of the Aravallis and north of the forested Narbada trough, where heavy occasional cyclones from the Bay of Bengal are invaluable for the Jumna rice-fields.

Advance. The Advance begins to be felt about June 5–7 and to fail about September 5–7; but the rainfall is widest, heaviest, and most regular, in July and August, when many parts of the country receive at least 20 inches of rain, fairly divided between the two months, but generally a trifle the heavier in July. It comes in "bursts and breaks," the rain not being continuous anywhere and least so where the fall is heaviest, *i.e.* where so much heat is freed that the air can hold the rest of its load; and each burst begins with a cyclonic storm, with a widely spread uniformity of temperature, humidity, and cloudiness.

Variations. The actual amount of rain depends on the strength and the direction of the current and on the latitude and the altitude of the place, the Arabian current affecting specially westward and the Bengal current southward exposures; and local variations seem to be due to local low-pressure pockets left at the end of the Hot Season and acting as lanes of least resistance to the incoming cyclones. These, in turn, seem to have some relation to the snow-

fall on the Himalayas; early snow seems to affect pressure conditions before the monsoon is established, and heavy snow at high levels seems to be associated with light rain at lower levels. The strength of the whole movement, too, seems to depend on that of the S.E. Trades before their extension northward, while the regional distribution of rain depends on the relative "volume" of the two currents. Thus, poor rains off the S.E. Trades in Mauritius and East Africa or in Australia are followed—*post hoc*, if not *propter*—by poor rains off their rotated S.W. monsoons, as happened specially in 1896 and 1899; and good rains off the Arabian current are associated with poor rains off the Bengal current and *vice versa*.

Rhythm. The rhythm of the phenomena is remarkable. Owing to the normal diurnal changes of temperature, the rain falls about the same time every day; owing to local differences of relief, it falls regularly in the same place, especially where the relief is high and on the coast, *e.g.* 100 inches on the Konkan coast. But, of course, very forced ascent doubles or trebles the fall on coastal ranges, *e.g.* along the Tenasserim and the Arakan coastlands (cf. Cherrapunji, 457″ v. Sylhet, 157″—approximately).

Extremes. There are usually eight or nine "bursts" during the Advance, and the rainfall is often very heavy quite independently of time and place, very nearly a yard (35½″) having fallen in a single day even on the Patna flats—in the advanced quadrant of the last burst of the season (September 13, 1879); but the variety—both normal and abnormal—over the whole country is immense, the normal varying from 3 inches on the Upper Sind plain to 13 yards on the Assam Hills, and the abnormal from 0″ on the former to 25 yards on the latter. A fall of 15 inches a day is fairly common, and one of 25 inches is registered occasionally at a fair number of places; and, as the persistent drought of one season or one area is balanced against the persistent saturation of another season or another area, there are very striking local and annual contrasts. For instance, in January, temperature maxima in the south-east may exceed 97° F., and minima in the north-west may fall below 25° F., while, in July, the northern maxima may exceed 125° F., and the southern minima fall below 65° F.; and the Indus delta, which has a mean annual rainfall of 8 inches (Karachi-Haidarabad), has had *c.* 13½ inches in three days (August 5–7), *c.* 10¼ falling on the 6th, when a shallow local disturbance was superimposed on the general regional flow.

"Cover" *v.* Statistics. The figures for Lower Sind are suggestive. Obviously, the actual fall here is of little or no importance in itself, but it may usefully supplement underground supplies of water, and the oceanic influence cannot be ignored; and it is worthy of notice that where Cutch rises above 1000 feet along the tropic, a region

credited with *only 15 inches* of rain is beautifully wooded—west of Bhuj! This is one of the cases where one prefers the vague evidence of the natural "cover" to the so-called proof of the precise statistics.

Retreat. During the Retreat, between mid-September and mid-December, the same causes are still at work, and they have the same effects; but the area of rainfall and the quantity of rain contract—roughly, from north to south, beginning in the Punjab about September 15, in the United Provinces about October 1, in Bengal about October 15. "Bursts" are as typical of the Retreat as of the Advance, though the general movement is slower, and the temperature over nearly all India is wonderfully uniform at *c.* 80° F.; and, when the last of them ends with the cool N.W. wind, this veers round by the north into a N.E. wind, the normal N.E. Trade. This brings the chief rains to the Coromandel coast, where they mature the rice, Madras having 27 p.c. of her total rainfall in the one month of November; but farther north the N.E. Trade is blowing parallel with the Golconda coast, and could not have picked up enough vapour to be "wet." Cf. p. 107.

Range of Temperature. Of course, the value of the rains everywhere depends largely on the temperature, while the range of temperature itself depends on the humidity. The range must be least during the Wet Monsoon, especially on the coast, and particularly the part facing directly to the wind, *e.g.* the Konkan and Malabar coasts; and it must be most during the Dry Monsoon, especially at the greatest distance from the ocean, *i.e.* in the north-west. But there are usually two maxima—an absolute maximum in calm November and a relative one in piping May, and two minima—an absolute minimum in the height of the wet season (July) and a secondary at the end of the cool season (February).

If India may be regarded as a model, it may be useful to survey the rest of the Indo-Pacific hinterland, as far as possible, in the light of Indian conditions in pertinent latitudes, *e.g.* taking our standard for tropical Arabia from the Dekkan and for the temperate Yangtze plain from Hindustan.

Arabia. Of course, Southern Arabia is much like the Dekkan in structure and relief as well as in latitude; but it is much more exposed to the north, and much more shut in on the west and the east. This must tend to increase any drought-control associated with the tropical high-pressure belt, and the dryness must increase the temperature range, so that even in the Ruba el Khali, "The Empty Quarter," night temperatures varying little, if at all, above 32° F. seem to be quite common in winter—a response to northern exposure unknown in similar latitudes and at similar altitudes in the Dekkan.

At the same time the longitudinal barriers look down on narrow

sea-lanes; the two troughs draw all winds into conformity with their own N.W.–S.E. trend; and both heat and humidity are excessive on the coastal strips. For the bare walls of rock reflect the sunlight on to the warm (over 81° F.) water, and have it reflected off the water; and this gives the southern halves of the troughs a "Turkish-bath" climate, which is excessively unhealthy, *e.g.* at Hodeida and Maskat, however useful it may be—in the form of dense mists during the middle of the day—to the Mocha coffee plantations. **Coastal Humidity.**

The position of the area between the Mediterranean and the Indian Ocean suggests that the land, as a whole, might have a climate more or less intermediate between the purely Mediterranean summer-drought and winter-rain, and the purely Monsoon summer-rain and winter-drought, or that at least we might have a transition belt, *e.g.* including that part of the Nejd which has both summer and winter rains; and this may be true approximately in the west—though typical temperatures in the belt are far above normal Mediterranean standards,—but it cannot be accepted even approximately in the east. **Position.**

In the west the transverse belt of highland, which runs eastward from Mecca for some 200 miles, with an average height of 6000 feet and an extreme of over 10,000, does seem to be a limit to both winter rains from the north and summer rains from the south. Thus, in most years, Taif has fully a month of good rain before-and-after the end of August; and Mecca has a similar month of rain before-and-after the end of November. **Rain Limits.**

In the east we have an area that is more comparable with the Dekkan. For Oman, with its concave arc of the Jebel Akhdar, the "*Green* Mountains," facing the warm and wide Gulf of Oman (with a temperature excess within 1° F. of that in the Red Sea = 9·4° F.), and reaching a height of practically 10,000 feet (9900), has—like the Carnatic hills—normal relief rains off the N.E. Trades in winter, and—like Cutch, if that may be associated with the Dekkan because of its physical history—has normal cyclonic rains off the S.W. Monsoon in summer. But, south of the Ras el Hadd elbow, the coast lies parallel with both currents, and *regular* rains become possible only where other things are favourable. Thus, in Dhofar (? Dhu-Afar, "the Cloudy Land"), where the Samhan peninsula flings a 4000-foot crest athwart the monsoon, there are three months of summer rain—reflected not only in the luxuriant vegetation of the Qara slopes, but also in the rich "permanent" pastures of the Janaba hinterland (54° E.–58° E.)—and slight relief rains (and heavy dews) in winter. **Summer Rains.**

Farther west, *e.g.* in the Mokalla Bay, or farther east, *e.g.* in Masira, where the feature-lines lie N.E.–S.W., there is practically no rain; and a great contrast to the island conditions is presented by **Sokotra.**

Sokotra, which also flings a 4000-foot crest athwart the winds, and has good relief rains in winter and good cyclonic rains in summer. The Kuria Maria islands, between the two, have a significant industry in *guano* !

Interim Rains. Of course, the whole "Oman" hinterland, *e.g.* the Ruba el Khali, is counted rainless, but there is evidently a large total area of grazing-land, which must be a response to rainfall; and travellers in the region report occasional and temporary pools of fresh water. The grazing areas, however, vary in quality from place to place and from year to year—enforcing nomadism—so that the rainfall must be quite irregular in both time and place.

Winds. Normal conditions, as we have noticed, are much disturbed along the longitudinal margins of the block by the trend and the relief of the feature-lines. In the Red Sea north of the tropic the winds blow almost always from the north—as blowing either from a high-pressure centre in winter or to a low-pressure centre in summer; thus, in the Gulf of Suez the mean for the year shows north winds on 10 days out of every 12, sometimes strong enough to raise rough seas and carrying heavy rains in winter as far south as the Farsan Islands. South of the tropic there are usually south winds, less persistent than the north winds, and varying in strength and duration with the ocean winds; and here, owing to the trend of the feature-lines, the monsoon becomes a south-east wind—at least on the Tehama, "the Lowland."

Relief Control. But there is a large area over 6000 feet in Yemen and Asir; the central plateau of Yemen seems to have an average height of *c.* 8000 feet, with the Sarat crests approaching 10,000; and, where deep valleys break up into this highland, as the Saham valley behind Hodeida, rotational deflection would press the monsoon eastward—making it again a S.W. wind—even if there is no deep low-pressure centre in the far hinterland. The western heights are drenched from June to September, and even places east of the Sarat crest and 100 miles from the coast have constant rains in August and September—comparable with the fall at Bangalore, which has 34 p.c. of its total fall in the same two months.

Sana'a may illustrate the whole sequence. It stands to the east of the Sarat at a height of 7300 feet, but at the base of the Negum peak, and with a summer maximum of 85° F.; and it has constant rains—partly cyclonic and partly orographic—during the two late-summer months. In winter it has frost regularly and snow occasionally; and yet it is at exactly the same altitude and in approximately the same latitude and within the same distance from the sea as—Utakamand !

Transition Area. The trend of the south coast of Arabia and the relief of the upturned plateau-edge behind the coast control the S.W. Monsoon very clearly, and the strong west element in the wind would, in any case,

make it useless as a rain-bringer to the heat-stricken Makran; and so there is a distinct hiatus, climatically, between tropical Arabia and the Indus plain. And—unless the word "felt" is used in a peculiar sense—it is in the highest degree unreasonable to believe that "at Quetta the summer monsoon of India makes its influence felt" . . . "producing a secondary maximum in July." For no place under the normal monsoon conditions in India has a temperature maximum—like Tehran, Isfahan, and Kabul—at the end of July; and the secondary rainfall maximum at Quetta, which comes in *August*, is exactly 6 p.c. of the total, and the six months May–October together produce only 17 p.c.

N.W. India.

So far as Baluchistan and India are connected climatically, it is during the Dry Monsoon only; and, even then, there is no proof that any lower air-currents from the western plateau affect the Indus plain. Both flanks of the Sulaiman uplift, however, have rains from shallow storms from the west; and, in spite of theories to the contrary, these are probably of Atlanto-Mediterranean origin, invigorated and refreshed on their way by secondary depressions west of the Sulaiman line, *e.g.* in the Seistan basin, as they are afterwards in the Punjab, and as the dry basin of Central Burma contributes to the Wet Monsoon. As the condensation level of these storms is often at least 15,000 feet, the snowfall on the mountains, *e.g.* the Western Himalayas, is relatively much heavier than the rainfall on the plains, *e.g.* in North-Western India.

Indo-China.

The transition from the real Indian region to "Indo-China" (including Burma) is as gradual as that from the Iran region to India, though again there is a meridional wall, concave for some 200 miles to 95° E.; for the climate of Burma is strictly comparable with that of parts of India (N.E. or S.W. according to latitude), in its seasons, its variations, its pressures, its temperatures, and more or less in its rainfall. The whole unit, too, is fairly comparable with India in its general latitudes and its climatic phenomena; but there is no Himalayan wall in the north to form a climatic or political barrier, the feature-lines are essentially "Pacific"—making access from the south even easier than from the north,—and Singapore is only 100 miles from the equator. But a drop of 100 feet at the Kra isthmus would make the land to the south an East Indian island, as it is already in climate and products.

No "Wall."

The absence of a Himalayan wall—with its legacy of savage unrest, which has retarded Indo-China so much politically and economically, especially in culture and in agriculture—makes the January pressure-divide of 30·0, which in India runs practically along the tropic, a N.W.–S.E. diagonal here, with 30·2 in the extreme north-east and 29·9 in the extreme south-west; and the winds are strongly easterly over most of the area, but still more strongly

northerly in the west. In July, of course, the diagonal trends more or less N.E.–S.W.; and, while the winds are strongly westerly over nearly the whole area, they are still more strongly southerly in the south.

Seasonal Contrasts. Differences in temperature distribution are less marked. In winter there is a fairly uniform 70°–80° F. except in the extreme south, and in summer a fairly uniform 80°–90° F. except in the extreme west; and meridian 100° E. makes a rough rainfall-divide, the mean annual fall to the east of it being normally below 75 inches—sometimes as low as 50, and that to the east of it being always above 75—often as high as 100, and on the Arakan and Tenasserim flanks as much as 200. The east coast and the southern peninsula, like the east coast of the Dekkan and Ceylon, have good relief rains off the N.E. Trades in the winter cool-season; and the south, like Eastern Hindustan, has good storm rains in the spring hot-season, with liability to typhoons, as in winter. In the wet season the whole closely resembles the Dekkan, with very heavy rains in the west, falling off more or less abruptly eastward, and with actual basins of relative drought, in Siam and Central Burma, but with no typhoons; and in autumn it again resembles the Dekkan, with lighter rain, but on both flanks and with no dry basins, only with liability to typhoons.

Malaya. Singapore, nearly 400 miles nearer than Colombo to the equator, has no month with less than 6 p.c. or much more than 10 p.c. of its total rainfall (*c.* 93″), while Colombo has 50 p.c. (of 88″) in four months—27 p.c. in October and November, and 25 p.c. in April and May, with only 2 p.c. in February. Penang, in almost the same latitude as Colombo and in a similar relation to an eastward highland, has under 3 p.c. (of 109″) in February.

Temperate Monsoon. Of course, Hindustan is, literally, in a temperate zone; but its climate is essentially "tropical" in its main features, and its dominant note must be heat. North of the tropic in the more easterly longitudes, the various factors concerned begin to have some differences of relative value, and the dominant note must be cold; and the relation of that to humidity must be different from the relation of heat.

We are on an "Eastern Margin" and in a Pacific hinterland; but the relief is not very marked, and the Pacific trend is obvious rather in such minor details as the rapids on the Amur, the Hwang-ho, the Yangtze, etc., than in serious obstacles to air-movement from the interior to the ocean. But the structure and the relief of that interior are more favourable to air-movement outwards than inwards—to the ocean than from it; and there is still such a wide distribution of residual snow and ice that "winter" controls may persist even when the height of the midday sun and the duration

of daylight are normally vernal, *e.g.* the immediate hinterlands of both the Sea of Japan and the Yellow Sea having a temperature 5° F. *below* normal even in April, when in similar latitudes round the north of the Caspian and the Black Sea it is 5° F. *above* normal. Then, while the pressure-lines alike in winter and in summer run systematically north and south, the differences of temperature between land and sea are in winter tremendous, but in summer trivial, so that gradients are steep in winter, but not in summer. Above all we are watching the interaction of the most profound influences of dry-land and warm-water on the face of the earth.

Winter Condition.

In winter, from a unique combination of high pressure and low temperature to north and north-west, winds tumble down from the vast plateau to lower levels and lower latitudes so strong, so steady, so dry, so much warmed by their descent, that they desiccate and drive before them endless clouds of dust, from which they carpet the ground with fertile loess, and veil the air in fulvous haze, and can carry frost and snow even to Hong-Kong. Only in the lee of the Tsin-ling tail of the great continental spine, 700 miles and more north of Hong-Kong, *i.e.* in the Red Basin, north winds are of föhn type, and snow and frost are "only words."

Summer Condition.

In summer, from north to south and from east to west, there is scarcely a temperature difference of 10° F., Peking being within 3° F. of Hong-Kong; winds are weak and easily interrupted; and, though rainfall is heaviest to windward—*i.e.* the south-east—there is rain everywhere, curbing the range of temperature. But maximum temperature comes in July, *i.e.* two months later than in India, and rainfall is less closely associated with temperature than in India; and, while in China temperatures above 80° F. and rainfalls above 40″ are abnormal, in India they are normal. But we must not forget the cold current which hugs the coast, and the effect of volcanic and other dust in decreasing the intensity of solar radiation in the lower atmosphere.

Central China.

The theory that Central China is scarcely a typical area of monsoon rainfall is far from convincing, and seems to depend on a perverse wish to ignore the probable and to emphasise the possible. It postulates a typical region in Northern China, but ignores the fact that most of Northern China receives its rain across Central China; it stresses the August typhoons, and ignores those in July and September; and it interprets the slight decrease of rainfall in July, which may most reasonably be referred to the very marked rise in temperature (in many parts of the Yangtze valley from 4° to 7° F. above June!), as separating two maxima of ***different kinds***. If the August typhoons are so important, they ought to be associated with a marked development of cool N.W. winds to the north-west of their centre!

But there is nothing non-monsoonal in the eastern half of the

Red Basin.

valley in China, rather the contrary, for it gets rains off both monsoons; nor is there in the western half, even if shallow depressions develop locally, *e.g.* in the Red Basin, and work north-eastward rather than north-westward—for it is their only obvious way out of the basin. But that does again emphasise the value of an enclosed basin, with its shelter from the icy N.W. monsoon in winter, and its spring and early summer temperatures much higher (4° to 7° F.) than in the east; and, due allowance being

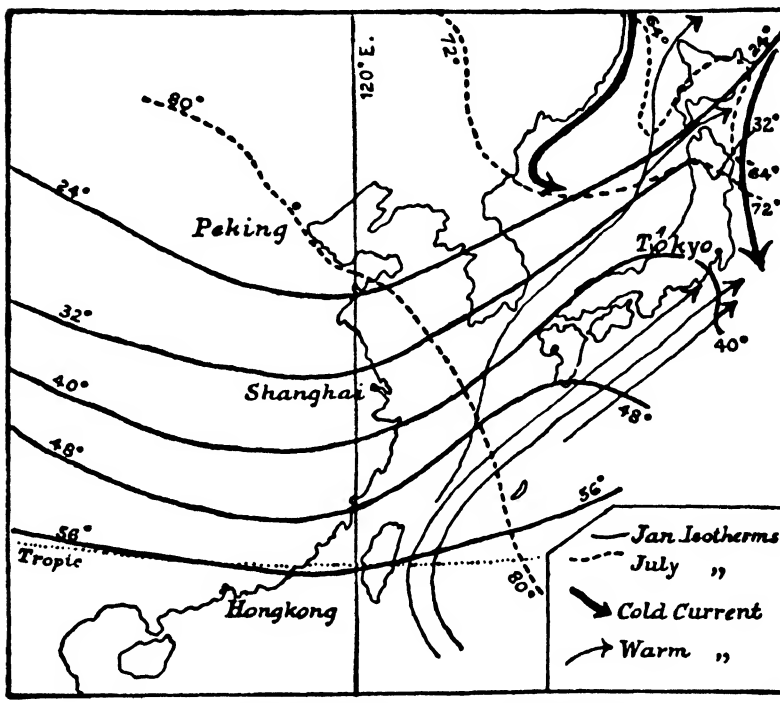

FIG. 27.—Isotherms and Currents in the Sino-Japanese area.

made for the different altitude, the Red Basin has the same advantages from shelter—with the same latitude—as the Vale of Kashmir. Indeed, allowing for altitude, Chengtu has much the same minimum temperature as Srinagar and in the same month (January), and both have their maximum in the same month (July)—Chengtu quite normally for China, but Srinagar abnormally for India.

The protective value of the mountain wall in both cases is confirmed by other "responses," and confirmation from other angles is always valuable. For instance, in early days both areas were well ahead of their contemporaries in culture and craftsman-

ship, with invaluable assets in their water-power; and "Four Rivers" is still the richest as well as the largest and most populous province of China.

Cold Current.

At the same time all the eastern margin comes under the influence of the cold south-westward current as well as under that of the cold N.W. wind; and, while the land wind chills the sea in winter, the cold current chills the land in summer—to an estimated amount of fully 14° F. round the Okhotsk Sea, nearly 11° F. along the western shores of the Sea of Japan, and some 5° F. even in the East China Sea. The warming influence of the Kuro Siwo is distinctly less, and is felt seaward rather than landward, helping to keep the Bering Sea (60° N.) at about the same temperature as the Okhotsk Sea (50° N.).

Japan.

Japan proper is like China, and unlike India, in having its strong monsoon in winter and its weak monsoon in summer; and the weakness of the whole air-current in summer renders it easily interrupted, as in Central China, by local depressions—probably *the same* as in China, following the course of the Kuro Siwo north-eastward. Like Ceylon, Japan feels the full effect of its island environment, especially with a warm current on its cold flank; and it gets rain from both monsoons—on different sides—with a marked decrease in the middle of the summer rains. The superiority of the "Latter" over the "Former" rains *may* be due to the September typhoons; but every month from July to November, inclusive, comes within the period of higher typhoon activity, and at Kagoshima—which stands between the September and the October tracks—the "Former" are much the heavier (*c.* 14″ *v. c.* 9″), while the most oppressive results in Japan are from typhoons that pass northward *west* of Kagoshima.

Heat and Moisture.

Throughout the mass of Asia, then, there are two marked seasons in the year, one more or less hot, and the other more or less cold; and the hot season is associated with rain, and the cold with drought. The association of heat with moisture may be often unhealthy for man, but is very favourable to vegetation; and the association of cold with drought makes the winter healthy and bracing, even if its effects on food-supply are trying.

Heat and Drought.

But there is one large quadrant of Asia where the seasons are exactly the opposite of this, extreme temperature being associated with summer drought, which makes the heat more bearable, while the wet season is warm enough to favour vegetation, if not to brace man. The reward for labour in the damp heat is great, but the labour is exhausting; the reward for labour in the dry heat is relatively small, but the labour is more or less confined to the wet winter. In several ways, then, the "Mediterranean" area of Asia is the most detached area of all, and "Asiatic" influences in it are

continental in the narrow sense rather than monsoonal; but we must have a definite meaning for the word "detached" before we can delimit the area.

Mediterranean Asia.

We expect the Mediterranean climate to differ markedly from the Monsoon climate of Asia in various fundamentals associated with latitude and longitude, relations of sea and land, seasonal temperature and rainfall. It is associated only with sub-tropical latitudes, and with the western longitudes of a continent,—with 1,000,000 square miles of very warm sea surrounded by a narrow hinterland, mainly of mountains and the intervening lowlands,—and with mild temperatures and winter rainfall.

Its Name.

The word *sub-tropical* is not precise, but does suggest a transition area between stormy west winds and steady east winds, related to relatively fixed latitudes ($\pm 40°$) and to definitely moving wind-belts, in which the winds are alternately near to and far from saturation, while the lands are alternately to windward for the wet winds and to leeward for the dry ones. But the word *Mediterranean* is precise, and describes a narrow belt of sea, well over 2000 miles in length, which lies between 5° W. and 35° E., and which is associated with a mild and wet season having an average midwinter temperature of *c.* 50° F. and *c.* 20 inches of rain, and with a dry and sunny season having an average midsummer temperature of *c.* 75° F. and no rain; and there are relatively violent changes of season—in the Former and the Latter rains of the Autumn and the Spring equinoxes.

Monsoon *v.* Mediterranean.

Obviously, the typical Mediterranean and the typical Monsoon climates seem to agree in certain respects, *e.g.* a two-season year,—an alternation of drought and humidity,—a fundamental change of regular winds,—a certain violence at the two times of change,—an instability in the "transitional" environment that gave Man an advantage over humble associations, etc.; but, if the temperature limits suggested (50° F. and 75° F.) are even approximately correct, the true Mediterranean climate has little in common with that of the other sub-tropical belts, and still less with any Monsoon climate, and no large region of Asia should be labelled "Mediterranean."

But, though much of the typically Mediterranean "response" of plant and beast and Man is to these narrow limits of temperature range and rainfall, wide deviations from the limits are found in the other sub-tropical regions and even inside the Mediterranean region itself. For instance, the Mediterranean coast-lands of Spain have very marked deviations of rainfall and temperature; Barcelona has the normal two rainfall maxima (at the equinoxes) and two minima, the one accompanying the maximum temperature in July (instead of the normal West-Mediterranean in August) and the other in *January*! And the hinterland of even Murcia is visited by frosts in *May*!

If, then, we more or less ignore the amount of rainfall and the range of temperature—though both were probably of prime importance to early Man in the Mediterranean basin,—and confine our attention to the association of rain with the cool season and drought with the hot, we may "detach" from the rest of Asia the whole plateau-belt west of the Sulaimans, with any contained lowlands that are outside the tropics; and we may even feel justified in calling it "Mediterranean"—for two reasons. **Essentially Mediterranean.**

In the first place, not only are we on a Western Margin, but the trend of the feature-lines is specifically "Atlantic," and they make what may fairly be called a single great "line of least resistance" for Atlantic phenomena, even though the first 2000 miles are over water and the second 2000 over land; for sun-scorched steppe and desert, fenced by snow-chilled parapets, are even more attractive, if less continuous, than the smooth surface of the sea. In the second place, it is the Mediterranean extension of the Atlantic that allows the easy passage of cyclones eastward, and even refreshes and invigorates them or gives them new birth in secondary developments; and so the mass of the rain that falls in sub-tropical latitudes west of the Sulaimans is really "Mediterranean."

The most important modifications of "Mediterranean" phenomena are associated with four factors—longitude, pressure, latitude, and configuration.

Obviously, from the very first, *e.g.* in climbing the Anatolian valleys or the Lebanon crest, the wet wind becomes steadily drier as it works its way farther from its source of supply; and all the year through it is being steadily interrupted or deflected by a stronger, northern component, with a relative humidity that may be below 15 p.c. in a steady north wind at midsummer, and approach 60 p.c. during a west wind intrusion at midwinter. In winter the line of highest pressure follows the snow-chilled northern parapet—in latitude 40° N. throughout the western half and latitude 35° N. in the eastern; and from this diagonal N.W.–S.E. base steady N.E. (instead of S.W.) winds, strengthened by rotational deflection, blow everywhere except where they are drawn down to follow the N.W.–S.E. lines of the Mesopotamian and Red Sea troughs. In summer the axis of the very low pressure in the south-east corner of the area lies at right angles to that of the high pressure in winter; and so the 29·4 oval, though *outside* the tropics, becomes the objective of all the winds, as N.W. instead of N.E. winds. **Pressure.**

Further, as the whole region is practically south of latitude 40° N., the sun-power is great, especially under the cloudless skies of these summer-drought lands; and, as the lower levels are to the south, summer temperatures are very high, with decrease in the actual amount and in the relative value of precipitation. At the same time, to the north the altitude and the lack of cloud to check **Latitude.**

radiation increase the winter cold ; but snow—which lies at Erzerum for six months—is the most economical form of precipitation, and a couple of feet of loose dry snow can make a difference of 70° F. within the 24 inches, from −40° F. on the surface to 30° F. on the soil below it. Baghdad has recorded a maximum of 123° F. and a minimum of 19° F. ; and nothing could suggest better how bracing winter may be, or how much encouragement is given to depressions to work south-eastward.

Configuration. But the configuration of the whole " Land of the Five Seas " is just the opposite of that in the real Mediterranean region, for the land is in the centre, and the sea is circumferal ; and, while—at the best—Anatolia is no better off than Iberia, the other units—like the sub-tropical regions in the Southern Hemisphere and North America —are merely flanked by sea, so that the land influence is at a maximum, and the sea influence at a minimum. There are heavy rains off the Caspian and the Black Sea in winter, and both maxima and minima temperatures are delayed, *e.g.* at Samsun till August and February ; and Smyrna, also—like Baghdad—with an August maximum, has significant *autumn* rains. But very little rain crosses the northern parapet ; and winter temperatures far inland, *e.g.* at Tehran and Isfahan or Kabul and Husseinabad, show no sign of any ameliorating influences from the Mediterranean. It may be better, therefore, to describe the climate west of the Zagros as Armeno-Mediterranean and that between the Zagros and the Sulaimans as Irano-Mediterranean.

STATISTICS[1] OF TEMPERATURE AND RAINFALL—TABLE I

ZAGROS-SULAIMAN STATIONS

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Tehran (*alt.* 4000′)	*34*° F. 1·2″	42 0·9	48 2·4	61 0·9	71 0·4	80 0	85 0·4	83 0	77 0·1	66 0·1	51 1·2	42 1·3
Meshed (*alt.* 2700′)	*33* 0·7	37 0·9	46 2·8	57 1·7	66 1·4	74 0·3	78 0	74 0	66 0	56 0·4	49 0·6	41 0·8
Kabul (*alt.* 6250′)	*31* 1	36 0·8	47 4·7	59 2·2	68 0·6	73 0·2	77 0·2	76 0·2	69 0	58 0·1	51 1	40 0·2
Quetta (*alt.* 5500′)	*40* 2·1	41 2·1	51 1·8	60 1·1	67 0·3	74 0·2	78 0·5	75 0·6	67 0·1	56 0·1	47 0·3	42 0·8
Husseinabad (*alt.* 1000′)	*45* 0·4	49 0·7	60 0·3	70 0·4	82 0	89 0	91 0	89 0	79 0	67 0	59 0	50 0·2
Bushire	58 3·1	59 2·5	65 0·9	73 0·5	81 0	85 0	88 0	89 0	86 0	78 0·1	70 2	62 3·4
Leukoran (for Astara)	38 3·8	40 2·8	46 3·2	54 2·1	65 1·2	74 0·9	78 0·8	77 1·8	71 7·2	62 8	52 6·1	44 4

[1] See note to Table II on p. 128.

CHAPTER VIII

MAJOR CLIMATIC PROVINCES

WHEN we begin to divide Asia into large climatic provinces, we find that obvious details of relief seem to have more significance in providing boundaries for these provinces than in determining their character; but, apart from the literal impossibility of divorcing climate from relief, it is useful to adhere to the threefold division of the continent into two vast oceanic hinterlands and the intervening roll of plateau, for there seems to be some essential unity or common factor in all the provinces of each division. **Three Old Areas.**

But, just as the centre of maximum pressure is a compromise between the normal latitude of sub-tropical high pressure and the actual latitude of minimum temperature in the Pole of Cold, with the below-sea levels of the Turfan-Gobi holding the balance, so there seems to be a certain compromise between relief and latitude in the determination of natural provinces. In winter all Siberia, whatever the latitude or the longitude or the relief, is below zero, and the whole continent north of 40° N. is below (a sea-level) 32° F., while all areas south of the Himalayas are above 50° F. and south of the tropic—and within Himalayan longitudes[1]—above 70° F. Conversely, in July all the continent as far north as the Arctic Circle, independently of latitude and longitude, is above 50° F., and south of the Himalayas is above 80° F. **Compromise.**

We may, therefore, make another division of the continent—also into three—but rather cutting across the first three; and we may base it on the generalisation that summer temperatures and typical crops are of infinitely less importance than winter temperatures and the direction of the wind (even if we will not call it a monsoon). Rice is grown "anywhere" from Yemen to Hondo in the Indo-Pacific hinterland, and the summer temperature is "everywhere" ±80° F; winter rains in the Punjab are off Anti-Trades, in Annam off Trades, in Japan mainly monsoonal. **Three New Areas.**

The three new belts, then, are divided by two lines, both slightly—

[1] East of the Himalayan shelter temperatures drop 10° F. (Canton being below 60° F.). See p. 115.

Dividing Lines. but only slightly—influenced by relief. The one line runs from the mouth of the Tobol to that of the Usuri, bending northwards to surround the great plateau core, and the other from the mouth of the Indus to that of the Usuri, bending southwards to surround it; and the former delimits an Arctic and Sub-Arctic region of Tundra and Taiga, while the latter delimits what is practically a tropical and sub-tropical region, as judged by such crops as rice and tea. Between the two belts there is a sequence of blocks and basins, steppes and deserts; and, while this gives almost as much diversity of natural units as there is on the Indo-Pacific hinterland, they are all disfigured by the kind of monotonous uniformity that is typical of the whole Arcto-Atlantic hinterland.

Basis of Classification. The basis of classification aimed at below is the general "genetic" control rather than any of its precise statistical resultants. Our ultimate object is a mental picture that shall be clear and true—so far as it goes; and, if truth is the correspondence between our ideas and observed phenomena, more truth is revealed by, *e.g.*, the natural "cover" of any given 1000 square miles than by the most exact statement of the mean annual temperature registered at their centre. (See p. 112).

To take a very wide example, the Indo-Pacific hinterland is to be interpreted as that part of the continent in which a "southerly" wet monsoon is the primary meteorological mechanism, with the Indo-Pacific ocean as the source of its moisture. So far from this definition excluding wide variations, these are actually inherent in the whole idea of a monsoonal *régime*; and so the extreme winter cold of Manchuria and the extreme summer heat of the Punjab are a logical sequence and a pertinent illustration of the principle. This lacks that precision which seems to many people so desirable, and which is often so misleading; but it is more helpful to visualisation than any attempt to base primary divisions on such criteria as mean monthly isotherms, especially when it covers such a vast area as the Indo-Pacific or the Arcto-Atlantic hinterland.

Arcto-Atlantic Lands. The outstanding feature of this Arcto-Atlantic hinterland is the vast expanse of undisturbed, unfolded sediment, still damp or stone dry, and distributed largely in very recent alluvium, *e.g.* throughout the basin of the Ob—the only river in the world really comparable with the Mississippi—and in shifting sands, *e.g.* of the Aralo-Caspian basin. The main watershed of the oceanic drainage, though more than 2000 miles inland, is high enough and far enough west to be fed with heavy snow; but it is so far south that its head waters are flooded from the spring thaw long before its lower waters begin to thaw at all, with an immense spread of flood over the higher latitudes of the basin. But the rivers are so long, and the land is so flat, that the heavy load of flood silt cannot be carried very far; and so the

beds of the rivers are raised above the level of the riverine lands, aggravating the flood and injuring transport, *e.g.* the floating of timber (*up*) to the river. At the same time this wide spread of flood does increase the relative humidity of the region.

But, while a great part of the region consists of a river-made coastal-plain, it is natural that in an Arcto-Atlantic hinterland there should be, as in Canada, a double slope—to the Atlantic and to the Arctic. The "Atlantic" slope may be measured by the relative heights of lakes, the Aral Sea being *c.* 200 feet above the Caspian (−84), Balkash *c.* 600 above the Aral, and Baikal *c.* 800 above Balkash. *Trans-Siberian* trains are allowed 15 hours more for the eastward journey to Irkutsk than for the return "down hill."

Relief *v.* Climate.

But, while the Indo-Pacific hinterland has its typical note in the climate to such an extent as to excuse, if not wholly justify, the habit of limiting "Monsoon Asia" to that hinterland, the typical note on this Arcto-Atlantic hinterland is as largely in the relief. There are, no doubt, some very interesting climatic phenomena common to the whole or nearly the whole of it. For instance, the latitudinal changes of temperature are very gradual, Obdorsk quite frequently having an absolute maximum of over 80° F. (83° F.), and even Tomsk having an absolute minimum of below −60° F. (−62° F.); and the mass has its rain in summer, specifically early summer—even spring in the Aralo-Caspian basin,—though exposure to the Atlantic gives a typical secondary maximum in autumn (October or November) certainly as far east as Krasnoyarsk. But even this secondary maximum has definite relation to the relief; and it is true of the whole unit that an essential uniformity of monotonous relief is reflected in a corresponding uniformity of natural phenomena, even if it is also true that north of the Ob-Aral water-parting rain comes in late spring and early summer, and is sufficient for agriculture, while south of that it comes in late winter and early spring, and is insufficient for agriculture.

Tundra.

I. The most northerly province, the Tundra, spans the whole continent from east to west, but it varies more in width than almost any other. So far from including all the land inside the Arctic Circle, it does not include anything like all that between the Circle and the 70° parallel; it spreads south of the Circle in the Taz basin, and still more north of it on the Taimyr peninsula. Its southern limit does in many parts coincide roughly with the July isotherm of 50° F., but only between longitudes 60° E. and 160° E.; it is a land where winter is both too dry for much snow to fall, and too windy for the fall to be uniform, and summer is warm enough for the little snow to be melted; the slight cover of snow allows the subsoil to be so deeply frozen in winter that only the surface thaws in summer; and, though the sunless winter is dry enough to be

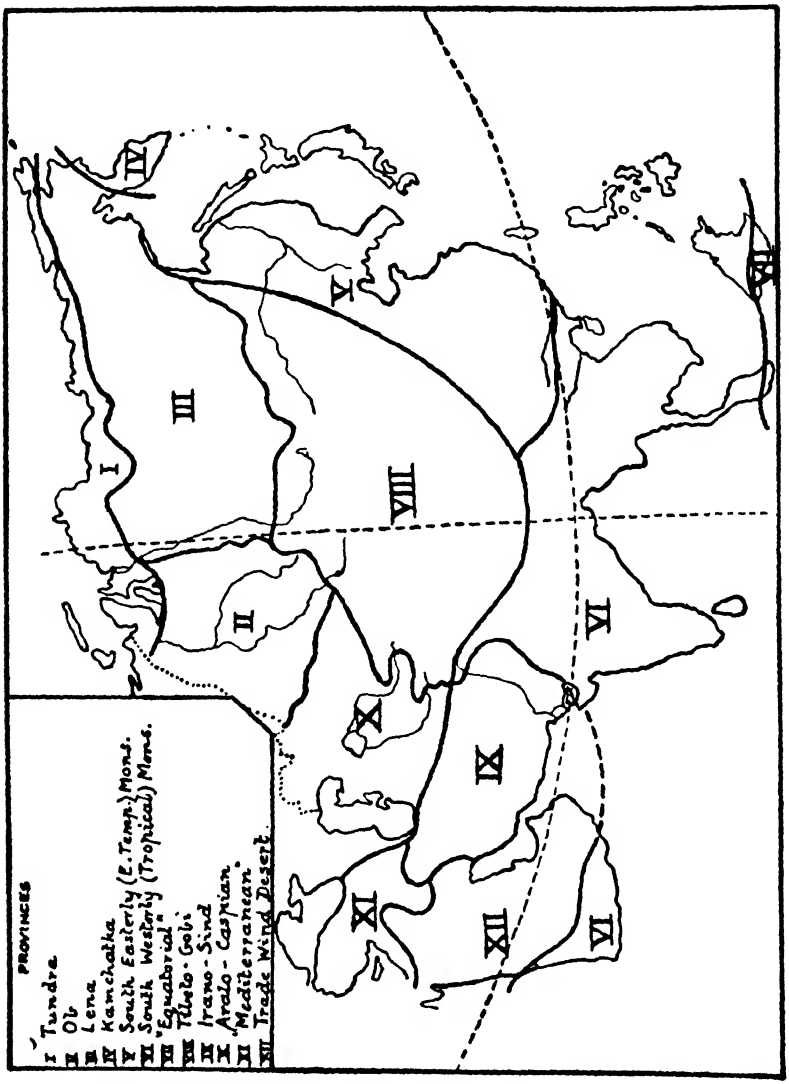

FIG. 28.—Climatic Provinces of Asia.

Some detailed defence of the delimitation of Region V.—beyond the general account given on p. 130—will be found in Chapter XXIX. (pp. 564-565, 568-570), with criticism of some prevalent theories about the climate of China.

clear, the surface is so swampy that summer is wrapped in fog, especially after a very hard winter, *e.g.* with much ice and little snow in the Kara Sea.

Climatic Control.

These general statements need to be related to the particular features of the environment that affect Man most. The two outstanding influences are the very long and dark winter season and the very long and bright summer day, *e.g.* lasting at Golchikha (*c.* 72° N.) for *two months*—out of only three summer months; and these two seasons are separated by a mere spasm of spring in May and a mere collapse of autumn in September—a fortnight rushing you from a shroud of snow to a sheet of flowers, and a fortnight dropping you back again into darkness and death. This is the climatic background of the "Arctic hysteria"—amongst newcomers, and *all* the tribes are intruders.

Reindeer.

The oldest of them are the Samoyeds, and they are typically domesticators of the reindeer, and so nomads; for, though the domestication of the deer is *not* an essential condition of survival, there is no true fishing culture, and the deer soon exhaust the moss in any one spot. The nomadism, then, is not periodic, but permanent—economic rather than seasonal; and, as a matter of fact, movement is much easier during the eight months of winter than during the three months of summer, for the frozen rivers are perfect "roads," and the sledges need only two deer instead of five, as in summer. The deer-farming is not wholly a legacy from happier days in other latitudes, but is enforced by the climate; and the people have recourse to fishing only when some catastrophe, *e.g.* anthrax, has decimated their herds, and even so it is a serious "social" calamity. For, though they have had to change their social organisation, *e.g.* the exogamy of the Tungus, they have instinctively retained "subsistence habits"; and, in any case, fish could not be procured from most of the rivers, for they are frozen *solid* to the bottom!

Drought.

This is one manifestation of what is a typical note not only of the Tundra, but also of a total of some 12,000,000 square miles of land in Asia—extreme dryness, which forbids heavy snow, and which is associated with violent winds that sweep up into drifts most of what does fall. This is the cause of the vast beds of frozen subsoil in Siberia, even in the extreme south. Much the largest continuous belt is this Tundra belt between the Yenisei and the Kolyma; but there is a "continuous" belt both east and west of Lake Baikal, and discontinuous patches are widely spread—wherever the air is dry enough for extreme cold with little or no possibility of snow. Where the January snowfall reaches 2 to 3 feet, they are wholly absent; when it does not exceed 2 to 3 inches, they may be found from 20 to 60 feet below the surface. Of course, they affect both the surface and the subsoil drainage and the river

STATISTICS OF MEAN TEMPERATURE AND MEAN RAINFALL—II

(in degrees Fahrenheit and inches)

The places are grouped so as to bring out marked similarities or dissimilarities as related to latitude and longitude, and to land or sea environment. The temperatures are to the nearest whole numbers; and where the actual means (maximum or minimum) are indentical for two months, the one is made maximum or minimum which has the highest or lowest daily mean.

Arctic and Inland Drainage

		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
II. 1	Beresov	*−10·7*	−1·7	10·8	21	34·5	50·5	**61·3**	55·6	41·7	25	4·3	−7·1
		1	0·6	0·8	1·3	1·6	2·2	**3·4**	2·3	2·3	1·1	1·3	*0·5*
2	Semipalatinsk	*0·5*	1·8	14·4	38·3	57·2	68	**72**	67·3	54·9	38·1	20·1	6·1
		6·5	*0·2*	0·4	0·4	0·8	0·9	**1·1**	0·4	0·6	0·6	0·6	0·8
3	Tobolsk	*−2·2*	4·5	15·4	33·1	47·8	59·5	**66·4**	60·1	48	32·7	13·8	1·4
		0·7	*0·6*	0·7	0·8	1·3	2·7	**3·5**	3·2	1·5	1·4	1·3	0·9
4	Tomsk	*−5·3*	1·4	14	29·8	45·1	59	**65·7**	59·5	47·8	32·2	10·8	1
		1·1	0·8	0·8	*0·7*	1·5	2·7	**3**	2·3	1·4	2·4	1·4	1·9
5	Turgai	*3·4*	4·1	18·9	43·7	62·6	72·3	**76·1**	72·7	59·4	42·3	26·1	10·9
		0·6	*0·3*	0·5	0·7	0·8	**0·9**	0·6	0·4	0·5	0·5	0·4	0·7
6	Barnaul	*−2·2*	1·4	13·5	33·3	50·9	62·1	**67·1**	61·7	50	34·9	15·6	3·7
		0·7	*0·4*	0·5	0·6	1·3	1·7	**2·1**	1·8	1·1	1·3	1·1	1
III. 7	Irkutsk	*−5·4*	0·9	16·5	34·9	48	59·2	**65·1**	60·4	48·2	33·3	12·9	0·7
		0·6	0·5	*0·4*	0·6	1·2	2·3	**2·9**	2·4	1·6	0·7	0·6	0·8
8	Verkhoyansk †	*−58·9*	−47·4	−24	7·3	35·4	54·5	**59·7**	49·8	36·3	5·2	−34·4	−52·6
		0·2	0·1	*0·09*	0·2	0·3	0·9	**1·1**	1	0·5	0·3	0·3	0·2
9	Yakutsk †	*−45·9*	−35·1	−10·1	15·8	40·6	59	**66·2**	59·5	42·4	16·2	−20·9	−40·5
		0·9	*0·2*	0·4	0·6	1·1	2·1	**1·7**	**2·6**	1·2	1·4	0·6	0·9
X. 10	Krasnovodsk (*alt.* −65′)	*36*	40	47	57	69	77	**84**	83	75	63	51	43
		0·5	0·6	0·7	**1**	0·5	0·6	*0·2*	0·3	0·3	0·5	0·6	0·5
11	Petro-Alexandrovsk	*23*	29	43	58	73	80	**83**	79	67	52	39	30
		0·2	0·4	0·5	**0·6**	0·2	0	*0*	0·1	0	0·1	0·1	0·1
12	Samarkand (*alt.* 2360′)	*32*	37	46	57	68	76	**78**	75	66	54	44	39
		1·8	1·2	2·4	**2·6**	2	0·4	*0·2*	*0*	0·1	0·8	1·2	1·2
13	Tashkent (*alt.* 1565′)	*30*	34	46	57	68	76	**86**	76	66	54	44	36
		1·9	1·3	**2·6**	2·4	1·2	0·5	0·1	0	0·1	1·1	1·3	1·6
14	Merv (*alt.* 750′)	*33*	38	51	63	76	**83**	82	82	72	59	48	39
		1·8	1·4	**2·1**	1·2	0·1	0	*0*	0	0	0·4	0·1	0·4
VIII. 15	Urga (*alt.* 3746′)	*−15*	−4	13	34	48	59	**64**	59	47	29	8	−8
		0	0·1	0	0	0·3	1·7	**2·6**	2·1	0·5	0·1	0·1	0·1
16	Kashgar (*alt.* 4300′)	*22*	34	47	61	70	77	**80**	76	69	56	40	26
		0·3	0	0·2	0·2	**0·8**	0·4	0·3	0·7	0·3	0	*0*	0·2
17	Urumtsi (*alt.* 2900′)	*5*	9	23	47	61	67	**72**	70	59	41	22	10
		0·5	*0·3*	0·5	1·5	1·1	1·5	0·7	1	0·6	**1·6**	1·6	0·4
18	Lukchun (*alt.* −56′)	*13*	27	45	66	75	85	**91**	85	74	55	33	21
							*	*	*				*

† The extreme at Verkhoyansk is well below *minus* 90° F., as measured by alcohol thermometers (mercury freezing at *minus* 38·2° F.), *i.e. minus* 105° F. on the air thermometer.

* The number of observations is very small, but "some rain" seems to fall usually in June–August, and a "little snow" in December. The total seems to be rather less than one inch.

erosion; and they reflect both the cause and the effect of the very scanty glaciation of the region.

Ob Province.

II. The Siberian plain, or Ob province, lies roughly between 50° and 70° N., and has summer temperatures varying from 50° to 70° F. Its northern limit is theoretically the July 50° F. line, and its southern limit the Tarbagatai water-parting; its western limit is the Urals, and its eastern the 600-foot contour that follows the eastern bank of the Yenisei, *i.e.* roughly 60° E. to 90° E. It has an "exaggerated Russian" climate, with somewhat similar climatico-vegetational subdivisions, though the Siberian vegetation spread westward, not the Russian eastward; but its old gulf-floor is naturally a trifle lower and distinctly flatter than the Russian old platform, and it is farther from the Atlantic. Its dominant characteristics are lowness and dryness, with extremes from below zero to 70° F., and a yearly rainfall of at least 10 inches. Its physical history has left it with a much better water-supply than the figure suggests; and, as over 6 inches (up to 10) of rain fall in June–August, agriculture is possible, the extreme temperatures being very favourable to the gluten content in hard wheat, while the widespread flood is some protection against late summer frosts.

Lena Province.

III. The Siberian platform, or Lena province, skirts the Sayan scarp and the south of Lake Baikal, and then stretches along the Yablonoi and Stanovoi crests to the Gulf of Anadyr—excluding the Kamchatka peninsula; its northern limit is the Taimyr platform. The Arctic Ocean to the north of it is shallow and frozen for many months; the Khingan-Stanovoi wall excludes Pacific influences; distance from the Atlantic and the physical history combine to give a drier air and a drier soil than farther west—the latter very favourable to better timber than the Ob basin can produce; and, though in summer the same latitudes have practically the same values as in that basin, 50°–70° F., the winter averages at least 10° F. colder (− 10° F.), and the rainfall is below 10 inches. The conditions are, of course, exceptionally favourable to great extremes, *e.g.* in the Pole of Cold; and there is no need to separate that Verkhoyansk "mountain" region climatically from the platform or the Yenisei basin from the Lena basin. The tiny eastern piedmont of the Stanovoi may be considered as an annex of either this province or that to the south of it (V. p. 130).

Kamchatka.

IV. The Kamchatka peninsula is definitely peninsular. The winter pressure from the Penshina Bay to the Kolyma Bay is only 30″, though the temperature drops northwards to well below − 20° F., and the Tundra touches the Anadyr gulf; but the winter temperature from Penshina Bay to the gulf is not below − 10° F., none of the real

peninsula is below zero, and the extreme south is above 15° F. The summer temperature over the real peninsula (50°–60° N.) averages 50° F., falling a trifle below that to the north, but approaching 60° F. to the south; the annual rainfall varies in different parts from 10 to 25 inches, but approaches 50 in the south, and 10 inches actually fall in winter (December–February). It is obviously a distinct, if minor, region.

South-East Monsoon.

V. If a certain combination of more or less uniform and moderate temperatures during a definitely wet summer with extreme temperatures and violent winds during a very dry winter forms a sufficient basis of agreement in determining a province, there can be no doubt that the whole region between the Khingan scarp (and its natural continuation) and the Pacific makes a single province; for temperature lines, whether of slight (+5° F.) excess in summer or of serious defect (−15° F.) in winter—like pressure lines, whether 30·3 in January or 29·7 in July—run parallel with the Pacific. The southern limit of the province may be accepted as the Tropic, embodied in a physical feature on land—the Si-kiang *v.* Song-koi water-parting; but the northern limit is less easy to choose. If likeness in kind is vital, and difference of degree is immaterial, we may choose 60° N.; for Okhotsk has a rainless winter, with steady N. winds, and then 88 p.c. of its total rainfall brought by steady S.S.E. winds in summer, with the remaining 12 p.c. during the two seasons of wind-change. The tendency to easterly winds in winter and westerly winds in summer excludes Kamchatka from this province.

"Temperate."

Under these circumstances the title "Sino-Japanese" scarcely covers the province, even if a purely political label were desirable, and if we regard the Sea of Okhotsk as an annex of this province (cf. p. 129); and it seems better to call it the "South-Easterly," or the Eastern *Temperate*, Monsoon province, that word suggesting such intemperate phenomena as are typical of the region. For the winter is strictly continental, with such contrasts of land and sea temperatures as to make it the stormy season; and the summer is marine, with too little difference between land and sea for the wet winds to be very steady.

Seasonal Contrasts.

But the whole province has summer rain, decreasing from 75 inches in the extreme south-east to 20 on the seaward face of the Khingan, though S.E. winds actually carry some 10 inches for a considerable distance *west* of the Khingan crest. The islands and peninsulas have also winter rain—fully 5 inches (or the equivalent in snow and sleet) in Korea, as in the Lower Yangtze basin, and fully 10 in Japan. The range of temperature in summer is small; even Okhotsk has typical temperatures above 60° F., practically all of the Sino-Japanese area has above 70° F., and most of it has about 80° F. The range in winter is great—at least 70° F., from 60° F. on the

south-east coast to – 10° F. in the far north-west. Peking in winter averages 15° F. below Hankow, and Hankow averages 15° F. below Canton; but in summer Peking is within 3° F. of Canton.

South-West Monsoon.

VI. The "South-Westerly," or Tropical, Monsoon province should include all the lands north of *c.* 10° N. and south of the Tropic; but neither limit can be enforced, even if we regard tropical Arabia as a mere annex. For Ceylon is clearly monsoonal and not equatorial, though south of 10° N.; and almost the whole of the Indo-Gangetic lowlands are practically tropical, though actually in a temperate zone. There are also some longitudinal differences; for, while Indo-China has perfectly normal latitudinal temperature-values except for some excess (*c.* 5 p.c.) in autumn (September–November), India has excess in both spring (April–May, up to 15 p.c.) and autumn, and tropical Arabia has excess from the end of April to the beginning of December, very marked in October. In any case, therefore, we need to subdivide the province, and make Arabia a continental, and Indo-China—including, for the moment, even Singapore—an oceanic, annex of the central region, which we may count as normal, even if it includes the Thar Desert.

It may seem strange to put Aden and Singapore, even tentatively, into the same climatic province, however closely similar they are in commercial and strategic importance; but a region must be judged by its normalities, not by its abnormalities. Aden is really as abnormal as Verkhoyansk, and the desert part of tropical Arabia as abnormal as the Thar—if this is kept within the Indian province (cf. p. 134); but the monsoon fragments of it are as much akin in kind to the Indian *régime* as the Okhotsk annex is to the Sino-Japanese.

India.

Even inside the Indian region (cf. p. 106) we must make the clearest distinction between, *e.g.*, the north-east and the north-west, *i.e.* between more rain and less range of temperature, and less rain and more range, rice and jute contrasted with wheat and millet; but both are monsoonal, and belong to the same major province, even if in winter the extreme north-west gets Anti-Trade rains, while the extreme south-east gets Trade rains. All parts of plain and plateau agree at least in one point:—their maximum temperature comes before the monsoon breaks, *i.e.* in June at the latest and more often in May.

Indo-China.

The Indo-China annex differs distinctly from this central region in virtue of its great articulation and its position between the two oceans; and the two characteristics interact in such a way that the typical note of the area is oceanic. For Indo-China is only a convenient *place*-name, to describe a location *between* India and China; but the adjective Indo-Chinese is far from describing the area well, for it is neither Indian nor Chinese in character. Indeed,

land influence is at a minimum, while the influence of both oceans is very strong; and the best description of the area is given by borrowing the ocean names, and calling it, in a narrow sense, Indo-Pacific. Genetically, the climate is monsoonal; even Victoria Point and Mergui have two months with a monthly rainfall of *less than one inch*,—Rangsit, Bangkok, and Saigon have three such months,—Moulmein and Rangoon have four. But both temperature and humidity are always high, and the range of temperature is very small. Except for Moulmein (86·1° F., in April) none of the towns mentioned has a monthly mean over 86° F., and except for Rangoon (74·7° F., in January) none has one below 76° F.

The marked oceanic influence thus brought into the typical monsoon phenomena is felt in two ways, one normal and the other abnormal.

Range of Temperature. The normal is this very small range of temperature. Even in the north-west, except round the Tongking Gulf, the rise and fall are slight and slow. Hanoi and Vinh have a range of less than 10° F. between the end of March and the beginning of November, though the N.E. wind in winter gives Hanoi in January a minimum of 62·6° F. (*v.* 84·6 in June), and Vinh one of 64·7° F. (*v.* 86·1 in June). Between the two, Thanh-Hoa has 64·4° F. (*v.* 85·6 in June); but Luang Prabang, in the same latitude, not much over 200 miles inland, and 1000 feet higher, but in the lee of the concordant wall (6000–9000 feet) that drives the Mekong abruptly southward along 102° E., approaches 70° F.

Rainfall. The abnormal phenomenon is the seasonal distribution of the rainfall. Hanoi has 84 p.c. of its total in May–September, and Saigon—500 miles farther south—has 85 p.c., with an extra 11 inches in October. Saigon (10·50° N.)—like Victoria Point, Mergui, and Moulmein—has a faint suggestion of an equatorial double maximum, but it is very faint; and Nhatrang (12·15° N.), on the east coast, confirms the monsoon character of the climate, though in a curious way. For its concordant mountain background should be a good precipitating medium, but it lies parallel with both the winds; and so for more than half the year the rainfall varies from only 1 to 2½ inches per month. On the mountain hinterland, Hoa Ba (4200 feet) and Dalat (4500 feet), both with a hint of double maxima and both near the altitudinal limit of maximum rainfall, show very heavy falls—Dalat with most of its 70 inches off the S.W. monsoon, and Hoa Ba with most of its 151 off the N.E. monsoon.

Typhoons. These Nhatrang and Hoa Ba rainfalls illustrate the abnormal oceanic influences here. The two places face the wind only when it is going round, *i.e.* only at the stormiest season, and that, too, the season when the sea is at its warmest, while the land is rapidly cooling. But the South China Sea is "always" covered with air

that is warm enough and still enough to favour typhoon development, and both towns are far enough from the equator (12°) to get the first of the series—as the sun begins to move northwards again. Nhatrang has 44 out of its 58 inches of rain in September–December, over 15 of them in November; and Hoa Ba has 86 in the same four months, with 26·6 in November.

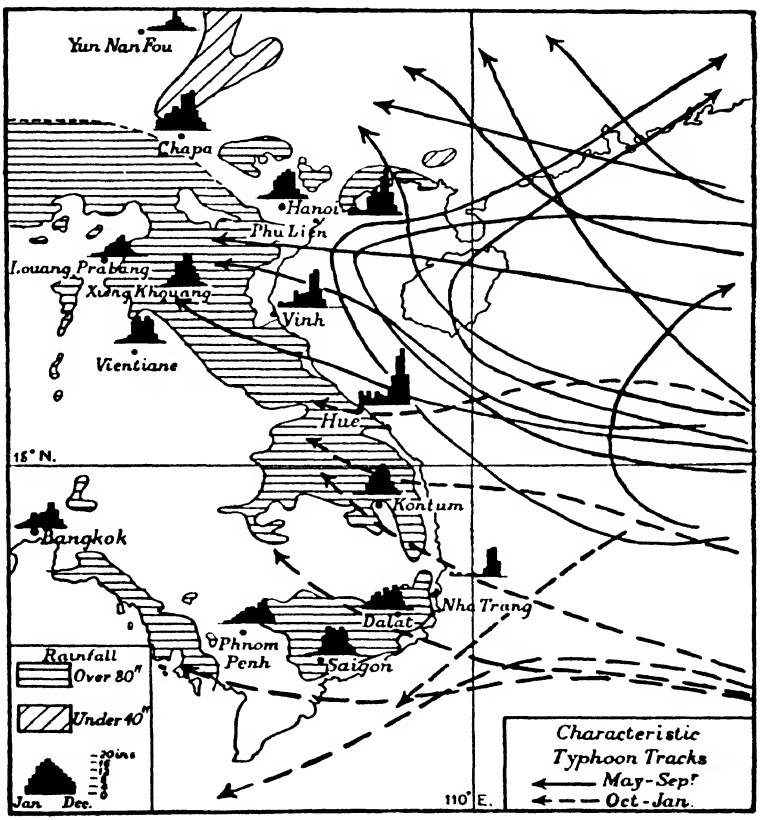

FIG. 29.—Indo-China: Rainfall *Régime* and Typhoon Tracks.

N.B.—The unlined land has between 40 and 80 inches.

The same blend of normal autumnal and abnormal typhoon rainfall is illustrated along the whole of this eastern coast of the peninsula. For instance, Hué is directly in the track of the October and November typhoons, and has 25·9 inches in October and 29·1 in November, with over 14 in September and nearly 15 in December, *i.e.* 74 out of 116 inches in the four months.[1] **Hué.**

[1] See the statistics and maps of the admirable monograph *Le Climat de l'Indochine et les Typhons de la Mer de Chine.* (Observatoire, Hanoi, 1930)

Equatorial.

VII. As even Saigon and Victoria Point have only 5 p.c. of their total rainfall in December–April, with only 0·1 of an inch in February, they are clearly not normally equatorial, even if there is a suggestion of two maxima and two minima; but Singapore, with clearly two maxima and two minima, has no month with less than a full 6 p.c. of the total, and even Colombo has none with less than 2 p.c. of the total. As both have a tiny range of seasonal temperatures—just over 3° F., while Penang has *under* 3° F., with the normal considerable range between day and night—it seems necessary to allow for a tiny equatorial province to include the very low latitudes; but it is far from typical, for it is nowhere a Belt of Calms, and has nowhere predominantly convectional rains or obvious relation between variations of temperature and of rainfall.

. . . . . .

All the rest of the continent seems to suggest the same kind of linked duality that is so typical of various aspects of Asia, for it may be grouped in pairs of "Block and Basin"—central, southern, and western.

Tibeto-Gobi Province.

VIII. The Tibeto-Gobi province may be correctly described as a Cool-Temperate Interior (Highland and Lowland) *if* we pay attention to nothing except mean annual temperatures; but these are not only perfectly worthless, but actually misleading, everywhere except at sea-level on the equator or on purely oceanic islands. Even at Peking, on a coastal lowland, the mean monthly temperature *for ten months out of the twelve* is either at least 23 p.c. below, or at least 27 p.c. above, the mean annual temperature of 53° F., which is about the same as the Scilly Isles!

The conspicuous feature of the province is its terrific dryness, which implies such ranges of temperature, diurnal and seasonal, as make the words *Cool* and *Temperate* a lamentable misuse of language. The whole is below freezing point, and much of it is below zero, in an icy winter of appalling gales; Urga has a January mean of −15° F. and a July mean of above 63° F., and Leh has about the same for July with 17° F. for January. The latter has 1½ inches of rain in the year, and the Pamirski Post has 2½. Lukchun (*c.* 30 feet below sea-level) has a January temperature of 13° F. and a July one of 90·5° F., while Kashgar, with a range from 22° F. to 80° F., does not have 3½ inches of rain in the whole year.

Irano-Sind Province.

IX. The southern Block-and-Basin province should possibly be called the Irano-Sind province. If this is the proper unit,[1] it certainly includes Quetta and Multan, and stretches from Isfahan to Bikaner;

[1] Subdivision, however useful, is less important than the unity of the "alien" summer-drought belt; and so Tehran is also included in the Mediterranean Province, No. XI., on p. 138. Cf. pp. 119-122.

Multan has 3½ inches a year more rain than Isfahan (3½″, at 5370 feet), and Bikaner has 1 inch more than Quetta (10″, at 5500 feet). Kabul, nearly 5500 feet higher than Bikaner (800 feet), also has 11 inches. The province is equally misrepresented by such adjectives as *Warm* and *Temperate*, for again the conspicuous feature is dryness—the mean annual rainfall in much of Seistan being just over *one* inch. There is, of course, considerable difference between its Hindu Kush and its Makran latitudes and levels, as between its Persian and its Thar longitudes and levels. The dryness and the heat are excessive, especially in the southern latitudes and on the eastern levels; and rainfall increases slightly with nearness to the sea and with exposure to the edge of the Wet Monsoon, Jacobabad having over an inch in both July and August. The outstanding phenomenon here, too, is wind—almost ceaseless and from the west, and as hot in summer as it is icy in winter; and it is associated with clouds of dust, as the east wind is in the Tarim basin. The worst manifestation is in the Seistan basin, where it is known as the Hundred and Twenty Days' Wind; and its strength increases markedly from the equinox, getting to maximum fury during the fortnight before the Wet Monsoon bursts in Bombay.

Aralo-Caspian Province.

X. The Aralo-Caspian basin has as great a proportion of very low land as the Irano-Sind block has of high land; it is, of course, very dry, and has great range of temperature. Its relation to the Atlantic directly, and indirectly through the Mediterranean, and to the Caspian and the Aral Seas, makes it just possible to say that "the northern half has summer rain, and the southern half has winter rain"; but it is more true to say that neither has any rain—except on the marginal mountains and their piedmonts, and that the only effective rain in the basin is spring rain. Tashkent, at 1600 feet, has slightly over 14 inches, while Samarkand, at 2360 feet, has slightly under 14; and down stream the former has a slightly colder winter (30° F. *v.* 32° F.) and a slightly warmer summer (81° F. *v.* 78° F.). Kasalink and Khiva illustrate the conditions on the lowland generally and the particular results of different relations to the Aral Sea; for the west wind slightly lowers the summer temperature at Kasalink (to 78° F.) and slightly increases its precipitation (to the equivalent of 5″ of rain), while in the early winter Khiva gets the *buran* so much ameliorated by its passage over the sea that the temperature is 12° F. higher than that at Kasalink (11° F.). Conversely, in summer it is also higher, 5° F. higher.

Three Factors.

Even if the basin was not the scene of the first fully developed human society, it was of immense importance in pre-historic times; and so we must pay much more attention to it, especially to some details which must have been of prime importance to early Man. For the fundamental control here must have been in the climate and

not, as on the Armenian crown, in the relief; and the climate does not seem to have changed materially *in kind*. The key to it is persistent drought in middle latitudes, with special relation to three factors—heavy snow on the mountain margins, marked inversions of temperature on the piedmonts, and the seasonal rain on the wide plains.

Drought. Even more than in Egypt (where the Nile did spread flood water and chocolate mud over a considerable area unaided by man) irrigation—not flood—was the only possible economic basis of any human group. The witless and the work-shy would have had, and must have had—if there were any,—no chance at all; but wise effort had a sure and rich reward. For the drought meant eternal sunshine from a cloudless sky. Of course, there are clouds on the mountains in winter and summer alike, and there is a good deal of cloudy haze over heavily irrigated areas, especially Ferghana; but there is a very high percentage of possible sunlight, the actual "summer" figures even at Baraim Ali being:

May	June	July	August	September	October
71	87	90	94	88	78

This must always have meant a high development, *e.g.*, of gluten in grain and of sugar in fruits (as to-day in the water-melons and sugar-beet), and other very favourable conditions.

Temperature Extremes. Then the dryness must always have meant, both directly and indirectly, great extremes and marked inversions of temperature. Of course, mean temperatures below 32° F. for January—with regular descents to zero and below zero—quite excluded such valuable fruits as olive and citrus; but six months at or above 60° F. —with mean monthly maxima of 86° F.—allowed even rice to flourish, and even such fruits as fig and pomegranate survived on sheltered piedmonts.

The temperature inversion implied in the last point was of great importance, for it was specially favourable in the precise places where there were also the best facilities for irrigation, giving an advantage, *e.g.*, to Samarkand over Bukhara; and its importance was increased by the very high percentage of "calms." Over all the lowlands in all seasons except spring three days out of ten are quite windless—an immense relief to transpiring plants and to the irrigator; and the natural disadvantage of such relative "stagnation" is neutralised by a persistent northerly drift—N.W., N., N.E.—*e.g.* on fully 155 out of the remaining 265 days in the year over the province of Tashkent.

Rainfall. As to the precipitation, we may at least feel certain that it has not increased with the lapse of ages; and, on the other hand, if it was once slightly heavier, the extra one or two inches must have had a special value. For all parts of the area seem to have *some*

precipitation. Even on the plain, in all latitudes and all longitudes, there is at least a sprinkling of spring rain. A minimum of fully 3 inches is assured even at Krasnovodsk—*below sea-level*, and about 4 inches can be expected even at Khiva and Petro-Alexandrovsk (3·88″); to the north-*east* the Aral Sea increases this to nearly five at Kasalinsk and just over five at Perovski, though Aralskoe—due *north* of the lake—has only 3·7″; in the south-centre, just above the 666-foot scarp of the higher plain, Charjui has 4¾″, and Bukhara fully 4; farther south, Merv has fully 5″, and approach to the Paropamisus piedmont varies this to 6″ at Band-i-Sultan and then to 6½″ at Karki.

Seed Time.

The increase on the higher plain tends not only to "fix" the wind-carried loess, but even makes it possible in some parts to grow wheat and barley without irrigation; but, from both points of view, the vital consideration is the season of the rain, for it falls precisely at the time when the seeds need both an undisturbed seed-bed and water for germination. It is, therefore, of prime importance that in all parts of the area the season is spring:

	Winter	*Spring*	*Summer*	*Autumn*	*Total*
Krasnovodsk . .	1·4	2·1	0·6	0·6	4·7
Tashkent . . .	4·6	6·1	0·6	2·8	14·1
Kasalinsk . . .	1·1	1·6	1·0	1·0	4·7
Charjui . . .	1·5	2·8	0·3	0·2	4·8

The historic and pre-historic importance of this must have been that, except in the very worst areas, there was *some* vegetation, if only poor steppe, while—especially if the rainfall was once slightly higher than it is now—there must have been a good sprinkling of fair steppe round patches suitable for unirrigated grain. If these facts are translated into terms of animal food and animal transport, if only by camel or ass, the pre-historic irrigators must have had a much wider outlook than they are sometimes believed to have had.

Exposure.

But, as irrigators, they were essentially the occupiers of piedmonts, and we have a double background to the precipitation. Approach to the actual mountain-line at once doubles the rainfall (or its equivalent) to fully 11″ at Askabad, over 17″ at Jisak, and over 34½″ at Aklach; and this great difference in the quantities southward and eastward is fundamental. In every part, *ceteris paribus*, the eastern highland, which faces the Atlantic winds, has heavier falls than the southern, which lies parallel with them; for both the rain and the snow, in spring and in winter, come on west winds, even when there is an easterly drift working down an eastern valley, *e.g.* Ferghana.

Shelter.

The only qualification that needs to be added is that towns lying at the bottom of narrow and sheltered valleys do not show the same higher rainfall. Khojent, in the defile leading into the Ferghana valley, has not much over 5 inches; Namangan, which

is below 1600 feet—though so far up the valley—and in the lee of the Chatkal-tau, has not much over 7 inches; and Narynsk, farther up the Narya valley and in the lee of the *transverse* Ferghan range, has only *c.* 36″ even at a height of 6000 feet. Andijan, still farther up the main valley, but actually on the Syr, has less than 10″, and Och (over 3000 feet) has only 13″, *i.e.* less than Tashkent or Samarkand. But these towns on the south side of the valley, though their rainfall suffers—that of Skobelev (New Marghelan) being below 7″—have great compensation in the towering Alai heights (Pik Baba, *c.* 19,700 feet) behind them; for the northern exposure guarantees both a heavier snowfall and slower melting.

Irrigation. This brings us back to the fundamental irrigation problem. Temperature and relief combine to limit all heavy precipitation to the one form and the one place—snow on the mountains, and this means—and must always have meant—a definite relation between the need for water (in great heat) and the supply of it; and the rapid descent has been as favourable to the development of "power" (even in the most primitive mill) as to the carriage of silt. This annual renewing of the surface soil was itself a form of irrigating as well as manuring; and, with the spread of organised irrigation, it converted large areas into a condition in which late-spring and early-autumn frosts became practically impossible. This is still of great importance, especially on the larger oases, *e.g.* Tashkent and Andijan, where it protects crops such as cotton—*l'enfant du soleil*—from irreparable harm; and the effect of the watering, like the influence of the Aral Sea or the Caspian, is specially great and specially useful in spring.

Man. Unfortunately, the line of densest settlement here was also the natural line of movement—in war as well as peace, and time after time fire and sword scourged it so fatally that there is little hope of rebuilding the history of the belt; but the conditions summarised above suggest that it had more advantages than any other area—except, perhaps, Egypt—that has any claim whatever to be the nursery of human civilisation.

Mediterranean. XI. The Mediterranean province may be described as "exaggerated Mediterranean" as to both the Anatolo-Armenian block and the Mesopotamian basin, and exaggeration in the form of extra continentality is exactly what is natural in an area where the land is central and the sea circumferal. We may expect, therefore, that temperatures will go constantly below 50° F. in winter, and above 75° F. in summer; and this is normal in the absence of summer rain—at least south of the 40th parallel—except over the low-pressure focus round the Persian Gulf. Tehran, if the eastward limit of the province, has not half an inch of rain in the summer months (June–September); and Isfahan, if that should also be included

here, has none at all in the same months, but has typical Former and Latter rains in November (0·8″) and March (0·8″).

These Persian outposts are far above normal Mediterranean temperatures in summer, Tehran with *c.* 85° F. and Isfahan with 82° F., and still further below them in winter with *c.* 34° F.; but even Smyrna (46° F.) and Baghdad (49° F.) are below normal, and Trebizond is as low as 41° F., though it has the normal 75° F. in summer. Smyrna, like Haifa, rises to 82° F. in summer, and Baghdad to over 92° F. The rainfall varies from 36″ at Trebizond and 27″ at Smyrna to 14″ at Damascus and 9″ at Baghdad, while Tehran does not reach 9″, and Isfahan not 4″. And it is interesting that, while these high plateau towns, like the Meseta towns of Spain (Burgos and Salamanca, Madrid and Ciudad Real), have their maxima in July, the lowland towns have them, like the Italian towns, in August. ***Not "Mediterranean."***

Baghdad may sum up what is generally " true " of more or less the whole of the habitable lowland, if allowance is made for the presence of the Persian Gulf and the trend of the Mesopotamian trough (cf. p. 113). Its daily mean maximum in August is 110° F., occasionally leading to a storm, so that some rain is actually registered; but the air is actually drier than in July, and the nights a trifle cooler in consequence (*c.* 79·5° F.). The mean daily maximum in January is 59·5° F., but the mean night temperature is only 38° F., and sometimes falls below 32° F. **Baghdad.**

XII. The Trade-wind Desert of Arabia is outside the true limits of both the Mediterranean and the Monsoon belts; but it is scarcely necessary to create a separate province for such an area, as it can be regarded as an extreme type of Mediterranean area or included in the S.W. Monsoon province, as the Thar can be. At the same time it is useful to distinguish a Trade-wind area from both the Monsoon and the Mediterranean areas, and so a separate province is marked on the map. **Trade-Wind.**

REFERENCES.—SIMPSON, "The South-West Monsoon" (*Quarterly Journal of the Royal Meteorological Society*, volume xlvii., 1921); WILLIAMSON and CLARK, "The Variability of Annual Rainfall in India" (*Quarterly Journal of the Royal Meteorological Society*, volume lvii., 1931); BRUZON and CARTON, *Le Climat de L'Indochine* (1930); WOEIKOF, *Le Turkestan Russe* (1914).

CHAPTER IX

NATURAL VEGETATION

Variety. THE vast extent of Asia in both latitude and longitude and its immense variety of relief combine to give it not only a unique number of Vegetation zones, but also glaring contrasts, whether between wholly different types, *e.g.* Arctic and Equatorial, or between somewhat similar types in close proximity, but under different conditions, *e.g.* the difference of altitude between the Gobi desert and the Tibet plateau. And such contrasts must result in a great diversity of plant associations.

Main Facts. Though the details are necessarily complex, the main facts are few and clear; and the fundamental one is that Asia has no oceanic border in the western longitudes of all its middle latitudes; and so a large proportion of it is condemned to a rainfall which is positively scanty, or which is too small in relation to summer temperatures to allow of any considerable forest growth. The far North has special conditions, which compensate for small precipitation to some extent; and the considerable parts of the Indo-Pacific hinterland that get heavy summer rain, especially the south-eastern peninsula, have a combination of high temperature and adequate moisture that guarantees even luxuriant forest. But elsewhere even continuous woodland is scarcely possible except where the summer temperatures are relatively low, or where relief and exposure result in heavy rainfall in the same season and at the same place year after year. Even true savanna is rare.

Steppe. Steppe, on the other hand, is as common as parkland is rare; indeed, it is the dominant—almost the differentiating—feature of the continent. It may thin out to scrub on the margin of tropical or temperate desert, with a scattering of stunted trees; but it is practically possible to travel from Orenburg to Peking and from Kurgan to Karachi without ever being out of sight of it in some of its phases, and it probably covers one-third of the whole continent.

Nomadism. This is the key to the unique importance of Asia in the history of nomadism, migration, and even emigration. Steppe can never be rich permanent pasture; a given area is soon exhausted, and—even

if not exhausted—would get "fouled"; and an increase of population—whether of man or lemming—has the same effect as a decrease of available moisture. The general uncertainty, or a particular series of bad seasons, causes whole groups to emigrate; at the best they must migrate from and to a fixed home, in following the seasonal changes of food-supply, or even wander over a wide area without any fixed home. "Leaving home" on a thousand-mile journey means nothing to the nomad.

Light. But, unfortunately, serious decrease of food-supply is naturally and normally accompanied by increase of population, for the strength of the light increases with the dryness of the air; and this strong light—(? as Vitamin E acting on the anterior lobe of the pituitary gland)—is equally potent in stimulating bodily fertility and mental irritation. Over-population and over-stimulation, too little food and too much restlessness, are behind the whole story of the steppe-raiders of Asia.

Täiga. North of the vast central steppes with their associated scrub-lands and deserts, lies the one great belt of forest in Asia, so far north and so continental that it is predominantly coniferous; but even here, though most Vegetation maps suggest that it is continuous from the Urals to Kamchatka, it is actually neither quite continuous nor very dense. For the conditions are far from favourable in some parts, and it is ribbed in many parts with Tundra, whether of Arctic or of montane type. At the same time, where conditions are favourable, the Taiga displaces the Tundra, *e.g.* in the Taimyr peninsula, and pushes its way down along the great rivers, especially the Yenisei, almost to the shores of the Arctic Ocean.

Marginal Forest. It is in the nature of things that marginal forests should have been more or less typical of the hinterlands of all the oceans. Even in the specifically summer-drought south-west, especially in and round Asia Minor, the winter rains make possible the growth of the Mediterranean type of forest, especially on coastal belts and mountain slopes. In the north-east the Pole of Cold is in a forest environment—showing how indifferent trees are to low temperature if it is *not* accompanied by wind; and the best timber in Siberia is found in the lower basin of the Amur. The appearance of deciduous trees in Manchuria is of great significance, even if very little of any original deciduous forest survives; but the enemy has been man, not the climate. The summer-rain forest of Eastern Asia has enriched the parks and gardens of Europe with some of their most beautiful trees and shrubs; but the conditions that favoured these, favoured also the crops upon which the teeming millions of China have depended for centuries. Again the enemy has been man.

Southward the marginal forest becomes first simply tropical and then of equatorial type, already much modified and becoming more and more so from human interference; and, where it might have

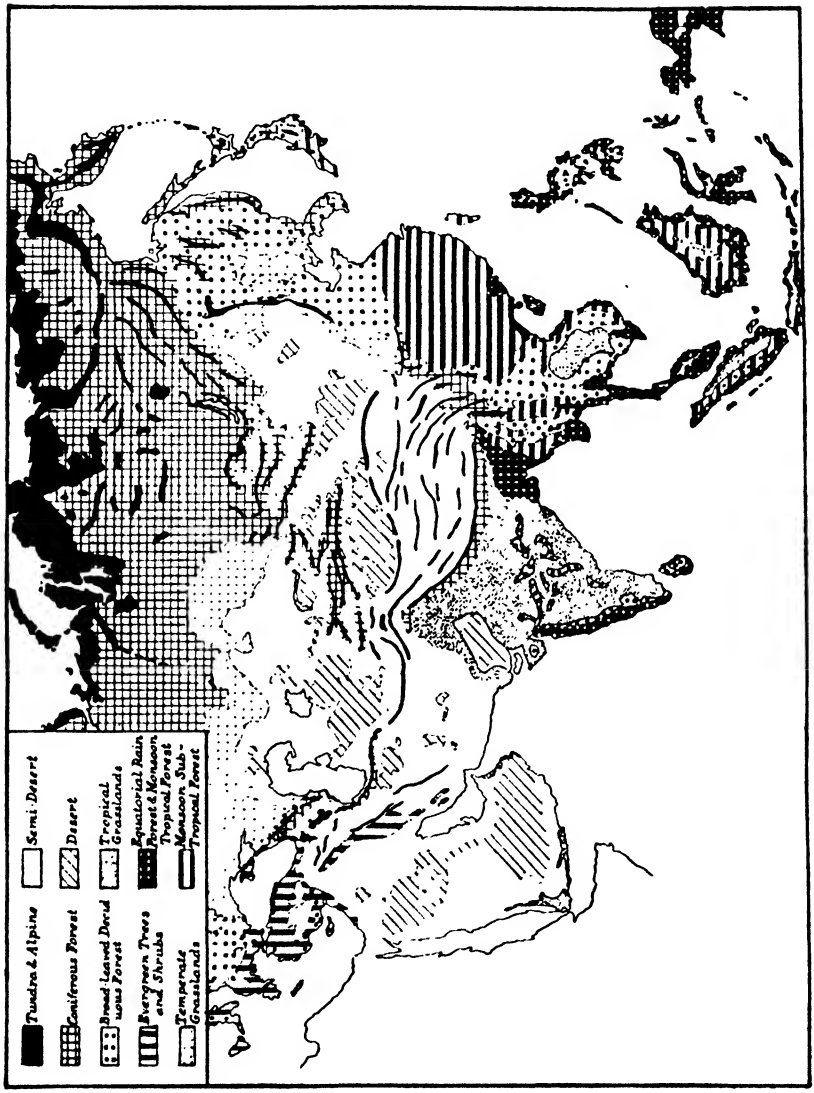

FIG. 30.—Outlines of Natural Vegetation.

This diagram should be compared with that of the Major Climatic Provinces (on p. 126), with special reference to the dividing line which runs from the south coast of the Caspian Sea to the north coast of the Sea of Okhotsk.

spread farthest inland, fed with rain from both oceans, the great plateau of Tibet intrudes between forest and steppe with a thin carpet of alien Tundra.

Man v. Nature. While the luxuriant forests of the south-east have been greatly modified or removed by man, both the Tundra and the Taiga of the north have hitherto proved intractable; and the various forms of "steppe" (scrub, semi-desert, etc.) have been modified only in a few places and over relatively small areas. Over a large part of Asia, therefore, the natural vegetation persists to a far greater extent than in Europe; and, while a relatively short period sufficed to clear most of the natural woodland from the surface of Europe, especially western Europe—thus changing the whole basis of rural life as well as the scenery—much of Asia has remained for a vastly longer period "the Changeless East." This is all the more remarkable because it is most true of the "Lands of Wandering"—the arid grasslands associated with hoofed animals that were easily domesticated; and, as even in the core of the continent position and relief often increase precipitation, or make irrigation possible, the briefest survey of the vegetation brings us in sight of the eternal conflict—nowhere else in the world so ceaseless or so strenuous—between the pastoral nomad, who is always on the war-path, military or economic, and the sedentary tiller, who is not usually a natural fighter, but is far too closely *adstrictus glebae* to be easily pushed off his patch of "kitchen-garden." And reaction follows action. The Desert may here and there, by luck and license, encroach on the Sown; but the Sower is deliberately and scientifically pushing into the richest pastures of the Wanderer.

A Summary. If, then, we use the word desert in its botanical sense, to include all areas where the plant-cover—whatever the cause—is discontinuous, *i.e.* both deserts in the narrow sense and lofty highlands, we may summarise the conditions with such references to other continents as may bring out the differentiating features of Asia.

The great mass of the area, including practically the whole of the centre and the south-west, is occupied by a vast area of grassland—prairie and steppe, scrub and semi-desert—occasionally ribbed by mountain woods of limited extent and partially surrounded by a lowland belt of forest. This varies in character from the coniferous Taiga through the summer-rain types to the wet jungle of the south-east; but the natural vegetation has been displaced to a very considerable degree in both directions—rainward and droughtward, *i.e.* in the summer-rain, tropical monsoon, and equatorial forest areas, and where water can be artificially supplied to make irrigation possible in areas of very scanty or no rain.

Agriculture. Similar phenomena are quite common to-day in both North and South America, and so it is useful to note the one dissimilar condition in Asia. For the high relief of the central mass and the climatic

effect of great longitudinal extension have minimised possible areas of transition between grassland and any deciduous forest, *i.e.* the precise kind of area that has become so important agriculturally in the Americas; and the greater difficulties of communication over the huge spaces have retarded the progress of agriculture even within the transitional belts which do exist. Further, deciduous forests of the more useful northern type are of very limited extension, the beech being killed out eastward by excessive evaporation even in western Russia; and yet the conditions of soil and climate that are favourable to them are more favourable to Man than those of coniferous forests. Consequently, that spread of agriculture, especially as the cultivation of the exceedingly valuable hardy cereals, which has been such a marked and vital feature in the development of western Europe, has no historical parallel at all—scarcely even a glimpse—in the mother continent.

This deficiency has an importance beyond the immediate provision of the best kind of bread-stuffs. For it is in these transition regions that we can best study the ways in which plants begin to adjust themselves to new conditions, *e.g.* when a native of summer-drought comes in contact with summer-rain and consequent dangers from rust and mildew; and only by such study can we learn how to extend the cultivation of the given plant into less favourable areas, as in the northward extension of wheat-growing in Central Canada.

Linked Zones. Perhaps the best approach to a division of the continent into vegetational zones is a wide comparative survey, linking together Tundra and Taiga or Steppe and Temperate-zone Desert; for that clarifies our ideas as to natural boundaries and actual distributions. For instance, in the hinterland of the Kara Sea the Taiga narrows rapidly, until in 70°–80° E. it is only 500 miles wide, while on the higher and drier levels that end in the Taimyr platform it is 1500; and in the former area the Tundra spreads 200 miles south of the Arctic Circle, while in the latter it stops 500 miles north of that. In Scandinavia the Tundra, Arctic and montane, runs parallel with the forest, coniferous and deciduous, as far south as 60° N.

In any case, the northern limit of the Taiga, especially where it is farthest north, *c.* 100° E., is of little importance at present; but we want to notice that, in spite of its overwhelmingly coniferous nature, this northern forest-belt in Asia does correspond approximately with the still-existing northern forest-belt in Europe as well as in North America. At the same time, there is so much more swamp, especially in the west, than in the European belt that the forested drier areas are relatively discontinuous.

Tundra: (1) Climate. The Tundra also corresponds with the similar zone in Europe, but is of far greater width, for in January the oceanic surface off Norway from the Arctic Circle to the North Cape is *from 25° to*

STATISTICS OF MEAN TEMPERATURE AND RAINFALL—III

Pacific Drainage

		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
V. 19	Okhotsk .	−10·5 0·1	−7·2 0·09	6·6 0·1	21·4 0·2	35·1 0·5	45·3 1·1	54·9 0·5	**55·2** 1·8	46·4 **2·1**	26·6 0·7	5·5 0·2	−7·8 0·2
20	Hong Kong .	59·7 1	57·7 1·3	63 3·3	70·3 5·4	76·8 12·4	80·6 **16·3**	**81·7** 15·9	81·1 14·8	80·2 12·5	76·1 5·2	69·1 1·1	62·6 0·9
21	Tokyo . .	37·2 2·1	38·3 2·6	44·1 4·4	54·3 5·2	61·5 6	68·9 6·4	75 5·5	**77·7** 6·4	71·6 **8·9**	60·6 7·5	50·4 4·1	41·4 2·2
22	Chengtu (*alt.* 1500′)	43·9 0·3	45 0·4	53·2 0·5	62·6 1·9	70·3 2·2	75·7 4·5	**79·2** 8·1	77·7 **10·1**	70·3 4·3	63·1 1·9	54 0·6	46·6 0·2
23	Hankow .	38·8 2·1	40·1 1·1	49·3 2·8	61·2 4·8	71·1 5	78·3 7	**83·5** **8·6**	83·3 4·6	75·9 2·2	64·8 3·9	53·8 1·1	43·3 0·6
24	Shanghai .	37·6 2·2	39·2 2·3	46 3·4	56·3 3·8	65·5 3·7	73·4 **6·5**	**80·4** 5·5	80·2 5·9	72·9 4·7	63·3 3·2	51·8 1·7	42·1 1·2
25	Kagoshima .	41·5 3·5	44·6 3·3	51·1 6·1	59·5 9·1	65·3 9·6	71·1 **13·9**	78·1 11·2	**79·5** 7·4	75·2 8·7	66·2 5·1	56·7 3·7	47·8 3·5
26	Peking .	21 0·1	29 0·2	41 0·2	57 0·6	68 1·4	76 3	**79** **9·4**	77 6·3	68 2·6	55 0·6	39 0·3	27 0·1
27	Tientsin .	25 0·2	29 0·1	41 0·5	54 0·6	68 1·2	76 2·8	81 10·9	**85** 5·7	70 1·9	59 0·8	41 0·6	29 0·1
28	Port Arthur .	6 0·8	8 0·8	20 0·9	36 1·5	46 2	57 2·7	**63** **3·8**	59 2·8	53 3·3	41 2·5	27 1·5	13 0·8
29	Akita . .	30 4·5	30 3·9	36 4·2	47 4·5	56 4·4	64 6	71 **8·1**	**74** 7·7	67 7·5	55 6·6	44 7	35 7
30	Mukden .	8 0·2	14 0·2	30 0·6	47 1	60 2·4	71 3·2	**77** **6·7**	75 4·3	61 2·6	48 1·7	29 0·5	14 0·2
31	Hakodate .	26 2·2	28 2·2	34 2·6	43 2·8	50 3·2	60 3·6	65 5	**71** 5·2	65 **6·7**	54 4·6	43 3·7	**32** **3**
32	Harbin .	−2 0·16	5 0·2	24 0·4	42 0·9	56 1·6	66 3·7	**72** **4·4**	69 4·1	58 1·8	40 1·3	21 0·3	**3** **0·2**
33	Vladivostok .	5 0·1	13 0·2	27 0·3	40 1·2	49 1·3	57 1·5	66 2·2	**69** **3·5**	62 2·4	49 1·6	30 0·5	14 0·2
34	Sapporo .	21 3·5	22 2·5	29 2·4	41 2·2	51 2·7	59 2·8	66 3·3	**69** 3·7	61 **5**	49 4·6	37 4·4	26 4
35	Chungking .	48 0·7	50 0·9	58 1·3	68 4	74 5·3	80 **6·7**	83 5·3	**86** 4·4	77 5·8	68 4·6	59 2	50 0·9
36	Ichang .	40 0·8	43 1·1	51 2	62 4·2	70 5	78 6·2	83 **7·8**	**83** 6·8	75 4	65 3·6	54 1·5	44 0·6
37	Osaka . .	39 2·0	39 2·4	45 4·0	56 5·3	64 5·2	72 8·3	79 6·5	**81** 4·2	74 7·6	62 5·0	52 2·7	43 1·9
38	Fuchou .	53 1·7	51 4·1	62 5·3	67 4·4	73 5·6	78 8·1	**86** 6·7	86 7·5	81 **9·2**	72 2·8	66 2·1	58 2·2
39	Kochi . .	42 2·2	43 3·6	49 7·4	58 12·3	65 12·1	71 13·9	77 13	79 10·6	74 **15·7**	64 9·5	54 4·9	43 3·2
40	Okayama .	38 1·5	39 1·6	45 3·2	55 4	63 4·4	71 5·8	78 **6·4**	80 3·8	73 5·5	62 3·7	51 2·2	40 1·4
41	Ishinomaki .	31 1·5	32 1·9	37 2·9	48 3·7	55 4·1	63 4·5	70 5·9	73 5·1	68 **6·9**	55 5	46 2·3	36 **2**

35°F. above normal temperature; and the influence of this abnormal warmth—the offshoot of which reaches to, if not wholly across, the Kara Sea during every month in the year except April and August—takes the generalised southern limit of the zone much farther north than in North America, to the great advantage of the rainfall in the Arctic hinterland of Asia. But during the dark winter the mean temperature is below zero and during the foggy summer not much above 32° F.; consequently, the fundamental characteristics of the zone are a permanently frozen sub-soil—in which have been preserved sub-fossil specimens of the mammoth, to be some source of ivory to-day, though most of the tusks are "perished"—and an entire absence of trees, which means such a demand on oils and fats for *warming* purposes that meat has had to be eaten uncooked—by Chuckchis and Koryaks.

(2) The "Cover." The vegetational response to these conditions is found in several forms, *e.g.* berry-bearing and arboreal (especially willow) bushes and a variety of herbaceous plants, including forget-me-nots and anemones, which beautify southern slopes in the continuous light of the two-months summer; but, as some of the species do not seem to be able always to ripen their seeds, they are evidently very near their northern limit. The more typical products, therefore, are mosses, the wetter areas producing quantities of the *Sphagnum* bog-moss—and myriads of mosquitoes in summer—and the drier areas producing quantities of lichens, including the so-called *Reindeer* "moss" (really a lichen).

(3) Human Note. Under such conditions human life depended naturally on hunting and fishing, *i.e.* on the destruction of the resources of Nature; but the Siberian nomads have learnt to drive their domesticated herds in summer to the moss-fields which the wild reindeer have always frequented. In winter, however, the zone has little or nothing to offer to either man or any beast except the reindeer, and those that do survive must be dependent on ocean products—"the sea-fed Tundra life"; for the wind is often so dry and so strong as to strip the ground bare of even the thinnest layer of "snow-dust," and to evaporate the most secret sources of "surface" moisture.

Taiga: (1) Climate. Not only can no sharp geographical line be drawn between Tundra and Taiga, but it is actually a special feature of the latter in the far north that its floor in many parts shows the typical Tundra characteristic of a permanently frozen sub-soil; and this practically decides the number and the size of the trees, as well as their restriction to coniferous species. Towards the east the Siberian "cedar" (*pinus Cembra*), with edible seeds, appreciated alike by man and beast, is specially important; and it survives in dwarf forms—like the mountain pine of Europe—even where conditions seem far from favourable. Of the other chief species, the Siberian larch is

a much more valuable timber-tree than either the Siberian fir or the spruce; but several special features deserve attention, particularly from the economic standpoint, *e.g.* timber supply.

The first is as to the amount of available moisture and its distribution. The annual precipitation is very small, and the constancy of violent winds is very unfavourable, especially as they are most violent in the latitudes most easily reached by cheap transport —by sea; but the physical history of the region both before and since glaciation largely compensates for the small precipitation, and hard frost means deep thaw just when growth begins. (2) Moisture.

But the soil in many parts is swampy or poor or both, and this affects the actual life of the trees as well as the quality of the timber. Even in the Alps the woods of *pinus Cembra* show a sad excess of dead and decaying trees over young growth; and the Siberian conditions are so much more unfavourable that the abundance of driftwood in Spitsbergen is due to the increasing load of dead trunks carried down by the great rivers, especially the Ob, and distributed westward by the ocean currents. Indeed, the amount of good timber in Siberia is probably far less than is often asserted and believed; and, though east of 90° E. higher and less monotonous relief, with less wind and less swamp and a much wider forested belt, promises better things, the region is even less accessible, though floatage is possible nearly everywhere. (3) Soil.

Though there is a considerable amount of "demarcation of territory," *e.g.* pines on the drier and lighter and spruce on the heavier and wetter soils, the Taiga is, as its name suggests, a continuous belt of predominantly coniferous and rather "open" forest; but it is often sprinkled with such "leafy" trees as birch, aspen, and willow, and these dominate the southern and the eastern limits of the belt so much as to produce the nearest approach to parkland, especially as it is accompanied by a great wealth of flowering plants. This is found in nearly all longitudes, with slight regional differences. Thus, north of the Baraba steppe, between the headwaters of Ob and Irtysh, the ground is rather too marshy for the wealth of flowers found round Lake Baikal, while the beautiful open birch-woods of Kamchatka and other coastlands of the Okhotsk Sea are sprinkled with giant types of hollow-stemmed "hemlock" and fibre-giving nettle. (4) Variety.

Though Nature has placed the Tundra-Taiga zone side by side with the Steppe-Desert zone, we are presented with the greatest of all vegetational contrasts in going from forest to grassland, from the domain of the longest living to that of the shortest living of all plants—from a certain and well-distributed supply of moisture, that gives the environment some stability, to an uncertain and irregular supply, that can only give instability. And so far as Extreme Contrasts.

stability or instability is the vital factor in human environment, it is very unfortunate that the Taiga even now is not "inhabited"; and so there has been no real check historically on the natural tendency of steppe environment, and Asia gives us no parallel with the contrast between the stable and tenacious Slav peasant in the (semi-deciduous) Muscovy forest and the turbulent torrents of ephemeral Mongol and Tatar raiders across the Cossack Steppes.

"Steppe." But, when we are linking together in a double "Steppe and Desert" zone two environments which seem to be contradictory, the one implying and the other denying population, we must come to a clear decision as to the precise meaning that we are going to attach to names. Professor Herbertson accepted as a definition of Steppe "unwooded tracts in middle latitudes, of considerable extent, and covered with useful vegetation"; and he added that it was "a convenient term to describe those lands whose treelessness is due to great extremes of climate, produced by their remoteness from the ocean." Even if every word of that is true, both the description and the explanation seem to be misleading; at least they do not cover all, or exactly what, we wish to include in our double zone.

The Russian word *stepe* or *stapi* means "waste-land" or "semi-desert," and was originally given to the vast areas of very poor land —or land that was thought to be very poor—in the Russian territories. These areas are mainly in middle latitudes, they are mainly of such extent and so far from the ocean that they have extreme climates and are treeless, and yet they are—more or less—covered with vegetation. But some of them are not in middle latitudes, nor particularly far from the ocean, still less cursed with the terrific climatic extremes of the Taiga round Verkhoyansk! Obviously, steppe—in any of its forms—is *not* due simply to extremes of temperature caused by remoteness from the oceans.

Climatic Controls. It is due to two main causes—wind in a dry season and lack of moisture in a hot season. The dryness is accompanied by great range of temperature, and deep frost means a thaw that may cover the most favoured areas with a perfect forest of ephemeral plants, including grasses as tall as a full-grown man; but the whole life is ephemeral, and that fact must be reflected in the lives of man and beast in any way dependent on it. But there are several forms of steppe; and we may keep the word in its original sense, and apply it to the vast areas of *poor* grassland, whatever their altitude or their latitude (within the temperate zone), while we use the word "prairie" for the better-watered grasslands, that pass polewards into park-land near the forest margins, and the word "scrub" for the still worse-watered areas, that pass equatorwards through semi-desert into true desert.

Distribution. We shall have a rough picture of an enormous expanse of pasturage, with more or less assured early-summer rains—which

make tillage possible and profitable, *e.g.* on Black Earth — real prairie at its best, merging through steppe and then narrow scrub into one huge desert in the west, and through steppe and broad scrub into several smaller deserts in the east. This is " repeated " in the Western Lobe, with three such deserts in Persia; and between the two there is a great Alpine wedge, with a narrow northern and a wide southern limb, shutting in two of the smaller deserts—the " double " Tarim and Turfan basins.

Fauna. Throughout we wish to have two ideas always, if subconsciously, present—animal life and physiological drought. The natural product of grassland must be grass-eating animals, and in temperate latitudes these do not attract an immense number of flesh-eaters; their main enemy at first is man—a destroyer until he becomes a domesticator, a rearer, a producer of wool and skins, meat and milk. This consideration bridges the apparent gulf between prairie and desert; the wild horse of Asia is camel-coloured!

Physiological Drought. But, while pressing a human note in the one case, we want to minimise it in the other, and to ignore the floristic classifications and regional subdivisions of the botanists. The one essential geographical phenomenon that can be predicated of this Central zone, as a whole, is physiological drought. The rainfall everywhere is scanty, and in some parts is practically negligible; in many parts it is too low for the high temperatures, or the temperature is too low for the plants to be able to absorb water. And in all the more central parts of this Central zone there is a succession of very low and very high temperatures, so that the true drought in summer is as acute as the physiological drought in winter. Tree-growth, then, is difficult, and forest-growth is impossible; and the typical plants do not really *cover* all the ground, or any of it for all the year, while the great deserts are subject to temperature extremes, both daily and seasonal, that seem to be unknown in the Sahara.

Variety. Such differences as exist are due mainly to variety of relief, but that—quite apart from any problems of " inversion "—is less important than the unity of control. We do not need to press, *e.g.*, the gradual merging of the Baraba steppes north-eastward in well-grassed and birch-wooded lands that repay cultivation, or south-westward in sandy or stony or salt steppes. Even in the wide and dreary salt steppes, with their glittering salt and their glaring sands, there are some plants, *e.g.* grey-green succulents: so, too, in the sandy and the stony steppes—if here the plants are thorny rather than fleshy. In Asia, too, more than in any other continent—perhaps, because of the unique extension in longitude—there is a tendency for the various phases to be arranged not only in latitudinal belts, but also in concentric bands round the stark desert sands, so that you pass inwards, through successive strips of increasing poverty. To a considerable extent this is as true of Irania as of

Turania or Mongolia; and it reflects the typical Asiatic phenomenon of a desert core.

Species. The pertinacity, the vitality, and the utility of typical Asiatic plants are also remarkable. For instance, saxaul, in spite of an individuality that carries it from the Ust Urt plateau to the Mongolian, is a *social* plant and therefore of prime importance to man and beast. Though typically leafless, it grows to a height of 10 or 12 feet, and its twigs are eaten gladly by antelope and rodent as well as camel; its hard wood makes excellent fuel; and its water-storing bark is drink as well as food to camel and rodent. It seems to be indifferent to climatic changes, however great or however rapid, so long as they do not involve any great variation in humidity; but it is not happy anywhere near a montane snow-line, and is not found in many parts, *e.g.* of Tibet.

Gobi. If the summer rainfall is slightly higher over the vast steppes and deserts of Mongolia than in the west, the winter temperature is slightly lower, especially in the desolate Gobi. Trees are absent throughout, and shrubs are few and far between; and even the herbs are mostly of dwarf habit. Even here, however, there are useful foods for man and beast, *e.g.* "goose-foot" seeds for flour-making, "wild-radish" capsules for pickles, and "saltpetre" *olives*, the last quite as much appreciated by the Tsaidam bears as by the Mongols. Again, too, we have a wild-grass that is social, even in the salt steppes, and grows to a height of 9 or 10 feet, giving shelter to birds and beasts, good fodder for domesticated animals, and fibre for "roofing" and tent cover.

Highland "Steppe." Even the great straggling highland that separates the western from the eastern steppes and deserts, may be included in the zone with some justification. For, so far as it has any sufficient human note, it may fairly be described as mixed wood and high steppe or simply forest-fenced steppe, especially in the Tian Shan region. The forest fence is not very deep, especially on southward slopes, or very close; on the Tian Shan fir and larch and the really deciduous ash stand so "open" that there is a wealth of undergrowth, including roses and honeysuckle, gooseberries and black-currants! There is real alp above, and there is real steppe below; and the Kirghiz transhumance is strictly seasonal.

Our double zone extends over the whole of what we have called the Mediterranean region in its largest extension, but the general character of that region—from the Aegean and the Levant to the Thar Desert—is African rather than Asiatic; for the combination of heat and drought shows itself at once in resinous and aromatic plants, the best gum-*arabic* being, literally, African.

Land of Five Seas. Of course, the Land of the Five Seas is very definitely mountain-rimmed and sea-flanked; and the lie of the marginal ranges and the economy of winter precipitation give enough rain for beautiful

forests of both deciduous trees and conifers, including such aliens to Central Asia as oak and beech, walnut and carob. As many of these forested ranges, especially in Anatolia and Syria—though also in Armenia and Persia—overhang treeless steppes or water transport, *e.g.* below Lebanon, they have had great importance historically; and the maquis or scrub-forest still has this, partly because of its typically predominating "resinous" nature or affinity. This seems to be the essential factor. When a species of *pistacia* is as typical of the Anatolian and Iranian steppes as of the Mediterranean basin proper, and as noted for resin, we seem to have a real regional common-factor; but the proximity of Africa does not allow us to think that Irano-Armenian floras worked westward, as Siberian floras seems to have done. In all the aspects of Nature that are really typical of Asia, moisture, whether scanty or abundant, is associated with the hot season, not the cold season; and even in the tropical Monsoon belt of Arabia, *e.g.* in Oman and Yemen, the typical vegetation includes many aromatic and resinous plants (cf. the Hadhramaut frankincense).

Oases.

But various geographical factors, *e.g.* location, physical history, relief, may make it possible for long-rooted plants to reach unfailing supplies of water in the driest and the hottest summer; and at once the date-palm, often associated with wormwood and tragacanth, becomes typical of the lower levels in the lower latitudes. Where the date-palm thrives, however, artificial supplies of water can nearly always maintain other fruit trees, *e.g.* citrus and fig, peach and apricot; and these can be extended far beyond the limits of the date-palm, as in the wonderful orchards of Damascus and the parts of Persia from which so many kinds of stone-fruit have spread over southern Europe. All these areas may be classed as practically oases on the thresholds of deserts, which grow poorer and poorer in plant life towards the south; winter rains feed various forms of camel-food in the Syrian desert, but even these are absent from the greater part of the Arabian desert. Where any plants survive, *e.g.* "the Rose of Jericho," they do so in virtue of the power of "hibernating" for long periods, reviving—if these have not been *too* long—when they again have access to water.

Indo-Pacific Lands.

There remains the whole Indo-Pacific hinterland—from the Indus to the Amur, about which two facts are of vital moment. The first is that it contains the almost incredible aggregate of half the world's population—900,000,000, out of 1,850,000,000; the second, almost equally difficult to grasp and to keep in mind throughout any study of the character and the importance of these peoples and their economic products, is that all this great arc of the earth's surface, *taken as a whole*, is really the natural home of

habitable forest. This lies behind the historical development of the millions and their typical products.

South v. North. The necessary qualifications of such an assertion are obvious, but we may pay a moment's attention to some reactions of latitude, history, and relief. When we compare Malayan wet jungle with the mixed woods of pine and larch, oak and ash, in Manchuria, we see that differences of latitude have been more important than anything else; it is precisely because such a tiny fraction of Asia can be called equatorial, that this long arc of forest is habitable. For this monsoon forest is a response to *seasonal* influences, to contrasts and discontinuities—warm and wet summers, cool and dry winters, strong winds and great range of temperature, diurnal as well as seasonal. Consequently, the forest is open; there are light and space for branching and for undergrowth, especially when the trees shed their leaves; and, though the trunks stand far apart, the trees are social. In other words, the environment is never overwhelming, least of all to the legitimate descendant of an Arboreal Primate; and it is rich in usefulness directly and indirectly—for food and for shelter, for a carpet of humus and for the beautifully figured timber that only branched trees can provide.

China. The northern limit of this distribution is very closely 50° N., as the generalised line of the Lower Amur; and this, rightly, puts the southern half of Sakhalin—with a temperature range of *c.* 50° F. (from 10° F. to 60° F.)—within the belt. The firs and the spruces of the Taiga survive, but accompanied by the maple and the walnut; and not only is the forest itself open, but it is penetrated by steppe of various kinds—from sheer moorland to lush meadow. Southwards this exceptional development of meadow gives place to a tendency towards evergreen bush; chestnut and mulberry become common and of economic importance, along with the weeping willow of the real Chinese "willow-pattern."

With increase of temperature in lower latitudes the number of evergreens also increases, and there is wide distribution of such plants as laurel and bamboo, wax and lacquer trees, magnolia and camellia, the most important being the tea (*camellia Thea*). But westward here relief becomes much more marked, and therefore more capable of neutralising the "indifference" of the monsoonal cyclones to variations of relief; and on the higher levels we are again in "Manchurian latitudes"—amid mixed woods, *e.g.* of fir and oak.

Japan. This is more or less true of Japan as well as China; evergreens predominate, but there is a northern transition zone—especially in southern Hokkaido and northern Hondo, characterised by beech and ash, walnut and maple, as there is a southern transition line through the Riu-Kiu islands, linking the sub-tropical evergreens

with the purely tropical flora of Taiwan, with maximum importance in its camphor trees. At the same time, low winter temperatures in Japan are associated with a humidity that is practically unknown in China ; and this is specially favourable to the beautiful conifers, which figure as largely in Japanese art as the weeping willows do in Chinese.

South-East.

But Taiwan is on the Tropic, and southward—unless relief interferes—rainfall is going to increase, and the rainy season is going to lengthen ; and general conditions will enforce a scramble for light, which results in senseless competition, with solitary rather than social types of plant and beast. The forests will become steadily denser and richer in species, and therefore poorer, *e.g.* in the power to supply 100 loads of *uniform* timber from any given square mile. Every division of the plant-world that can take arboreal form, and every one that is accessary to tree-forms, may be represented ; but the individuals are as rare as flies in amber.

Monsoon Forest.

But the senseless scramble is not typical of this great arc of monsoon forest, even in the south, where the teak is not only the most typical tree, but is deciduous and social ; and, in the primeval dawn, such forest must have made an ideal home for the Arboreal Primate. Its dry season enabled him to use easily the only effective weapon which he could use against it—fire ; and its soil was so wonderfully enriched by centuries of leaf-fall as to justify the destruction even of the nut-bearers, for in such a climate he could replace fruit by grain and pulse. To the destruction of this deciduous forest in temperate latitudes, then—though it practically ruined thousands of square miles of hill country, as similar destruction is *still* doing—there was no obvious objection, and the immediate reward was obvious ; and the cover was swept away once and for all—with its full legacy of floods and other evils—before the dawn of history. It seems probable that only in a land where tillers had manured deep and tenacious soils for so many centuries that it had become impossible to find clean supplies of surface water, would the habit have naturally sprung up of boiling all water for drinking purposes ; and the natural sequel was the cultivation of some plant from which *continuous* supplies—and therefore of leaf rather than bark or fruit—could be obtained of some infusion to improve the " flat " taste of the boiled water.

Tea.

But, obviously, if leafage is wanted for this purpose, continuous showers become of prime importance ; and the " Bohea " ranges offer an ideal location. Though the soil is light and friable, it contains enough humus—a legacy of old forest—to be rich and not too porous ; the ranges are both concordant and concentric ; and, as they run S.W.–N.E., they lie at right angles to the S.E. monsoon where it is at its wettest. In addition, then, to rain off

the regular sequence of monsoon cyclones, there is constant orographic rain, as the wind works inland over range after range.[1]

Unforested Areas. In some parts of the arc, too, relief is responsible for the absence of forest cover, but in a natural way. For, though both cyclonic rains and wind-borne dust are normally independent of moderate relief, the distribution of both may be affected by particular forms of relief; and nothing affects the distribution and the economic value of rain so much as plateau. There are some definitely dry patches on the floors of mountain-girt basins, especially in Central Burma; but on a great plateau such as the Dekkan, with its upturned western edge, there is nothing basin-like. Over the mass of the area the S.W. wind, after ascending the Western Ghats and then descending from them, is warm and dry; any rain which does fall, runs off rapidly wherever the rock is neither porous nor horizontal, and runs through rapidly where it is both horizontal and porous; the evaporation by day and in summer is as rapid as the radiation by night and in winter; and in the dry climate, especially where the rock is horizontal, rivers cut down their beds steeply, and so the riverine surface is drained completely.

Indian Forest. Under these circumstances it is of special interest that many of the ordinary Indian forest species are still present, though only in favoured places, especially where the Wet Monsoon has easy access, *e.g.* up the Tapti and Narbada valleys; but the mass of the land approximates to savanna, and for much of the year a savanna that is parched almost into desert. Even on the Hindustan plain there is a strong tendency of the same kind, due to causes similar to those at work in Central Burma; and, though the Himalayan forests give an almost normal picture of montane forest in such latitudes, it remains significant that the differences of rainfall in the east and the west are reflected in both the vertical and the horizontal distribution of the forest cover.

[1] The very valuable winter rain here is dealt with in the chapter on the physical conditions of China (see pp. 564-570).

REFERENCES.—ZON and SPARHAWK, *Forest Resources of the World* (1921); SCHIMPER, *Plant Geography* (1914).

CHAPTER X

ECONOMIC VEGETATION

In this summary account of the natural vegetation of Asia we have been careful not to avoid reference to the high economic value of much of it; and, for that very reason, we cannot avoid some repetition in surveying the economic vegetation, whether quite artificial or not. Indeed, in Asia this repetition is at once necessary from the economic standpoint and peculiarly appropriate from the historic.

Forest *v.* Orchard.

For, excluding the "Mediterranean" area (in the widest sense), we visualise a gigantic "horse-shoe" of continent, with too little moisture and too much wind and too great a range of temperature for a forest cover, in a deep frame of natural forest on the marginal hinterlands of the three oceans. The whole of it may be reasonably labelled as a "summer-rain" area, even if the rain often or systematically fails to materialise effectively. And, somewhere near the meeting-place of this summer-rain area with the summer-drought area, we may postulate a "Garden of Eden," which was certainly well-watered and well-wooded,[1] and in which agriculture probably began, not as a transition from pastoral conditions nor in the idle planting of slips of fruit-bushes, but as an irrigation industry dependent on the natural flooding of the rivers.

Irrigation.

If Man began his tillage as an intensive irrigator of small plots in a region of seasonal or perennial drought, the paucity of pests—bug or bird or beast—must have given such encouraging results that he would not easily change his methods; they would be ideally appropriate where the rich dry soils of Central Asia were fenced by perennial sources of water in snow-clad ranges; and these dry valleys all lead on eastward to the longitudes and the latitudes of the Temperate-Monsoon region.

This generally accepted theory of the beginnings of systematic agriculture seems to be of exceptional interest and significance; at least, its assumptions seem to throw an explanatory light—otherwise wholly missing—on some of the typical features of the "gardening" activities of half the world.

[1] The word *Eden* means approximately "orchard."

Good Tillage.

Over-crowded industrialists, who depend on other lands for nearly all their supplies of vegetable food and other raw materials, are too apt to measure the efficiency of crop-production in terms of exports; but this criterion is fundamentally fallacious in regard to the millions of Asiatic cultivators. Their lands are as densely peopled as our own, and so their "holdings" are usually even smaller than ours; but the gardeners feed themselves off their gardens first, even if they succeed in having some surplus for sale or export, *e.g.* tea or rice or sugar.

For instance, apart from Cuba—with its 5,000,000 tons of sugar a year[1] making one-fifth of the world's production, two-fifths of the world's exports, and four-fifths of the whole Cuban export trade—India is much the largest producer of sugar in the world, producing twice as much as Java and half a dozen times as much as Hawaii; but, so far from being an exporter, she imports 2,000,000 tons a year. The position of China in regard to tea is somewhat similar. Here India exports half a dozen times as much as China, and Ceylon exports three or four times as much; even Java exports more. But, as a producer of tea, China stands alone. Over 45,000,000 people in the British Isles consume *half* of the total world export of tea, to which China contributes 60 or 70 million pounds; but she grows enough to supply 450,000,000 people! So, India and China are far the greatest producers of rice; but, with the separation of Burma, probably India will no longer be able to feed herself, still less able to export rice.

Conditions.

This difference of purpose in production is not the only fundamental difference between the eastern and the western "margins" of Eurasia. For instance, essential climatic differences may be traced in both agricultural methods and agricultural products. The marginal hinterland of the Atlantic has fairly moderate temperatures in both winter and summer, so that there may be considerable agricultural activity in winter; but crops requiring high temperature cannot often be raised successfully in summer, and, while a relatively heavy precipitation in winter is liable to leave the land too wet, summer is apt to have a relatively deficient precipitation. Moreover, these two "extreme" seasons are relatively short, and are divided by two "intermediate" seasons, which are relatively long, and which approximate closely and irregularly to one or both of the other two from year to year. But the marginal hinterland of the Pacific in similar latitudes has great range of temperature, and its heavier—if not the only—precipitation is in summer; and the coincidence of high temperature with heavy rainfall and the shortness of the "intermediate" seasons permit of, or even enforce, a far more continuous and far heavier cropping than is possible in the west.

[1] These have been quite typical figures for Cuba in recent years, but are not typical of this critical period; in 1930–31 the output was only *c.* 3,120,000 tons.

A glance at basal crops may be helpful, especially if we confine our attention to Asia proper, and take our examples from latitudes 30°–40° N. If Man does not live by bread alone, it is his main source of sustenance—whatever he means by " bread " in the particular latitudes and longitudes ; and the basis of his agricultural activity must be the providing of bread. In the West this is mainly a *winter* task, and the temperatures are not high enough to make the growth rapid, *e.g.* of wheat and barley, though both seem to be actually natives of the area ; summer crops are supplementary, and must be from long-rooted plants, which are " organic pumps," and so can endure the summer-drought, especially fruit-trees, with the vine and the olive of outstanding importance. **Basal Crops.**

While the ends in view are the same, the means employed in the East are distinct from those in the West ; rice and millet take the place of wheat and barley—though these can be, and are, grown in the cooler areas,—and vegetables take the place of fruit. But the essential detail is the rapidity of growth. At least one variety of rice matures in 60 days, *i.e.* about half the time needed by most varieties of wheat ; and a radish may be nearly a yard long, and yet have grown so fast as to be tender from top to tip. Then, with the main crop disposed of so speedily, there is room for a multiplicity of minor crops. But the summer rain is far more favourable to leaf and sap than to bark and fruit, and is definitely unfavourable to stone-fruit and fruit with " bloom " ; and the oil and proteid and sugar that the West procures from olive and almond and fig, has to come from fibres and pulses and tubers, especially soya bean and sweet potato. **Cereals.**

Rice and tea take the place of bread and wine, and the spatial relations of the two crops are somewhat similar to those of wheat and the vine, but the plants are even less competitive ; for, though there are lowland and highland varieties of both, the grain is as typically a lowland crop as the shrub is a highland crop, because the latter is as intolerant of sluggishly moving water round its roots as the rice is tolerant and even desirous.

As China has ceased to be of any real importance now as an exporter of either rice or tea, and yet her people—like the Japanese —have unusual gifts as " gardeners," it may be worth our while to emphasise again the two points that are often ignored or misunderstood. It has not been from any lack of skill that the Chinese and the Japanese have never produced the fine orchard-fruit that we associate with south-western Asia, and that they are no longer able to supply the world market with rice and tea. They have always had climatic difficulties to some forms of fruit-raising, as we have seen ; but both peoples could have conquered some of these difficulties *if* they had not been absorbed in the raising of necessaries—to the neglect of luxuries. **Horticulture.**

But why this lack of time and space ? Mainly because the best

lands in China and Japan—and in India—have been worked, and worked efficiently, and even worked till they are "tired," for literally some thousands of years; and their agriculture had become intensive, and had reached a certain measure of economic stability, before the Siege of Troy. The mental attitude of the people, too, like their gardening aptitude, was evolved in a very "Old" World; it was wholly alien to the obsession of abandoning food-production for home use in order to grow luxuries for a distant market of Foreign Devils.

India. The importance of India in World commerce to-day drives home the fundamental truth; large exports of agricultural raw materials from Asia are practically the sequel to the spread of European influence, and that of quite recent date. The export of tea from Ceylon even in 1900 was greater than that of China at the very peak of the Chinese trade; but it was—and is—the product of a highly industrialised agriculture, worked by immigrant coolies, who were—and are—fed on imported rice.

Food *v.* Fibre. It is even significant that on the marginal hinterland of the Atlantic such typical beverages as beer and wine—the latter, in its summer-drought "home," also associated, like the tea, with difficulties of water-supply, though not to any great extent hygienic difficulties—involve the use of *food*-products; and, even if that very fact makes them more stimulating than tea, and enables them to act in some respects as food-savers, it means that they are less useful for the proper purpose in view—the quenching of thirst. For other purposes China grows other plants, *e.g.* the opium poppy.

It is equally significant that these ancient peoples based their necessary supplies of textile material on two *food*-plants, but used *other parts* of them than the cotton-seed and the mulberries; and, again, both were grown for home use, and were peculiarly well suited to dense populations of peasant cultivators.

Cotton. The cotton deserves a little further attention, for China is still—almost certainly—the largest producer of cotton in the world, as Russia is of flax, though the original impulse here—a supply of *vegetable* oil instead of butter for use during Advent and Lent—is so far crushed that the future of flax-growing in Russia is very doubtful. And the Russian attitude to cotton-growing in Asia has been the very opposite of the Chinese. For the raising of "kitchen-garden" crops for home use is as typical of, as it is favourable to, the self-sufficient independence of the individual peasant; but cotton-growing for the production of fibre rather than food is a "plantation" industry nowadays, and political domination is made easier if the gardener is made into a garden tool or an agricultural implement for mass production, and if he is raising an inferior product instead of a luxury bye-product of a self-contained horticulture. When official Russia realised the practical impossi-

bility of converting the old silk-industry of Turkestan into a " plantation " industry for export, the first step towards enforcing the new crop and the new culture was the wholesale destruction of the mulberry " avenues " !

Asiatic Standards.

Turkestan is just within our critical latitudes, but comparison with a Northern Power and modern methods under Western aims is not quite pertinent, even if the area of experiment is in Asia ; for what we need is a comparison between two Asiatic regions which show typical features of Asiatic agriculture, both of them closely associated with climatic conditions,—both of them developed naturally centuries ago,—and both of them centres from which typical plants and typical methods spread as far as natural conditions allowed.

Summer Drought.

In the summer-drought region agriculture depends still, as it has done for centuries, on such cereals as wheat and barley, and such fruits as olive and vine ; and the suitable areas are coastal belts, with easy relief and natural rain, or marginal piedmonts, where long-rooted drought-lovers can reach deep underground supplies of water or be irrigated from the montane watershed. But any approach to mass production depended even here on political power. The natural sub-montane belt is quite narrow in most places ; but a strong Power could always push cultivation out on to neighbouring plains, especially along the rivers or main *wadis*, and here irrigation at once made *bread*-raising possible.

"African" Control.

We have noticed several times that the climatic control and the floral response here tend to be " African," and the agricultural development in the " Land of the Two Rivers " probably owed a good deal to earlier development in the " Land of the (One) River " ; but Mesopotamia has been as truly Asiatic in essence as Egypt has been African, and has illustrated even better than Egypt how the collapse of political power tends to push back such extensions of the sub-montane (quite absent from Egypt) to their original condition of desert or semi-desert—owing to the decay or the destruction of the irrigation machinery. And it seems possible, if not probable, that the predominance of the date-palm here was due to its " political " importance in the first place, and then to its power of bridging the transition—in place or in time—between the Desert and the Sown.

Collecting.

The methods and plants of 30°–40° N. in the West spread across and round the Aegean to Greece, as those of 30°–40° N. in the East did across and round the Yellow Sea to Japan ; and, if there was no " spread " southwards in either case, at least similar conditions—allowance being made for higher temperatures and for European influence—produced in India and Indo-China results similar to those in China. A considerable portion of the Chinese output of silk is still " wild," and India still neglects the cultivation of the

cotton-tree ; but in India the sacred cords of the Brahmins and the wicks of temple lamps are still made of *tree*-cotton—a legacy from the earliest hours of historic time (? 2500 B.C.) ; and there are still aborigines in India who have scarcely risen above the collecting stage.

Plantations. Here we have one key to the economic—if not any political—success of European methods in southern or sub-equatorial Asia. When European influence was first felt here, most of the peoples, even if past the purely collecting stage, had not evolved from their natural environment any highly specialised agriculture ; and so they easily and even readily adapted themselves, or were moulded, to the plantation method of cultivation, which is specially well suited to the high temperatures and the heavy rainfalls of the latitudes. But these conditions are at least equally favourable to the food-plants of jungle, whether yielding real foods such as coconut and bread-fruit and sago, or those spices which a rice-eating population must have to enliven the monotonous flatness of their diet, *e.g.* clove and nutmeg, cinnamon and cardamom, pepper and ginger. All these can be, and are still, "collected" from wild or semi-wild plants, the continuity of their vegetative growth throughout the year making cultivation of relatively little importance—which must have been a constant check on the development of agriculture ; and their systematic cultivation is due almost entirely to European influence.

In the far north conditions were as unfavourable to natural supplies of food as they were favourable in the far south, and this also militated against the development of any native system of agriculture ; and to-day the system in Siberia, so far from being primary and Asiatic, is not even specifically Russian, but merely secondary and European.

Frost. In this connexion it is noteworthy that European methods here will produce some approximation to European conditions ; for, as proper cultivation spreads, evaporation increases and radiation decreases, while quantities of water accumulate underground. The unploughed prairie sod is covered with a thin carpet of frozen snow, which melts during the day in early spring only to freeze again during the night ; but on ploughed land the melted snow runs down into the furrow, and does not climb up again ! So there is nothing to form an iced-surface. Tilled land, therefore, dries and warms much faster than untilled ; and, with the spread of the tillage, there should be a slight definite improvement in the climate, especially in the amount and the distribution of rainfall, and in the disappearance of summer frost. In this way the Asiatic conditions are being ameliorated towards the European standard.

Climate *v.* Soil. The whole emphasis throughout here has been laid on the climatic conditions—possibly, to the neglect of structure and relief—because they seem to have not only a much wider, but also a more truly geographical, significance, especially in a continent where the

typical rains—from all points of the compass alike—are predominantly cyclonic, and where the qualities of typical soils over huge areas are primarily so largely of climatic origin. Thus, to the east, the yellow dust of the Hwang-ho basin and the red mud of the Yangtze basin are a response primarily not to relief and structure, but to wind and rain; and, to the west, the light colour and the high potash content of the dry soils are due primarily, not to the underlying rock and its typical relief, but to the lack of humus and the lack of rain.

Climate v. Relief.

But it is not easy to dissociate climate from relief even when their forces seem to be working more or less separately and almost in antagonism. Normally, high relief means low temperature and thin soil; and both cyclonic and orographic rains tend to be concentrated,—more destructive, if less prolonged. A gain in sunshine, then, may cost a loss of soil. At once there is good reason for preferring, *e.g.*, a long-rooted bush to a short-rooted grain and plants that like alternation of rain and sun to those that like a steady continuance of one or the other. But in typical monsoon climates the value of relief is minimised, for the monsoon rains are relatively independent of relief, and irrigation gives to the lowlands as much variety of crop as relief gives to the highlands. This is a fundamental link between hill and irrigation environments—a valuable variety, *e.g.* of food, which is as valuable in itself as monotony is harmful, and which endows the people of both environments with some chance of supplying *all* their own needs.

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CHAPTER XI

NATURAL FAUNAS

Same "Control."

EVEN if we believe unreservedly that the closest similarity of natural environments does not necessarily produce close similarity of faunas, and that each species spread from a single race-home—with one or two exceptions, to prove the rule,—we may believe as unreservedly that the character of the species was fundamentally related to the environment *in the first instance*, and safely predicate quite different characteristics for, *e.g.*, montane and marine faunas.

Nor need we take such extreme examples. Even the strictest of montane carnivores live on montane vegetarians, so that they are indirectly related to the flora, as conditioned by the climate. Isolation, whether on a continental scale or limited to some butterfly-haunted glen, is only one form of geographic control; and the widest response must be capable of being related to some control that can override the accidental barriers imposed by local or even regional relief. For this purpose we may accept the vegetable cover as related to climate, and may follow the lines already adopted for a survey of Natural Vegetation.

Tundra.

If we commence our survey with the Tundra, we have the satisfaction of finding a close similarity of physical conditions throughout its whole length, and this associated with a close similarity of plant-growth everywhere, and this in turn associated with close similarity of faunal distribution. And, if our description of the Tundra was sufficiently complete and pertinent, we may expect a more or less "amphibious" fauna, even if true amphibians—like reptiles—are absent; and, if we restrict our survey to useful types of land fauna, we may assume that three features of the natural environment are important.

(1) Food.

In the first place, owing to the latitude and the length of time during which the sea is frozen, the Tundra is too dry for heavy snow and too windy for an even cover of snow; there are exposed surfaces on which plants can grow, especially berry-bearers; the snow is thin enough to be easily penetrated by hoof or horn; and some of the

plants, *e.g.* the reindeer moss, do not die down even in midwinter. There is, therefore, some relative, if only seasonal, *abundance* of food for bird and beast, especially the ptarmigan and the reindeer; and both are mobile and so far "amphibious" that they *can* make use of seaweed as food in times of scarcity.

But, in the second place, this food, if somewhat limited, is of very high nutritive value. As on real alp, so here the physical conditions tend to dwarf, but not to impoverish. On the contrary, the plants are as rich in proteid as they are poor in cellulose; and, if Man has been slow to realise the excellence of reindeer "beef," the Arctic fox has had no doubts about the excellence of the ptarmigan, or the wolf about that of the Arctic hare. Unfortunately for the ptarmigan, (2) **Its Value.**

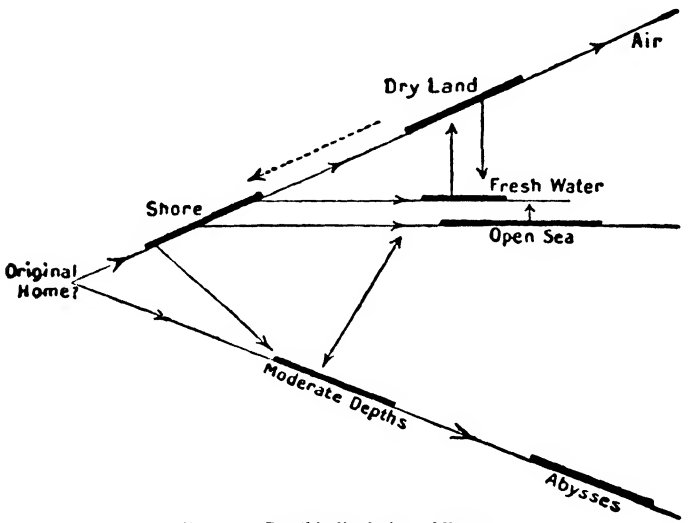

FIG. 31.—Possible Evolution of Faunas.

the fox, too, has a seasonal change of colour; and, unfortunately for the hare, there is enough food *above* the snow to encourage it to remain on the Tundra even in winter, and it is too large an animal to copy the lemming in living *under* the snow.

Then there is the relative security of the region, both as to the number of faunal foes and as to the daily extension of light for finding food. This is specially valuable to the real natives, whether bird or beast; but it also attracts an immense number of migrants, especially sea-birds, and that in spite of the great poverty of fresh-water fish—one cause of the appalling superfluity of mosquitoes that breed on the ubiquitous swamps. (3) **Safety.**

When we enter the Taiga from either the Tundra or the Steppe, we are at once conscious of two novelties—an absence of strong **Taiga.**

wind and an absence of bright light, and the clear suggestion of shelter and the vague suggestion of sleep encourage us to expect to find there refugees and hibernators; but we must recall exactly what the vegetable life is doing, before we can estimate the chances and the activities of the animal life, whether directly or indirectly vegetarian. For the conditions are hard, and the individual must fight for itself, even if it belongs to a social species; and the trees are social—so much so that those on the margin of the forest have to suffer for the sake of the rest. Even on the margin, and still more in the depths of the woods, the bulk and the canopy of the trees are obstacles to wind and to the radiation of heat as well as to the penetration of light; and the transpiration of the trees and their check on evaporation increase the relative humidity, and tend to keep the temperature more equable and slightly higher than in the open. But there is an unceasing alternation of poverty and plenty—for plant and beast.

Food. So far as the climate is directly concerned, the cone-shaped and cone-bearing tree has great advantages in a shape that sheds snow, and in scales that protect the slowly ripening seeds; but there is still a real danger of death from starvation or thirst or both while the soil is hard-frozen, and the tree must store food and minimise its apparatus for transpiration. It becomes, therefore, a straight and practically branchless trunk, an ideal source of *wood*; but it can do little or nothing to feed animal life or to fertilise the surrounding soil, and so its site—if cleared—can be of little use for the production of any alternative and more useful crops. The reckless destruction of conifers is, therefore, even more criminal than that of deciduous trees.

But the conditions forbid any very close tree-growth, and the open character of the forest—often increased by forest fires, though the abundance of swamp minimises the harm done—has a double importance. For it allows both a relatively wide spread of undergrowth—which, like practically the whole of the tree, is always above the level of the thin snow—and the penetration of even antlered beasts, such as the male red deer; and, therefore, seasonal visitors from Tundra or Steppe can find familiar food in the unfamiliar environment, *e.g.* the cranberries and crowberries of the Tundra. But the forest is relatively rich also in real forest-products, *e.g.* edible seeds, especially those of the Cembra pine, and edible fruits, such as those of the cherry and the rowan—not to mention stores of wild honey, found even on the Arctic Circle, and much loved by the brown bear. The real natives, therefore, can hibernate, or store food, or do both, like the chipmunks and the true squirrels.

Fur-bearers. The result is that they, like the grouse and the capercailzie, fare so well that they attract carnivorous foes both from inside and from

outside of the forest—marten and sable, ermine and mink, lynx and fox, wolf and even tiger. The only essential is that all shall have coats of fur thick enough to protect them from the bitter cold; and how well this can be done may be gathered from a comparison between the coat of a Siberian tiger and that of the much overrated Bengal tiger—overrated, perhaps, only by those who do not realise how much tigers, like elephants, suffer from great heat.

Steppe.

The Steppe in several ways recalls the Tundra, *e.g.* in violent winds and great extremes of temperature, in scanty precipitation and grim alternation of poverty and plenty; and the reactions of its fauna—sometimes the same, and often closely akin to those of the Tundra—are very similar. Such typical forms as the marmots and the Suslik "squirrels" burrow, and store, and hibernate—the hibernation being more easy than on the Tundra and more necessary than in the Taiga.

(1) Food.

In some respects conditions on the Steppe are worse even than on the Tundra and, of course, much worse than in the Taiga. A mere modicum of warmth and of moisture, *e.g.* the normal spring thaw, is enough to germinate the seeds of Steppe grasses; the combination of heat and moisture makes life very "rapid" for both plant and beast—so that a very short time covers the growth, flowering and ripening, and shedding of seed; and autumn alternation of diurnal thaw and freeze fixes enough of the rotted leaves and stalk to form wind-proof storage for some of the seeds till the next combination of warmth and moisture. But the plants not only die, but actually *disappear*; even if there were a snow-cover, there would be little or nothing beneath it in most places! And locusts are as great a curse here as mosquitoes are on the Tundra.

(2) Shelter.

The great difficulty for the fauna, however, is the absence of shelter—from storm and from foe. Steppe scenery is usually described as monotonous, but this is scarcely correct. There is much variety of relief in plain and plateau, highland and basin; but the distances are immense, and are rendered monotonous by the uniformity or the insignificance or even the absence of any vegetation cover. Indeed, cover is so scanty that even the leaf of the wild rhubarb may be a shelter from the blast; and the *buran* is as common as it is violent.

No doubt, the Steppe is richer than the Tundra—at times and in places,—for the contrast of poverty and plenty is local as well as seasonal; but the climatic exposure and the seasonal "disappearance" of food are very serious. From the one point of view, survival is easiest for the omnivorous: horse and camel, bustard and sand-grouse—like the Nomads—all devour the goosefoot seeds on the salt steppes; both beast and bird learn to drink little or actually nothing, as camel and bustard; and Man

becomes the meanest of thieves, driving his cattle to the warrens of herbivorous " storers."

(3) Mobility. From the other point of view, survival may come from escape—foodward, that is rainward, and that is westward ; even the swarms of smaller fauna raid westward, like Hun and Avar, Mongol and Tatar. But such escape depends on mobility, and that depends on the combination of speed with endurance ; and there is still a double danger. The mere fact that the Steppe is richer than the Tundra means that its inhabitants are larger and more numerous ; and, while the size of the group and the strength of the individual are protective, a social unit is suicidally more destructive of natural resources than the greediest and most voracious of solitary wanderers. It is precisely to powers of speed and endurance that the typical large natives of this environment—animals large enough to carry burdens—owe their original domestication and their historic importance, *e.g.* the wild horse and the two-humped camel. Both are hard-footed, able to scrape away frozen snow or to traverse the roughest ground ; and both are khaki-coloured, and so exceptionally well protected from the bright light. The horse is very swift, endowed with the most acute sight, and covered with a perfect blanket of fur ; and the camel is not only tolerant of, but even seems to have a preference for, saline food and saline drink.

" Natives." Even if from time immemorial sheep[1] and goats, like cattle, have formed an important item in the stock-list of the Steppe nomad, they are not natives of the normal " Steppe " area, but plateau or mountain fauna. But, as we have already noticed, we may reasonably include highlands in this Steppe zone, *e.g.* describing the mass of Tibet as either cold desert or poor steppe or even tundra ; for climatic continentality has effects closely similar to those of high latitude and high altitude—a fact which lies behind the whole practice of transhumance, and which may be illustrated by a comparison of the Tibetan yak with the musk-ox of the Tundra or of some of the sheep (eating moss and lichen and preferring wind-swept surfaces !) with the reindeer. Cf. the presence of rodents, *e.g.* marmots, on both steppe and plateau, and the absence of reptiles on both mountain and tundra.

Sheep and Goats. Again, from our restricted point of view, we are mainly concerned with animals useful to man and with their adaptation or their response to their geographical environment ; and so we are specially interested in the sheep and the goats, regarding them—very roughly —as, respectively, plateau grass-eaters and montane shrub-eaters, though both are found in both environments. These agree, too, in some of the fundamental factors. Thus, the climate of each is more favourable to plant than to animal life ; real alp is better pasture than the richest steppe, but neither the sheep nor the goat

[1] The sheep are specifically fat-tailed—except the Karakul (" Astrakan ").

is prolific—though Central Asia is their race-home, and has produced half a dozen species of sheep. But here relief is as potent an element as climate in the environment.

Their characters.

The cold is reflected in the character of their coats, as in those of the leopards and the bears,[1] and is at least no deterrent to activity; but the latter is necessitated by the relief, and so the relief both directly and indirectly makes for security. For, except to the birds of prey, the relief is very unfavourable to carnivores, who are usually intelligent rather than swift, very few of them being capable of sustained speed; and, as both the sheep and the goats are social, and as the rich alp allows the heights to be relatively densely inhabited—though the number of young at a birth is seldom more than two—their numbers may be protective, even if the individuals are more or less defenceless. But, if poor soldiers, they are supremely good sentinels; and on these bare heights even the best of the "climbing" carnivores, *e.g.* the snow leopard and the brown bear, have to fight fierce hunger as well as a rough terrain, and have practically to become omnivorous—in which the brown bear has been the more successful.

Dense population.

In the densely peopled lands of the S.W. and the S.E. Monsoons, age-old civilisations have entirely obliterated the original distributions, especially in China; and in much of the area the high temperature and high humidity, and the steady continuance of both, are far more favourable to such pests as insects and reptiles than to higher forms of life. In China only the fish are really important, and the turbidity of the rivers is not very favourable to them; and most of the fruit-eaters of Indo-China, including the monkeys, are just useless parasites. India is in rather a better position, for scavenging depends very widely on the jackals, as forest-work—especially in teak forests—is wholly dependent on elephants, who are happy in the forest, for they are, as we have noticed, intolerant of unshaded heat.

India.

Of course, India is very important from the purely economic standpoint. Apart from a fair number (500,000) of camels in the driest parts, *i.e.* the north-west, and a much larger (30,000,000) number of buffaloes in the wettest, especially in the north-east and east, India is the most important country in the world for draught animals. Her humped cattle (120,000,000)—for draught and milk and transport, in that order of importance—are more numerous than the whole cattle stock recorded for any other continent in the world, and at least as numerous as those of all the rest of Asia itself; and the annual export of hides (6,000,000) and skins (24,000,000 from goats, which are twice as numerous in India as sheep) is very important. Indeed, India is the main cause of the importance of the Empire as supplying 40 p.c. of the cattle-skins and 47 p.c. of the

[1] The Himalayan black bear is *thin*-coated, but *stores fat*!

goat-skins of the whole world; but, as cattle are used mainly for work, and are persistently underfed, and are not killed by Hindus however old and decrepit they become, the quality leaves very much to be desired. Buffaloes, from which milk is largely obtained, do better, and some good cattle are raised, *e.g.* round the Rann of Cutch and along the Aravallis; but forest faunas are not likely to thrive where both shade and grass are scanty.

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CHAPTER XII

MAN

MAN is an Arboreal Primate, and it seems to be agreed that his home was in Asia; and we may reasonably assume that he was true to the arboreal type, and that Asia was the scene of his earliest differentiations. But these are facts of distribution, which is the special field of Geography; and it must be of some significance that the other Primates are all also of Old-World origin, and also of the elongated type that is arboreal, and all of them wavy-haired, and all of them patriarchal. **Arboreal Primate.**

These Primates had diverged from the primitive mammal stock long before the Ice Age; and, though the anthropoid apes to-day—like the lemurs and the pygmy men—are all distributed *south* of the line of great mid-world deserts, their primeval relics are found *north* of that line—from the Cantabrian to the Siwalik ranges. Why, where, and when did one of these Primates leave the forest, or be left by the forest, and come to live in large and complex communities under "democratic" conditions in open regions of easy movement?

Whether he was driven from the forest by that "flaming sword which turned every way"—associated with that Armenian "star" of seismic and volcanic upheaval to which we must refer again,—or was left in a parkland environment by the drying up of the forest, his descent from his tree-house must have involved great changes, *e.g.* in his method of locomotion, his use of arms and hands no longer needed for climbing, the kinds of danger which he had to meet, and other "controls," which combined to modify materially the plan of his body. We need not expect to have proof of the details through finding any relics of the generalised Man who was a real tree-dweller in the late Miocene Age, for his usual sepulchre must have been the stomach of some huge carnivore; but we have valuable evidence of certain geographical happenings in that Age which must have greatly affected him. **"Loss" of Forest.**

For it was the birth-time of the long spine of Asia, which was being up-folded—to cut naturally temperate from naturally tropical **Alpine Divide.**

latitudes; and this made the "Himalayan" axis a great climatic divide, exaggerating the natural climatic contrasts to north and to south of it and evolving an ethnic equator for the world. Heavier rain on the southern slopes favoured forest and the rapid development of arboreal mammals, including all the apes; and scantier rain on the northern slopes meant the replacing of forest by grassland, which would be favourable only to herbivorous animals.

But, to anyone who believes that there is any formative virtue in environment, it seems as difficult to believe that the Age most favourable to mammals did *not* produce the highest order of them, as to believe that one quarter of the world's present population can be credited to a pair—or a few pairs—of Miocene freaks amongst the typically long-bodied, long-headed, long-faced family of "Adam and Eve," with their oval-sectioned hair and oval finger-prints.

Changes in Vegetation.

If we associate the Alpine uplift, in time, with the collapse of Gondwanaland, and with the terrific convulsion that radiated over the Armenian "star," we must also remember that, as soon as this became a Western Margin, facing an arm of an Atlantic Ocean, it was bound to become an area of summer-drought, and so very adverse to the survival of forest. And, if we may assume—at least for our present purpose—that it was on or near this crown that the tree-dweller parted company with the forest, it is interesting that the Armenian crown (with its legendary connexion with a Garden of Eden) must have been a very good focus for the easy dispersion of Man over the whole world,—that there must have been a tremendous need for intelligence to outwit the carnivores (and, for those who moved *northwards*, the ice),—and that probably none of them would prefer to move either along lines or into areas of special difficulty. At the same time, all who lacked the necessary intelligence, must have disappeared and left no progeny; and the widespread massacre of these Fools must have given great hope of unique progress by the intelligent survivors, who had learnt, *inter alia*, the wisdom of being catholic in their diet.

The Cradle.

One further point seems to have special geographic importance. There *may* have been two cradles, *e.g.* of true camels; but, at least, they were far apart. And there might have been two cradles of mankind, but *not* at the same time and in approximately the same place! But, if the Gondwana Long-head was of post-Alpine origin, then the Angara Round-head must have been evolved to the north of the Himalayan axis, *i.e.* where conditions were very *adverse* to mammals, especially if naturally forest-dwellers and fruit-eaters; and this is on a par with the absurdity of any suggestion that the Age most favourable to mammals did not produce the highest order of them.

Primitives.

If we may assume that the oldest groups of whom we have any knowledge are probably the nearest to the original type, we must

attach special importance to their character and their location; and these become still more important in the case of a group which is uniquely unmixed, as the Pre-Dravidian Veddas. They haunt almost inaccessible jungles in a remote fragment of the old Gondwanaland; they have the smallest of all human skulls; and they are long-headed and wavy-haired, like all the apes.

But it is with deviation from the original and the normal that we are specially concerned, if the human note is as important geographically as, *e.g.*, the plant cover, in our regional complex; and for that we need to examine the control exercised by the Angara grassland, with its dryness and its bright light, its scanty food-supply and its interminable distances, its great extremes and its violent strains.

Head Features.

But in such an environment, however anxious we may be to avoid making any unjustified inference, it can scarcely be unreasonable to expect to find a population more or less systematically *under*-nourished, whether seasonally and locally, or cyclically and regionally; and such a population can scarcely have had great stature or strong jaw-muscles, with all that is implied in this. But small jaws and weak jaw-muscles are associated with round heads and with an absence of brow-ridges—such as makes the Mongol "moonfaced"; and these brow-ridges, in turn, are associated with the growth of the canine teeth and—like the wide nose and flat malar—with the angle of the eye, the "Mongol" eye.

It is surely incumbent on those who ridicule anything in the nature of geographic control, at least to give us more than flat denials; it is not enough simply to say, for instance, "the original characters of hair are morphological, and any modification of them is physiological." No one disputes it; but some of us wish to know whether and—if so—how, and why, the new function did affect the old form.

Hair.

To take that one problem of hair, all the intemperate grasslands of the whole world are associated with a native population having hair that is both lank and black; and the two most pronounced characteristics of all those grasslands are extremes of temperature and bright light, with their various effects. If there is no connexion between the two dualities, at least there must be a very interesting coincidence; for black is the best of all colours for protection against nerve-injury from bright light, and a round section presents a minimum surface for exposure to the extreme temperature. The hair is lank only because its section is round, like the finger-prints of all these Round-heads.

Hunter *v.* Shepherd.

Of course, the drought-stricken grassland provided, and provides, little except fodder for herbivorous beasts; and Man must have soon become carnivorous in place of being vegetarian, and so must have become a hunter. But he must in time have realised

the wisdom of preserving the young of any mothers whom he killed, and killed easily just because they were unable to escape without deserting their young; and so the hunter became a shepherd, increasing instead of decreasing the resources of nature.

No doubt, his task was made easier by the fact that the desiccation must have been most felt by any large mammals; for the turf grasses were not suited to their heavy frames and large teeth, and the fewness of their offspring minimised the chance of any "freaks," whose modified structure might have enabled them to adapt themselves to the new environment. On the contrary, the smaller mammals were relatively favoured, and with them man could cope; but he became a consumer of meat and cheese, butter and milk.

Occupational Control. The occupational "control" is reflected in many ways. Though the grasslands must have been for ages areas of scarcity, a great consumption of milk and milk-products does, and did, tend to corpulence amongst people whose daily occupation simply could not, and cannot, be followed except on horseback, and who have become so "lazy" that they *only* canter or gallop. Apparently, too, only those survive who inherit the stocky "groom's" physique; and, again, it is at least interesting that this physique is found—amongst all the lank-haired natives of all the temperate grasslands in all the world—*only* where the native fauna included the horse and the camel, neither of which was found in the Americas.

Riders. The compulsion to ride was not due only to the vast area to be covered, nor was its only effect the corpulence that came largely from lack of real exercise. No doubt, the main cause was in the immense distances, reaching 1000 miles in the course of the season; but other causes were the largeness of the flocks and herds and the smallness of the population. As the lemmings and the hamsters show an incredible fertility, associated obscurely with a terrific death-rate, so fear of wholesale calamity from drought or *buran* or other "act of God" led the nomads to increase the number of their animals far beyond an *optimum*, regardless of the extra strain thus put on the limited food-supply. At the same time, if and when there was enough fodder, the very large number of speedy animals must have made their masters very mobile. That very strange "Yellow" man, Jenghiz Khan—with his fair skin, auburn hair, straight ("green") eyes—distributed his orders and his falcon tablets by a "postal" service using 300,000 ponies!

Mobile Few. It was the uncanny mobility of these nomads that led to the absurd belief in Europe that the steppes were densely peopled and capable—even from the historian's standpoint—of sending out "ceaseless thousands of raiders to flood the plains of Europe." But the belief was held at first only by foresters, who could not believe that any body of fighting men could move more than a few miles a day; and they could not—in forest. But it was character-

istic of these lank-haired Round-heads that they avoided forest in Europe as sedulously as wavy-haired Long-heads farther south avoided grassland.

Race Homes.

Professor Haddon, with his wide geographical outlook, lays repeated stress on the tendency for a particular type of region to attract or to develop—" be characterised in general terms [1] by "—a particular type of human group ; and he illustrates the point from several distributions in Asia. Thus, with approach to the Atlantic, oceanic conditions seem to be reflected in a tendency to " blondeness,"—which must have been still more encouraged in the days of the old Ob Sea. The western lowlands, indeed, seem to have been the race-home of the fair and long-headed Proto-Nordics, as the western plateaus were for the fair but round-headed Alpines; the tall and long-headed Indo-Afghan, though he was domiciled on the Iranian plateau long enough to be considered a native, was only *on his way* from the Atlantic lowland to the Punjabi-Rajput lowland.

Modifications.

Of course, now these western lowlands are the home of Turki peoples, who shade off eastward into the Yellowmen of the eastern plateaus ; for this was the differentiating area of the yellow skin, as of the extreme round-headedness. And the less-specialised character of the Yellow Round-heads nearer to the ocean may mean that the less-specialised were more versatile and more energetic, and so swarmed in many directions, or that they were less suited to the " ideal " conditions, and so were easily pushed out by the more-specialised ; or, as Haddon says, " some will regard this as a direct response to environment "—in other words, they *became* less specialised in the new oceanic environment.

At any rate, there are several interesting " coincidences," *e.g.* the preponderance of *brown* hair on the damp West Siberian lowland, especially amongst the Ostyaks and the Voguls,—the *white* skin and *brown* hair of the Koreans and the Ainus, associated even with beards in both types, though the Koreans are Tungus,—and the *white* Arabs in the only corner of Arabia that is sea-girt, and has heavy rain. And what of the very interesting minor groups whose hair is *beginning* to " wave " again on intrusion into humid regions ? (See note on p. 175.)

Isolation.

In all cases isolation seems to be of special importance, and this is at a maximum on a large scale on these steppes ; and it was probably the main agency in making the nomads wholly and most efficiently pastoral and patriarchal. They were forced to depend on themselves and their stock for everything—milk (as milk and koumis or as cheese and butter) and coats, whether wool or skin (as clothes and carpets, bottles and tents) ; and the best products in each case came from the animals that were best suited to the

[1] *Races of Man*, p. 84, etc.

environment, *e.g.* the mare being infinitely more valuable than the cow (really a *forest* creature). There must be constant movement for fodder and water, to win shelter in winter or to escape from insects in summer; and there is an urgent need not only for mature experience to economise supplies and direct movements, but also for a maximum number of attendants—an encouragement of polygamy and of family grouping. And, when grown-up sons, who are themselves fathers, continue to live with their father, patriarchal tyranny is assured. The ultimate result of the rigid conservatism of the aged tyrants, of the blood-tie throughout the group, of the unavoidable catastrophes from storm and disease, is a society as unprogressive and hospitable as it is fatalistic.

General Background.

Ethnic and allied details, so far as necessary at all, may be left for treatment with the regions of characterisation; but a summary of all the geographic conditions may help towards an approximate visualisation. We have a huge highland backbone, more or less impassable to the east, but more or less easy to work round, and with certain passage-ways to the west, especially the Armenian; and this is flanked by an Arcto-Atlantic hinterland of low continuous plain and by an Indo-Pacific hinterland of discontinuous valleys, leading to or divided by terminal peninsulas. The whole north-west of this complex has a dry climate, with extremes of cold, and the whole south-west has a dry climate, with extremes of heat; the south has heavy rains with a tendency to heat, and the east has heavy rains with a tendency to cold. (See p. 88).

General Distribution.

When we impose the human note on this, the two great continental axes seem to suggest a very rough ethnic classification. South of the main, horizontal, Atlantic axis, and west of the subordinate, perpendicular Pacific axis, the population is predominantly "White" and wavy-haired, whether tall or short, fair or dark; north of the main axis and east of the subordinate axis, it is predominantly "Yellow" and lank-haired. The political note has an obvious relation to this, but is complicated by its double historic background; for ancient centuries of expansion from within were ultimately followed by modern centuries of intrusion from without. And, while the wider distributions seem to be mainly world phenomena, related specially to the restlessness of insular and peninsular Europeans, the narrower are regional phenomena, related specially to relief and climate as deciding security and food-supply.

Human Note.

Quite roughly, then, we may regard the north-west as an area where the foreign White has imposed himself on the Yellow native by means of mobility on land, as illustrated by the early sledge expansion of Russia or her modern Trans-Siberian and Trans-Caspian railways; and, if we give full weight to its very recent development, the true historical note is probably the pervading influence of cold desert and its relation to Devil-worship. In the south-west the

" native " Yellow man has imposed himself on the native " White " man because the Buffer position between Asia and Europe made the area a natural nursery of intrigue, with clash of race and speech and creed ; and the typical note of the area is probably the pervading influence of hot desert and its relation to monotheism, as the work of Moses, Christ, or Mahomet. In the south the foreign White, from the isles and peninsulas of Europe, has imposed himself on the native White of continental plain and plateau by means of mobility by sea, greatly aided by a bewildering confusion of races and languages and creeds and customs ; but in the east the native Yellow man of the marginal islands, though endowed with remarkable mobility by sea, could scarcely hope to impose himself in a similar way on the native Yellow man of the continental basins in the face of a profound unity, if this is shown only in a ubiquitous genius for passive resistance.

The problem on this eastern margin should have the stronger geographic interest, for both people illustrate the fundamental phenomena which we are trying to investigate. Both established themselves on what was obviously a suitable terrain long enough ago to be fairly counted as natives, if only because they have been able to maintain themselves *in loco*, as a natural element in the regional complex ; and in each case the conditions have evolved a stable type. All the necessaries of life must, therefore, have been present, and present in some abundance ; and, though this may have induced a certain degree of over-population that involves its members in unfailing industry, there has been sufficient leisure to allow a high standard of artistic development. "Natives."

Such stability must have had an agricultural basis and an isolation that more or less guaranteed security ; it must have involved tendencies towards expansion—by river or sea, over desert sand or mountain wall ; and it must have included some organic factor that resisted deterioration and decay. In proportion as geography can, or cannot, thrown light on any influence of place-conditions in all this and in the consequent relations of the people and the place, it is fertile or futile.

NOTE

Ethnologists explain that the straightness of the hair-follicles and the roundness of the lumen *cause* the hair to be both lank and round in section, and they even *correlate* this with " a contraction of the skin due to a dry habitat." They omit to explain what happens when the man moves to a damper climate, and the skin is ***necessarily relaxed*** !

CHAPTER XIII

SOME "CONTROLS"

"Geographic Control."

MOST of the facts and factors which we have been discussing may be presented again in a slightly different connexion; for it seems unnecessary to avoid the word "Control" simply because there are persons who insist on reading a determinist causation into the word, or who accuse others of doing so. The word is used here of the tendency of certain geographical conditions to favour or disfavour certain human "responses," and "response" is used of action as well as reaction. There is no compulsion on a climber to carry oxygen with him, but height will certainly "control" his ease or difficulty of breathing, however bravely he denies that there is any such force as Geographic Control; and at least the artistic world is not prepared to deny the existence of a *genius loci*.

Asia *v.* Europe.

The character and the distribution of relief in Asia are reflected significantly in the character and the distribution of population, though it is as difficult as it is undesirable to completely dissociate relief effects from climatic; and, again, comparison with Europe emphasises the essential considerations. For in Europe the distribution of relief is favourable to communication both by sea and by land; the character of that relief is favourable to the intimate relations of the various land units; the concentration of considerable variety of relief within a such small area is favourable to that variety of environment which is a prime element in human progress; and the configuration isolated natural units in such a way as to favour greatly the rise of Nation-States.

Population.

In Asia the immense variety of relief is masked under a still more fatal immensity of size, with its inevitable climatic results; and the difficulties of communication over the continent as a continent have hitherto been almost insuperable — enormous obstacles of mountain and plateau, desert and steppe, stretching more or less from 50° E. to 120° E. and from 50° N. to 30° N.,— extremes of temperature due to altitude or latitude or mere size,— even seas that are ice-bound or swept by typhoons. These causes have combined for ages to keep Asia generally, as compared with Europe, scantily peopled (60 *v.* 136 per sq. m.), though it is far

more densely peopled than any of the other continents (North America = 18), and contains the densest large groups on the face of the earth.

Isolation. Further, in those parts where concentration has been possible, and where, therefore, high civilisations have been evolved, the very conditions of the process have been adverse to the extension of the benefits to the continent as a whole. For the local or regional adaptation, though admirable in itself, has been quite local or regional, due to special conditions; and so it is not equally—if at all—suitable elsewhere and to different conditions. It has depended closely on a physical isolation which has prevented it from spreading, *i.e.* from being of use to the uncivilised areas, and from being reached from outside, *i.e.* from sharing the benefits of the other civilised areas. Indeed, its most obvious effect has been a power of passive resistance to external influences; but it does not follow that any "International" modes of living can be devised—still less imposed—that would be suitable for all sorts and conditions of men in every kind of climate and environment.

Here is one key to the double problem of the old Asiatic independence of European influence and the recent political subordination to Europe; and it is of special interest that the most significant phenomena in both directions have appeared in the temperate-monsoon lands of the east, where alone—within the outer shore of island festoons, wholly Japanese—Asia has any natural medium of commerce at all comparable with the Mediterranean Sea.

Occupation. There is still another aspect to this population problem to be related to the geographical individuality or peculiarities of Asia, though here it is still more difficult to dissociate relief from climatic influences. Broadly speaking, we may describe Europe as occupied by a complex of peoples who, with a full share of political individuality or peculiarities, have virtually only one type of social polity, even if there is little or no unity of social culture. But in Asia no fewer than four different types of social polity are represented on a large scale.

Agriculture. I. Throughout Europe generally the basal occupation still is an agriculture which is carried on with the help of many domestic animals—not, except in Russia, still including women (!)—and which aims fundamentally at the growing of temperate cereals and the raising of domestic animals, *e.g.* wheat and rye, cows and pigs. No doubt, where the Russian steppes give a foretaste of Asia, and sporadically in some unsettled areas of the Balkans and even Spain, one does meet the pastoral nomad still actually wandering with his flocks, if not with his herds; but even where this is so, he is there really on sufferance, and "his" pastures—except on the *alp*—are always being, or likely to be, encroached upon by the cultivator.

Pastoralism. In Asia, on the contrary, the mass of the folded belt, and even the steppes and semi-deserts adjacent to or enclosed by it, form the natural home and territory of pastoral nomads. Here and there, where other conditions permit, especially abundance of water, the inhabitants cultivate certain crops, *e.g.* some fruits, especially such as demand little water; but over many thousands of square miles cultivation of any kind is literally impossible, and the nomad wanders naturally and normally over vast spaces in seasonal or long-period migrations similar to — and, perhaps, initiating some of—those of the herds of antelopes and wild asses that are the natural inhabitants of the continental interior.

This nomadic population is necessarily small, for the flocks and herds need very large pastures, and even then there is always the danger of prolonged drought; but for the beasts and for their owners there is always the chance of seasons of extra rainfall—bringing fecundity to both man and beast. And here is the real risk. As a succession of favourable seasons provokes the small fauna of the steppes, *e.g.* the rats and the hamsters, periodically and systematically to increase beyond the power of the land to feed them, so the same cause has made the human inhabitants multiply, until hunger has forced them to seek new lands, *e.g.* in Europe.

Obviously, the general result must have been the same whether the migration was due primarily to increase of population or to decrease of rainfall, with its dependent food-supply; but in the latter case the movement would probably be more violent, for the decreased rainfall meant not only decreased supplies of water and grass, but also an increase of bright sunlight, with an increased percentage of the ultra-violet rays which are so irritating to human nerves. As the lands to both the north and the south of this critical zone have very little to offer to man or beast, any overflow has always tended to move eastwards or westwards.

"Gardening." II. More important in nearly every way than this nomad type, if less widely distributed, is the type that we find in India and China. It is based upon agriculture, but an agriculture in which domestic animals play only a small part, while machinery practically does not play any part at all. Rice, even if not the staple food of much more than half the people, is the typical product; and that means that cultivation is intensive, and that any comparisons should be with market-gardening elsewhere, *e.g.* in western Europe. But the combination of high temperature with heavy rainfall in limited areas assures normally a remarkable productivity and a corresponding density of population. Indeed, the density in purely agricultural districts is quite comparable with that on the European and the American coalfields.

On these coalfields, however, the population is associated with a

product which has little or no meaning apart from industry or commerce; but exactly the opposite is more or less true of the great rice-lands of India and China, where the population has been sedentary almost to stagnation. For the dry kernel and the damp-proof husk enable rice to be stored where it is grown; and so the typical rice areas have always been densely peopled, and have never been the great exporters of rice. Where densely peopled areas anywhere do export rice, it is rice of very fine quality; and either the exporters are not really rice-eaters, as in Italy, or they import cheaper and inferior rice for their own needs, as in Japan. **Rice.**

In any case, as we have seen, the whole character of the great mountain and plateau belt, and specially the change from "Atlantic" to "Pacific" lines (cf. p. 35), cut off the civilisation of India from that of China; and the particular character of the south-western and north-eastern lobes, as we have detailed it, still further cuts off both India and China from the rest of Asia and from access to Europe by either of the natural detours round the vast central desert.

III. The third indigenous type of Asiatic social polity is domiciled on the vast lands drained by the lower courses of the great Siberian rivers. Here we have a variety of peoples who are not agricultural, but who depend for the mass of their food on hunting and fishing; and their nomadism is partly forced on them by the climatic extremes, and partly encouraged by the development of reindeer-"farming." The Lapps of Norway, of course, represent the same type in Europe; but they lead a very precarious existence, and are distributed over a very limited area. In Asia, on the contrary, the wide extension of tundra and semi-tundra gives these peoples a very wide domain. **Hunting**

The native Siberians do not now abut upon the true pastoral nomads of the mountain and plateau interior, because their old meeting-ground in the latitudes of certain summer rain and sufficient summer heat has been made European by a wedge of Old World agriculture carried on by Europeans. This is regarded by both the Chinese and the Japanese as a menace, but so far it has been effected at the expense of the pastoral nomads to the south, especially the south-west, and the hunters and fishers of the north, especially the north-east.

Behind these distributions the prime problem is not structure or relief, soil or mineral wealth, but mobility, whatever the particular medium of transport that is employed; and, as a matter of fact, the two great areas of civilisation have suffered in a double way, because both were approached from Europe over an estranging sea. But even from the commercial point of view the Indian Ocean to-day is merely a huge bay, wrapped round with a typical hinter- **Mobility.**

land of plateau blocks. On three sides,—four, if we include the Antarctic Continent,—the blocks only flank the ocean; but the northern block intrudes so forcibly that it would seem to have always offered India the domination of the whole basin. But the monsoon *régime* was really favourable only to seasonal voyages between the west side of the ocean and the centre of its northern coast; and this was bound to mean stagnation and isolation.

Alien Seamen.

At the same time Indian and even Chinese ships which visited Babylonia in the seventh century were manned mainly by *Dravidian* seamen; and the Asuras and other peoples whom the "Aryans" found in India, were certainly familiar with ocean navigation, perhaps learnt on the Indian coast. But, as long as the winds blew towards India, they brought the precious rains which must always have glued to the soil the eyes of the Indian "soil-cutter"; thus far the peninsula was self-sufficient. At other times its peoples were generally absorbed in internal strife. In any case, its coasts and currents are very dangerous, and there was no obvious gain to allure landsmen out to sea. Thus, the influence of the Indian peninsula, like that of the similarly compact Arabian, has never been characteristically peninsular.

This is true even of its historic relations to Sea Power. Europeans had reached India 1800 years before Vasco da Gama landed in Calicut; and, though the Indian Ocean became almost a Portuguese lake, it was generations before the Portuguese influence spread over the 200 miles between the Malabar coast and the Carnatic, and three centuries before the Carnatic really reacted to Sea Power. It is true that the unity of the British possessions in the earlier days was secured by Sea Power, but they were purely coastal territories; and it is equally true that the growth of British Power in the south-east of India was essentially separate from its growth in the north-east, and that—though the ultimate destiny of India may have been decided at Madras—its fate was worked out on the Ganges plain.

Genius Loci.

But these accidents of history may, perhaps, be more closely related to geographical fundamentals—at least by those of us who prefer to recognise some essential relation between the man and the place, and who are inclined to believe that the *genius loci* may be of very wide, as well as of purely local, influence, and may give a certain unity even to a whole continent. At all events, it is quite conceivable that, even if Europe had been much less articulated than it is, its *genius* would have been peninsular, and its people would have been conscious of their peninsularity, *i.e.* their intimate and inevitable relation to the sea—climatically, economically, strategically. India is only half the size of Europe; it is cut off from the rest of Asia by land more completely than Europe is; and the sea makes it a unit as clearly defined. Arabia has a ***higher*** proportion of coast to surface than Iberia, and for centuries occupied

a far more favourable maritime position, for the "Suez" route is at least 3000 years old.

Arabia *v.* Iberia.

In its way, too, the Arab development of sea traffic was comparable with the Iberian; but the prevailing note of Arabia was never maritime. The cause was certainly not any lack of virility or any inability to find their way by the stars; quite the contrary was the case. Even when the Iberians were sailing the Arabian waters in the sixteenth century, the audacity of the caravan routes was greater than that of the caravel routes; both were mainly marginal, skirting the sands of sea and desert, but the Arabs took more—if not greater—risks than the Portuguese. The *genius loci* was terrestrial and continental. Peninsularity merely tended to isolate and individualise, not to concentrate or to give any idea of unity. Here, as in India, the solution of the problem may be sheer size, for Arabia is half a dozen times the size of Iberia; but size is precisely the factor we have been trying to emphasise throughout in our survey of the continent.

Trans-Siberian Route.

The one great route, where wonderful facilities for movement were associated with an almost entire absence of serious "natural" risks, was that across the narrow parkland of the north. The ease of movement there in that sixteenth century may be inferred from the pace at which it was first overrun—mainly by sledge over snow. It was in 1579 that the Cossacks, under Yermak, seized the Tatar fort of Sibir at the Tobol-Irtysh confluence—for the whole country eastward to take its name from the kingdom of Sibir which he tried to set up; and by 1639 Kupilof had reached the Pacific! The conditions which made such progress possible, decided the route of the first trans-continental railway. This was, at least, proof that the fundamental difficulty of inter-communication between different parts of Asia could be solved by energy and enterprise, so long as the great plateau core was avoided; and the most important subsequent developments have linked up the two termini of the Trans-Siberian line, respectively along the western and the eastern scarps towards the southern apex of the plateau. The completion of the through route on the south-western flank presents no physical difficulty whatever between Kushk and Chaman, while the difficult portion on the south-eastern flank is pierced core-wards for hundreds of miles, *e.g.* to Yunnan and Myitkyina.

Railways.

But the traffic problem is not solved merely by the construction of a 5000-mile railway, for Asia is not only the continent of enormous distances, but also has its distances complicated by the presence of huge deserts—as well as mountains and plateaus—and by the absence of large rivers in the interior. No doubt, the Trans-Siberian and Trans-Caspian lines follow the historic routes of traders and raiders through the Ural-Caspian gap and along the foot of the Kopet Dagh; but the old caravans carried only goods

of high value and small bulk, and the railways must be content to do the same. Even in North America real trans-continental traffic in bulky and heavy goods is almost non-existent. The slender chain which binds Europe to Asia overland is quite insufficient for commercial development; and the Russians have still to learn how the difficulties of communication can be overcome for ordinary trade purposes. The east-to-west direction of some of the great tributaries of the Siberian rivers and the low relief, at least in the west, suggest that canals might do much; but the difficulties of navigation in the Arctic Ocean will always remain great—in spite of aeroplane reconnaissance and wireless communications.

Central Routes. But the central routes, which take us back to the 40th parallel, are far older than even the earliest coastal route, and their character suggests that the Yellow man—perhaps just because he was acclimatised to such terrific extremes of heat and cold, of damp and drought—was more afraid of relief than of climatic dangers. This may have been true also of the Arab, for he did not fear to cut his way straight across the Nefud Desert from Medina to Baghdad; but there were no formidable obstacles in the relief, as there were in Central Asia.

"South" Road. The fact that nearly all the regular traders came from a very densely peopled land makes it possible—as some of the old stories suggest—that the decisive factor was the fear of being lost, and that they were really skirting the mountains and not the desert, intent on the landmarks and not the easier relief. This would rather encourage the view that the old and real South Road, the Kun-lun Road, was the one *first* followed; and this may fairly be called the natural choice for travellers working westward from Soochow between the Nan Shan piedmont and the Sulo Ho desert, for the Cherchen flows for some 200 miles close below the Kun-lun scarp. Whether they clung to the mountain piedmont all the way round to Yarkand, or crossed the Takla-Makan desert along the Khotan river, a single journey would prove the superiority of the old "North" Road along the foot of the Tian Shan; and, as soon as experiment proved that there was a still better road to Tashkent and Samarkand up the "Urumtsi Gate," the old South Road dropped out of the map, and its name even passed to this "Middle Road"—in its new position as the *Tian Shan* "South" Road.

Samarkand and Bukhara. With the opening up of the Zungarian Gate route and the relative decline of the Kashgar-Khokand crossing of the Pamirs, the valley centre of Samarkand, beneath the northern ramparts of the Ala range, had fewer advantages than the plain centre of Bukhara as the great junction of the Turan routes; and the earlier travellers clung to the mountain wall *via* Merv to Tehran, the great plateau junction. Apparently, the "natural" route took them along the Elburz-Pontus foothills *via* Tabriz to Trebizond and Constantinople,

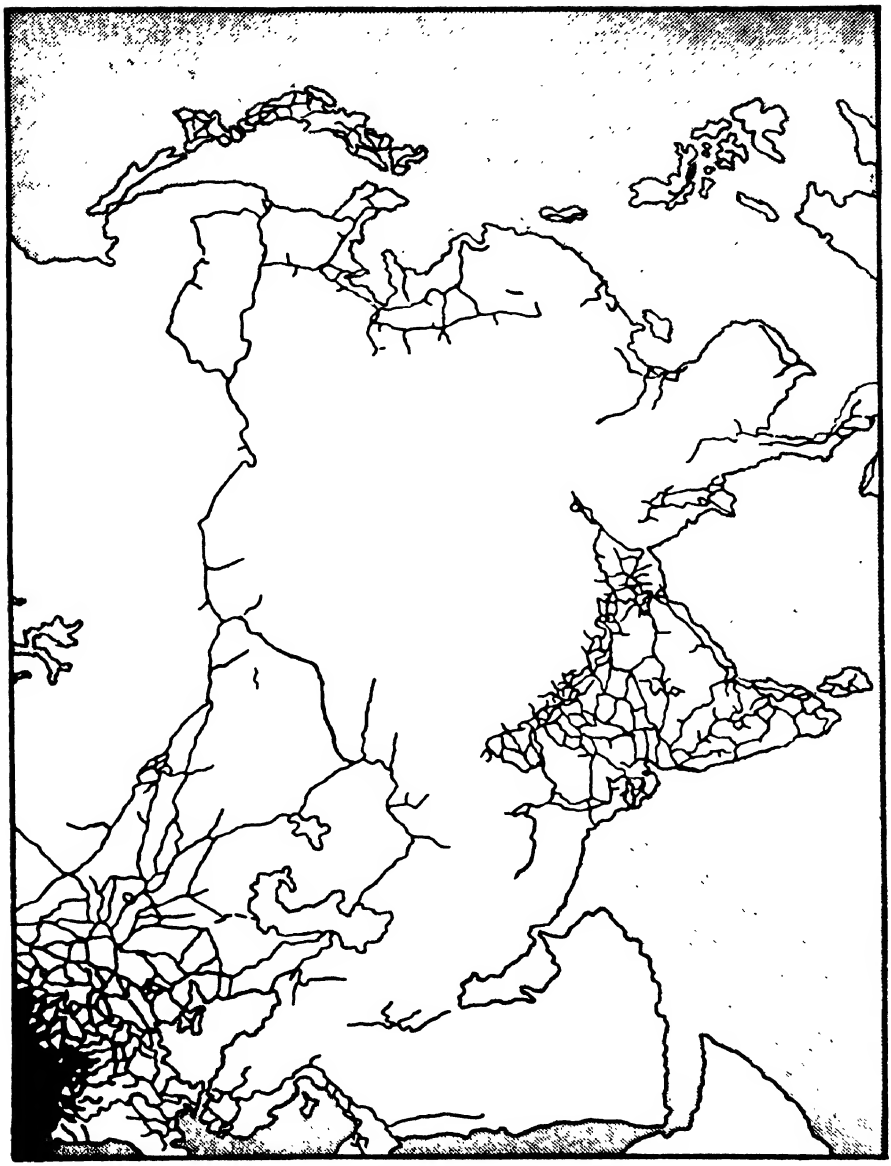

FIG. 32.—Area within ten miles of railway lines in black.

The thickness of the lines is intended to represent 20 miles, 10 miles on each side of the railway; and so the patch of black in east-central Europe means that no area is more than 20 miles from some railway. The map may be regarded as one illustration of what is said about the character of the continent on p. 12, especially the relation of core to circumference.

but the Fertile Crescent skirted the Tauric scarp on its way from Baghdad to Beirut; the eastern scarp of the Zagros marked the great road *via* Isfahan to Ormuz and the Daibal-Safera (Karachi-Bombay) coasting trade.

Primitive Sailors. There remains one point of great interest, especially with regard to the future development of the whole centre of the continent; but the evidence about it is only sufficient to be suggestive. The dug-out canoe spread round the Indian Ocean from the west, made more seaworthy, as it worked eastward, by being given an outrigger—eventually, in the Malay Archipelago, even two outriggers; and there, too, it came to be built up by top-strakes into a "ship." But, independently of the oceanic development, and probably prior to it, the kellek raft of Babylonia—the typical vessel in the earliest records—had spread right across Asia *via* the Syr and the Amu, the Irtysh and the Amur, to Korea and Japan. Surely, there might be some modern sequel to this extraordinary use of even a clumsy wooden raft, made more buoyant with a few inflated skins.

When we relate the human distributions to the terrestrial background, there is an obvious absence of the relationships which are of such vital importance elsewhere, especially in Europe and North America; and it is necessary to determine whether this is due to lack of some form or forms of capacity in the people or to lack of the physical conditions on which such relationships depend. And at once we are faced with a curious contradiction.

Minerals. For in an enormous continent such as Asia, with such a physical history, faulting and folding of rocks and other disturbances would seem to have given infinite opportunity for the occurrence and the segregation of metals; and some of these disturbances have been associated with regions of very dry climate. On the other hand, there are immense areas where the strata have not been greatly disturbed, and where we might reasonably expect to find a wide distribution of mineral fuels. And yet, of the nine chief mineral products which are needed on a large scale in modern development, *only one*—tin—is associated with Asia. Granting, then, that Asiatic peoples have the fullest capacity for using these products and organising properly all industries based on them, it remains true that they have not got the products on which to use the capacity.

This is the most glaring example of the unequal distribution of mineral products in the world, and its importance is mainly due to the fact that our dependence on mineral wealth is far greater now than ever before, and is becoming steadily and even rapidly more and more close. Even a century ago it was a matter of no importance that 80 p.c. of the world's mineral oil was accessible in the countries washed by the western waters of the Atlantic.

No doubt, the aggregate mineral output of Asia is considerable, if not imposing; but the items which make up the aggregate are

scattered and in relatively small proportions and often of low grades. If we take mineral fuels and iron ore, there seem to be, perhaps, 5 p.c. of the world's coal and 1 p.c. of its iron ore; but they are not usually near together, and the best ore and the best coking coal are often far apart. If we take the other important metals beside tin, only copper reaches 5 p.c. of the world's supply. And this is due mainly not to the backward state of industry, but to the absence of the required products in adequate quantity and quality. The coal reserves of China are very large, but the largest are in very remote regions, and the coking coal is quite localised, mainly in Chihli and Shansi, while her iron ores are very poor except in the middle basin of the Yangtze. India has large reserves of fine iron ore and adequate quantities of coking coal, but Japan has neither; and accessible supplies of coal elsewhere are almost limited to Siberia (Sakhalin, Kuznetsk, etc.) and Anatolia. **Major Minerals.**

But there is one side of the problem in which Asia is much more important, and that is with regard to the "alloys" essential in making steel. India holds the first place in the world for manganese with fully 35 p.c. of high grade ore, while Russia produces 20 p.c. India, too, is second in the world for chrome (7 p.c.) and produces 15 p.c. of the tungsten; China produces over 50 p.c. of the tungsten. It is also significant that the mass of the minerals which are produced on a large scale in Asia is not used in Asia, but exported, *e.g.* the China antimony (75 p.c.), the "Malay" tin (65 p.c.), the Indian mica (65 p.c.), and the Ceylon graphite. **Minor Minerals.**

The main significance of these details may be in their correction of the prevalent exaggeration of the commercial importance of the Far East; for this has been grossly exaggerated for centuries, and there is a similar misconception still about the whole of Asia apart from India. **The Far East.**

At present India is an exception. The opening of the Suez Canal and the cutting of the Alpine tunnels led to a great expansion of trade between India and Europe, especially north-western Europe. This was based on a wholesale substitution of steam for wind as a source of motive-power; and the shortening of distance and the increase of speed, by reducing the relative demand for tonnage and increasing the efficiency of each unit, revolutionised the character of the trade. The old "luxury" trade in articles of high value with small bulk gave place to one in masses of necessaries, foodstuffs and other vegetable raw materials; and India is now one of the main world sources of such products, while the Indian Ocean is one of the great trade areas of the world. **India.**

But it is very doubtful whether there will be much more development on the same lines, especially as some of the vital factors seem to be ignored or vastly underrated. For its size, which is not half that of the Pacific (*c.* 64,000,000 square miles), the Indian Ocean **Indian Ocean.**

is of relatively high importance; but, so far as Asia is concerned, there is practically only one main route—from the Aden Gate between the West and the Near East to the Singapore Gate between the West and the Far East. The number of great ports, too, is very small; and, apart from through trade which is not with Asia at all, the mass of the trade is with India, and its character is very important.

Basis of Trade. For it is a specialised trade, based on agriculture and mainly of necessaries in bulk, with a gross excess of exports over imports; and agricultural research is immensely increasing the yield and improving the quality of the products, especially the wheat and the cotton. But the population is too poor to make any effective demand for imported goods, and at too low a standard of cultural and even of physical development to be able to understand and to use successfully the results of the research. Medical research is improving the health and the stamina of the cultivators, and so will enable education—when more wisely organised and directed—to raise them in cultural standard; but this most desirable rise in culture will make them probably less, and not more, inclined to concentrate on the production of commercial crops for export.

West *v.* East. It seems doubtful, too, whether the West will be able to increase or even to maintain its present effective demand; and, even if it could increase it, the present heavy excess of exports—with its transport difficulties—could not go on for ever. A raised standard of comfort amongst the Indians will mean a higher purchasing power and an effective desire to purchase, but the market will be *in India*. Railways will in no way check this tendency; nor will any extension of motor transport, though this will be of great service in many areas. International trade must be by sea in the meantime, and its prospects might almost be judged from a comparison of the passenger lines to Asia with those to the Americas.

REFERENCES.—HADDON, *The Races of Man* (1919); RISLEY, *The People of India* (1908); BUXTON, *The Peoples of Asia* (1925); ANSTEY, *The Trade of the Indian Ocean* (1929); CONDLIFFE, *Problems of the Pacific* (1927); BAIN, *Ores and Industry in the Far East* (1927).

PART II

REGIONAL

RUSSIAN ASIA.—I

CHAPTER XIV

OCEANIC DRAINAGE—SIBERIA

WE may usefully begin a more detailed examination of the continent with what we may still call "Siberia," for it is the most typically Asiatic of all the political units in no less than four respects—shape, size, relief, and climate.

Length. It is the longest political unit in the world, covering—between 60° E. and 170° W.—more than one-third of the whole land-and-water circumference of the globe; and this remarkable extension in longitude is even emphasised by such inaccessibility from both the North and the South that its vital historic connexions have been longitudinal, but much more westward and with the Atlantic than eastward and with the Pacific.

Area. In size, too, it is equally remarkable, being the largest political unit in the world, and comprising about one-tenth of the whole land-surface of the globe. In such circumstances, even if its natural wealth and its geographical conditions were much more favourable than they are, it would be a colossal problem to give the unwieldy mass any real coherence, any really effective transport system, or a really sufficient population—even though the known mineral wealth is sufficient to pay for an elaborate net of roads and railways.

Relief. In relief, as we have seen (p. 59), it gives, perhaps, the best illustration of the plateau features and relationships that are so typical of Asia, and includes the largest and flattest plain, which offers some promise of solving the very serious problem of easy access to and from Europe; and the extreme continentality of its climate is equally typical of the essential conditions of all monsoon phenomena.

History. The name "Siberia" has been accepted, and may still be used loosely, as covering all "Russian" Asia north of the Ob-Aral water-parting, *i.e.* far more than the original area so named in the

Ob and Yenisei basins; and it is significant that the pioneers in opening up the area—who were almost all "destructive" collectors of loot in the form of furs and fish, the cattle of the natives, and the riches of the Kurgans—moved by sledge and by barge. Even Yermak himself did most of his work by means of the Tura, the Tobol, the Ob, and the Irtysh; and it was largely by rivers that the Russians reached both the Arctic Ocean and the Pacific, though the soldiers and the sailors arrived at the mouth of the Yana almost at the same time, *c.* 1640.

But the history of the region has been unusual, *e.g.* compared with that of Canada, and so its future may also be unusual. The usual development has been of "colonies" by motherlands that were older and more highly civilised than the colonies; but, historically and pre-historically, Siberia was much older than Russia, and developed more or less in parallel with Russia, certainly not behind it. Indeed, it was probably more attractive than Russia; certainly, there was a steady drift into Western Siberia from eastern and northern Russia *before* the age of Yermak, much encouraged by the good navigation on the various "Tobol" streams, *e.g.* the Tobol itself from Kurgan, the Mias from Chelyabinsk, the Nitza from Irbit, the Tura from Tyumen.

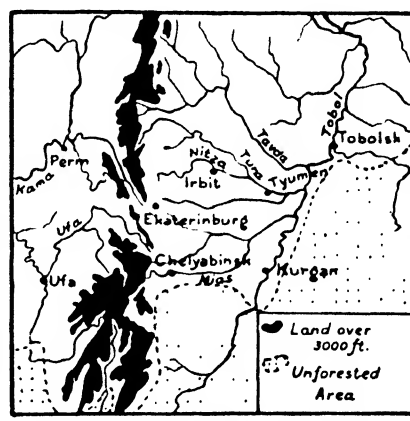

FIG. 33.—River Approaches to Tobolsk.

"Convicts."

Eventually, however, while Canada remained open to the world, Siberia was closed to all but Russians; and a large proportion of the Russian population was represented by "convicts"—a thing unknown in Canada. Real convicts, too, were mixed with the political victims, with the intention—and the result—of implanting suspicion and dislike of the newcomers in the "natives." Real colonisation, even by Russians, was actually retarded by the Government, because labour was believed to be needed at home; and so Siberia came to be reserved for "convicts," and Russians emigrated to America.

Colonisation after 1905.

But a change came after the Russo-Japanese war. The home population was increasing very rapidly, and there was a real lack of land; and yet there was little hope for an industrial development which could only be based on illiterates—84 p.c. of the total! During the war, too, the *Trans-Siberian* railway had been double-tracked, and even double-routed in the west; and after the war the

Government was glad to get rid of the "discontented," by giving them 45 acres apiece in Siberia for every 5 that they worked in Russia. In 1906 there were 270,000 who accepted the offer, in 1907 there were 500,000, and in 1908 there were 760,000. Then there was a falling off, due partly to a series of bad seasons in Siberia and better conditions in Russia, but also—and still more—to the fact that the "accessible" free-lands had been occupied, and what remained were "inaccessible"; but during the Great War thousands of *Slav* prisoners were sent to Siberia as prisoners or allowed to go there as settlers.

Human Note.

Till 1905, then, Siberia had been regarded by Russia—just as the French once regarded Canada, and we regarded Australia—as at the ends of the earth; and so it seemed to be suitable for a penal colony, but was put under all sorts of disabilities for fear of its "free-labour" competition being dangerous. But the Japanese war changed all that, and the region began to be recognised as a great reservoir of food and other raw materials, and as worth developing in every way.

The opportunity was a bigger one than was realised. For, from the seventeenth century, Russia had been sending to Siberia, rather as England sent to New England, three types of people—Cossack[1] adventurers, political and criminal "convicts," and religious exiles; and so the population was morally, or intellectually, or physically earnest and active, with more vigour and intelligence and enterprise than the Russians who stayed at home. This gave ground for successful development in Siberia, and showed its effect in all kinds of ways, especially economic, as the result of which the area became sufficiently *anti*-Asiatic to be a real political frontier for European Russia, *e.g.* when the Tungus influence was working wholly on the side of the Japanese. If its progress has been less than might have been expected, the disappointment is probably due partly to the great difficulty of access and of internal communications, and partly to a greatly exaggerated view of the actual resources of the region.

Physical Basis

River Basins.

In dealing with the various natural divisions of the area it is certainly not necessary to pay great attention to the present political subdivisions, for they often present simply a ***reductio ad absurdum*** of the principle of self-determination, and some are obviously doomed to a very ephemeral independence; and for these reasons a terminology which attempts to compromise may be not only pardonable, but even useful. In any case, the obvious bases for

[1] The Cossacks are really Kaizaks, "Wanderers," and are certainly not Kirghiz; but the Russian Government persistently classified them as Kirghiz, apparently in order to keep the name Cossack as a purely military title.

divisions must be the basins of the three great rivers, Ob, Lena, and Amur.

The broad generalisations of a small-scale map suggest the fundamental differences,—a western lowland, which is largely an alluvial swamp,—an eastern platform, which is of very old rock,—and a complex scarp-land in the south, from which both the others are fed by the great rivers that deploy on the Tundra flats. But there is the same "diagonal" compromise in the lie of the feature-lines as in Canada, only the trend is from south-west to north-east. The old-gulf alluvium lies north-west of a line *via* Semipalatinsk, Tomsk, and Yeniseisk, to the Arctic Circle at 100° E.—probably the largest (? 20,000 miles), but least useful, of all the "navigable" river-systems in the world; the low platform (1000–2500 feet) parallels this south-eastward up to a line from the Altai *via* the Sayan and Baikal scarps to Yakutsk; and this gives place eastward to the high platform (3000–5000 feet), with Alpine approaches and Border Heights on each flank. But this is too narrow, especially in the north, too low, and too much weathered, to be any very serious obstruction to railway development, especially with the help of such a "fiord" route as is provided by the Selenga-Uda gorge for Kiakhta, Urga, and Peking, and for Chita, Harbin, and Vladivostok. The sudden, but not very deep, drop to the low platform and the mountain-ribbed lowland of Amuria transports us from Atlantic to Pacific conditions, illustrated appropriately by the volcanic character of the sentinel peninsula in the north-east. Cf. Figs. 9 and 10.

Ob Basin. I. The Ob basin almost coincides with what we may still call Western Siberia, as limited eastwards by the Palaeozoic platform against which the Yenisei is pressing, for the left-bank tributaries of that river are negligible, and west of the Primary scarp there are complete uniformity of relief and considerable uniformity of climate. The Ob is one of the greatest rivers in the world. It has much the largest basin of any river in Asia, rivalling the Mississippi in this respect (*c.* 1¼ million square miles); and its total length, either to the source of the Katun or to that of the Kara Irtysh, is about 3300 miles, *i.e.* certainly equal to that of the Yenisei or the Lena, and probably that of the Yangtze. Almost the whole area is low and flat; steamers ply up to Biysk on the main stream, which is ice-free up to Barnaul for *c.* 200 days in the year—from the end of April, and on the Irtysh up to Semipalatinsk (*c.* 2000 miles) for about the same time, while metals are actually shipped down-stream from Bukhtarminsk—another 200 miles.[1]

The total length of navigation in the basin approaches 20,000

[1] There is actual navigation up to Lake Zaisan, in which the Black ("Muddy") Irtysh deposits its silt, and from which the *White* Irtysh issues.

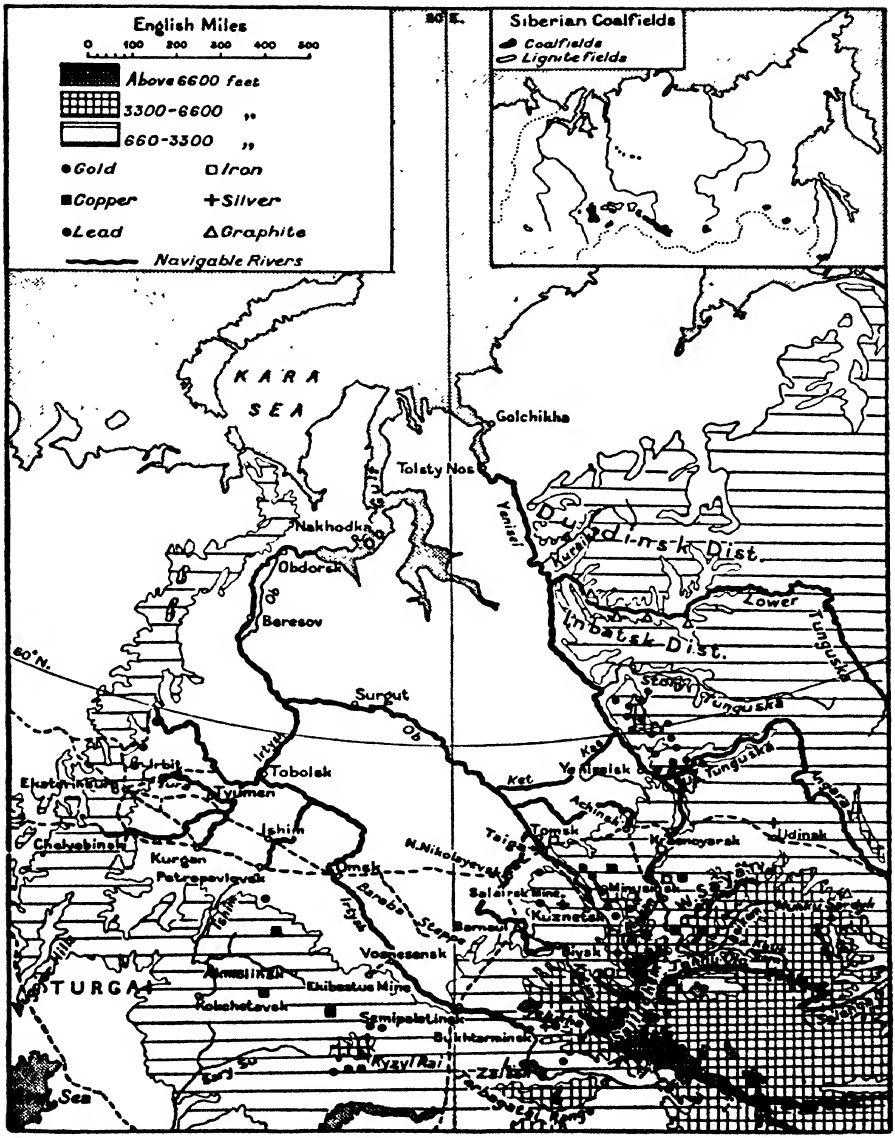

FIG. 34.—Ob and Yenisei Basins.

For the delimitation of the Climatic Provinces here and their vegetational cover, see pp. 125-129 and 144-149.

miles; and, though the last 500 miles are within the Arctic Circle, the width and the "double mouth" are real assets, the "Little Ob"—in which the current is less—being used for up-stream traffic. But the slowness of the current everywhere is a climatic disadvantage, for the water freezes sooner, and large vessels have to stop at Nakhodka.

Its Margins. The basin proper rises above lowland level in three directions—in the north-west to the line of the Urals, where Russia has a firm grip on both sides of the water-parting,—in the south-west over the Kirghiz platform to the Turgai platform, which is of no importance,—and in the south-east to the wide Altai highland, perched up on the western end of the old shield of the continental core; and its early development was closely connected with the 8000 square miles of this highland as "The Altai Mining Region," which was—fortunately for the speedy development of the whole area—in the farthest corner of the basin from St. Petersburg.

The Altai. This region is not, like the Urals, a long mountain chain, but a square highland, loosely connected with the Sayan Mountains as the natural northern boundary of the Asiatic core. It is one of the ridged highlands that are very typical of Asia, with most of the ridges running roughly east-and-west—to fan out westward, but with others trending almost north-and-south, *e.g.* the highly mineralised Salairsk which runs diagonally from Marinsk to Kuznetsk.

The highest ridges are known as Belki ("Alps"); and, as many of them reach 9000 feet, they are 1000 feet above the snow-line even on their southern slopes, and 2000 feet above it on the northern. The Katun head-stream of the Ob flows from the glaciers which enwrap Mt. Byelukha (14,900 feet), and the Bea head-stream from the Alpine lakes below the Sailughem crest. As these crystalline Alps are usually flanked by sedimentary rock, the metallic wealth (*e.g.* silver-lead, gold, and copper) along the junction of the two formations is complemented by other minerals, especially in the coal-"basin" of Kuznetsk; and there are at least 3000 square miles of fertile soil, including a narrow belt of Black Earth, that give good pasturage and good tillage.

The opening up of the "Turk-Sib" railway from Arys to Novo-Sibirsk has practically made this Altai elbow into the natural pivot of all the Russian territory in Asia; and it is interesting, therefore, to remember the importance of the elbow to the Mongolo-Tatar empire when it spread from the Dnieper to the Sea of Japan, and to notice the persistence of what seems to be the most primitive of Tatar types in this Altaic race-home.

Human Note. The interest is a double one. Only behind this elbow, in the whole vast area of Tatar dominion, was there any centre calculated to make a natural race-home; but a people spread over such a vast area, with all its diverse conditions and relationships, could not

retain any purity of race—least of all at the end of five centuries of dominion (A.D. 1222–1783). To-day they are Russians in manner of life, and Turks in speech; they have accepted much of modern civilisation, but retain the legacies of the old race-home and of the ultimate dominion. For they are famous as gardeners and irrigators, wholly patriarchal in family government, and ubiquitous nomads, as traders and pedlars—still preferring the tent to the house, the aul to the village, and with little individuality and no collective culture or capacity. Indeed, they are essentially phlegmatic and peaceful, neither hysterical nor cruel, but—no use for the development of Siberia or Turania. Their one unique gift is for silence—consoled by tobacco; and their ideal of beauty is the bony Mongol face—as the nearest human approach to the face of a horse!

Ob Lowland.

Apart from these highlands, the whole area is one continuous plain. North of 60° N. it includes a low slab of Mesozoic rock, which forces the river into its Beresov detour, and there is a belt of rich Black Earth; but the level nowhere reaches 400 feet above the sea, and the mass of it is covered with "ash-coloured" alluvium of low fertility. As in Russia, the appalling monotony of relief is partially masked by a variety of vegetational cover—in Tundra, Taiga, and Steppe; but the monotony within the limits of each association is deadening.

In theory such an area should be able to produce an enormous quantity of a few staples, at least from the forest and the grassland zones; but these would be mainly of a kind which has to be moved in bulk, and for that purpose water transport is essential. But, as a mighty waterway, the great river is ruined both naturally and economically—naturally by the climate of the Ob Gulf and the Kara Sea, and economically by flowing *across* the natural line of movement. Above their confluence, the Ob and the Irtysh, the real head-stream, combine to give an uninterrupted and very cheap route between some of the most important traffic-centres; but it is too circuitous to be really useful even for slow traffic, *e.g.* grain and meat, minerals and timber.

Climate and Vegetation.

The climate and the vegetation of the basin have already been outlined (p. 129) from the general point of view. From the particular one the most important factor is in the relation of the continentality to the precipitation, for the temperature range is greater, and the precipitation is less, than in European Russia; and the virgin character of the soil does not compensate for the scarcity of moisture, especially of snow, the snowfall in the agricultural belt being only five-eighths of that in Russia, while the wind tends to accumulate in huge drifts whatever does fall. In the Taiga, however, the extent of swamp keeps the average—though not the extreme—summer temperature *c.* 5° F. below that of Russia. It is important, therefore, to notice that the temperature of the

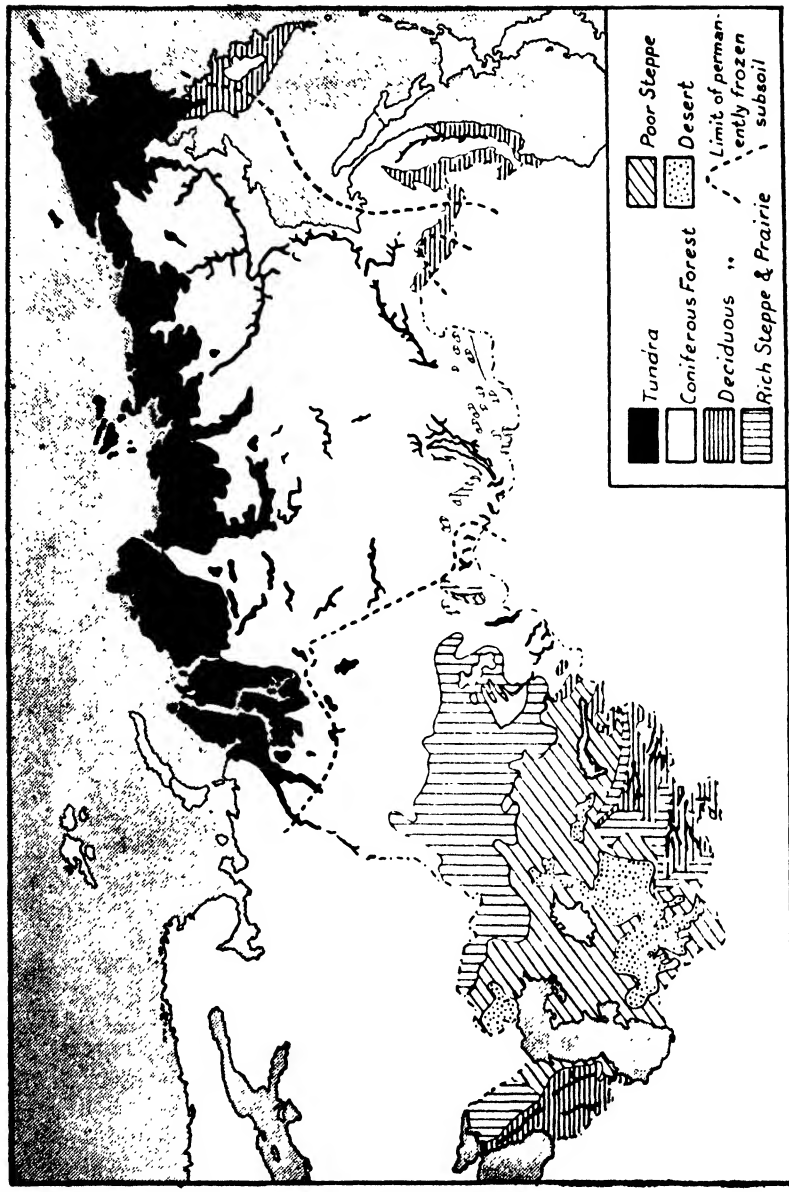

FIG. 35.—Vegetation of Siberia.

For the general account of the vegetation, see pp. 144-149.

vegetative period leaves the herbaceous flora as in Russia, except that the stems are richer in sap and the flowers brighter in colour; but the lower temperature and the dryness of winter at once eliminate oaks and elms and ashes (not "rowans"), while some of the Siberian conifers do not penetrate west of the Urals, *e.g.* the "cedar" (*pinus Cembra*). There is a rather similarly specialised flora in the Altai region, but from different causes. It is a much broken country of ridge and valley, peak and plateau; it was once isolated by the Ob "Sea"; and it is still the meeting-place of "western" types impinging on abnormal drought and of "central" types impinging on abnormal moisture. There are, therefore, great wealth and great variety, especially of Steppe and Alpine plants. The extreme forms of Steppe vegetation, however, are found on the yellowy-red, red, and greyish-red soils that form a series of decreasing fertility and increasing salinity between the Black Earth and the Ob-Aral water-parting, where there is a natural reaction. For the divide is generally above 1600 feet, and it reaches nearly 1900 in the far west (Mugojar Hills), and nearly 4900 in the Kyzyl Rai, from which—and from the *wooded* Kokchetavsk platform—the Ishim (350 miles) flows to the Irtysh and the Sary Su "to" the Syr. On the northern piedmont there is good coal, *e.g.* at Ekibastus, with a branch line to Vosnesensk, on the main line to Semipalatinsk and on the Irtysh, at a height not much above 400 feet!

Yenisei Basin.

II. The Yenisei is the best means of access to Siberia from the Atlantic (Kara Sea), but is in other respects inferior to both the Ob and the Lena; and the two chief drawbacks of its basin are its narrowness and its old rock. The narrowness exaggerates the disadvantages of its course running *across* the natural line of movement, and all the more so because the mouth of the river at Tolsty Nos is 250 miles farther north than that of the Ob at Obdorsk; and at the same time it gives at all latitudes a very small hinterland from which to draw traffic, even though the main stream is marginal to the basin. The Palaeozoic formation encourages no hope of much fertility, and gives a much rougher surface than in the Ob basin. It is significant that even the lower reaches of the Lower Tunguska are spoilt by rapids,—that the Middle Tunguska is called "The Stony,"—and that the mentality of the natives was not equal to giving distinct names to the three great tributaries!

Navigation.

At the same time, in spite of all its important tributaries entering the right bank, *i.e.* draining from the ancient Angaraland, the Yenisei has some points of close similarity to the Ob, with certain advantages; for the main stream and the Upper Tunguska (or Angara, really the head-stream) meet in lower latitudes than the Ob and the Irtysh,—the basin is much more free from land off which there is rapid evaporation, and quite free from semi-desert,—and the

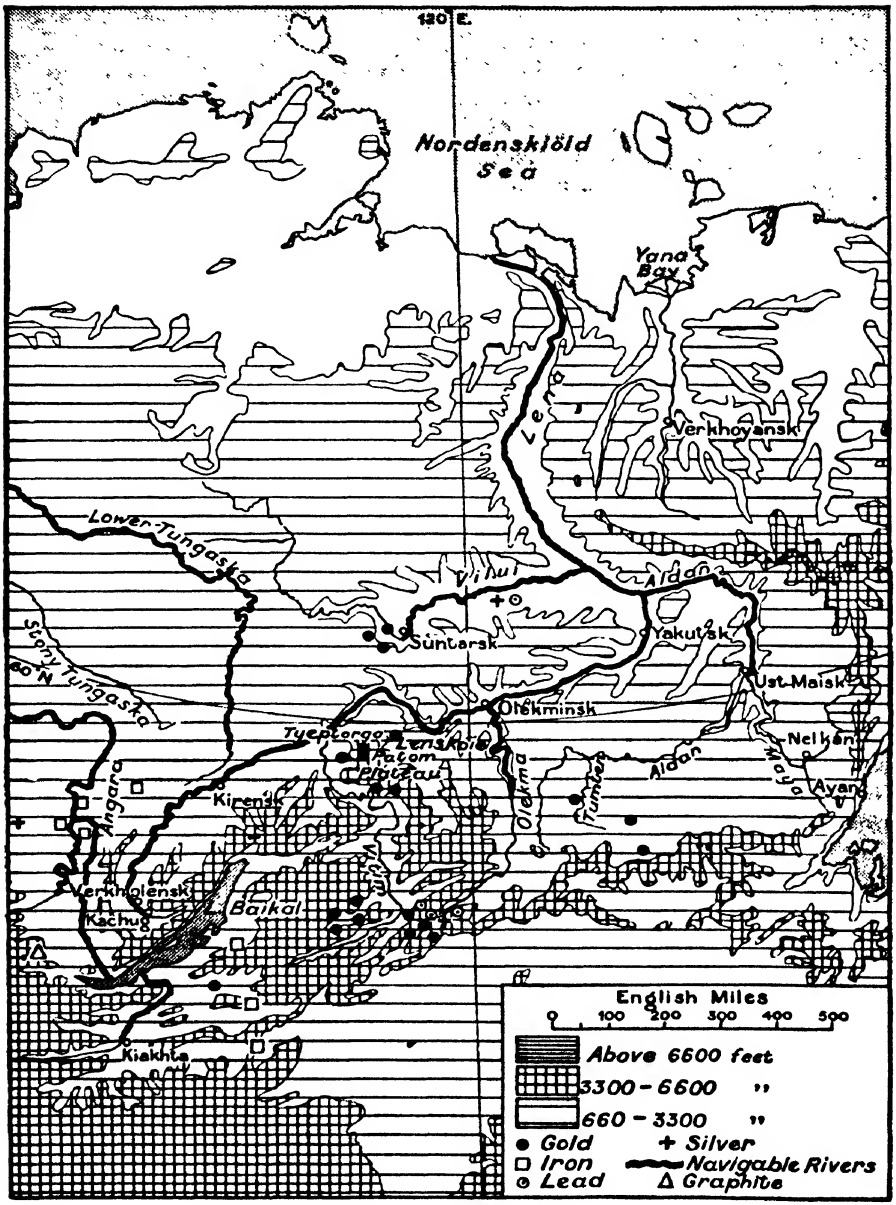

FIG. 36.—Lena and part of Yenisei Basin.

For the delimitation and the character of the Climatic Provinces here, see pp. 125-129 and 144-149.

mouth of the river is more accessible by sea. This fact, and the ease with which the river has been connected by canal with its two great neighbours, especially by the 3-mile Ket-Kas canal, suggest that it might be made the key to the internal waterways of Siberia when the bed of the Angara is completely regulated up to Lake Baikal. It offers 1850 miles of really good navigation—up to Minusinsk, and has a deep-sea port in Golchikha (p. 127); and, when the rapids are kept properly dredged or at exceptionally high water, it is possible even to reach Kiakhta—though there is mist or bad fog on Lake Baikal. Indeed, the lake is said to owe its name of Dalai Nor, " Holy Lake," to its mysterious veil of fog. Graphite is actually being exported, *via* the Kara Sea, from the Kureika valley, and there is coal near the river in both the Dudinsk and the Inbatsk districts.

Southern Frontier.

From this point of view, however, it is unfortunate, for both hydrographic and historic reasons, that the southern frontier of Russian territory is the Sayansk line, and not the Tannu-ola, so as to include all the head-waters, *e.g.* Selenga, Bei-Kem, Ulu-Kem, of the Irgana-Kon valley, *i.e.* the cradle of the people now spread over all parts of, and practically confined to, Russian Asia. For the Munku-Sardyk peak (*c.* 11,500 feet) looks down on the source of more than half the drainage of Siberia and on the race-home of more than half its native people. On the other hand, if the Sayansk is not the real divide between the Siberian Taiga and the Mongolian steppe, the Tannu-ola forest is certainly showing—according to Printz—marked signs of desiccation.

Climate.

But there is still another point of importance with regard to the basin as a whole, and it has some special reference to this Sayansk area. Both the average and the extreme temperatures in both summer and winter are slightly lower than in the Ob basin, and the precipitation as a whole is slightly less ; but there is a heavier fall of *snow*, an immense advantage to the soil for protection in winter and for water-supply in spring. This is all the more important because the 5-months vegetative period in the Taiga has a mean temperature not very much above 50° F., though half of the total precipitation falls in the three summer months ; and the Taiga here, like the Tundra, is more widely developed in latitude than in the Ob basin. The result is that in the whole basin there is no area really suitable for agriculture except the Sayansk region ; and, though there is a belt of Black Earth here, a large proportion of the area is a mineralised highland. Even here, then, the major importance of the Krasnoyarsk prairie is as a southern passageway below 600 feet between east and west.

Lena Basin.

III. The Lena basin has a harder climate than the Yenisei basin, but has compensating advantages ; it is a longer river, with a much

larger basin (*c.* 900,000 square miles). Steamers ply regularly up to Verkholensk and even to Kachug (*c.* 2800 miles); and, though the river flows for over 1000 miles through a steep-sided and narrow trough in the edge of the Tyeptorgo Patom plateau, it opens out near Olekminsk into the Yakutsk basin—which has no parallel at all in the Yenisei region. Into this basin three great navigable tributaries empty—the Vilui (1300 miles), navigable to Suntarsk (750 miles), the Aldan (*c.* 1300 miles), and the Olekma (*c.* 700 miles), valuable waterways and iceways west, east, and south; the main river gives 1200 miles of deep-water navigation northwards. The climate and the labyrinth of islands on the great delta, however, make this lower-river navigation unimportant, especially as the river *narrows* (to 4 miles) seaward, and is blocked by floes when the north monsoon is strong; but up-stream from the Vilui confluence there is a splendid waterway from the beginning of June to the beginning of October, while up-stream from the confluence of the Vitim (the gold river) it is open from the end of May to the end of October.

The river is 70 yards wide even at Kachug, 700 at Kirensk, 1700 at Olekminsk, and the fall in the 1200 miles varies from not more than one foot per mile near Kachug down to less than one inch near Yakutsk; but it is better suited to steamers than to sailing-boats, for there are no steady winds except in spring and early summer—the former from the north, bringing snow to Yakutsk, Viluisk, Olekminsk, etc., and those in June being from the west.

Differentiation. This basin is distinguished, then, by much less range of elevation than the two others, but also by much less monotony of detail. The main stream rises amongst summits not much above 4000 feet —*i.e.* 2000 feet lower than the Yenisei,—and its main tributaries are in much the same position, though the actual proportion of lowland to "hills" is much less than in the Ob basin; but the Lena and even the Aldan meet much farther north than the Ob and the Irtysh, —the mouth of the Lena is even less accessible than that of the Ob,— and the Nordenskiöld Sea is far less navigable than the Kara Sea. In the meantime, too, the whole area is too remote to have any considerable population, the total for the Yakutsk Republic being given as under 300,000! But the improvement of the Maya valley "track" from Ust Maisk to Nelkan and Ayan would probably make a vast difference.

Forest and Fur. The small amount of lowland, the extreme winter temperatures (averaging −40° F. for 3 months), and the lack of precipitation, especially of snow in winter (only two-thirds as much as falls in the Yenisei region), are adverse to agriculture, though spring wheat is actually grown with success round Yakutsk (*c.* 62° N.); but the proportion of forest is large, and much of it is dense—a tribute, no doubt, partly to the absence of wind. In the Tundra, where the

precipitation is not much more than 3″ a year, more than half falling in the three summer months, not only tusks and skeletons, but even whole bodies, of mammoth and rhinoceros are found, sometimes in a wonderfully perfect state of preservation; and this region is still specially favoured in its fauna, particularly fur-bearers, the variety of relief being as favourable as the number of bare "mountain" sanctuaries which rise out of the forest.

Cattle v. Fish.

It is always useful to keep in mind such potential influences as are implicit in the fact that cattle are forest fauna, and the number of cattle kept by the Yakuts in this basin *may* reflect this to some small extent; but it is probably more definitely connected with the grassland home and habits of the Yakuts before the Mongols drove them off the grasslands. In any case, the essential value of the region must be found in its mineral wealth, though the Yakuts, as cattle-breeders, have raised the population capacity of the Taiga far above its limit under the aboriginal hunters and fishers whom they drove out of it—to be starved to annihilation on the most poverty-stricken section of the Tundra.

For the natural poverty of the land here is exaggerated by the character and the normal condition of the ocean. There are no glaciers descending to the sea, and so the icebergs are relatively few and small; but the ice is very thick, and is pressed up into gigantic "drifts." The ice often does not begin to break along the coast till the very end of June, out at sea not till the end of July—the *Vega* having had a quite exceptional season,—and the resources of the ocean cannot be exploited from this coast.

Gold.

The Lena goldfields supply fully three-fifths of the total output of Russian Asia, the Vitim (*e.g.* Lenskoie) and Aldan (*e.g.* Tumten) mines being particularly rich, the former in 1929 claiming 25 p.c. of the total output; but the difficulty of access is a terrible drawback, and the cost of production is much higher than it was before the War. This is largely due to the cost of importing machinery, *e.g.* taking a dredge from Baltimore to Murmansk, thence to Irkutsk by rail, then over 200 miles of "track" to the Lena, then 900 miles down the Lena by boat, and even then 11 miles of railway to Lenskoie! At the same time even the Tumten mines are accessible by steamer from Yakutsk, except for the last 35 miles.

Amur Basin.

IV. The highest point in Amuria, Sokhondo, from the neighbourhood of which both the Shilka and the Argun flow, is little above 7000 feet (7200), *i.e.* it is well below the snow-line in that latitude (50° N.); but the average height of the area is as much greater than that of the rest of Siberia—except in the Verkhoyansk mountain arc—as its relief is more varied, though the Yablonoi passes on the railway route do not exceed 3400 feet. The main

difficulty is that the river is pursuing its way eastward *across* the grain of the Pacific feature-lines, and the various steps-down mean rapids and shifting sands, the latter giving rise to two bad bars in the lower river. But this following of the economic line of movement across the grain of the physical features is, at least, better than the contrary.

Trans-Baikalia. In the west, Trans-Baikalia is in some ways more continental than most of Siberia, for the influence of Central Asia makes the dryness extreme; the total precipitation is only five-sixths of that in similar latitudes, even in the Yenisei basin; and less than 5 p.c. of the total falls in winter. Both the winter and the summer temperatures are, therefore, extreme; and the latitude, the summer heat, and the nearness to the Pacific (Chita-Vladivostok = 1000

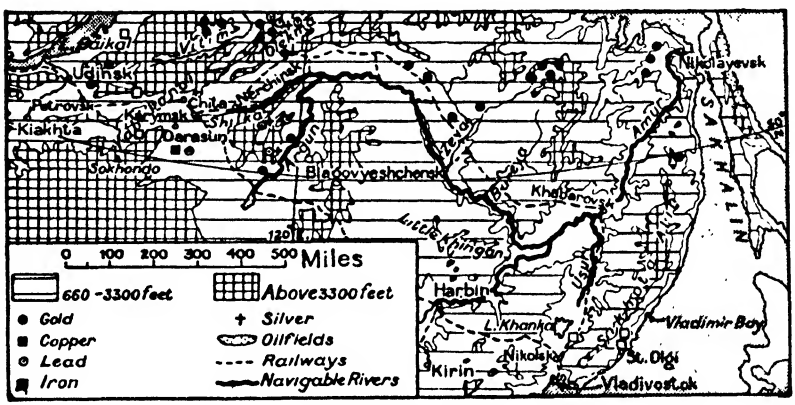

FIG. 37.—Amur Basin.

miles, Chita-Port Arthur = 900) combine to make it quite an important grain area, while oak and elm, walnut and maple, reappear in the woods, and crane and magpie are associated with ptarmigan and capercailzie. Even by the end of the seventeenth century the number of Russians settled here was quite considerable, and it is the Slav element that is making possible the industrial development in this upper area, *e.g.* the Petrovsk foundry and the Darasun smelter (copper-lead).

Amuria. Eastward of the Khingan Scarp and the Shilka-Argun confluence—to form the Amur—the relief is rather complicated, Pacific feature-lines tending to run transverse to the river except in its lowest reaches, where they dominate it entirely; but the heights are nowhere great, and there are fair-sized plains along the rivers, *e.g.* the "Little Prairie" of the Zeya and the Bureya. Here, too, both temperature and rainfall during the 5-months vegetative period are favourable to agriculture, though the large amount of moisture

conserved by the dense forests and reed-beds has been hitherto unfavourable to a free development of crops; but, when we relate this to the latitude, we are not surprised that rice-growing is very successful and very profitable.

Natural Regions

This survey of the three great river basins gives us a basis for some subdivision of Natural Regions, and it seems useful to give these such names as may be both appropriate to and suggestive of both their histories and their economic importance.

(1) Tobol-Yenisei Lowland.

The title of "Tobol-Yenisei lowland" would have such propriety for the whole of the "Ob" region north of parallel 58° N., *i.e.* Tobolsk and Yeniseisk, between the Urals and the "Yenisei"

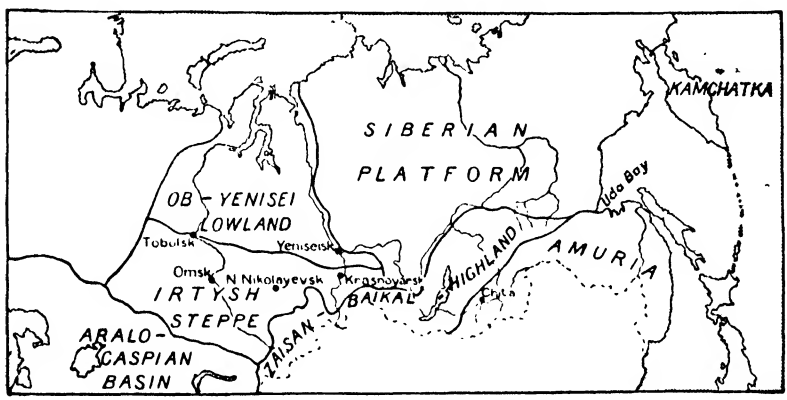

FIG. 38.—Natural Regions of Siberia.

scarp, *i.e. c.* 60° to 90° E. This covers all the western section of the double Tundra-Taiga zone, and the Tundra does not stretch nearly as far south as in North America; and the facilities for navigation in summer are remarkable. But access by sea is really difficult (cf. p. 208), so is the transport of timber, etc., to the rivers, and the incoherent glacial drainage makes the area more or less a battlefield between swamp and conifers—*e.g.* larch on the drier and spruce on the wetter patches—with their attendant birch and aspen and willow. Fur-bearers have been decimated, and the fishery is not very productive; mosquitoes are an appalling plague in summer, and haulage of timber *up* on to the rivers in winter is costly. Theoretically, access to and from Europe is "easy," and Europe greatly needs timber; but, like the rest of the Ob basin, the land is imprisoned by Russia, and wholly at her mercy.

(2) Irtysh Steppe.

South of this Tobol-Yenisei lowland lies the Irtysh Steppe, including all separately named portions, *e.g.* the Baraba. In the

north it is flat, and edged on the forest side by a belt (200–300 miles) of parkland; and the Taiga marshes are reduced to strings of lakelets in any (? wind-made) shallow saucers. These seem to be the remains of a wide belt of grassy marshes in which wind-blown dust became "fixed," so that the loess became enriched with humus—to form Black Earth, and its critical centres represent admirably the relation of both the railway and the three rivers to the agricultural wealth—Omsk, Novo-Nikolayevsk (now re-christened Sibirsk), and Krasnoyarsk. The Irtysh is the most important of the rivers, as the region goes as far south as the Ob–Aral water-parting; but this is only because the Akmolinsk spur of the Tarbagatai largely neutralises the climatic disadvantages of the lower latitude.

Economic Development. The key to the future of all Russian Asia lies in transport, and there has been a real reduction of cost on the transport of bulky freight, such as coal—from Kuznetsk to the Ural metal centres and grain to the Baltic, but on light freight, *e.g.* butter, so far from the cost having been lowered, it is nearly double what it was in 1913—mainly owing to the very high cost of bureaucratic management when applied to coöperation amongst a number of small producers.

In the meantime, however, the development of the excellent Kuznetsk coal has increased the local demand for food-staples. There has been a considerable increase of the area under bread-stuffs, especially wheat, and under sugar-beet, especially round Barnaul; and there is easy rail and river communication with Novo-Sibirsk—for export of coal and wheat, or the storage of wheat in the local elevators, and for the import of mechanical tractors. Indeed, the Kuznetsk coal seems likely to make this Altai elbow the most important economic focus in Russian Asia; for the estimated reserves (? 320,000,000 tons), if correct, represents about two-thirds of the Russian total. In any case, the coal is abundant and of high quality, and the cost of production is low (? 7 roubles per ton), and the present output seems to be fully 2,500,000 tons, one-fifth of which goes to the Ural metal centres; but the iron-fields of Minusinsk and Teletsk and the development of electrical power seem likely to monopolise the local market presently.

(3) Altai-Sayan Lakeland. The sources of all the three rivers are associated with special conditions of relief and climate, which demand a separate Natural Region; and this may be named either from the lakes—which suggest, or from the heights—which explain, the conditions. In either case the other name may be brought into the title, and the region called the Altai-Sayan lakeland, or the Zaisan-Baikal highland, the latter giving a link with the Lena and even with the Amur.

This highland is so well fed with rain and snow from the Atlantic

and Arctic Oceans that it is a finely forested watershed on its Siberian face, actually linking up with the Taiga by a belt of very pure conifer (fir, larch, spruce) almost devoid of the birch, etc. Of course, this is the first obstacle that the north monsoon meets ; and the lake storage is of prime importance.

The Siberian platform needs little further attention than we have given it, for it is already much overrated. It is really only a parallel to the backwoods of Northern Canada, though well enough drained to grow pure stands of conifer ; but they are neither dense nor tall, and in the meantime are more or less non-marketable. (4) **Lena Platform.**

The platform may be extended, however, across the Yablonoi-Stanovoi scarp far enough to include two indeterminate areas. The narrow strip of Okhotsk lands northward from Uda Bay, the polar limit of economic agriculture, is quite insignificant ; but the little block of Nerchinsk highland west of the Argun (*c.* 120° E.) contains in Chita a vital position, and the town may be divorced from Amuria, though only on the ground that the latter makes an unsatisfactory (and wholly political) unit based on the north bank of the Upper and Middle Amur.

Amuria has the best political position of all these units, and to some extent the best climatic and commercial position; but its ocean-face cannot compare with that of Eastern Canada in spite of much similarity of detail. This is all the more unfortunate because Nikolayevsk is the natural focus and outlet for a really important mineral area. The valleys of the Uda and the Argun and the land between them are rich in gold, while Sakhalin has a large amount of good (coking) coal, especially round Alexandrovsk, and a fair amount of oil ; and the salmon-fishing in the Sakhalin Gulf is very productive. (5) **Amuria.**

As a Pacific unit its importance is centred in the Maritime belt, and this is dominated, both politically and commercially, by the block-ridge system of the Sikhota Alin. For the system is low, with passes below 1200 feet and with very little crest above 4000 ; but it hugs the coast for nearly 700 miles athwart the paths of both the wet and the dry monsoons. It forces the Amur, like the St. Lawrence, to take a deplorable northward detour—towards the Okhotsk Sea ; but its southern spurs lead to the eastern arm of Peter-the-Great Bay. **Sikhota Alin.**

Its climatic importance, even locally, is considerable. For, like the backbone of Nova Scotia, it makes an effective barrier to sea-fog. Even Vladivostok has a typically continental climate compared with St. Olgi, the rainfall at the latter being three times that at the former. Similarly, freedom from fog gives Khabarovsk a midsummer temperature 5° F. above that of St. Olgi—though its mean annual temperature is lower—and a 5-months vegetative period at least as much above that at Vladivostok and twice as much **Climate.**

above that at St. Olgi. Unfortunately, the system is so low that the rainfall to leeward—where Lake Khanka imitates, though very feebly, the climatic influence of the Bay of Fundy—is unusually heavy; and, though this is favourable to the forest growth, it is adverse to agriculture.

Okhotsk Sea. This fog illustrates the influence of the Okhotsk Sea. The town of Okhotsk is in the latitude of Stockholm, but the sea is less comparable with the Baltic than with Hudson Bay, though that opens northward and not southward. It is nowhere deep, but its salter bottom waters seem to be always above 32° F. (? 36° F.), while its surface waters in July and August reach 50° F.; but below 100 feet and above 1300 the bulk of the sea is below 32° F., and its rich flora, especially the algae, can only be called Arctic or specifically Okhotsk, not Pacific. The equally rich fauna, too, attracts an immense number of large mammals, *e.g.* seals and whales. The Bering "Sea" is not quite so rich in flora, but is the passage-way of the mammals; and, as really an ocean strait, it has a climate far more marine than that of the Okhotsk Sea, even its winter temperature being little below 32° F.

From the piedmont valleys of the Kolyma scarp masses of ice "screes" are carried down into the Okhotsk Sea, to float about there almost the whole summer, or to be wedged by the counter-clock current between the Jurgur scarp and Sakhalin, so that Tugur Bay is not ice-free till August; and this is very serious for Nikolayevsk, as the Tartar Strait is too narrow for large ships, and yet in summer the temperature is *lower* to the east of the island than to the west. The S.E. Monsoon may have *some* effect on the movements of this ice, but—in great contrast with the N.W. Monsoon—it is very gentle; and the latter owes its evil reputation rather to its violence than to its temperature. At first it merely provides a steady wind for sailing-vessels returning to Petropavlovsk at the end of the season; but later it becomes an intermittent hurricane, tearing down the "3000"-foot scarp of the Stanovoi with terrific strength, and then warmed enough to lick up any stray patches of snow rather than to deposit any. The narrow western coastlands are therefore almost literally snowless under this "icy föhn."

(6) Kamchatka. Kamchatka, except for its treeless tableland to the north, is a very different world. The avenue of cones on its eastern coastlands is at once a significant comment on its physical history and a striking feature in its scenery. The dead giant of Icla, which looks down on the divide between the sedimentary north and the crystalline south, and the still active Kluchevskaya (*c.* 16,000 feet) are exceptional in their height; most of the cones are from *c.* 8000 to *c.* 11,000 feet, including the beautiful Strelka or Koriatok (= Etna), worthy to stand beside Fujiyama or Ararat, and a third (a dozen) of them are still active. Behind them the crystalline range is drenched with snow

and rain, especially in autumn and winter, or wrapped in fog ; and, though the forest growth is luxuriant, the conditions are too oceanic to be favourable to the Siberian conifers except the fir and the cedar. It is, however, now the great source of furs, and already there are both seal and blue fox " farms " ; both the shape of the area and the climate make fully 50 p.c. of the forest easily accessible, whether for fox-farms or for sawmills. Petropavlovsk is important as the only good harbour on the west of the Bering Sea, but the economic foundations of the peninsula are essentially sable and salmon, including the Anadyr product.

Some Economic Problems

Sea Access.

This eastern coast, then, seems the natural line of approach to Siberia by sea, and has been so regarded till quite recently ; but the Novgorod traders used the " North-East Passage " regularly, even in the eleventh century, and it is coming into use again. During the Great War, when the railway was monopolised by the Government, wheat and butter, hemp and flax, were shipped out by the Ob and the Yenisei ; and, in any case, the railway is too long and too costly for the normal traffic. There is very little *trans*-continental traffic by rail, even in North America, and the journey here is roughly 6000 miles !

Yenisei Navigation.

As we have seen, the two rivers are navigable for fully four months (June–September), and the Yenisei flows almost due north along the ninetieth meridian, with a current that averages only four miles an hour even as far south as Krasnoyarsk, and with supplies of " Tunguska " coal within easy reach of Dudinsk (69° N.) and of Turukhansk (outcropping along the whole westward course of the Lower Tunguska). Indeed, the Novgorod traders, after keeping the Siberian " capital " at Tazovsk (Mangazea) for nearly 200 years, actually changed it to Turukhansk—reached very easily from Tazovsk by the lower, *longitudinal* reach of the *left*-bank Turukhan tributary ; and, though they moved it to the high eastern bank at Monastir, and then up-stream to Yeniseisk, great efforts were made to colonise along the river. Indeed, at the end of the sixteenth century the riverine tract, both in the Tundra and in the Taiga, was *more* settled than it is now ; and this seems to show that the importance of the Yenisei was being fully realised even then. Certainly, in these days of steamers a straight river that is seldom less than half a mile wide, and for 300 miles is from 20 to 30 miles wide, cannot be ignored.

Yalmal Isthmus.

But to make full use of the Yenisei the difficulties of the Kara Sea must be met or avoided ; and, though the Novgorod traders did use the long sea route to both the Ob and the Yenisei, they preferred the " river, lake, and portage " route of the 130 miles across the

Yalmal isthmus *via* the Saletta and the Yuribei rivers. This is quite an easy route to canalise; it avoids the most troublesome submarine ridge of the sea route, on which ice collects, and it saves 1200 miles to and from Obdorsk; but it leads only to the Ob, and a railway from Medinski to Obdorsk would mean double transhipment.

Kara Route.

The trouble is not mainly in the Kara Sea. That is a fair depth, and fairly free from currents; the ice is seldom very troublesome, though the quantity and the distribution vary greatly from year to year; and the movements of the ice are due mainly to strong west winds, and so it is found mainly to the east of the sea. But the mass of fresh water from the Ob and the Yenisei is so light that it completely covers the salter and heavier Atlantic underflow; it freezes easily, and most of the ice is formed in the sea, not brought

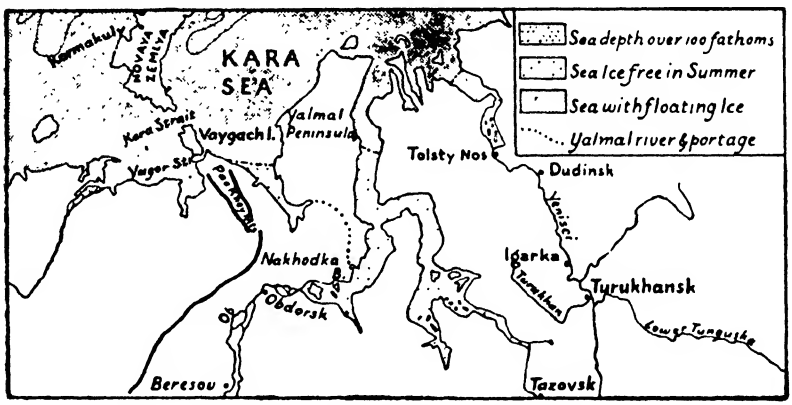

FIG. 39.—Sea Approaches to W. Siberia.

there by wind or current; and the division of the entrance into two straits, Kara and Yugor, by Vaygach island, both adds a land influence and narrows the lines of access for tide or ocean drift from the west.

At the same time, the continental shelf west of the Yalmal peninsula is very near the surface, and extends far out to sea; and ice covers it all often when the Kara Sea is not frozen, and certainly forms here first. The critical area, then, is really the belt of land from the Pae Khoy range *via* Vaygach to Novaya Zemlya, which lies at right angles to the prevailing S.W. wind, and that, too, precisely at the end of its passage across the Baltic Sea and lakeland and the White Sea; and solution of the problem should start in the meteorological conditions along that water-line in autumn.

"Wireless" Forecast.

If the autumn is open and ice-free, the strong winds—always warm—keep the Kara Sea and its approach too rough for ice to become very firm; and if the winter is mild and snowy, there is

little ice. But if autumn is cold and windless, and winter is too dry for heavy snow, new ice is easily formed, and a very large quantity is actually found. The essential conditions of success, then, in using the North-East Passage are—(1) comparison, in spring (May), of the winter conditions (November–April), especially the temperature, at Karmakuly, Obdorsk, and Archangel, so that proper preparations may be made; and then (2) aeroplane reconnaissance, to collect information as to the amount and the distribution of the moving ice in summer and autumn.

The first great step towards such solving of the problem was taken in 1912, when the Tsar had wireless stations erected at Vaygach, Yugorsky Shar, and Mora Salë, to distribute information about the air and the water conditions; but it was the courage and the skill of Captain Wiggins—still the local saint of the Yenisei boatmen—that first called practical attention to the possibilities which are now being realised.

Golchikha.

The development would have been more rapid if Golchikha had not been chosen as the terminal port, for it is so much exposed that the river boatmen would not venture to go so far down to tranship their cargoes; and there was no need whatever for choosing the place. If a pilot is taken on at Dickson Haven, 6000-ton vessels can safely reach Igarka, 400 miles up the river; and the town is actually exporting 200,000 tons of cargo a year even now, and the insurance rate—as compared with that for Golchikha—has dropped from 5½ to 1 per cent. Igarka has even an artificial lake of *warm* water, which enables the saw-mills to work all through the winter.

Further, the Ob Gulf opens eastward, while the Yenisei Bay opens westward; and as there seems no means of improving the ice-conditions in the gulf, wisdom would suggest depending more on the Yenisei than the Ob—deepening the 3-mile Ket-Kas canal, and developing the large amount of natural east-and-west waterway between 50° and 60° N. The deepening of the 14-mile "Kirensk" canal across the Ilim ridge is less important.

Climatic Extremes.

As we have seen (p. 129), the climate of Siberia is essentially continental, with extremes increasing north-eastward and south-westward from the belt of Black Earth that is roughly represented by the main line of the Trans-Siberian railway; the extremes to the north-east are of cold, with normal December temperatures of below −40° F. at Yakutsk, and to the south-west of drought, though the water-parting is high enough to give a slight increase of rain in the extreme south-west, Akmolinsk—at a height of 1000 feet, not much more than 500 miles from the Aral and less than 900 from the Caspian—having as much as Omsk, *i.e.* nine inches. Semipalatinsk, 400 miles farther east and 400 feet lower, has only seven.

Spring. Except in the extreme north-east, the normal range of temperature "everywhere" is between 60° F. and 70° F., and the mid-summer mean "everywhere" is also between 60° F. and 70° F.; even Beresov is well over 60° F. (61·3° F.), and even Akmolinsk—though not Semipalatinsk—is just below 70° F. (69·8° F.). The most important single factor in the whole region is, almost certainly, the very rapid rise of temperature over the prairie in spring, with its sequel of early-summer rains; at Omsk, which in position and in conditions may be taken as the best representative of the prairie, there is a *difference of 40° F.* between the beginning of March and the end of April. The slight abnormality of minimum temperature —north of the railway—coming early in January, and yet maximum temperature being late in July, is due to the widespread influence of swamp *when that is not frozen.*

Economic Vegetation. The vital facts summarised here must be reflected in any economic picture of the area. Obviously, if the least range of temperature is some 60° F., economic vegetation must be of annuals, or the perennials must be of very special kinds or treated in some very special way; on the other hand, there is nothing surprising in rice being grown in the same unit as contains the world's Pole of Cold. Probably, the natural phenomena suggest the best methods of treating the economic crops. For instance, nothing can rival snow as a natural "non-conducting" protector, but fruit-bushes can be "clamped" in earth—as we clamp turnips and other roots in this country; nor can anything really rival snow as an irrigator, and dry-farming methods do more good and less harm to the soil than any ordinary irrigation system. This is of prime importance where the natural conditions already tend to produce saline soils, and the looseness of very dry soils needs to be kept in mind; but this does not justify either of two common misconceptions.

Spread of Forest. The first is that the grassland is encroaching on the forest; but just the contrary is the case. The constant and violent winds sweep the normal steppes clear of snow in winter, but cannot drive it into the forest; on the contrary, it collects in very large quantities round the skirts of the forest, and the spring-thaw leaves a belt of drenched land along the southern edge of the Taiga. In this also the fallen leaves of birch, willow, aspen, etc., collect, leaving it far more favourable to forest growth than to grassland. In the meantime, then, natural causes are extending both forest and Black Earth southward; but subsoil investigation reveals, *e.g.* in the age-old burrows of long-vanished *Steppe* rodents, proof that this particular belt was once pure Steppe.

Shifting Sands. The cause of shifting sands is also misunderstood. Most of these present evidence of their origin in alluvial formations, so that they have some connexion with a water-supply for either plants or beasts. The most harmful are along this same forest margin, and

are due to the reckless destruction of the forest for fuel, etc., and to the consequent misuse, or non-use, of the cleared area. Where they are found away from the forest, but along rivers or *wadis*, they are mainly due to unorganised herding of cattle, allowed to go on day after day trampling along the margin of the "water-course." If the cattle are kept off them, most of them actually become firm again, especially if there is still some fair amount of organic material left in the "alluvium," or if they lie to leeward of belts of Black Earth from which similar material can be blown.

The great difficulty of obtaining information about the region, and, unfortunately, the greater difficulty of accepting what is offered officially—for when two or three items are obviously and demonstrably false, how can one be happy about the rest?—leave us with no clear picture whatever of the conditions for 10 or 12 years; and, as this makes it impossible to give any trustworthy account of it—for statistics of 1913 are more likely to mislead than to help,—it may be better just to make some general comments on indisputable tendencies and conditions.

Taiga: (1) Timber and Pulp.

First, then, what of the Taiga? An estimate that it aggregates half a million square miles is probably under the mark; one that the area representing good timber aggregates 150,000 square miles is probably above the mark. There never has been any really considerable trade in timber, least of all in the Ob basin; and the timber has never been really good, even where there is least swamp, and where the transport has been relatively easy. The trees are very open and yet not tall, for the openness is due to the impossibility of the roots going far down—into the ice!—and the consequent need for them to spread out near the surface. No doubt the modern demand for pulp-wood is much more easily met than the demand for good timber; but there have been, historically, only two staple products—furs and fish.

(2) Furs and Fish.

The fur-trade has been recklessly overdriven, and even a generation ago it was necessary to forbid the export of sable, and fur-centres were declining before the War, even Irbit and Yakutsk. So far as the centres have continued to flourish, it has been as fishing-centres or wood-centres or both, *e.g.* Tobolsk; but the suggestion that "proper," *i.e.* official, organisation of the fishing will lead to improved methods of wood-transport is childish. As we have seen, the fundamental difficulty is that even the *bed* of the river may be above the surface of the riverine lands; and official organisation is not likely to be of much help to an industry the raw material of which is regarded as, and even called by, a name meaning "bread."

At the same time, some export of fish might be possible from, and north of, Tobolsk, *e.g.* Surgut and Beresov, Obdorsk and Nakhodka; and Tobolsk and Tyumen have natural advantages for

wood-pulp traffic in the west, as Blagovyeshchensk and Khabarovsk have for a timber trade in the far east. But Russian estimates seem to be based, quite naturally and reasonably, on experience in Russia, where there is a deciduous belt as well as a sprinkling of deciduous trees, and where the transport problem is concerned with under 14 degrees of latitude. In Western Siberia this distance is expanded to over 24 degrees, and there is no deciduous belt. The value of cleared forest can therefore easily be exaggerated, especially in the west; in the far east, where the proportion of grassland is very small, clearing may be of some value.

Grasslands. The grasslands, as we have seen (p. 148), are rich and poor, prairie and steppe, the former well suited to tillage and the latter

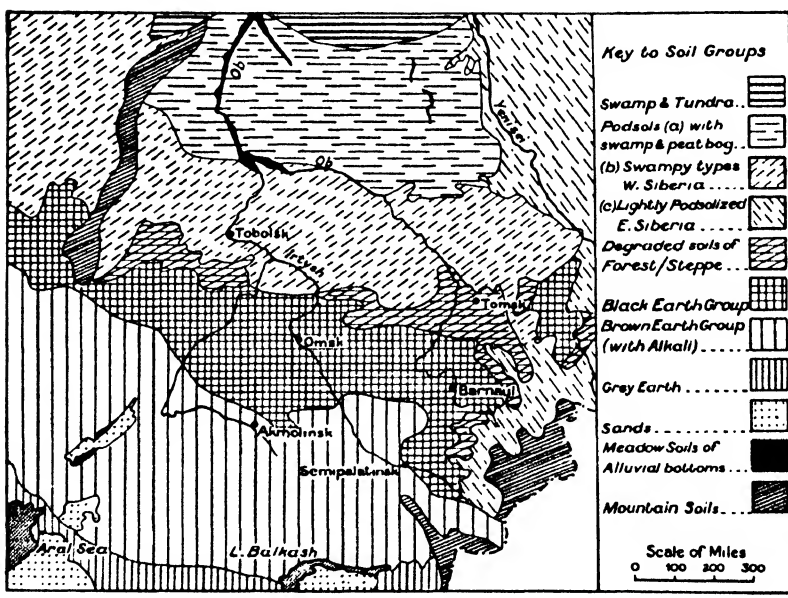

FIG. 40.—Soil Belts in the Ob Basin. (See Note on p. 218.)

well suited to pastoral work; but the future probably lies with the old lake-floor of the Irtysh, especially those parts which remain relatively damp, and which have a fair snowfall—that lies. The aggregate area here for tillage is considerable, and it is well distributed, valuable lands being found, *e.g.* as far north as Tobolsk, as far east as Tomsk, as far south as Akmolinsk, and as far west as Kurgan. These limits, too, probably enclose three-fifths of the total population of Siberia, and fully 90 p.c. (? 93 p.c.) are Russian Slavs.

Butter. Two specially good areas are along the middle reaches of the Tobol and the upper reaches of the Ob, the one centred on Kurgan

and the other on Barnaul; both are near mineral wealth—in the Urals and the Altai, with river and rail transport. But the significant fact is that both are famous only for a pastoral product—butter; and the reason is that the mass of these Russian Slavs are illiterates, and they do better with stock than with tillage; and it seems probable that for a long time to come stock will be more important than grain, especially on the damp soils of Amuria. But the conditions deserve more attention because in some respects they are naturally suited to a dairy industry. The peasants must depend on their cattle till the wheat is harvested, though the Steppe unit is the village (!) and not the farm; the wide beds of riverine alluvium make very good meadows for some weeks after the spring flood; the most favoured centres, Barnaul and Kurgan, are within easy reach of mountain pastures—Barnaul within reach of real alp; and, in the extreme cold, the milk, if not as rich naturally as that of the reindeer, is of fine quality.

Coöperation.

Further, the Slav genius for coöperation suits the kind of industry admirably; "fool-proof" machinery for dairy work is easier and cheaper to obtain than for tillage, and is more truly "fool-proof"; the products are easy to handle and to grade, and the particular samples have proved neither primitive nor inferior; and the "better"—(*i.e.* better for grain)—lands in the north, *i.e.* Kurgan-Barnaul, are specially suitable because they command at once the cooler northern route *via* Tyumen for open water at Ventspills (Windau), the chief export harbour.

But there is great need of proper organisation—far more than for a grain industry. There *seem* to be cold-storage centres only at Kurgan, Omsk, and Barnaul; the large quantities of buttermilk ought to be used in veal or bacon industries, and the breeds could be greatly improved, especially the pigs; and meat-markets should be developed, as at Petropavlovsk, at every point where rail crosses a navigable river, by which grain for fattening could be transported, *e.g.* Novo-Sibirsk, the capital of "The Siberian region."

Wheat.

But this raises the other side of the question. The old Mongol caravan route followed the northern edge of the dry steppe, but the main line of rail now follows the southern edge of the "lake" prairie (roughly 56° N.); and all the chief centres are where rail crosses navigable rivers, and all have water access to Tyumen or Kurgan. Not only is wheat an admirable crop for pioneers or for primitive herdsmen, requiring no attention during the best butter months (here, from May onwards); but, as a bulky and non-perishable product that does not demand quick transport, it can use the wonderful waterways to relieve the rail of all the pressure due to the transport of a portable but perishable product, especially in Western Siberia.

Urban Foci

Tobolsk. The political history of the whole area in recent centuries has involved a strong contrast between the area as a whole and its urban foci of administration; and this is brought out in many details. For instance, the old capital of Tobolsk, as its name suggests, marks the historic link with Russia—by water; and even now it is not on rail, though it is quite an important link between forest and prairie. For that reason it may be usefully contrasted with Winnipeg, the Tobol and the Irtysh being compared with the Red River and the Assiniboine. But it cannot hope to compete now with any centre in the densely peopled (? 15 to the square mile) area between and along the two western branches of the great railway, *e.g.* Tyumen or Kurgan.

Omsk. From several points of view Omsk is the natural centre in Western Siberia; for, once the Steppe raids ceased, there was no longer any need to seek the shelter of the forest, and the Om is not only the greatest right-bank tributary of the Irtysh, but also the last of them eastward and giving a direct route eastward, as illustrated to-day by the railway. The natural objective of the route westward was as naturally Petropavlovsk and Kurgan as that of the Irtysh was Ishim and Tyumen. Omsk is still the largest town (? 160,000), and must remain the capital of the steppe, simply as a great grassland.

Tomsk. But the balance of power is moving naturally to the great Tom valley coalfield which lies roughly between Tomsk and Kuznetsk. Tomsk is associated with the eastward elbow of the Ob very much as Omsk is with that of the Irtysh, and the Tom is the most important right-bank tributary of the Ob; but the valley leads southwards and not eastwards, and the town enjoyed the pre-eminence of being the first university centre in Siberia. Like Oxford, it used its influence to keep the railway sufficiently far away for it not to disturb the study of the studious; and, like Oxford, it lived to regret its action. The "Step" in the relief that brings back the forest cover may be compared with that near Regina as the one at Krasnoyarsk may be compared with that near Medicine Hat.

Kuznetsk. While the railway worked eastward into the forest—the junction for Tomsk being actually called *Taiga*,—steppe traffic was at first monopolised by the meandering Ob; but the Sailughem piedmont began to have much economic importance with the development of trade in grain and butter, coal and metals, and railway development was bound to start from where the main line crossed the Ob—to tap the coal (Kuznetsk) and the head of navigation (Biysk)—and to avoid following the meanderings of the Ob. This drew immediate attention to the Barnaul elbow, and this proved to be a very suitable objective for the Turkestan railway. The change of capital has

given official impetus to Novo-Sibirsk (? 120,000); but the real centre must be Kuznetsk. All the coals are of high quality, the western annex of Gorlovo being of anthracite; and the seams are thick as well as wide—the output in 1929 being given as 3,000,000 tons. Naturally, in view of the large and steady demand for the Ural ironworks, in the early days most progress was made in places on or near the main line, *e.g.* Anyersk and Cunyensk; and this encouraged work in places where there was no local demand, *e.g.* Altaisk, near *Taiga*. But the branch line up the Tom valley, to supplement and supersede the poor river transport, has developed other centres, *e.g.* Kolchuginsk, Kemnovsk, and Telbes, with its rich iron-field.

Novo-Sibirsk.

This Sailughem, or Abakan, piedmont is now the most important area (? some 80,000 square miles) in Russian Asia, and it will become more so. Barnaul is just as much more important than the head of navigation at Biysk as Krasnoyarsk is than Minusinsk—though the Achinsk line to the Abakan coalfield has greatly helped the latter; but Kuznetsk is the vital centre, and Novo-Sibirsk is entirely the right point for the regional capital, even though at present without a direct line to Kuznetsk.

Krasnoyarsk.

Krasnoyarsk, however, has a further importance, which will take it ahead of Barnaul (? 75,000), for it is the natural gate of Central Siberia; and, though its population seems to have fallen (? by 15,000 since 1913, when it was 90,000), it is below 600 feet, and ships grain and timber down the Yenisei for the Kara Sea, and is a rather important fur-centre (mainly squirrel—? 1,500,000, and ermine—? 15,000). But it needs direct rail to Kuznetsk, and this must come with the development of the Minusinsk iron and copper field; and, though the local "Abakan" coal (some of it at Korkinsk, "coking") is rather inferior to the Kuznetsk, it is better than any farther east except on the Pacific coast. In any case Krasnoyarsk has nothing to fear from the little town of Yeniseisk—which is only a fishing-station (salmon and sturgeon) that collects furs—though the river has dropped, within the 200 miles, from nearly 560 feet to very little above 230.

Irkutsk.

The belt of prairie east of Krasnoyarsk grows steadily richer as it falls in latitude, and the Sayan rocks are rich in minerals, *e.g.* Udinsk silver and Alibert graphite; but it was its strategic position that had raised Irkutsk to a city of 130,000 by 1913. Its advantages were a very fertile basin with a rather exceptional climate,—a large supply of (rather poor) coal,[1] which was of immense use to the railway,—the protection of the great lake and its mountain wall,—and yet access by the Selenga up to Kiakhta (June–September). The population now seems to be not more than 100,000—another hint that the geographical factor has been as powerful in

[1] The Cheremkhovo mines in 1929 raised 1,000,000 tons.

the reconstruction as the political was in the destruction; for it is only in the more fertile areas that agriculture, and only in the more accessible that industry, are being at all successfully developed. Irkutsk was a very old focus; but it was not the old "capital" of the region, because it was not, like Kiakhta, on the Chinese side of the lake. Its actual position was made strong strategically by the winding river, and strong economically by the fertility of the "volcanic" alluvium of the Irkut valley. Nor can anything change the relation of this centre to the "three gates"—Krasnoyarsk, Kiakhta, and Chita.

Lake Baikal. With a maximum depth of nearly 5300 feet, Baikal is much the deepest lake in the world, *c.* 1000 feet deeper than even Tanganyika; and, as its walls drop perpendicularly for hundreds of feet except in special places, *e.g.* the Selenga delta, and as an area of *c.* 175,000 square miles is pouring fresh water into the trough, the total volume is immense, and can change temperature only very slowly. Of course, the lake lies S.W.–N.E., *i.e.* for 400 miles exactly in the track of the prevailing wind; along its N.E. coast there is a number of hot springs, and quantities of heat are used in thawing the ice (4–5 feet) in early summer and in evaporating the warm water (56–57° F.) in late summer, while the mass of the water, even at 500 fathoms, falls little below 40° F. The total result is a midsummer maximum delayed till August, and—according to Halbfoss—the air temperature is "below normal" by the incredible figure of fully 40° F.; and, as the same degree of above-normal warmth characterises December, Listvinichnoe is a paradise—except for sudden storms [1]—at any time when the lake is open. The scenery of the surrounding ranges, *e.g.* the view of Khamar-daban (5300 feet) across the lake, is a further attraction; but the common comparison with Geneva rather ignores the facts that Baikal is about the size of Switzerland (!), and that the fishery has been more productive than that in the whole of the Okhotsk Sea.

Chita. Trans-Baikalia is dominated by Chita and even the completion of the Kalgan railway *via* Urga will not change this; for Kiakhta is a frontier post, and Udinsk—in its "fiord"—gave up the struggle of competing with it in 1920. Though sheltered valleys are relatively warm, and retain enough snow to protect their soil, most of the area is almost snowless, *i.e.* is without the main source of water for plants; for most snow falls in spring, which is very short, and the gales allow very little of it to lie. The future here, therefore, lies with the mineral wealth, *e.g.* the gold and mercury of Nerchinsk, and with commerce; and though the actual junction of the two main lines is Karymsk, Chita is the real pivot. It also has the climatic advantage of being in the lee of the Yablonoi, with a rain-

[1] The terrific gales in winter, which often rip up the ice, seem to have some value to the rich fauna (again, salmon and sturgeon).

fall of 12 inches, and its pure air and constant sunshine are making it a sanatorium; and the Bukachachi brown coal is very good.

Amur Centres. With the present distribution of political frontiers, and the natural conditions of the river *régime*, the Amur valley—from the junction of the Shilka and the Argun—has no place which is at all likely to become of any importance. The mineral centres to the west can scarcely rival those along the Vitim, the real head-stream of the Lena; the first 300 miles of the "Amur" contain fully a dozen bad rapids, and the second 300 fully half a dozen; the Manchurian railway has deprived the Blagovyeshchensk gap—between the Little Khingan and the Turana—even of its old strategic importance; and the Zeya and Bureya confluences become the centres of long lakes during the Wet Monsoon. But Blagovyeshchensk is just *south* of the limit of permanently frozen soil; the wet meadows might raise fine beef and soya beans; the town controls some good timber (especially yellow pine), always in demand in Australia; and the frozen rivers give excellent transport in winter.

Khabarovsk. The only real question, then, is as to the distribution of power along the Maritime arc; and here we may at once rule out the northern focus of Nikolayevsk, as disqualified by very long winters, by bad bars in the estuary, and by the absence of rail. Khabarovsk, 30 miles up-stream, is at least as good a port (the Amur is navigable for 2000 miles—to Sryetensk); the Usuri is open for navigation before the Lower Amur, and flows through the best timber in Siberia; and the Sungari is navigable up to Kirin. For all internal development, then, Khabarovsk must come first.

Vladivostok. But for foreign trade Vladivostok must remain supreme. Its Jurassic coal and Tertiary lignite are abundant and of fair quality, *e.g.* at Mongugin and Suchan; iron is equally abundant and accessible by sea, *e.g.* in Vladimir and Olga Bays; and though the port is much troubled by ice—largely because of the "Nikolsk" Gap behind it, ice-breakers can keep it open, especially because the north wind blows down that gap so strongly that it clears the ice away almost as fast as the ice-breaker can break it. The Siberian route to Japan saves weeks on the sea route, and the Pacific ranks next to the Black Sea in Russian sea-trade, being far above the Baltic for exports.

The Railway. The great railway across this long belt was definitely a political undertaking, and so was intended to link together certain pockets of population without any regard to intervening barriers or to the economic value of intervening spaces; but, as the pockets always did represent certain conditions of soil (or rock) and climate, the route had a geographical basis, and really followed a "Line of Least Resistance," even if that involved 30 miles of bridges. For the population was distributed in a narrow belt that was free from both forest and marsh, and yet was fertile and fairly well watered.

Its Duality. The whole system should be regarded as practically two systems, which are accidentally continuous, though serving distinct ocean termini; and, except for passenger and "political" traffic, each carries only what is wanted or produced regionally, *e.g.* wheat and butter to the Atlantic and beef and beans to the Pacific. Geographically, perhaps, the divide should be the Yablonoi scarp, with the mineral wealth that lies behind it; but economically it has been Lake Baikal, the objective—*via* Kiakhta, *i.e.* from the south—of all "eastern" traffic. The western half has been "lowland" traffic from both the engineering and the production standpoints, carrying food-stuffs for open water on the Baltic, where Windau and Libau were always better ports than Riga and Reval. The eastern half, from both standpoints, has been "plateau traffic," at first only in minerals.

The War doubled the use of the system in a double sense; it was double-tracked east of Omsk, and double-routed west of there—the Ishim-Tyumen route encouraging some export *via* Archangel, while the Petropavlovsk-Kurgan route used only the Baltic ports. From Tatarsk, too, the Omsk-Barnaul route was "doubled" across the Baraba Steppe as far as Slavgorod. This development was essential to the dairy industry, and greatly facilitated the import of agricultural machinery; but grain, like timber, should always move by water here, and elevators are far more important than branch-lines.

NOTE

Podsols are soils evolved under moderately moist conditions in temperate latitudes, and they have a close relationship to the temperate-forest belts of the world. Their most constant characteristics are an ash-grey colour, due to leaching, and a much whiter layer 4 to 8 inches below the surface.

RUSSIAN ASIA.—II

CHAPTER XV

INLAND DRAINAGE—TURANIA

RUSSIAN Central Asia is roughly south of 50° N. and east of 50° E., lying between the Caspian and the Sarikol ridge (*c.* 75° E.) in the south, but extending to the Tian Shan (*c.* 85° E.) in the north. Geographically, it offers almost every feature and phenomenon that is typical of Inner Asia—in morphology, climate, and scenery; and, historically, it has been a link or transition belt between Europe and Asia, and between different parts of Asia, especially between the south-west and the north-east.

Three Divisions.

It may be divided quite roughly into three main areas—an Aral lowland, a Balkash platform, and a Pamir highland, the last being taken to include all the highlands (with the contained valleys) east of 65° E. and south of 45° N.; and the name may be defended by the fact that, south of the Khan Tengri (Kunghei, Alexander, Kara-tau) crests, the eastern watershed is a succession of *pamirs*, *e.g.* the Ak-sai and the Chatyr Kul, including—and of exactly the same type as—the political Pamirs, but of more value. They are less well known only because they have lain off the line of movement, which has been either across the official Pamirs, *e.g.* from Kashgar to Ferghana, or along the Zungarian trough, *e.g.* from Kulja to Ilysky. They are of more value because they are not quite so high, and yet are far enough north to be much better watered. Indeed, the windward slopes of the transverse Ferghana range are covered with quite luxuriant vegetation—up to 8000 feet, though the eastern slopes are devoid of both fodder and fuel; and the Kirghiz spend the summer on these pamirs, *e.g.* the Ak-sai (at *c.* 11,000 feet), and winter down in the valleys, *e.g.* the Narya valley. This transverse range is also interesting as being a remarkable natural divide between the red marmots and the brown.

Aral Basin.

But this triple subdivision must not be pressed against the unity of the whole as an area of inland drainage centred naturally on the Aral Sea. The sea has still an area of fully 25,000 square

miles. and the whole " basin " is well above 250,000, though not much more than a third of it now actually drains into the sea ; it is thus the largest lake in the world after the Caspian, Lake Superior, and—possibly—the Victoria Nyanza, and its climatic importance is correspondingly great. The greatest depth—except below the Ust-Urt scarp (500 feet high)—is not more than *c.* 100 feet ; even in February the mean air-temperature over it is *c.* 50 °F., and in July it approaches 80° F. ; the daily range over it is under 35° F., while 50 miles away—at Kazalinsk—it is over 50° F., and the average annual evaporation is estimated at a very high figure. Economically, it is not of great value otherwise, as the change to a salt condition from a fresh (while it communicated with the Caspian) seems to have decimated the fauna.

Climatic Unity. The nominal unity of the basin as a drainage area is confirmed by a profound actual unity as a climatic region. It is below sea-level in the Emba oil-field, and fully 23,600 feet above it in Khan Tengri, and there is considerable variety of soil and of vegetational cover ; but the influence of all these on the climate is negligible, and in some respects even soil seems to be more effective than height. A difference of 5000 feet makes practically no difference of summer temperature between Khoroz and Samarkand, and one of 6000 feet makes practically no difference of winter temperature between Narynsk and Pamirski Post. The latter is the driest place in the whole basin, (2½"), with maximum in June and mimimum in March ; Kazalinsk, with just double the amount, has its minimum in June and its maximum in April. Turgai, in the far north, has a mean range of *c.* 73° F., from under 3·5° F. to over 76° F. ; Merv, in the far south, has an extreme range of over 120° F., from −8° F. to 113° F. Fruit trees in the Khiva province have to be " clamped " in earth as a protection in winter ; in summer the soil becomes so overheated in the dry air that falling storm-rain may be evaporated before it reaches the ground.

The Kirghiz have to leave the pamirs (11,000 feet) in August from want of water—not a really premature movement because, if they wait till the beginning of September, they run serious risks of having their flocks snowed-up ; in January on the plains they have no source of water (other than by melting river and lake ice) except from wells, and the water in wells less than 100 feet deep is generally bitter. Indeed, in some places good water can be obtained only by sinking 600 feet. It is equally typical that, *e.g.* on the Bukhara plains, travellers' tents may be flooded with storm-rain in a few hours in summer (August), and covered with six inches of snow in one night in winter.

Balkash Basin. The best climate seems to be in the neglected Balkash basin, especially on the Ili piedmont (*c.* 2000–7000 feet). At Vyernyi the average winter temperature is *c.* 21° F. (*c.* 14° F. at midwinter),

and the average summer temperature is *c.* 72° F. (*c.* 79° F. at mid-summer); the corresponding data for Kopal are *c.* 23° F. (*c.* 21° F.) and *c.* 68° F. (*c.* 70° F.). The 5-months vegetative period at Vyernyi has an average of *c.* 70° F., and at Kopal *c.* 65° F. These are temperatures very favourable to vines and to stone-fruit; indeed, this may be the real home of the apricot. They are also very favourable to the production of mild-flavoured onions, and on the south-east of the basin there is a range called Tsun-Lin (" Onion Mountains "). The name Semiryechensk means " Seven Rivers "—from the Karatal to the Lepsa, *i.e. not* including the Ili drainage—a name suggestive of irrigation possibilities, and the influence of Balkash and the smaller lakes must be considerable. Certainly—though the upper currents are steadily eastward—there is a marked daily " sea-breeze " off the Issyk Kul, which has central depths of fully 2000 feet; and, as its salinity is low, the level must have been still higher " recently "—high enough for an overflow to the Chu *via* the Buam gorge. Round the eastern shores, too, there is fairly heavy summer rain, especially in July and in August.

Watershed.

The general character of this Turan basin has already been noticed (p. 84). With very well-defined boundaries on three sides, it has also three well-defined physical features, associated with general differences of economic value and with particular differences of regional value; and these are largely of hydrographic origin. For instance, the border mountains in the south, though a continuous line of recent folding, are relatively low and not permanently snow-covered; and so, though the number of typical *wadis* is great, their volume is too small and too variable for them to be of much use for irrigation in a climate of such pronounced summer drought. In a stretch of 400 miles, 27 of the largest streams are used up entirely in irrigation; even where the supply is better, and where the terrace is wider, the Tejend and the Murghab have no surplus for much extension of the cultivated area in this southern belt. But the bordering mountains in the east are high, with several peaks over 20,000 feet; they carry a deep cover of permanent snow and ice, with—above 12,000 feet—a number of glaciers; they thus make a magnificent reservoir for perennial rivers, with many facilities for irrigation. Indeed, they would form a very serious barrier eastward if they did not fan out westward into a series of well-defined valleys, which give relatively easy movement, *e.g.* the Ferghana-Tarim route *via* Andijan and the Terek Davan Pass.

Lakes.

It is of special importance that so many of the rivers feed lakes, *e.g.* Balkash, Issyk, and Ala; and both the Balkash and the Issyk drain from the glaciers round Khan Tengri, as the Narya head-stream of the Syr also drains. At the same time, some rivers which

seem to reach lakes are really held up by thick, tiger-haunted reed-belts, that mark the limits from which a wider water-surface has shrunk ; for instance, the Lepsa does not usually reach Balkash.

Silt and Soil. The height and the steepness of this western fan account for the pace of the torrents, both for " power " and for transport of silt on the high plains ; and the sudden change of slope at the foot accounts for the very deep deposit of both coarse and fine material—the Zarafshan being the "*Gold*-scatterer " only as distributing the fertile silt, and hitherto the silt has been the only fertiliser—in the absence of animal manure. The piedmont zone is widest, fortunately, where the mountain-wall is highest and steepest, and is associated with the heaviest precipitation ; and its own height (well above 1000 feet) is at least more favourable to precipitation than the level of the low plains. These, as the old bed of an enlarged Aral, include considerable depths of marine sand ; and this, in conjunction with the very low level, results in a wide distribution of typical desert conditions, with considerable areas of aeolian deposits. Here, as on the high plains to some extent, the yellow loess-like soils have " enough " humus in them (*c.* 2 p.c.) ; and, though a rain-storm may be followed by an efflorescence of salt, they are not too salt for, *e.g.*, cotton and sugar ; indeed, the fine quality of the Khiva cotton is attributed to the saltness of the soil. But the prevailing distribution is sand or gravel.

Climate and Vegetation. The climatic conditions are very similar in all parts : a large range of temperature (32° F.–77° F.), a small precipitation (all under 6″, much under 4″), a sprinkling of snow in winter, and a rather heavier sprinkling of rain in spring, with a very low relative humidity (27 p.c.) and a very high percentage of bright sunlight. Such conditions are very adverse to any permanent vegetation, without very marked adaptation to drought, *e.g.* saxaul ; but it does sanction ephemeral herbs in spring, differing from place to place with differences of soil.

In the salt desert, especially in the worst drained areas, the flora is very sparse and dwarfed. With decrease of salt and increase of precipitation, as on the Golodnaia Steppe (6″–10″)—and part of the Ust-Urt plateau, with its beds of recent loam, is somewhat similar—conditions should be more favourable ; but an impermeable clay causes insufficiency of subsoil water, and there is a general absence of deep-rooting plants, with specialisation in a spring flora of bulbs. This is characteristic also of the river-side gravels, but there deep-rooted plants are more favoured.

Sand. The sand formations are the most widely spread and the most characteristic feature. Because of the permeability water is economised, and so the sand can be fixed by long-rooted vegetation, *e.g.* saxaul, and even the Kara Kum desert converted into poor steppe. In the Kysyl Kum there is more variation of relief, in remnants of

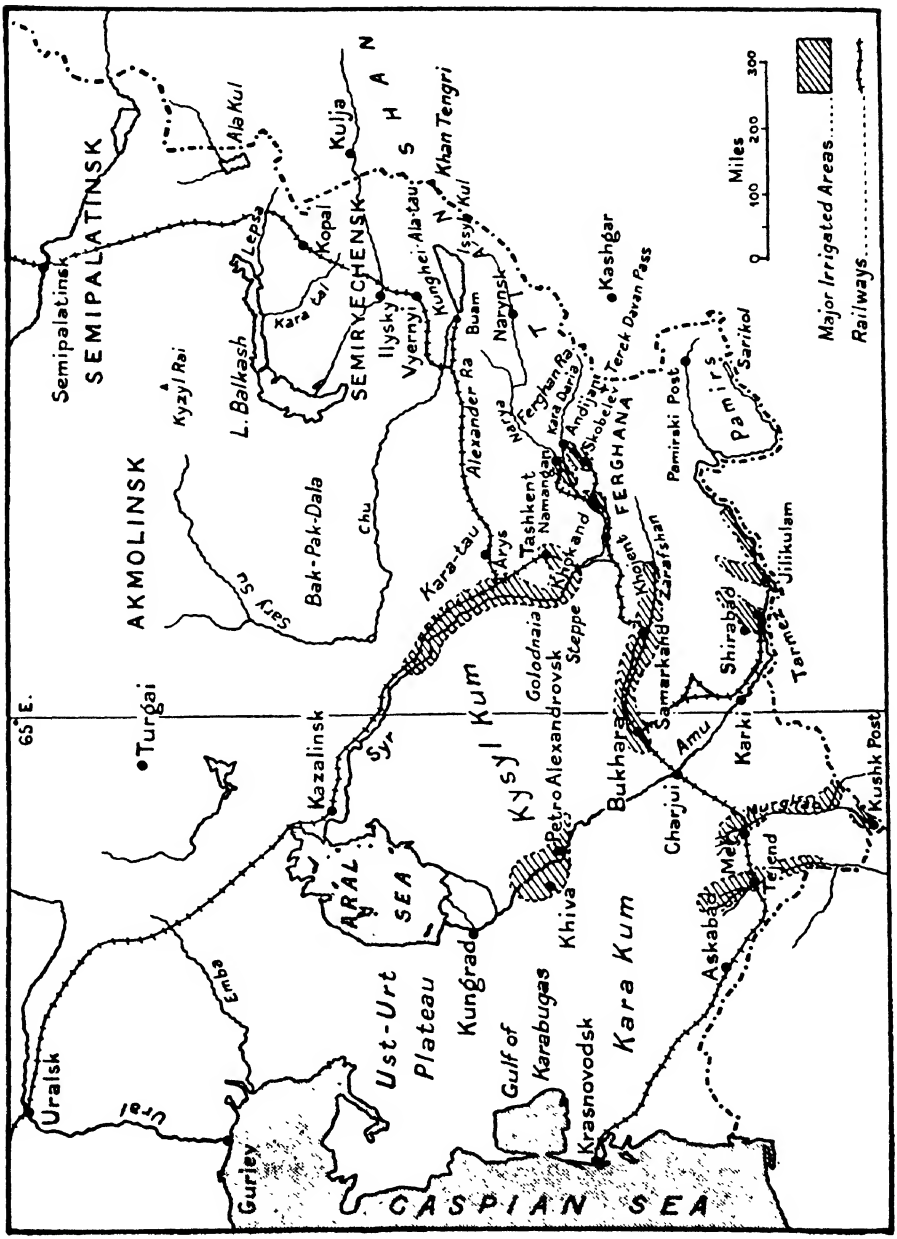

FIG. 41.—Russian Turkestan—Irrigated Areas.

The mean of several estimates (Mastchak, Wocilof, *Asie française*, etc.) suggests a total irrigated area of fully 10,000 000 acres, probably 4,000,000 under cotton.

old piedmont spurs, *e.g.* between the Amu and the Syr; and these may form fairly good steppe.

Water Supply. Of course, even the best soils are useless without water; away from the frontier mountains latitude is no help. Even in the Akmolinsk area the Sary Shu, though draining from the piedmont of the Kyzyl Rai (*c.* 4900 feet), not only does not reach the Syr at all, but—even when joined by rivers from the south-eastern mountains, *e.g.* the Chu, from the Alexander range—disappears in temporary marshes. Indeed, the lowland between the Chu and the Sary Shu is known as Bak-Pak-Dala, "Famine Steppe" area; and Turgai, though only 500 miles from the Caspian and half that from the Aral, has only 13 p.c. of its rainfall (5″) in summer.

Wool. If there is one product which would be natural in all parts of the area, it is wool; and everywhere it is wool of fine quality—the so-called "Astrakul" and "Karakul." These supplies have been for a long time an important source of raw material for the Russian textile industry, but they will scarcely become more important now; for with the competition of cotton and silk in the basin, and with increasing difficulty of transhumance as agriculture develops, the nomad will become weaker and weaker against the tiller. Indeed, the latter may even become almost a rival as a stock-rearer, for the Russians have introduced into the native economy the pig, which is worse than useless to the nomad, even if he is not a Moslem.

Obviously, the future here depends absolutely on irrigation associated with sweet soil, and that is to be looked for almost wholly on the high plains; and, as we have seen, the eastern plains have more rivers and longer flood-season than the southern. But heat and drought are as typical here as cold and swamp are in Siberia; the best supplies of water are up-stream, especially at the foot of the scarp, where, too, the loess is deepest, and where rail has an easy gradient; irrigation means a variety of crops almost unknown in Siberia, including rice and cotton; and, apparently, four-fifths of the water in the two great rivers, Amu and Syr, still runs to waste.

Two Areas. In the meantime, two areas are of special importance, the Ferghana valley and the Shirabad plain; and in both there are possibilities of extension if there was any adequate storage, and if it was realised that irrigation agriculture must be really, as well as nominally, intensive. Even now the price of irrigated land has risen above 600 *times* that of unirrigated—some indication of the value of continuous cropping and varied crops.

Cotton. Of course, during the present century cotton has been pushed into an unjustified importance; for there are other crops better suited to the local conditions, if not to the needs of European Russia. On the one hand, the Russian peasant does not understand irrigation, or like its continuous industry; and yet he despises and

dislikes the Sart, who does understand both irrigation and the management of "cropping" work. On the other hand, the climate is a difficulty; for the tiny rainfall comes when the temperature is too low (below 59° F.) for sowing cotton, and there are early frosts, and yet harvest-time (September–October) is apt to be damp. There has to be, therefore, a compromise between three factors—the presence of loess, mountain-shelter, and the length of the frost-free period.

Ferghana. The very fine grains of loess that rest upon an impervious clay absorb water before it can evaporate; the Ala-Kunghei heights are a perfect shield against N. and N.E. winds; but the Ferghana latitudes are relatively high (north of 40° N.). The valley, as a whole, has its last frost on 25th March, and its first on 26th October; but the mouth, *e.g.* Tashkent, has its last frost 3 days later, and its first 4 days earlier. Askabad, nearly 250 miles farther south, has its last on 17th March and its first on 4th November, *i.e.* 18 days longer than even Ferghana free from frost; but it greatly lacks assured supplies of water.

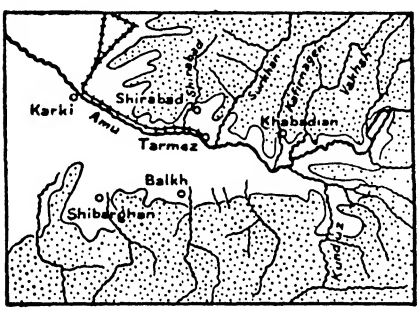

FIG. 42.—Shirabad Plains.
The stippled area is above 660′, and most of it is about 3000′.

Shirabad Plains The Shirabad plains—along the Amu between Khabadian and Karki—are the one great area of promise. They lie even farther south than Askabad, they are directly in the lee of the Hissar crest, and they have four good rivers—Vakhsh (Surghab), Kafirnagen (with water-transport at Aiwaj), Surkhan (with rail at Tarmez), and the Shirabad itself. The knot of glaciers—all of the isolated "valley" type—that radiates from the southern side of Peter the Great range, has been showing, since 1900, a great increase in the volume of ice, though the terminal moraines are still 3000 feet above the relics of older ones; and the actual Shirabad plain has a record of no precipitation at all of any kind during August and September.

In the meantime only lower grades of cotton have been raised, and the capsules ripen irregularly—so that harvest is greatly prolonged, and they have to be broken by hand—so that cleaning is very tedious and wasteful; but labour is very cheap, and selection of proper seed would eliminate the other troubles—except transport to rail. Here railway junctions such as Khokand are much favoured; the old caravan-routes favour rail termini such as Andijan and Namangan; and centres that depend on water-transport must

exercise some self-denial in using water for irrigation. The last point is of further importance, especially to terminal oases, such as Bukhara, which depend wholly for their prosperity and even their existence on control of the up-stream irrigation.

Other Crops. While cotton, then, is definitely associated with our south-eastern division, silk may be regarded as typical of the north-eastern; and here the relative absence of irrigation makes the climate not only much healthier (*e.g.* less malaria), but also more suited to tobacco and vine, phylloxera being almost unknown in the dry summers. Rice, on the contrary, is associated with the Aral lowland, especially round Khiva, where—particularly in the lee of the Aral (for N.W. winds)—the humidity is much higher than might be expected, while the very high temperatures ripen crops very rapidly. The vine is also cultivated widely in Ferghana, and the better communication is favourable to the production of both wine and raisins—for the drying of which the conditions are ideal; but only Russians produce wine, and the Moslems do not produce raisins good enough for foreign markets. Transport is far too poor for the export of the fine fresh fruit, and no centres west of Tashkent and Samarkand have really the *choice* of routes into Europe.

River Transport. The rivers have maximum and urgent utility for irrigation; they are too rapid, too variable, and too much impeded by bars, for good transport, even if they were not frozen in winter. Khiva is thus practically isolated in winter; the Amu is hard frozen for three months, and camel-transport even to the main stream at Petro-Alexandrovsk is usually very slow. As far south as Charjui (39° N. = Lisbon), the river is frozen nearly every year. Indeed, from the cultivator's point of view, the fact that the river remains iced as long as snow is lying on the soil is almost a kind of asset. Charjui ("Four Streams"), with its Farab suburb, being the only place where the railway crosses the river, is the headquarters of the navigation, with an easy week's journey up to Tarmez or down to Kungrad; but boats that draw 5 feet of water have to anchor at night because the shifting sands are so dangerous.

Railways. Railways, then, are absolutely essential to modern development; and, though the existing lines were built purely for strategic purposes—internally, without question, to control the Turkomans, and externally, as many people thought at the time, for aggression eastward and southward,—they are admirably suited to economic needs, because the lines of natural movement here in peace and in war have always been the same. The fact that both routes have Ferghana as their objective must not be allowed to weaken the historic importance, till the end of last century, of Tashkent and Samarkand; but the linking up of the oases in this way has greatly strengthened the—once incoherent—oasis people against the—still incoherent—nomads, and has made Russian colonisation of the oases relatively easy.

This question of population is intimately bound up with the transport and the irrigation as related to the climate. The latter is near enough akin to that of Russia for colonists to have no real trouble about acclimatisation; but the colonists will be of low educational rank, and they will suffer badly from malaria if that disease is not vigorously fought on normal modern lines. Their success, therefore, is not assured, even where land is available; and the obvious areas are already "densely" settled by "Natives." New settlements must be in new areas, but should be as near as possible to old areas, from which help of various kinds—practical and theoretical—can be obtained; and, even so, its work will be rather extensive agriculture with machinery than intensive with the hoe; there will be a different unit of area and of labour, and a different kind of yield per acre. **Population.**

Three areas seem specially favourable—the Golodnaia Steppe along the left bank of the Syr, with rail and river transport,—the oasis round the great junction of Merv,—and the Shirabad plains; but the suggestion that development should be based on the notable work of Professor Glinka and his friends—on the relation of soils to climate—ignores the low standard of education and capacity amongst the proposed tillers. **Three Areas.**

Professor Woeikof seems almost equally optimistic in his view that "dry countries with irrigation are the countries of the future," and that, as the Turan basin has more irrigated land than any other equal area outside Asia and North America, it has a very brilliant future. Even his assertion that the planting of "Palatzly" shrubs *has* checked the moving sands in the basin is somewhat absolute. For the experiment coincided with a spell of unusually high humidity (as gauged by the rise in the level of the Aral Sea), and that—as usual—must have immediately checked the sand-movement.

This is only a minor illustration of the importance of the historic factor in the area, and the influence of that goes back even into pre-historic times. There is abundant proof of marked dualism in the population, even amongst groups of the same racial stock; and it shows itself even in a semi-religious antagonism between the meat-eating nomad and the sedentary vegetarian. But in the earliest days there was a clear difference of race between the Long-heads of the oases and the Roundheads of the steppes. The former at first (Anam)[1] seem to have cultivated only wheat and barley, and to have hunted *wild* animals; but (? by 3000 B.C.) they began to domesticate the young of their victims (p. 172), and thus became direct rivals of the pastoral nomads. **Historical Geography.**

The latter had been, to start with, only hunters; but it was to them that Neolithic Europe owed its "domestic" animals, so far as sheep and goats, horses and donkeys (? camels), were concerned. **Nomads.**

[1] They *may* have been Alpines—wavy-haired, but round-headed.

Apparently, they did not try to transport cattle for the long distances, but centred them on the Altai, where water never failed, and from which all the typical nomads seem to have come. In bad seasons such peoples only wandered farther than usual—perhaps as far as Europe, and at such times the camp and the clan, and even the tribe and the folk, became merged in the Horde—under a Khan; but the greater movements had so little direct connexion with the real type and the needs of the people that greater unions were unstable and impermanent, while the vital and permanent smaller unions were really limited in size by the natural character of the winter-quarters.

Political Geography.

We may, perhaps, infer that such life trains the freedom and the independence only of the group, not of the individual; and in this respect it was very typical of Asia. Any polity that resembled a European model could be found only in the south-eastern quadrant of the area, where there were conditions which might fairly be called "Mediterranean" in their advantages for Early Man; and only here was there any real foundation for any approach to an empire, such as the Bactrian and the Sogdianan. Zoroaster was a Bactrian—a native of Balkh.

The present administrative divisions have carried self-determination to a *reductio ad absurdum*; they have introduced the worst features of nomadic incoherence into the sedentary oases; and they have involved the smaller units in tasks for which they have neither capacity nor capital. The position has been made worse than it need have been by the "removal" of the old Anti-Tsarist population, which consisted mainly of "exiles;" these responded at once to the Bolshevist invitation to every tribe and every creed to assert its independence, and yet they were thoroughly in touch with their own areas, and knew how to maintain and even to develop the prosperity. The sequel left the areas much reduced in population and wholly devoid of leaders who understood the local conditions; and the decimation of some areas, *e.g.* the Kirghiz Steppes, Askabad, Khiva, Bukhara, and Khokand (according to the *Izvestia*, 3rd March 1922), was accompanied by wholesale destruction of property. The subsequent restoration has included some building of railways,[1] especially the link line from Arys *via* Vyernyi to Semipalatinsk; but this line, though nominally open, is not working properly at present.

Tadjikistan.

The relations of the Tadjikistan to the Uzbeg republic illustrate at once the ridiculous results of the self-determination craze and the differences between the Pamirs proper and the more northern pamirs. Certainly 65 p.c. of the original population was Tadjik (Iranian), and they numbered about a million in 1917; but civil war, emigration to Afghanistan, and famine had reduced them to 700,000 by

[1] During the Civil War 3672 bridges on these railways were destroyed.

1924, and three-fourths of the Governmental expenses have been provided by subsidies from their Uzbeg neighbours! Half the area consists of the Pamirs; valleys fit for raising food are mainly devoted to cotton;[1] and the mineral wealth is small and inaccessible. Consequently—in spite of some twenty miles of railway line from Tarmez to Dushambe (or Stalinabad), the capital, and a river service from Tarmez to Jilikulam, on the Vakhsh tributary of the Amu—the "Established Equality" of this little republic with the other republics of the Soviet Union is in the nature of a poor joke; but the Shirabad plains are rich enough to attract presently outside interests (cf. p. 225).

Uzbekistan. In great contrast to this, Uzbekistan, though stretched westward across the Kysyl Kum to include Khorazon (Khiva), is a rich area of intensive agriculture, based mainly on irrigation from the transverse Ferghana range; and the population seems to be fully 5,000,000, with a cultivated area possibly approaching 10,000,000 acres. Samarkand, the capital, has a population of above 100,000; and, except for the ex-centric Khiva and—to some extent—Bukhara, there is a relatively concentrated population of *c.* 1,000,000 in the old Ferghana towns—Tashkent, Khokand, and Khojent, Skobelev (Marghelan), Andijan, and Namangan, etc. The radio-active minerals of the Kara Daria basin may be of great importance.

Turkmanistan. The Turkoman capital is Askabad (Poltaiatsk), which is about half-way between Krasnovodsk and both Charjui (now Leninsk) and Kushk Post (Roushk); but Merv and Krasnovodsk seem still to be really more important, and development of Shirabad may lead to increased importance for Karki. The indications of oil along the Caspian are less important than the proved wealth of Epsom salts in the Kara-Bugas *liman*.

Though the Caspian has no perceptible tide, differences of pressure and persistent north winds lead to differences of level—often 4 feet, and sometimes 8 feet; and there is always a current into the "pan," averaging *c.* 22,000 cubic feet a second. And, as the mean depth is only *c.* 35 feet, and the mean temperature of the water never falls to freezing-point even in midwinter, the lake is a huge evaporating-pan for the salt Caspian water, and is now an immense reservoir of pure Epsom salts.

Kaizak Republic. Much the largest unit in the basin is the Kazak, or Kaizak, republic; but it is infinitely incoherent. Akmolinsk and Semipalatinsk have really nothing in common, and no natural link with Uralsk and Emba; indeed, the Irtysh and the Ishim drainages are quite alien to the Turan basin; and the real objective of both the great railways at present is not the Kazak republic at all, but Arys for Ferghana.

In the west there is access to the Kara-Bugas, and between the

[1] The cotton is good (American upland), but the total area is scarcely 25,000 acres.

Emba Oilfield

Ust Urt platform and the Ural river the promising Emba oilfield flanks the Mugojar spur of the Ural mountains. The Emba itself is only a *wadi*; the Guriev "port" has only $2\frac{3}{4}$" of rain, and Uralsk has only 5"; the chief centre is Dos-Nor, "Summer Lake," and there is no good drinking-water at all. The nearest is at Novo-Bogalinsk, a frontier post 40 miles *west* of Guriev, and the snowfall is not large enough to be worth storing. The field has fairly easy access both to the Caspian and to the Orenburg-Tashkent line, and there are refineries at Rakusha; but the shore-waters are so shallow that the conducting pipes have to run out six miles into the sea, and there is great need for a proper pipe-line to Samara. Transport is possible on the Ural river, but that is the only large river in the world devoted wholly to fishing (caviare), and boats are forbidden during the whole of the breeding season. The native people are sober and orderly, but nomadic in both character and aptitudes.

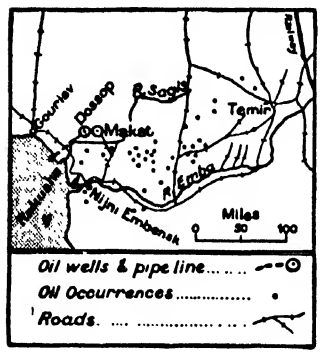

FIG. 43.—Emba Oilfield.

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CHAPTER XVI

THE LANDS OF THE FIVE SEAS

THE lands in question are practically those parts of Asia which were included in the pre-war Turkish Empire, and the seas are always assumed to be the Black, the Red, and the Caspian, with the Levant and the Persian Gulf. If this is accepted, it ignores the Aegean and the Arabian Seas, the one by far the most important and the other the least important of the seven surrounding seas—so far as that Turkish Empire was concerned. And, if the inarticulate coast of Southern Arabia between Aden and Muscat, with its hinterland of Hadhramaut desert, excuses the omission of the Arabian Sea, the overwhelming importance of Greek influence in the area historically should have forbidden even partial ignoring of the Aegean. **The Seas**

At the same time, the omissions seem to be peculiarly significant, and not entirely inappropriate—for two reasons. It was the irony of fate that the coasts of these seven seas should come under the control of a wholly and fanatically Land Power; for all the use that the Turks themselves ever made of the Aegean, it might almost as well not have been there. And, if Moslem peoples in all parts of the world have been overshadowed by European Powers, European influence has not leavened Islam as a social force, least of all in the part of the Ottoman Empire and the Turkish Caliphate that was nearest to Europe, to Rome and Byzantium. ***v.* Land Power.**

There are three essential units in this aggregate of some three-quarters of a million square miles. Its genetic core is the huge peninsular block that separates the Persian Gulf from the Red Sea; round the north of this, between the Dardanelles and the Oman Strait, is wrapped a huge arc of Alpine plateau; and between the two there is a crescent of low trough, partly Syrian saddle and partly Euphrates valley, linking the Levant to the Persian Gulf. This last unit has been the stage on which the great drama has been mainly played, but the men and the means came from the other two, and especially from their interaction—the interaction of Armenian snows and Arab sands; bodily wants were satisfied **Three Units.**

from the snow-capped mountains, but the great impulses came from the star-lit desert.

Central Trough

The mass of this area consists of inhospitable highland, whether mountainous plateau or desert block; but a large proportion of its central trough is an old gulf that has been filled up with rich alluvium from the volcanic crown of the arc. In this trough, between the Tauric snows and the desert sands, there was a belt of maximum attraction and easy life, which offered loot with little effort to those inured to the hard life of the Semitic desert or the Aryanised plateau; and permanent conquest could only come from

FIG. 44.—Lands of Five Seas.

the Aryanised north, because the Semite of the drought-stricken south was only a raider, and was never happy in humid Elam—still less in the cold and the snows of the Taurus.

Climate.

Almost everywhere the climate is one of prolonged or perennial drought, imposing on Man an urgent need for irrigation, for which the seven seas seemed to promise abundant means; but the rulers were pastoral nomads, who despised agriculture as "slavish"—because it binds men to the soil and the place. In any case the source of water-supply was in the marginal mountains, which also offered some security from the nomads; and so the effective population—all of it wavy-haired and "Aryan"—came to be marginal and montane, Greek on the marginal lowlands, especially in the

west, and Armenian and Kurd and Iranian in the mountains, whether marginal or not. Even on the southern block the Semitic population was marginal and more or less montane. Everywhere except on the plateau steppe of the Turkish minority, the basis of sedentary life tended to be irrigation, even if disguised on the oasis; and there was a time when Greek Anatolia and Arab Mesopotamia were the most prosperous regions in Asia.

Armenian Crown.

The orographic and hydrographic focus of the whole area is the Armenian crown, the centre of the summer-drought lands in Asia, turning its back on the Caucasus and its face to the structural focus of Arabia; and it is linked to, or separated from, this old block mainly by the narrow ridges and rift of the Syrian isthmus, with its Hebrew atmosphere, and across the wide flood-plain of Mesopotamia, with its Chaldaean atmosphere. Between the isthmus and the flood-plain is an oblong of steppe (300 × 100 miles), which carried the great piedmont road from Aleppo to Mosul. The mass of the area drains southward across this belt to the same parallel (30° N.) to which Egypt drains northward.

Historically, if the desert sands of the south have been the political and spiritual focus, the snow-swept folds of the north have been the economic focus, as water-shed and thoroughfare; and the real pivot has been Armenia, because central by position and essentially montane. With its maximum heights central, it could have no desert; essentially montane, it could have little arable land. Isolated, unattractive, inaccessible, especially from north or south, it made an admirable refuge; but its regional separateness was always encouraging political separatism, while the continuity of the Alpine folds made the middle-man equally accessible from east or west. Erzerum has been for centuries equally on the road from Tiflis to Tarsus and on that from Tabriz to Trebizond.

Peoples.

But Armenia, as an area, covers the basins of both the Upper Tigris and the Upper Euphrates, and the racial note is different in the two. The southern half of the area has been Kurd; and its chaotic relief and its nearness to the Fertile Crescent were favourable alike to isolated pockets of "tribal" population and to easy raiding on the permanent inhabitants and the passing traders of the Crescent. As they "all" spoke a Persian dialect, and were all Moslems, these Kurds formed a politico-religious unit in spite of being scattered, and were united politically and religiously in a cordial hatred of the Armenian.

Like the Kurds, though not an Aryo-Semitic blend, the Armenians are a very old people; but they are essentially valley people and not highlanders, concentrated for settlement and movement in the down-folds of the Frat. With their round heads and hooked noses, they resemble closely the old Hittite carvings and the "traditional" features of the Jews; and they resemble

the latter both mentally—in their intelligence and industry, and morally—in some unheroic and unchivalrous qualities. But it may have been the Roman roads which were driven along the down-folds, that favoured their special "middle-man" development as foreign merchants and local money-lenders; and this in turn may have favoured that development of Oriento-Occidental traits which made them supreme in international business. The Turks quite understood how insidiously the international mind becomes anti-national in political and economic intrigue; in Bombay one is told—"An Armenian, he is worse than nine Jews."

Roman Roads.

The Roman roads were far from an unmixed blessing to them, especially in two curious results. One was that Christianity reached them in an Arian form, and this presently led to their practical excommunication as heretics; and the natural result was to divorce them from Europe and all Christians, and to throw them into the arms of Asia and the Jews. The other was such easy access for troops as cost them their independence and their national rights; and, though they repaid political oppression by financial oppression, there was a great exodus all over the world. At the same time, the isolation of the basins and the valleys, especially in winter,—the antagonism of East and West, *e.g.* Persian and Roman,—and the decay of the old through movement in peace and war, tended to keep a naturally exclusive and tenacious people very clearly individualistic in creed and customs; and in 1913 they still believed firmly in a national resurrection—round Ararat, in command of the strategic and commercial gate between "Asia" and "Europe."

Arabian Block.

If the Armenian crown has been the orographic and hydrographic focus of the Lands of the Five Seas, their political hub has been the Arabian deserts—deserts, because there are two, the Syrio-Nefud and the Arabo-Dahna; and the divide between them is the Nejd ("Plateau"), with conditions of relief and climate and physical history (*e.g.* "sticky" volcanic soil) which have had marked effects on the inhabitants. For they have been *pastoral on oases*, and so have not been strictly nomadic;

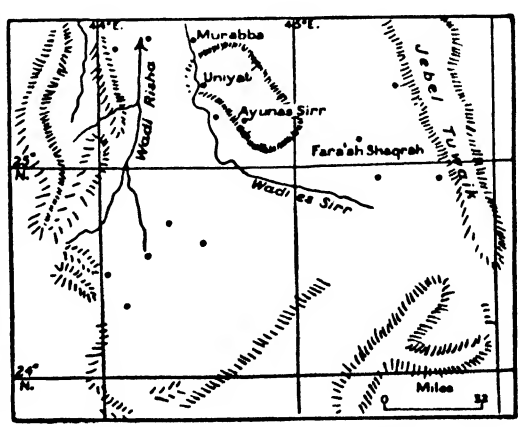

FIG. 45.—"Section" across the Nejd.

and yet they have been patriarchal, and so polygamous. And, in the pure air and on the clean soil of desert environment, they have been at once healthy and prolific, and yet persistently "underfed"—a potential nursery of Man-Power for or over other lands.

The Nejd is only a narrow belt (*c.* 700 miles), but is broken into many "Asiatic" basins, with walls 2000 feet higher than their floors (*c.* 3000); and these formed natural units for many tribes, with oasis centres and enough moisture for pasture except in bad cycles, though there must always have been a maximum surplus of population and a minimum surplus of food. These conditions must have favoured incoherence and even mutual hostility until Mahomet gave them a bond of union.

"Fan" of Tribes.

As the whole block has a definite trend down towards the north-east, the *wadis* were always inviting movement from high and rocky watersheds in the west and the south-west to the low and fertile plain in the north and north-east, or to the Koweit-Hasa coast; and, in recurring cycles of drought, escape was the only alternative to death. This is the geographical background to the cycles of wholesale dispersion of whole tribes—Amorites, Canaanites, Edomites, Hivites, Jebusites, Midianites, Perizzites *et hoc genus omne*, in periodic tides, which possibly occurred when the sun and the moon had maxima of declination and of nearness to the earth simultaneously, and which were as hard to stop as wind-blown spray or wind-blown sand.

They spread, too, by sea almost as readily as by land. Indeed, cut off by the desert on all landward sides, but with sea easily accessible from all the best watered areas, the Arabs became famous—sometimes infamous—as sailors in very early times; and even when they were nominally under the Turk, their best ports, *e.g.* Aden and Muscat and Koweit, were not Turkish.

The Semitic tides were not concentrated, like those of the Mongolo-Tatar steppe-men, on a single focus, but fanned out in nearly every direction, *e.g.* Canaanites westward, Aramaeans northward, and Chaldaeans eastward; and those most realised in Europe, whether the earliest or not, were naturally those nearest to Europe, *i.e.* the Canaanite movement to Phoenicia, and the Aramaean movement to Syria (Damascus).

Semitic "Assets.

One great asset of these Semitic raiders of the Levant was precisely the same as that of their Greek rivals—a superlatively useful language, useful both mechanically and mentally. For it more or less ignores vowels, and concentrates attention on the stable consonants, which all peoples in all lands *pronounce exactly alike*; and it is a fine medium for expressing both thought and passion. They had also two personal assets in their vigour and their religiosity, and they managed to combine these in an intensity of religious fervour which became a basis of nationality for them,

and which can be traced, *e.g.* in the religious imperialism[1] of the Assyrian. Both the mental and bodily vigour and the particular direction of the religion (Sin = the Moon) may possibly be related to the bright light—of both sun and moon—in the dry air.

Idea of Empire.

The Syrio-Mesopotamian corridor thus became almost wholly Semitic, flanked by a really Greek Anatolia and a really Persian Irania; and so the Semite, too, like the Armenian, was a middle-man, but specifically a political middle-man. Far ahead of the Egyptian in the energy of mind and body that works out in science and art, in government and administration, he gave the West its first object lesson in empire—on the wide plains; and the importance of this was immense. For on those plains there were no tiny hill-fenced glens to favour the rise of tiny City-States, in which everyone was useful enough to be important, but where thought was seldom national and never imperial; and yet it was precisely in the West that there was the most vital influence—in the Greek philosophy. The Greek was just as free as the Arab, but much less religious and so less narrow and less self-centred; and so Semitic religiosity became Hellenised into a form less narrow and less extravagant and more capable of philosophic expression. (See note on p. 239.)

It was because Syria became Helleno-Arabic that it was so valuable to Rome as a foothold for the Orient; and because it became so Roman, it was an admirable centre from which the great roads could distribute religiosity over most of Europe in a form suitable to Europeans. Auxiliary cohorts carried the worship of Baal and Astarte to Northumberland; and, humanly speaking, only a Hellenised Semite who was a Roman citizen, a Saul of Tarsus, was likely to be successful in spreading any creed into Europe.

European Approach.

No doubt, to Europeans—and, through them, to the World—these western Helleno-Arabic lands have always been more important than the eastern Indo-Iranian; and this importance has really been inherent in the geographical conditions, even if the Iranian plateau stood in much the same relation to India, and played much the same part in the ancient World, as the Anatolian did to Europe. But the whole modern World has centred in Europe, and not lurked in corners of Africa or Asia; and this has greatly increased the importance of the immediate approach from Europe to the two other continents, and European intrusion into them focused the political and the economic problems of such intrusion, especially those connected with World transport by sea and land, on the Anatolian plateau and its Sea Gates. Indeed,

[1] We have their own records: "Assur, my Lord, commanded me to go forth. I covered the land with ruins; I strewed the earth with bodies; I cut off heads, and made a pyramid; I built a wall, and flayed the chief men, and covered it with their skins; as for 200, I cut out the centre of their wrists; and in their presence I gave thanks unto Assur, my Lord."

any serious analysis of the causes of the Great War outside the limits of Europe proper must begin with the problem of Anatolia.

The problem was much graver than most people, especially the politicians, realised at the time. For the character and the location of the peninsula, its real and reputed (exaggerated) wealth, its obvious merits as an economic and mechanical base, its security from Sea Power, its monopoly of all the direct routes between Southern Europe and Southern Asia, offered advantages which the incapacity of its rulers—or their indifference to much that the West thought important—seemed to make easy of acquisition. **Great War**

There was even an obvious advantage to any Power that became dominant on the plateau in the Turkish language. The number of "real" Turks in the world, even in 1900, was quite small (? 30,000,000—half of them in the Russian empire), and even these were probably hybrid, resembling everywhere the *local* type, as is natural in the case of polygamous conquerors; and they all spoke, and speak, a Ural-Altaic language. But intercourse and inter-marriage with peoples of many languages reacted on the language as similar—but *commercial*—conditions had reacted on the Greek language; it had got rid of, or modified, all forms and usages that hindered clearness and simplicity, and had become a *lingua franca* from the Aegean to the Gobi, easy to learn and easy to speak. And Anatolia was recognised as its home, for it was a fusion of the Anatolian Emirates that gave birth and a home-land to the Ottoman empire. **Turkish Language.**

In any case, International interests were concerned in Inter-continental communications across this "bridge." And so the importance of railways in the area was very great, especially to the north. The northern coast has little lowland except in the north-west, there is no room for population, and so no need for local railways; and, in any case, access inland is very difficult. Movement must go east-and-west by land or by sea, and there are definite east-and-west valleys nearly everywhere, though access to them is easy only in the west. Even then the problem is not quite simple. The "Baghdad" line, after entering the Sakaria valley above Ada-Bazar, climbs *1000 feet in half a dozen miles*, and has to climb 2500 before it reaches the top of the scarp at Eskishehr. The Pursak valley offers no difficulties eastward to Angora [1] (not 300 feet higher than Eskishehr), but the main line has to climb to *c.* 3700 feet to cross the divide into the Akshehr basin. **Railways.**

The only through line from the Aegean coast joins the main line here—at Afium-Kara-Hissar (3300 feet), but the Gediz valley has never been the natural route of maximum movement; and the Menderes line was not carried beyond Egerdir because the traffic (figs and raisins, cotton and tobacco, liquorice and valonia, rugs

[1] Normally four-fifths of the trade from Angora has been grain, not wool.

and carpets, manganese, chrome, and emery) was purely local, as even on the Baghdad line for a long time, and there was in the meantime no demand for through traffic.

Cilician Gates.

The Cilician Gates section plunges down 4500 feet in 60 miles, through a great number of tunnels, and even then military considerations interfered; for the original and right plan was to cross the Giaour Dagh by the low Beilan Pass, but Russia forbade this, and the route was diverted north to the higher Bogtche Pass (over 3000 feet), which involved seven small tunnels and the great Bogtche tunnel, the longest in the old Turkish Empire—over 5300 yards.

Foreign Aims.

Whatever the object in view, then—whether economic, as with the British, or political, as with the Germans—the obvious instru-

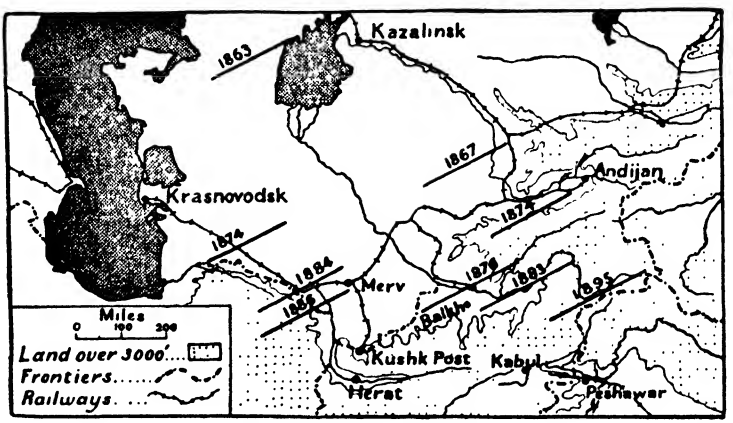

FIG. 46.—The Russian Advance.

ment or weapon for penetration was the railway; and Britain, as then much the most important Power commercially, was first on the scene, and built the first railway just where it ought to have been built. For the basin of the *meandering* river has the richest soil and the best climate in the region, the best harbour, the easiest access inland, and a considerable amount of mineral wealth, including almost a monopoly of the world's supply of emery, fine manganese, etc. This meant regional development of local resources, especially the very famous fig-plantations, where the volcanic alluvium covered the lower slopes of the crystalline range.

The German idea was different; it aimed both at the development of the interior as a supply-base in a climate suitable for German colonisation and at access to the great mineral wealth farther east, especially in copper and oil; and a fundamental condition was that their lines of movement should follow the Alpine piedmont, but not on its sea-face. The opposition of Russia, as we have seen, made the northern piedmont impossible.

France had a somewhat intermediate position. Her vital interests were to the south, in Syria; but her relations with Russia made the Marmora belt important to her, and she was always interested in the production of silk. She set herself, therefore, to open up the quadrant between the Gediz, nearly as important a river as the Menderes, and the Sea of Marmora, from which she built lines to the sea at Panderma *via* the Soma coalfield and to the "Baghdad" line at Afium-Kara-Hissar *via* Kassaba and Ushak. As we have seen, this is a fertile region, with considerable mineral wealth, but the great routes—by land and by sea—go round it rather than through it.

Strategic Area.

This may suggest that the real problem has not been acute till recently; but that is far from the case. Alexander the Great, and then the Romans, fought here for the mastery of the "civilised" world, and the Great War only produced the latest evidence to the world of how its destiny depended on the political control (and the railway development) of this strategic area. For it is a natural fortress, fenced by seas, mountains, and deserts; with its agricultural wealth—immune from Sea Power, if European Turkey is friendly—it makes a perfect mechanical base; as really the centre of the Old World, it makes an equally good strategic base—for aggression against any one of the three continents of that Old World; and it contains the shortest route between the dense populations of north-western Europe and south-eastern Asia, even if the actually shortest route is not the one used by the Baghdad railway across the Taurus.

The attitude of Russia towards the choice of routes for the railway was regarded with much suspicion, mainly because of her own persistent advance southward to the east of the Caspian, where she seemed to be threatening the whole Iranian plateau—for ultimate movement westward against Turkey or eastward against India; and this reacted strongly in Anatolia and Afghanistan (cf. p. 342). But the advance may have been a natural economic movement—up-stream, as suggested later (cf. p. 646).

NOTE

Sumeria was, to some extent, a land of City-States, the cities gaining or regaining autonomy whenever the suzerain was weak; but it was as economic rather than political units, though they did control their own foreign trade.

CHAPTER XVII

THE ANATOLIAN PLATEAU

Its Importance. The critical position and the marked relief of Asia Minor are reflected very clearly in its history; indeed, few areas show so clearly the control exercised by mere location. Its physical features are strongly marked; its peninsular form gives it a somewhat unexpected unity; and its history for at least 3000 years is more or less accurately known. We have, therefore, an unusual amount of evidence as to the interaction of the geographical and the human, and there is special interest in the fact that it is the only *land* route by which civilisation ever moved westward into Europe.

Lines of Movement. It has been essentially a bridge between Asia and Europe, and a bridge with great parapets on the north and the south. These parapets, in themselves and in their relations to the seas below them, have practically compelled traffic to move specifically east and west; and, while the Ural-Caspian Gap in early days only discharged Asiatic influences into Europe, and now discharges European influences into Asia, the balance has been held more evenly in Anatolia, and the historical direction of movement has tended to be different. Moreover, while the Ural-Caspian Gap itself has never been the scene of important conflicts, the Anatolian plateau—from Troy to Tarsus—has been the scene of immemorial struggles; and these struggles have been specifically between East and West, associated with such names as those of Cyrus and Alexander, Godfrey of Bouillon and Frederick Barbarossa. Of course, Man *can* work through or over more difficult gorges than, *e.g.* the Cilician[1] Gates; but for many winter months the Anatolian parapets are practically impassable, and the natural routes in winter and summer alike are east and west. This led to the constant trouble between forces moving specifically eastward and westward, and none of them could either escape or get help across the parapets.

In this respect it was important that the Tauric parapet was the

[1] There was a waggon-road as early as 400 B.C., for Tarsus *cut* her own pass through the Chakut Su gorge, as she made her own "river," and so ruined Adana (and Mallos).

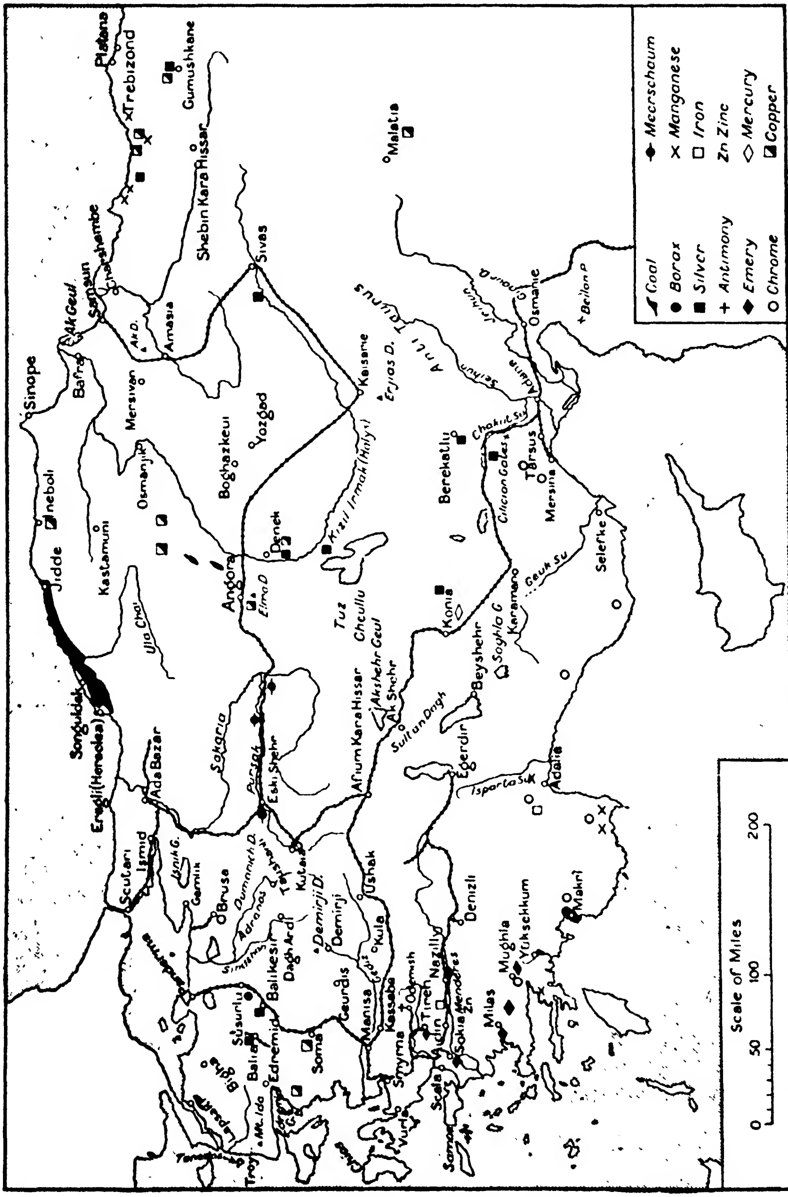

FIG. 46.—Railways and Mineral Deposits of Asia Minor.

Political Objectives.

more formidable, for there is nothing to reinforce it eastward, as the Caucasus reinforces the Pontic. Cilicia and Pamphylia were "beyond" the Tauric parapet, while Paphlagonia (round Kastamuni) was "within" the Pontic; and it was the Tauric parapet that made the western boundary of the Orient even 2000 years ago, and that has made a western boundary to the Arab, if not to Islam. In climbing the Taurus "the Arab tongue was chilled into silence" (Hogarth); Semites survived in Cappadocia, but only in the part of it that was east of the Anti-Taurus; and even to the Romans Cilicia was part of Syria.

Nearly every Great Power in the Old World has fought in or round Anatolia; it has been invaded from all three continents of the Old World; and in all ages the combatants have all been fighting for one or more of three objects—the through route by land, the control of the water routes (especially the Straits), and the fertile patches. The story of the Straits and of Constantinople belongs to the Historical Geography of Europe rather than of Asia; but this cannot be said of the other two problems.

Peninsular Disunity.

For, as a mountain-fringed plateau with a basin of inland drainage, Asia Minor is typically Asiatic, while, as a peninsula washed by three Atlantic seas, it is typically European; but its peninsularity is of the Iberian type, and the differentiating personality of the area lies in the contradiction of an Asiatic picture in a European frame. For the apparent unity is ruined by the structure and relief: the centre is a long, barren plateau; the edge is a series of fertile lowlands, *e.g.* those of Bafra and Charshembe, Adalia and Selefke; and they are separated by young folds that are Border Ranges, with one foot down on the discontinuous lowlands, and the other up on the continuous plateau.

Coastlands.

But it is the presence of spurs from the parapets that makes the coastal lowlands discontinuous, and the discontinuity meant independent and isolated little units linked only by sea, such as are so typical of Greece; and this made them very suitable for, and easily accessible to, Greeks, so that the European frame showed a certain unity of (exotic) civilisation quite devoid of any political unity. It was quite "normal," therefore, that at first Roman Cilicia should be an annex to Syria, later a separate province, and later still two separate provinces, with an essentially European basin in its western maritime plain, and a more or less typically Asiatic basin in its eastern non-maritime plain. The "natural" route of the Chakut Su—the whole 70 miles of which may be called the "Cilician Gates"—led to the Seihun and Adana and the Orient; but the actual Gates, where Tarsus cut her road, were above the Cydnus, and led naturally to the Levant. The railway deploys *between* the two towns, and the whole balance of power has moved westward—? temporarily—to Mersina.

The general setting and the character of the peninsula would suggest an intrinsic disunity which may be typically peninsular; and, in any case, their effects have been clear and consistent. The great core of steppe has perpetuated pastoral habits in a pastoral people, and so preserved patriarchal usages; fertility and accessibility have developed a series of small cities on the coastal plains, where there was always abundance of fine stone for building or for sculpture; and the open plateau allowed great armies to sweep rapidly from end to end (*c.* 700 miles), especially if well supplied

Political Disunity.

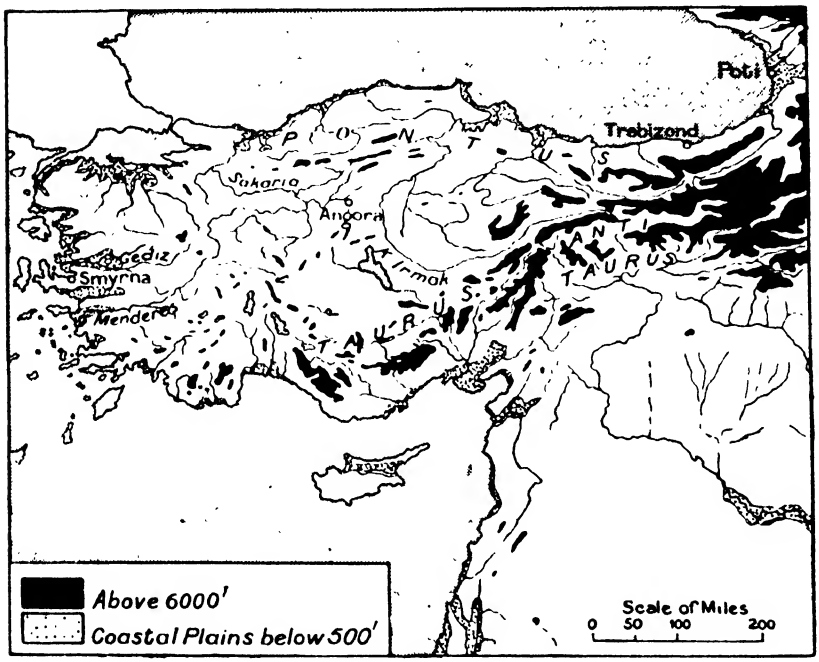

FIG. 47.—Anatolian Plateau.

with cavalry. On the other hand, the natural disunity was strong enough to prevent the area ever making a single State. Under Croesus the Lydian kingdom practically covered all west of the Halys (*c.* 550 B.C.), but its power lay on the Aegean lowland at Sardis; and primitive tribes survived unconquered in the Tauric basins of Caria, Lycia, and Pisidia—making fine mercenaries for the Greeks, and causing great trouble to the Romans as Soli[1] pirates. But the only political unity which the area has ever had

[1] Soli (from which we get our word *solecism*) was actually in Cilicia, but was the headquarters of the pirates, perhaps as a good *food* base.

has been when the whole of it has been included in some great empire that spread far beyond the limits of Anatolia, *e.g.* the Persian, the Macedonian, the Roman, the modern Turkish; and it is significant that the Persian fought as an Arab. Cyrus owed his great victory over Croesus to the fact that he deliberately manœuvred his camels to windward of the Lydian cavalry, and the scent of them "stampeded" the horses.

Buffer. No doubt a strong factor in the problem was the buffer position, for such a position is always favourable to intrigue, political and economic, and to great mixture of race and speech. In such circumstances, again, creed is apt to become unduly important as a bond of unity and as a cause of disunity; the Ottoman Turks are a mixed crowd of orthodox and fanatical Moslems, located on the central steppes, and the Christians are a mixed crowd of Greeks, Circassians, and Armenians, whose doctrines are mainly points on which they differ and can bicker. And when the influence of Sea Power, as represented by Britain, was cleverly diverted from Anatolia—where it was *too near Stamboul*—to a Protectorate of Egypt (1882), the influence of Russia and the German Powers, as Land Powers, was far too strong for the feeble organisation of the Turks.

(1) *The General Geography*

Access to Europe. The earliest expansion of Asia into Europe was by land, not by sea, going round and not across even the little Marmora Sea; and at first the Hermus and the Meander, Phocaea and Ephesus, were more important than the Scamander and Troy—far more so than the Sakaria, which empties northward and eastward, and is not a complete link even with Ismid and Scutari. For the Pontus was Barbarian, while the Aegean was Greek; and, though the Bosphorus is shorter and narrower than the Dardanelles ("the *Greek*" straits) or the Hellespont ("the *Greek* sea"), it was ignored till the Greek demand for a coastal road round the Aegean gave place to the Roman demand for a coastal road along the Pontus—to Armenia and Parthia.

Troy. But, so long as the coastal road round the Greek sea was important, Troy was the most strategic point on it, commanding all access to or from the Pontus, and holding the ***most westerly site*** on the continent of Asia. These two facts are the key to the Trojan story. The Troad was all the fertile land and the harbourless coast to which Mt. Ida (5000 feet) was the background, keeping off the N.E. ***buran*** [1] and wringing the precious rain from the S.W. winds—to the great advantage of the grain-lands on the Tuzla alluvium, of the piedmont pastures and the pine-forests, and even

[1] In the *Northern* Troad winter temperatures are as low as 14° or 15° F.

of the yellow crocuses and blue squills which beautify the ugly brow of Mt. Ida as much to-day as when Homer saw them.

Even in his days there was shortage of grain round the Aegean, and the grain-buyers along the Scamander and the Hermus, the Caÿster and the Meander, and their customers in Athens and Corinth, demanded "the Freedom of the Seas," *i.e.* of the Dardanelles-Bosphorus route to the Crimean ports; for summer-rain crops might be good even if winter-rain crops had failed, and were most needed then. But a harbourless coast belonging to a Land Power, with abundant local supplies of food and fodder, and access to the Anatolian steppes for men, was not likely to fall an easy prey to a Sea Power, least of all to one fighting nearly 200 miles away from its main base, and depending on oars rather than sails! It is this kind of problem that has always made the possession of the islands (Lemnos, Tenedos, etc.) essential to the control of the Straits, where the southward surface-current was as useful to the Turkish mines during the War as it was 2500 years ago to the Athenian ships which carried 3,000,000 bushels of wheat a year from the Crimean ports to Athens. **"Freedom of the Seas."**

At the same time, apart from the great parapets, the fact that even in the west the mountains touch the sea, made any coast road difficult and circuitous, and so traffic was easier by sea than by land; and this threw the control of transport into the hands of Greek sailors, and peopled the coast-lands with Greeks—from Tarsus round to Trapezus (Trebizond). It was natural, then, that the coast-lands should become European and Christian,—that in modern times different sections should come under the influence of different European Powers,—and that some of these Powers should try to annex spheres of influence across and within the parapets at the expense of the Turkish Moslems of the core.

West of the Tauric water-parting we have a high plain (2500–3000 feet), mainly of porous limestone, but with large enclaves of volcanic rock, *e.g.* round Kaisarie and north of Angora, and round the headwaters of Meander and Hermus and Sungarius (Sakaria) in the ancient Phrygia; and, though the general slope falls steadily westward—from *c.* 4500 feet round Sivas—there is a definite depression in the centre. Here the porosity of the limestone, the deficient rainfall, and the very rapid evaporation, reduce the area to very poor steppe round the Tüz Göl (or Cheullu); and the conditions are so much like those of the old Turkish home in Central Asia that they have allowed the survival of many of the old customs and traits. **Structure and Drainage.**

The drainage begins to work definitely westward from *c.* 30° E., and by 28° E. the rivers are dipping down into sheltered valleys, at the foot of which they have built up rich deltaic plains; and two of these have been of very great importance for 3000 years—

those of the Hermus (Gediz) and the Meander (Menderes), associated respectively with Magnesia (Manisa), Sardis and even Smyrna, and with Miletus, Aidin, and Laodicea. The intervening Cayster valley was much less important—though the name "Asia" was originally given by "Homer" to the marshy and swan-haunted plains above Ephesus,—and Ephesus had easy access to the Meander. The largest lowland is the lake-studded Marmora plain, which is practically continued in the lower basin of the

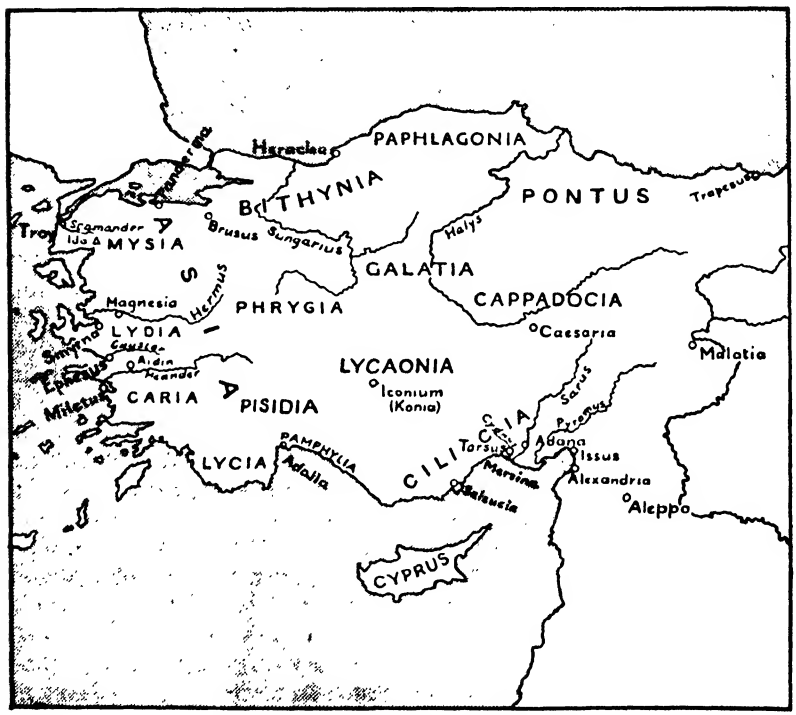

FIG. 48.—Roman Provinces and Place-names.

Sakaria; but it is exposed to a much rougher climate (cf. p. 249); and the political difficulties of its position may be gauged as well from the old story of the Trojan War as from the recent decision to demilitarise the Dardanelles-Bosphorus zone and the Turkish islands of Imbros and Tenedos.

Road-steads. The coastal plains are very fertile, especially those of the Paphlagonian delta of the Kizil (Halys) and of the Cilician delta of the Seihun and Jeihun (Sarus and Pyramus); but even the Cilician is not very large, and their interference with the natural approaches to the rivers (cf. p. 247) has necessitated the use of mere roadsteads, *e.g.* Mersina and Adalia. Trebizond is scarcely even a roadstead,

as most vessels must lie at least 500 yards offshore; and, in N. and N.W. gales, they must move 20 miles westward—for shelter at Platana. On the contrary, Trebizond is the most westerly port that is sheltered by the Caucasus from the N.E. *buran*, and is on the direct route from Erzerum westward to the sea.

Climate. The height of the parapets and the width of the plateau combine to make the rainfall very light, and the porosity of the limestone combines with the very rapid evaporation to diminish greatly its effective value for all vegetation, even for steppe grasses. In the narrower east, where the curve of the Taurus admits, or catches, the cyclones, it may amount "anywhere" to 20″, and that is abundance in such a latitude, *e.g.* for wheat and tobacco; but in the widest parts it falls often to only 10″, which is barely enough for good pasture. Of course, there is heavy snow on the mountains, which is of great value for irrigating the coast-lands; but the heaviness of the precipitation on the parapets is precisely the cause of the drought inland. This implies considerable range of temperature. Under the shelter of the northern parapet, *e.g.* at Kastamuni, there may be 20° F. of frost even in February, while in midwinter the northward exposure of Beyshehr has resulted in a temperature of −25° F., while the whole winter (Nov.–Jan.) does not yield 6 inches of snow on the Konia plains.

There is a curious difference in the quality of the wool and the mohair from these two areas, but it does *not* seem to be associated with the difference of winter temperatures. The real "Angora" fibre is very long and white, but is *less* fine; and the fineness of the "lakeland" fibre seems to be due more to the presence of shady trees in summer than to the very low temperatures in winter.

Temperatures. The latitudinal contrast illustrated by these different winter temperatures is perfectly normal, though the unhealthy Kastamuni is sheltered (so much so as to be almost rainless) and the healthy Beyshehr is exposed. The winter temperature to the south of the plateau, *e.g.* from Egerdir and Beyshehr to Konia and Karaman, approximates to the normal Mediterranean of 50° F.; to the north it is about 10° F. less, being *c.* 41° F. at a number of points along 41° N., *e.g.* Mersivan and Osmanjik. In summer the isotherms run longitudinally rather than latitudinally, except actually along the parapets; practically everywhere east of the terminal step (28° E.) there is a temperature above 75° F. (sea-level), and this increases steadily until in the far east, *e.g.* on the Kaisarie-Sivas line, it is 20° F. higher. This line, like the Karaman-Konia line, keeps generally just below 4000 feet, but at Sivas itself—as we saw—it reaches 4500.

Continentality. The continental influence affects the Aegean and the Levant coasts more than the Black Sea coast, and affects the Aegean coast more than the Levant coast in winter, but the latter more in summer.

The winter temperature in the west is normally below 50° F., Smyrna being quite normal with 46° F., while the summer temperature in the south-east is very high, in spite of the humidity, Tarsus having a July temperature of 85° F., with midday temperature 20°–25° F. higher.

Rainfall. Except in the Tüz Göl basin, the rainfall is everywhere above 10 inches, and increases in every direction from that basin. To the north, north-west, and north-east there is a belt along and

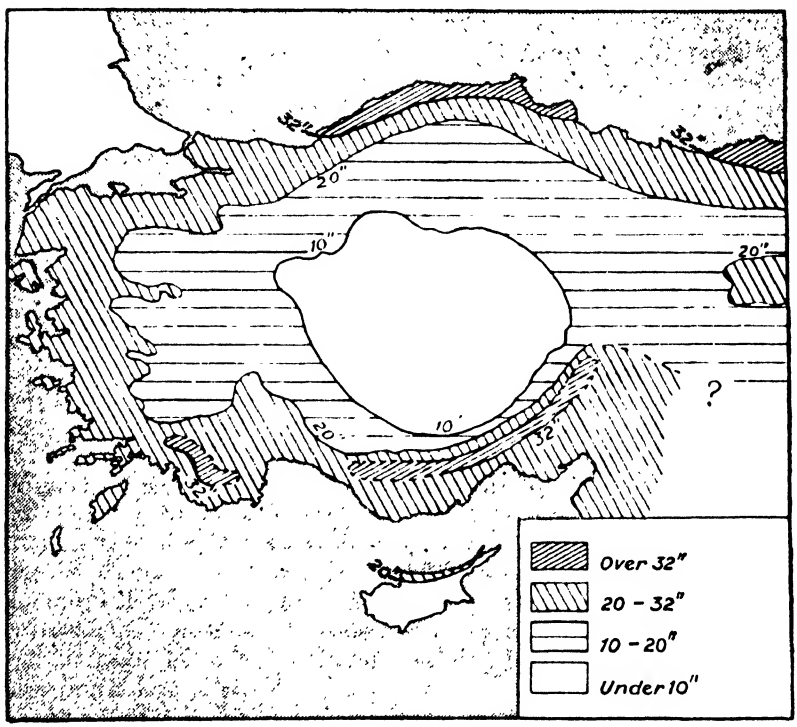

FIG. 49.—Rainfall map of Asia Minor.

south of the 40th parallel—a belt never less than 100 miles wide—with the most typical rainfall of the whole area, ± 12 inches; but the total immediately to the west and south-west of the basin is much more, ± 17 inches, and even that is at least doubled to the south-east—on the Taurus. Exactly the same conditions are found in the north, most of the Kastamuni valley having ± 17 inches and the Soghanli Dagh having at least double that.

Coastal Contrasts. These conditions are, of course, wholly alien to the coasts, though the climates of the three have distinct differences. For the north coast has such heavy rains, even in summer (!), that it is

densely forested, and is specially famed for its boxwood, though it can grow good tobacco in the lee of the Caucasus; the even temperature of the west coast is very favourable to fruit—in the valleys, not on the deltas—*e.g.* fig and grape; and the climate, soil, and available lowland have greatly encouraged the growing of cotton on the Cilician plains. At the same time, the *best* conditions of soil, temperature, and rainfall are probably on the inner piedmont of the parapets, *e.g.* in ancient Paphlagonia (*i.e.* the Kastamuni valley).

On neither the western nor the southern coast-lands does the rainfall often rise above 25 inches, Smyrna having only 20 inches; but at most places four-fifths of the total falls in five months which have an average temperature of only 50° F., so that the actual fall has a high value. On the northern coast-lands, however, the total seems to be always above 30 inches, increasing eastwards, especially east of the Sinope promontory; and in the extreme east, where the Soghanli scarp (3000 feet) comes close up to the water, and föhn winds from the Caucasus blow across 150 miles of warm sea (60° F. +), the maximum is fully three times 30 inches. Naturally, autumn and winter are still the rainiest seasons, but summer is wetter than spring.

(2) *Natural Regions*

Population.

Till quite recently, in any division of the area into Natural Regions, the geographical complex in each case was based not only on a certain unity of relief and climate, but also on a certain unity of speech and racial aptitude; and, though the post-War exchange of population has been very adverse to Turkey, some efforts have been made to counteract the evils. For instance, Moslem peasants from the real home of the finest Turkish tobacco, in Macedonia, are working the plantations behind Samsun. On the other hand, Brusa has lost all its silk-workers, and some 85 p.c. of its mulberry trees seem to have been cut down—for firewood! Behind this contrast there is one of the many signs of the changed relations of Angora and Constantinople, in the deliberate encouragement of trade northward and southward rather than westward; Trebizond and Samsun and Eregli (Heraclea) are receiving more attention than Scutari and Panderma and Brusa, and Italian trade is making great progress in Adalia—and even at Mersina—at the expense of Smyrna.

Nomad *v.* Gardener.

But two things may be taken for granted. However mixed the population of the old Turkish empire was—Mongol and Arab, Hittite and Iranian, in race and speech, aptitudes and stage of development,—it was essentially a sparse population, scattered over semi-arid steppes and with the ideas and ideals of pastoral nomads;

and this unity was cemented by a considerable unity of creed, even if some Moslems were not orthodox. And this is still fundamentally true of Turkish Asia as the hinterland of the Eastern Mediterranean and its pockets. On the other hand, no considerable part of the population was marginal, still less well-suited to the work and the opportunities—even to the climate—of the coast-lands; and Brusa is only one illustration of the result of denuding the coast-lands of gardeners and traders.

Physical Relations. The peninsularity of this western plateau is illustrated, in a rather typical way, by the complex inter-relations of its structure, relief, and climate. We have a plateau cut off from its coast-lands by Alpine heights, which monopolise the rainfall so far as to clothe themselves with forest and to irrigate the coast-lands, but to leave the plateau drought-stricken; and these folded zones are associated with a remarkable variety of mineral wealth—worked by Hittite and Mycenean, by Sumerian and Akkadian, by Byzantine and Ottoman, at least down to the seventeenth century.

Mineral Wealth. In the meantime, however, the mineral wealth is of relatively little importance; some in the west, *e.g.* the gold of the Pactolus tributary of the Hermus (Gediz), is probably exhausted, and some in the east, *e.g.* the oil-bearing region which seems to link Trebizond to the Jebel Hamrin, has not been really touched at all. The bituminous coal of Heraclea is very useful; and there is a considerable quantity of lignite in the piedmont along the 28th meridian, which is used in working, *e.g.*, the Susurlu borax, the Balikesri and Balia silver-lead (very rich), the Odemish antimony, the emery of Tireh, Sokia, and Nazilly. So the Makri coal is available for the working of local chrome and the emery of Mughla. The meerschaum of Eskishehr and the chromite of Kutaia and Brusa are also near enough to the coast, and have good enough transport, to be worth working. But the population has no gift for mining, and capital and organisation are lacking. Nor need the forest wealth claim much attention. For centuries accessible forest has been cut for firewood and charcoal; valonia and other tanning extracts have only a tithe of their old importance; and the survival of the Ismid and Bigha forests is probably due to their strategic value as a frontier belt.

General Plan. The natural analysis of the area, then, is into a pastoral plateau and an agricultural coast-land, the pastoral aspect being typically Asiatic—even to survival of nomadism—and the agricultural being mainly "Mediterranean," though with some modifications. Thus, the olive is absent from the western half of the Black Sea coast, and the fig from the eastern third of the Levant coast, the one being too cold and the other too dry; but the tobacco of the eastern half of the Black Sea coast—where the olive can survive, in the lee of the Caucasus—is as typically Mediterranean as the fruit of the

Aegean coast. Our attention, therefore, should be mainly directed to the belt—or stretches—of Mediterranean agriculture, and then to the pastoral plateau, where the climate is still purely Mediterranean, only with the emphasis on the summer drought and not on the winter rain.

I. The Asiatic half of THE MARMORA basin does not really belong to the Pontic folds. It is mainly lowland, with a fairly typical Mediterranean climate, which has encouraged a wide variety of crops. The summer temperature is the normal 75° F., but exposure to the Black Sea and the *buran* lowers the winter temperature to little above 40° F.; the annual rainfall is about 25 inches, four-fifths of this usually falling in the winter six months, but every one of the other months has some rain. This is reflected in the forest-growth, *e.g.* of valonia oak. **Marmora Basin.**

It may be divided into two areas by the very high spur of the Pontic parapet which separates the Ismid gulf from the Isnik geul, and is a great protection to the crescent of lake-land that flanks the sea from Gemlik *via* Brusa to Panderma. The latter area—with the Edremid Gulf—is the great olive land of Anatolia, and the former one of its great tobacco lands; but their development on these lines, as in the production of silk (cf. p. 243) and minerals, was due to their Greek population, itself attracted in the first place by the political importance of the belt. This may be gauged by the history of the Straits, of Ismid (Nicomedia) and Isnik (Nicaea), of Troy and Brusa—really Prusa, for the king whom Hannibal advised to build a palace over the hot springs at the foot of Olympus was Prusias.

Europe and Africa, then, Church and State, the Old World and the New, have all been concerned with this strip of Asia. As the Kashish or Dumanich Dagh, Olympus is still the centre of attraction, for its skirts are rich in chrome and borax, the chrome specially between Brusa and Kutaia, and the borax between Brusa and Panderma; there is also some metallic wealth (silver-lead and zinc) in the western piedmont, at Balikesri, while the eastern has famous deposits of meerschaum at Eskishehr and Kutaia.

II. THE PONTIC region has a fundamental unity of relief and climate, as montane and marine, but the latter is in respect of climatic rather than commercial advantages; and, though the relation of the two is seen throughout in a continuous cover of forest, the mass of the eastern half has fully twice as much rain as the western, and the seaward face twice as much as the landward. A further distinction may be made; for access by sea is easier in the east than in the west, and the east has some rich deltaic plains —with some metallic wealth in the Archean rock, *e.g.* the Gumushkhane silver and copper—while the west seems to be rich in minerals, especially Jurassic coal. The forest is both coniferous and **Pontic Region.**

deciduous, and logs are exported from almost every roadstead; oak and chestnut are very common, but the two typical trees are box (on the lower levels) and walnut (on the higher).

The coal-field is in the Ula Chai "basin," and its development means not only the opening up of virgin forest and of the Kastamuni farming country, but also the conversion of the coal-port of Eregli (Heraclea) into the natural outlet for Angora, for Songuldak is specifically a coal-port. Railway development in the east is similarly making Samsun the natural outlet for Sivas, the great rival of Angora. Tobacco is grown along all the coast, *e.g.* round Ineboli and Sinope; but, like the Ismid leaf, it is of inferior quality. The best comes from the deltaic lands flanking Samsun (rainfall, 30 inches), the superiority of the Bafra leaf being apparently related to the position of the plantations "in the lee" of Ak Geul (20 miles long). The extent of alluvial lowland and the humid nights are equally favourable to the production of maize; and so hitherto Samsun has been an *exporting* harbour, while at Trebizond exports and imports have been fairly balanced.

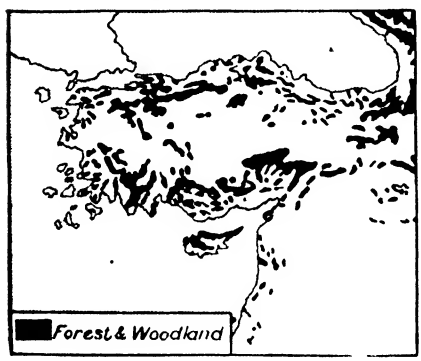

FIG. 50.—Forests of Anatolia.

Tauric Region.

III. THE TAURIC region has the same kind of unity as the Pontic, and the mass of alluvial lowland is again to the east; but the greater part of that is in the continuous unit of the Cilician plain, and its rainfall is less than that farther west. The landward face of the system is relatively useless, and the actual lowland west of Cilicia is ruined in many places by a broad belt of marsh, which seems to be connected with the subterranean drainage of the Isaurian lakes (cf. p. 45). The demand for wood, however, has always been large and steady round the Levant; and the Ionian Confederacy, under Miletus, exploited the Carian and Lycian forests very seriously, though Yuksekkum still exports logs. The mass of the forest is coniferous, but walnut and chestnut are again typical.

The Cilician plain is, of course, quite out of touch with the Adalian, the old Pamphylian belt; indeed, the rugged spurs of the Taurus make this so difficult that it even became a refuge—hence its name, "All-Tribes." But these valleys do give access inland, even for wet winds, to the Isaurian lake-land; and the Italians are making great efforts to develop Adalia, as a port for the "macaroni" wheat of the Konia plains, with motor-bus services for "small" imports, *e.g.* as far as Afium-Kara-Hissar. There is

considerable wealth of iron and manganese and chrome round Adalia, and of silver-lead near Konia, *e.g.* at Berekatlu.

This inner piedmont may be considered an annex of the Tauric region nearly as much as the Paphlagonian valley is an annex of the Pontic; and south-west of the Sultan Dagh, the real boundary of the poor steppe, there is a rainfall which very seldom falls below 15 inches, "and may reach 20 inches." The soil, too, a limy clay, is very suitable for wheat; the "Latter" rains are much heavier than the "Former," during May especially, though enough rain usually falls in autumn to make the ground soft enough for ploughing; and the **Konia.**

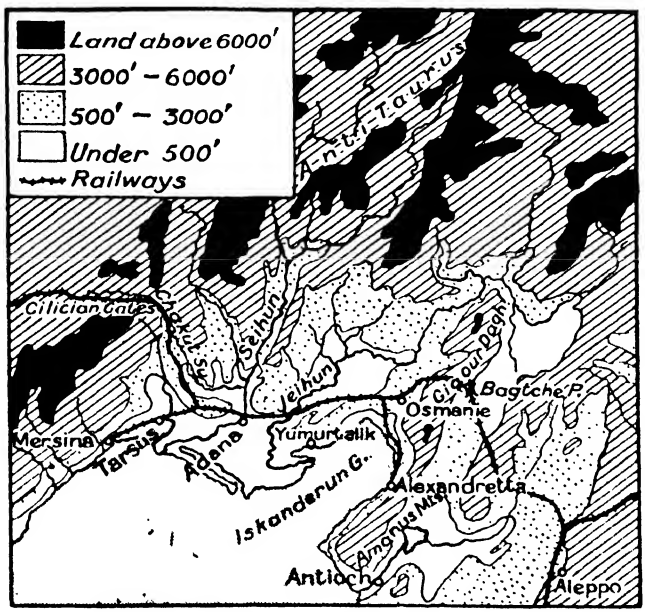

FIG. 51.—Cilician Delta.

gradient is quite favourable for irrigating the plains (300 feet below L. Beyshehr and 200 below L. Karaviran = Soghla Geul). Indeed, Konia (*c.* 3400 feet) stands at the eastern foot of the highland, where old Pisidia dropped to Lycaonia; and the railway from the west even approaches the town for the last 20 miles from the north-*east* because it has been skirting the highland. Here, too, as round Kastamuni, the small rainfall is due directly to the local relief, for the Taurus crest to windward (S.W.), *i.e.* immediately above the Karaviran lake, reaches very nearly 10,300 feet.

But for the objection to a meticulous multiplication of Natural Regions, Cilicia might almost be treated as a separate region, along with the Alexandretta Gulf, of which it is the reproduction on land; **Cilicia.**

and, historically, it was Semitic before it was Greek, and the semi-arid climate of the Jeihun basin is still more suited to pastoral than to agricultural pursuits, especially as the streams are too deeply incised for easy irrigation. But the political diversion (cf. p. 238) of the railway *via* Osmanie across the Giaour Dagh has encouraged development—by Egyptian and Syrian colonists.

But the "Seihun" plain is in a very different position, though even here irrigation is neglected; and the reason is mainly in the climate. The deltaic deposits of Tarsus (Cydnus) and Seihun (Sarus) are constantly being renewed from the abrupt scarp (7000 feet within 30 miles of Adana), and are as damp as they are rich; the course of the Cydnus has moved eastward, and that of the Sarus westward, and their old deltas are marked by marshes and lagoons; and the resultant humidity in the *cul-de-sac* during the rainless summer is excessively high, with correspondingly high night temperatures. The conditions are, therefore, very favourable for cotton-growing even without irrigation; and the Baghdad railway runs through the most suitable belt, the "Mesopotamian" (Hamidian) plain east of Adana. For years Adana and Tarsus have been spinning and weaving their own fibre, often by water-power, and exporting a coarse "Cabot" cloth; but the native "Jerli" cotton has a short and coarse staple, and there is a shortage of labour. The people here are as naturally tillers as those of the inner basin are shepherds, and are at least as much interested in raising their own grain and oil-seeds (sesamum), bananas and oranges, as in raising cotton for the Adana mills, and more so than in the iron of Adana and the chrome of Mersina.

Aegean Region.

IV. THE AEGEAN region—as distinct from the Ponto-Aegean Marmora belt—is very much favoured. It is safe from the N.E. gales across the Black Sea, and widely open to the soft S.W. winds which bring the winter rain; every valley has its northern shield of mountain-spur—on which olives flourish 600 feet higher than on the opposite side—and its alluvial plain and delta; and the Greek population had inherited the experience of centuries in raising fruit, if not also in packing it. Indeed, except for the mineral wealth of the Palaeozoic rock, *e.g.* round Aidin (iron, zinc, antimony), the products of what may be called "the Smyrna hinterland" are largely what they were 3000 years ago.

For it is specifically an agricultural and horticultural area, and is almost self-supporting in the necessaries of life, bread and oil. Wheat and barley are the most important, the area under wheat being about one-sixth more than that under barley; but it is all soft wheat, and the yield is some 100,000 tons less than of barley. The olive is of less importance than in the Marmora belt, but the quality—on the hills from Manisa and Smyrna to Aidin and Nazilly—is better. Cotton is grown fairly widely

in the Gediz and Menderes valleys, the best round Aidin ; and both the quality and the yield are better than in Cilicia, some 10 p.c. being of American types. There are also thick woods of valonia oak up the Gediz valley, especially round Ushak, which is high enough for the yield of valonia to be usually very heavy (*c.* 400 lb. per tree).

The typical products, however, are opium and tobacco, sultanas and figs. The opium has much the highest content of morphine of

Crops.

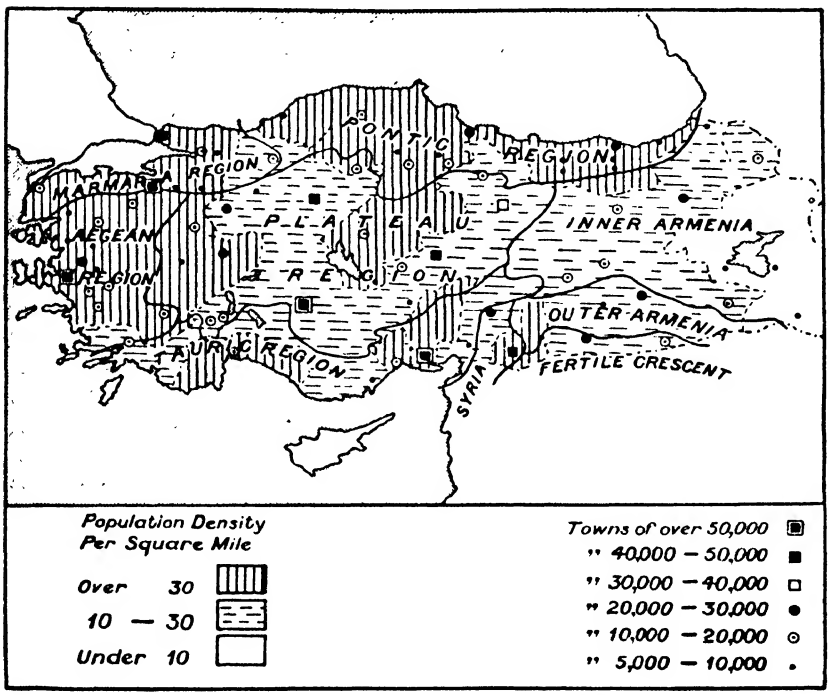

FIG. 52.—Natural Regions and Population in Asia Minor.

any in the world, half a dozen times as much as most of the Chinese, and twice as much as most of the Indian ; and the oil, as cattle cake, is nearly as valuable as the drug. It is mainly a coastal product, especially round Smyrna and Mughla, but is also grown inland, *e.g.* at Denizli, and even as far east as Afium-Kara-Hissar (" *Opium* Black Castle "), though the industry there was ruined during the Civil War (*c.* 1921–22). The rich light soil, which produces the best quality, also grows very good tobacco, *e.g.* round Smyrna itself.

The best sultanas are also a coastal product, especially round Smyrna and Manisa ; but the figs, like the best olives, are a valley

product, especially from the southward slopes of the Menderes valley; and, as with the olives and the valonia, the finest quality comes from the higher lands. The more exposed Cayster valley produces a large crop, but of inferior quality; for the figs contain a smaller number of "seeds," and the flavour depends on fertilisation of as many seeds as possible by an insect that thrives best in a mild and humid winter, while high temperatures and low humidity are vital for the summer drying of the fruit.

Industries. Even in the days when Croesus held his court at Sardis, on the banks of the "gold-bearing" Pactolus, the local resources were the basis of busy industries, *e.g.* the silver work of Ephesus, the wine of Chios, the pottery of Samos; and the exports are still, as they were then, largely in the nature of luxuries, *e.g.* fruit and textiles. And, in spite of opinions to the contrary, it seems probable that the loss of the Greek population will *not* materially affect the one great industry in carpet and rugs.

All the necessary materials are produced locally, the wool being far more important than the cotton (for "backing"); the work, especially along the foothills of the Demirji Dagh, *e.g.* at Geurdis, Kula, and Ushak, is specifically a home industry carried on by women, so that the decimation of male labour is of relatively little importance; and the organisation has been supplied by the great spinning-firms (mainly British) in Smyrna and Manisa, Aidin and Nazilly. The loss of the Greeks and the lack of male labour may, however, affect the cotton industry, and such industries as the making of wooden boxes (of *imported* wood) for the figs and raisins or the making of soap in the olive districts.

Plateau Region. V. THE PLATEAU reflects to some extent contrasts between various parts of it that are similar to those between itself as a unit and its coast-lands. For there are areas where volcanic soil economises rainfall, or where relief increases it, or where there are special facilities for irrigation—though this is not important so far. For instance, the Erjias Dagh increases the rainfall round Kaisarie; and Amasia, like Konia, has special facilities for irrigation, *e.g.* for poppies. Sivas is still more important, standing actually on the shortest line between the northern and the southern seas (just under 300 miles), between the Ak Dagh and the Anti-Taurus.

Samsun was the farthest point eastwards, *i.e.* towards Russia, which the Turks thought strategically safe for the terminus of a great road—the "Baghdad Road," *via* Malatia—to lead across the plateau; and Sivas stands on the direct line from Samsun to Malatia, immediately in the lee of the Karabel Dagh section of the Anti-Taurus, which rises 2000–3000 feet above the Sivas plain, and is crossed by only three tracks in 70 miles. The fertile area begins immediately west of this water-parting, where Sivas and Shebin Kara Hissar stand at a height of 4500 feet; and the Hittites evidently

understood the good value of the 300 miles of fertile lands between Sivas and Angora when they chose Boghaz Keui (near Yozgad) for their capital. Timur understood their value equally well.

Sivas itself, where the Pan-Islam Conference met in 1919, was once (in Byzantine days) a city of 300,000 people, *i.e.* at least three times as large as it is now. The Upper Kizil (Halys) valley, while one of the best grain regions in all Anatolia, and fenced eastward by the Anti-Taurus, opens westward—to the real home of 8,000,000 Turkish Moslem peasants, who form a very remarkable unit. For they form a sort of huge " tribe " of courteous and honest, stupid and fearless, believers in one creed and one tradition ; and the latter is the tradition of their own centuries of conquest, which have left them recently with the smallest percentage in the world of males of military age. **The Turks.**

As we have seen (p. 245), their environment is one of purely Asiatic steppe, which is well suited to the inhabitants, but which dooms them to more or less perpetual poverty. The rainfall in winter is so scanty (seldom much above 10 inches), and the summer is so hot and dry, that the surface is converted into a carpet of dry loose dust—perhaps, really due in the first instance to the " stamping " of sheep and goats ; and the violence of the short " Former " rains and of the winds combine to sweep this away—indirectly the cause of the large size of the delta plains compared with the volume of the rivers by which they have been laid down. But, as the hot season is so dry, weathering proceeds slowly, and evaporation is so rapid that nearly everywhere an alkaline crust is left on the soil. In many areas, therefore, the surface is gravel or stones or quite bare or very salt ; and such vegetation as does grow on it at all is really suited only to sheep and goats or camels.

The importance of the area in ancient times, *e.g.* as the kingdom of Phrygia, seems to need investigation ; and the key to the problem perhaps lies in three facts. Phrygia spread north and south rather than east and west, and so commanded *all* routes eastward or westward ; it contained some very strong positions, *e.g.* the " impregnable " volcanic plug on which Angora—like Stirling and Dumbarton and even Edinburgh—stands ; and it contained an immense and easily collected supply of the most useful of minerals in those days—salt, the 4000 square miles of Tuz Cheullu being an unfailing source of it, for the water is *nearly one-third* solid salt ! **Phrygia.**

Now that Angora is the capital of the Turks, no doubt there may be some serious effort to develop the mineral wealth other than the salt. There are valuable deposits of fuller's earth at Mikalijik, —pockets of meerschaum between Eskishehr and Angora,—copper and silver-lead at Elma and Denek ; farther afield there are rich deposits of manganese and some mercury round Konia, and silver round Tuz Cheullu.

Internal Incoherence.

Hitherto there have been two difficulties, one very old and the other modern. The former is the age-old rivalry between Angora and Sivas. The real frontier of the whole plateau eastwards was, and is, in the broad belt of the Taurus and Anti-Taurus; but for centuries the Kizil Irmak (the Halys) was made a political frontier, *e.g.* between Lydia and the Median empire, between Pontus and Paphlagonia, between Paphlagonia and Galatia. It even imposed on Strabo; and Boghaz Keui was really the centre of the great horse-shoe of land (300 m. × 150) enclosed by the river. No doubt, the relations of the two cities in modern times still reflect the legacy of the old days.

The other difficulty has been the lack of modern transport, though that is now being supplied—by rail and motor. Both Sivas and Angora lie, like Erzerum and Erzingan, along our critical 40th parallel; and there can be no question that "the Baghdad" railway ought to have gone along this line. As we saw, that was the original intention, for Germany was very anxious to keep it wholly out of reach of Sea Power; but it was diverted to the circuitous Konia route and the terrific difficulties of the Cilician Gates by the determined opposition of Russia.

(3) *Economic Geography*

Essential Factors.

Some detailed analysis of the phenomena thus outlined may help towards the differentiation of essentials, and for this purpose the economic aspect seems to be the most useful; for, in spite of a chequered political history, we have twenty-five centuries of evidence as to the remarkable stability of the economic factors. And the economic development has been dominated by the primary contrast which we have noticed, between coast and core, with soils and relief of less importance than climate and accessibility; and for our present purpose we may ignore not only the intervening ramparts which are the main cause of the great contrast, but also the great plateau within them.

Three facts are fundamental. Climatically, the coast-lands are demarcated from the core—very sharply indeed except in the west—by a considerably heavier precipitation and a much smaller range of temperature; the coastal relief is remarkably varied, but the variety is in an alternation of containing heights and contained lowlands; and the considerable aggregate of delta and valley is distinguished by rich and deep alluvium, while the monotonous flats of the core have thin and saline soils.

Accessibility.

Accessibility, however, has probably been the factor of supreme importance. Historically, it meant ease of commerce in days of primitive navigation, and this involved the marginal veneer of Greek type, which has always shown remarkable commercial gifts

with considerable aptitudes also for industry and horticulture. In modern times the combination of fertility and accessibility, with the presence of this type, attracted capital; and the impulse of the old development has been so great that the area has far outstripped the rest of the peninsula, and even all the other Lands of the Five Seas, in commerce and industry and in the density of population needed for these and resulting from them.

Though this is true to a large extent of the whole coastal belt, there is sufficient difference to warrant three divisions of the belt, based on the geographical features which we have already surveyed. For the western coast-lands differ from the two others in several important features and factors, and—to a less extent—the northern differ from the southern.

West Coast.

The Western lands are essentially the most varied, for their complex structure is reflected in a complex relief, even if this is not on a grand scale; the sharp alternation of ridge and valley has given a certain complexity of environment, encouraging such variety of development as that between forestry and horticulture. At the same time the general concentration of drainage on this front, even though there is little river navigation, has opened to easy access a considerable area of arable land and mineral wealth; and it is possible that the rivers might be much improved by regulation, as also in Cilicia.

One advantage, no doubt, has been that the climate on this coast is of the "familiar" normal Mediterranean type, and that the relief allows an adequate supply of rain to reach a large proportion of the area. From both points of view it has a distinct advantage over both the other coasts—over the northern especially in rainfall *régime*, and over the southern in temperature extremes. And location reinforces the opportunities offered by the relief; for, if Miletus has disappeared, Scala is a real harbour, compared with the roadsteads of the north and the south coasts. So are the terminal harbours of Makri and Panderma; and, though Panderma has not direct communication with the Mediterranean, it has better connexions with the Black Sea than Smyrna or Scala, and shares some of the advantages of the Eurasian link.

People.

These physical factors, especially the location and the climate, seem to have worked mainly through the type of population—up to 1923. For there can be little doubt that the higher degree of development, *e.g.* in commerce, in industry, and in agriculture, was due to the Greeks; and they attracted the capital which interested itself in mining and industry and in their necessary dependence on proper transport. At present the belt contains fully 45 p.c. of the total mileage of metalled roads, and —exclusive of the main Baghdad line—fully 75 p.c. of the effective railway.

"Greek" Variety. There has been, no doubt, much hindrance to development even here—due to apathy, careless tillage, and defective transport, especially on the rivers; but the advantages analysed have made it, beyond comparison, the region of maximum importance, and accusations of "lack of concentration," and "piecemeal freights" show some misunderstanding of Greek mentality. It is precisely the broken character of the environment that suited the Greeks, and that enabled them to develop an extraordinary *variety* of products—compared with the cotton of the south coast and the tobacco of the north coast—on an area not large enough to ship any product in great bulk. Owing to the dense population, the largest production is for home consumption, *i.e.* cereals, which include even rice; and the exports are of products which are also very largely consumed on the spot, even if the consumption is only of the inferior qualities.

The Olive. For instance, the olive is ubiquitous, though its *special* distribution is on the piedmont belt. This is not only—or even mainly—because of the economic pressure on the available lowland, but also because the best oil comes from well-drained areas; and the slopes, while equally warm, are better drained than the floors of the valleys. The available space, too, depends to some extent on exposure, for groves flourish up to 1600 feet on southward slopes, *i.e.* 600 feet higher than on northward slopes. In any case, immense quantities of oil "went bad" in the old days, while they waited—for weeks or months!—to be rated for taxation before export; and during the Greek retreat in 1920 there was much malicious destruction of the trees—at a time when foreign competition, *e.g.* even from California, was becoming more active. Even if there was no competition, it would take years to replace the trees; and the ground is being used for crops giving an immediate or a very much quicker return.

The Fig. Much the same can be said of the fig industry, though the frost control depends not on the tree itself, but on the insect which fertilises it in winter; and the production for export is even more localised than that of the olive, being very largely confined to the rift valley of the Bujuk Menderes. This is partly a soil control, for the alluvium is very fertile, and partly a water control, for the basin of the river is large (over 9000 square miles); but two economic factors are at work—the early provision of railway transport to Smyrna, and the large floating population in Smyrna itself (150,000) and the immediate neighbourhood available for picking, drying, and grading the fruit.

The Vine. The grape, while having naturally a far wider distribution than the fig and the olive, has the same artificial localisation for export, with somewhat similar conditions of growth; for it is not irrigated, and not grown on any poorly drained soil. But the raisin industry

has been as typically Greek as the currant industry, and has been closely connected with the dense Greek population on the hilly lands between the Gediz and the Caÿster, especially round Manisa. It may be found flanking the railway anywhere between Smyrna and Kassaba or Smyrna and Aidin, but fine quality seems to depend on nearness to the sea (cf. cognac), though shelter from sea-influences is very important for drying. The Vurla isthmus, in the lee of the Kara Burna north-and-south ridge (over 1500 feet), is an ideal position. But here again there was much destruction in 1924, and the ruined area seems to have been replanted with tobacco, not vines.

Cotton. Cotton is much less important than the fruit, especially for export, but has provoked some criticisms that are not justified. There are two factors of importance—water limits and quality, and both are related to both area and type. The native Jerli type requires little water, especially when there is heavy dew, *i.e.* not much more than 50 miles from the sea ; though short in staple, it has good colour, and takes a good gloss ; and it ripens early and without " breaking." It constitutes, therefore, 90 p.c. of the crop, while the 10 p.c. of Eyptian and American requires relatively heavy watering, and has to be picked *before ripening*, as it "breaks," and may be spoilt by the early rains.

Minerals. In an area with such relief stock-raising may—and does—make use of areas that cannot be profitably cultivated, especially deforested ranges, though even on the Bigha peninsula the forests are not worked more than 20 miles from a river ; but its success really involves either transhumance or fodder-crops, and neither can be easily provided. On the contrary, the factors in favour of advanced exploitation of the varied minerals are to some extent those favourable to the fruit industry, *e.g.* good transport, a dense population, and the same kind of " monopoly " as the fig enjoys ; and the relative abundance of forest is a great asset. Of course, the same " monopolist " minerals are found in the interior, but with much inferior access to transport, to labour, and to wood.

Coal. The coal resources throughout the peninsula seem to be over-rated, and specially in this western region ; but there is coal in the Bigha peninsula and round the Gulf of Makri, and it is actually worked—for the Balia silver-lead mines—at Manjilik, if not, at Lapsaki. There is also a considerable quantity of lignite, which is used locally ; but its quality is poor, except near Manjilik, and it is worked on a fair scale only when the quality is fair,—where the outcrop can be quarried,—and when there is an immediate market, *e.g.* Balia. It is not always used even when it might be, *e.g.* for working the Lapsaki copper and the Edremid iron ; but the Greeks were little interested in products that were in no way monopolistic, unless conditions were exceedingly favourable, as at

Balia, with a very high percentage of silver in the lead and zinc and very easy access to rail and to coal (and lignite).

Chrome. This preference for "monopoly" products was as favourable to the development of the chrome and the emery as it was unfavourable to that of the copper and the iron. The competition of New Caledonia, Canada, etc., has caused a decline in the chrome output during this century; but up till 1900 Anatolia was practically the only sure source of supply—from the eruptive serpentine, and in this case it was certainly not true that Anatolia was "very rich in poor mines," for there were only two zones and the percentage of chromic oxide seems to have averaged about 50.

The two centres are respectively in the north and the south. In both the mining machinery is very primitive, roads are so poor that most transport is done by mules and donkeys, and access to the sea or to rail is not easy. The Krupp firm worked the northern centre during the War, and introduced aerial cables; but the industry has declined here more than in the south, though the deposits are actually the richer. But the whole Olympus area is difficult of access, even *via* Kutaia, especially as the Taushanli mines are in the Adranos gully and the Dagh Arde in the Sindshon, with a 3000-foot wall between them. Only the skirts of the southern area have been worked—at Denizli, with access to the Smyrna railway, and at Mughla and Makri, with access to the sea; but even here shipping is not easy, for the actual shipping point for the Menteche mines is in water too shallow for anything except lighters.

Emery. Except for Naxos, Anatolia had also a monopoly of emery, and it was confined to the Menderes valley; and here again, during the War, aerial rope-ways were introduced, but they have been replaced by animals, including even camels. The largest and the richest deposits are along the southern edge of the valley, *e.g.* Menteche, and the actual mining—really quarrying or even picking-up by hand—is very easy; but transport difficulties have proved prohibitive. The northern group lies about the upland between the Buyuk and the Kuchuk rivers, and so had access by the main lines (and by some branch lines) to the sea—from Sokia, Tireh, and Nazilly; and for some purposes this emery is quite beyond competition, *e.g.* for glass-finishing.

Carpets. As this western area is far the best developed in agriculture and mining, so it is in manufactures; but the development here is very primitive, and depends wholly on local animal and vegetable products except for the wood used for fruit-boxes. As with the other branches of work, there is a good variety, but there is nothing on a large scale—the total trade, the number of hands, the size of the factories, being alike small. The number of factory hands, however, in the carpet industry has been considerable, especially in the centres which produce the systematised "classical" patterns, *e.g.* Milas,

Kula, and Kutaia. The heavy carpets are more commonly made where the local raw material is easiest of access, and sometimes even comes "on the hoof,"[1] *e.g.* Ushak, Demirji, and Chiordes. Smyrna is the great centre of the whole trade.

The prosperity of the carpet-industry has been more favourable to the cotton industry—of Manisa, Aidin, Nazilly—than to the silk, which is being replaced by cotton even in the famous old silk districts, *e.g.* Brusa; and, even before the wholesale destruction[2] of the mulberry-trees, the industry was declining owing to disease amongst the silkworms.

South Coast.

The South coast presents a very remarkable contrast to all this relatively high development. Its great forested wall is very near the coast, and rich in streams that can be used both for transport of logs and as a source of power; and there is apparently abundance of lead, manganese, and chrome. But there is no cutting of forest except just along the streams, and the mineral wealth is practically untouched. One cause may be the very adverse history of this "Pirate Coast"; another certainly is lack of labour.

Even in the deltas little progress has been made, and the area of useful land even in Cilicia is often exaggerated. The Isparta and Geuk deltas can grow citrus fruit and sugar, but the olive is practically absent—for the reason which favours cotton, *i.e.* the very high relative humidity. This humidity, the heavy dews, the fair rainfall, the damp soil, and the sub-tropical temperature are distinctly favourable to the native Jerli cotton (95 p.c.), some of which actually comes to Lancashire; there is a total production of over 150,000 bales, which is the basis of the industry in the Adana and Tarsus mills.

North Coast.

The North coast resembles the south in the highly localised and specialised agriculture and in the difficulty of access, but differs remarkably in climate; for the summer rain is quite enough to be very favourable to tobacco. But the real opportunity here is for the opening up of a valuable coalfield, which stretches along or close to the coast for nearly 100 miles between Eregli and Jidde. Already it is responsible for well over 70 p.c. of the whole coal-output of Turkey; and, when properly picked and washed, it is equal to all except the very best Welsh coal. Here again the War produced something very like a revolution—in provision of railway transport and port equipment, Songuldak being equipped to ship 3000 tons a day, some of it of first-rate coking quality. The quality, the easy access, the enormous reserves (? 2,000,000,000 tons) should

[1] Immediate access to the raw material, cheap female labour, and the survival of "family" patterns, combine to account for the great importance—especially for fine carpets—of the plateau towns, *i.e.* Isparta, Konia, and Sivas.

[2] To a visitor the official 85 p.c. (cf. p. 249) seems exaggerated.

make its future safe and very prosperous; but since the War there have been great labour difficulties, due partly to actual lack of it, partly to its being "seasonal" labour off farms, partly to—praiseworthy, but unpopular—official efforts to deliver "clean" coal.

THE ARMENIAN CROWN

Considerable attention has already been paid to the physical details of this Crown both for their intrinsic interest and for their supreme importance to Mesopotamia; but otherwise the area at present is of little significance. The Turkish possession of Artvin, Ardahan, and Kars neutralises the political affinities of Armenia, and these were from the first very artificial; and, as Artvin is within 30 miles of the Black Sea, the whole Crown may be regarded as merely an annex of the Anatolian peninsula except in its physical relationships.

Double Area. Beyond the Anti-Taurus, then, the whole territory between the Black Sea and the Baghdad railway may be roughly divided into two straggling triangular areas, which may be called Armenian and Kurd. The former stretches from the Trebizond-Rize (another tableland) coast to Ararat and Lake Van, with its natural centre in Erzerum (*Arzen-Rum*, "Roman Arzen"), which has been for ages the last "station" on the old trade and pilgrim route from Tehran to Trebizond (for Mecca); but, in spite of this and of the location of the city on the Kara Su, the railway *via* Kars to the frontier near Alexandropol (for Tiflis) is giving it in the meantime a new political orientation, which is likely to persist until the extension of the line to Sivas is completed.

Ancient Route. The age and the permanence of this trade-and-pilgrim route are astounding in view of its geographical character; and it would probably never have come into use except for what was in the nature of an "accident." The old Armenian name of the district behind Trebizond was Khalybes ("The Miners"), and the famous Gumushkhane ("The Silver Place") lies at a height of *c.* 4600 feet in a basin of the Pontic ranges; but it was so rich in silver as to encourage its development even though access from Trebizond meant climbing the Zigana Pass (*c.* 6600 feet). An easier route was found eventually up the Kelkit valley to the Vavuk Pass (*c.* 6500 feet), which deployed on the water-parting between the Kelkit and the Chorokh; and there seems to have been a very ancient track between Baiburt (*c.* 5300) and Erzerum (*c.* 6250) across the Kop Dagh (*c.* 8900), and there is an easy route on *via* the upper waters of the Aras and the Murad, between Tendurek and Ararat, to Bayezid and on to Khoi and Tabriz. The route was probably in use even in the days of the old Khaldi, or Urartu, kingdom round Lake Van, only approaching down the Murad

valley, though Duspas was to the south-east of the lake. The Van basin now, though it forms part of the Armenian triangle, is quite isolated from Erzerum.

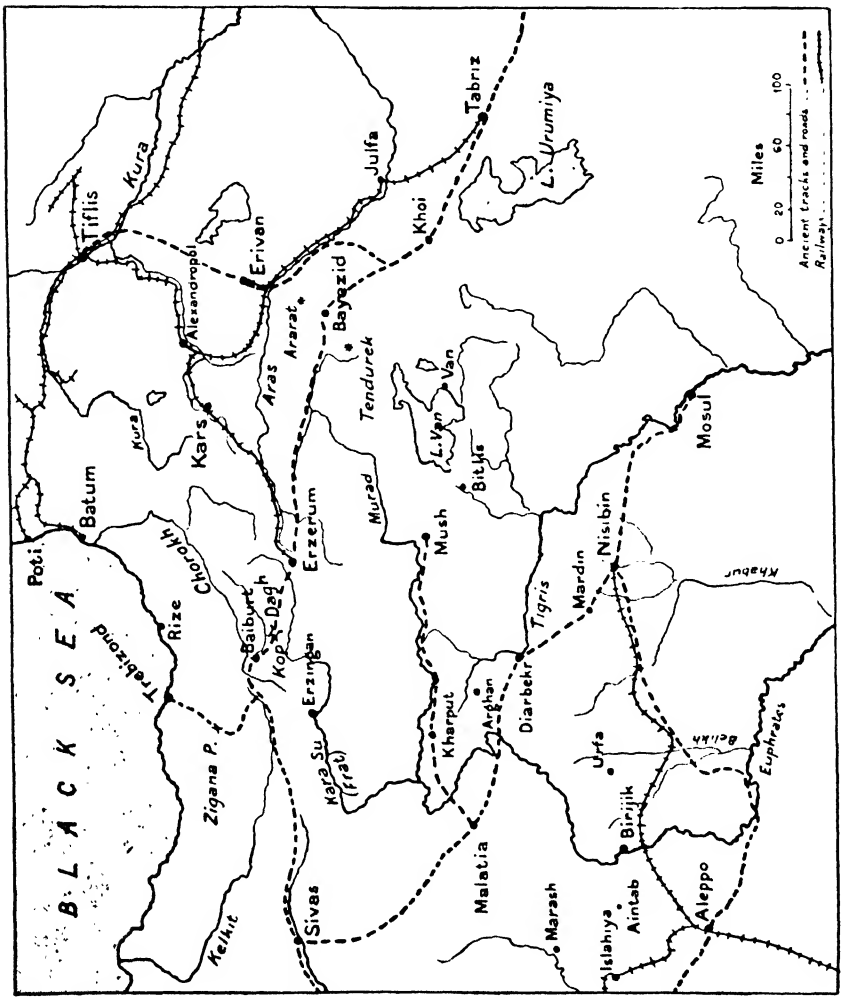

FIG. 53.—Routes and Place-names of Armenia.

Of course, the Armenians, who survived the War, have moved into the tiny Soviet Republic (not twice the size of Yorkshire) which has its capital at Erivan. There, with a population 85 p.c. Armenian, and with 85 p.c. of their cultivated land under cereals, they can, at least, feed themselves, and feel safe; and their business

People.

instincts may find some outlet in connexion with the Alexandropol-Julfa section of the Russian railway to Tabriz, and there is a fair number of Armenians in the lower basin of the Aras (the Azerbaijan Republic). At least, they seem to have more prospect than the scattered remnants of mixed population in the deserted valleys of old Armenia, though the pastoral nomads are really more suited to the prevailing "steppes" of the Crown. Even Erzerum, where there are occasional summer rains from the Black Sea, stands at a height of 6200 feet.

Kurdistan. The Kurd "triangle" is even more straggling, but it pivots on the Euphrates gorges between Erzingan and Birijik, and its natural centre is Kharput ("The Rock Castle"), which has been a real centre of education in recent years, with its "College of Armenia"; but the old importance of the Mush-Kharput-Malatia route has gone, and even Bitlis is now more important than Mush, while Diarbekr (the old Amida) is much more important than Kharput. The railway has ruined the old caravan trade *via* Aintab and Urfa (the old Roman capital, Edessa); but, if a branch line is built from Islahiya to Jerablus—or even to the head of navigation at Birijik—to avoid the "Aleppo" detour into Syria, it will go through Aintab, as the branch for Diarbekr goes through Mardin. The Diarbekr chrome and the very rich Argan copper should well repay efforts to develop them; and access to the railway is already encouraging the revival of the old fruit-growing of Aintab and Urfa. But these towns, though they lie again along a political frontier, can never have again the importance which they had in Roman days, especially Mardin; and their external relations have always been, like those of all the Fertile Crescent, with the Mesopotamian foreground and not with the Kurd hinterland—from which they were persistently raided!

Frontier. To run a frontier through the basins of such small tributaries of the *lower* Euphrates as the Belikh and the Khabur argued a complete ignorance of—or indifference to—natural geographical units and relations. To divorce the central section of the Fertile Crescent from its two terminal sections, and to link it up with an alien mountain crown, is equally fatuitous. At the same time, the political settlement has involved one happy accident. As in the west of Poland, so here there were no geographical features at all corresponding to the lines of partition devised by the politicians; and, while in Poland they had to fall back on the *trenches dug by the Germans in the War*, here there was the railway. So here there are at least 150 miles of political frontier formed by a "feature" which does *not* naturally separate peoples, but to which they naturally gravitate in peaceful occupations.

Drainage. The importance of this Crown, then, in the meantime lies in the complete success with which it is drained into the Land of the Two

Rivers. Much of the watershed is deeply wrapt in snow during the winter, and the collection and the distribution of rainfall is very effective. The Kara is scarcely 300 miles in length, and rises below 9000 feet; but it is nearer the sea, and has the heavier snow. The Murad is over 400 miles in length, and rises at fully 10,000 feet; and, though its less marginal position and its less easy access from the east made it so much less important as a thoroughfare that Rome paid little attention to it, and it was never a frontier, it carries the greater volume with less extremes of flood.

Scenery. The drainage is collected over 8 degrees of longitude; the open "basins" of the Kara are to the east, and those of the Murad to the west; the water is discharged through narrow valleys shaded on the sunny side by 10,000-foot ramparts, and down transverse gorges which are almost sunless even at midday. On the Bitlis and the Zab the cañons are among the finest in the world; and even on the Tigris at Diarbekr, only 1900 feet above the sea, the river is "rushing like *an arrow*" ("Shat") at the bottom of a 300-foot ravine in the basalt. In the rift, where the Euphrates falls 1000 feet in 100 miles, it is within 12 miles of the Tigris; and the headwaters of the Tigris near Kharput are only half that distance from the Murad. The Crown has, therefore, one of the best-planned drainage schemes on the face of the earth.

REFERENCES.—RAYNDAL, *Turkey: a Commercial and Industrial Handbook* (1926); LYNCH, *Armenia* (1901); Peace Handbooks, x. and xi.

CHAPTER XVIII

MESOPOTAMIA

Northern Frontiers. Professor Banse, in his meticulous analysis of Turkish Asia into Natural Regions, wishes to include in Mesopotamia the whole area connected with the two great rivers between the 3000-foot piedmont of the Taurus and the Persian Gulf. This would give Derek and Severek and—still worse—Diarbekr to Mesopotamia; but Diarbekr, which even the Romans put in Armenia, and which had an old Armenian name (Tigranogird), is cut off from the south by the Jebel Tur-Karaja line of heights (4000–6000 feet), and to divorce the Karaja volcano from the Armenian Crown is unpardonable.

In any case, to press a particular contour seems undesirable; even Mardin stands at 3000 feet. On the other hand, land-usage would be a good test, and that would restore the grain-lands of the Urfa limestone (*c.* 1500–1600 feet, with 15–16 inches of rain) to the Land of the Two Rivers; it would also exclude the Kurd population and the village "gardeners" of the Tauric scarp. This was all the more desirable when a French mandate was going to carry *Syria* to the Turkish-Irak frontier *on the Tigris*, at 42° E., enclosing the whole "Shammar" steppe as far as 41° E. on the Euphrates. The frontier actually runs through Sinjar; and, though the desert-flanked Jebel Sinjar discharges all its good *wadis*, *e.g.* the Tartar and the Ulra to the south-east, the "Syrian" Arabs must not use them! The only defence of the arrangement is that the Sinjar sanctuary (4600 feet) has been not Arab and Moslem, but Yezidi and semi-pagan; and now the little island of refugees seems to be actually, if not theoretically, divided into two![1]

But Mesopotamia has its special relation to its own geographical setting as well as to the alien Crown; and, though it seems indisputably the right area to survey after the Crown, it may be helpful to glance at its open setting first.

All the rest of the old Turkish Empire south of the Belikh-

[1] Since this was in print the absurd arrangement has been cancelled.

Khabur watershed has a certain unity which has been of great importance historically, politically, and economically, and which made it an appropriate area to have given birth to the three great monotheistic religions in the world; and this unity is geographical. The land is the very core of the three continents of the Old World, and it has an overwhelming unity of race, of speech, and of creed; but its own core is desert, and this led to outpours which distributed these unities, and which made inter-continental communications circumferal. Movements in peace or in war had to go round; except for initial impulses the flanks are the important areas, and our first concern is with them. The one is a narrow highland, the other is a wide plain; but both are transverse to our main Atlantic lines, and both are river-threaded. Geographically, the fundamental relation of the flood plains is to the Alpine watershed; historically, it is to the old block, and the more important relation to the latter seems to have been direct rather than *via* the Syrian isthmus, even if we know more about the indirect relation. But distributions from either Syria or Arabia could spread easily and widely over the great plain, and the nominal limits of that plain have been as varied as its names.

Centrality in Old World.

(1) *General Geography*

The original Jezireh ("Island") lowland between the Tigris and the Euphrates southward from 37° N. had an area of *c.* 50,000 square miles (= England); Irak Arabi, the Sawâd ("Black Earth") of old Shinar, Babylonia, Chaldaea, south of 34° N., was nearly 100,000; at its largest, under the Turks, Mesopotamia was calculated at 150,000; and the whole area from the Taurus scarp to the Gulf and from the Zagros scarp to the western scarp of the Euphrates valley probably amount to 200,000. The Mandate settlement left Irak at about 150,000, but deprived it of more than half the longitudinal belt of useful steppe north of 35° N., and gave it—"in compensation (!)"—the 50,000 odd square miles of the Syrian Desert, the "Badiat esh Sham."

Area.

Greater Mesopotamia, then, includes four main units—a wide belt of piedmont steppe north of 35° N., between Aleppo and Mosul, —the Baghdad flood-plain or old Babylonian delta,—the new Basra delta,—and the Zagros piedmont. It is fenced with sea and swamp in the south, and with 700 miles of desert and poor steppe in the west; but there has always been an easy descent for raiders from the highlands in the east and the north. Indeed, the Kurds were always raiding, not with the object of any permanent occupation of the Crescent, but because it was a thoroughfare for rich caravans; and it was impossible for the lowlanders to retaliate, for they were not much more numerous than the Kurds, and the latter could

Four Units.

always retire to the wilder parts of the highland, *e.g.* the Zab cañons (cf. p. 53). The security of these may be estimated from the survival in them of a little group of Ashirets, *i.e.* old Assyrians.

Access. Access and exit were really easy, however, only in the north-west and the south-east; and in the latter direction only the sea gave both, for the Pylae Persicae, "The Persepolis Gate," gave only easy access, and there was no exit at all up the el Khar and other *wadi* valleys that led from the Nejd. Even the Palmyra route to Damascus from opposite the mouth of the Khabur—where the confluence of that river greatly improved navigation on the Euphrates, and offered the direct route to Nineveh (Mosul)—was far from easy; and it did not really serve both Europe and Egypt. In the north-west the Pylae Syriae, or Syrian Gate, included both the Beilan and the Bogtche Passes, though the latter was more properly called Pylae Amanicae; and, as the lower and easier pass was also the farther south and the nearer the sea, it was the natural route from Aleppo to either Antioch or Alexandretta (Iskanderun).

The Great Divide. The Anti-Taurus, as we have noticed, is not only the main water-parting between W.-N.W. and E.-S.E., but has been the real historical and political divide between the east and the west—the Assyrian and the Hittite, the Arab and the Roman, the Asiatic and the European. Rome made the range a "scientific frontier," and then regarded Mesopotamia as a "sphere of influence," linked up by a line of piedmont fortresses—Edessa (Urfa), Amida (Diarbekr), and Nisibin (Nisibis)—to an advanced base in the Amanus, between the fateful Issus and Beroea (Aleppo). The Mandate settlement revived the Roman attitude in a "Military Territory" round the southern end of the Kurd Dagh outpost of the Amanus.

Antioch. Antioch had no geographical importance here. The Orontes deserves its Arab name "Asi" ("The Rebellious"), and even Seleucia was a purely artificial harbour, "a pit dug in the plain" by Seleucus. Antiochus probably chose the place (to build a capital on) for the same reason as Prusias chose Prusa, its warm baths; and so it acquired a great political importance, with a maximum population of 400,000! Even in Christian times it had 200,000; but earthquakes and the Saracens worked havoc on it, and the gravitation of importance to its proper geographical centre has reduced it to-day to less than 30,000.

Aleppo. This geographical centre must always have been to *landward* of the transverse ranges and their rift valley. Aleppo—probably the old Chalybon, as the old name of the Koeik was the Chalus—is like Hama and Homs and Damascus in this respect; and, as the most northerly of the four, it was the only one that could really control all the great connexions—Syrian, Anatolian, Armenian, Persian, and that part of the Mesopotamian trade which preferred the steppe

route to the desert route, whether for Egypt or for the Levant. Indeed, economic justification for the (enforced) change of route for the main Baghdad line has been found in the extent to which—as far as Aleppo (*c.* 850 miles)—it serves the south as well as the east. Even now the actual junction is not at Aleppo, but a dozen miles *to the north*—at Moslemiyeh ; on the other hand, Aleppo had little chance of serving the south till the decay of Tyre and Sidon, and the consequent neglect of the very old route directly west *via* the Palmyra wells from the Baghdad-Babylon focus. This is the route followed by the pipe-line from Haditha to Tripolis.

Relief.

Within the limits suggested above there is practically no *area* whatever over 2000 feet in elevation ; roughly south of 36° N., *e.g.* south of Aleppo and Mosul, there is practically none reaching 1000 feet ; south of *c.* 34° N., *e.g.* south of Hit and Samarra (which mark the oldest coast-lines) there is none reaching 500 feet ; and most of the area does not reach 200 feet, Baghdad itself—more than 300 miles from the Gulf and half as much again by river—being only *c.* 110 feet above the Gulf level. Indeed, the commonest gradient per mile, if not the actual mean, over a flood-plain which measures 300 by 70 miles, is said to be 2½ inches.

Foreign Flanks.

The uniformity of general conditions, as based on relief, suggested by this is neutralised by definite climatic differences and by the entire difference of flank. The " foreign " flank of the Euphrates is desert and steppe, desert to Deir and then steppe to Jerablus ; and it was probably the effect on rainfall of the long series of ridges (all over 3000 feet) from Damascus past Palmyra (Tadmor) to the Euphrates near the mouth of the Khabur, that made Deir really more important than Circesium (? Carchemish). Diocletian made the latter the frontier station of the Roman empire—probably, just because the river is flanked by desert up to Deir.

Under normal conditions the " foreign " flank of the Tigris in the Zagros scarp was the safer, especially while the Tigris steppes and their piedmont were held by the virile Assyrians ; but the valleys of the Zabs, the Diala, and the Karun offered natural lines for flood-water and for invasion, though the Babylonian flank just between 32° N. and 34° N. was wonderfully safe, thanks to the advanced Pusht-i-kuh buttress of the Zagros.

The Two Rivers.

The two rivers are often compared with the two components of the Nile, the Euphrates giving the steadier supply and the Tigris the heavier floods ; but the comparison is not very useful, for the two head-streams of the Nile have *different régime*, and the whole river-system is in different latitudes. Of course, the Ganges rises in the latitude of Basra, but a useful comparison may be made with it. For the really vital factor here is the double delta, which is double in two senses—as two deltas merged in one, and as an

old delta extended seaward in a new one. Of course, the Tigris does resemble the Blue Nile as being specifically the " great flood " ; but the cause is quite different. The river is only two-thirds the length of the Euphrates (1800 miles), but is at least two or three times as fast ; and on the higher plain, " Asshuria," between the Zab confluences, it is prevented by the Hamrin range from swinging naturally westward. It remains, therefore, very near its eastern watershed, and derives flood-water, from the very heavy rain on the Zagros, very rapidly and very suddenly ; and at its confluence with the Euphrates it has at least double the volume of the longer river.

Pace. There is a further difficulty. The pace of the Euphrates is not great enough to carry much even of its fine silt, and this has to be deposited in the bed, where it blocks navigation, and causes flooding —that is relatively harmless except as providing swamp on which malarial mosquitoes can swarm. But the Tigris can carry enough even of its coarser salt to increase greatly its destructive power, and to involve an immense deposit where river and tide meet—with such impact that fresh water is even distributed, by canal, automatically at high tide (9 feet at spring tide) ! The joint delta, therefore, must always have been a wide expanse of swamp, in which early " Irreconcilables " found a safe refuge as the " *Sea*-Folk of Sumer."

Old Coast. In this connexion nothing is more illuminating than the pace at which the new delta has grown, and is growing—at least a mile and a half every century (Hogarth). In 2350 B.C. the Euphrates was said, by a contemporary, to run west of Ur to the sea at Eridu —" Dungi, Lord of Ur, cared much for Eridu, which is on the shore of the sea " ; and, though the scribe does not explain why all the shells in the old channel at Eridu are of *fresh-water* organisms, Eridu was evidently the shipping port. But 400 years later Khammurabi is shipping troops at Ur itself ; and, even if an Elamite conqueror of Larsa (Senkera) had " straightened " the Euphrates to go through Ur, that would not have made Eridu an " inland town " if it was really on the sea.

The conflicting evidence of scribes, however, is of little importance compared with the actual evidence offered by the land ; and we may be certain that the great Sumerian cities—Ur, Eridu, Lagash—were on the sea. Possibly, their builders—those *Sea*-Folk —came to the land by sea ; their God of Wisdom was a sea-god, and people who erected huge mounds for their temple-sites *ought* to have come from a mountainous land or a land of floods. At least, there is no question that, even in the days of Alexander the Great, the Euphrates, the Tigris, and the Karun had separate mouths,—that the *earliest* coast-line of the Persian Gulf reached Hit,—and that the Euphrates and Tigris have certainly met at not less than three different points (roughly Ur, Qurnaka, Basra).

Ur was certainly for centuries the dominating centre of all Babylonia. It was the terminus of the Arabian caravan route by 3000 B.C., the junction of land and sea traffic, and the centre of Moon-worship—with 13 months of 30 days apiece in its calendar year. The bitumen used as its " mortar " was shipped from Hit—hence its name of Mughair (" Pitch-built "), and its power came to an end about 2000 B.C., when its harbour began to silt up. **Ur.**

All this is of far more than mere antiquarian interest, for the extent and the exact lie of the Persian Gulf decided, once for all, the fundamental relations of the two great rivers. The initial slope of the land must have been south-eastward from Hit, where the flood discharge is 3600 cubic metres per second—far more than the open bed of the river could ever carry ; and, as the oldest delta of the Tigris does not reach north of Beled, the Euphrates must have been flowing at a lower level than the Tigris even before Nimrud—Marduk, to Semites a hunter, but to Sumerians an engineer !—turned the latter out of its bed, and forced it on to the hard conglomerate along its eastern bank. Water, then, could " easily " be sent across from the Tigris to the Euphrates. **River Relations.**

But the Euphrates here, like all relatively slow deltaic rivers, kept on depositing mud until its bed was actually above the level of the riverine land, while the swifter Tigris was still carrying most of its burden. At Baghdad, then, the Euphrates is 25 feet the higher,[1] and so water borrowed from the Tigris can be sent back to it ; but, when the Tigris deposited its burden in turn, once more it was above the level of the Euphrates, and water could be sent westward again. The Euphrates, too, was destined to much the more wandering and changing of course ; the Tigris has used only two main routes—the Amara and the Hai (Gharaf), while the Euphrates has tried half a dozen. If the two rivers bring down four or five times as much mud as the Nile, there is nothing to wonder at in their having filled up the old gulf even for a distance of 450 miles ; but, when both rivers are cutting naturally to the *west*, it does seem curious that there is so much more deltaic land *east* of the Shatt al Arab than west of it. And the key to this problem is with the Karun.

For, while the Euphrates and the Tigris left their burden in the thousands of square miles of marsh in Babylonia and in the western bay of the Kaur Abdullah—to make Bubiyan island,—the Karun rushes down from the Kuh-i-Rang (9000 feet in 250 miles) passing through no lakes[2] or swamps, and with rapids even at Ahwaz (not 20 miles up-stream in the days of Alexander, though now nearly 120). It has thus built up the whole of this south-eastern quadrant **The Karun.**

[1] And the Hilla branch, *i.e.* the nearest to the Tigris, is higher than the Hindiya.

[2] According to Strabo, Polycletus said that the Eubæus (Karun) did enter a lake ; but its name Pasi-Tigris shows that some people thought it the *main* river.

of the new delta, to a height of five feet above the level of the rest, converting—with the help of the Batin " rubble "—the Susiana swamp into a huge " lock." Even the Basra bar is made almost wholly of fine *Karun* mud, overlapping on the top of coarse Batin shingle, and it is this 5-foot bank that protects the Al Hammar swamps from being flooded with salt-water ; and even now, according to Sir Arnold Wilson, not 10 p.c. of the silt which passes both Feluja and Baghdad ever passes Fao. This, at least, suggests that harbour improvement at Basra should include some regulation of the Karun ; and it is the earlier flood on the Karun that dams back the Tigris in the Shatt al Arab.

Irrigation. For centuries these conditions have formed the permanent background of every irrigation-net for the whole area, and so of all its old prosperity ; and the future of the land, as depending on irrigation, will be definitely related to the fundamental conditions of that old prosperity.

There were three main canal systems. The Nahrwan system took off from the Tigris immediately *below* its exit from the Hamrin gorge (Fatha), and watered the land to the east of the river as far as Kut on the present course, and as far as Wasit on the old " Hai " course to Nasria (Ur) ; the Izakhi-Dijail system also took off from the Tigris at Tekrit, and watered the land to the west of the river as far as Baghdad ; and then the Dijail portion linked up with the Euphrates canals, which were intended mainly for the " island " between the two rivers southward of the " Diala isthmus " to Qurnah, where once the two rivers met.

Temperature. Unlike Egypt, the land runs northward and not southward from 30° N., and has no sea on either the north or the east ; and the latitude and the environment cause the Mediterranean climate to tend to great extremes. A normal range of temperature from 55° F. to 95° F. in Egypt is replaced here by one from 20° F. to 120° F. ; the " snow wind " can send the midwinter temperature down to 14° F., and the " sand wind " can send the midsummer temperature up to 125° F. Indeed, some of the temporary bars on the Euphrates are due to the sand carried by the wind into the river at low water from the very " loose " banks ; and the diurnal range is as great relatively as the seasonal, so that the temperature stimulus is severe.

Rainfall. The rainfall, though of Mediterranean type, is equally marked in its range. Fully 75 p.c. falls between October and April, and the " Latter " rains are not only heavy, but also brought by a very warm south-west wind, which melts the mountain snow very rapidly; but the variation is extreme. Baghdad is credited with a mean of 9″ a year, but it has had over 22″ and under 2″ ; and 7 out of 10 inches in some years have fallen in 16 days. As the mountain

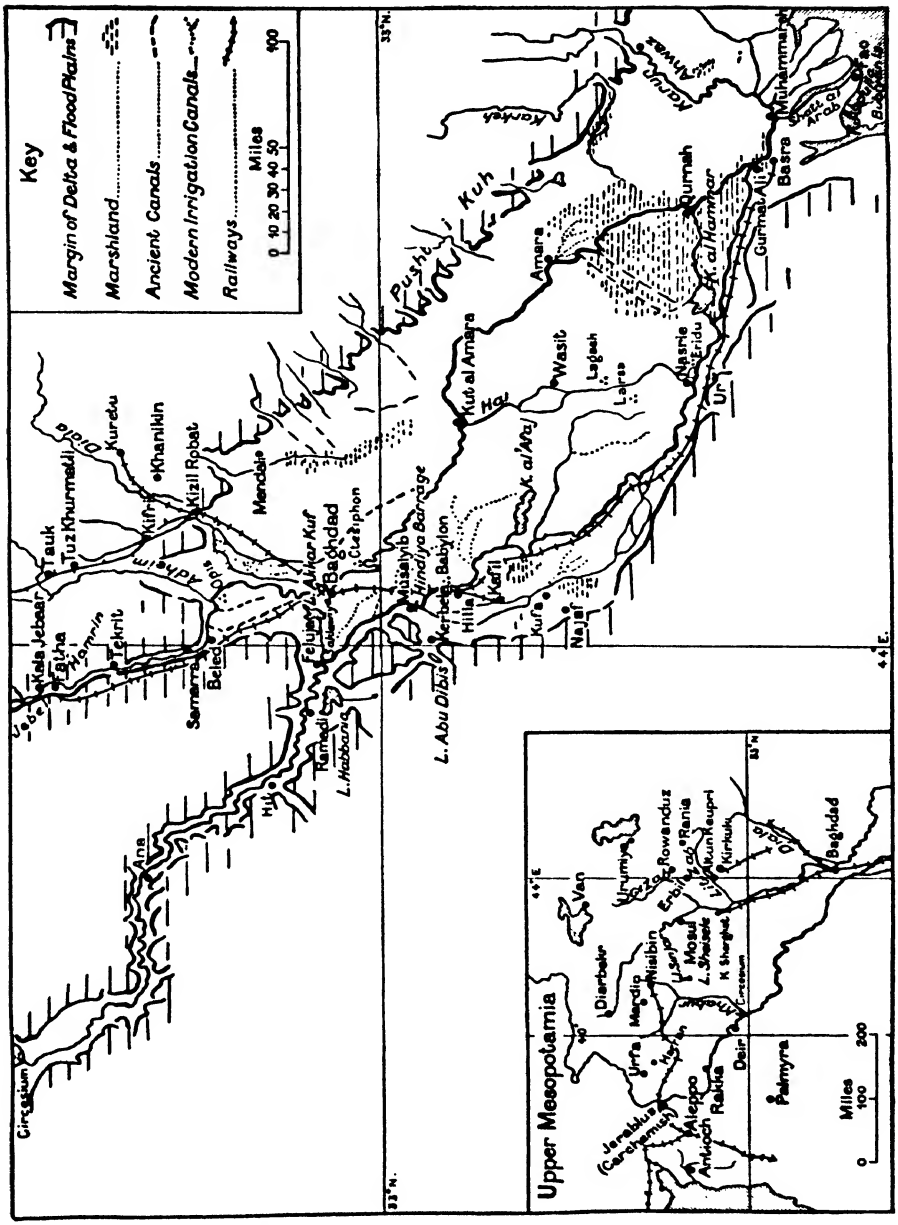

FIG. 54.—Irrigation Areas in Mesopotamia.

For the Climatic Provinces here and their natural cover, see pp. 138-139 and 150-151.

watersheds are both lofty and near, especially in the east, floods are sudden and very dangerous as well as variable; and even the March flood comes too late for winter crops, and the May flood too soon for summer crops.

There are cyclonic rains—from the Levant—about once a week during the winter, and they are sometimes associated with slight flooding; but the real flood does not begin till March, and low water comes during August and September. The heaviness of the "Latter" rains is due to thunderstorms associated with the very rapid heating of the land during the short spring; and the great heat of summer (June–August) is often ameliorated by very strong N.W. winds (averaging 30 miles), known as *Shamal*. But, in the absence of any N.W. drift, the influence of the Gulf must be very strong and very unhealthy; for even in February the mean temperature of the water off the Shatt al Arab is very nearly 60° F., while in August it has a mean of 90° F., and for a fair proportion of the month has even above 93° F.

Continentality. The continentality here, then, shows itself in great range of temperature (diurnal and seasonal), in the shortness of the transition seasons, in the scanty rainfall and the very low humidity; and so life can never have been as "easy" as in Egypt. There is no benevolent flood slopped over its banks by a friendly river, but a "dragon"—to be first tamed by man, and then to be made to work; silt was almost as dangerous as flood, and every hamlet had its ark. Egypt gave the world some ingenious mechanical devices, but no world ideas such as came from this troubled land. "Noah's flood would have been as impossible in Egypt as Joseph's famine would have been in Babylonia."

Use of Land. Under such conditions most of the land must be poor steppe or even semi-desert, suited only to pasture; and, though there may be a little extensive agriculture in winter without irrigation, all summer cultivation must be intensive and directly dependent on irrigation. But, as the deltaic lands give special conditions of relief and subsoil water, it may be useful to divide the country—roughly along 34° N., *i.e.* the latitude of Baghdad—into two. In the deltaic south the rivers are above the level of the neighbouring lands, while through the slightly raised platform to the north they have cut down their beds to some depth.

There seem to be some places in the north, *e.g.* the Nisibin valley, where the rainfall is only 8″, but over the mass of the area it reaches fully 12″, and this is quite enough for wheat and barley even on land which in summer looks like desert; and conditions in the Zagros basin (cf. p. 46) are really very favourable, while any saltish lands should suit sugar-beet admirably. In fact, nearly all the land between the Tigris and the Zagros is quite good, and some of it is actually rich. The facilities for irrigation, too,

are very great; and in a land which depends directly on irrigation for all real prosperity, and yet has so poor and so precarious a rainfall, every effort should be made to control the water-supply.

Water Control.

Such control must deal with three difficulties—flood, silt, and waste; and it seems strange that, apparently, no attention is being paid to the expedient which would cure all three, and to which there are no obvious geographical objections. For the future of irrigation depends on the Tigris, and the Zagros is the main cause of both flood and silt, while storage on the plain, *e.g.* in the Akkar Kuf, Habbania, and Abu Dibis basins, is the main cause of waste —75 p.c. of all such stored water being lost by evaporation. But the political allotment has left Irak with the scarp of the Zagros, and the main rivers could be bridled, filtered, and economised, by dams at the mouths of the Zagros defiles. The facilities for building the dams are at a maximum, and in the depths of the gorges evaporation would be at a minimum.

Middle Tigris Region.

This may suggest a re-statement about the four main units of the area, with some emphasis on the Zagros piedmont as probably the ultimate base of political strength; and history seems so far to encourage this attitude that some attention to the evidence may be usefully paid. For the Middle Tigris region, especially the prairie between the river and the Zagros, was politically of very great historical importance. It is just possible that the tall and slim Sumerians were very early Semitic intruders, even if they spoke a Chinese dialect brought from the Turan basin; their gods were certainly *bearded*, and sanitary reasons may have induced the old desert-dwellers to shave in the damp heat. Certainly Samuabu, who revived Babylon *c.* 2000 B.C., was an Amorite; and, though flood-girt Babylon was the first and the last great centre in the region, the oldest capital was *Semitic* Ur. But old Sumer was a very unlikely home for "Bedawin"—inside filthy swamps, a nursery of locusts and fever and plague, and needing great dykes to keep out flood and wild beasts and raiders; and the great mass of the old Semites moved across the Ana-Hit steppe, keeping off deltaic lands, to an ideal home on the Middle Tigris prairie.

Capitals.

Here there evolved a sturdy *agricultural* peasantry with mountain and river ramparts—Nineveh, unlike Mosul, being on the east bank—and with an incoherent plain in front of them; and they had nothing in common with the priest-ridden swamp-people. Indeed, they moved their capital from Asshur, between the Tigris and the Hamrin ridge and "behind" the Little Zab, to avoid the priestly influence, much as the Russians moved theirs from the Kiev steppe to the Muscovy forest; but even this was not far enough, and the capital was moved again—to Calah, behind the Great Zab, and ultimately to Nineveh, beyond the priestly influence and in a much better climate.

Military Base

But knowledge of their people's old origin and journeyings, and ignorance of what lay behind their mountain wall, seem to have rather misled Shalmaneser and his successors. The open plain in front seemed to be the only source of danger, and its incoherence seemed to invite conquest; and this led to the development of an imperial machine in the shape of a military organisation and a standing army—mainly *non*-Assyrian. As this was supplemented by a bureaucratic provincial system, it allowed them—once they acquired the Phoenician "Heligoland" of Cyprus—to indulge in dreams of World Empire.

But the real danger was behind the Zagros scarp, in the coherent "Jura" valleys; and the Assyrians never held these, and would not have been any more happy there than they were among the Elam jungles or the Anatolian snows. And from these valleys came the Medes—to prepare the way for the Persians, who were not Semites at all, and had no Semitic obsessions about razzias or religion. If the finer silt was carried down-stream to make a richer soil in Sumer and Babylon, Akkad and Assyria had a soil good enough to repay cultivation, and a much better climate in which to work.

Architecture.

Amongst the various results were some very remarkable building exploits—in Sumer as well as Akkad. There were no "Egyptian" temples for observance of flood-dates or pyramidal tombs for preserving the dead, but palaces and protective walls—to protect from flood as well as foes. Engineers and architects took the place of priests and embalmers, and built noble buildings and whole towns—"four-square," with streets and walls and quays. A town might be placed on a 40-foot platform above the river, so that sanitation was as sound as defence; and the walls might be, as at Babylon, 100 yards thick. If temples were neglected, it was not from inability to build them, as Esar-Haddon showed after his victorious war in Egypt—by building three dozen of them.

But the supreme work was done in tackling the raging floods, controlling them merely by earthen dams and forcing them into the service of man; and the only blot on the record was in the use of slaves,[1] as the reward of war.

Engineering.

The spirit behind it all was one of immense virility and worlds away from barbarism; women were able to read in Nineveh all those thousands of years ago, and a fortified canal ran as a great irrigating moat the whole way from Hit to Ur. Even the flood and the silt of the great rivers were more or less adequately dealt with. Any natural depression, especially on the "floor" of the old Gulf, where the rivers have raised their beds even above the level of the riverine lands, can be used as an "escape"; and—in that case—it must form a reservoir, even if there is no means of

[1] It was only the strength and the vigour of these captured soldiers that made it possible for Nebuchadnezzar to have a new palace built in fifteen days.

draining the contents back into the river at low water. Nimrud used the Akkar Kuf basin as such an escape for the Tigris—with 40 square miles of surface at low water and 300 at high water; and the Saklawiya canal feeds this from the Euphrates, which is 25 feet higher here than the Tigris. But the Habbania escape, on the *right* bank, is the natural escape for the Euphrates, offering at its normal high level a surface of 500 square miles; and this can be raised 20 feet, thus multiplying its cubic contents *nine-fold*, when it is capable of taking the whole excess of the river. Abu Dibis, the old Babylonian escape and reservoir, with a maximum depth of 80 feet, covers 4000 square miles. But, if the estimate of *75 p.c. loss by evaporation* off these escapes is fairly correct, the process is criminally wasteful. Cf. p. 277.

New Works. While avoiding the major problem of prevention, the Irak government is facing the minor problem of cure, and doing so in the best way—by adopting two of the most important suggestions in the complete scheme originally submitted by Willcocks. The new channel from Ramadi to Lake Habbania is being supplemented by a new channel from the lake to the Bahr al Mihk near Kerbela; and in years of excessive flood this will be used to avoid undue pressure on the Feluja escape from Lake Habbania. This should stop all serious spring floods in "Babylonia," and guarantee more water in the late summer. The second suggestion was a new dam at Kut, and this will divert excessive flood into the old course of the Tigris, which very little regulation will enable to carry on, artificially, its old work.

In this connexion two problems present themselves—a comparison with Egypt and the importance of Babylon, and in both cases far too little emphasis is laid on the non-Egyptian and non-Sumerian factors.

Unlike Egypt. No doubt, the Mesopotamian complex may be described as the nearest type and the next stage to Egypt, so far as it was concerned with irrigation agriculture, and the relation of rivers to canals, and a multiplicity of deities,—though all worshipped Bel, the *storm*-god of Nippur. But Egypt had no storms, no dangerous flood, no need for initiative; the river made the land, watered it, manured it. The Fellahin were only "soil-cutters." Here there were danger and chaos, urgent need for reclamation and organisation, an imperative demand for courage and energy, for imagination and initiative, to evolve system out of chaos, "Day out of Night"—so aptly suggested by the order of the words in The Book, "the *Evening* and the Morning were the first Day." There was far more making for virility here than in Egypt.

Yet Nineveh, with abundance of good stone, copied the Babylonian custom of building with bad brick![1] Why was Babylon

[1] If the bad brick has crumbled into mounds of dust, it has, at least, preserved the clay tablets, which were so much more permanent a medium than the papyrus.

Babylon. persistently predominate? One reason, no doubt, was the greater security, with a greater stability of life. The steppes had little or no protection from the desert or the mountain raiders—Amorites, Hittites, Medes, Parthians, etc.; and the extreme poverty of the Jezireh increased the duality of the two rivers. No single strong State existed here in the earlier days; there was no empire till the time of Sargon (2500 B.C.), *i.e.* 1000 years after similar development in Egypt, the Land of the One River; even then it was really only a loose and temporary Confederacy, and imposed by the Semitic Akkadian, whose Ishtar was the goddess of War and not, like the Sumer Ishtar, the goddess of Love. The Aramaic dialect of Damascus even became the *lingua franca* of the whole region; and it was the steppe mobility of the Semite that spread the Babylonian influence so widely and so far—till there were Babylonian elements in Hittite art, and a Babylonian script as the diplomatic medium of Cappadocia.

Instability But the Semitic power was never organised permanently on the incoherent physical base; indeed, it was never quite safe, so that all its prosperity—economic or political—was intermittent. It had been founded by Semites, and was constantly being affected by subsequent and similar invasions by other Semites from the west and the south, as well as by the invasions of non-Semitic Highlanders from the north and the east. The destiny of the area was to be never prosperous until it was for ever freed from all that is implied in pastoral nomadism, and was properly restarted under a strong administration based on irrigation agriculture.

Changes of Capital. Apart from the purely marginal Ur, the two earliest capitals of the region were Babylon and Nineveh, the one at the head of the deltaic reach of the western river and the other at the head of the non-deltaic reach of the eastern river; and Nineveh held the eastern end of the Fertile Crescent that linked their upper waters, while Babylon held the western end of the little isthmus of marshland between their lower courses. The relations between the two cities and the relations of both of them to the later capitals—*e.g.* Seleucia, Ctesiphon, Baghdad, all on the one river—illustrate the fundamental forces at work here, and the changes of geographic value that may be involved in historic development.

Obviously, the prime need was for an unfailing water-supply, and lines of movement tended to be riparian or actually on the water; and the Euphrates provided this well—for the vessels of the ancient days—from the gulf to within 100 miles of the Levant, *i.e.* along the whole western flank of the region, emphasised so greatly both by the wealth of Egypt and by the virility of Arabia.

The "Home" Bank. Even if Babylon was not founded by seamen, safety and fertility, which came next to water-supply in importance, were at first more or less confined to the delta; but, as civilisation spread up-stream to

a better climate and to hardier types of Man, Nineveh was almost as well placed as Babylon for cross-desert travel—*via* Sinjar and Palmyra—and much better placed for the easier and richer route across the Fertile Crescent, even if it lacked the sea-trade of Babylon. But, like Babylon, it was on the eastern bank of its river, because danger *was* feared from the desert, but was *not* feared from the mountains, though the Great Zab valley was a main source of food!

Seleucia.

But Alexander changed the outlook; and there was even a hint of the great "line of the happy mean and the middle course" in the choice by a Greek of a capital between the two extremes, where Seleucia—on the "European" bank of the Tigris—could watch both the great waterways from near the head of the fertile delta and its shipping. The position even gave much better access—by the Diala—than that given by the more northerly Zab to the Tehran Gate; and so, when Seleucus was once on friendly terms with Chandragupta, he should have been content at Seleucia. No doubt, it was natural for a Greek to wish to have his capital nearer "home"; but it was a mistake to move it to the European end of the Crescent, and his Antioch was as ephemeral as his second Seleucia.

Changes of Value.

Irrigation was the basis of all early development, and will be of all future development; and, while it was more or less local in the early days, with the water-courses—whether river or canal or even swamps—supplying transport and defence as well as water, now a single Power must control not only the whole of the deltaic formation up to Hit and Samara, but also the scarp gorges which make the far northern and eastern frontiers. This minimises the folly of the attempt to make a racial frontier in the north, and the railway incidentally has a further merit in this respect; for it did *not* follow the good steppe, or link the really important foci. Of course, Marash and Diarbekr were too far north; and so were the Roman centres, which did follow the good steppe—Aintab and Birijik, Urfa and Mardin. Aleppo (1450 feet), though about the right altitude, was a trifle too far south (cf. p. 271); and still more so were Meskenech and Haroun-al-Rashid's summer capital of Rakka,[1] and they would have been even if it had been feasible to go straight across the "desert" to Mosul.

Euphrates Towns.

There have been many other changes of values, especially connected with the Euphrates. Of course, Rakka—the old Nicephorium or Callinicum—is one of them; Circesium, commanding the Sinjar-Khabur route from Nineveh to Palmyra, is another. But the supreme case is Babylon itself. Though there is a depth of 14 feet at low water (24 feet during flood), the river will never again be a great waterway, for it is needed for irrigation; it was irrigation,

[1] At low-water camels can still cross the old Thapsacus ford.

as the basis of a great food-market, that gave Babylon its persistence and its importance, and that made a natural basis of union over a wide area under the pressure of common danger. But the fertility and the enervating climate were fatal to industry and energy, though the superior civilisation of the earliest irrigators gave them a prestige which delayed a little the final fiasco.

But there was another side to the story, and a glance at that may prepare the way for some detailed attention to the economic geography of the political unit of Irak as based on the division of the area into four main physical units.

Foreign Trade. The Sea-Folk of Sumer—whether sailors or highlanders or both or neither—were middle-men, between land and water, and had relations with their neighbours both by land and by water; and many of the tillers became traders, and some of the fishermen became seafarers. And so foreign trade led to some emergence of the original unit from the seclusion of its swamps, with a much enlarged reputation for being wealthy; and, as the tillers had been draining some of the swamps for tillage, there was easier access for intruders (cf. Russia's drainage of the Pripet marshes). It was natural that the early intruders should also be tillers, Elamites and Kassites, who were more likely to come from the rainy east than from the droughty west.

Trade War. Later, *c.* 1400 B.C., came fresh intruders—not tillers, and very far from sedentary. They were from the exposed debatable land round the desert, and had learnt to defend what was not defended naturally, *e.g.* by swamps; so they had evolved a military centralisation, at Mosul, though they were still so much dominated by the old steppe "control" that they could not evolve a suitable system of government for the sedentary tillers of irrigated alluvium. Too late (750 B.C.) the Second Assyrian Empire tried to consolidate, to organise, to extend trade; but the only result was to show the Medes how rich Mesopotamia was, and to show the world that an attempt to found a trading empire by war was bound to fail. And one reason for the failure lay in the exaggerated importance that their world had come to attach to the Euphrates and the Babylon to which it led.

Euphrates Traffic. For to-day, if we had to choose the best natural line of movement for traffic in this region, it would be impossible to choose a route with only one-way traffic, and that through a belt which can contribute nothing to that traffic; and this must practically always have been more or less true of the Euphrates route. It is the shortest route between Babylon and Aleppo, and to Europeans it was the obvious route from Aleppo to Babylon; the Greeks and Romans found the river navigable at Europos (Jerablus), and even from Samsat, and were not accustomed to navigable rivers which became

shallower and less navigable *down*-stream. As early as 3000 B.C. timber ("cedar," cypress, pine) from Lebanon and Amanus were being rafted down-stream, but only in the flood season; and even the pitch-plastered coracles that carried down stone and pitch could not work up-stream against a 4-miles-an-hour current. In no epoch were there any resources on the way, nor was there any perceptible population or any real safety (from the nomads) above Hit.

Special Use

It was, therefore, not a serious commercial route, still less a military one; but it was used for passenger traffic in curious emergencies. Nebuchadnezzar used it for a hurried journey home on hearing of his father's death; Cyrus led a campaign along it to surprise Artaxerxes—though with dreadful sufferings to man and beast below Circesium; Alexander tried it from Thapsacus to Rakka, but left it to try up the Belikh and find his way to Nineveh by Harran (Charrae) and Nisibis; the Romans started down it to attack the Parthian capital of Ctesiphon, but gave up the attempt—again at Circesium. It is not surprising that traffic was forced on to the Fertile Crescent or the Red Sea or even to go by a land track along the left bank of the Euphrates.

Piedmont Traffic.

In the days when Armenia was of importance, the track along the Crescent immediately below the Tauric scarp, with its good rains and stores of snow, became actually semi-urban; and the towns were very prosperous, partly because too far north to be much troubled by the nomads. But these Mardin latitudes were as rugged as the Rakka latitudes were drought-stricken, and the best route was the intermediate one, *via* Harran ("Road Town")—the focus for all the fords of the Euphrates "elbow" from Carchemish (? Jerablus) to Thapsacus, the extreme western outpost of Babylon, and for a time an Assyrian capital. This route became the great "road" of war and trade alike, the actual line of movement shifting with the season. Alexander was on the northern line when he saw the eclipse of the sun in the late summer of 331 B.C.

Some Economic Geography

River "Control."

In any survey of the economic geography of Irak it is difficult to dissociate the physical and the economic factors; their interaction has been very intimate for centuries, and political controls have actually changed the physical environment, especially when neglect of the rivers has led to catastrophes. But the fundamental control has remained the same; whether there has been prosperity or disaster, it has been the work of the rivers—in response to strong "agricultural" government or weak "pastoral" government. We may, therefore, treat the old and the new deltas together, and then treat the stretch of the northern steppe as an annex of the Zagros piedmont. We may ignore the asymmetry of political

boundaries with physical limits, but internal divisions may be based on essential differences of physical history.

Zagros Relations. The one outstanding distinction must be between the deltaic and the non-deltaic, Lower and Upper Irak, both within a sunk (? faulted) corridor of recent origin between the Arabian block and the Zagros folds; and, if the historic human note has been intimately associated with the block, the physical basis of all the economic development has been associated very largely with the folds. For our present purpose, therefore, we may associate the Zagros front specially with Upper Irak, even if the yellow soil of Lower Irak owes its colour directly to the *débris* from the limestone wall; and it is noteworthy that the bond of common interest in irrigation and common danger from raiders almost always minimised the duality of the two river systems, and tended to make a political unit out of the irrigation unit.

An equilateral triangle (with sides of 120 miles), based on Van, Urumyia, and Mosul, includes the famous Hakkiari highland; and its outer wall is part of the N.W.–S.E. folds of the Zagros, consisting of parallel ranges 9000 or 10,000 feet high, impenetrable in winter and very difficult of access even in summer. The outermost range, as elsewhere, *e.g.* the Pusht-i-Kuh, clearly defines a change of structure as well as relief, for the limestone wall drops abruptly (Amadia = 4200 feet) to a rough floor which is very rich in gypsum, but of which the conspicuous feature is a series of sandstone and conglomerate ridges—most conspicuous, naturally, when out on the plain, as the Jebel Hamrin, but equally obvious (600 feet) below the Pusht-i-Kuh.

Traffic Routes. It was mainly this change of structure (in relation to the water-supply) that took the old caravan route from Mosul to Baghdad at first *eastward*, as far as Erbil (1350 feet, *i.e.* 350 feet above Mosul), and then southward along the piedmont—in the corridor between the piedmont and the Jebel Hamrin—*via* Altun Keupri, Kirkuk, Kifri (with its Neft Dagh, "Naphtha Hill"), and Kizil Robat. But each of the great tributaries, in cutting to its right, has left a wide "basin" on its left bank, *e.g.* Rowanduz-Erbil, Rania-Altun Keupri, and the famous Khaniquin-Kizil Robat; and the fertility of these basins, no doubt, also attracted the caravans. The railway followed this route northward from Baghdad to tap the oilfields; and the Little Zab seems still to be a natural divide between the economic hinterlands of Mosul and of Baghdad, as it was some 3000 years ago.

Upper Irak. Apart from the basins enclosed in this montane belt, Upper Irak consists of a gently moulded platform of cretaceous and tertiary formation, through which in the dry climate the two great rivers have carved typically steep-sided valleys (seldom less than two or more than four miles wide); and, though the strata have been

hardly disturbed, the platform is well above the river level, and flood-irrigation is practically impossible. In the valleys, especially below Ana and Mosul, there are useful strips of riverine alluvium, and between Ana and Hit there is a series of poor cataracts capable of turning water-wheels ; but practically the riverine alluvium can be irrigated only by lift.

Pastoral.

As the area is thus not well suited to irrigation, development can only be by pastoral activities and an extensive agriculture dependent on the natural rainfall ; and the distributions are, therefore, directly associated with the rainfall. In the north, and especially north and north-east of the Jebel Sinjar, the average fall seems to be *c.* 14″–15″, while the amount where the two rivers converge is seldom more than half this. The Turkish troops that garrisoned the Sinjar during the War seemed to have no trouble about water ; quite a number of considerable *wadis* flow southward from the ridge (*e.g.* the Tartar), and the ruins of Hatra suggest an even better supply in olden days. But not one of the *wadis* reaches the Tigris, all being lost in salt marshes, *e.g.* L. Sheisele (scarcely 25 miles from the foot of the ridge). Of course, the rainfall in the south is quite inadequate even for good pasture ; but, as the mass of the fall comes in November–March, and as the land heats up so rapidly that the short spring is relatively warm, there is a large amount of good pasture in most parts during and just after the rainy season, and there is also the possibility of growing cereals widely in the north.

Wool.

The natural response to the prevailing controls here, then, is pastoral nomadism, precarious to the south, but prosperous where there is at least 10″ of rain ; and this has been, and is still, the basis of the economic life, even if on the northern and the eastern margins it takes the form of transhumance. The conditions are most suited to sheep, and one type does produce a fine wool, but it is black. The much commoner white wool is coarse and much less valuable ; but the conditions are not, as in Lower Irak, unfavourable for the introduction of better breeds, *e.g.* from Anatolia. Success depends, however, on provision of summer fodder, wells, and transport, all of which can be supplied only by Government ; and, while only the Government can tackle the financial difficulty, it must also be firm in organising—and even curtailing—the nomadism. If food and water can be found locally, the nomadism will come to a natural end.

Agriculture.

The agricultural development also depends largely on Government provision of improved varieties of plant and improved transport, and the northern area should be distinguished from the eastern. The 13″ rainfall-belt is admirably suited to cereals, with harvest in May. The wheat is hard, but very poor—a coarse (red) variety, but the conditions would suit many of the better

(white) varieties. At the same time they are even more suited to barley. Its short growing-season, its small water-demands, and its indifference to a slightly saline soil, give it real advantages over any varieties of wheat; and the colour and the quality of the normal crop are both admirable. This surely suggests that sugar-beet might also prove a great success.

Zagros Piedmont. The submontane basins—where the rainfall often reaches 20″—are much larger than the aggregate of riverine strips, but they are not really large; and they are best suited for intensive culture under irrigation, especially the Rania cotton and the Keupri tobacco of the Little Zab and the neighbouring Adheim basins, though some *un*-irrigated crops are raised in the Rania area.

Petroleum. But the immediate importance of the area is in its mineral wealth. Except for the Jebel Sinjar basalt, the platform is of sedimentary rock of recent origin, and has no metallic wealth; but the wealth in oil seems to be very great, as proved by centuries of leakage,—by conditions essentially similar to those of producing beds elsewhere in the neighbourhood, *e.g.* Ahwaz,—and by actual investigation of the structure, etc., on the spot. Originally the easiest access was to the Mandali end of the Hamrin anticline, but now the railway—which went up the Diala valley, avoiding the Nafat swamps—serves the centres farther north, *e.g.* Kifri, Tuz Khurmatli, Tauk, Kirkuk; and the Khaniquin branch connects Kuretu with the great refinery at Alwand.

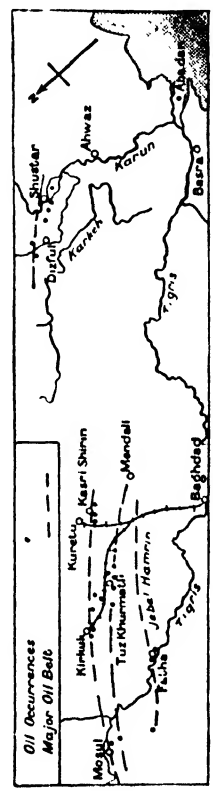

FIG. 55.—Mesopotamian Oil Belt.

The prospects for general commercial development are not very bright, long distances by land and much transhipment being at present unavoidable. The Kirkuk[1] line is metre gauge, and so has a through route to Basra; but the Baiji line from Baghdad is standard gauge, and so, even if Mosul was linked up with both lines, transhipment would remain necessary.

People. Organisation is, obviously, the great need—for external protection and for internal control; and the latter must include not only

[1] The pipe-line from Kirkuk crosses the Tigris near Fatha and the Euphrates near Haditha, where it bifurcates—the Tripolis pipe running due west *via* Homs, while the Haifa pipe runs *via* the Hauran *wadi* to Mafrak and then past the ancient Jabesh Gilead and Jezreel.

control of water and of nomadism, but—as far as possible—of the distribution of population. At present, in the whole expanse of fully 145,000 square miles there are not 3,000,000 inhabitants; and 60 p.c. are Arabs, who are very intelligent and appreciative of economic progress, but half of them are confirmed nomads and a bar to *agricultural* progress. The tillers, whether Arab or not, are careless and ignorant, fatalistic and optimistic—qualities that are useless here.

Lower Irak.

Lower Irak is well suited to irrigation development by its deltaic formation; its climate makes irrigation necessary; and its highly fertile soil—an argillaceous, calcareous loam—greatly encourages it. The extent of possible development depends on the extent of possible irrigation; even in the salt area the light yellow soil is so porous that it could be reclaimed with relative ease under a wide scheme of water-control. But, as the flood comes in spring, it must be stored; as its volume is so great, there must be protective works—even if these should be in the gorges of afforested basins in the Zagros; and, as the pace and the volume involve a terrific load of silt, surplus silt must be collected somewhere. Given wide and perennial irrigation, the possibilities are very great, for the wide range of temperature and the character of the soil allow of such winter crops as wheat and barley and beans, and such summer crops as cotton and millet, under "dry" treatment, and rice and dates under "wet" treatment.

River Foci.

The rivers themselves never left any room for doubt as to their critical points. Man might dam up an old channel to make a canal, or the river might drive a flood down a canal to make a new channel; but the foci remained stable. Even if man never realised that there were two deltas, one old and the other new, the foci on both rivers had direct relation to the apex of each delta.

On the Lower Tigris the point of decision—or indecision—was below Kut-al-Amarah; on the Lower Euphrates it was below Musaiyib. On the old delta of the Tigris its position was equally clear; for the old gulf lay to the south-*west* of Samara, and the river was cutting normally into the west bank. The point was, therefore, the actual apex of the delta at Beled. But on the Euphrates there was some doubt; for, though the river was cutting normally into its west bank, the old gulf was to the south-*east*. The point might be, therefore, anywhere along the 50 miles of eastward swing below Hit; and the actual apex of the delta at Hit was *less* likely than a point where there was a natural "escape" reservoir on each side of the river, *i.e.* between Akkar Kuf and Abu Dibis.

River Works.

This theoretical distribution was confirmed in every detail by the formal Willcocks survey. That postulated a Beled barrage—practically on the site of Nimrud's dam—and a Kut barrage on the Tigris, and a Feluja barrage and a Hindiya barrage on the

Euphrates. And active development has largely followed the survey, though it is more or less confined to three main schemes. The Hindiya barrage gives perennial irrigation along both branches of the river, using the lower and western Hindiya branch as the flood channel; and again at Kafil (near Ezekiel's tomb) the western branch is retained for the flood, which must swing westward. For the same reason the Hai branch carries the flood (and silt) from Kut—into the Hammar lake. No figures can be given for either scheme, or for the Diala scheme, which was the most satisfactory of all before the War, partly because the only real trouble was the control of the flood; but, if fully developed, the smallest—the Diala—should serve nearly 1,000,000 acres, and the largest—the Kufa—fully 3,000,000. Two-thirds of the whole area are said to be under water during and for some time after the flood, and there are several important inundation areas, *e.g.* near Feluja and Musaiyib and Baghdad; and—thanks to cheap oil—fully 1,000,000 acres seem to be supplied by pumps.

Labour. Even if now there is in many parts no lack of water, there is lack of labour; and delay on a summer crop, *e.g.* the harvesting of rice round the Khor al 'Afaj, may delay the work on other crops, *e.g.* the sowing of beans. As rice is confined to the lowest areas, this does not affect the winter cereals much; but the perennial supply of water ought to extend all crops if only there was enough labour.

Dates. The one crop for which the physical possibilities are almost unlimited, and the supply of labour is sufficient, is the date crop, which is far the most important at present, with an export in 1929 of over 150,000 tons; and, with improved quality and improved packing, this could be greatly increased. It occupies the two tracts where water is abundant, but where there is protection from flood; and there are major belts—round Baghdad,—along the west bank of the Euphrates, from Kerbela *via* Kafil and Kufa to Najaf, —and as far as tidal pressure up the Shatt al Arab leads to mechanical flooding of the riparian strips by the fresh water (cf. p. 272). This is far the largest continuous area of date-cultivation in the world, both banks being lined with the palms for over 100 miles; and, so long as the ground is well-cultivated—*e.g.* for subsidiary crops—they flourish, whatever the character of the soil or the water (clear or muddy, salt or sulphurous). But increased population will mean increased local *demand* for dates, which supply food and drink, fuel and fodder, for the cultivators.

Cotton. Rice is the main grain crop and is increasing in importance as a local food; and the latitude is very favourable to quality if any care were taken about this. But, like maize, it is grown specifically for home consumption, though there is a small export; and both rice and maize may have to compete with cotton.

This crop used to be confined to Upper Irak, and specially to the Zagros basins, *e.g.* the Khaniquin-Rania area, and the fibre was very poor and coarse; but the conditions in Lower Irak, specially round Hilla, are very favourable—the yellow soil, the long freedom from frost, the sharp fall of temperature in autumn, the absence of rain without any lack of moisture in the air or in the soil. The Baghdad experimental station shows very high yields of good staple (1–1½"), largely Punjabi-American, especially on some 200,000 acres of the Diala flood-plain. But, again, the Government must prohibit cultivation of the native variety,—control the import of good seed,—and supply instruction and instructors; and the latter should be Egyptian by preference.

Baghdad. The two most important centres in the country are Baghdad and Basra, linked by rail—from *Ur junction* !—and by road and river and even air-mail, the 350 miles forming part of the London-Cairo-Karachi route; and both are very young towns—for Mesopotamia, though Haroun-al-Rashid knew Baghdad, and Marco Polo "tasted the best dates in the world at Bastra." Baghdad is younger not only than Athens and Rome, but even than London and Constantinople. The convergence of the two rivers was the regional focus for thousands of years, but Medinet-es-Salaam, the "City of Peace," was not built—out of the ruins of Greek Seleucia and Parthian Ctesiphon—till *c.* A.D. 760.

The "peace" at which the Arab conquerors of Ctesiphon had wondered so greatly, was the peace of a Persian water-garden, with its Tree of Life (evergreen) and its Tree of Knowledge (fruit); and so the city was given its *Persian* name of Baghdad, "Garden City," and the map of the garden is still the design of the famous Chashura-Shaki ("Garden-carpet"), as the design of a real Kashmir shawl plots the meanderings of the Jumna.

Basra. Basra, like Calcutta, stands on the first point up-river where there is land solid enough for a town to be built on beside "deep" water; and, though midday August temperatures are above 125° F., it is much healthier than it was before date-growing displaced rice-growing, and before the habit was given up of drawing the drinking water from the part of the river into which the sewage was discharged! Muhammareh was never a serious rival even with the old frontiers, because it is on the wrong side of the river—a *Karun* port, actually on the Hafar canal that links the Karun to the Shatt al Arab. The old East India Company, three centuries ago, made a typically shrewd "guess" at the right spot when they chose for their "port" Magil, 5 miles higher up the river and in recent times considered the base of any military control of the delta.

A glance back at some of the stages of development which we have traced may suggest the kind of hereditary equipment which

Historical Geography.

the Phoenicians carried with them from their old home on the Persian Gulf to their new one beside the Levant; for even in the earliest days (by 4000 B.C.) we are confronted here with City State units, *i.e.* a form of polity not really suited to a deltaic environment.

The round-headed, beardless "Sea-Folk of Sumer" may have come from the sea-washed mountains of Elam, where they could certainly have learnt that use of stone which was quite alien to delta life; and that would account for the earliest settlements here, unlike the Egyptian ones, being on the delta and not in the valley of each river. In those days the Karkheh and the Karun may have had a joint "Susa" delta, 100 miles away from the Eridu-Ur-Lagash coast; and the people, like the Greeks later on, lived on hill-tops—safe alike from flood and foe, and with natural "terraces" for their crops, provided that they could get enough water.

City States.

Though rice was not introduced here till about 400 B.C., these delta "States" had an assured supply of "bread" so long as they had water; the river current was relatively slow, and the water was relatively free from silt. But the need for common defence from flood and foe had already suggested a Confederacy, and such needs as those for stone and metal and timber had to be satisfied from up-stream. Here, again, trade brought into existence a series of City units—Babylon, Kish, Opis (Samara); and the long-headed, bearded Akkadian also realised the value of a Confederacy. Eventually Khammurabi unified these confederacies into a "Babylonian" empire with an "Akkad" capital. Up to this time Asshur (Kalaat Shergat), "behind" the Hamrin ridge and the Little Zab, and commanding the Tigris gorge near Kala Jebaar, was a suitable place for a capital of "Assyria"; but there had long been no doubt that the way to the Western sea lay round the foothills of Zagros and Taurus and not along the Euphrates, though traffic could work down that river; and so a trading people—also worried by priestly[1] interference from Babylon—were prepared to move their capital northward to Nineveh, in the latitude of Aleppo. There land and water routes met, and east-and-west routes crossed north-and-south routes. The convergence of the two rivers to within 35 miles near Baghdad might mark the proper focus for a capital of the whole area, but the trade centre was going to be at the "turn of the ways"—Mosul.

All the peoples of the area, then, in earlier days, must have inherited ideas that sprang from, and always tended to return to, City State life based on trade—by land or by sea, and the land traffic largely a water traffic down-stream and a caravan traffic up-stream. Harran, the greatest of the Crescent trade-centres, and Nisibin seem to have been the sites of Phoenician factories!

[1] The priests were of a *trading* class!

CHAPTER XIX

SYRIA AND PALESTINE

(1) *The Syrian Corridor*

THE western half of the Fertile Crescent, as we have seen (p. 281), had several routes; the summer route led naturally *via* Birijik and Aintab to the Bogtche Pass (the Amanus Gate) and the Cilician plain, while the winter route led to the El Bahra basin—"the entering in of Hamath"—with the choice of climbing the Beilan Pass (2400 feet) to the Gulf of Issus or following the Orontes down to Antioch and Seleucia, or following it up to Hama (Hamath, Epiphamia) and Heliopolis (Baalbek). **"Entering in of Hamath."**

Many Biblical scholars (Porter, Stanley, Robinson, Barrows, etc.) insist that the "Entrance" was either the water-parting between the Leontes (Litsin) and the Orontes (Asi), marked by Baalbek, or the Kebir gorge between the Lebanon proper and the Ansariye, which now carries the railway from Tripoli to Homs; but the arguments used can scarcely be called geographical, and the assertion that "the Amanus constitute a true continuation of Lebanon and Bargylus (Ansariye)" is definitely incorrect. The Amanus *folds* are continued in Cyprus; the Lebanon is not folded; and neither the Phoenicians nor the Jews feared any "entrance" *by sea*. The Hebrew tongue does not even contain a word for a natural "harbour"!

From the north-eastern flank of the Amanus to the south-eastern flank of Sinai, what has been called "the Syrian Isthmus" extends as a rugged belt of territory as long as it is wide. If we locate it between the Alexandretta Gulf and Sinai, the very names suggest—and not only to Greek and Jew—that it has been a battlefield between two wholly alien ways of thought as well as a bridge between three converging continents; it has offered wonderful chances to the middle-man and the money-changer and many a fine site for an inn or a bazaar, but never one for a home or for a real Jerusalem, a "City of Peace." Its chequered story is almost epitomised on the rocks where the Dog River springs **Bridge and Battlefield.**

from its Lebanon cave—where Egyptian and Assyrian, Greek and Roman, inscriptions are almost translated in the neighbouring Turkish and French, English and Australian, "comments" of similar kind.

This history is reflected in the present chaos, for Syria is no more one country than India is, but is split into a number of racial and religious, political and economic groups, each with its own narrow interests and aims and hatreds, ancient and modern. There are no less than *six* persons claiming to be Patriarch; the population includes Turks and Turcomans, Kurds and Circassians, Persians and Armenians, as well as Arabs and Jews; and the interests of Alexandretta and Aleppo, as between east and west, and between north and south, are antagonistic to those of Beirut and Damascus.

Incoherence. The French control is not really helping to lessen the confusion. Its pivot is the 300,000 Christians (of many varieties) of the Lebanon Republic, where even in the old days no Turkish soldier might intrude; but to the Lebanon proper have been added the ports of Beirut and Tripolis and the Bekaa, all three very largely (? $\frac{9}{10}$) Moslem. As Latakia is the centre of two groups of Moslem dissenters, it is a separate Government, and the Jebel Druz is also—for obvious reasons. Alexandretta is isolated—for real administration (a Sanjak)—from Syria for convenience in handling frontier problems; and so the State of Syria is almost reduced to a nominal unit, though it contains the two most important towns in the area, Damascus and Aleppo. The result of such subdivision can only make the units more parochial and incoherent, increasing rivalries and denying the educative influence of coöperative experience in government, especially while Beirut looks seaward to Rome and Paris, while Damascus looks landward to Mecca and Baghdad.

South-east. Even to the south the eastern belt (east of 37° E.) of the French mandate is in no sense either a part of the "Isthmus" or a natural annex of it. The earliest inhabitants there seem to have been pure Semites, and the mass of them came under Greek rule before being incorporated in the Roman Empire; and there are, even in the desert, remains of Roman roads, with bridges where now no *wadi* ever flows. There are also the remains of hundreds of oil and wine presses in places where no olive or vine could exist to-day. It is evident that a great deal of wood was used in the buildings which now lie in ruins, and reckless destruction of timber may have affected the climate; but the Persians and then Mahomet's generals "bled the land white."

North-east. To the north, too, this eastern belt is not part of the "Isthmus"—by structure or relief or drainage; but it is a sort of annex of the Aleppo section, and the Khabur—with its steep banks and swift current—has constantly been a frontier, especially for a

western power. It was so for the Hittites, for Syria against Assyria, for the western satraps of the Persian Empire, and for Rome; and its Mygdonius tributary (Jaghjaghe Su) tempted Rome to Nisibin. The Fertile Crescent was recognised as a better route than the poor steppe and bare desert from the Persian Gulf to the Levant so early that the Syrian god of Rain and Wind, Rammar, had a temple in Babylon 2000 years before Christ; and the relief which allows easy access by the Aleppo Gate to the Levant also gives access inland to rain-bearing winds, with the result that fine barley can be grown between the Belikh and the Euphrates.

Motor Transport.

Further, it is probably a real advantage to have the land south-west of the Euphrates in the hands of a power able and anxious to develop modern means of transport; and the French have no less than three companies operating motor routes between Beirut and Baghdad (*c.* 1500 miles). The shortest is *via* Damascus—directly eastward across the desert to Ramadi, and then along the Euphrates to Feluja and its floating bridge; and, though there are a few bad places, the surface for most of the 550 miles is a hard gravel on which very good time is made. A longer (700 miles) but more profitable route goes from Damascus *via* (a modern French) Palmyra to Hit for Ramadi; but this may be changed to start at Tripolis,[1] and run *via* Homs and Palmyra either to Abu Kemal, joining there a route from Aleppo *via* Meskeneh and Deir, or to Rutbah wells, on the direct Damascus-Ramadi route, where it may be joined by a Jerusalem-Amman route.

Deir.

These motor routes are producing a definite change in values, especially as to important foci; but the stable control can still be traced behind the changes, for the really vital question was always safety, illustrated well by a comparison of Deir with Abu Kemal or Ana. It stands exactly off the south-eastern corner of the Syrian platform, which presents a north-eastern wall to the Euphrates and a south-eastern to the caravan route from Palmyra. The wall is at least 1500 feet, rising very suddenly in some places to 2000, and the 2000 level carrying—very close to its edge—the 3000-foot ridge which means rain. Both the river-valley, then, and the caravan route "open out" here, and on an island in the river stands *Deir*, "The Camp."

Island Fortresses.

In the river-valley above the island there are strips of fertile and tillable soil, but the total area is so little—especially compared with the length—that it could never support enough tillers to form a group capable of defending itself for one day against the nomad raiders; and, therefore, it was deserted, though not desert. But, as the river begins to cut down its platform and widen out its valley, with approach to its delta, a number of islands are found; between

[1] The trunk pipe-line from the Irak oil-field has one terminus here and another at Haifa.

Ana and Hit there are half a dozen that carry the ruins of what must have been really strong fortresses; and, with this refuge of island castles, the riverine lands were very prosperous under the Abbasid caliphs of Baghdad (A.D. 750–950), and even as late as the thirteenth century. And now there are numbers of little villages along the river, even between Deir and Abu Kemal, where supplies of various kinds can be stored by the motor companies.

"Arabian."

Apart from this alien, or eastern, flank this "Syrian Isthmus" —or "Semitic Bridge"—may be regarded as a long and narrow annex of the Arabian block; and its history, both physically and otherwise, has been most remarkable, with twin lines of movement and with a double human note, Phoenician and Hebrew. Its western foundered flank lies beneath the Levant; its sheer scarp has been tilted up to a crest of 10,000 feet; its narrow body has been depressed rather abruptly eastward and split from end to end by twin lines of deep fracture.

The Great Rift.

As the originally continuous dome of the Vosges-Black Forest mass dropped to form the floor of the Rhine valley, so the narrow belt between the fractures here dropped, but not to form the valley of any master river. Like the Appalachian and the Californian valleys, and like the Baikal valley (p. 216), it is a trough, occupied by a succession of rivers flowing in opposite directions; and all are faced with the alternative of breaking through the lateral walls, as the Leontes and the Orontes do—at very sharp angles—or of disappearing in some basin or abyss of inland drainage, as the Barada (Abana) and the Jordan do. And the slipping of the limestone "floor" between the two faults was associated with the folding of the Amanus to flank its northern end, and with the outpouring of basalt to flank its southern half, *e.g.* in the Hauran (Bashan).

Levels.

This "Bridge" has two arches, the key-stone of the larger being the Baalbek saddle and that of the smaller being the Petra saddle; the former is at a height of *c.* 3800 feet, and forms the water-parting between the Leontes and the Orontes, while the other is scarcely 800 feet, and suggests that the Jordan once flowed along the raised beaches of the Dead Sea and through the Araba gorge past Petra into the Akaba Gulf. The western parapet of the Bridge is higher and more continuous than the eastern, reaching 10,000 feet in Lebanon against only 9000 in Anti-Lebanon (in several summits besides the terminal Hermon, "The Landmark").

Maximum height is reached in these Baalbek latitudes both in the rift and on the parapets (10,600 feet), and both sink northwards and southwards—to normal sea-level near the mouth of the Orontes in the north, but in the south far inland in L. Huleh (the Waters of Merom), and then to 700 feet below that in the Sea of Galilee and to nearly 1300 feet below it in the Dead Sea, where the

crests of the coastal scarps are just above sea-level. In the north the Bahret el Kattine marks the point where the Orontes escapes from the real Coele Syria (" Hollow Syria "), or El Bekaa, with the Nahr el Kabir glen on its western flank and no wall to speak of on its eastern flank, the Huleh (Aleppo) platform.

Syria, then—roughly north of L. Huleh, *c.* 33° N. and west of 37° E.—presents four belts more or less parallel with a corcordant coast. A discontinuous ribbon of coastal plain is followed by a **Four Belts.**

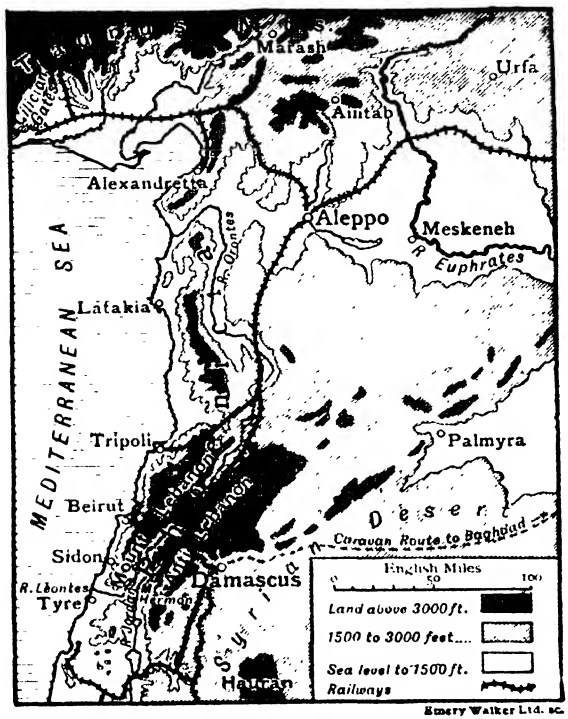

FIG. 56.—Relief of Syria.

continuous ridge of limestone blocks, having an average height of 7000 and an extreme height of nearly 11,000, with a disjointed section (Ansariye), to the north. Behind these two come a narrow upland—which falls to sea-level to north and south, but rises to nearly 4000′ towards the centre, and yet is always in the nature of a trough, even when one side of the trough is broken—and an eastern ridge of limestone blocks having an average height fully 1000 feet lower than the western ridge and a disjointed section (Hermon) to the south, but—unlike the western line—not heavily swept by rain.

Climate. The climate is purely Mediterranean, but dominated by the relief. In the north the relief is so "low" that neither the rift nor its walls are obvious, and rain is carried up the lower valley of the Orontes so easily that even Aintab has an annual fall of 22", and there are exceptional facilities for agriculture in the El Bahra basin and its flanks, especially for cotton in the Afrin valley and on the Idlfb platform. Farther south there is heavy rain only on the western heights; the valley has little rain, though abundant water for irrigation, but its broken eastern flank has not even that, so that the agriculture of the Homs and the Hama plains gives place to steppe pasture. At the head of the Orontes valley the western barrier is so high that the rift even at 4000 feet has very little rain, though enough for tillage; and the eastern barrier dries the wind entirely, so that eastward there is only desert —but with rich oases, such as Damascus, growing grain and fruit (olive, mulberry, and vine) and tobacco.

Ports. The Alawiya part of the coastal strip is much wider than the "Phoenician," and so is the more suitable for tillage, *e.g.* the Latakia tobacco culture; but the rough piedmont of Beirut and Saida is at least well suited to olive and orange. At the same time its real importance is essentially in its roadsteads, Beirut being much the most important, and Tripolis (El Mina) and even Latakia being larger towns than Alexandretta. Though the coast is typically concordant, the sea in front of it is not very stormy or treacherous; and the "inferiority" of the northern roadsteads has been due historically to the danger of raids from the northern mountains (*e.g.* Hittite) or the eastern steppe (*e.g.* Assyrian) rather than to their intrinsic badness as harbours. This danger was always more effective in early days than the desire to tap the trade of the Fertile Crescent; but there can be little doubt that Disraeli was right in asserting that, to a Sea Power, Alexandretta was the key to Turkish Asia and the best terminus for a railway to India.

Lebanon "Cedar." Though only the peaks carry snow throughout the summer, Lebanon ("The Snow-White") deserves its name, as it collects enough snow for its precipitous eastern slopes to be swept by avalanches; and it is very rich seaward in streams and stream-cut gorges, and is literally terraced with orchards up to 5000 and even 6000 feet. There are a few patches of the sacred cedars still left, *e.g.* above Ain Zahalla in the Barukh valley and in the Al Arz ("*The* Cedars") in the Kadi valley; but the cedars were always on the *higher* terraces, and their timber was too soft and too apt to shrink and warp for it to be used for shipbuilding. The Egyptian supplies of ship-timber did come from Lebanon (even 3000 B.C.), and the Egyptian name for a sea-going ship was actually derived from Keben [1] ("Gorge"), the Lebanon port; but the timber was

[1] Keben = Jebeil (Byblus).

fir and juniper—both branching in the same manner as the cedar—from the lower slopes.

El Bekaa.

The lower valleys of the Orontes and the Leontes, which define admirably the two ends of the range, give access to very different kinds of country; for the Antioch plains, as we have seen, are a scene of general agriculture, especially grain and pulse and cotton, and there is an extensive cultivation of the silk-mulberry. The Hama-Baalbek "upland," El Bekaa, is a healthy orchard land, which raises good silk if the worms are hatched from French eggs; but the middle valley, below the Ansariye, is too marshy to be healthy or to be well cultivated.

This was an additional reason for early trade avoiding, as the Aleppo railway does to-day, this section of the (? rift) valley; but the possibility of doing this depended on the discontinuity of the eastern range, of which half sinks to below 2000 feet to be lost in the edge of the plateau, while the other half works eastward as the Jebel Shamaria. So Aleppo could be reached west, and Meskeneh east, of the Es Sabkha, while Rakka could be reached directly from Hama along the Shamaria piedmont. The gap between Hermon and the rest of the dry and forbidding Anti-Lebanon gave fairly easy access, by the Barada valley, to Damascus.

The Hauran.

South of Damascus and the barriers of Lebanon and Anti-Lebanon there is easy access for wet west winds to the wide basalt plains of the Hauran, "The Cavern-Land"; and here the development of rivers and the economy of water are far better than on the porous limestone. The name was probably given originally to El Leja,[1] "The Refuge," a wild caverned chaos of cracked lava, in the innumerable caves of which refugees, *e.g.* Druses, found safety. But beyond that the basalt platform stretches for 50 miles each way, with the "6000" feet of the volcanic massif of Jebel Hauran as a fine watershed; and it is immensely fertile, producing very fine wheat. The ubiquitous relics of Greek and Roman occupation suggest that it always did this, and it is believed to have been King Solomon's granary.

Syrian Products.

Apart from the Phoenician coast and its people, and the Hauran and its products, the Syria of the Mandate has not been of much importance except politically and as a north-and-south passage-way; and it is less important now as a north-and-south route than it used to be, even if equally important as crossed by an east-and-west route. Its climate and its soil are favourable to mulberry and tobacco, and its Maronites are very clever silk-workers; it has considerable mineral wealth, mainly in manganese and antimony; and it has access to large supplies of wool. But the Beirut line has to cross the Lebanon—with 20 miles of rack and pinion—at a height of 4900 feet and the Anti-Lebanon at 4600; and the *natural* outlet

[1] Also known as Argob, "The Rocky," and Trachonitis, "The Rocky."

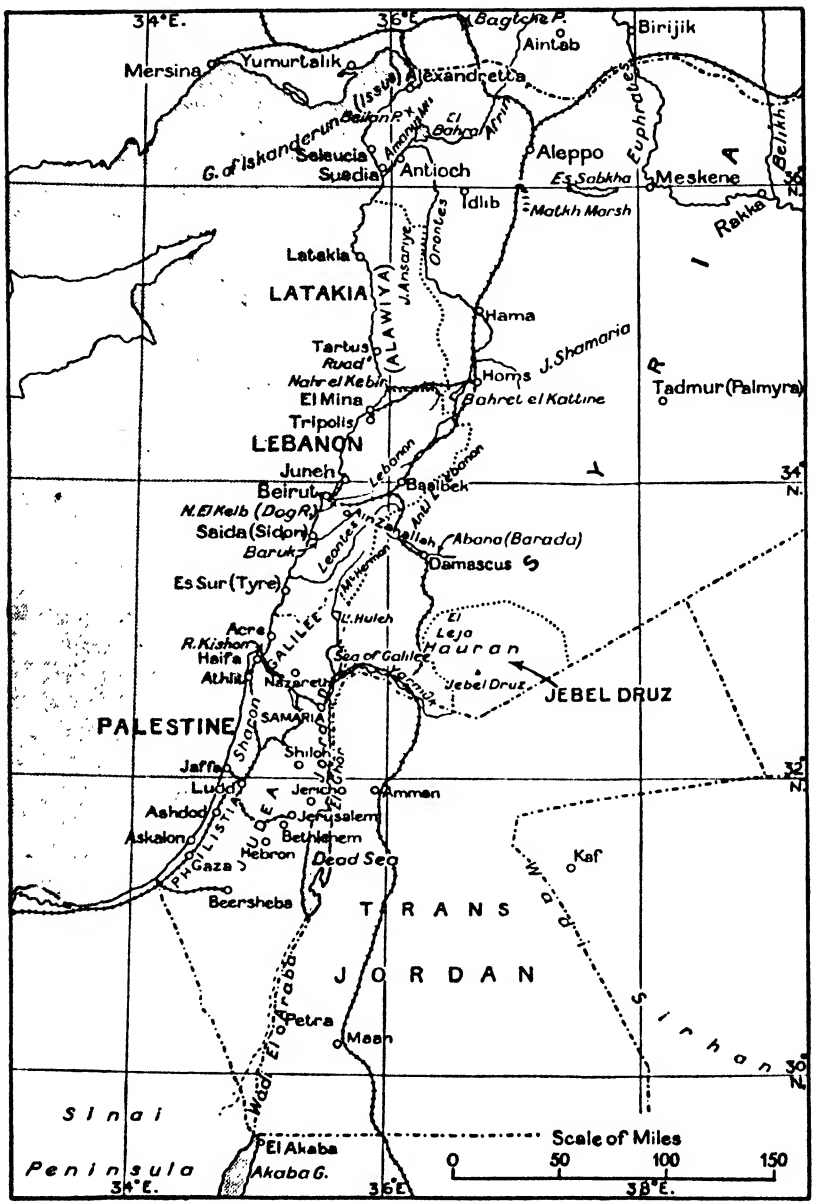

FIG. 57.—Syria—Economic and Political Centres.

for the Hauran is across the plain of Esdraelon, *i.e.* through the British "Mandate." The hostility of the Druses to the French does not discourage use of this natural outlet.

Difficult Government.

Quite apart from any political or racial or religious antagonisms, *e.g.* the concentration of Moslems round Aleppo and of Christians round Beirut, the area is far from being an easy one to govern. The Phoenician coast has none of the old linked unity; the parallel passage-way inland, as a north-and-south thoroughfare, is declining in importance, though it is a link; the dense Maronite population is concentrated on the Lebanon; and the two effective belts of the territory are not only transverse belts at the two extremities (the Alexandretta-Aleppo and the Beirut-Damascus), but also antagonistic in their interests.

Political Focus.

In this connexion it is difficult to avoid the conclusion that, once Mosul is properly linked up with the railway across the Fertile Crescent to form a great "international" junction, the balance of power must tend to move northward; but the political distributions are troublesome, especially the severance of Cilicia from the Amanus shore of the Iskanderun (Alexandretta) Gulf. For the natural outlet, not only of the Cilician plain, but also of the south-eastern section of the Anatolian plateau, is the gulf. Mersina, though the railway terminus, is a very poor roadstead, where most vessels have to lie two miles out from shore; and the natural harbour of Yumurtalik on Ayas Bay, though separated from the plain by only low hills (1500 feet), is on the wrong side of the gulf to tap any traffic from the east or the south.

Iskanderun Gulf.

There must be here, in south-eastern Anatolia, south-western Armenia, and northern Syria—apart from the Fertile Crescent—an area of 100,000 square miles for which the natural shipping point must be on the gulf; but it must be on the Asiatic side, and Suedia is not much better than Mersina, though the Phoenicians seem to have had their most northerly port here. Even at Yumurtalik some harbour works would be needed, and Alexandretta has some shelter[1]—but not as much as a port on Ayas Bay—from the stormy quarter (S.W.). In any case, access inland across the Amanus is much easier than from Beirut across the Lebanon, and the farther hinterland is much more important. From London to Alexandretta by rail is 3400 miles, and the distances on are: 400 to Mosul, 600 to Baghdad *via* Mosul, and 500 to Baghdad *via* the Euphrates.

Aleppo.

The future depends less on the relative importance of Aleppo and Damascus than on the through traffic. The descendants of the old Venetian colonists have kept Aleppo famous for all kinds of craftsmanship, especially in silk and cotton textiles and gold and silver "thread"—the two words *bombazine* (Bambyce) and *muslin*

[1] The Elma Dagh shelters it too much from the north and the east, so that the marshy hollow in which it lies is not very healthy.

(Mosul) coming into English from Aleppo; and the miles of gardens along the river—which disappears in the Matkh marshes—are high enough (1400 feet) to produce a great variety of fine fruit.

Damascus. The story of Damascus can be told in almost the same words, though there was no Italian settlement of the place in the Middle Ages. The city, which claims to be "the oldest in the world," is rather nearer than Aleppo to the Levant (*c.* 60 miles), and has not suffered as Aleppo and Antioch have from earthquakes; but its typical activities are in silk and gold and silver,—it is girdled by a 60-mile circuit of gardens growing wonderful fruit, especially apricots and walnuts,—and its river disappears in salt marshes, the "Meadow Lakes." Sea transport has ruined its caravan trade, and the pilgrim traffic is only a fraction of what used to march down "the street that is called Straight" (a mile long); but the city will remain to some extent the market of the whole desert, as Aleppo will remain to an increasing extent the market of the steppe.

Air-Traffic. The suggestion that Damascus might become an important air-station seems to ignore both its latitude, as compared with those of Aleppo and Petra, and the character of the desert eastward from the Meadow Lakes. Desert routes are being very much belauded for air-traffic; but the intensity and the rapid variation of heat must create very dangerous conditions both *of* and *in* the atmosphere; and a sudden descent from a snow-capped coastal range into the glare and the heat of the low levels of the desert must be as adverse as boulders and camel-thorn in landing operations.

Phoenicia

This reminds us again that the most persistent feature of this Bridge for 4000 years has been its danger as a passage-way, which has never been better illustrated than in the historical geography of Phoenicia; but that is worthy of attention on other grounds, especially if we try to relate these middle-men to their position beside the great Midland Sea, midway between Egypt and Babylonia.

The Phoenician. For both the river lands were lands of drought, where the need for surveying irrigable lands developed in very early days the study of arithmetic and geometry, and where the cloudless skies encouraged the application of such science to the study of the stars; and so the two great sources of trade provided the traders with a great aid for navigation and an essential means for development of both a calendar and a coinage. And the traders had quite exceptional preparation for their work, for they had come from the Bahrein islands up the Euphrates—probably in *sewn* boats, such as the Bahrein pearl-fishers still use,—and must have had constant difficulty in avoiding the "storm-wood" that is still constantly floating down the river. The little coves, with their backing of Lebanon fir and juniper,

must have seemed a paradise to them ; they knew at first hand the value of such timber in Baghdad, and must have realised instantly how much more easily it could be moved by sea than by river ; though they were never fighting men, they had no other sailors of whom to be afraid ; and their trading instinct was quite as much alive to trade by land, *e.g.* to Harran, as by sea and river.

Sea Confederacy.

From a political standpoint the long and narrow territory between the forested wall and the tideless sea enforced coöperation on the series of isolated settlements, so that they formed a definite Confederacy, resembling the Hansa, but less political and much less aggressive ; and from the economic standpoint they did not need a larger area (*c.* 3000 square miles), for their man-power was not sufficient for agriculture as well as trade and industry. They could buy bread-stuffs, as they bought wool, from inland ; and they could obtain food, as well as purple dye, from the sea, while the shore gave fine sand for their glass, and the Lebanon slopes gave them not only timber, but also amber and sites for vine and olive. People who for centuries had known how to *sew* seaworthy boats needed no training in textile work, and only needed the humid coastal air to produce the finest products of wheel and loom. If pressure of population led to some emigration, the emigrants made useful " factory " settlements all round the southern shores of the Great Sea.

If this Phoenician coast to-day cannot show a single great harbour, it did satisfy Venetians and Portuguese and Levant companies for centuries ; and the secret of the extraordinary success depended—apart from the small size of the ships till quite modern times—on the combination of profit with protection. There was risk to the trade whether by land or by river or by sea, but the base was secure—so secure that the traders never really feared invasion, and did not find the overlordships, *e.g.* of Egypt, really burdensome. Their story, as told by Rawlinson, only suggests cautious choice of positions that were perfectly secure in themselves and yet in close proximity to a great trade-route ; or, if they did move towards dangerous points in order to get access to some special focus, they took infinite pains to minimise the danger.

Ports.

Their first settlement was almost certainly at Byblus (Gebal, Jebeil), in a quiet bay—north of Beirut—with a Lebanon stream and its glen behind it. Evidently the advantage of a position where the south-west of the " harbour " was sheltered by a bold promontory, as at Beirut and Tripolis, had not been realised ; but it had been realised that there was *too easy* access from inland to these two ports—*via* the Nahr el Kelb (" The Dog River ") and the Nahr el Kebir. Sidon *may* be equally old, and stands in a very similar position, with two miles of very fertile plain between it and the steep foot of Lebanon ; but it had the great advantage of a

small promontory and a small island, and could be approached from north or south *in the lee* of the island. The great attraction, however, seems to have been in the great beds of shell-fish, from which the purple dye was obtained; and this gave the town its name (*Sidon*, "Fish-Town") and made it the chief industrial centre of Phoenicia.

Tyre. But for trade Tyre (*Es Sûr*, "The Rock") had even greater advantages, for there was a little "reef" of islands half a mile off shore, of which the two largest ran parallel with the shore for nearly a mile; and this position, though "a safe five miles" south of the Leontes gorge, *i.e.* the *easiest* route to Damascus, was near enough to the gorge to tap all the trade. Tyre, therefore, became far the most important centre in the whole Confederacy, and the strength of the position—to seamen, especially after they had constructed a *submarine* aqueduct for fresh water!—even encouraged excessive confidence. Nor was this wholly unjustified, for the city did hold out against Alexander the Great for seven months—in fact, till he built a causeway, and converted the islands into a peninsula! But it was again a famous city under the Romans, and still famous as a medieval city, sheltering the Crusaders for 150 years, though drifting sands have now utterly ruined the harbour, never a deep one. The sea-beaten fragments of its tremendous fortifications offer to-day a most melancholy spectacle, with which even Ezekiel would be satisfied (Ezekiel xxvi. 4, 5, 14).

Arvad. But there was another great route across the desert besides that *via* Damascus, and it deployed from the Fertile Crescent *via* Hama, Homs, and the Nahr el Kebir; but this was much less safe—possibly, the dangerous "entering in of Hamath" (p. 291). It was desirable to command the sea-terminus of this route too, but only with great precautions; and the first need was a Refuge—*in the sea*. And there was one. The bare island of Ruad (near Tartus), which is the broken end of a little promontory, lies two miles off shore; but the rest of the promontory was not much below the surface of the water. It was a relatively small task, therefore, to build up the "reef" into a great breakwater, leaving a moat inside it, and to construct two harbours—again a northern and a southern—in the lee of the enlarged island. And it was well worth doing, because in the middle of the sea off the harbour there is a *spring of fresh water* from one of the great ducts in the Ansariye[1] limestone; and they tapped this *under water*, and conveyed the fresh water to the island in a huge leathern pipe. Well might they call the place *Arvad*, "The Refuge."

[1] The water-supply in the old race-home, Bahrein island, comes similarly from a limestone duct fed from the rainfall on the Nejd hills *300 miles away*; and one of the springs comes up in the sea, and is tapped as this Arvad spring was.

(2) *Palestine*

Even if Palestine were a mere replica of Syria physically, its history would justify its treatment as a separate unit ; but some of its main physical controls simply contradict those of Syria, and its story is unique, for it is " Holy " alike to Jews, Christians, and Moslems. It is a land of strongly marked features, in a very critical position, with a long and full history ; and it gives us some vivid examples of the interaction of Man and Place, *e.g.* in its relation to the outside world, in the relations of the various parts to one another, and in the relation of the controls to the responses in those parts.

External Relations.

Its immediate relations to the outside world were in the form of strong natural boundaries eastward and westward, the desert and the sea, and an easy natural passage-way northward and southward, north-eastward and north-westward to Asia and Europe, and south-westward and south-eastward to Africa and the great Desert, —from which were to come the three great monotheistic creeds of the world. And the passage-way carried the oldest road in the world, in the very old days, when men moved only by land ; and south of Hermon, past Tabor and Carmel, from Nazareth to Gaza, it was the *only* land link between the three continents which made up that Old World.

So Palestine, between its barriers of desert and sea, had the essential unity of a bridge, on which converged routes from all the world. It thus became the morphological centre of a very important area, which was all Semitic,—between the dense nurseries of man-power and wealth in the flood-lands of the Nile and the Euphrates, and so a highway of trade,—between two great centres of empire in Egypt and Assyria, and so an artery of war,—between two diverse stages of civilisation in the old lands of Asia and Africa and on the untried waters of the Mediterranean and the Indian Ocean, a refuge from the one and an outlet to the other.

A World Centre.

As a line of least resistance—to trade and war and even plague— it almost epitomised the history of the Old World ; at every stage it was used by the great figures—*e.g.* Sennacherib and Alexander, Pompey and Saladin ; it was a scene of constant passing and re-passing that must have been very congenial to the nomad mind, and from its passers-by its natives must have taken constant profits, small and great ; in its little centres every tongue and creed and colour of skin and type of costume were familiar ; it collected news from all the world, and was an admirable place from which to distribute news, whether gossip or gospel.

The Great Road.

But in itself it had no great attraction for those who used the Great Road, for they came from much richer and more fertile lands ; and the sweet and clear waters of Abana and Pharpar were much more attractive than the saline and muddy flood of Jordan. But

to people from the desert, fairly fresh water, however muddy, was delicious; and milk and honey, even if only goat's milk and wild honey,[1] were precious. And so the land was peopled from and through the desert, entered definitely "across Jordan"; and it was a great change for them to come from the silence and the solitude, the vast spaces and the isolation of the desert, to live in broken bits of country beside the Great Road, with all its bustle and throng in peace and war. Even if the Great Road had been always a road of peace, and the land had been rich in other things beside animal products, a collection of broken bits—however well suited to tribal settlement—was no basis for an empire, or even for a stable kingdom.

An Epitome. Not only is the Palestine of history a broken land, but it is a very little land. It is only the size of Yorkshire: Judaea was only the size of Norfolk or Devon, and half of it was semi-desert; to go from the Lake of Galilee to the Dead Sea, from Bethel to Beer-sheba, was only "like" going from London to Oxford. And that is why it seems so remarkable that this tiny land should show us almost an epitome of the physical world—with examples of almost every land-form from peak to rift, and almost every climate from polar to torrid.

Coast. The Levant was distinctly favourable to early efforts at sea-traffic. Being practically tideless, it causes little coastal erosion, and supplies its harbours with an unvarying depth of water; and, though it is stormy in spring and autumn, the strength and the direction of the wind from day to day can be calculated with some certainty, and nights are nearly always calm. As a rule, then, ships do not need natural harbours for safety. Cf. p. 291.

Climate. The climate is Mediterranean in its main sequence, but is extreme in many of its details, and might almost be described as semi-Saharan when there are eight months of continuous drought. Of course, with a great range of elevation and of exposure—to sea or desert, from Hermon (9150 feet) to the Dead Sea (*minus* 1300 feet)—there are great variations of temperature and rainfall; but in many parts 60° F. is a typical winter temperature, and 80° F. is a typical summer one, though a fair number have 90° F., and some may have 10° or 12° of frost in January. The dry air and the thick stone walls of the houses, however, make these extremes bearable except in the Rift. There, to the south, 118°–120° F. may be registered, though even here all through the middle of the day there is usually a sea-breeze off the Dead Sea blowing up the valley; to the north, round the Lake of Galilee (*minus* 700 feet), mean maxima for January and February are 60° F. and 65° F. respectively, while for July and August they are 99° F. and 100° F. The mean minima for January and February are respectively 48° F. and 50° F., accompanied by *c.* 18″ of rain.

[1] This may have been concentrated grape-juice.

The average rainfall outside the Rift is from 25″ to 32″ except, again, to the south and east. Gaza has fully 16″, Jaffa has nearly 24″, Jerusalem—*c.* 20 miles farther north—has 26″, and Nazareth has *c.* 27″. The even distribution as between highland and lowland suggests that this is predominantly cyclonic rain, and that explains its uncertainty and its variations; but there is no doubt that the climate has changed, even if there is reasonable doubt as to the cause and even the kind of change. Certainly, the date of the Hebrew "Feast of Tabernacles" (*October* new moon) has not changed, but the vintage now comes in *July*; and Mangin and Viola[1] insist that the acceleration in maturing can be due only to greater drought and greater heat. **Rainfall.**

But the rainfall is more important than the temperature, though the latter may involve a change of crop or a change in the varieties of seed and plant used; and the vital factors are the relatively heavy rains at the beginning and at the end of the rainy season, *i.e.* when the land is suddenly chilling or rapidly heating. Tillage is almost impossible in many parts till the Former rains have softened the ground, and harvest depends on the Latter rains leaving the plant prepared to face the long drought. During this, however, especially in the most dusty months, a great deal of mist accompanies the daily sea breezes, and the dews are very heavy, —"literally drenching" in August.

There is a further advantage in the concentration of the rainfall into a relatively short period that is introduced by specially heavy rains; for evaporation is minimised, the porous limestone becomes saturated, and streams break out "miraculously" at the foot of the hill-country, *i.e.* in Sharon and Philistia, rather than in Judaea. Almost everywhere, too, the sea breezes bring some relief from great heat.

As in Syria, there are four belts of country. A maritime plain runs the whole length of the country, narrowing in width from *c.* 20 miles at Gaza to *c.* 2 at Acre, and then sending a very important tongue inland up the Kishon valley as the Plain of Esdraelon. A highland backbone, scored with deep *wadis*, runs parallel with the plain, falling abruptly to the rift-valley on the east, rising to over 3000 feet in central latitudes (Judaea), and dropping to an unimportant transverse lowland near Beersheba and to the very important Esdraelon plain between Galilee and Samaria. **Four Belts.**

The coast-line is less favourable than the sea in front of it, for it does not contain a single natural harbour; and, though the drift of Nile mud is much less[2] now than it used to be, the blown sand from the miles of dunes is equally bad. Gaza ("The Strong")— **Ports.**

[1] In their study of the diseases of the vine in *La Terre et la Vie*.

[2] There is not enough mud now at Askalon even for "beaching" boats safely.

where the dunes are nearly three miles wide—does a little trade, and may become important with the development of the Dead Sea potash industry; but the railway which now follows the old caravan route—into Egypt, can never restore the place to its old importance as "The Gate of Philistia, Palestine, and Syria." The old Philistine roadstead at Askalon is as much a thing of the past as the old Crusaders' promontory at Acre; and the only port in the old kingdom which might have a future is Ezion-Geber, as Akaba ("The Cliff").

Jaffa. At present Jaffa is twice the size of Haifa, and is the natural port for Jerusalem, as it was in the days of Hiram, King of Tyre; and its Zionist "suburb," Tel Aviv, is the town next in size to it, and clamorous for it to be made the official port of the country. But Jaffa was never really the outlet even for Sharon, still less for Philistia; and Philistia and Sharon have not a tithe of the potential importance of Esdraelon and the Hauran, as suggested by the main railway line going through Ludd and not along the coast. But, of course, in the old days all the great towns did stand on the southern reach of the Great Road—Gaza, Ashdod, Ekron, etc.; and this was always the most fertile part of the land.

Haifa. Haifa, on the contrary, has the full shelter of Carmel (*c.* 1750 feet) on the stormy quarter (S.W.); it directly commands the Esdraelon plain, with all its connexions north, east, and south, and has an alternative route west of Carmel *via* Athlit to Ludd and Jerusalem; and—apart from the disabilities of political frontiers, etc.—it is really a better port than Beirut even for Damascus, for trains on this southern route can carry seven or eight times as heavy a load as can be carried on the rack-and-pinion line (only 40 tons!). Moreover, in the meantime, Haifa is a *free* port.

Nor must political propaganda be allowed to exaggerate geographical advantages. Sharon is still a fertile and flowery[1] plain, beloved of bees and Gargantuan thistles; once it was forested, and it grows admirable "Jaffa" oranges and "Latakia" tobacco. But it is not as level as Philistia; it is only a narrow little belt—not more than 30 miles long and scarcely 10 wide; and its exaggerated political importance to-day is only a legacy from its *strategic* importance 3000 years ago, when it commanded the famous Megiddo road to the middle Kishon valley and the Vale of Dothan to Jezreel. The latter—a broad, low, straight route—was so much associated with war that it was regarded as a danger-zone which marked the natural limits of Israel. Mt. Gilboa commanded the link between Esdraelon and the Jordan fords.

Philistia. Philistia is fully 40 miles long and varies from 10 to 20 miles in width; it is lower and flatter than Sharon, and seems still—

[1] The famous "rose" was really a white narcissus, and the Philistine "lily of the valley" was a blue iris.

after 4000 years of use—to retain much of the amazing fertility

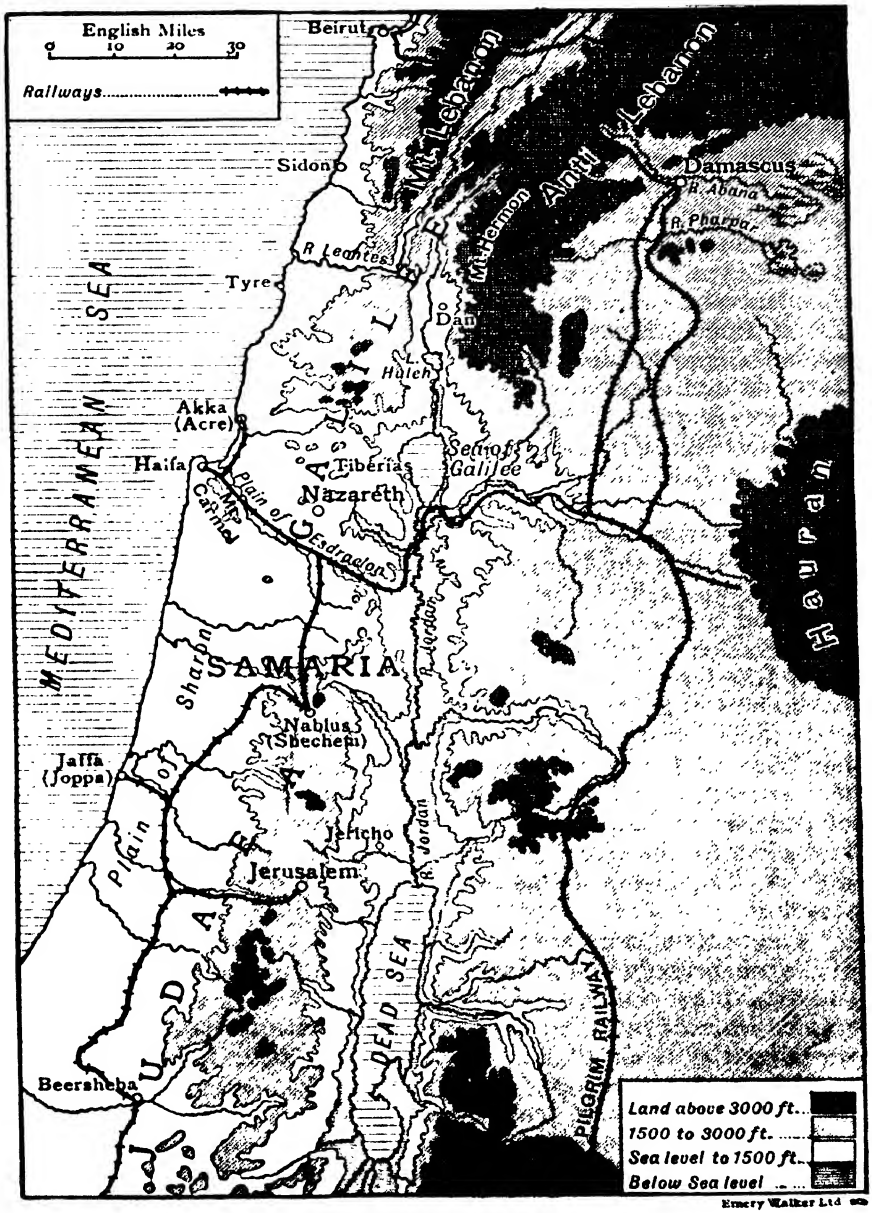

FIG. 58.—Relief of Palestine.

that it owed to the Nile mud of which it was originally built. Its relief makes it much more suited to grain (mainly barley) and pulse

(mainly beans), and rather less suited to fruit-trees, than Sharon; but its eastern hills are an olive paradise, and its "necessaries of life" must have been very complete—in spite of rats and locusts—to have allowed four great cities (Ekron, Ashdod, Askalon, and Gath) to have existed within 20 miles of one another. Gaza, too, is only about a dozen miles farther south.

With its genial climate, its productive soil, its busy thoroughfare, this plain became the home of a rich and self-indulgent people of grossly mongrel type and cosmopolitan tendencies; and it is profoundly unlikely that, if the Hebrews had entered Palestine from Egypt by this natural route, they would ever have climbed the Judaean scarp and settled in rocky solitudes away from the Great Road. They might then have invented a coinage and a calendar, and become famous horse-dealers, and even been more versatile and more susceptible to new ideas; but they would have been a very different people, and would certainly not have acquired the knowledge of precious stones (turquoise, etc.) which they brought with them from Sinai and the Wilderness.

The Plateau. The interior highland has an easier slope to the west than down to the Rift, but the Hebrews did not hold the plain any more than the Philistines held the plateau; and the southern half of the highland is much less attractive than the northern, especially north of Esdraelon. In fact, the hill-country of Galilee is a beautiful and open lake-land, leading up to Lebanon and Hermon, as the less fertile hills of Samaria lead up to the forbidding heights of Judaea, with their bare grey limestone and beggarly grey shrubs, their persistent lack of water and wood. The hills of Samaria do slope to scattered valleys that repay cultivation, but the broken plateau of Judaea is "half moor, half stony pasture," rich only in stones and skins (of sheep and goats), which combined—as they still often do—to make a sling the natural "weapon" for keeping sheep from straying.

Nucleus. The nucleus is an area of 35 miles by 15, at an average height of *c.* 2500 feet, edged northward by the desolate moors of Benjamin, southward by the Negeb ("Parched") desert, westward by a rugged scarp of caverned limestone, full of Adullam caves, and eastward by the Ghôr ("The Ravine"), the Rift, "the great gulf fixed,"—with not a drop of sweet water on the main line of approach to Jerusalem between Jericho and Olivet. This was not an impregnable stronghold, such as might have encouraged a "godless conviction of absolute security"; but it was so rocky and dry that it was most unattractive to the pampered lowlanders and secure enough to encourage its holders to defend it. All their cities, too—Shiloh, Bethel, Jerusalem, Bethlehem, Hebron—were placed so as to be just eastward of the sky-line, and therefore invisible from the

Great Road. It was a secluded sanctuary for self-contained provincials, who were likely to be intensely loyal to the past, capable of amazing concentration, and profoundly indifferent to the luxury of the world " below "—on the Philistine plain.

The Ghôr, though more remarkable here than anywhere else, is only a section of a great world feature (p. 54); and the *local* feature, the Jordan valley, is a real river-valley (a quarter of a mile to half a mile wide) *inside* the Rift. Considering the fall of the river (*Jordan* = " The Plunger-down ")—averaging 10 feet per mile between the Lake of Galilee and the Dead Sea, *i.e.* too much for any navigation, even if there were no cataracts,—its course is wonderfully tortuous, measuring *c.* 200 miles for the direct 65 (Lynch); till quite recently there was no bridge below the Roman one at the outlet of the lake, and the possible fords at high water are very few. As the valley has been notoriously unhealthy and so much avoided in consequence that wild beasts still haunt the river-side scrub, the whole feature may be regarded historically as a **The Rift.**

FIG. 59.—Section across the Dead Sea.

tremendous moat, that isolated for centuries the Jew from the Arab. It offers now immense possibilities for the development of hydro-electric power; but it does not really overflow even its own banks, still less inundate its flanks like the Nile. The oasis of Jericho never depended on it for water, but on the famous springs of Dûk and Ain-es-Sultan.

There is now a prospect of a double development in this Ghôr— of " power " in the north and of potash in the south. In the 10 miles above the Lake of Galilee the Jordan tumbles down nearly 700 feet in cataract after cataract, and the Yarmûk, 5 miles below the lake, drops through a series of great cascades which aggregate 2500 feet; and the distances for transmission are negligible. Even Lake Huleh (Merom) and the Lake of Galilee are highly impregnated with salts, though not sufficiently to prevent Galilee (*c.* 65 square miles = L. Como) being very rich in edible fish; but the Dead Sea is five times that size, its percentage of salt is *very nearly 25* (the shallowness of its southern end being really due to a floor of solid salt), and the mean maximum air-temperature at the mouth of the Jordan during May–October is over 112° F., and during October–May it is over 101° F. **'Power.'**

Under these circumstances the Dead Sea has become a gigantic

Potash. evaporating pan for the mixed chlorides of magnesium and sodium which the Jordan carries down from Hermon, crystallising the sodium chloride and leaving the magnesium chloride in solution. The estimated quantities of salts in the sea are incredible, even the magnesium bromide being estimated at nearly 1,000,000,000 tons; the potassium chloride is said to be twice that, and the magnesium chloride twenty times as much. Below 250 feet the concentration is of sodium chloride; the separation of this leaves the upper layers concentrated in the potassium-magnesium salt known as carnallite (the chief source of potash in France and Germany); and so the supply of potash here may be considered as practically inexhaustible. The extraction of pure salts from the chlorides in the lower layers is, of course, much easier than from ocean water; but their transport is a matter of some difficulty, for the water level is 4300 feet below the Hebron crest 10 miles away and 6300 feet below the Moab crest.

Trans-Jordan. The eastern highland is much less broken than the central plateau, and its southern half is distinctly higher (over 3000 feet); and

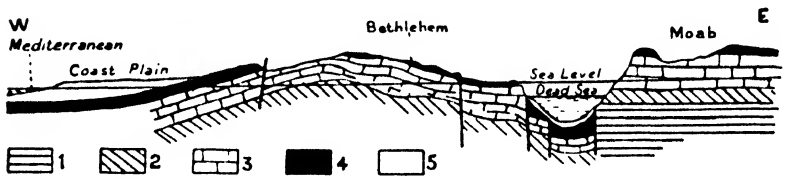

Fig. 60.—The Geology of the Rift. 1. Primary and crystallic; 2. Cenomanian sands; 3. Cenomanian limestone; 4. Miocene marl; 5. Pliocene-recent.

west of the Hejaz railway the land, especially in the volcanic Hauran, is very fertile, while the rainfall is sufficient for fine winter crops of grain and for excellent pasture—in Hauran and in "Moab", if not also in "Edom." But in the meantime only Amman and Ma'an (the present terminus of the Hejaz line as working) are of any importance, Amman especially so as an air-station on the Cairo-Baghdad route. It may be found, however, that the Romans were characteristically shrewd in their conviction that the right link between the mouth of the Nile and that of the Tigris lay along latitude 30° N., *i.e.* went *via* Petra and Jauf.

Sinai. There is some likelihood of the Trans-Jordan country, especially to the south, becoming an interesting tourist country. Sinai, with its "Trinity of forms"—northern dunes, sedimentary tableland, and crystalline mountain—is an area of curious attraction; and Petra, which may be the Sinai ("Moon-Mountain") of Moses, is as easy of access now as Jericho was a generation ago. The ruins of the stately city, "A rose-red city half as old as Time," built of the fine local sandstone,—the convergence of natural routes on the gorge,—the natural reservoir of the "basin" in which the Wadi

Musa (" Moses ") rises,—the carvings of crescent moons on the rocks, all suggest that Petra (" The Rock ") was, and was regarded as, the site of the Mount of Moses.[1] Trajan's road from Amman has now a good motor surface, and supplies can be found at the various villages placed near springs that break out where the red sandstone is overlaid by limestone.

The Corridor.

The north-eastern wing of Trans-Jordan may become important economically, for it is the corridor between Palestine and Irak, with the Imperial air-route running through it from Amman; and it is being used for a pipe-line from the Hamrin oilfields to Tripolis and Haifa, round the northern end of the Sirhan depression. This, as a unit between Kaf and Jauf, with its *five* water-courses, is a natural part of the Nejd, though it may be a source of trouble with the Nejd nomads; but recognition of pastoral needs, *e.g.* access to wells across political frontiers, is embodied in the political agreements.

Zionism.

But this Trans-Jordan territory is definitely excluded from the operation of any Zionist agreement, so that the political aspects of local agreements cannot be divorced from an economic background that is limited to the land west of the Jordan; and there is no question that, apart from the potash, it is a very poor land as well as a very small one.

The vine and the fig flourish, the olive and the orange reach great perfection, and the Hauran and the broad triangular expansion of Esdraelon (south of Nazareth and Mt. Tabor) grow excellent grain, though ease of export by rail is tending to starve the country—by exporting it. The Jews already in the land are settled on all the best areas, *e.g.* round Huleh and Galilee, over Esdraelon, Sharon, and Philistia; but the only export valued at more than £P.250,000 is of oranges!

Population.

The total population—including *c.* 100,000 nomads—may be just a million, of whom *c.* 575,000 are Moslems, rather more than 150,000 are Jews, and over 80,000 are Christians; and, though the country is quite incapable of supporting even a second million, its present Jewish population is only a tiny fraction of the total Jewish population in the world. The land, therefore, can never be a *National* Home; and, if the scheme is impossible economically, it seems cruel and even criminal to invest it with political pretence. It is at least inartistic, too, to materialise Jerusalem.

[1] Musil locates Mt. Sinai on the mainland of Arabia, south-east of the entrance to the Gulf of Akaba.

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CHAPTER XX

ARABIA

Structure. West of longitude 55° E. the rectangular block of Arabia is a very simple geological unit, with a correspondingly monotonous topography, appropriate to the passive part which it played in the days of mountain-building. Even its lava flows were "quiet," and there are no large cones. This monotony makes it very "African," and it is very African also in its climate, its vegetation, its fauna; indeed it was only Tertiary fracturing that broke it from Africa.

It has both Secondary and Tertiary deposits on the flanks of its Archaean dome, but has a general slope from the south-west down to the north-east, and drains normally with the slope; but even along the Persian Gulf there is not much low land, and the Tehama ("Lowland") strip on the Red Sea coast is very narrow, while the Yemen scarp reaches fully 10,000 feet.

Lava. The structure is of special importance. The crystalline dome stretches from Sinai at least as far east as Hail and as far south as Mecca; in the north and the far east there is much sandstone, with a veneer or a fringe of limestone, as in the Tuwaik plateau, and in the south the granite is often overlaid by sandstone. But the vital factor, especially for the hydrography, is that great sheets of lava have flowed over both granite and sandstone, protecting softer beds and standing up as *harra*, which are the characteristic feature of the river system. The most important water-parting in the whole 1,000,000 square miles is in the 6000 feet of the Khaibar lava between the Hamdh and the Rummah.

N.W.–S.E. Trend. The determining forces seem to have worked simultaneously and with great uniformity over the whole block, corrugating the mass of it into a series of stripes—of limestone or sandstone or granite, with or without a lava cap—running strictly parallel with the Red Sea coast, *i.e.* N.N.W.–S.S.E. Every *wadi* crossed and jebel climbed by Mr. Philby between Ojair and Mecca, the Dahna and other belts of sand, lay essentially N.N.W.–S.S.E.; so does the Wadi Sirhan in the extreme north, and so do the jagged Shammar ridges south of the Great Nefud.

The same general principle prevails in the river system, but there is more variety of detail, and there is even some real divergence, because there is a double water-parting. The main one runs parallel with, and at a distance of *c.* 150 miles from, the western scarp; and, if any name beyond the "Main Divide" is needed it might be called the Hejaz ("Divide") Divide, as it follows closely the eastern edge of the political Hejaz—past Tebuk, Teima, Khaibar, **Water-parting.**

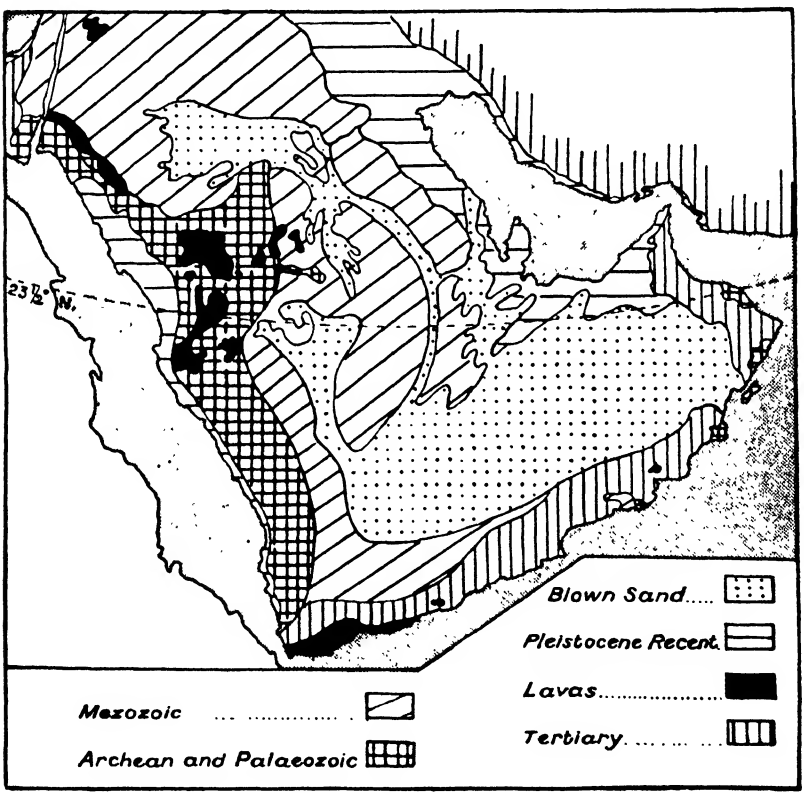

FIG. 61.—Geological Map of the Arabian Block.

etc. But a minor water-parting runs eastward from Taif—which Mahomet seems to have considered the heart of Arabia!—towards Riyadh and Hofuf, carrying the Wadi Sirra and throwing off the Rummah in the normal north-eastern direction of the general slope, but the Dawasir south-eastward rather across that.

The climate (p. 113) is more favourable to herbage than to hydrographic development; but the steep and high scarp in the west must cause abrupt and marked rise of the air-currents, and **"Fossil Rivers."**

there is abundant evidence of heavy storms on the great watershed and even in central Nejd. There seem to be conditions, then, favourable to the development of very long, but not of perennial rivers. Even west of the Main Divide the Hamdh-Agig seems to have a total length of certainly 900 miles, possibly 1000; and the length[1] of the eastward *wadis*, fanning out from where the Tropic crosses the Divide, *i.e.* roughly between the latitudes of Mecca and Medina, must have had a very direct—if incalculable—influence on the concentration of power in and between these two towns.

The *Wadis*. Even if the Great Nefud and the Shammar get only a sprinkle of winter rain *and snow*, it *is* in winter; the rain sinks into the loose surface rapidly, and is economised in the low—a relatively low—temperature. Central Nejd gets cyclonic rain in winter and thunder rains in summer, and even the Khali seems to get far more than anyone ever believed that it could get. And so these long eastern *wadis*, though shallow in their middle courses and very shallow in their lower courses—with their beds, indeed, so slightly sunk that they can be, and have been, crossed unnoticed!—seem *always* to carry subterranean water, which can be reached by wells. This is, of course, of immense importance, for it makes them natural lines of movement and even of settlement, round artificial oases such as Bereida and Aneysa along the Rummah, and Sobrom and Taraba on the *wadis* from which they are named.

Tehama Ravines. The western *wadis*, which ought to be so much more "permanent," are even less useful, and remind us that *wadi* meant "ravine" before it was applied to the torrent that cut the ravine. They are very short, and their gullies are very deeply eroded, which makes them very serious obstacles to communication. They do open out on the piedmont, and might have given rise to small oases; but they are too short to bring down much silt or much water, and in the great heat the flood *débris* is dried into dust in a few hours. Even Jedda and Yambo are not on oases, but on stark coral, which cannot support even a garden and with practically no local food-supply except fish.

Desert Areas. The distribution of what may be called sheer desert, seems to be related vaguely to the minor water-parting, for the Great Nefud lies parallel with that on the north, the Ruba el Khali lies parallel with it in the south, and the two are linked across its lower eastern levels by the Little Nefud; and this gives an aggregate area far larger than the Arabia Deserta of the ancient geographers.

That lies wholly to the north of Arabia and contains three areas which they distinguished from Arabia Felix ("Happy Arabia") as not having oases fed regularly by springs. The Sirhan is a saline

[1] The length of these *wadis* may be due to a pleistocene development, such as Gautier and other Frenchmen have analysed in the Tibesti and the Air plateaus.

basin of treacherous quagmires; the Hammada[1] is very dry, but enough rain can be collected in clay-lined reservoirs (at *c.* 3300 feet) to feed sheep and goats from November to May; and then the Udian ("The Valleys") is the dissected scarp of the Euphrates basin. They are all cut off from the Nejd oases by the Nefud ("Sands"), and their largest centres are in the west, *e.g.* Kaf and Anaza, Jauf and Shaka; but the Hammada is really the most

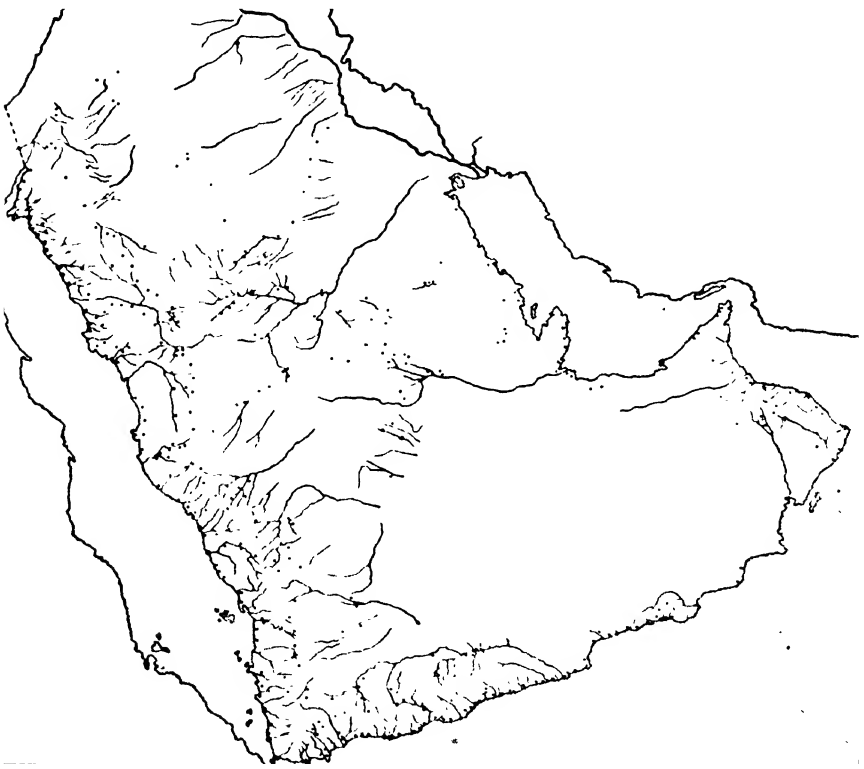

FIG. 62.—The *Wadi* System of Arabia.

important, as its flat hard surface is easily traversed by motor-transport. The whole area is too large and too desolate to be easily policed, but it must be included in modern transport routes between Cairo and Baghdad. Haroun al Raschid had his "Darb Zobeidal" provided with forts and reservoirs the whole way! And the removal of the Turkish control, the practical collapse of the Russian rail-

[1] In the Hammada during November Mr. Eldon Rutter "came to a pool every second or third day—some . . . as much as 4 or 5 miles in length."

ways, and the modern craze for speedy transport, encourage the reopening of the old desert thoroughfares.

Nefud or Rimal. Any continuous area of deep sand that is loose enough to be blown up into dunes, may be called Nefud or Rimal, and there are half a dozen such areas between Taif and Riyadh; but the Great Nefud lies in latitudes of special drought, for it hangs from the 30th parallel—which runs *over land for nearly 10,000 miles* between Agadir and Shanghai. It merges westward in the poor steppe through which the old pilgrim route and the Hejaz railway run; it lies in stripes with the typical N.W.-S.E. trend; and the general water-system gives S.W.-N.E. routes across it, especially north-east of Hail. This afforded both a regular route for "Phrat pilgrims" and an escape for the natives in cycles of drought; and, as in the Tarim, between the ridges of sand there are long strips of bare rock—limestone or basalt—called *khabbs*, where there is not enough drift of sand to be any obstacle whatever.

The Dahna, or Little Nefud, is a sand belt, but quite narrow; and it is near enough to the Gulf to have sufficient rain—partly in winter and partly in summer—to have good camel pasture. It is no serious obstacle to communication between Hofuf and Riyadh.

"The Empty Quarter." The Ruba el Khali, or "Empty Quarter," lies south-east of a rough line from Sanaa to Hofuf, fenced in by the habitable lands of Nejd and Yemen, Hadhramaut and Oman, but itself presenting some (?) 300,000 square miles of almost stark and continuous desolation. It is a very difficult country, as only camels born and bred on loose sand (*Ramliyat*, "Sand-bred") and on carried fodder are any use; winds are often very strong, winter and summer alike, and sandstorms may rage all night; and the cold at night is perceptible (below 40° F.), while in January hard frost is common —"each night the water in our skins froze hard" (Philby). But Mr. Thomas has proved that the area is not wholly uninhabitable, still less quite waterless.

Water. Any expanse of such sands may be called Ar Rimal ("The Sands"), but it is not properly called Ruba el Khali unless it will not support life; and the real difficulty is want of herbage, not of water. It is probable that no considerable area east of 50° E. is waterless, even if the water is too salt for camels; in Suwahib ("Sand Ridges") it is found *within a yard* of the surface, while in Sanam it may be at 100 feet. Farther west, however, conditions are probably worse, at least to 45° E., which is the rough western limit, as 55° E. is the rough eastern limit. In the north the sands nearly reach the coast at Ojair and actually reach it in Trucial Oman; but in the south there is a belt of "steppe-desert", which widens eastward until there is a space of at least 100 miles between the Kuria Muria Bay and the marginal oasis of Mugshin. Similar steppe-desert skirts the Oman piedmont.

Behind the Dhofar highland (p. 113) there is a great *wadi* system in which the main element, Umm'al Hait (" Mother of Life "), has a length of perhaps 200 miles, rising at a height of *c.* 3000 feet and ending as springs in the Mugshin oasis at a height of 400. In summer the nomads have to retreat up the tributary *wadis*, *e.g.* the Hat and the Ghudun; but in winter there is often good pasture. The water-supply is not sufficient for horses; but there is a fair abundance of varieties of acacia, suited to sand or stones, and supplies of salam and inferior fodder in most areas—a response to very heavy dew. **Dhofar.**

If Arabia came to an abrupt end along meridian 55° E. it would be the most perfect geometrical block in the world; but east of that longitude an Alpine section of the Zagros seems to be found west of the Oman Gulf, looking Alpine in the jagged face of the Ras el Jebel (" Heads of the Mountains "), but more in the form of plateau to the south. The coast here, too, is quite alien to the block, with some wonderful rias, *e.g.* Elphinstone Inlet, which could accommodate the largest fleet in the world—if the crews could survive in the stifling steam of the climate. Even on the open Batineh plain, between the igneous crests (5000 feet) and the Gulf, the climate is bad enough, but in the airless rias it is impossible—for White people. The population of Muscat and Matrah is mainly Negro, and Whites have a refuge within 100 miles at Nakhl, with its one crest reaching fully 7700 feet to face the ocean breezes, and the 9900 feet of Jebel Akhdar (" Green Mountain ") to the west sheltering it from the desert blasts. West of the mountains, *i.e.* down on the Baraimi oasis, the thermometer on the breakfast table in April may register as much as 110° F. **Oman.**

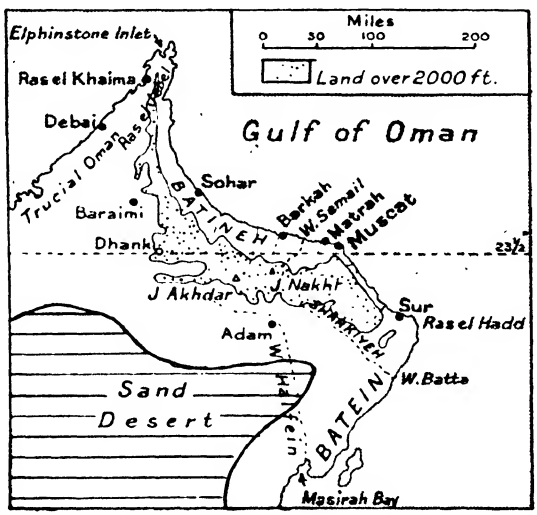

FIG. 63.—Alpine Section of Arabia.

As the annual rainfall is only about 5", irrigation is essential everywhere—from wells and underground channels; but, as the staple product is dates, the conditions are very favourable. The **Date-palm.**

Batineh coastland carries a continuous belt of palms (60 × 2 miles), and they begin to ripen as early as May and continue ripening till November; but the famous "Jard" hand-picked crop comes from the Semail valley below Nakhl, where the so-called *Wadi* Semail is a perennial river. Even more important for local use in Oman Proper and Sharkiyeh is the Wadi Batta, which also drains from Nakhl—*parallel* with the coast from Muscat to Ras el Hadd. The Wadi Halfein, the great corridor from northern Oman to Masirah Bay, has there a safe refuge during the N.E. "monsoon"; and the shore folk are famous fishermen—for sardines and herrings, to be dried for camel food.

Sur. But for the direction of the feature lines, however, the old slave market of Sur would be supreme on this coast, well sheltered and

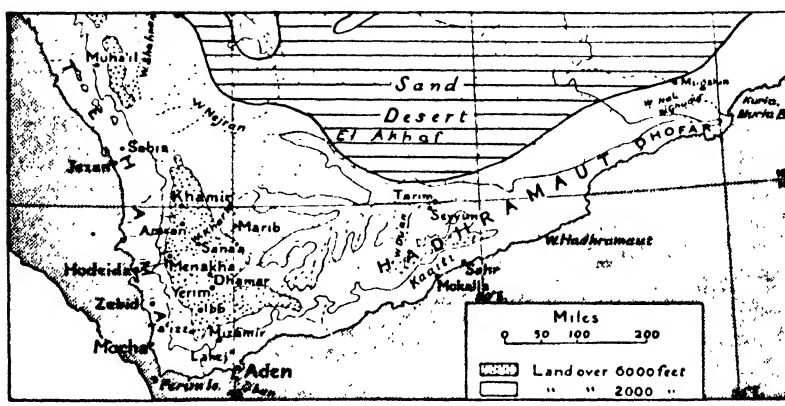

FIG. 64.—Hadhramaut and Yamen.

just off the monsoon track (*c.* 3½″ of rain, falling in *c.* 3½ weeks, with a sun temperature approaching 190° F.), once a famous ship-building centre and still somewhat a rival to Muscat and Matrah.

Hadhramaut. The name Hadhramaut ("Abode of Death") has been applied to the whole southern rim of Arabia which may be considered habitable in any settled way, *i.e.* more—especially eastward—than is included in our loose "Protectorate," and more—especially northward—than comes within the great arc of the Hadhramaut (Masila) wadi, with its Kathiri towns of Seyyun and Tarim.

These Kathiri people are cut off from the coastal Kaaiti people by a great 7000-foot crest that lies completely between the Seyyun-Tarim trough and the Mokalla-Sakr coast. From the north side of this the Wadi Du'an disappears through a maze of cañons into the Wadi Hadhramaut, where these towns are probably the survivals of the old Sabaean incense-trade; and on that fact probably is based

the intimate connexion between the Kaaiti Hadhramis and Hyderabad, where the sultan of Mokalla is the hereditary Jemadar of the Nizam's bodyguard, and between the Kathiri Hadhramis and Malaya. The trade may have been done partly by Indian vessels (cf. p. 180), but the very dangerous coast here has been held by an intrepid race of sailors, and boatbuilding and fishing are typical occupations still.

"Incense Land."

But the valley is much more than a mere avenue to the land of frankincense, for it is a busy irrigation area; and the work is so well done that there is no water even beneath the bed of the river in its lower course, and the valley has been so largely self-sufficient that even the Seyyid descendants of Mahomet have lived a life isolated from the rest of Arabia as a unit, but with maritime relations with India (for luxuries) and Africa (for necessaries—*i.e.* slaves). The abundance of water in the main water-course, some of which *may* drain—below an old bed—from the Yemen heights, has for centuries supported a busy agriculture, including cereals (wheat, barley, and millet), oil-seeds (sesame, etc.) and indigo, and quite first-rate tobacco and dates, the flowers of the palms being the source of honey that was famous even in the days of Pliny.

The Dhofur section of this strip is a typical limestone belt, with a coastal plain, a forested piedmont, and a 3000-foot crest, beyond which the country slopes down in sandstone steppes to desert; and the sandstone fringe is the great frankincense land of Arabia, ancient and modern, the tree flourishing specially at 2300–2400 feet, where the rainfall is tiny, but the humidity—on the edge of the Wet Monsoon—is considerable, and the dews are very heavy.

The Nejd.

North-west of our diagonal line (p. 313) we are in the Nejd in the wide sense of the word. It is a broad saddle across the tropic, its most central point being probably *c.* 24° N., 44° E.; it has wide belts of sand, but is habitable—a land of discontinuous habitation; and it includes the whole of the minor water-parting west of the Little Nefud, with an average height well above 4000 feet and an extreme height of fully 6000. It includes all the central oases from which an emirate won by arms a wide overlordship that was held by spiritual force.

Three Centres.

It contains three groups of oases. The Shammar group lies in the lee of the Great Nefud with its capital on the Jebel Aja at Hail, which always commanded the direct pilgrim route to and from the Lower Euphrates. The Nejd proper lies in the lee of the "Empty Place," with its capital at the foot of the Tuwaik in Riyadh ("Green Hollows"), and probably there is water, if brackish, everywhere, but specially at the foot of the Tuwaik ("The Crescent"), which encircles for 500 miles the eastern edge of the area, with a series of oases along it where it faces the Indian Ocean, *e.g.* Dam and

Sulaiyil, Laila and Hauta. Kasim holds the balance between north and south along the Rummah, with command of the Rummah-Batin route to Koweit and Basra.

Nejd, in this larger sense, then, is an isolated land, isolated by real desert. The Little Nefud, or Dahna, *is* little and comparatively hard; the Great Nefud is a windy belt, where deep sand has been blown up into long and high dunes; the Ahkaf is soft sand, which is very difficult to traverse, and which makes an impenetrable barrier between the Nejd and Yemen; and on the so-called "open" side the ragged lava of the Harra is even more deadly—to both man and beast.

Pilgrim Railway. South of Ma'an (*c.* 3500 feet), which made with Petra "the twin gates of gold and frankincense" (from Arabia), the whole country along the railway and the pilgrim route is a dreary expanse of desert almost devoid of water as far south as Tebuk; and even here, though there are from time to time quite heavy rains, there are no regular rains even in spring, as at Ma'an. Then there are no springs till El Ala; in fact, in the whole 500 miles between Ma'an and Medina the only "villages" are Tebuk and El Ala. Obviously, there is no possibility of developing such country; and, with the decline of the pilgrim traffic, there seems to be little encouragement to keep up the railway, while to extend it to Sherm Rabigh and Jedda would only mean the total collapse of import or export trade by caravan. In any case it would all have to be relaid, as it had to be built to the Beirut gauge (3 ft. 5¼ in.), over which the rolling-stock had to be brought; and increase of gauge would only mean increased cost of working, though this is not due to steep gradients. The general elevation is not more than 2500 feet, and even the Dar-el-Hamra between Tebuk and the Hamdh is only *c.* 4000.

Lateral Access. Access is really easiest exactly in the centre of each side. Along 40° E. between Medina and Mecca, in spite of the lava-capped *harra*, there is fairly easy access to the coast between Yambo and Jedda, especially from Medina to Yambo and from Mecca to Jedda; but there is easier access from Medina to the northern Nejd than from Mecca to the southern Nejd. Ojair has much the same relation to Hofuf as Jedda has to Mecca, but is still less healthy and less accessible, so that Manameh (the port of Bahrein) is really the port—60 miles away, but with an excellent steamer and telegraph service; and it is at least interesting that the Hofuf oasis and the Bahrein islands seem to have the same ultimate source of water-supply. At Hofuf most of the springs are warm, and this is thought to account for the peculiar excellence of the "Khatasi" dates; and, as the land slopes *down westward* to the foot of the Tuwaik, their overflow collects in marshes, in which grow the reeds used in making the "Bahrein" mats. The connexion between Hofuf and Bahrein (once *Tyros*) seems to be very old, and the oasis has had for centuries

a very highly developed metal industry in gold and silver, brass and steel.

Though the Teima-Khaibar water-parting of the block is farther to the east (p. 313), the key to the Hejaz is really the high ridge (also lava-capped *harra*), which may be called the Aueiridh-Subh, or simply "Aueiridh,"—which in some parts is actually higher than the water-parting,—and which dominates both the railway and the great Hamdh system, the former from Tebuk to Medina and the latter from Taif to El Ala. It seems to rise to **The Great Divide.**

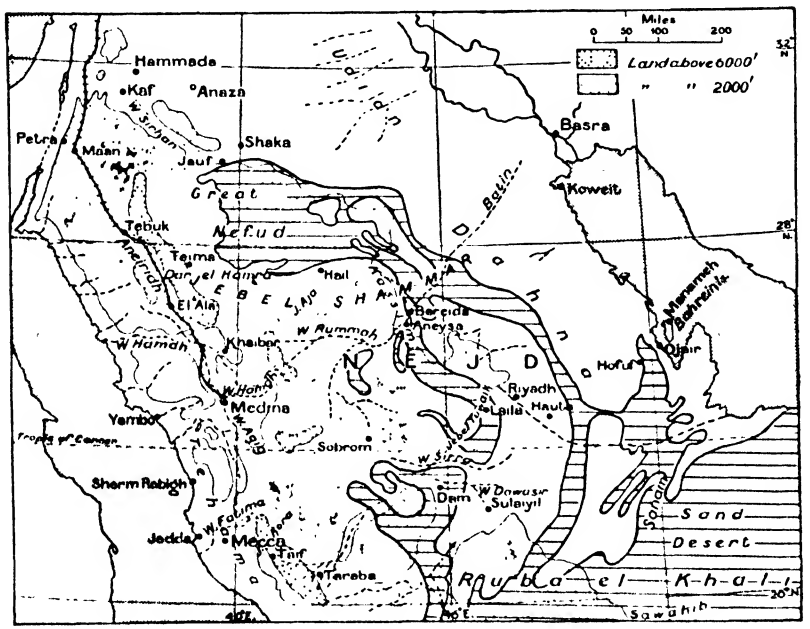

FIG. 65.—Nejd and Hejaz.

fully 8000 feet south-west of Tebuk, south-west of Medina, and south-west of Taif. The Fatima *wadi*, with the richest oasis on the Tehama, and the Yelemlam *wadi* drain from opposite ends of this Kora section of the ridge which divides Mecca (below 2000 feet) from Taif (nearly 5400).

Arab geographers have confined the name Hejaz ("Divide") to this long line of heights, as "dividing" the sandstone flats of the Tehama ("Low land") from the Nejd ("Plateau"). Mecca, which was "Holy" before the days of Mahomet, seems to have owed its importance, as Hofuf did, to its real centrality as a market,[1] **Mecca.**

[1] Its "Feasts" are at times when the different fruits, skins, etc., of the plateau are ready for sale.

commanding the Fatima *wadi*, for it has a wonderful sanatorium in Taif; but now the population seems to be specifically associated only with the (declining) pilgrim traffic, drawing supplies from the oases below and above, *i.e.* dates and bananas from the Fatima, and peaches and apricots from Taif.

Medina. Medina ("*The* City"), on the other hand, at the confluence of the Hamdh and the Agig and with many springs and wells, is one of the best-watered centres in the Hejaz—a real agricultural centre as well as a great stronghold. It is about the same distance (±250 miles) from Mecca and from Jedda, and the three towns have a definite pilgrim organisation, which makes them at once far the greatest importers in Arabia and very cosmopolitan; but the natural roadstead of Medina is Yambo, only 125 miles away. The contrast between the rich urban organisers of the pilgrim traffic and the Bedawin, who can wring so little from the poor soil and scanty water-supply, is a permanent cause of trouble.

The Tehama. It has been suggested by M. Gautier that the Tehama was for ages a "Red Sea Phoenicia," held by a regional group of sea-traders (? with factories in Madagascar), for—apart from one or two small oases—it is quite unsuited by its sterility and its unhealthiness for any normal "settlement," even by people accustomed to the climate of the Persian Gulf. Certainly, Jedda was a very useful entrepot in the Red Sea for the small Indian "clippers"; and almost everywhere there is a broken coral-wall parallel with the actual coast, which gives remarkable shelter to the dhows. But steam and the Suez Canal ruined all the entrepot trade.

Yemen. Yemen seems to be on the same general plan as the Hejaz, but its marginal heights are much greater (estimated by M. Lamare as approaching 12,000 feet), and its rainfall is increased by its lower latitude and its higher altitude. Its Serat summit is generally from 40 to 50 miles in width and from 9000 to 10,000 feet in height, with summer temperature seldom over 80° F.; the western slopes are covered with lava, and the axis is marked by a line of volcanic cones. They are very remarkable between Amran and Sana'a and between Marib and Dhamar; and the main line of movement follows them southward, reaching its maximum height near Yerim (8600 feet). Then it drops to Ibb (*c.* 6300), a junction for Aden *via* Mizamir (*c.* 2600) and Lahej or for Mocha *via* Ta'izz (*c.* 4600), which is the junction for a piedmont route *via* Hais (*c.* 1000) and Zebid for Hodeida.

Two Belts. The whole area has been divided into a large number of parallel belts, but we need not emphasise more than two. There are several fairly important *wadis* flowing from the eastern flank of the inner heights, *e.g.* Nejran and Kharid, and an old trade-route seems to have run up the Banna valley and to have followed that flank across

their upper waters. Now the depression along the western flank is one important belt, containing the capital of the State, Sanaa, with nearly all the political importance ; and the other is the western scarp, with its heavy rains (orographic and convectional) and its volcanic soil, which has nearly all the economic importance as the Land of Coffee. The flat Tehama is not only very narrow, but very arid and very hot, the temperature reaching over 90° F. even in winter ; and the low maritime heights behind it are little better, even when they merge in intermontane basins, though a fair amount of millet is grown.

Mocha Coffee.

The heavy and regular rainfall makes Yemen by far the most productive unit in Arabia in spite of its small size (*c.* 75,000 square miles), *i.e.* half the size of Hejaz, though this is compensated to some extent by the relatively dense population (? 3,000,000), which seems to be nine times that of Hejaz and nearly three times that of the whole Nejd. This allows of very intensive cultivation, in terraced plantations, the terraces being sometimes only a few feet wide and with not more than two feet of soil. The methods, like the implements (hoe, mattock, basket—for carrying soil, and an old oil-can—for watering), are very primitive; but centuries of experience have made the people exceedingly clever in devices of various sorts, *e.g.* facing the terraces with stone, building cemented cisterns in every corner where water can be caught, and using every accessible patch of soil, even with a slope of 65°. Ibb is the cereal centre, the Sahul plain having a very good rainfall at the western foot of the Jebel Menar (*c.* 10,500 feet); and Menakha (*c.* 7600), on the Harraz heights, is the chief coffee centre. Along this coffee scarp mists rise, on 345 mornings in the year, up to the 4000–8000-foot levels of the plantations, veiling them by noon and keeping them veiled till the heat of the day elsewhere is gone.

Aden.

Yemeni exports have hitherto been collected at Aden, either by land, *via* Lahej—which accounts for the telegraph-line up the Tiban valley—or by dhow from Hodeida, where there is not even a roadstead inshore, or the neighbouring Jebhane ; but great efforts are being made by the Italians to have Massawa used as the collecting centre. Even in the days before Mahomet, Mecca traded with Abyssinia in winter, and Aden does so still. Of course, the fortified harbour at Aden, with the connected territory and the island of Perim, actually in the Bab el Mandeb straits, makes the place a very important strategic centre and coaling station ; but it is often said to be merely a foothold and a junction with no

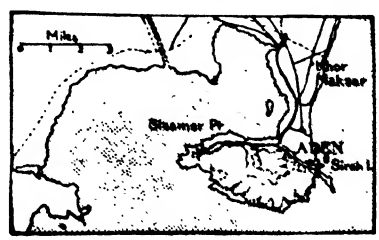

FIG. 66.—Aden Harbour.

special trade of its own. As a matter of fact, it has been for many years the export market for four commodities which no other port in the world seems to combine—aloes, civet, myrrh, and frankincense; it is said that the best aloes come from Socotra, the best myrrh and frankincense from Somaliland, and the best civet from Abyssinia.

Human Note.

The human note in this political hub of Semitic Asia has been so important historically that the conditions of life over the whole area as a unit must have some further attention. The total population can scarcely be more than *c.* 7,000,000, and the mass of it is nomad, the aggregate of settled area being quite small; but, though the nomad influence is felt—is generally supreme—everywhere, the power of the chiefs is so largely based on the oases that there is little or no antagonism between the settled and the nomad. Another cause for this is that, except perhaps in the "Pilgrim triangle" (p. 322), the urban population is very nearly as hard and as warlike as the nomad, and its members pass easily for Bedawin in Cairo or Aleppo.

"Range" Rights.

The nomads themselves are more peaceful than they are believed to be. There are definite "ranges," where other tribes may not trespass for pasture or water, though they may have access to these on payment; and minor chiefs seem obliged to join major chiefs in razzias, which violate all "range" sanctities. But where there are very few wells, *e.g.* north-east of Shammar, several tribes may have rights of way and water on "ranges" which are not their own. Still, there is a constant increase of population without any possibility of any real increase of food—for man or beast. Nomad life, then, is essentially related to constant movement along narrow tracks over vast, lonely, and monotonous spaces; and it involves great hardships which leave their mark on body and character alike.

Conditions of Life.

The rare dry air of the desert, electrified by sand-friction, has a marvellous power of absorbing moisture even from beneath the skin, and bodies become lean and sinewy. The extreme temperature strain, along with the associated privations, kills off the weak; and in the aseptic air the wiry survivors suffer very little from disease, and many of the plants[1] to which they can get access at all are aromatic, cleansing, and healing, *e.g.* frankincense and myrrh. The leanness is further emphasised by habitual scantiness of food, the little use of the jaw muscles being associated with the dead unobtrusiveness of the jaws and the cheek-bones; and this in time makes the nose seem relatively sharp, while only those survive whose nostrils are narrow enough to exclude from the lungs a fair proportion of the blown sand.

[1] The absence of sugar in these typical plants must always have been an obstacle to any abundance of cheap alcohol.

Even though night-travel, suitable head-dress, and other precautions are some defence, there is much exposure to very bright light; so the skin is deeply tanned, and the eyes are naturally kept narrowed. But the light is immensely stimulating, and men's senses are abnormally acute, especially sight and hearing, so that friends or foes can be seen at great distances, and orators and preachers can be heard correspondingly far. But to such people luxuries take the form of thick stone walls, dimly lit "rooms," and the tinkle of hidden fountains.

Rules of Life.

The isolation of this kind of life tends to make those who follow it, self-contained and self-reliant, as the constant movement must leave them restless and impatient of control; but safety is impossible for the lonely individual or for the leaderless group, and group-life under experienced leaders is normal. Such experience is concerned specially with weather signs and "rights of range," and age is thought to be an advantage from both standpoints, for tribal range is often very wide, and precedents are innumerable. And, while the patriarchal attitude tends to extreme conservatism, selfish impulses to fight for grass and water are associated with immense capacity for self-denial.

This may be partly due to the inability to fight with fate, *e.g.* bad seasons and epidemics; and the type is certainly capable of profound resignation to fate, Kismet, while keenly resenting avoidable evils, especially when due to malice. Great trouble is taken to avoid the avoidable evils, *e.g.* in the regular movements of the tribe. Then night travel has obvious advantages, for the temperature is low, and there are no sand-storms, and it is easier to "steer" by sky-marks than by land-marks—by the stars and not by the dried bones of beasts that have died on the trail; so they look to the heaven rather than to the earth for guidance, and even the most tireless raiders seem to be curiously *non*-materialistic.

Oases.

But, with change to oasis life, we find great changes of response. The oases are all actually or relatively small, which greatly increases the relative importance of the individual; they are, *ipso facto*, fertile enough to make life fairly easy; they are all on or near a line of movement. The water-supply is often connected with a *wadi*—even one that has no surface water; and so the series of wells in the old bed makes that the natural line of movement. Probably at first they were simply wells for traders, *e.g.* at Mecca itself; but, where springs were good, agriculture came in very early, *e.g.* at Medina. Then the combination of agriculture and trade tended to develop regular industries.

A single centre which thus became very important, *e.g.* Damascus —like single ports under similar circumstances, *e.g.* Miletus—might dream of empire; but these successful trading-centres were naturally pledged rather to peace than to war. Politically, too, they

were of the City-State type, a fact which made Greek ideas and ideals attractive to them and Roman law unattractive; and this was not favourable to empire, even if patriarchal ties were strong enough to unite tribes over a large area. On the other hand, as the tribal basis of society was adverse to political unity, the unifying value of religiosity was, and still is, very great.

Religion. Mr. Stoddart has given us a vivid picture of the relation of the creed to the man and the place. In a single century the great source of Man-Power in Western Asia had spread a creed over half its world without the aid of any great leaders, such as Cyrus or Constantine or Asoka. The Byzantine and Persian tyrannies were wasted by war, riven by heresies, and discredited by persecutions; Mahomet's gospel was simple and austere, with neither priestcraft nor mysteries; it made, therefore, a perfect appeal to the Children of the Desert, and was almost irresistible while they remained pure in faith and cultured in rule.

As faith faded, tribal disunity strengthened; saints gave place to politicians, who struggled for the khalifate. They moved the capital from Mecca, where the fierce free Arabs would not tolerate despotism, to Damascus, with its servile Syrians, and then to Baghdad. And, once decay began, it became clear that Islam had spread too rapidly to digest and civilise its converts; and, when political tyrants—with Turkish mercenaries—supported religious tyranny, spiritual and mental growth stopped. A weakened khalifate fell to these Turks, and Islam came under the control of an uncultured horde who could face, and survive, the Tauric snows. To the ultimate Turko-Turanian flood we owe the disappearance of Baghdad off the map for centuries, the paralysis of all civilisation in the Near East, and—worst of all—an enduring enmity between Christian and Moslem.

REFERENCES.—MUSIL, *Exploration in Arabia and Mesopotamia* (1926–1928); PHILBY, *The Heart of Arabia* (1922); THOMAS, *Arabia Felix* (1932); Admiralty Handbook, *Arabia* (1920).

CHAPTER XXI

THE IRANIAN PLATEAU

THE fundamental fact in the geography of this Iranian plateau is that it is a warped segment of the great Alpine zone, and the character and the distribution of the folds have dominated the whole history of its peoples. Obviously, the fact that maximum heights are marginal is reflected in the political isolation of the area and its security from external dangers ; but it is reflected also in the drought of the interior and the difficulties of reaching foreign markets. But the wide distribution of minor folds internally has reacted in just the same kind of way, if less obviously, in the political incoherence and the economic antagonisms.

The Borders.

While the area as a unit has had this political isolation, its borders have been lines of constant instability and unrest. In the extreme east and the extreme west the Highlanders have looked down on the Indus and the Tigris plains, which seem to have had perpetual fascination for people who had learnt to till the well-watered floors of their own little glens ; in the extreme north they looked down—across a very narrow strip of irrigation culture—on a wide belt of nomadism, where the boundaries of the nomads, like the actual number of the people themselves and their animals, varied with the scanty and precarious rainfall. Always, too, the climb down to the open lowland was safer and easier than the climb up to the complicated highland.

The marginal folds almost everywhere are convex to seas and concave to the core of the area, except where the Elburz encloses the southern end of the Caspian ; but even here the more important fact is that both the Zagros and the Elburz start from a common point on the flank of the Urumiya basin,[1] and run for some distance almost parallel with each other, so that the Elburz is convex to the Arabian Sea. The Great Salt Lake of Daria-i-Namak is, therefore, a more natural feature than the Safid Rud gorge ; and the value of the Atrak valley as a line of approach to the plateau is largely due to the fact that it is again " concave."

[1] *Urumiya*, Persian *Urumieh* or *Urmieh*, our *Urmia*, is now officially *Riyaiyeh*.

"Seistan" Divide. The one complete break in the marginal rampart, the Hari Rud valley, marks longitudes (61°–62° E.) of almost continuous depression across the zone *via* the Namaksar, Patargun, Seistan, Zirreh, and Mashkel *hamuns*, along which the political frontiers run; and the effect of the rise of altitude eastwards, especially north-eastward, has been to increase the rainfall so much that rivers from the north-east are large enough to give the inland basins of Afghanistan and Baluchistan much more water than those of Persia have.

The convergence here, below 30° N., of the Khorasan and the Zagros folds leads to an eastward diversion of feature-lines in the Chagai hills, which separate the Helmand drainage from the Mashkel drainage, and practically Afghanistan from Baluchistan; and in the southern end of the intermont area—marked by the famous historic fortress of Bam—the Namak Sar lies below 1000 feet, while the Kuh Paieh rises to nearly 11,000 feet. The north-eastward trend of the feature-lines east of 62° E. eventually develops in the Kirthar and the Sulaiman ranges, and becomes of special importance in connexion with the North-West Frontier of India.

Marginal Folds. The character of the marginal folds has already been noticed (p. 46), but their relation to tribal development and to foreign commerce needs more attention, especially in view of the effect of the great central deserts in separating both the north from the south and the east from the west. And on all the flanks the five essential details seem to be closely similar and fairly constant—the number of folds, the length of contained valleys, the character of connecting "tangs," the innumerable streams that break out at the base of the limestone ridges on to the floors of the valleys, and the heaviness of the snowfall. The last is so typical of all areas of high plateau in south-western Asia that it is another justification for calling the climate here "Mediterranean." Indeed, it is this fundamental characteristic of a major region that justifies the extension of the climatic frontier eastwards *across* the tremendous political and economic barrier of the Lut-Kavir desert.

(1) *Persia*

Zagros. The maximum number of folds is in the Zagros; and where the Pusht-i-Kuh widens the belt between the *tangs* of the Diala and the Karkeh, the political independence of 3000 years ago is reflected in political independence even to-day. For this is ancient Elam, a land of parallel sierras, with an even sky-line of *c.* 8000 feet for some hundreds of miles except for an extra 1000 in the Manisht nucleus; and the names of features are very significant—Kuh-i-Tulwar, "the Mountain of the Sword"—Kabir Kuh, "the Great Mountain" (8000 feet for *c.* 150 miles)—Pusht-i-Kuh, "Back of the Mountain." This is "back of the mountain" from the *Persian* side, and the

Vali in Deh-Bala, at the foot of Manisht, has been virtually quite independent of Tehran. The rough belt of sandstone and conglomerate in "front" of him —with its oil seepages and undrinkable water—made as safe a frontier for Mesopotamia eastward as it did for Media and Elam westward.

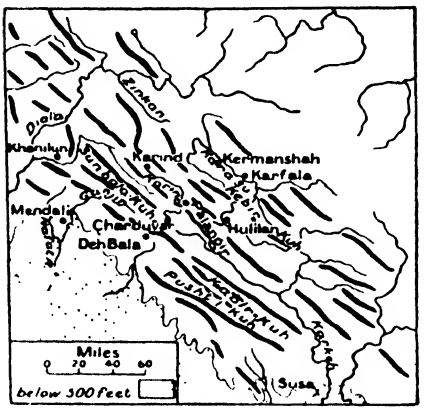

FIG. 67.—Diala-Karkeh Section of the Zagros.

The long well-watered valleys here, *e.g.* that of the Karkeh above the *tang*, were once well forested, and are full of the ruins of old cities; and the semi-nomadic character of the population today may be partly due to excessive destruction of the forest for fuel and by goats, and to a relative increase of transhumance. But the old fertility is still there, and the plains of Khurramabad and Kermanshah (fully 4500 feet) are capable of feeding the same numbers as they fed 3000 years ago, and of making them practically self-contained. These were the conditions which made their tribes so dangerous to Babylonia. **The Valleys.**

These valleys also illustrate well the character of the *tangs*, as illustrating the height, the steepness, and the sierra-crest of the upfolds. The Upper Karkeh (or Kara Su) and the Zinkan drain the Kermanshah plains in opposite directions; below Kartala the Karkeh makes a right-angled turn to the south-west across the Kebir Kuh to Hulilan. In the next valley to the south-west, the Karind, after flowing parallel with the Kara Su to Palangir, also makes a right-angled cut to Charduvar, and then flows on south-eastward to join the Karkeh. In the next valley to the south-west again, the Ganjir drains the Zamel plain from Manisht parallel with the Karind, only to the north-west; and then it cuts south-westward through the limestone outliers of the Sunbula[1] Kuh down to the Nafat lowland near Mandali. **The *Tangs*.**

Exactly the same phenomena are found on the Caspian hinterland. Behind another Pusht-i-Kuh the Kizil Uzun flows due north-eastward past Mianeh, where it meets the Shah Rud, which has been flowing north-westward for 100 miles; and then the two rivers combine as the Safid Rud to cut a 25-mile defile down to the Gilan coast. In the east the Firuz Kuh Pass (*c.* 6600 feet) between Damavend and Kuh-i-Nizwa (18,000) gives an easy route for **Caspian Valleys.**

[1] The old Royal Road (of Darius) climbed the steep 1000 feet of the Tak-i-Girra between Khanikin and Karind.

Balfrush and Meshed-i-Sar or for Sari and Bandar Shah, the latter already connected with Aliabad [1] by rail.

Makran Valleys. Even on the Makran coast the same kind of development is found, but the containing folds are not very high, and the natural lines of movement run east-and-west, not to the sea. Here the great Bampur-Mashkel valley, with a "coastal" range of fully 7000 feet and an "inland" scarp [2] of as much (5000–9000), has always carried the traffic, and has been able to feed a relatively large population by using every trickle of water in irrigating "terraces." But the parallel valleys to the south, marked by such towns as Kasarkand and Turbat, are drained by the Chil and the Dasht through abrupt *tangs* down to Gwattar Bay.

In the north-east conditions have been rather different. There the continuous Atrak-Kashaf Rud valleys, like the Bampur-Mashkel valleys, have been a thoroughfare, but a less important one and less safe. For there was always an alternative in the oasis route fifty miles farther north, and that was both easier and on the line of maximum movement; and in pre-Russian days there was continual danger from raids. Indeed, this was the only part of the marginal ramparts that was ever exposed for centuries to systematic raiding; the primeval connexion between Turania and Mesopotamia seems to have been by the "Meshed Gate."

The Deserts. The Lut Desert must always have minimised the importance of the eastern frontier of Persia, and even now the Indian railway *via* Mirjawa is essentially a desert track, though during the War a road was constructed from the railway terminus of Duzdap *via* Birjand to Meshed; and the Kavir Desert had somewhat the same effect in the north-east. But it is significant that the balance of power in the Zagros belt—as delineated eastward by the old caravan route from Kerman *via* Yezd to Tehran—is steadily moving from the two ends, Tabriz and Bandar Abbas, to the centre, *i.e.* round the Khur Musa. The proposed route of the Trans-Persian railway is from Bandar Shahpur to Bandar Shah, and both the terminal sections are already working; and the Karun might be made a good waterway up to Ahwaz,[3] where the line crosses the river at the lowest rapids. When the line is complete, it will dominate the whole foreign trade of Persia; and no trunk-line from Khanikin *via* Kermanshah and Hamadan to Tehran will be able to compete with it, even though following the oldest "road" in Persia.

Bandar Abbas. At the time of the Anglo-Russian agreement about spheres of influence in Persia, Bandar Abbas, the coast terminus of the British line, was the best harbour in the country, though big vessels had

[1] *Balfrush* is now officially *Babul*, and *Aliabad* is now *Aliabad Shahi*.

[2] The Sarhad scarp is capped by volcanoes, *e.g.* the active Koh-i-Taftan (13,000 feet).

[3] The actual port is at Nasrie, the transhipment station for the Upper River navigation to Shushtar.

to lie far out from shore ; for it is large and sheltered except to the south-east, and had a considerable Indian population. A further advantage was that it is the only port which has access inland without serious obstacles (cf. p. 47)—to Kerman *via* Tarum and Saidabad ; and the relation of Kerman (*c.* 6000 feet) to the eastern (or " Central ") folds of the Zagros gives fairly easy access on even to Yezd, Isfahan, Kashan, etc.

Bushire.

Bushire (Abu-Shehr, " Father of Cities "), an even more unhealthy place, was also greatly exposed in olden days to piracy, and would never have had any real importance but for the—difficult—Dalila valley approach to Shiraz ; but, during the War, the old Persepolis [1] route to Isfahan was opened up. At the same time, this route is inferior to the Trans-Persian railway route *via* Ahwaz and the fertile districts of Khurramabad and Sultanabad, and to the present motor route—through a fertile, but lawless district—from Khanikin *via* Kermanshah (*c.* 5000 feet) and Hamadan (6200 feet), on the very fertile piedmont of Mt. Alvand.

Political Bias.

But the actual character or even the existence of the ports is not the decisive factor, which is the desire to be free from slavery to foreign influence, *e.g.* the long-established Russian domination at Enzali (Pahlevi) and the recent treaty with Irak about the control of the Shatt al Arab. This has led to the abandonment of Muhammareh as the terminal port of the " Trans-Persian " route in favour of Bandar Shahpur, which is nearly 30 miles from the sea, and which has been built entirely on reclaimed land. It is, thus, a purely artificial place, its only merits being that it is literally and metaphorically " away from " the Irak frontier, and that the tides on the Khur Musa are useful.

On the Caspian the political pressure is against Enzali, in spite of the importance of the Gilan province and its capital, Resht ; and Russian influence would be equally strong at Astara, which serves only the Tabriz area. At the same time, the Ashurada Bay had obvious advantages over the Meshed-i-Sar beach, though the bay is so shallow that a mile-long jetty has had to be constructed at Bandar Shah to enable any of the large Caspian boats to come alongside.

Southern Coast.

The southern coast is very much more important than the northern, which does scarcely 6 p.c. of the total sea traffic ; and the (British) air-route to India, *via* Jask and Gwadar, is even giving importance to the Arabian Sea strip. The total distance from Abbadan to Karachi is not much over 1300 miles, but the barren concordant coast is most forbidding, especially the 300 miles between Bushire and Linga, which has lost all its old pearling importance—a steep wall crested with jagged volcanic teeth and

[1] Cyrus had his permanent capital (" Ecbatana ") at Hamadan, his winter one at Babylon, his spring one at Susa, his summer one at Persepolis.

backed by higher ranges touched with snow, and sometimes in front of it a muddy swamp smothered with flamingoes and pelicans.

Alpine Character.

For practical purposes, then, the mass of Persia may be regarded as essentially an Alpine area. There are long belts of good soil, but production is closely dependent on water-supply, and this on snowfall; even the large towns have a relation to water-supply which, though centuries old, seems ridiculously modern. Hamadan is supplied directly from Mt. Alvand, as in the days of Cyrus; there are similar relations between Kerman and Kuh Paieh, Meshed and Kuh-i-Nishapur, Isfahan and Kuh-i-Rang—100 miles away, etc. There are a few large grain-raising areas, *e.g.* round Hamadan and Burujird, and the country is almost self-sufficient; but even the grain-crops are largely irrigated or—in the north—the products of dry-farming,[1] and the small proportion of the land that is cultivated is really an aggregate of oases. The variety of relief, of soil, of climate, only emphasises this.

Chief Centres.

At the same time, there are fairly well-marked regional differences, and 3000 years of history have left certain indications of the fundamental foci and lines of human activity. Thus, there seem to be three peripheral foci—Tabriz, Meshed, and Shiraz; and the wide-spreading markets of Tabriz ("Warm Springs"), the commercial capital of the country, are as significant as the one long straight river-threaded street of Meshed ("The Saint's Tomb"), its religious capital, the Mecca of Shiah pilgrims. If Omar Khayyám and Ferdusi lie near Meshed, Shiraz is equally famous for Hafiz and Sadi, and still produces much the best wine in Persia. The interior centres seem no less clear—Isfahan (? "The Camp"), Yezd, at the foot of Kuh Kharuna (*c.* 10,500 feet), and Tehran, at the foot of Damavend ("The Spirits' Home").

Isfahan.

Isfahan—under Abbas the Great "the richest city in Asia"—was the natural place for the political capital, as it was till the eighteenth century, *i.e.* as long as there was any real political unity and stable control over the whole area; and ever since it ceased to be the political capital, it has been second only to Tabriz as a commercial centre, and its importance is likely to increase with the importance of the Gulf Coast. In any case, it still looks like a capital,—a city that sleeps, but never dies,—the creation of Persian art in its prime, with a clear individuality of delicacy and dignity,—set in walled orchards,—bisected by the rapid Zindeh Rud that makes a gash across its ring of "plain." This does not look like a plain, for it is desert for half the year, and ends in every direction in jagged crests and peaks that catch the Former and the Latter rains. And the city has practically only these—nearly 1″ in March and nearly 1″ in November, out of *c.* 3½″; and, if 200 miles farther south than

[1] Dry-farming seems to return seed tenfold, and irrigated grain gives up to fortyfold.

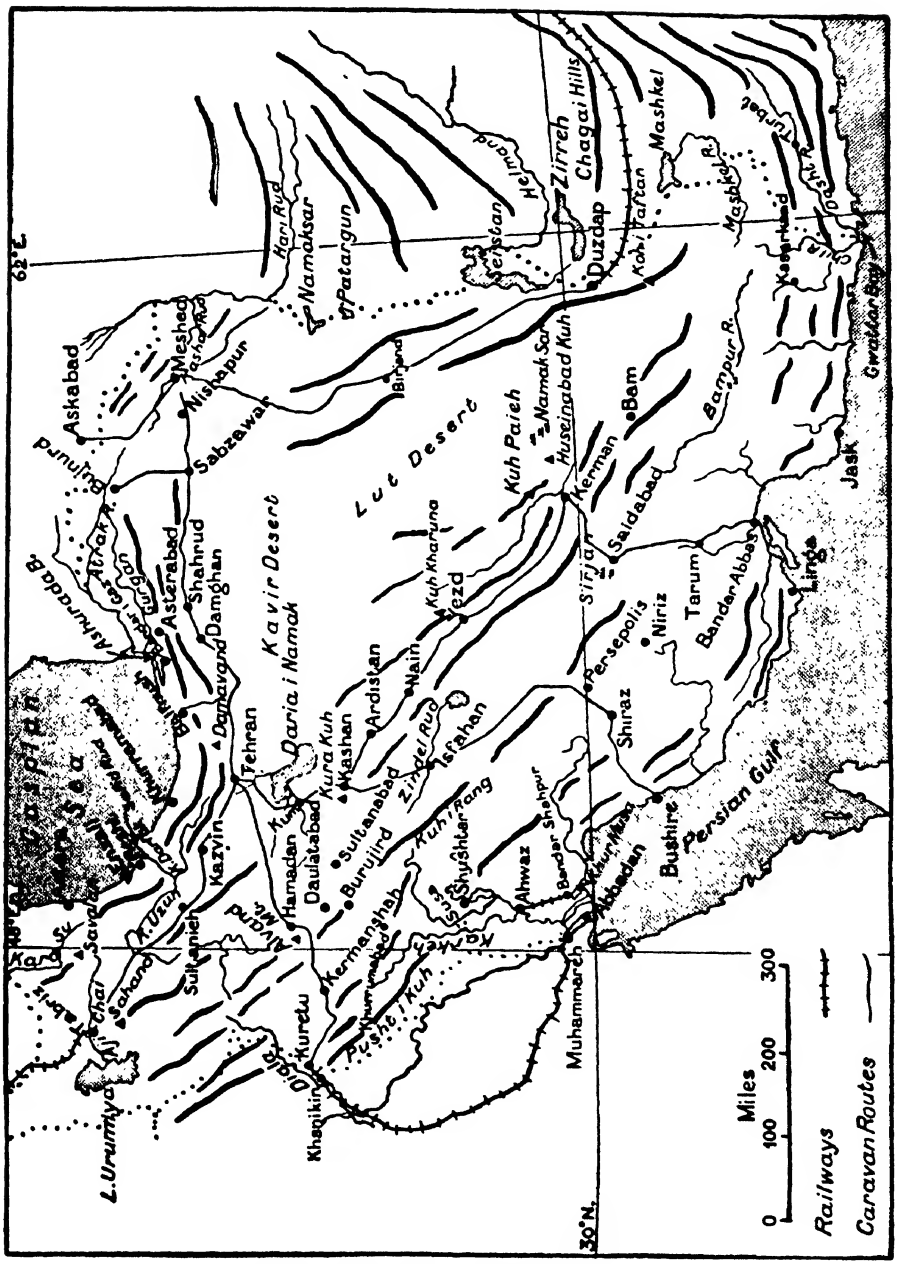

FIG. 68.—Feature-lines and Drainage of Irania.

Tehran and so slightly warmer at midwinter (*c.* 34° F.), it is nearly 2000 feet higher (*c.* 5200 feet), and so much cooler at midsummer (*c.* 82° F.), with only one month (July) showing a mean temperature above 79° F.

Yezd and Tehran. Yezd, on the contrary, in its grilling basin, is declining with the decline of the silk industry, even if it is still an appropriate religious centre for the Zoroastrians. Tehran only holds the balance between Tabriz and Meshed, in a position of complete security from outside interference, but the irrigation of its desert-plain (90 × 40 miles) has made it exceedingly unhealthy in summer, and its most typical buildings are municipal rather than regal. Even the background is less favourable than it seems to be. Between Manjil and Firuzkuh there are several possible tracks across the Elburz, but they are too bad for regular use, especially in winter; and, though there is an immense supply of water in the Elburz defiles, there is very little land that can be cultivated—for the crops needed, wheat and barley (bread and fodder).

Changes of Capital. We may notice, in passing, that the mistake made by Seleucus (p. 281) was repeated both in and from Persia; for, when a Parthian dynasty from Khorasan was ruling a joint lowland-and-highland domain, Ctesiphon—on the "home" bank of the Tigris—made one suitable capital, as Susa would have made another. But, if the bulk of the empire was to lie between the Syrio-Arabian and the Kavir-Lut deserts, it was a mistake to move the capital to their little Khorasan homeland, even if Meshed was a better choice than Kuchan for a capital in that corner of the empire. The Abbasids, though also of Khorasan, were wiser; and their Baghdad gave even a stronger command of the Diala connexion than Ctesiphon had done. Of course, the Mongol devastation of the thirteenth century left the Tigris plain a desert; but, when a really Persian dynasty ruled Persia, it turned its back resolutely on the line of Mesopotamia, and faced eastward from Isfahan. The history of Persia would have been other than it has been if the capital had again been attracted to Meshed; but Nadir Shah was greater as a soldier than as a statesman.

Natural Regions

Foci *v.* Regions. The great foci of Persia seem to have had more importance historically than the regions to which they belong; at least, there has been more equality between them than between the different regions. This, no doubt, is typical of Asia as a continent; it is also one reason for not attempting to make any minute subdivision of this particular area. Indeed, excluding the Caspian littoral, the whole might be divided simply into two major units, a great arc of Alpine folds and a great square of desert plateau. But some sub-

division may help to give precision without confusing the picture of the whole as a unit.

I. The great advantage of the Tabriz Neck is in its location. Two primeval thoroughfares have carried war and trade across this region east-and-west, one in the north and the other in the south; and both have followed the ribbon of grassland between the marginal heights and the central desert. And it was the blocking of these, especially the northern, by the Turks and the Mongols that forced commerce on to the sea, thus reviving the old importance of the Persian Gulf and—incidentally—taking England to India. **Tabriz Neck.**

The northern route was the more important, especially for the China connexion; and it gave some importance to the southern apex of the Shemran scarp behind Tehran, between the main bulk of the Elburz and the Daria-i-Namak ("Sea of Salt"). But it gave much more to the bottle-neck on which both routes converged, affecting both Kazvin and Hamadan, but concentrating importance on Tabriz; for the town naturally commands all traffic converging between Lake Urumiya, with its Sahend cone (*c.* 11,800 feet), and the Caspian ramparts, with the Savalan cone (*c.* 15,800), the Aji Chai draining from both the cones *via* Tabriz to the lake. The Mongol rulers here for some time had their capital at Sultanieh, between the Tehran Gate and the Tabriz market and commanding directly the Safid Rud access to the Caspian, *i.e.* the narrowest barrier north-eastwards, as Hamadan commanded the narrowest barrier south-westwards.

The whole of Azerbaijan, but especially the Urumiya basin, is very fertile; the height and the latitude combine to give it a relatively good rainfall, while the normal level (*c.* 4000 feet) is not high enough to involve troublesome snow; and agriculture is sufficiently successful for the population to be relatively dense. **Urumiya Basin.**

The influence of the lake must be great, though not capable of being precisely calculated. Though it is normally not more than 2000 square miles, its immediate "saucer" is 20,000; and, when much of this is flooded, the evaporation must be very rapid. The average depth of the normal lake is only 20 feet, and the extreme is scarcely 50, while the rainfall is only 20″, 7 p.c. falling in June–September, when the lake temperature may be above 80° F.

At the same time, though there is a great variety of crops, and rough pastoral nomads roam over the uplands, commerce is the important activity; and this tends to make the province Armenian rather than Persian in its aptitudes, though Tabriz is a great carpet and rug centre, manufacturing carpets and collecting rugs from the Turkish tribes of the Kara Su basin (Ahar). The river-and-rail junction of Marand has a lake port in Cheraf Khane.

II. The Khorasan region shows a considerable contrast to this,

Khorasan Region. though its importance in the distant past was probably quite as great as that of Azerbaijan, and camels are still reared in large numbers on the uplands; but the area is now off all lines of maximum movement, and—since the suppression of the lawless Turcoman people—it has become definitely agricultural and "industrial." The fertile valleys of the Atrak, Gurgan, and Kashaf Rud are "the granary of Persia," and the old cities are now important only as carpet centres. The region should go as far west as Shahrud, the old Parthian capital, between the Salt Desert and the Shah Kuh, with its heavy snows, and commanding a very important pass down to the stone-built frontier town of Asterabad and the Caspian. The caravan route kept away from the robber-haunted heights between Bujnurd and Meshed, and went *via* Sabzawar—with its Silk Bridge and "Madan" turquoise mines—and Nishapur, the capital of the old Afghan empire, a cotton-growing centre, like Shahrud and Sabzawar and Meshed; but the objective was Meshed, and it is the great commercial and industrial centre, manufacturing carpets and collecting rugs. The so-called "Baluch" rugs are woven by *Persian* tribes living in Khorasan.

Western Zagros. III. The South-western flank may be taken to include all the western folds of the Zagros, but may be subdivided into three sections. The northern, or Luristan, section is of little importance in itself, even for its oil-belt; but it controls important lines of access to Persia, *via* the railway terminus at Kuretu to Kermanshah and *via* the ruins of the old Elamite capital of Susa (wedged between the converging currents of the Karkeh—with its beautiful drinking water—and the Khorates) to Khurramabad. Both the plains are very fertile, those round Kermanshah getting quite heavy snow even in February.

Karun Basin. The central, or Khuzistan, section includes the whole Karun basin, with the fertile Arabistan lowlands, the Karun delta—as productive of dates as the Shatt al Arab banks,—and the rich oil-fields; and the essential link is in the 150-mile pipe-line from Masjid-i-Sulaiman (once the site of a Zoroastrian Fire-Temple) to Abbadan, a town of 50,000 people, on what was a mud-flat a generation ago, with a branch pipe-line from the Haft-Kel oil-field joining the main one at the river port of Kut Abdulla. The development here is likely to restore much of its old importance to Arabistan, though the old focus of Shushtar now lies in a deserted valley between the pipe-line and the Dizful railway; but, if any new conditions took the Persian capital back to Isfahan, Shushtar would also begin a new life. The position was very strong, just below the great transverse sweep of the Karun, where the river divides into two—the Gargar and the Shatut—to meet again 50 miles nearer the sea; and the town, like Asterabad, was a stone-built frontier stronghold. It is only a dozen miles from the railway, and so is only about 130

miles from Muhammareh by land as against 210 by the river;[1] even the Karun valley in its inner (eastward) reach is well within 100 miles of Isfahan. This was, probably, the deciding influence in the choice of Susa as a capital, in days when the Karun was much more navigable than it is now, and when all boats were very small.

Shiraz. With the decline of Bushire as a port, Shiraz is likely to decline as a commercial centre. It is still the great market for the fine Fars tobacco and opium; but both are equally good in the Lake Niriz basin, and the old Achaemenian capital of Persepolis was more free from earthquakes. The Shiraz gardens, while typically Persian, with their sounds of birds and running water, and their scents of flowers and ripening fruit, are not more beautiful than other Persian gardens, or even as beautiful as they seem to have been in the days of Hafiz and Sadi; but they present a remarkable contrast to the unirrigated vineyards on the stony hills. Historically, it was the suitability of the Fars plateau to horses that allowed the Steppe intruders to maintain nearly all their old Steppe aptitudes and organisation; and so they came eventually to spread over all south-western Asia as a ruling aristocracy—from the Aegean to the Persian Gulf, and from the Persian Gulf to Turkestan. Darius boasted that his land was rich in horses as well as in men, and the story of Shiraz and Persepolis, Pasargadae and Istakhr,—all really the same focus—justifies his boast.

Central Zagros. IV. The Central Folds may be divided into two belts by the Kavir-Sirjan (Isfahan-Saidabad) depression; but this differs from the other down-folds only in scale and sterility; and, in any case, it seems exceedingly undesirable to describe any of this broad belt as "plain." The Persian equivalent for our word is used for the floor of a narrow valley, *e.g.* the Hormuz Plain between Shushtar and Behbehan; but there is no "central plain," only a series of oasis-valleys, dependent on irrigation—for which the subterranean ducts in the limestone (*Kanats*) are of untold value.

Naturally, the more favoured points are westward and northward; but every valley has its line of settlements, sedentary and irrigational. If they are large enough to make carpets—in small factories (up to 20 looms), they are called towns; and those with access to *tangs* or other facilities for collecting rugs, may be of some size, for nine-tenths of all the rugs and the carpets are exported. Here, again, the north-western towns, *e.g.* Hamadan and Sultanabad, were specially favoured; and Hamadan—on the fertile Kara Su plain, with the Alvand peaks to windward—combines a very important leather trade with its textile industry. Everywhere, of course, irrigation agriculture is the basis of life, and the variety of

[1] The depth of the river varies from 3 feet at low water to nearly 20 at high water, and even at low water the current is strong.

crops is very great, even rice flourishing up to 3000 feet, and the vine up to 4000 (6000 in the south).

Hamadan. It was this certainty of an abundant food-supply that made Hamadan (Ecbatana) so important, by enabling it to make full use of its position on the easiest rout across the Zagros from the Babylon-Baghdad focus to the Rhagae or Tehran Gate to meet the Chinese and the Indian tracks. The natural trend of the Zagros valleys gave it also easy links north-westward with Tabriz and south-eastward with Isfahan.

Carpets and Rugs. The eastern centres are not so favoured in climate or in facilities for export, *e.g.* Ardistan and Nain, Ravar and Zarand; but again the northern centres, *e.g.* Kashan, are better placed, and terminal points, *e.g.* Kerman ("Home of Safety"), have more facilities than central, *e.g.* Yezd ("Shrine of Prayer"). Both Kashan and Kerman are notable carpet (and rug) centres, but the industry at Kashan is relatively young, having developed very much since the decay of the old silk and velvet industry. At Kerman it is very old, and has produced some of the largest and most famous of all Persian carpets, using local cotton (for backing) in the industry; but Kashan has the more fertile oasis, and grows good tobacco. Almost all the centres produce opium, though it is a special product of the Niriz basin, and have access to local dyes, *e.g.* madder, walnut, indigo.

Namak Basin. Kashan (3700 feet), at the foot of Kura Kuh (12,000 feet), actually belongs to the Namak basin, where there seem to be special chances of development. In the days when Hamadan (Ecbatana) was the Median capital, the basin raised their famous cavalry-mounts; and, with some regulation, even the Kum, the Kara Chai, and the Shur, might be made much more useful than they are, for both the Former and the Latter rains are very heavy in some parts of the basin, *e.g.* spring rains near Kazvin and autumn rains (especially November) near Kashan. But the importance of the squalid "Holy City" of Kum is exaggerated apart from the fact that it has "Bast," *i.e.* absolute sanctuary, and is thus superior to Meshed. On the other hand, the importance of Kazvin and the Karaj are underrated; the town stands at a height of over 4000 feet at the foot of the Elburz, where the road from Resht to Hamadan crosses that from Tehran to Tabriz, and a large proportion of the whole piedmont between Kazvin and Tehran could be irrigated, for wheat and cotton, by proper regulation of the Karaj.

Caspian Littoral. V. There remains the alien Caspian province, with its *steep*, red-tiled roofs—alien in scenery, in climate, in history. For 350 miles from Astara, the natural outlet for Tabriz, to Bandar-i-Gaz, the historic outlet for Asterabad, a lofty limestone wall presents a very abrupt face to the regular N. winds off the Caspian, at a distance of not often more—and quite often less—than 20 miles.

Even down on the coast-strip the rainfall averages 60", and is often 75"; and strips of jungle merge in dense forests that clothe the lower ranges—with *European* species, *e.g.* oak and hornbeam, beech and box. As an inhabited area, it is a hot-house in summer and a swamp in winter, scourged by malaria and hook-worm. Hundreds of torrents splash down hundreds of feet to irrigate acres of rice and cane-sugar along the lagoon-fringed coast; above the rice and the sugar are beans and maize, tobacco and cotton, oranges and mulberries. The oranges and the tobacco (Turkish "cigarette" type) are of fine quality, Resht and Balfrush being the two chief centres, the latter being also a cotton centre (cf. the upland Damghan). The old silk industry has declined greatly, except for the export of cocoons, and the fishing (salmon and sturgeon) is largely localised

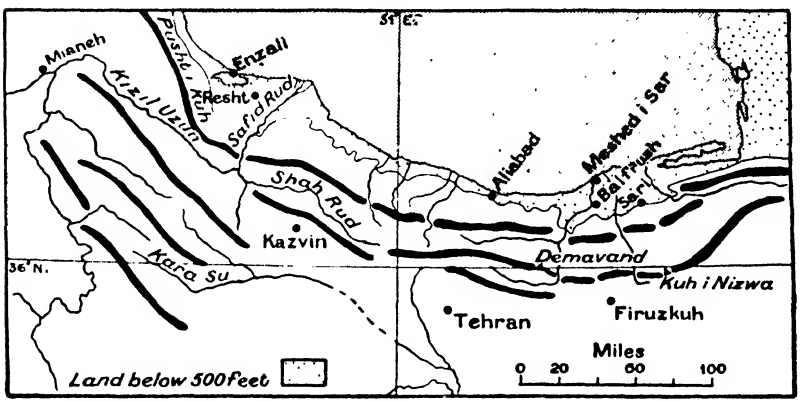

FIG. 69.—Feature-lines and Drainage of the Elburz Crescent.

at Enzali—at the mouth of a typical lagoon (*Murdah*, "Dead Water"); and, in spite of a greatly improved road from Enzali and Resht to Meshed-i-Sar and Balfrush, the forests are almost untouched except for charcoal-burning. In the little, rather inaccessible, Tunakabun territory there are some 400 square miles of cleared forests, raising excellent rice and very fine cotton, while in the high valleys (4000–5000 feet) equally good barley is grown. Westward of this district, too, as the scarp draws nearer to the sea, the quality of the forest improves.

Local Problems.

In the old days—even before Alexander conquered "Hyrcania"—there seems to have been considerable movement across the eastern Elburz by the "Aliabad" route; indeed, there must once have been a time when there was enough trade for the southern end of the pass to be called Barfurush ("Market-place"). Now, as we have seen, traffic is moving eastward again, partly to be free

from Russian domination, though the great mass of the traffic is still with Russia, and partly owing to the great decline in the Russian trade, with a fall of 20 p.c. in 20 years in imports, and of 55 p.c. in exports. But the great need is for proper precautions against malaria; at present the only section of the community that is fairly healthy is the nomadic, for they move seasonally—40 miles!—to the land of flat roofs and real steppe behind the Kuh Darfak. The contrast here is even more complete and more sudden than that between the date-groves of the Gulf coast and "that world of opium and manna[1] which we call the Persian plateau."

People. There are some difficult problems connected with both the world-relations of Persia and its internal conditions, the most important of the latter being the incoherence of the population. At least one-third of it consists of armed nomads, not of Persian stock and not speaking Persian—or any other single tongue. They do a little cultivation, but are essentially herdsmen, living in black goat's-hair tents, and wandering for fodder and water, and for markets (for their rugs). This gives them constant, but indefinite, relations with the villagers; and the villagers have somewhat similar relations with the townsmen.

Transport. The only easy and natural lines of movement are up and down the various valleys, *i.e.* far too local for railways to pay; and the cross-connexions would involve immense expense in tunnelling and bridging, so that a railway-system could only be a Government concern, involving beyond all question a dead loss in working. The proposed "Trans-Persian" route is probably the best possible, even if it ignores the whole of the area except a narrow belt—not more than 150 miles wide—between the north-east coast of the Gulf and the south-east coast of the Caspian; and it contemplates at least a "Baghdad" link *via* Kermanshah and Hamadan to join the main line at Daulatabad, and a Tabriz link *via* Kazvin to join it at Tehran. But there can be little doubt that in this "magnified Jura" land motor traffic is the proper way in which to develop; and, now that the country has become such an important World-link in telegraphic and air service, the need for the motor development has become much more urgent. Except for the 6,000,000 tons of oil, which travels by pipe-line, the only heavy exports are from the Caspian coast, especially rice, and *must* go by sea; and the valuable exports, the carpets and the opium, can travel by car or even by aeroplane.

[1] It is the dry air that causes the "honey-dew" produced by the plant-sucking insects on the tamarisks to crystallise into the whitish grains of manna.

(2) *Afghanistan and Baluchistan*

Political Importance.

In its political geography, between the latitudes of 26° and 36° N. and the longitudes of the Hari Rud-Harud (*c.* 61° E.) and the Indus, we have one of the most important areas of Asia, full of fascination to those who believe in both the national and the international, but do not believe that it is the destiny of the World to be for ever at war. It seems reasonable to believe that every natural unit of people and area, if it has coherence and self-expression, should have some special contribution to make to the general good of some larger natural region to which it belongs. The history of the Greeks and the Jews, of Belgium and Holland, suggests that the natural unit need not—perhaps, should not—be large, though there must be an adequate minimum of both people and area ; and the World needs contributions of every kind, including such an engaging—if sinister[1]—habit as that of teaching a covey of baby partridges to play hide and seek with you, as a Mahsud raider will do while he is on sentry "go."

Necessary Coherence.

The required coherence may be dependent to a serious extent on the physical geography of the area ; there can be no question that Afghanistan would have had a different history in this respect if there had been any connexion between the Kabul and the Hari Rud valleys, and a railway from Kabul *via* the Upper Helmand to Herat would do far more for the Afghans than any tunnelling of the Hindu Kush into the Oxus valley. But the self-expression must be more dependent on the political geography, for no people can express themselves if all their energies and resources are expended on safeguarding their existence ; and so it seems peculiarly desirable that frontiers should be drawn along lines or features where men naturally meet in the friendly intercourse of everyday life. And easy communications can do as much to make a unit coherent and peaceful as to offer it friendly intercourse with its neighbours.

Alexander's Route.

If, then, the inner lines of the Afghan triangle were made railway lines—Kabul *via* Ghazni to Kandahar, Kandahar *via* Girishk to Herat, Herat *via* Daulat Yar to Kabul, two of these would become at once and automatically parts of great thoroughfares,—which would entirely alter the outlook and the interests of the people,—and they have been thoroughfares at least since the days of Alexander the Great. He entered the country by the *Arius* (Hari Rud) valley, worked southward along the frontier line of depressions into Seistan (Drangiana or Daruñka, "Lakeland"), then north-eastward up the Helmand and its Arghandab tributary to Kandahar, on up the Arghandab to Kabul, and—after his detour across the

[1] As to the motive, no one would believe that an enemy lurked behind the bush round which the birds were playing !

Bamian Passes to Bact (Balkh) and Aornus[1]—down the Kabul valley for India, crossing the Indus near Attock. On his way back from Pattala (Tatta), on the Indus delta, he intended to skirt the Makran coast, but could not obtain provisions for his troops, and so worked inland; but he found conditions in the Bampur valley no better, and the sufferings of his men were terrible.

Relief and Location. In the case of a typical Buffer State relief and location should be equally important; but, under ideal conditions, there should be an axial line of crest with its flanks facing the two large units between which the minor unit is a buffer. Such a line was presented in the old days by the Balkan range to Russia and Turkey-in-Europe, and the Hindu Kush presents one here between India and Russia-in-Asia. In this case, too, the approach to the northern flank carries a series of historical lines strictly parallel with the Hindu Kush axis, which were—rightly or wrongly—a reasonable excuse for regarding Afghanistan as a Buffer State of critical and urgent importance. Under such circumstances the political geography becomes of overwhelming importance, once we have formed a rough picture of the area itself and of its human products; but even in that picture we may emphasise the critical lines.

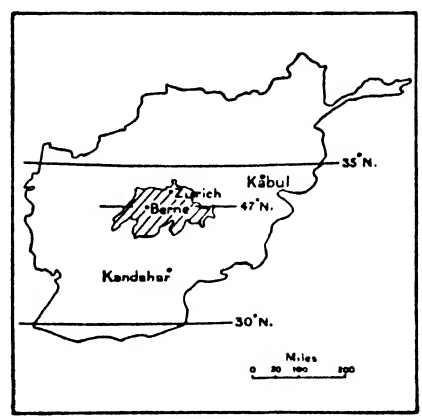

FIG. 70.—An Afghan "Switzerland."

Not a "Switzerland." Facile comparison with Switzerland may be misleading. The relations of Shah Fuladi (*c.* 16,900 feet) to the Kabul, the Hari Rud, and the Helmand are not really similar to those of the St. Gothard to the Rhine, the Rhone, and the Ticino; there is still less resemblance between the Seistan Lake and Lake Geneva, or the Amu frontier and the Rhine frontier; and the Afghans have never had to concern themselves seriously with two of their four neighbours, *i.e.* Persia and China—the Wakhan[2] finger being only in nominal touch with China. But size has made Afghanistan, more even than Switzerland, a junction for races and tongues,—a refuge for refugees from strong Governments, whether orderly or tyrannical,—a strong-

[1] Fixed by Sir Aurel Stein on a spur (1600 feet) below the Pir-Sar ("Saint's Peak," 7600 feet) near Chakesar.

[2] It measures only 10 miles in width at the narrowest, and the "Indian" passes are *c.* 19,000 feet and overhung by peaks of 24,000.

hold for those whose daily fare may be scanty, but whose recreation is fighting.

Ocean Drainage.

We have already noticed that the Hindu Kush system rises from the Pamir Knot, and runs south-westward, as the Karakoram runs south-eastward; but the looping up over the old block (cf. p. 33) has not obliterated the fundamental east-and-west lines, as illustrated farther east by the main Kun-lun crest. Here the same phenomenon is found in the 500 miles of the Koh-i-Safed and the Safed Koh ("The White Mountain"), which run systematically along the 34th parallel, flanked northwards by the "continuous" depression of the Hari Rud and the Kabul and then again by the Koh-i-Band and the Koh-i-Baba.

Kabul Entry.

This distribution results in such an angle with the Hindu Kush folds as allows the Kabul to escape from the encircling heights, to reach the Indus, and thus to give an "official line of entry" from India to the north-eastern quadrant of the Iranian plateau. But this gap occurs exactly south of a point where the Hindu Kush is very deeply dissected by factors of the Oxus drainage; and, though the passes rise to over 12,000 feet (*e.g.* the "Bamian" Haji-khak and Irak passes, where the Koh-i-Baba and the Hindu Kush meet), there is a distance of only about 100 miles (in a straight line) between the 3000-foot contours in the Oxus and the Kabul basins, and one of only about 200 between the 1000-foot contours. The importance of the Khaibar Pass, the sites of Kabul, Jalalabad, and Peshawar, and the history of the region, are all comments on the relations of the two sets of folds; but the easiest—though a circuitous—route southward from Tash-Khurgan and Kunduz is by the Shibar and the Khawak passes (the one well below and the other above 11,000 feet, but neither much troubled with snow), and the old route eastward from Kabul went by the Kunar valley and Malakand and not by Jalalabad and the Kabul valley.

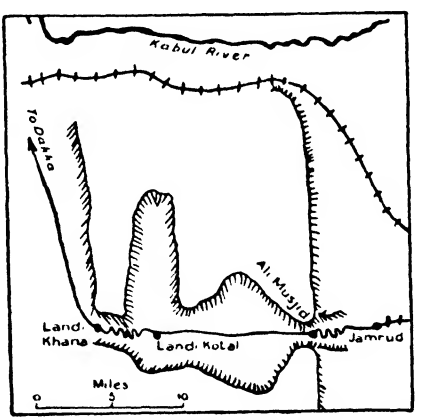

FIG. 71.—The Khaibar Entry.

The Passes.

South of 34° N. the south-westerly trend of the feature-lines again appears, dominating the relief and the hydrography of the Seistan basin; and in the angle of torsion the structural complexity of the Waziri mass is accompanied by a relief favourable to transverse lines of movement, *e.g.* in the Kurram, Tochi, and Gomal

valleys, and by a marked north-and-south direction in the northern half of the Sulaimans. At the same time, the Kurram and the Tochi have never been much used for trade, though the Kurram passes are not high (Peiwar = 8600 feet), and though the Tochi valley gives the direct route to Ghazni. When the Sulaimans recover the south-westward trend, the Bolan Pass offers a highway down which "Iranians" have raided for centuries, and up which the engineer of the Indian agriculturalist has driven a railway into the barren realm of the Iranian pasturalist. The apparent objective of this line in Kandahar commands one natural link with Persia, as that of the Peshawar line in Kabul overlooks that with Turkestan; but the connexion with both countries, so far as relief and climate suggest, is *via* Herat.

The Buffer Area.

We might even venture, then, to say that the Buffer area is really the whole eastern end of the Iranian plateau between the Oxus and the Indian Ocean, but that the critical part is east of a line from the south-west corner of Baluchistan to the north-east corner of Afghanistan, where the Wakhan finger between the Russian and the British spheres is a peculiarly typical annex of a Buffer State; and we may distinguish between the two halves of this area as divided by latitude 32° N. or—more usefully—by the Bolan Pass. Regionally, the northern half is the more important, especially the narrow belt of independent Afghan tribes between 32° N. and 37° N., between the Gomal river and the Gilgit, with its pivot in the Khaibar; but from the continental standpoint more importance may come to be attached to the independent Baluchi half, south of 32° N., with its pivot on the Quetta water-parting between the Lora and the Zhob. In both, but especially in the north, the physical difficulties are very great, and they include a temperature range of perhaps 140° F., from well below zero to over 128° F., and a rainfall range of at least 140″, from under 8″ to well over 150″.

"Five Fingers."

The natural routes, whether provided with roads or not, run up valleys into hinterlands that differ materially north and south of our line. To the south the Kirthar and the Sulaiman ranges are relatively compact, coherent, and continuous, with a typical "concordant" attitude to the Indus; to the north the attitude is "transverse," and so both continuity and coherence are broken. Throughout, however, the mountain hinterlands are wild and hard in both relief and climate, and the tribes correspond, the worst section being in the arid centre, *i.e.* where the two halves really meet in Waziristan. The famous "Five Fingers" are the two great passes of the Khaibar and the Bolan and the three minor ones of the Kurram, the Tochi, and the Gomal. The last is, possibly, the "oldest" of all, for both the Gomal river and its Zhob tributary are mentioned in the "River Hymn" of the Rigveda, under their Sanskrit names of Gomati and Yavyavati.

North of the Khaibar the whole area is a series of spurs from the Hindu Kush, with their river-threaded valleys, *e.g.* the Swat, feeding the Kabul; and access to important passes, *e.g.* the Malakand and the Dargai, is relatively easy, Dargai having actually rail connexion with India *via* Naushahra. Now the Khaibar, too, has its railway—and a broad-gauge one. The pass begins at Jamrud, about 10 miles west of Peshawar, and winds about for fully 32 miles before debouching at Dakha on to the Jalalabad plain; but the (single-track) line, by means of 32 tunnels, reduces the distance to 28 miles, with a summit at Landi Kotal that is *below* 3500 feet. The critical points, where the gorges are not more than 200 yards wide, are at Ali Musjid, 10 miles east of the summit, and Landi Khana, 5 miles west of it. The summit widens out northwards for about two miles, and the summer temperature on it may reach 118° F. **Hindu Kush.**

The Waziri section is a complicated area between the Kurram and the Gomal, with the Tochi giving possible access to the rear of it; and it needs a good "General Wade" system of roads,—as already projected, apparently, for purposes of motor transport (cf. p. 355)—with Razmal (7000 feet) as their objective, and rail up the Zhob valley at least as far as Fort Sandeman. The core is a mass of mountains that reach 11,000 feet, and separate the Wana plateau from the Kurram depression as the route from Kohat and Thal to Ghazni (7500 feet) *via* the Peiwar Kotal Pass. There are *Kaches*, or patches of fertile alluvium, in the "saucers" of the Wana plateau, and the hills collect 48–50″ of rain,[1] while the piedmont has about a quarter as much; but the area is very bare, and agriculture is very difficult and precarious. The Mahsud highlanders are immensely democratic, and have some attractive virtues; but they are not lovers of peace or of their neighbours. **Waziristan.**

The political frontier as delimited between Afghanistan and Baluchistan deserves some attention. Round the Takht-i-Sulaiman butt it is formed by the Kundar-Gomal; west of British Baluchistan it runs along the desert piedmont (*c.* 2000 feet) of the Koh-i-Amir to Koh-i-Malik Siah, where Persia, Baluchistan, and Afghanistan meet. The country between the Zhob and the Afghan frontier is very wild and quite isolated in winter,[2] but makes famous grazing-ground for camels and sheep in spring and early summer on both the Kakar and the Toba ranges; and the latter region illustrates the effect of interference by the politically-minded when ignorant of the geographical details and superior to the advice of the men on the spot who did know them. For the old frontier here was the Registan desert, which made raiding very difficult; but, by moving the frontier to the Indian foot of the Khwaja Amran range (*c.* 8900 feet), **Political Frontier.**

[1] This is equally divided between the S.W. Anti-Trades from mid-December to mid-May and the S.W. Monsoon from the beginning of July to mid-September.

[2] Even at Quetta—*i.e.* *c.* the latitude of Cairo—the *maximum* mid-day temperature in January has been as low as 15° F.

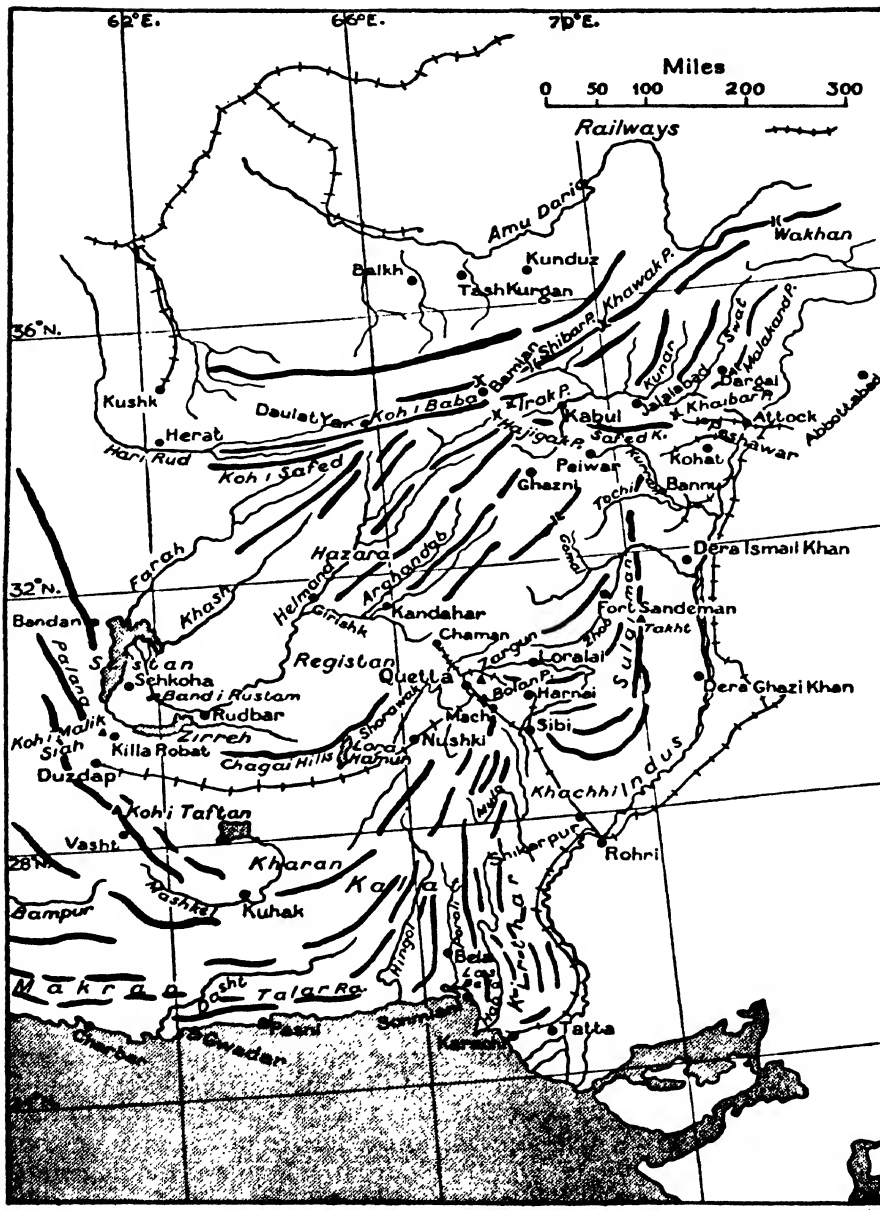

FIG. 72.—Orographic Features of Eastern Irania

Shorawak was made a handy refuge where raiders — especially fanatical Duranis, who *should* have been kept in Durani Afghanistan—could camp within a yard or two of the frontier! This folly

was repeated farther west, where the frontier was removed from the Helmand desert to the piedmont steppes of the Chagai Hills—with the same untoward results ; and it also meant that, when the railway was extended westward from Nushki, it had to go south of the Lora Hamun to Duzd-ap instead of going direct to the Koh-i-Malik Siah piedmont at Killa Robat.

Even on the Persian frontier the same policy was pursued, for we allowed the Persians to push down the Mashkel river, and seize Vasht—which belonged to Kalat, not to us !—with a loss of the important telegraph business now centred there, a matter of considerable moment to the *British India* steamers that call regularly at Pasni. The great wall of the Koh-i-Taftan ranges between Malik Siah and the Mashkel gives only on to stark desert, and here the Persians asked for nothing ; but, though the complacent gesture on this Persian front was not so criminally costly in human lives as it has been, and is still, on the Afghan front, the alienation of Kuhak lost us a useful support for the telegraph line to Robat and for the " Khorasan " railway, and an easy means of checking import of arms at Charbar and Gwadar (which belongs to Oman). **Access to Sea.**

The meeting of the three countries in this Zirreh depression, which is under 1600 feet, is the probable cause of the wasted opportunities in the Seistan lakeland. If the whole basin had been included in a single political unit, the desert might have been made to " blossom as the rose." Very nearly the whole of Afghanistan south of the Koh-i-Safed line drains into the Seistan (Helmand) *hamun*, and a large part of Baluchistan (including Persian Baluchistan) drains into the Mashkel, while the Helmand overflows periodically into the Zirreh. Of course, the Helmand is much the largest of the four rivers that feed the Seistan lake, but both the Khash and the Farah are far from negligible. The Helmand itself at dead low water brings down about 2000 cubic feet a second, in normal flood about 65,000, and in abnormal flood Sir Henry M'Mahon estimated it at 600,000 ! In normal flood-time the *hamun* is fully 100 miles long and nearly as wide, covering an area much larger than the Dead Sea ; but it is shallow, and the strong dry wind causes a much heavier evaporation than off the Dead Sea (Irwin). Indeed, it should be much salter than the Dead Sea ; but periodically (once in 10 years) abnormal flood makes it overflow, by the Shelag, into the Zirreh, where the water *is* salter than the Dead Sea. **Seistan Basin.**

The lakeland soil is fertile, and canals supply water to a number of centres, so that the quarter of a million people are able to raise large crops of wheat and barley, peas and beans, and fruit, especially melons, of which there is a considerable export, and fish and fowl are plentiful. The population seems to have been much larger **Its Value**

formerly than it is now, but proper regulation of the river would restore the old prosperity; and the climate—thanks mainly to the "120-days wind"—is exceptionally healthy, for the wind—in addition to turning innumerable windmills—tempers the summer heat, and keeps even irrigated land marvellously free from insects.

Wind. The wind movement recalls that in the Red Sea and Mesopotamian troughs, for it blows very steadily and strongly from N.N.W., *i.e.* in close correspondence with the lie of the Dasht-i-Lut trough and all the related feature-lines, *e.g.* the Palang and Bandan ranges, between which it normally sweeps on to the *hamun*. It grows stronger at the same time as the Wet Monsoon reaches Bombay, *i.e.* about 5th June; and, as it is strongest at the beginning of the season, and as the soil is driest and loosest then, it carries at first an enormous quantity of dust. Its strength and velocity are very closely related to the temperature, especially during the last week in May and the last week in August, when a stable condition of the cooling air allows the smoke of the villages and towns to be suspended overhead—the Dud-i-Seistan, or "Smoke of Seistan."

Makran. We may, however, distinguish between the relative possibilities of the Afghan and the Baluchi "deserts," with special reference to their history. The Makran is probably hopeless, the only normal supplies of food being the fish to which the land owes its name (Mahi-Khuran, "Fish-eating"), and on which both the people and their domestic animals (camels and cattle as well as dogs and cats) largely live; and the old Kej route to Sonmiani *via* Armabel (now Las Bela) is off the line of least sterility, *i.e.* the Rakhshan valley. But the Mashkel basin can still produce dates of the quality praised by Idrisi, and the success of Duzd-ap as one of the main centres of Persian trade to-day suggests that the railway is more or less on the right line of movement, and may give some commercial importance to the Kharan district. At the same time, it seems probable that the proper objective of any international railway here is Kandahar—for Lahore.

Seistan Irrigation. Certainly, prospects improve with higher latitudes. The actual area of the Gaud-i-Zirreh ("Hollow of Zirreh"), over which there seems to have been once a permanent, if variable, water-surface, measures fully 100 miles in length and 30 in breadth; and the Seistan lake once covered the whole of the present delta of the Helmand. To-day, even in spring, the Zirreh marsh does not measure 10 miles by 3, as a rule, and the Helmand valley below Rudbar is a series of dead cities, including the famous Shahtistan and Zabidan; but the cause lies in the neglect to replace the famous dam, Band-i-Rustam, which Timur destroyed, and which had made the lakeland for centuries an exporter of grain.

The dam was at the base of the present Seistan peninsula, and its destruction led immediately to the Helmand cutting a new

course—past Sehkoha, partly along an old canal, which had continued the westward trend of the river; but it was *not* the best place for a dam on the Helmand, and there seems to have been no attempt to control the Farah and the Khash. Proper control of these rivers and of the Robat, which feeds the Zirreh from the Chagai hills (over 7000 feet), would revolutionise both the local conditions and the distribution of blown sand over many miles.

Afghanistan

A Buffer State.

Though the population of Afghanistan is scarcely 8,000,000, the country is certainly larger than France and probably as large as Japan; but, except for this "abnormality," it is a very typical Buffer State, especially in relief and in history. Many of the important details of relief have been noticed in the earlier pages of this chapter (p. 328), and little further attention may be paid now to them.

Racial Chaos.

Whether the Afghans and Pathans are "Beni Israel,"—descendants of Afghan, King Saul's grandson—or not, their racial pride is unlimited; but neither group is pure-bred, the Pashtu-speaking Afghan being rather akin to the Khorasan Persians, while the Pakhtu-speaking Pathans (really Pakht-ans) may be akin to the Punjabi Indians. Beyond the Hindu Kush the Ghilzai tribe is Turkish, but speaks the Pashtu—or Pakhtu—as well as Turki; in the Hazara hills there are pure Mongols, descendants of stragglers from Jenghiz Khan's army, but they speak the archaic Persian, which is the *lingua franca* of the country, even if Pashtu (Pakhtu) is the natural speech of the mass of the population. Along the Hindu Kush neck, which is as useless to the Iran plateau as the Azerbaijan neck is useful, there is an extraordinary collection of racial and linguistic "fragments," aboriginals and refugees from Kafiristan and elsewhere.

Other Difficulties.

The importance of these details is in their interpretation. Afghanistan is simply a land where we may find a great variety of racial and linguistic scraps, with rival and even hostile interests, without any real bond of common speech or common descent or even common creed; for they are fanatical rather than religious, and—though all are Moslems—some are Sunnis, while others are Shiahs. Whatever else this makes, it does not make a nation, scarcely even a true political entity; for the rulers are mainly Sunni Afghans, while their servants are Shiah non-Afghans. As Afghans, they have some remarkable martial qualities, including an ultra-democratic power to stand on their own feet, to be true to their own customs and ideals, to be frugal as well as hospitable; but they lack nearly all the most useful moral qualities, especially the self-control which is some guard against arrogance, violence,

and greed. There is no end to tribal strife and intrigue; and, though the Duranis still rule, and will continue to rule, it will be tribal and not national ruling. Political influence will still coincide with military influence, and so will be concentrated east of the Gul Koh, between the latitudes of Kabul and Kandahar.

Indian Relations. This fact dominates not only the internal affairs of the country, but also its external relations, especially to India—India between Attock and Dera Ghazi Khan, or even between Abbottabad and Rohri. This is almost a straight line, and the Durand Line—when generalised—runs parallel with it some hundred miles westward; and between the two there is a third line, converging on the Durand Line in the north and on the Indus Line in the south, the Tribal Border Line, with its five fronts—to Peshawar, to Kohat, to Bannu, to Dera Ismail Khan, and to Dera Ghazi Khan. The Swat north (*Uelyana*, "The Garden") and the Baluch south may be ignored, for the Swatis face Kashmir, and Quetta is in the same latitude as Dera Ghazi Khan (± 30·10° N.); but in the Afridi and Waziri centre we have the core of the real difficulties, political and military, connected with the North-West Frontier of India.

The fundamental causes seem to be geographical, not political; for Afghanistan, in part or as a whole, has always been an unstable unit, expanding and contracting in response to the movements of neighbouring units. This has been true at all periods—for Persian Satraps, for Bactrian kings, for Afghan emperors in Ghazni or Mogul emperors in Delhi, etc.; above all the Sulaimans have never been a satisfactory or an effective frontier.

Foci. If we ignore the south-western "desert," we have the country as a rough triangle of highland, with a focus for each angle and each face. Herat, with the easiest access—and this, too, on the most exposed flank—and with a large Persian element in the local population, is the largest (120,000), and commands both Persian and Russian relationships. Kabul, the most difficult of access, but with the only oceanic drainage, is directly related to India; but it has not as good a position as Ghazni for a natural capital. Kandahar now has relatively little importance except economically, and has only half the population of Herat; but it has easy access to Indian markets (for its fruit), and in a sense does overlook the road between India and Persia.

Climate. Inside the triangle there is more productive land than is sometimes suggested, and the climate is better than it seems at first sight. If we relate the seasonal changes to the relief, we infer a large proportion of winter snow in the north-eastern quadrant and of summer dust in the south-western; and the latter throws some light on the quality of the piedmont soils, while the former throws some on the great skill of the people in growing fruit, especially stone-fruit, on the irrigated piedmonts. Indeed, they are amongst the cleverest

irrigators in the world, and fruit forms a quite abnormal proportion of their diet.

Animal food is abundant, the sheep being of especial use for both food and raw materials; and there are two harvests a year, a **Food Supply.**

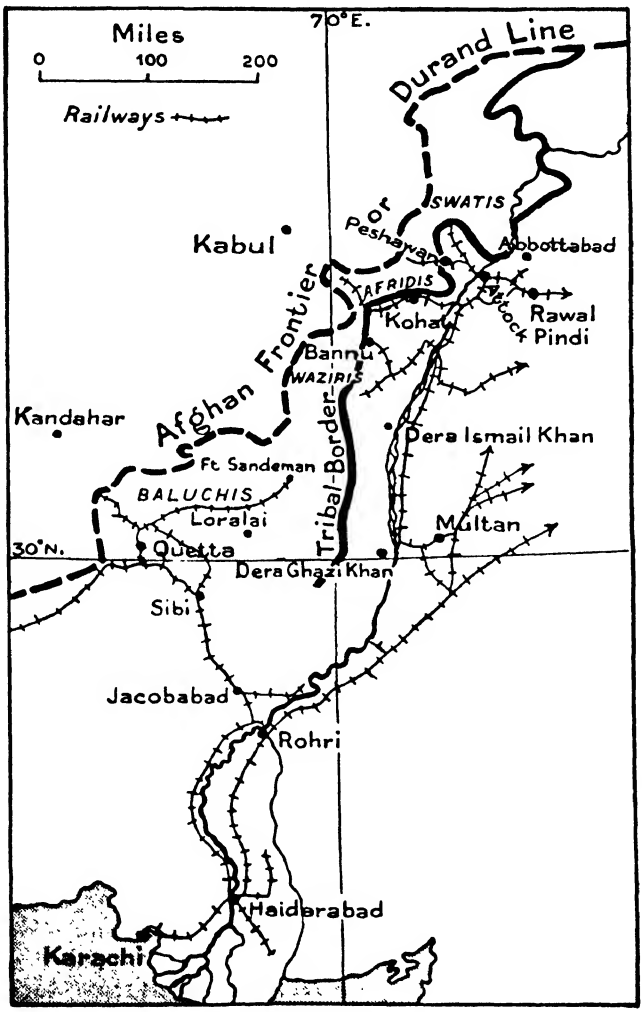

FIG. 73.—The Durand Line.

winter harvest of wheat and barley (horse-food), and a summer one of rice and maize. Many other crops are grown, *e.g.* tobacco and opium, and the land is naturally rich in drugs. Like the rest of Irania, too, it is the home of stone-fruit, and fruit is a great export (apricots and peaches, cherries and plums). There is also a great

production of field as well as orchard fruit, especially melons. The export goes almost entirely to India, but usually *via* Baluchistan because of the easy transport from Kandahar to rail-head at New Chaman; and in late summer (August–October) even regular fruit-trains are run.

Afghanistan, then, has a much better chance than Baluchistan for ultimate development, but it seems very probable that it will be internal development, *i.e.* as an independent State, not merely as a Borderland to India. But in that case it will probably become much less important as a Borderland, and there are some grounds for thinking that it has been already overrated in this respect; and, if Afghanistan becomes less important as a buffer or a link, Baluchistan will probably become more important.

Two Problems. In the political geography of Afghanistan there are also two points of special importance, but one is definitely a military problem —the relative value of the Bamian Passes and the Hari Rud valley; and, so far as it has non-military elements in it, it can scarcely be discussed without some direct agreement as to the value (or even the possibility) of really long-distance railway traffic in bulk.

The other point is the very typical racial disunity, and the relation of the "units" to the neighbouring countries; and here everything must depend on the wisdom and the strength of any central authority. For only the Kabul area is definitely Afghan, and even so there is a religious difficulty (cf. p. 349); Herat is definitely Persian, and Turkestan is Usbeg. The central highlands, with their terrific gorges (*daras*), quite isolate the core of the country; and the Oxus plain, though its low beds are very rich, is alien—Turan, not Iranian—except that its climate approximates to that of Herat. The Helmand is the only natural link in the whole area, and this suggests that Kandahar is the proper place for the capital; but the summer there is intensely hot, and the dust storms are very trying, while snow seldom falls, and never lies.

Baluchistan

The Makran. But in connexion with this political geography we have allowed an obsession about the Buffer State to the north to divert our attention from the great historic thoroughfare in the south. This is the route by which the Dravidians travelled from, or *via*, Mesopotamia to India; the Baluchis speak an archaic Persian; and the Brahuis ("Highlanders") of the Kirthar heights are Dravidian. The Makran route was thought very important in both land traffic and sea traffic by the Arabs, and it declined with the decline of Arab influence; but it was too far south to suffer seriously from Tatar or from Turk, and much of the old Arab attitude to it might be revived with great advantage. For it is a belt about 80 to 100 miles wide, in which, as we have seen,—except in its south-eastern (Brahui) corner—there is

a definite east-and-west trend of the feature-lines; and during the three centuries when Arab peoples were ruling Sind it was one of the greatest thoroughfares in the world. In the 20 degrees of longitude between the Karun and the Indus no navigable river reaches the sea, and most of the coast-land was impossible as a route, even in the Makran, for it is very narrow (not more than 20 miles, though probably twice as much now as in the days of Alexander), and much dissected by transverse *wadis*, in which any water is generally underground.

A Monsoon Control.

But, parallel with this harbourless coast and its difficult coast-land, there are wide valleys inland which give an open road from Tabriz to Quetta; and this road is crossed, *c.* 62° E., by the natural depression occupied by the Hari Rud-Harud-Shelag waterways. In the same longitude on the coast the Arabs found an old Drangian port on Charbar Bay, represented to-day not by the cable-station, but by the shabby fishing-village of Tiz. Alexander was making for this port along the coast; but the strip was 5–10 miles narrower then between the Hingol and the Porali than it is now, and the abrupt scarp at Ras Malan forced him to try up the Hingol valley. Unfortunately, he took the *first* turn westward, along the northern flank of the Talir and Talar ("Rocky") ranges instead of holding on north into the Kej (Idrisi's *Kiz*).

All that happened can be related to the monsoon, and the details have value for us to-day. Apparently, Alexander *knew* why the sea-trade stopped at Tiz. The Gwattar Bay, which is nearly as good as the Charbar, is 100 miles nearer India, and gives a better route inland—up the Dasht valley to Tump or Turbat; but the need was for a point which would tap both the fertile Seistan and the Kej route to India, and which was practically too far west to be troubled by the monsoon. But it was precisely the absence of the monsoon that accounted for the 200 miles of stark desert (in Persian Baluchistan), where his men suffered such agonies from thirst.

Drainage.

South of the latitude of Quetta the main water-parting trends south-westward, and south-east of it the Hab, the Porali, and the Hingol flow directly southward to the Arabian Sea parallel with the Kirthar range, while to the south-west the Dasht flows westward along the northern piedmont of the concordant Talar range until it cuts its way to the sea from Kalatak (500 feet). Nothing in this distribution has any vital relation to India; though minor chiefs have territory on the two flanks of the range, Las Bela and Kharan, there is really only one power, Kalat; all the southern and the western ranges and the rivers radiate from Kalat proper; and the State is separated from British Baluchistan by the Kachhi Desert and the Sibi railway. The Baluchis and the Brahuis of the south are great rearers of camels and sheep, but are typical "products" of the Makran, with no fear of the sea; indeed, during the War a

complete Camel Corps was enlisted, equipped, and despatched from Pasni to Somaliland *within ten days*!

But, in the geography of Baluchistan, as a Borderland to India, two points need attention. The more important is that the main water-parting—between the Lora and the Zhob, the Bado and the Loralai—is in the 9000 odd square miles of British Baluchistan, *i.e.* in the precise area where access to and from India is easiest, —where the associated "British" territories are narrowest,—and where the divide is racial as well as hydrographic.

Northern Wedge. I. The northern wedge, which narrows northward from *c.* 200 to *c.* 100 miles in width, has its feature-lines largely parallel with the great Sulaiman wall; and it makes a rough, healthy, picturesque highland, which was the race-home of the Pathan highlanders. The upper Zhob basin is open and fertile, with the olive growing wild—a significant comment on the winter climate; and the valley gives a direct route for 100 miles on the way from the Gomal Pass *via* Fort Sandeman and Loralai to Quetta. Besides the Kakars there are a dozen other tribes of Pathans in Baluchistan, and they are massed in this northern wedge, where they make a buffer of independent tribes between Afghanistan and the British frontier to both the south and the east. The facilities for irrigation guarantee a fair level of food-supply here, especially since the introduction of dry-farming—with wheat, on land watered *once*, and that just *before* sowing; and so the population is fairly dense and fairly contented.

Southern Block. As we have seen, the square block (*c.* 300 miles each way) to the south is now much less favoured, though there seems to have been an epoch when a much heavier rainfall supported quite a dense (Arab) population. It is too far south to get any real benefit from the Anti-Trade cyclones, and too far west to be on the line of the Wet Monsoon; and so it is a desert-land of bare mountains and bare flats, of *wadis* and salt-pans. There is little or no permanent drainage; and the dryness of the air leads to great extremes of temperature, with an important reaction in India. There are belts of fertile soil, some of which can be irrigated from underground ducts (*karez*); but the typical grain is millet, and the food supply is very scanty for both man and beast, though the people retain the old Arab skill with horses. But they form a tiny population, forced to wander from extremes of temperature and from the poverty of the pastures; and, though all speak Iranian tongues, they speak three or four different ones. The Baluchi is still a robber and a raider; but, so far from being any real danger to India, his homeland is a real protection—an arid plateau basin, fenced east and west by mountain masses.

Quetta. Between the two areas the "Quetta" water-parting carries the highest group of peaks in the whole of Baluchistan. Quetta itself

is within a ring of peaks, from *c.* 10,500 to 11,500 feet in height, Zargun actually approaching 11,800, so that—while comparable with Cairo in latitude, if not in altitude (5500 feet)—it has a rainfall of 10 inches, four-fifths of it in December–April. With a mean temperature of nearly 40° F. at midwinter (January) and under 78° F. at midsummer (July), the district would be of special importance as a centre of Baluchi tribes; and the railway gives it complete dominance between Baluchis and Pathans—with a little coalfield at Khost, workable also in the Sor range and at Mach. But the Bolan Pass (5000 feet) is nearly twice as high as the Khaibar, and the original line from Sibi to Bostan is narrow-gauge; and so Quetta must yield in economic importance to Harnai, with its broad-gauge and with no break-of-bulk on the through traffic. Harnai, too, is the natural junction for the Zhob caravans *via* Loralai.

Motor Transport.

At the same time we must not over rate the railway, for it has never done what motor transport is doing, *i.e.* revolutionising village life economically throughout India,[1] as it is revolutionising political life in Waziristan—where to-day passengers will even *go without their rifles* to get room in a motor bus on the great circular motor-road through Barum, Dera Ismail Khan, Manzai, Razmak, Idak.

Mountain Wall.

II. These conditions of the hinterland make the character of the frontier wall of relatively little importance, and it is certainly of less importance to-day than it was a century ago; but the meridional trend and the completeness of the wall have permanent reactions on both military and commercial routes, greatly modifying the main problems. The Sulaiman wall runs directly parallel with meridian 70° E., and reaches an extreme height of over 11,000 feet in the Takht peaks; and south of Dera Ismail Khan there is no place of anything like equal importance along the west bank of the Indus. Still less is there any such focus south of Shikarpur, for the 7000-foot wall of the Kirthar is almost unpierced. From the Kalat centre the Mula does cut down to the Kachhi lowland, and was followed for ages by the old highway (cf. p. 330); but the rest of the drainage which does not flow westward to the Kharan desert and the Kej valley, flows directly southward to the Arabian Sea in a series of parallel valleys. The Hab actually forms the frontier for 60 miles, and the Pab and other ranges and the waterless valleys are parallel with the wall, and form a succession of obstacles to movement to or from India.

[1] The need is very great, for in India there are only 41,000 miles of railway, *i.e.* only 1 mile to over 44 square miles, compared with 1 to 4·4 in Great Britain.

REFERENCES—WILLIAMSON, *In a Persian Oilfield* (1927); HAMILTON, *Afghanistan* (1906); HUNTINGTON, *Explorations in Turkestan* (1905)—pp. 217 to 317 dealing with the Seistan Basin.

INDIA—I

CHAPTER XXII

(1) THE SURROUNDINGS

Land and People. As one of the great units of Asia, India is marked by both external isolation and internal incoherence. The land is not made literally more aloof from its continent by the physical barrier of the greatest mountain-mass in the world than its peoples are made metaphorically so by essential features of their lives—religious and social, political and economic; and these features differentiate as completely, and even more acutely, between the various races and tongues and creeds within the great barrier. The wish to "see the problem whole" must face a multitude of differences and disunities that can be related to diversities of relief and climate, of outlook and activities; and its actual result would probably be exactly the opposite of that suggested by the words. For there is only one obvious unity in India to-day, and that is a unity of British control; and, as that is being relaxed, the great disunities are being intensified in the urgent scramble for place and power, for prizes and patronage.

Isolation by Land

95-100° E. I. The isolation of the country by land does not need much more attention than it has already implicitly received in the survey of the structure and the relief of its hinterland (cf. p. 66); but one of the details emphasised there has a direct bearing on the matter. For the changed[1] trend of the continental feature-lines about longitude 95° E. evolved a series of parallel valleys, deep and narrow, flanked by lofty mountains and floored by wide rivers, which presented an endless repetition of rampart and fosse against any serious invasion from the east. Moreover, the relation of these north-and-south lines to the Wet Monsoon covered flanks and floors alike with dense forest, an extra protection; and yet immediately

[1] The change of trend can be detected even at 90° E

to windward on the Ganges plain the Wet Monsoon also guaranteed food for the densest population in India. The jungle-clad yomas—Arakan, Lushai, Patkai, etc.—though they do not rise much above 10,000 feet, have been so secure a protection to India that they have been also a very great barrier to intercourse by land, even with Burma. At the same time, the early Mongol and Kolarian elements in India did enter the land at this north-eastern corner.

Himalayan Screen.

The great Himalayan arc, with its height and mass, its snow and ice, its parallel ranges, stretching for 1500 miles between the great transverse gorges of Indus and Brahmaputra, with a width of 150 to 300 miles and a height of from 3 to nearly 6 miles, has been at least an equally serious barrier, physically and climatically, politically and economically; indeed, it has entirely deprived Hindustan of such bracing winters as are enjoyed by the similar latitudes of Southern China. So we have at once a great climatic disharmony of a tropical climate imposed on half a million square miles of a temperate zone (cf. p. 123).

The great arc widens out westward, and its altitude decreases as its width increases; and it trends more and more off the line of the Wet Monsoon, with a decrease in the distribution and the density of the forest cover. Movement across it is, therefore, slightly easier westward; and, as we have seen, across its south-western extension there have been at least two thoroughfares for 30 centuries. The difference between the eastern and the western flanks is mainly a response to the climate, not to relief. The total transverse wall is about the same length on both flanks, 25°–35° N. in the west and 17°–27° N. in the east; and the "Sulaiman" crests are not much higher than the "Burmese"; but the parallel ranges are quite off the line of the Wet Monsoon, and in the dry climate the forest cover is slight.

North-West Frontier.

The only compensations are that there is enough very pure limestone to give rise to a considerable belt of Karst desert, and that the "thoroughfares" are not really very easy. It is significant that the Khaibar Pass is not in the valley of the Kabul river, and that the "real Bolan" Pass is not in the valley of the Bolan *wadi*; and the "Khaibar" railway does not follow the river, or thread the Pass, while the "Bolan" has two routes between Sibi and Bostan, the easier "Harnai" route—between Zargun (*c.* 11,800 feet) and Khalifat (*c.* 11,450)—not touching the vital focus of Quetta at all. But in the "700" miles there are said to be 350 tracks usable by camels, and the approach from the Aegean and Europe is through the three great Moslem states of the world; and the position is not made easier by the exceptional power of the Mullahs in northern Afghanistan. For there is so much ethnic confusion, and the tribal elements are so small, that no chief has wide power; but there is a maximum of religious unity, from which the Mullahs profit.

In the south, on the contrary, with less racial mixture and larger units, the chiefs have considerable power; but they are often Afghan or Pathan "Sunnis" ruling alien "Shiahs."

From the Indian standpoint the relatively easy approach to the Tochi-Kurram routes which facilitated the construction of railways to Bannu and Thal, is not of very serious political importance, because the old importance of Ghazni and Khost is now entirely lost—to Kabul and Kandahar, even if the latter has also now lost all its old political importance (as capital of the Afghan Empire), and has only some economic importance; and the railways penetrate between the Afridi and the Waziri domains, the source of the worst anxiety. But there is nothing here to do the work done by the Zhob and the Dori valleys, under Sandeman, in the settlement of the Baluchis; and the Mahsud "retreats" dominate the left flank of the Gomal and the right flank of the Tochi.

Early Intruders. On the other hand, "Aryans" were intruding here 5000 years ago, and non-Aryans (Dravidians) even before that. Indeed, the most important, if the least calculable, influence associated with this Borderland may be the persistent pressure, or even actual intrusion across it, of hardier peoples from lands where life was harder; and pre-historic intruders had a more difficult problem than historic intruders. For the instinct of self-preservation amongst the intruding Aryan minority in early times took the form of a demand for the preservation of racial purity, which has been the basis of "Hindu" life ever since; and, though this did not prevent mixture of blood, it did prevent healthy inter-racial intercourse. As a natural result, the "creed" was spread by concessions and compromises, the admission of aliens and alien superstitions and barbarisms,—the main influence in dissolving Brahmanism into Hinduism having been the non-Aryan "low-caste" tribes; and even pure Brahmanism never captivated the Dravidians, partly because they were a more cultured people, and partly because they were climatically naturalised to India, while the intruders were being debilitated by the process of acclimatisation.

Islam. Even an Asoka could not undo the harm, but Islam found it fairly easy to check the natural evolution of the compromised Hinduism; and, in doing this, it brought in that sectarian hatred which is the greatest of all dangers to the peace and the prosperity of India to-day. For Hinduism has no Hindu support elsewhere in the whole world; but Islam, from Baluchistan to Bengal, and especially between Kashmir and Kathiawar, is fully conscious of the support of the drought-stricken tablelands of "Mediterranean" Asia for 2000 miles and more westward. Indeed, in spite of its pre-historic origin, Hindu India regards its north-western approach very much as Italy regards its north-eastern.

This attitude is more or less justified,—as the Italian has been,—

for all serious invasion, whether Moslem or not, has entered India from this north-west corner; and Delhi was ruled for 200 years from Ghazni. When intruders of Tatar or Moghul type combined religious fervour with high organisation, they were exceptionally dangerous to the small units of unorganised Hindus; and, though Akbar made something like a permanent settlement—on an economic base,—and Aurangzeb had some power over the Dekkan, the intolerance of Islam soon alienated the most virile of the Hindus, the Rajput Warrior Caste.

Isolation by Sea

II. The isolation of India by sea has been in some ways, especially down to the 17th century, more complete than its isolation by land; and, again, there are two aspects of the problem. In very early days there can have been no enemies to fear from the ocean, and there was very little to lure coast-dwellers out to sea. Between Karachi and Chittagong there are not more than 3500 miles of "direct" coast, and that means only 1 mile of coast to about 450 square miles of hinterland; except for about 150 miles, too, all of this coast is in the Torrid Zone, and it is almost devoid of natural harbours. For, in the absence of islands and border seas, the whole is storm-swept and scourged by fierce currents; there are hundreds of miles of bare rock-wall in the western half and of mangrove-swamp in the eastern; the river harbours are amongst the most dangerous and expensive in the world; and the only seaport that was naturally and always first-class, Bombay (*Bom Bahia*, "Good Bay"), has a *Portuguese* name, and was rented by Charles II. to the East India Company for as little as £10 a year! As a result of all this, even in modern times India has had only half a dozen regular outlets by sea—Bombay and Calcutta, of first rank,—Karachi and Rangoon, of second rank,—and, a long way behind them, Madras and Chittagong. **The Coast.**

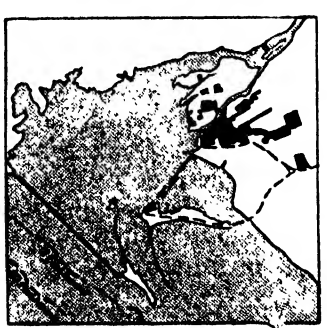

FIG. 74.—Karachi Harbour

This makes the case out, however, both rather better and rather worse than it actually is, or has been. For instance, in 1839 Karachi was merely a shallow lagoon, and up to 1873 it was merely an anchorage where coasting boats could tranship cargo to and from sea-going ships in the lee of the little island of Kiamari, now part of the breakwater; and only with the completion of the breakwater (to protect the entrance from the S.W.Monsoon) did it begin to **Karachi.**

be a real port. But Karachi has at least the great advantage of being to westward of the Indus estuary, the silt from which is carried—by wind and current—eastward; and the result illustrates very well what must have occurred at a great many places along the Indian coast.

Rann of Cutch.

For up to the time of Alexander (325 B.C.) there seem to have been seven islands off an old easterly distributary (Puran or Hakra) of the Indus; but these are all now joined up and connected with the mainland by the Greater Rann of Cutch, though the Luni river still has access to the sea through the Kori creek. There seem to have been some seismic troubles here, but the chief force at work has been river silt, under the pressure of wind-and-wave action during the S.W. Monsoon, and terrific dust storms from the north-east just before the monsoon breaks; for the alluvium of the Greater Rann is unmistakably from the Indus, while that in the Lesser Rann is from the "black cotton soil" of Kathiawar.

Even the confident assertion that the Greater Rann is flooded from the ocean during the S.W. Monsoon seems to be generally baseless, for the saltness of the water is due directly to the Luni—the Banas doing something similar for the Lesser Rann,—and the very stable influence of the Luni and the absence of silt in the river-water seem to be due to the fact that both the main river and its chief tributary, the Sarsuti, have their origin in lakes—at Ajmer and Pushkar respectively. So far from being a gulf, then, it is only what its name may imply—a Rann, a "Marsh," of Cutch, "Mud"; and it was the same in 1361, when an Arab described it as "a howling desert . . . no bird . . . not a tree . . . not even a miserable noxious weed!"[1] There is no reference to water, only the suggestion of very salt sand!

Kathiawar.

Of course, there are little roadsteads, where coastal trade is done, *e.g.* Porbandar and Verawal, and the Cutchis were once fairly famous seamen; but there have been no places where small vessels could approach at all times of the year, still less where they could anchor and discharge cargo. The Okhamandal peninsula in the north-west protects Beyt so well from even the worst storms that recently a good harbour has been made, at Okha, where vessels drawing up to 22 feet can approach even at dead low-water; and, as the territory belongs to the State of Baroda, some trade may be diverted here from Bombay. But the character of the work done to ensure this, and the directors of it, are not Indian.

Marmagao.

All the little roadsteads on this coast have, however, some political or economic "excuse" for their existence, but not much more than an excuse; for instance, pilgrims want access to the sacred city of Dwarka, which belongs to Baroda, and the island

[1] The word *Cutch* may be a form of *Kach*, "sea-coast."

port of Diu survives because the territory is Portuguese. Marmagao has more justification, for the Portuguese have provided it with a breakwater, so that it is open all the year; and, apart from that, it has tapped naturally the cotton and the manganese of its hinterland along the line of differential erosion between the lava-capped and the crystalline sections of the Western Ghats, which has given very easy gradients to railway access inland.

Malabar Coast.

With approach to the Malabar Coast below the uncapped Ghats we have a marked feature of the topography in the shape of "the Backwaters," a series of lagoons which required only a few links of canal to give continuous navigation to Cape Comorin. Many of the ports here are very shallow, and large boats have to lie far out—*e.g.* 2 miles at Tellicherri and Cochin, 3 miles at Mangalore and Calicut, etc.; but boats which can use them are safe at all seasons, and in most cases there is some special trade, *e.g.* pepper and Laccadive coconut products at Mangalore, and pepper again at Tellicherri, where the approach to the port is so well protected by a natural breakwater that even large boats can take refuge, though they cannot use the port itself.

Calicut, on the contrary—though it has an important coconut trade—owes its existence only to the Pal-Ghat Gap (under 1000 feet); but the necessary closing of the port during June–August is partly discounted by the fact that that is the "slack time" in the coconut trade. The same applies to Cochin, but its backwater connexions are considerable; and, again, the Maliapuram bank makes it a refuge even for boats too large to cross the bar. Alleppi, at the other end of the long lagoon, has a very fertile hinterland and the political support of its Travancore State; and it has backwater connexions with the other Travancore port of Quilon.

Eastern Coast.

Once Cape Comorin is rounded, the problems are much modified, and some are of a new kind; for instance, the dangers of exposure to the south-west cease to be such an obsession, and the harbours are normally open the whole year through. On the other hand, the actual coast is worse, even on the Carnatic section; and political factors have had more weight, *e.g.* command of the coast and access inland, where the dryness of the climate was welcomed by Europeans.

As we have seen, the Ghats are lava-capped behind the Konkan coast, but not so behind the Malabar coast; and this, accentuated by a lengthening of the wet season southwards, has caused considerable difference in the weathering and in the distribution of weathered material, *e.g.* to shut in shallow lagoons. But otherwise the western coast is distinctly a unit with a single orientation. On the east coast, however, we have a marked distinction between a northern 600 miles lying N.E.–S.W., *i.e.* parallel with both the

regular winds, and a southern 400 miles lying almost due north and south along 80° E., over which both the N.E. Trade and the S.W. Monsoon blow obliquely; and on the one there are three large deltaic promontories, while on the other there is none, though the present delta of the Cauvery may once have been a bay. The sand-drift along this southern half of the Coromandel coast was always depositing material south of the Madras elbow and eroding it north of that, where the Pulicat lagoon now lies below the Nagari hills; and the amount and the pace of the drift have recently been measurable—since the old, open, surf-beaten roadstead of Madras was provided with sea-walls to make it a really useful port, even if vessels may enter only during daylight. Since the walls were completed, there has been a yearly accretion of sand to the south averaging 1,000,000 tons a year, with a corresponding erosion of coast to the north.

Manar Coast. The natural conditions here were the more effective before the arrival of Europeans, but the political considerations were the more effective after that. For instance, Tuticorin owed its very early prosperity to the latitude and the surroundings of the Manar Gulf, which is so shallow, so sandy, and so well-sheltered, that it made an ideal "nursery" for the pearl oyster (or "mussel"); but, though it has stood next to Madras for sea trade in southern India, vessels have to lie 5 miles out! And the ferry from the Rameswaram rail-terminus of Dhanushkodi to Talai-Manar has ruined its main trade, *i.e.* that with Ceylon.

New Factors. North of Adam's Bridge and Palk Strait we come in touch with the new factors—the importance of rivers, the shallowness of the sea over the submerged sill of the gently tilted block, and the political importance of good anchorage; but there are still economic "excuses" for the existence of nearly all the roadsteads. The river note is struck at once in Negapatam; and even now, though the Kaduvaujar and the associated canals give access to the rice and the tobacco lands of the Cauvery delta and the ancient capital of Tanjore—with rail *via* Trichinopoli and Dindigul to the still older Madura,—fully laden boats cannot cross the bar. The French possession of Karikal ("Fish Pass"), actually on the delta, though once a fishing settlement, is now only an outlet for the rice and the ground-nuts (cf. Cuddalore).

Pondicherri. Pondicherri brings us to the question of anchorage. Though the town is the centre of the ground-nut trade, which is specifically with Marseilles, it is in no sense a natural harbour; but, for a Sea Power, access to the Dekkan was much easier through this Carnatic coast than anywhere else, and—in the absence of any kind of harbour that could shelter a fleet—the quality of the anchorage was of vital importance. This, no doubt, accounted for the French choice of Pondicherri, for there is no better anchorage

round the whole Bay of Bengal; but they would, probably, have been wiser to choose Madras.

Madras. For along all this coast there is a wide coastal plain, with a comparatively dry climate, and there were no serious obstacles to movement north-and-south wherever the intruders landed; but the historic base for Europeans had been Calicut. The easiest route to the Malabar Coast was—and is—from Negapatam (and Karikal) by the Cauvery valley *via* Trichinopoli and the Pal-Ghat depression, but this only commanded the southern end of the plain; and the Kistna route to Goa from Masulipatam (and Yanaon) only commanded the northern end. But Madras, on the extreme eastward reach of the coast, had the best command of the coastal waters; and yet it had access northward by the Penner valley into the Kistna basin and to Goa, and southward by the Palar valley (cf. Arcot) into the Cauvery basin and to Calicut.

The Deltas. On the Northern Circars the deltas are the vital feature, and ports are rather objectives of delta navigation, especially on the Godavari and the Kistna deltas, than sea-gates; indeed, at Masulipatam vessels have to lie 5 miles out, and at Cocanada 7 miles! And the choice of a non-deltaic, surf-beaten roadstead such as Vizagapatam for development depended on the existence of 6 square miles of swamp in front of the only practicable gap in the Eastern Ghats for many miles and behind the Dolphin's Nose promontory. This is rather less than 500 miles from Madras, rather more than 500 from Calcutta, and within about 250 miles of Raipur, *i.e.* a point where there is a variety of freight (manganese and coal, cotton and oil-seeds), demanding access to the coast. In other words, here again the conditions are wholly artificial; and, in the absence of Europeans, there would have been no more probability of even a small port being created on this surf-scourged coast than of a great port being created behind the fever-haunted swamps of the Sundarbans.

Foreign Seamen. Obviously, then, conditions were profoundly unfavourable to much maritime development. The gradual disappearance of any old Dravidian seamen suggests that their early exploits were the dying efforts of aptitudes which they had brought with them from their race-home. Any subsequent development was likely to come from outside—from Arabs and "Malays," English and Portuguese, who were not only real seamen, but also free from the obsession which enslaved all "Indians" during the only season when India could be reached easily from the west by sea—the obsession of the cultivator to make full use of the Wet Monsoon. The fishermen of the Carnatic coast were more or less free from this obsession, for their food-supply depended on the N.E. Monsoon; but the coast was peculiarly unfavourable, and its hinterland was so much isolated from the rest of India that it developed an independent

culture of its own. Even Asoka did not control Pandya and Chola, nor did the Afghan emperors, nor yet the Moghul emperors.

Sea Power. This inability of the strongest Land Powers to control the whole area, and the very late arrival of Sea Power on the scene, are significant comments on the incoherence of the unit and its greater isolation by sea than by land; and it is worthy of notice that the foci of intrusion for Sea Power were largely associated with the structural variety. Asoka, the Afghans, the Moghuls, had all found Hindustan more or less a unit; but no one had found any unity in the Dekkan, and it was against the naturally incoherent Dekkan that Portuguese and Dutch, French and English, made their "attack." Obviously, the Cambay Gulf and the Ganges estuary, Calicut and Pondicherri, were bound to be the points of impact. There was very easy access inland from Calicut, but navigation was easier on the Coromandel coast; there, too, the coast-lands were low and fairly dry and fertile, and they were occupied by dense populations of unwarlike peoples with old civilisations. The Carnatic was very far from Delhi and the warlike peoples of the north-west, and the Delhi Power had to be dealt with on the Hindustan plain, even if a Sea Power could reach it only at the Ganges end of the plain (Plassey); but the destiny of India, at the hands of a Sea Power, was going to be decided behind Madras or Pondicherri, the vital triangle being Pondicherri—Madras—Arcot.

Surat. But, if access to Hindustan for a Sea Power was easiest by the Ganges, the Gangetic plain was completely isolated from the Dekkan in early days by the "Indravati" forest, while movement between the Indus plain and the Dekkan was much facilitated by the Malwa plateau, and this made the Gulf of Cambay very important, the "Surat river" being almost a dividing line between the Sikhs of the dry plain and the Mahrattas of the dry plateau.

Steppe Intruders. A brief comparison of the three main stages of historical development in India will throw a little more light on the problem. The Aryan invasion was a series of typical Steppe migrations, in which whole groups moved as units—men, women, and children, with their flocks and herds, their Sanskrit speech and Nature-worship. In spreading gradually over the whole area, they absorbed groups of natives and of older immigrants, incorporating many beliefs and customs that were alien to Steppe life and ideas; but caste was not alien. The Iranian steppe peoples had their four social classes and their sacred thread; trade and husbandry are as closely associated with nomad life that centres on oases, as are divination and war. And the dry north-west of India—which, down to the creation of our modern irrigation machinery, was never able to maintain more than half a dozen people to the square mile—

was in many essentials very similar to the land from which these virile priests and warriors, traders and tillers, came.

Leprosy. Fear of leprosy seems to have existed amongst the Iranians centuries before any Egypto-Israelitish taboos could have reached them; and the recognised intensity of the disease on sea-coasts had already given rise to the mistaken belief that it was due to the eating of fish. Obviously, the intruders thought that they were approaching the sea, or they would not have called the water *Indus* or *Sindhus* ("the Sea"); but the suggestion that this may be behind the "untouchability" which distinguishes the Hindu caste-system from all others is not based on any actual evidence. In any case, the theory has to face the fact that for 1000 years, more or less, Buddhism was going to impose its unifying influence and to be a great spiritual solvent of Brahmanistic ritualism.

Oriental Mentality. The vital fact is that Ancient India, whether Brahman or Buddhist, though a wonderful chaos racially and linguistically, had a certain unity as the home of philosophic religion; and for three centuries after Buddhism had given place to Hinduism, the older influence remained widely active. Perhaps "passive" is a more appropriate word, for the one defect was lack of real activity; and the mental attitude of Indians is still what it was then. They observe, *e.g.* abuses; they draw intellectual conclusions, *e.g.* about a situation; and then—they accept anything and everything. There is no Western mania—*e.g.* to correct the abuse, to control the situation, to trample on religious or racial or any other snobbery. It has been typical of the East that monks should live on charity and meditate, while monks in the West have given charity and worked; so the East has been even poorer and more over-populated than the West, but it has been indifferent to both conditions.

Religion. The sequel suggests that the spiritual and social salvation of the individual, even by a Buddhism organised by such a Constantine of Buddhism as Asoka, was not the best preparation for resistance to the "heresy of individualism" or to the curious allurement of esoteric mystery in religion—which Buddhism never routed from any large part of India—and still less to the fierce virility of Islam, which invaded India just at the time when the Brahmano-Buddhist Hinduism became the dominant creed of the whole area (*c.* A.D. 800). The organisation of the new faith crushed Hinduism into an incoherent collection of minute divisions, which reacted against its purity by developing a repulsive ceremonial; and its gospel of the sword brought into India a bitterness and a barbarity from which the land has suffered terribly ever since.

"Western" Intrusion. Then misfortune still awaited the peoples. For just as Islam arrived at the critical moment for Hinduism, so Europeanism arrived at the moment when the strong rule of the Moghuls promised some real political unity; but it arrived, not as a fighting

faith, but as a useful and harmless trade. English, French, and Dutch followed the Portuguese as traders; the first "Factory" was at Surat, the first "Territory" was Bombay. India is to-day the poorest country (*per capita*) in the world, and probably was always poor; but the Oriental love of display had convinced Europe that it was fabulously rich, as the limitation of European knowledge of the land to knowledge of only coastlands made Europeans believe that all Indians lived solely on rice.

Chaos v. Companies.

Unfortunately, a century of experience left these traders with a clear understanding that India was only a geographical expression, and that its peoples were of varied race and creed and speech—for ever at war with one another; and, when the bigotry of Aurangzeb not only provoked the Mahratta Hindus under Shivagi, but also alienated the Dekkan Moslems, the Moghul empire broke up into its naturally incoherent bits. The chaos gave an opportunity to the Persians under Nadir Shah, and then to the Afghans, to intrude; and meantime the traders had been able to acquire lands and privileges, out of which trade rivalries emerged as political rivalries. In the end the East India Company had to choose between sinking in the turmoil or putting a stop to it; and never since then has India been disturbed by foreign invasion.

For that very reason internal troubles have loomed larger, and need some notice here; and, if the economic geography of India may discuss the suitability of an American type of cotton to India, its political geography may assuredly discuss the suitability of a European type of polity. It is not a question of any one's sincerity or humanity, but—as we have already suggested—one of mentality and inheritance.

Self-Government.

Representative institutions and responsible government are alien, not only to India, but to Asia as a continent; but so were cinchona and eucalyptus, which have been a very great blessing, though even European officials still often have not the wisdom to plant the mosquito-hated eucalyptus round their bungalows. But, just as we plant the one in damp heat and the other in dry heat, and have a Hindu University in Benares and a Moslem University in Aligarh, so we must try to find conditions favourable to the alien political scheme; and the conditions—outside India—are agreed upon by all rational persons. They are—a population of somewhat the same type as has evolved the scheme that is to be tried,—a large community of speech, creed, culture, etc., amongst those on whom it is to be tried,—some equality of sex, suffrage, and citizenship,—and a firm conviction that self-government must include self-defence.

But, as we have seen, "India" is merely a geographical label for an area in which successive conquests from the north-west have left a chaos of racial elements. So far from it containing a nation, for 2000 years before the English reached the land, even Hindu

India had never had a *national* government, or learnt any lessons in administration and self-government as understood in Europe.

Speech and Creed.

Thorough discussion of mutual aims and needs might help greatly towards the necessary conditions, but in what language would such discussions be conducted? The linguistic chaos is even worse than the racial. There are no less than *25 main vernaculars*, with innumerable sub-divisions; even in the United Provinces there are approximately *50 distinct languages*. The legislative bodies, like Mr. Gandhi in his pamphlets, employ English; but only 1 p.c. of the total population can speak what may be called English, and only 6 p.c. can write their own names in their own vernacular—90 p.c. of them being men. Religion is a still greater difficulty—immensely difficult even for the British officials, who are neither Hindus nor Moslems, neither Sikhs nor Buddhists; and the 200 odd millions of Hindus have 2000 main caste divisions, which forbid intermarriage, community of meals, etc., so particularly that on November 29, 1921, the Central Provinces Council formally denied the Pariahs (well over 20 p.c. of the total population of the Provinces) the "right" of access to the public water-supply (tanks)! And all the fighting races are rural and politically and educationally backward.

(2) THE BORDER LANDS

Indo-Iranian.

India is one of the countries in the world where land frontiers have to be pictured as belts and not as lines, and where each frontier has its own human note, so that we may usefully think of them as respectively Indo-Iranian, Indo-Tibetan, and Indo-Burmese. As we have seen, the Indo-Iranian belt has been historically the most important; for, by its relief and by its climate, as reflected in its vegetation, it is much less of a barrier than either of the two others. At the same time, it is not nearly so easy to cross as its history might suggest; and the ease with which its native inhabitants can raid the fertile lowland to the east, is no guide whatever to the immense difficulty which strangers from a distance would have to face not only in crossing the belt, but also in bringing up all supplies —troops, food, ammunition, etc.

Defence.

Further, the configuration of the belt is such that it facilitates the concentration of Indian defence at points within easy reach of the main passes, without serious encroachment on areas where the natives can raise enough food to support life, and yet without leaving serious gaps through which any traffic in arms can be carried on. Thus, the Kachhi valley, the easiest line of access from the sea, is a "desert"; in the far north the Malakand Pass is commanded by the railway to Dargai.

As we have seen, the whole belt may be divided geographically,

Gomal Divide. and is divided politically, into two by the Gomal valley, which makes a natural centre, *c.* 32° N.; and the character of the southern half and its relation to the Indian lowland as expressed in the Kirthar and the Sulaiman walls distinguish it clearly from the northern half. It is significant that the Indian counterpart in the North-West Frontier Province begins at the foot of the Takht-i-Sulaiman; for that means that the southern approach to the province is through "British" and not Afghan territory, while the Hindu Kush protects the Chitral, Panjkora, and Swat basins in the north.

N.W. Frontier. The whole province stretches for about 500 miles along the Indus below Nanga Parbat, and the river makes a natural base for it, and covers the railway running parallel with it on the "Home" bank all the way south of Attock ("the Limit"—of navigation). North-east of Attock the province crosses the Indus to include the Hazara district, and it should include the Potwar or Sohan plateau south-eastward to the crest of the Salt Range, if not the whole area "inside" the Jhelum elbow from Mangla to Khushab.[1]

The province is rather larger than Ireland, and one-third of it is directly British, but it has three natural regions. The Hazara highland is definitely Himalayan, with peaks rising to 17,000 feet, and it is clearly delineated by the Indus (and the Jhelum); but its importance to the province is that, north of Abbottabad, the Kagan valley gives the easiest route—*via* Chilas—to Bunji and the Gilgit valley.

Tribal Highlands. The Tribal highlands do not usually reach 12,000 feet, though the boundary range of the Safed Koh nearly touches 16,000 in Sikaram; and the valleys have a fair proportion of fertile soil, with a predominantly winter (January–April) rainfall, and are often well irrigated. The Wet Monsoon does reach Jalalabad in July and August, and gives good rains in the north of the province, but very little in the south; and so irrigation is of vital importance—in a region where 95 p.c. of the population are potentially nomad raiders, with a Moslem attitude to tillage.

Settled Districts. The Settled Districts are separated from one another by low hills, and the Kohat District is itself hilly and rough; but there is generally good pasture in the Dera Ismail Khan District, and the high plains of Peshawar and Bannu are fertile and well irrigated, and produce famous crops of fruit and grain. It is significant that, except for the millet of the arid Potwar plateau, wheat is the staple bread-stuff of the whole area; and the high percentage of sunlight and the quality of the foods (wheat and beans, fruit and meat) may surely be traced in the physique of the people, their health, and their power of resistance to bacterial infection.

[1] This would put the massive beds of gypsum associated with the salt marl along the southern part of the range into political relation with the range, and the Mianwali and other sepages into relation with the Khaur oil-field.

In the lee of the Salt Range, the Potwar plateau is unfavourably placed, being alike too far from the Sulaimans for winter rain, and too far from the Himalayas for summer rain; to the south-west, *e.g.* Mianwali, there is a fair certainty of 10 inches of (predominantly winter) rain and to the north-east, *e.g.* Rawalpindi, there may be well over 30 inches, but it is predominantly summer rain. Peshawar has $6\frac{1}{2}$ inches (out of $13\frac{1}{3}$) in January–April and about 4 inches in July–August. **Rawalpindi.**

The wavy-haired Iran, or Aryan, intruders who crossed this western Borderland, must have found themselves in an environment that seemed almost familiar except for the lower altitude; but any **Indo-Tibetan.**

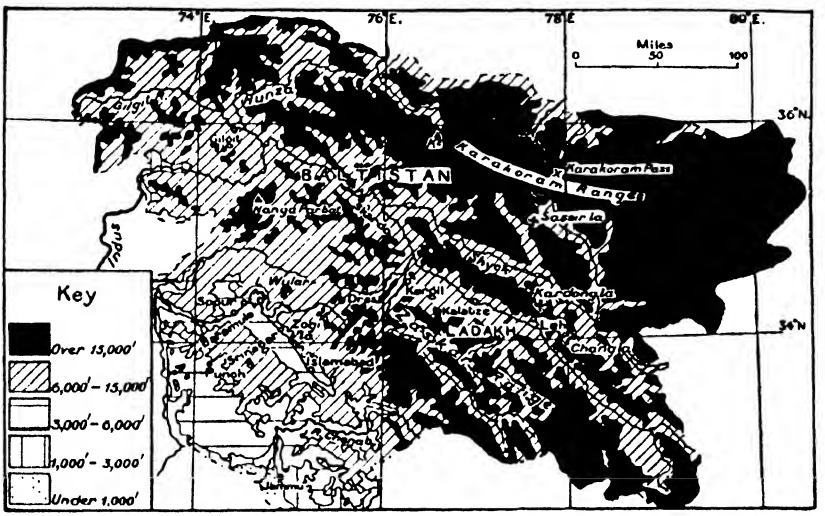

FIG. 75.—Feature-lines of Kashmir.

lank-haired Mongols who crossed the Himalayan Borderland must have found themselves in a most unfamiliar one, and can have reached it in most places only across a noisome belt of *Terai* swamp. Chinese armies and Buddhist pilgrims who did penetrate came round the obstacle rather than directly across it; and any groups that tried to cross it must have been tempted—beyond resistance—to halt in some of the beautiful valleys enclosed in the great barrier. Indeed, some study of the contained units here is probably a substantial help towards realising the character of the whole system.

Kashmir gives us an epitome of it. Four parallel lines of magnificent mountain masses fence in three valleys, down which three great ice-fed rivers flow *north*-westward. The southern **Kashmir.**

valley is broad and relatively low (5000–6000 feet), the Jhelum valley or Vale of Kashmir; the two others are narrow and about twice as high, the valleys of the Indus and the Shyok. The Vale was once a huge lake, one relic of which—Lake Wular—is still the largest body of fresh water in India; and the old lake-floor is so flat that the Jhelum is navigable for 80 miles—up to Islamabad. The line of weakness, by which the water escaped, was round the shoulder of Nanga Parbat; and so the western end of the great trough between the Zaskar and the Karakoram systems is drained south-*east*ward—by the Gilgit. A straight line joining Gilgit and Leh divides the State into two approximately equal "halves" (each fully 40,000 square miles), the north-eastern being the unique Trans-Himalayan mass that culminates in the Karakoram and K^2 (28,250 feet), with its famous Karakoram Pass, a thoroughfare at a height of 18,400 feet.

Conditions of Life. The possibility of any thoroughfares here depends on the great Indus–Gilgit trough, for at each end this is connected with an important transverse valley, the Hunza and the Upper Shyok valleys; and, as the Wet Monsoon is practically excluded by the Himalayan wall, the climate is far too dry for these valleys to be snowed up. Even at Leh (11,500 feet) the total precipitation for the year scarcely exceeds 3 inches, more than half of that being distributed through the four months of January and February, July and August; and in the very dry air the wind and the fierce insolation seem to evaporate the melted ice on the surface of the glaciers before it can flow away, and to do this to such an extent as to affect seriously the available supplies of water for irrigation. The one advantage is that the heaviest precipitation does occur in winter.

Population. The distribution of population depends on food-supply and communications. For food-supply there must be both tillable soil and gravitating water, which are naturally associated only on the "delta" fans of lateral tributaries of the great rivers; nothing will grow without irrigation, and the only means of irrigating in most places is by gravitation. Every square yard of tillable soil and every gallon of water are used, often on little walled terraces; and two crops a year are raised, the first being wheat and barley and the second being some other grain (millet or maize) and pulse. Fruits of various kinds, especially apricots (up to 13,000 feet), and vegetables are also grown.

Leh and Skardo. Naturally, the mass of the population is in the Indus valley, *e.g.* round Leh and Skardo and Kargil; and, though Leh is much the largest centre—and the administrative capital in summer,—conditions are more favourable to vegetation and to man at Skardo, the administrative capital in winter, and fully 4000 feet lower than Leh. The superiority of the latter is due wholly to its position

directly on the line from the Zogi-la (11,600 feet) to the Kardong-la[1] (17,700) for the Sassir-la (17,700) and the Karakoram Pass; and this accounts for the importance of the Suru valley towns, Kargil (8800′) and Dras (10,100′), both with properly built bridges. Elsewhere except at Kalatze, also on the main road to Leh, fords and rough ferries are used for crossing rivers; but most travel is done in winter, when ice provides "bridges" and good roads everywhere.

Baltistan and Ladakh.

Though the population is least sparse in Ladakh because of this great through-route—and in spite of the fact that the shorter and lower Kardong route is often so much obstructed by glaciers that caravans have to use the inner easterly Chang-la (18,400 = the Karakoram)—the cultivated area is greater in Baltistan, with its lower levels and better climate; and the population in the east seems to have come from the west, for the Buddhist Ladakhis seem to be decreasing in numbers, and the Moslem Baltis to be distinctly increasing, though both speak Tibetan dialects. And, politically, life in Ladakh is safer; there is no need for villages to be walled, as in the Hunza valley. It is, perhaps, the western Moslem element that has made the horse as important here as the yak or the zho; and both Baltis and Ladakhis are themselves "magnificent pack-animals."

The Vale.

The southern half of the country presents a great contrast to the northern. The Vale is far more important than Jammu (and Punch), having a total length of about 120 miles and a width of about 75, while the actual plain—as suggested by the navigation on the Jhelum—is about 80 miles long and fully 20 wide, over which the river meanders into and out of Lake Wular, the total fall in the 80 odd miles between Islamabad and Baramula being not much more than 350 feet.

The Panjal range cuts off the Wet Monsoon so much that the climate is not typically monsoonal. Some monsoon storms do cross the Panjal, and there is a fair certainty of some rain and snow in winter, the "lowland" having fully 25 inches of rain, two-thirds of it in winter (December–May); but dryness is again typical, though the Jhelum and the Chenab systems give abundance of water for irrigation. The conditions are, however, exceedingly favourable to Europeans and to much useful vegetation, including valuable forests of deodars and "jungle," from which much wild-silk is collected. Rice and maize are the chief grains; and, of the "natural calamities" with which the country is credited, only the floods are *natural*[2]—due to blocking of the rivers by ice or avalanches.

[1] By crossing the Kardong-la instead of following the Shyok down its *north*-westward road to the confluence with the Indus, and then following the Indus up to Leh, some 300 miles are saved.

[2] The fires are due to the custom of carrying small braziers under the clothes, to warm the body in winter, when there may be temperatures of 15° or 16° F.

Peace and Prosperity. Though the country is obviously a frontier belt, it is so in a sanitary and not in a political sense; for it touches no country from which any danger to India need be feared, while it is an ideal health resort for Europeans exhausted by the Indian climate. The stable political security, too, as we have noticed is of very long standing; and it helps to account for the old and high civilisation of the people, with great achievements in literature and in art, especially art as applied to industry. In fact, Kashmir probably still stands at the head of all the Indian units in skilled craftsmanship.

Some of the artistic inspiration came from Persia—in the days when the only easy access to the area was from the west, *e.g. via* Murree and the Jhelum valley; but much of the development was quite local, *e.g.* breeding of sheep with different coloured fleeces, use of water-power, and cultivation of vegetable dyes. The very fine pashmini wool used to sell for its weight in silver, and the "wedding-ring" shawls were made of the underhair of the ibex. Srinagar is the chief centre: but the whole country is a raiser of wool, and the industry is well distributed, *e.g.* in Islamabad, Bandipur, Sopur, etc. Since road-making has introduced motor traffic, access to the country, *via* the Banibal Pass (9000 feet) and Jammu, has been greatly facilitated.

Nepal. Nepal presents a great contrast to all this, even the story of its name being exactly the opposite of that connected with Kashmir. For there the name was, apparently, derived from the inhabitants, Kasmir Naga (? "Tree-Snake" people); but it has now been very much appropriated by the Vale. Here "Nepal" is definitely the name of a similar vale, once a lake, but has been extended to the whole country.

Natural Regions. Like Kashmir, the country can be divided into two by a N.W.–S.E. line, the northern half being monopolised by the gallery of giants—Gaurisankar (23,400 feet), Gosaik Than (26,300), Dhaulagiri (26,800), Kanchenjunga (28,150), and Everest (29,000); and the very ancient sanctity of the valley below them may be associated, obscurely, with these. There seem to be nearly 3000 shrines even in the Vale of Nepal (at most, 25 miles long by 15 wide), and "religious" dances are a part of the weekly "Fairs." The southern half is a series of parallel ranges, running generally N.W.–S.E., but relatively low, and with the 500 miles of consecutive stretches of longitudinal valleys broken into separate divisions by transverse ranges; and the two southernmost lines (7000 and 8000 feet) are flanked by a 10 to 12-mile belt of *Terai* swamp. There are four of these divisions, in each of which a group of rivers collect—(?) "to make a sacred seven," *e.g.* Sapt Gandaki, "The Seven Gandaks" and Sapt Kosi, "The Seven Kosis"; but the Gogari

(Gogra) group is only five—of any importance, and the Vale has no more—though the Bagh Mati is itself sacred. The Gandaki system is the home not only of the Gurkhas but also of the old military tribes of Nepal.

The Climate.

Large stretches of these rivers drain longitudinally, *e.g.* the Sun Kosi and the Kali Gandak; and the Vale itself lies in the same way, the original lake having covered some 300 square miles, with an extreme length of 30 miles, at a height of *c.* 4500 feet above sea-level and shut in by heights varying generally from 7000 to 9000 feet. As the northern rampart is quite impenetrable for a third of the year, and the southern belt of forest-flanked ranges has been almost equally impenetrable till recently for another

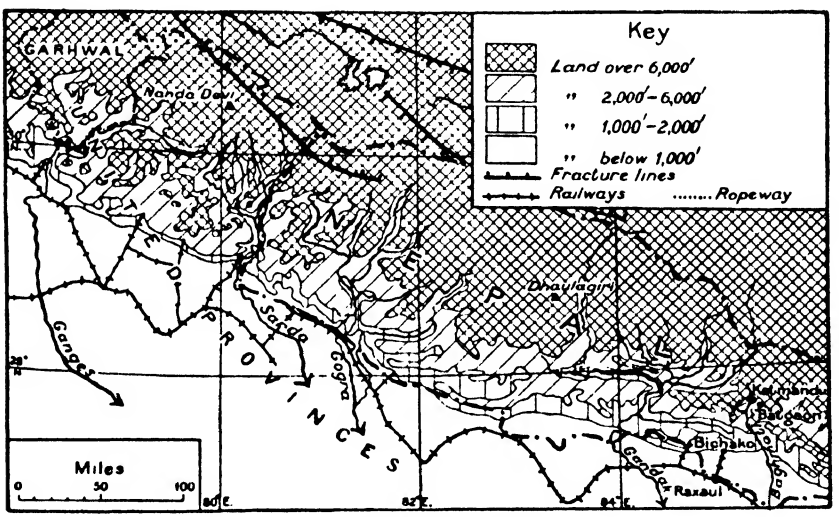

FIG. 76.—Feature-lines of Nepal.

third (late summer and autumn), the isolation of the country has been very complete. Unlike Kashmir, however, it has not been isolated from India in climate, but is typically monsoonal, with the regular cool, hot, and wet seasons, and only one point of clear differentiation: at each season, owing to the height of the Vale itself and of the southern ranges, the conditions in the habitable area are much pleasanter and more healthy than in any part of Hindustan—*e.g.* maximum temperature in the hot season seldom being above 85° F., and the mean rainfall seldom above 60 inches. Even the *Terai* is not so unhealthy as elsewhere, and it is very productive, *e.g.* of rice and cane-sugar; but the population is too scanty to keep much of it cleared, and so the splendid sal forests are almost untouched, and the jungle still teems with wild life (tiger, elephant, rhinoceros).

The People. The densest population, as in Kashmir, is naturally in the Vale, where there are two or three small towns besides Katmandu, *e.g.* Patan and Bhatgaon, and the Mongol Newars are very skilful cultivators, famous as fruit-growers.[1] The variety of crops is immense, and only *food*-crops are allowed to be grown in the Vale. These Newars are Buddhists, while the Gurkhas are Hindus, but neither body is very rigid, especially in the matter of food; for instance, the Newars have adopted some caste regulations, and are quite prepared to slaughter the plump ducks and geese with which every lakelet swarms. But the purely military Gurkhas seem to be more strict than the other Hindus. Both groups seem

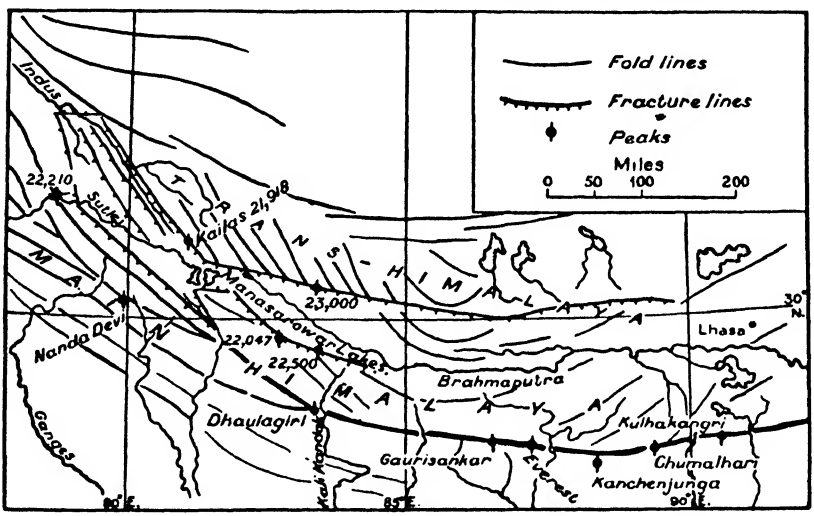

FIG. 77.—Fault-belts in the Himalayas.

to have an historical literature—a treasure quite alien to most of these mountain peoples.

Like Kashmir, again, the country has suddenly made great improvements in its transport. Access from India had been by tracks where only human porterage was really possible; but now the 70 odd miles between Katmandu and the Raxaul railway terminus has been "bridged"—by a light railway to Bichako (22 miles), porters to Dhursing, and then a 14-mile rope-way worked from the Katmandu hydro-electric station, with a 4000-foot span across the Khuli-Khani gorge!

Sikkim. The little sub-Himalayan "horseshoe" of Sikkim, no larger than Lincolnshire or Devonshire, is interesting from almost every

[1] Specially oranges and pine-apples: stone fruit grows wild, but is generally ruined by the July rains.

geographical aspect, the mathematical included; for it impinges on the most westerly of our critical meridians, 90° E., and the first glance at its physical geography reveals its "Pacific" feature-lines in the long meridional valley of the Tista, a Tibetan rather than an Himalayan river. A second glance—at the shoulder of Kanchenjunga—raises the question of whether the extreme height of the two terminal giants in the Atlantic line may be related to the terrific pressure of the Pacific line. The horseshoe is a fan of converging defiles—which seem to have given the Lepcha natives their proper name of Rong-pa, "Ravine Folk"—cut in the Tibetan plateau-scarp, but separated by high ranges that converge on the Tista-Rangit confluence; and access is in some ways easier to the plateau, *e.g.* by such passes as the Jelep (14,500 feet), the Chola (14,500), and the Kangra (16,000), than from one ravine to the next. And, while the N.–S. trend of the feature-lines gives direct access inland for the Wet Monsoon, the open-plateau hinterland gives access for movement of flora and fauna southward.

Flora and Fauna.

For this "Land of Leeches," which the Tibetans call Dejong ("Rice-Land"), contains types of every flora—from tropical to polar, with 4000 species of flowering plants; and its fauna is almost equally rich, especially in butterflies and birds. The dominant factor seems to be the relation of an open-plateau hinterland, with abundance of sunshine, to a foreground of drenched mountain spurs; and even fifty years ago the whole area below the 13,000-foot contour was an almost unbroken expanse of forest. This, no doubt, helps to explain why there were no villages—still less towns—but only clusters of isolated houses in forest clearings; but the influx of emigrants from Nepal has led to wide clearing.

This influx was not entirely peaceful, and led to the removal of the "palace" from west to east, Tumlong, with a summer palace at Chumbi (Tibetan); but the chief market-place is in the more open country—at Gangtok, and the natural outpost of Darjiling was ceded to the Indian Government by the Rajah in 1839.

Bhutan.

Bhutan, like Nepal, is divided into four river-threaded basins by transverse ranges; but there is no longitudinal valley, as in Nepal, nor are there even longitudinal reaches on the rivers, though there is a regular track across the country from Tawang to Paro. The hinterland, too, as in Nepal, is a belt of lofty ranges (Chumalhari, 24,100 feet, and Kulha-Kangri, 24,700) and not the Sikkim open-plateau; but the Chinchu gives access inland round one end and the Manas gives it at the other, Paro having direct connexion with the Chumbi route (to Shigatze) at Pharhi. Population is densest along this track; and it is significant that the chief centre, Punaka, is on one of the rivers (Machu) which does *not* drain from north of the great ranges.

Like Sikkim, the country—though very rough and much elevated—is largely natural forest, and the Bhutias are very clever workers in wood, on both small scales and large (house-building), the timber to the north including such "temperate" trees as beech and ash; and the people are great meat-eaters (pork). They are also clever irrigators, growing what are said to be the sweetest and tenderest turnips in the world.

Valley Tribes. Till recent years our knowledge of the Valley Tribes, *e.g.* the Abors, has been very slight; we have not even known whether

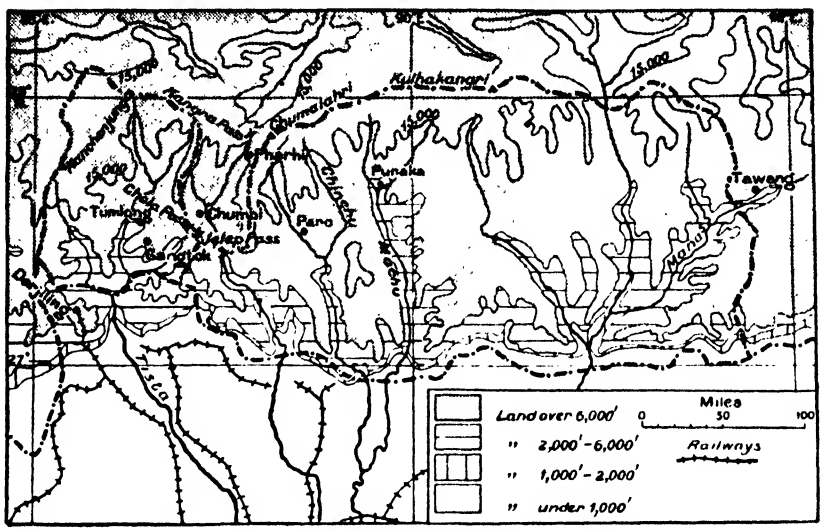

FIG. 78.—Sikkim and Bhutan.

the Tsanpo was the Upper Brahmaputra. The mountain ranges that shut in the Loktak Lake basin of Manipur, *e.g.* the Barail, seldom rise above 8000 feet, and then only to the north; and as far back as 1762 a Rajah asked for British aid against the Burmese. But almost nothing was known of the country till about forty years ago except that it was the home of polo, and that women were held in very high consideration, especially in trade! If such conditions were justified by the climate and the vegetation, obviously Nature had provided here a frontier which would have baffled even an Alexander.

Rainfall. The relation of relief to rainfall here may be gauged from the Khasi hills. On the north-eastern face Shillong, with just over 80", has only half as much as Sylhet, on the south-western face; and Manoyaram, 660 feet *lower* than Cherrapunji, has had a (5-year) mean of *c.* 500" (498·5"). Cf. p. 111.

INDIA—II

CHAPTER XXIII

WESTERN HINDUSTAN

(1) *General Introduction*

We have already noticed a certain resemblance between Italy and India (p. 9), and may now pay a little more attention to it. We need not delay over interesting details in the history of Afghanistan and Burma which recall the history of Savoy and Dalmatia, nor over such an obvious parallel as the concentration of dense population on the fertile, mountain-girt lowland in the north, where there has always been most exposure to continental influences. And we may agree that both countries have been for centuries merely geographical expressions, the causes in both cases being the same. The important point seems to be that the obvious resemblance has been neutralised—so far as any human response was made to the geographical conditions—by the extent to which India is typically Asiatic, and Italy is typically European; and India has been most typically Asiatic in its size and its isolation (cf. p. 356). **India *v.* Italy.**

Size is the significant characteristic of all the three structural and relief divisions of the area. The rough triangle which encloses them exceeds 1,750,000 square miles, each side of it measuring about 1900 miles. The mountain wall is the vastest mass on the earth, and forms a typical section of the marginal parapet of the great continental plateau; the longitudinal plain is one—the most important—of the discontinuous lowlands of southern Asia; the terminal peninsula contains one of the huge blocks of the primitive Eurasia. But, in spite of their size, neither the plain nor the peninsula has any natural race-home; and the absence of a nodal nursery only exaggerated the evils of size, each unit being too large to allow of the natural unity of race and speech and interest which is likely to breed political coherence and independence. There was never any reasonable hope of the whole organising itself, still less of it organising any outside area; and the difficulty was as great externally as **Size.**

internally. India never got from Arabia what Italy got from Spain, still less from Malaya what Italy got from Greece; and even the Indo-Gangetic plain, as the double name may suggest, was not a real unit. Indeed, the Jumna has constantly been a political frontier, *e.g.* for Kanishka's Empire (A.D. 120), for the Gupta Empire (A.D. 350), for the Empire of the White Huns (A.D. *c.* 500), etc.

Incoherence. No doubt, the geographical variety, as in Italy, might have been expected to have some parallel in a variety of race and creed and occupation; but Italy was set in the relatively small and comprehensible basin of the Mediterranean—a very favourable environment for a race-home, where the peoples of its European peninsulas progressed by constant but gradual changes. India has no such record. With three great racial types, three main families of speech, three conflicting creeds, it remains a complex of several countries and many peoples, with no really common ground, not even in customs or in staple foods. Caste has divided most of them into 2000 fractions, and condemned 60,000,000 of them to be "outcasts"—except in English law; and natural units have been segregated both in locality and by difference of speech, with some 150 separate tongues. In Bombay alone there are *six official scripts*—Arabic, Sindhi, Gujerati, Marathi, Kanarese, and English; and the only common speech—for private letters or political propaganda—is English! Even this confusion is, perhaps, less remarkable than the incoherence of the great plain, though not only was there never any serious obstacle from end to end, but there were actually some good river-links; the demands of modern irrigation and the railway competition have killed river-traffic, but the Jumna is still navigated up to Agra. When even such an area shows a persistent inability to cohere, there can be little doubt about the overwhelming need for a strong, central Government completely dissociated from the racial and religious fermentation; and the conditions must affect the choice of any basis for detailed analysis of the area.

Basis of Division. In any area, but specially such an area as India, the relations of relief and climate are probably illustrated best by the character and the distribution of the river-basins; but, where the human note is so predominantly important, it is scarcely possible to press the politico-economic factors too much. At least, political names may be used as labels of regions, even if they must be applied loosely. The difficulty in regard to a large area with a long history is that, in approaching a survey of it and in trying to divide it into regions that are appropriate to the particular area—whether literally "natural" or not,—what seems to be appropriate from one standpoint seems to be inappropriate from another. It is quite easy to divide India into two, or even three, dozen regions, and that seems appropriate to its chaotic incoherence—racial, religious, linguistic, etc.; but the ingenuity involved almost suggests indifference to

proportion and propriety, and the result is certainly not a coherent picture of the area. The prime object of geography should be to teach us to picture clearly and truly, so far as we can, the forms and the forces of human environment that are beyond our horizon; and, for this reason alone, the political unit is of far more importance than current fashion is prepared to admit, and of very unusual importance in India. Indeed, the political unit as a basis for analysis here probably gives far more practical truth than the most perfect theoretical treatment of Natural Regions can give; but it seems so desirable to give the natural its full value, as against the artificial, that probably the best course is to compromise, especially if we stretch the meaning of the word "political" to include all the artificial influences—racial, religious, linguistic, etc.

Climate and "Cover."

We may note, then, that, though there is to-day only one real unity in India—the unity of British control, there are two approaches to unity—a certain unity of present climatic conditions, and the relics of some pre-historic unity of forest-cover.[1] The most meticulous subdivision cannot get very far from these unities of climate and cover, and the widest picture must be confined to the limits of the political frontier. We must aim at some proportion; and, in an area of 1,750,000 square miles, to isolate 20,000 square miles—because they have 10 inches more rain or 1000 feet more altitude than the surrounding country for a circuit of 100 miles—is a vainglorious splitting of straws rather than the registration of any precise observation.

Great Hindustan Rivers

The simple generalisations of the small-scale map give us a useful background, especially in Hindustan. This is, of course, much the most important part of the three great structural and relief divisions of India; and, as practically the whole of it is alluvial—the fundamental differentiation being only between *bhangar*, or older, and *khadar*, or newer, deposits,—the rivers themselves demand some further attention. The three great rivers all have really the same essential conditions—of permanent glacier, seasonal precipitation, great heat, and intense evaporation; and they all have three stages—of mountain, plain, and delta phenomena.

Ganges.

The Ganges, though much the most famous and hitherto much the most useful, is the least remarkable. Like the Po, it is fed from watersheds of very different value; and the Himalayas would have forced the main stream southward against the foot of the Vindhyas, as the Po is forced against the Apennines, even if it had not been cutting to its right. It rises not much more than 10,000 feet above

[1] Remains of elephant and rhinoceros east of the Kirthar range show that even the Sind plain was once forested; even in the time of Alexander the Larhana part of it was "a garden."

sea-level on the *southern* face of the watershed, and within 200 miles escapes from the Siwalik gorge at Hardwar (*Hari-Dwara*, " Vishnu's Door "). Its plain stage is over a very level, low expanse of rich and deep alluvium, and its pace is just enough to carry most of its silt; but above Allahabad for most of the year it is irregular, broken by rapids or deep pools, and in the United Provinces it normally looks yellow and muddy, though the rainfall is less than 40 inches, and the flood does not last more than 40 days. East of the Rajmahal hills it can swing to its right, and its pace slackens until it can no longer carry silt; wide and long flooding gives the new delta an annual redressing of fertile silt, but leaves it very damp and unhealthy. Its two great left-bank tributaries are wholly Himalayan, and are steady feeders of the main stream; but the two right-bank tributaries are wholly (Son) or partially (Jumna) fed from the Vindhyas, and are the main cause of harmful floods.

Gogra. The Gogra ranks with the Indus, Sutlej, and Brahmaputra as a Manasarowar river, and from a height of 13,000 feet gathers all the Himalayan drainage west of Patna and the Gandak; it maintains a steady 5–6 feet depth in mid-stream over its plain stage, and is the most important waterway over that plain. Considering its great importance, it is relatively short—not 600 miles; and it not only has a relation to the Ganges rather similar to that of the Karun to the Euphrates, but also divides into two in crossing the *Terai*, the eastern Girwa and the western Kauriala, which unite again in Kheri (Oudh). The Gandak, perhaps once a tributary of the Gogra, brings down a large quantity of water, but is useless otherwise, even when not harmful.

Jumna. The Jumna is, of course, mainly a Himalayan river, though—like the Ganges—from the southern flank of the watershed; and it rises 500 feet higher than the Ganges, and measures 100 miles more than the Ganges above Allahabad. It has, however, only half as long a mountain stage, falling over 5000 feet in the first 20 miles, and 4500 more before it escapes from its Siwalik gorge at Fyzabad, about 100 miles from its source; but in its remaining 750 miles it falls only 900 feet, winding about a great deal more than the Ganges. Its valley is also much prettier, especially on the flank of the Bundelkhand, partly because of the high banks and partly because the water is generally much cleaner and clearer than that of the Ganges. North of Agra it dwindles to quite a small volume during the hot season, but that is mainly due to the great canal systems—the western system dating back to A.D. 1350!

Chambal and Son. Unfortunately, the Vindhya watershed has no snow and not much rain; indeed, it is quite rainless when the Himalayan ice is beginning to melt. The plain stage, too, as below the Sulaimans, is very narrow; and the run off from the impervious rock is very fast. The consequence is that, though the Chambal rises only some

1800 feet above sea-level, its flood is very sudden, and has, at the time, a greater volume than that of the Jumna above the confluence. The Son rises much higher (? 3300 feet), and has a much heavier rainfall and correspondingly more forest in its basin; and it has shared with the Gogra and the Gandak in giving great importance to the "Ganges" in the Patna basin, as a great rice-raising area.

Indus.

The Indus, like the Ganges, is fed from two very unequal watersheds, the Himalayan and the "Sulaiman"; but it is also fed by a third, the Hindu Kush. It rises in three separate heads (?18,000 feet) in the Kailas glaciers to unite in a single stream about 80° E., and flows for 500 miles—with a more or less quiet current—down a valley which is part of the ancient trade-route between Leh and Lhasa *via* Gartok (*c.* 14,000 feet); and it is still at a height of 8000 feet when it receives its Shyok tributary, which gives part of the ancient route between Leh and Kashgar. Although so intimately connected with great ancient routes, it falls 17,000 feet in its mountain stage—to the Salt Range gorge at Kalabagh. In the Attock gorge the variation between minimum low-water and flood-level is often 40 feet, and has been 80 feet; but these abnormal conditions, which have even reversed the current on the Kabul river, are due to quite exceptional accidents, *e.g.* landslides. More or less permanent dams have been formed in the past at several places in the mountain stage, and the floors of the resultant lakes are level and fertile (cf. Vale of Kashmir); and ferries and native suspension-bridges have made the river easy to cross—even far above the iron suspension-bridge at Bunji.

The 700 miles of the plain stage lie between the Salt Range and the head of the present delta at Haidarabad; the river is actually navigable to Attock ("The Limit"), and the old Indus flotilla plied regularly to Dera Ismail Khan; but the railway and the immense development of irrigation have put an end to navigation even in the upper half of the plain. The right bank tributaries here, like the Chambal and the Son, have little or no plain stage, but they do not flood dangerously; and the Indus, like the Nile, steadily decreases in volume as it approaches the sea. The depth and the pace of the river throughout the plain decided its value as a frontier, and it was as the great frontier feature that it came to give its name to the whole country (cf. "Asia," p. 246).

The Punjab.

It is like the Nile, too, in having a single great left-bank tributary—the Sutlej, with Kashmir playing somewhat the part of Abyssinia, and Sind that of Lower Egypt; and the rainfall of the basin varies rather closely with that of the Nile basin. The name *Punjab*, or *Panjnad*, was applied originally only to the five great rivers east of the Salt Range—in the days when the Beas did not join the Sutlej till Bahawalpur,—and the amount of water carried by the five rivers

across the high plain is enormous ; but such demands are made on it for irrigation that the total supply at Mithankot is less than that in the Indus itself.

Brahmaputra. The Brahmaputra, though a really great river, like the Indus, and with its valley carrying a primeval route in the Janglam track *via* Lhasa to Batang ,while the river itself is regularly navigated, *e.g.* for 100 miles west of Shigatze, requires little attention. Its mountain stage ends at Sadiya, which is only *c.* 400 feet above sea-level, and its plain stage ends 450 miles west of that—at the Garo Hills. The joint delta with the Ganges begins at Goalundo ; and the name Brahmaputra is not applied properly above the confluence of the Dihang, the Dibang, and the Luhit, at the head of the Assam valley.

Soils. The great Hindustan arc of plain contains, then, two *bhangar* regions—in the Punjab and the United Provinces, and two *khadar* regions—in Sind and Bengal, the western units dry and the eastern units wet ; and the difference of climate has left the Punjab bhangar fresh and unexhausted, while that of the United Provinces is " tired " and declining in fertility. The subsoil consists normally of an infinite number of alternate layers of sand and clay, so that it is well suited to irrigation, for which great ice-fed rivers offer immense facilities ; but physical history and climate have decided that in the Punjab the sand-belts should be more numerous and much deeper than the clay, and so it is less suited to well-irrigation than the United Provinces, and is more wasteful of inundation.

Indo-Aryans. The ethnic distributions over this plain are closely related to the relief and the climate. The Indo-Aryans of the original movement (begun as early as 2000 B.C.) entered the plain from the north-west corner, coming as complete tribes. They were not at all suited to damp heat, *e.g.* the men being bearded ; and they remained substantially in the north-west, in the Punjab and Rajputana, north of 24° N. and specially between the Indus and the Jumna. They were—and are—a fine hardy type, a very good sample of Steppe warrior, and their women still retain the Steppe habit of carrying all their wealth in the form of portable jewels on their persons. They even call the Indus *Daria* !

Hindustani. As these Steppe people settled down, and began to multiply, pressure of population and the legacy of instincts from mounted warriors led to an eastward movement—of young men, who intermarried with the Dravidian and other " Native " women ; and their offspring, if darker-skinned and broader-nosed and—with rice replacing wheat as the staple—of inferior physique and stature, were at least better suited to the damp heat which encouraged the cultivation of the rice. They occupied specially the Ganges-Jumna lands, *i.e.* what we call the United Provinces, with the north of

Bihar; and they are to-day the typical Hindustani, but they never penetrated far eastward.

In that very damp north-eastern region, where the convergence of Garo and Rajmahal Hills suggests the convergence of Mongol and Dravidian types, *i.e.* over all the newer delta lands—in Bengal, Assam, and Orissa, a Mongolo-Dravidian type developed in the triangle now marked by Darjiling, Chittagong, and Cuttack, which is the modern Bengali. There is nothing Indo-Aryan about it, and the approach of Hinduism to Buddhism here even evolved the Jagannath compromise round Cuttack, which may be loosely **Bengali.**

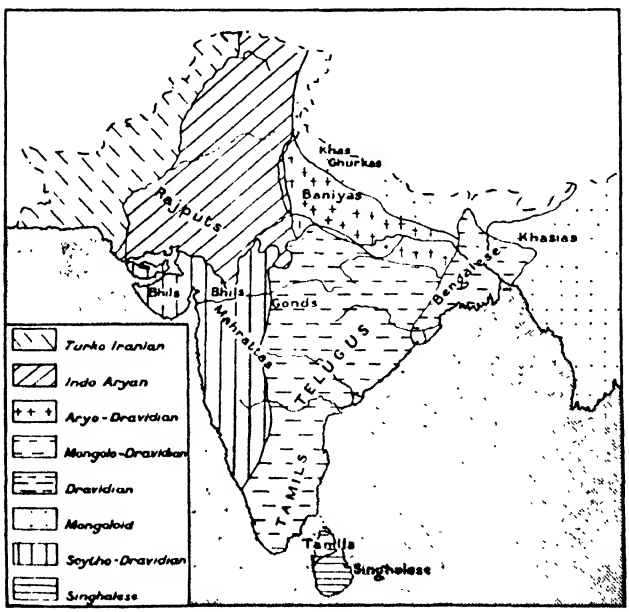

FIG. 79.—Racial Distributions in India.

compared with the Sikh attempt at compromise between Islam and Hinduism round Amritsar.

A Trans-Iranian element crossed the lower Indus lands, and intermarried with the Dravidian peoples of the Malwa plateau, and the resultant Mahratta type occupied a large part of the present Bombay Presidency—from Sind and Gujerat eastward to *c.* 76° E., and then spread southward along the coastlands as far as Calicut and the great Pal-Ghat thoroughfare. A Turko-Iranian element pressing behind them was never able to dislodge them, but occupied the Alpine lands west of the Indus from the ocean to Chitral; and a Mongoloid type was never dislodged from the eastern Alpine lands from east of the Simla States to the far south of Burma. **Mahrattas.**

(2) *Natural Regions.*

Sindo-Rajput Region.

Our natural approach to India to-day is still, as it was for the Arabs in A.D. 711, by sea—to the Indus delta, to the part that was first called India, Sind; and, though Sind forms politically part of the Bombay Presidency, it has really nothing in common with that in structure or physical history or climate, and not much in common with it in the language, the customs, or even the history of its peoples.

Climate.

Between the young Kirthar folds and the primeval Aravallis, between the Rann of Cutch—or roughly the Tropic—and the winter isotherm of 66° F., there is a Sindo-Rajput area with outstanding common characteristics of low latitude, low level, and drought. It has its high-temperature focus in the Jacobabad saucer, which has the highest consistent temperatures in India, with June day-temperatures ranging from 120° to 127° F. and a mean of about 98° for the month. Although it is immediately below the Kirthar wall, the total annual rainfall is only *c.* 4″, and it is mainly summer rain, *c.* 2½″ falling in July and August and not much over ½″ falling in January and February. The latter is off typical Anti-trade cyclones, but the latitude is too low to be reached by more than the very edge of the current; and the potential rain brought by the Wet Monsoon is evaporated and absorbed by the hot, dry, strong winds from the Baluchistan "desert" plateau.

From this centre the rainfall increases in nearly every direction, northward with penetration into the higher latitudes of the Anti-trade belt,—eastward with exposure to the Wet Monsoon off the Arabian Sea,—everywhere with increase of elevation, *e.g.* towards the Aravallis, the coastal sand-dunes, the Kohistan hills, where there is quite fair pasture for camels in the years when the Anti-trade is both strong and reaching into low latitudes. The mass of the fall everywhere is attributed to the Wet Monsoon, and there is no lack of water in the wind; the 4000 feet of Mt. Abu wring 59″—out of a total of 63″—of rain out of S.W. winds in *March*–September, 45″ falling in July and August, and the "Arabian" Monsoon is felt as far north-eastwards as the Jumna.

Bikaner.

Even if the earlier rains should not be attributed to the S.W. Monsoon, the June–September fall is typically monsoonal; and it almost looks as though we might expect to find throughout this region about 1½ths of the rainfall coming from the S.W. Monsoon. Bikaner has about 1½ths of its total fall in June–September, with 52 p.c. (6½″) in July and August; and its 40 p.c. variability is of no importance, though very typical, in such an arid region. Without irrigation, agriculture is practically impossible, and therefore there is no risk; and Bikaner has water by two canals from the Sutlej. But

both Bikaner and Jaisalmer are off (west of) the line along which the sea breezes in the hot season carry the clouds of *salt*-dust from Cutch—up the Luni valley to the Sambhar Lake basin, from which it is carried down into the lake by the monsoon rains; and the question arises as to the origin of water that is found, *e.g.* in February, in the *dhands* or shallow pans.

Dhands. The whole of Bikaner State is a slightly corrugated expanse of very loose sand-hills, in the hollows of which there is often camel pasture in the cool season, and from which the water is evaporated very rapidly in the hot season, leaving a salt crust thick enough to have a commercial value; and it seems incredible that this water has been lying on such ground since the previous September. The wells from which all water is obtained are seldom less than 250 feet deep, often 350, and even then the water is almost always brackish or actually saline. Jaisalmer is in the same position, and so is the Khairpur district of Sind, the latter with easy export of sodium compounds to Karachi. It seems, then, as if there must be slight *winter* rains on the higher dunes here, as there are on the Kohistan ridges below the Kirthars.

Indus Riverine. The only part of this region, then, that is of any real importance—except for the security which the Rajput Chiefs found (from the Moslem conquerors) on rocky heights surrounded by desert—is in immediate proximity to the present course of the Indus. Every part of the alluvial plain appears to have been traversed by distributaries of the great river at some time or another, and the remains of dead cities are considerable, including the marvellous Mohenjo-Daro[1] of the "Chalcolithic Age" (*c.* 3000 B.C.); but now that the inundation epoch has come to an end, the river's power to harm is curbed. Not only so, but the "return seepage" from perennial irrigation of 6,000,000 acres will not only raise the level of the delta water in the cool season, but also may so ameliorate the very low humidity of the area as to make it much more favourable than it has been to various crops, *e.g.* rice and even Egyptian cotton. As only about 15 p.c. of the Indus discharge in Sind has been used hitherto in inundation agriculture, there seems to be an opportunity for immense extension; and the certainty of no scarcity of water in the two very critical months of April and October will revolutionise the agricultural calendar. The cost of such works here, as in Bikaner, is much reduced by the abundance of good local stone from "kankar."

Egyptian Cotton. At the same time, the "plausible" (?) suggestion that the Indus has been to Sind what the Nile has been to Egypt is as unfortunate as the attempt has proved hitherto to grow fine Egyptian cotton in Sind. Except at the Sukkur-Rohri gorge and along the Kohistan

[1] Almost on the site of the Lloyd barrage at Sukkur, so that the position was recognised as crucial even 3000 years before Christ.

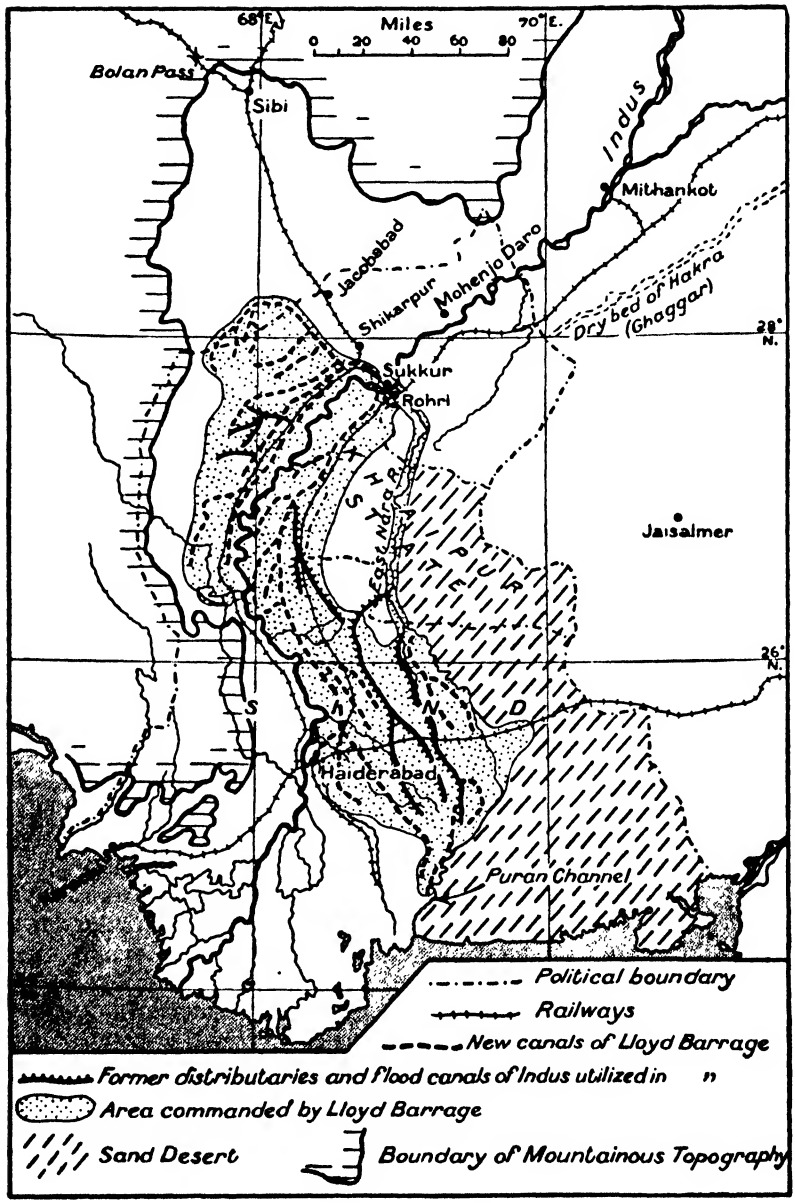

FIG. 80.—Sind: Drainage, Past and Present.
For the climatic relations of this area, see pp. 134-135.

ridge, the river has changed its course perpetually, and has silted up its various channels so fast as to be a constant danger to the riverine lands. The soil is an easily worked clay, and the yearly inundation has been made very useful—except on the delta—by a very ancient system of canals; but the maximum flood comes so much earlier than on the Nile in Egypt that work on the land (soaked and strewn with rotting vegetable *débris*) is much less healthy than in Egypt. Above all, so far as cotton is concerned, the Indian Cotton Committee's Report (1919), in forecasting the future of Egyptian cotton here, failed to show appreciation of the difference—for fine cotton—between a low humidity under a brazen sky and a high humidity under a luminous sky.

Railways. The new conditions can scarcely make much difference to Shikarpur and Haiderabad, but must make great difference to Sukkur and Karachi. Haiderabad, the old capital, stands at the head of the new delta, 3 miles from the river, on a limestone ridge, so that it is doubly safe from flood, and has a rainfall of 8″ on the ridge, 6″ in July and August; but it derives little importance from the fact that the ridge gave a good site for a railway bridge (the farthest south) across the Indus, and the delta has never been a scene of busy traffic. Shikarpur, too, has quite lost its old commercial importance since the development of the Indus-Valley railways.

The limestone ridge which gave a site for Rohri and Sukkur—and the Bukkur fort on an island between the two—made another point for bridging the river, and it is practically in the latitude of Shikarpur, *i.e.* just where it can command all the Bolan Pass traffic. With the development of railway traffic with Persia, the double town must become a very important traffic centre.[1]

Punjab

Climate. North of this region we have another of the same general character, but sufficiently differentiated by latitude, by a steady rise in average level—from *c.* 500 to 1500 feet, by the height of its flanking ranges, and—to some extent—by its exposure to the S.E. Monsoon blowing up the Ganges valley. Though this area includes both less—in the north-west, and more—in the south-east, than is included in the political unit, we may call it the Punjab region; all the Five Rivers—Jhelum, Chenab, Ravi, Beas, and Sutlej—cross the sub-Himalayan plain (500–1000 feet) between the Salt Range and the Delhi Ridge, and the north-west of Rajputana is irrigated from the Sutlej. Its high-temperature focus is in the Multan basin, where the mean temperature in June is 95° F., and the annual range is nearly 40° F., while the rainfall is *c.* 7″, 4½″ in July–September and 1½″ in December–March. Except southward, the rainfall increases

[1] A new suburb-town has sprung up round the engineering headquarters.

in every direction from this focus, the higher latitude including the definite Anti-trade course and being exposed eastward to the S.E. Monsoon, while the higher elevation, *e.g.* in the Sulaimans and the Salt Range, the Siwaliks and the Aravallis, is reflected everywhere in the rainfall. As a dry region, it is subject to great variability; but this is less than farther south, and decreases towards the north-west and the south-east.

Winter Cyclones. In the north-west the winter cyclones are of special value, greatly reducing the variability. No place east of the Salt Range or the Sulaimans seems to have as small a percentage of its rain from the Wet Monsoon as Rawalpindi (55 p.c.), still less to have more than half from the winter cyclones, as Peshawar has (62 p.c.); but even Multan and Dera Ghazi Khan feel the effect of them, if only in decreased annual variability. Throughout the whole of the extreme north-west of the province a moderate to an adequate supply of winter rain is assured, and the water-table, as elsewhere on the Himalayan piedmont, is generally very high, so that usually the shallowest wells reach water. Consequently, the normal effects of variability are greatly checked, the wetter winter compensating for the drier summer in the *rabi* crops,—the relative humidity is raised,—and risk is almost eliminated.

Variability. So much has been written since Blandford's days on this problem of variability—not always as helpfully as in his case—that we may pay further attention to it here, where it first becomes of importance in India. Blandford showed that rainfall was never either excessive or deficient all over India in the same year, though there are constant regional variations that may be related to regional conditions. The strength of the great currents varies, as their volume, and "excess" in one means deficiency in the other; but there is no "*failure* of the rains" in the sense that individual storms are not normal in duration, downpour, and general effectiveness. Preceding and contemporary conditions of temperature and pressure decide *when* the series can begin, or must end; and the one essential variation is in the number of the storms, *i.e.* the length of the season.

Distance and Time. It seems obvious that the most distant areas, *i.e.* those which the storms take longest to reach, must be those most affected by the length of the season; and, if the distance and the time are really the result of such areas being *off* the line of the travelling wind, variation must be greatest where the total fall is least. Further, where the total amount has no economic value whatever, variation is of equally little importance, *e.g.* in the Sindo-Rajput region. But, if the two monsoon currents (p. 108) normally meet a trifle west of the Delhi ridge, this Punjab region is in a different position. Here crops do depend to a slight extent on rainfall; and it is of real importance whether heavy storms continue late enough

(October) to leave the ground too wet for *immediate* sowing of the *rabi* (winter) crops, or cease too soon to leave the soil really wet enough for sowing when the right time comes for that. And these *rabi* crops are often twice as extensive as the *kharif* (summer) crops in this region.

Seasonal Relations.

If June and July are compared with September and October, the importance of the length of season becomes clear; and, if *high* temperature is the one vital consideration, increasing temperature must accompany less variability, so that June must be less variable than October. But minimum variability (40 p.c.) in the Punjab is at least no higher during August than maximum variability is in Bengal;[1] and the mean annual variability is of no importance *in itself*, because it simply reflects the variability of the season of maximum rainfall, whether that is winter or summer. The important problem is the relation of the lengthening of one season to the shortening of the other, especially wherever there are effective winter rains; and it is better to avoid reference to "*failure* of the rains," and to emphasise relative length of season. This becomes more and more important towards the north-west.

Range of Temperature.

At the same time, this part of the province has much the lowest temperature in winter, with a few degrees of frost quite common, the minimum generally associated with the N.W. wind at the tail of a cyclone—in the early morning, 4 to 5 o'clock; and nowhere is there anything like an equable climate, the extremes of both heat and cold being greater than in any other part of India. And this is true of all latitudes and of all longitudes, Rawalpindi and Multan, Lahore and Ludhiana, all having a range of *c.* 40° F.

This uniformity of range seems worth emphasis, because it is a phenomenon that is typical of the province, and yet there has been —in quite recent years—an agreement to press a certain lack of uniformity and to over-rate the influence of the S.E. Monsoon up the Ganges valley from the Bay of Bengal and to under-rate that of the S.W. Monsoon from the Arabian Sea.

Uniformity of Rainfall.

Though we may presently subdivide the province along the Sutlej, we wish at present to press the climatic uniformity—in kind, if not in degree. The natural vegetation of the area as unirrigated confirms this absolutely, and such a guide is often more trustworthy than a multitude of statistics; in this case the statistics confirm the uniformity, and assert the unity of the area as here differentiated. A comparison of some figures for marginal longitudes makes this clear. For from the Multan basin, on which all the great rivers converge, lines radiate along the various river valleys, *i.e.* north-*east*ward, showing an exactly similar increase in the rainfall with the distance *from Multan*; and the emphasis as actually laid on eastern totals is wholly misleading unless there is careful explanation

[1] And a normal rainy day gives nearly as much rain.

that the totals are identical, but that the proportions of winter and summer fall vary greatly.

Thus, on marginal longitudes in the far south both Maghiana and Sirsa have 10″,—both Mianwali and Fatahabad have 15″,—both Pind Dadan Khan and Rohtak have 20″; Jhelum and Gujrat, as well as Ludhiana and Panipat have 25″—Rawalpindi and Sialkot, as well as Rupar and Ambala, have 30″. The valley of the Ravi, really the *central* river, shows 15″ at Sharakpur, from 20″ to 25″ in the Lahore-Amritsar reach, 35″ at Gurdaspur, 40″ at Pathankot; and of the stations on the Delhi–Kalka (Simla) railway, Panipat records 25″, Ambala 30″, Kalka 35″. The total rainfall varies, therefore, only with distance from the Himalayas, *i.e.* strictly at right angles to the Arabian current, and not with nearness to the Bengal current.

Agriculture. Even 30 inches of rain, however, are very scanty for any crop in a climate at once so dry and so hot, and the population of the Punjab in 1891 was only 7 to the square mile, "more or less nomads"; and what irrigation means here was shown even by the 1911 Census, in a return of 272 to the square mile, "almost all agricultural"—from 7 to 272 in 20 years. The problem here is as simple as possible. The soil is usually a loam, though often very light; it is dry and quite level; and it is generally owned by the peasant who cultivates it, cultivating about two-thirds of his holding each year. The size of this is usually about 12 acres, one family generally cultivating just as much land as they can be practically sure of managing with one pair of bullocks—though a pair of real Hissar bullocks can probably cover twice that area. Weeding and inter-culture is done by hand, but the bullocks do all the ploughing, with ploughs that do not invert the soil, but only furrow it for about 4 inches; and, though this seems very shallow ploughing, it is probably *better* than deep ploughing in such a climate, especially if the land is ploughed several times—at least for wheat and sugar-cane.

The Rivers. Of course, the rivers have always been of supreme importance. Centuries before the introduction of modern means of irrigation, the distribution and the movements of the people depended wholly and directly on them; and, though their courses still change—within certain limits, and their shoals shift, so that there can be no organised steam-navigation on them, they carry a considerable amount of boat-traffic. There is no evidence since A.D. 1398 of serious climatic change, even if there has been some "removal" of vegetation, and if the drying up of the Hakra (and the Eastern Nara) still needs to be elucidated. But it seems clear that the *ban*—the higher and drier part of each *Doab* ("Land between Two-Rivers")—so far from being barren, was always most valuable camel pasture.

The names of the three great doabs seem to have been crudely

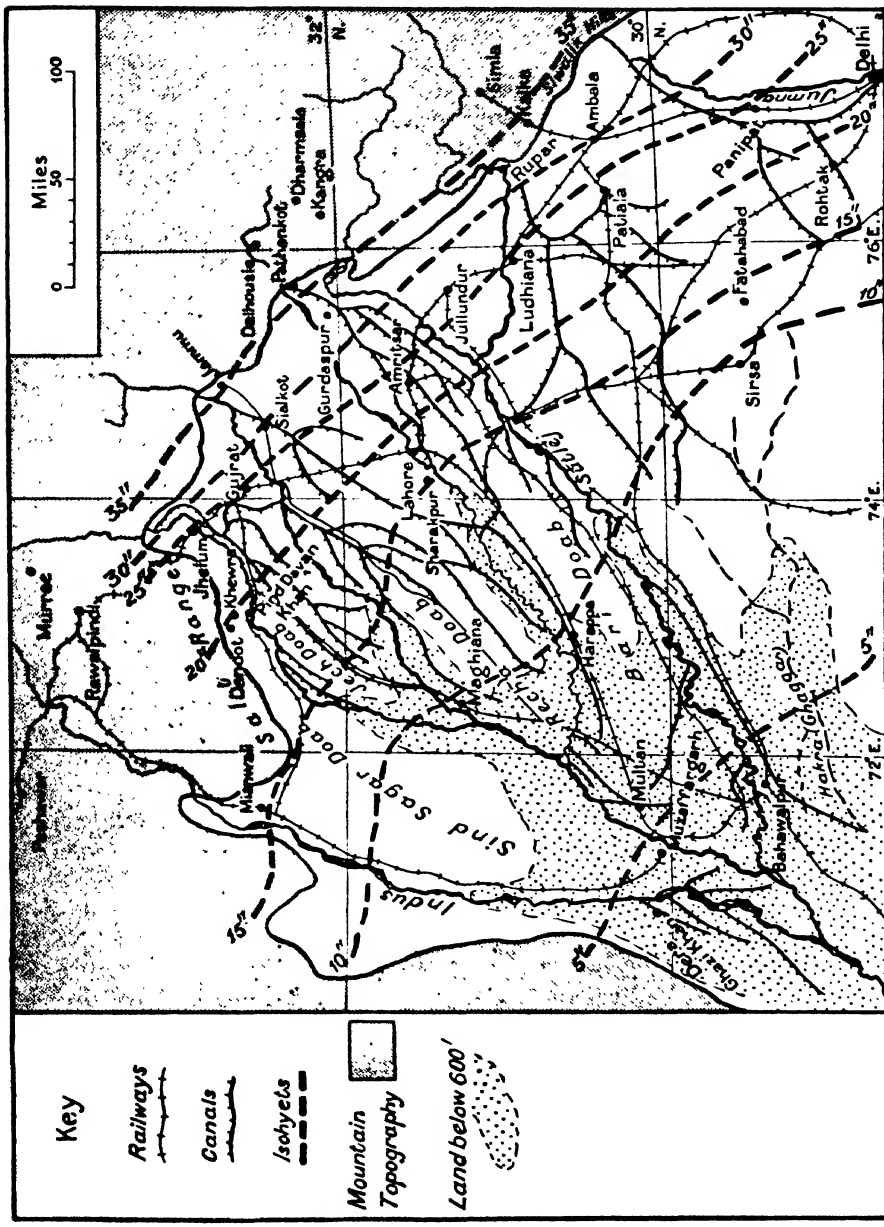

FIG. 81.—Punjab: Rainfall, Drainage, and Irrigation.

For the pressure conditions here, see pp. 106-108, with general rainfall maps on p. 109.

The Doabs. compounded from the names of the various rivers, *e.g.* Bari from Beas-Ravi, Rechna from Ravi-Chenab, and Jech from Jhelum-Chenab. The so-called Sind Sagar Doab is literally between two rivers, and the two rivers are parallel with each other—an essential idea in the word; but the high bank of the Jhelum runs the whole way along its western flank, isolating it wholly from natural relations with the Indus, and the intervening topography isolates it almost as much economically.

This point is of some importance, as the canal irrigation is largely related to the vagaries of the rivers within a *doab*. For instance, in the extreme south of this Sind Sagar, at the end of the eighteenth century, a "Muzaffargarh" canal was dug from the Chenab to an easterly bend on the Indus; but the Indus changed its course over the canal—where it still is,—and the Chenab had to make a new confluence with it about 60 miles farther south. This is rather a reversal, however, of what has usually happened; for, as a rule, the river has simply changed its course—for the hundredth time—and the deserted channel has been made into a canal (cf. Prussia).

High Banks. The whole area presents a remarkable expanse of almost dead-level, scarred only by the wide sandy channels of the rivers; and the "high banks" which shut in the pairs of rivers must always have checked the wandering of the channels, for the highest known floods never reach their crests. Thus, the Jhelum and the Chenab could never swing west of the Jhelum bank (right bank) or east of the Chenab bank (left bank); and the same is true of the right bank of the old Beas and the left bank of the Sutlej. Naturally, there is a great deal of river sand, and there are considerable patches of *reh* (saline crust); but there are very large areas of fertile soil, with or without the nodular accretions of lime known as *kankar*. The full utility of any area, therefore, has depended on the rainfall.

Sub-divisions. From this point of view the province must be subdivided—with some regard to the relative proportion of summer and winter rain, but mainly with regard to the presence or absence of great rivers. For this purpose, as a rule, the meridian of Lahore is taken; and, as we have seen, the Ravi is the central river, and the uniformity of level from Lahore to Delhi (both just over 700 feet) is remarkable. But the province lies N.E.–S.W.; the Five Rivers make a unit; there is a real gap—cultural as well as hydrographic—between the Sutlej and the Jumna, as there is really between the Indus and the Jhelum; the left bank of the Sutlej is closely related to the 600-foot contour; and it is from the Sutlej line that the isohyets (10″, 15″, 20″) bend southwards, parallel with the Delhi ridge and with this 600′ contour. The average rainfall for the whole of the plain east of the Sutlej seems to be 20–25″, which is typical of the Lahore-Amritsar region, and this eastern section is predominantly Hindu, while the western is predominantly Moslem.

What we may, perhaps, call the Sirhind gap, between the Sutlej and the Jumna, is of unusual interest, for—almost certainly—it was not always riverless. The Sarasvati *wadi* was very famous 3000 years ago; its "basin" was the centre of the Indo-Aryan culture; and it is "believed" to flow underground to join the Jumna and the Ganges at "The House of God" (Allahabad). In much later times the Ghaggar seems to have been not only a live river, but navigable from Delhi to Multan; and the Jumna *may* have been a tributary of the Ghaggar, or at least have fed the old canal which ran along the *eastern* flank of the Ghaggar (A.D. 1350). But what was true for any one generation may have been untrue for the next. Multan once stood on an island in the "Ravi," and Tamerlane's men could work down the Ravi into the Chenab; but the Ravi joins the Chenab now *above* Multan—fully 30 miles above. The Sutlej, as a Manasarowar river, must always have been the supreme carrier of water; it may be the remains of the old Hakra, and have emptied through the Puran ("Old") channel of the present delta; and in all the catastrophes involved in these changes it may have well earned its name of Sutlej, "The Terrible." **Sirhind Gap.**

Everywhere there are two well-marked seasons, with two distinct harvests; and the total area irrigated by canals alone is greater than the whole arable area of England. The spring crops are specially wheat and barley and oil-seeds; and the autumn crops include maize and millet, cotton and sugar-cane. But there is a good variety of other crops, including tea in the Kangra district; and, with irrigation, there is almost no limit to the variety. More than half of the whole province—much more than half of the eastern and western plains—is irrigated; and along the Himalayan piedmont many crops can be grown without even well-irrigation. Both harvests often come off the same ground, *e.g.* wheat and millet; but the area under wheat is very large (⅓ of the arable), and the crop is of great importance, being far the most important export, *e.g.* from Lyallpur and Ludhiana. **Products.**

As a rich pastoral area, the northern Punjab must always have had abundance of such raw materials as hair and wool, hides and horn; and these would form the basis of the typical domestic industries. Specialisation in such articles as rugs and grass-matting must have been at once a Steppe legacy and an Iranian impulse; and the lowlanders must have had, and did have, the same kind of stimulus from their cultured "Alpine" neighbours as northern Italy had from her Alpine neighbours. In fact, the whole of the silk-industry and the fine wool-industry seem to have been introduced from Kashmir, and both are still largely in the hands of Kashmiris, the rugs and carpets specially in Lahore and Amritsar, and the shawls and fine cloth in Ludhiana and Nurpur. Fine metal work **Textiles.**

is done in Sialkot and Gujrat, and fine leather-work more in the hills, *e.g.* in the Simla and Kangra districts. The fine silk-work, on the contrary, is more associated with the southern latitudes, *e.g.* at the great trade junction of Multan and at Bahawalpur, where the Native court gave it great encouragement.

Sikhs. The special " tone " of the north is Sikh (" Disciple "), though the Sikhs are not more than 12 p.c. of the total Punjabi population ; but there are two classes—Sikhs proper, peace-loving Disciples, and Singhs (" Lions "), and agriculture has always been held by them to be the only alternative occupation to fighting. Fully 75 p.c. of them are tillers of the soil, the best tillers in all India, and they own about a quarter of the cultivated soil in the Punjab ; they also form about a quarter of the Indian army. Their literary religion helps to bridge the gap between Islam and Hinduism.

Towns. In such an area population centres may be mainly of three kinds —old centres of political or religious importance, which very often meant almost the same thing,—modern centres of strategic or commercial importance, based in either case on railways,—and sanatoria for Europeans, which should be fairly dry and fairly cool, *i.e.* at some height and behind some range of hills reaching not less than 5000 feet and more than that by preference. There is little or no mineral wealth in the province, though the Dandot coal mines have been worked for railway purposes ; the Salt Range ranks next to the Sambhar Lake as a source of salt for India, and potentially it is more important, but not as a basis for any industrial development. The Khewra mine, one of the largest salt mines in the world, is quite near the Dandot coal-field ; but Pind Dadan Khan is not really as important as the tiny military junction of Malakwal.

Lahore. Lahore, the capital of the Punjab and much the largest town (*c.* 300,000), is a post-Alexander city, that grew up on a mound—much raised by the ruins of successive cities,—which was isolated by barren or floodable lands in the Rechna Doab, south of the Ravi, on the Manjha plateau (now under Bari irrigation). Its history is suggested both by the walls round the Native town—part of them Akbar's—and by the four quarters, Native and European, Bazaar and Military. It was the capital of the Sikh Empire under Ranjit the Lion, and it has some typical " luxury " industries, *e.g.* gold and silver lace; but its real importance is as "the Crewe of North-West India." Its famous Punjab University is outside the walls.

Amritsar. Amritsar is not much more than half the size of Lahore, and a much younger city (16th century). It is important as an industrial centre, but suffers badly in health from its position ; for Ram Das chose—naturally—a depression in the Bari Doab for the site of his artificial lake, "The Pool of Immortality," where the Golden Temple stands on an island in the lake. And it is as the capital of the Sikhs that the city is really important—though the Sikhs in the

district form only 26 p.c. of the population (28 p.c. being Hindu and 47 p.c. Moslem). Like Lahore, it is getting hydro-electric power from the Beas basin in the Mandi State above Simla.

Hill-Stations.

The sanatoria are, naturally, all in the Himalayas—Murree, Dalhousie, Simla; and their average height is about 7500 feet, with a good deal of variation in levels. Murree, for instance, is fully 1000 feet below the maximum of its ridge; at Simla there is as much of the suburbs below 7000 feet as above 7500. The "excellence" of their climate is very often exaggerated, especially that of Simla;[1] and conditions are really better—for 8 or 9 months really very pleasant—amongst the Kangra tea-gardens, at about half the height. Thus, Palampur is only 4000 feet, and Dharmsala is only 4500, and they are actually easier of access—though a little farther from rail-head at Pathankot—than Dalhousie. The towns actually at the foot of the mountains seem to have been always more or less military in character (" forts "), though this was emphasised while the Punjab made the most easterly satrapy of the Persian empire; and this " emphasis " has, of course, moved westward under British control, *i.e.* towards Rawalpindi (*c.* 1700 feet) and not towards Delhi. Jhelum obviously controls the river-route along, and the land-route round, the Salt Range; the easy railway route to Jammu probably throws light on the choice of Sialkot by the White Huns for their capital; and Gurdaspur holds a position on the " Dalhousie " railway exactly similar to that of Ambala on the " Simla " line. Jullundur was, like Amritsar and Lahore, rather a capital (of a Rajput kingdom) than a piedmont fortress.

Indus Towns.

The Sulaiman towns show the same influences at work, but even Dera Ghazi Khan is no longer of any real importance, except as illustrating the character of the Indus. Now that the railway runs parallel with, and not more than 10 miles (often only 5) from, the river, through-traffic has entirely deserted the water, though it still retains local traffic; and, for navigation purposes, the towns should be *on* the bank. But the old *Deras*[2] ("Settlements") were so often ruined by floods that they were moved back from the river; Dera Ghazi Khan is now half a dozen miles away from the river and its first site, though that was nearly 400 feet above sea-level.

The Indus, though the worst offender, is not the only one. Multan, although on the " safe " left bank of the Chenab, is four miles away from the river; and it has, of course, lost all its old river importance. In the time of Alexander, (as Malli) it stood between the converging waters of Ravi and Chenab, an immensely strong position then, where it controlled the first " Narrows " between the

[1] Murree is at least dry; it may have 85° or 86° F. in June, but with a relative humidity of only 12 or 13. The one asset of Simla was access to the Sutlej valley.

[2] With the Arabic idea of a " camp." The old Dera Ismail Khan was swept away bodily in 1823, and the present town stands back from the river on a hill of 567 feet.

Indus and the Chenab, on which Muzaffargarh now stands, and which Dera Ghazi Khan commanded on the west. But, just as the military emphasis in the north has moved west to Peshawar, so here it has moved west to Quetta; and in the Chalcolithic Age it was rather farther *east* than Multan—at Harappa.

Native States. The political importance of the region and the economic reaction of its poverty may be seen in the size of the "Desert" State of Bahawalpur, which is nearly three times the size of the largest "Plain" State, Patiala, and a dozen times the size of some of the "Hill" States. Bahawalpur, in its setting of crude, loose, desert sand, is the chief Moslem State; but Patiala, the chief Sikh State, is the premier State, and was conspicuously loyal to the British during the Mutiny. But religion here has little relation to racial qualities or political loyalties. During the Great War the Punjab raised *more than half* the total number of troops raised in India; and of these the Sikhs (12 p.c. of the population) sent 25 p.c., the Hindus (35 p.c.) sent 25 p.c., and the Moslems (51 p.c.) sent 50 p.c. The fighting qualities, too, may be associated with widely different "moral" qualities even within the same creed, as between the Baluchs and the Pathans. For both are Moslems, with the strictest codes of honour and hospitality; but the one is strictly utilitarian, and the other is not. And it is often "convenient" for the one to break a promise and to shoot his enemy from behind.

Delhi

Symbolic. Delhi almost epitomises the story, not only of Hindustan, but also of most of India. For that reason alone it is the most suitable capital of India, quite apart from the wish to divorce an administrative from an economic capital; but it is equally suitable for other reasons, geographical and symbolic—the geography behind the story, and the symbolism involved in it. Unfortunately, the symbolism has been weakened by the feeble stupidity which hoped to allay religious and racial jealousies and to add dignity (!) to the city by investing it with a District, as though it was a Washington meeting-ground for a number of equal and friendly States with a common language and a common code of general behaviour. The only action appropriate from the Indian and the Asiatic standpoint has been supplying it with what do look like Imperial buildings; but, at the time, this was indefensible financially, and the admirable equipment has not encouraged the officials to resist the heat of the plains for one week longer than before.

Representative. Delhi, like the original Indo-Aryan settlement of Indrapat—which *is* inside the tiny Province, and on the *Punjab* side of the river—stands on the finger of primeval rock that divides the alluvial plains of the Indus and the Ganges, at the point where the old

Dekkan block comes nearest to the young Himalayan folds; at once, therefore, it is associated with all the chief geographical units in India. But this centre marks the eastern limit of the original Indo-Aryan settlement and the western limit of the Indo-Aryan colonisation; and it gave the hardy conquerors from the west their first glimpse of, and grip on, the Promised Land, as the very gateway between the intractable desert and the invincible mountains.

Crucial.

The actual middle line of the 150 miles between the 1500-foot contours in the Aravallis and in the Siwaliks is Panipat, where the fate of India has been decided at least three times—when Babar overthrew the Lodi dynasty, when Akbar routed the Afghans, and when the Mahrattas were taught to remain on their lava. But the streets of Delhi have run with blood scores of times, especially when its Chandni Chauk ("Silver Street") has been looted by every conquering horde that believed it to be "the richest street in the world"—*e.g.* under Nadir Shah, Timur, Ahmad Shah, and the Mahrattas. The Jumna was the vital line, and Panipat represented that as clearly as Indrapat or Delhi; but these two had the military and the commercial advantages of being behind a river which—in those days—was always navigable, and which they could move *along*—instead of across.

Responsible.

The city, therefore, has come to represent all the three great phases of Indian development—Hindu, Moslem, British,—philosophic, military, economic; but its future is not beyond doubt. If numbers and volubility are to the east, vitality and action are to the west; and, if some unprejudiced third party has neither the will nor the power to hold an even balance between the two, Delhi will run with blood again. The little Province includes "a tract of land in the United Provinces comprising 65 villages," and the family and the village are the core of Hindu life; but Islam offers social freedom and equality—even to 60,000,000 "Untouchables," who are nominally Hindus, and the Hindu mind—like the Hindu body—is not "of the desert" nor "of the West." It would be as foolish and unfair to try to belittle that mind as it is to ignore its qualities. As Hindu sculpture is massive rather than linear, so Hindu thought is concerned with conceptions rather than arguments. But, that being so, why argue with them? British "goodness" is, in any case, un-Indian and un-Asiatic; and British knowledge is only of yesterday.

Aravallis

Punjab Unit.

Structure, physical history, and relief, all suggest the association of any Aravalli unit with Peninsular India; but climate is more important than all these as a differentiating force, and is supported by both political and economic history in associating the Eastern States of Rajputana with the Indus (Punjab) plain. The climate

has a direct relation to the human distributions and activities; and, as reflected in the river system, it makes the unit clearly a link between the Indus and the Ganges basins. But the Aravallis have a human note only on their eastern flank, dependent on a rainfall that is very precarious, but still is a monsoon rainfall; and so that flank is rather a latitudinal annex of the Punjab than a longitudinal

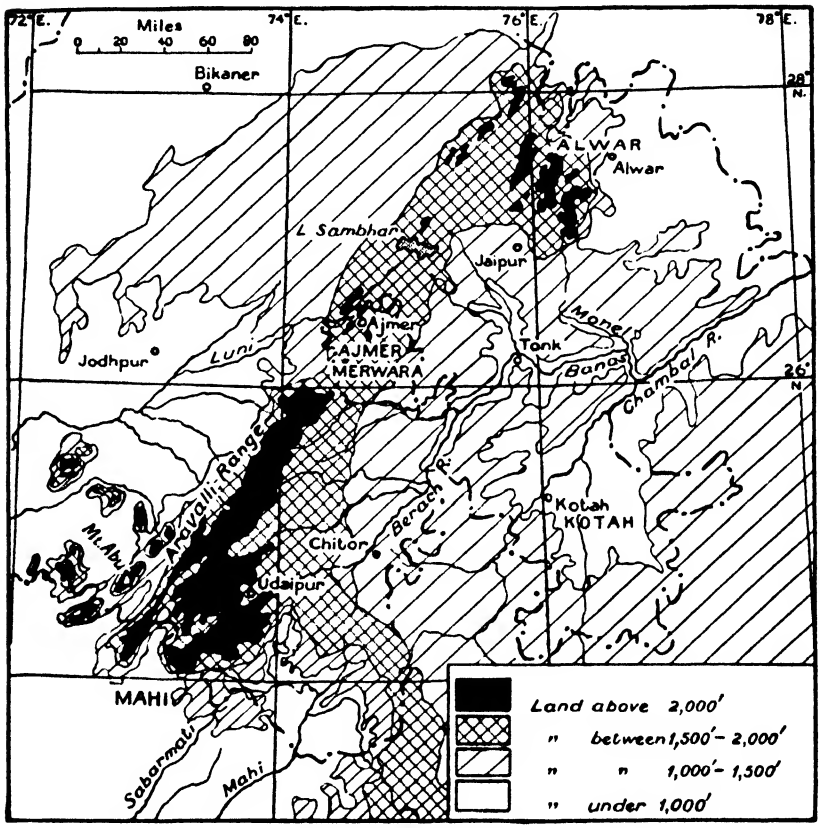

FIG. 82.—Aravalli Hills.

annex of Sind and the Thar desert, even if only two-fifths of Rajputana lies east of the Aravalli crest.

Topography. Perhaps the key to the interesting geographical and artistic problems of the area lies in the relation of its topography to its location. The Aravallis lie definitely S.W.–N.E.; but their Mahi spur to the south-east—in connexion with the scarp of the Malwa plateau—gives a secondary water-parting, from which the Sabarmati and the Mahi flow south-westward, and a northward trend even to the direct Aravalli drainage. At the same time, the western

limit of lowland, alike in Alwar and in Kotah, runs near meridian 76° E.; and so the various "terraces" up to the Aravalli foot narrow northwards, though the elevation of the Aravalli crest falls in the same direction. The abruptness of the precipitating medium, therefore, compensates to some extent for its relative lowness; and even the Luni rises, in Lake Pushkar, to the *east* of the dozen miles of high ridge (over 2000 feet) that shelters Ajmer from sand-storms.

Drainage.

The precarious variability of the rainfall, then, depends on the trend of the summer cyclones; and the distribution of both relief and temperature takes this—for 200 miles—along the remarkable low and straight valley of the Chambal, towards the great watershed of the whole region behind Udaipur. The steady flow of the Chambal is associated with the Dekkan lava of its upper basin; but, practically, the whole drainage of the Aravallis, like the effective flood in the Chambal, is associated with the Banas. The latter rises at least 1000 feet higher than the former, and is fed by every permanent stream between the Udaipur Berach and the Jaipur Morel; and the whole of its basin is in the immediate Aravalli tract, while the Chambal, for half of its length in Rajputana, is only a frontier.

Mhairs.

Except for the purely lowland towns of Kotah and Tonk neither river is associated with town-sites; for the country is a highland inhabited by Highlanders, *Ajmer Merwara* being "Ajmer of the Mhairs" ("Highlanders"); and their typical centres are associated with fortified hills overlooking natural or artificial lakes. Ajmer, the capital of the Agency, stands about 1600 feet above the sea, protected from blown sand by the Nagpathan ("Serpent-Rock") Range and with its old fort—now a sanatorium—1200 feet above it on Taragarh hill. Alwar is sheltered on the west in the same way by parallel ridges of the Aravallis (well over 2000 feet), with its citadel 1000 feet above the valley and its little lake (9 square miles). Udaipur, at 2500 feet, still has its Ekhingarh citadel and its Pichola lake; and Chitor, the old capital of Udaipur (the parent State), also has a famous hill-fortress. Jaipur stands on the bed of a lake now dry, only 200 feet lower than Ajmer, but with a midsummer mean 2° F. higher; both have about eight-ninths of their total rainfall in June–September. The natural convergence of modern transport-routes on such old capitals as Chitor, Ajmer, and Jaipur is significant.

Mineral Wealth.

In such an area—apart from the Chambal lava—agriculture must be mainly a precarious raising of millets, camels and sheep may provide hair and wool, and the old rock may be rich in metals, while the climate may favour the production of salt from such sources as Lake Sambhar; and so, in the absence of other opportunities, the population seems for ages to have devoted attention to the beautiful stone and the metals of its highland. Indeed, the

metal-working seems to go back to the Bronze Age, with special development in jewelry; and for this, though the women are still loaded with an immense weight of ornaments (on neck and shoulders, arms and ankles), there was no obvious market amongst a scanty and poverty-stricken people.

Location. It was precisely here that position became important. For almost all the art of Rajputana is of foreign origin—*e.g.* jewelry made to order from Agra and Delhi. Most of the work seems to have been done in the northern part of the area, where Ajmer was the capital of a Moslem Sombal (" Division ") of the Empire, and the Imperial Court was often in residence. To the south similar influences came up the Chambal valley from Agra and down it from the great Mahratta States—to Chitor and its hinterland; and Chitor is the only one of the great old capitals which still survives, *e.g.* Amber (Jaipur) and Mandor (Jodhpur) being mainly or wholly deserted.

STATISTICS OF MEAN TEMPERATURE AND RAINFALL—IV

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Delhi	*58*	62	74	86	92	**92**	86	85	84	79	68	60
	1	0·6	0·7	0·3	0·7	3·2	**8·4**	7·4	4·4	0·4	0·1	0·4
Jacobabad	*57*	62	75	86	94	**98**	95	92	89	79	68	59
	0·3	0·3	0·2	0·2	0·2	0·1	1·2	**1·2**	0·2	0	0·1	0·2
Simla	*39*	41	52	59	66	**67**	64	63	61	57	50	43
(*alt.* 7200′)	3·2	3·1	2·5	2·3	3·7	7·8	**18·4**	17·9	6·2	1·2	0·4	1·3
Karachi	*65*	68	75	81	85	**87**	84	82	82	80	74	67
	0·6	0·3	0·1	0·1	0	0·4	**3·2**	1·8	0·7	0	0·2	0·2
Lahore	*53*	57	69	81	89	**93**	89	87	85	76	63	55
	0·9	1·1	0·9	0·5	0·8	1·9	**6·7**	4·9	2·1	0·4	0·1	0·5
Multan	*56*	60	72	82	91	**95**	93	90	88	79	67	58
	0·4	0·3	0·4	0·3	0·4	0·4	**2·2**	1·7	0·6	0·1	0	0·3
Peshawar	*50*	53	63	74	84	**91**	90	88	82	71	59	51
(*alt.* 1100′)	1·5	1·3	1·9	1·8	0·7	0·3	1·7	**2·2**	0·7	0·2	0·6	0·5
Srinagar	*31*	33	45	56	64	70	**73**	71	64	53	44	36
(*alt.* 5200′)	3·4	**4·2**	3·1	3·3	2·7	1·8	2·8	2	1·2	1·2	0·4	1·1
Leh	17	19	31	43	50	58	**63**	61	54	43	32	22
(*alt.* 11,500′)	0·3	0·4	0·2	0·2	0·3	0·2	0·5	**0·5**	0·2	0·2	0	0·2

INDIA—III

CHAPTER XXIV

CENTRAL HINDUSTAN

(1) *United Provinces*

If the suggested "Agroude" were not too ugly for use as a label, it might at least suggest some of the significant disunities typical of this area, though there is enough fundamental unity for it all to be included in a single region, even if we extend its eastern limits down the Bihar valley—to include at least Patna and the confluences of the Son and the Gandak.

History. This was the "middle country" of Indo-Aryan epics, *Mahabharata* and *Ramayana*, Rama's home being at Ajodhya (or Oudh, *i.e.* practically Fyzabad) and the home of Brahminism being at Benares. Buddha and his creed were born here, and it was the appropriate centre of the Buddhist empire of Asoka, traces of his Pataliputra still surviving in the subsoil of Patna. It was the Hindustan of the Moslem historians, and Agra and Allahabad, Jaunpur and Lucknow, were Moslem capitals. It has always been the heart of India, typically Indian and securely Indian. Central India was almost as safe a bulwark as the Himalayas; both the north-western highlands and the south-eastern ocean were remote, and the lands of approach from both were difficult and unattractive. The security helped to make it, in a Land of Sanctuaries, the richest in shrines; the nodality helped to make it the Home of Urdu, the nearest approach—amongst the Indian languages—to a *lingua franca*; and it has much fundamental unity—in structure and relief, in climate and its vegetational controls, in the density and occupations of its people.

Physical Basis. From 77° E., where the Aravallis and the Himalayas converge, to 87° E., where the Vindhyas and the Himalayas converge, stretching up to 30° N. in the north-west and down to 25° N. in the south-east, lies the Middle Basin of the Ganges. It is an old delta, the work of three great rivers—Gogra, Jumna, and Ganges; and the

steady southward trend of the Himalayas both brings the lofty crests of the Nepal ranges nearer to the Wet Monsoon, and narrows the plain-stage of the Gogra, while its Kali-Sarda tributary at least drains from behind the vast mass of Nanda Devi (25,600 feet). These conditions emphasise the source and the length of the Gogra in producing the most forceful river; and so, again, the Gogra plays, with regard to the Ganges and the Jumna, the same kind of part that the Karun plays to the Tigris and the Euphrates (p. 273).

Himalayan Control.

But all these are related to the frame of the unit in exactly the same way. They all start at the "proper" angle (a right angle) to the Himalayan axis, and flow south-*west*ward, the Jumna so much so as to suggest that it once joined the Indus basin. But to-day the Aravalli finger guides it south to Agra—in the *same* longitude as Mussoorie; and the Vindhyan system, with its steady northward trend, sets Benares in the latitude of Haidarabad and Gaya in that of Karachi. The mass of the Himalayan front, including the *Terai* swamps, is in Nepal; but the "Garhwal" mountain square, with its great peaks of Nanda Devi and Kamet (*c.* 25,400), Trisul (*c.* 23,000) and Kedarnath (*c.* 22,000), the source of both Ganges and Jumna, belongs appropriately to the United Provinces. Substantial parts of the frontier, too, are marked by Himalayan, Aravalli, and Vindhyan rivers, including the Kali and the Chambal, the Jumna and the Gandak; and the median line of the whole unit is the semi-circular course of the Ganges from Gangotri to Patna, a line of minimum level and maximum fertility, both more pronounced on the right bank (west) of the Ganges in the west, but on the left bank (north) in the east.

Three Areas.

The whole region may be divided into three areas—a mountainous north, a hilly south, and a central lowland. The mountainous north contains parts of all the three Himalayan ranges, a guarantee of the river-development, though the abrupt descent has resulted in the lands and the banks of the great rivers being unduly raised by silt; and there may have been some elevation of the whole plain. There are dense forests, including the valuable sal timber—most of the sal logs being floated down the Gogra from Khairigarh, the only jungle where now tigers can be found in any numbers, and wild elephants can be found at all throughout the whole region; and the valleys (*duns*) behind the Siwaliks grow fine tea, especially the Dehra Dun. Both the Garhwal and the Kumaon districts grow hemp (for fibre), and Kumaon grows good ginger; but the trade, like the tea trade, depended on the opening of a railway to Dehra —for Mussoorie (6600), which looks across the Dun to the Siwaliks.

Hill Stations.

These highlands are a great asset to the province in several ways, but especially in this matter of health and scenery. Naini Tal, with its beautiful lake, is only about 6400 feet above sea; Ranikhet, also on the Kumaon highland, only just reaches 6000 feet, and yet has

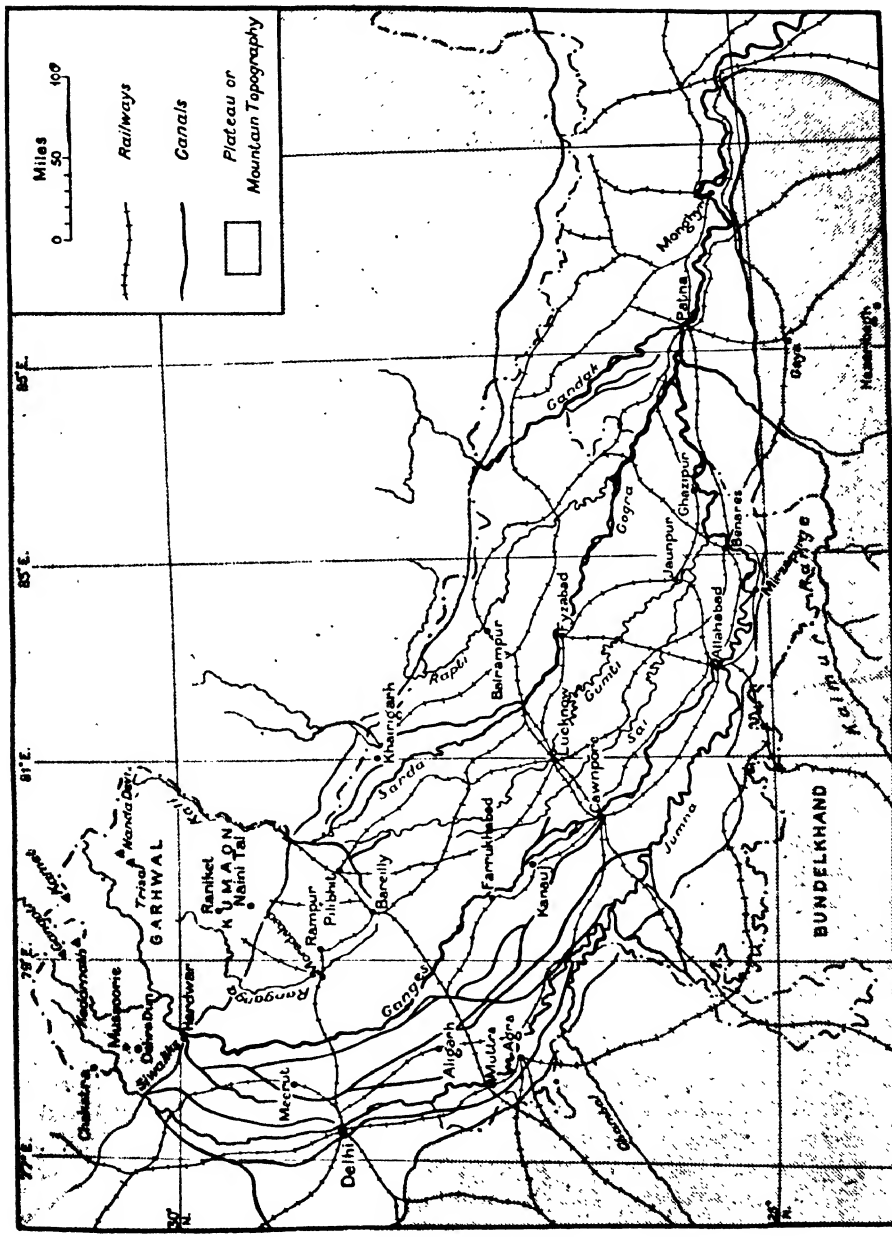

FIG. 83.—United Provinces.

a midsummer mean only just over 70° F., while its total rainfall is less than 50 inches, and well over 25 p.c. of this is winter rain (October–May); Chakrata, 1000 feet higher, has lower temperature and heavier rainfall, but again about 25 p.c. of this is winter rain. The permanent inhabitants and their stock reflect the conditions. The Garhwal district and the Kumaon (Almora and Naini Tal) are the only parts of India outside the Indus "basin" that can produce what can be called really good wool, *i.e.* wool that is not hair, and will felt; and the Garhwalis—like the Dogras, of true Rajput descent—are as cheery and as simple as the Gurhkas "next door," as fond of "a scrap," and as clever in it.

Dekkan Scarp. The hilly south presents a very different picture. The hard old rock is infertile, the rainfall is always precarious and generally below 30″, and the latitude is relatively low. Even the Bundelkhand is cut up with dry ravines or rugged spurs of sandstone or granite that are encroachments of the Vindhyan system; and both the Vindhyas proper and their Kaimur extension drop—in awkward terraces—from less than 3000 feet. In the rainier east there is (tiger-haunted) jungle below the Kaimurs, but even along the Son there are no towns, only the haunts of Bhils and Bhars.

The Plain. The plain can be divided into two—(*a*) the rather older lands of *The* Doab, extending that eastward to the Ramganga in the north, and (*b*) the rather younger lands of the Gogra-Rapti doab, extending that westward to the Sai, so as to include the whole basin of the Gumti, "The Meanderer," with all the suggestions that the name carries. The whole is studded with countless[1] villages; it is—for India—well cultivated; it is—in spite of more large towns than in any other province—overwhelmingly agricultural, reflecting in that its dead levels and low monotony. All of it, too, has heavier and more certain rains than the Punjab, but lighter and less certain rains than Bengal; the relative lack of rain can easily be met—where needed—by irrigation, and it implies a relatively healthy climate and considerable extremes of temperature.

Climate. The differences between the two divisions are not directly climatic, but associated indirectly with their economic history. The whole area may be put at about 150,000 square miles, of which fully two-thirds must be credited to the United Provinces (nearly four-fifths of it to Agra); and two-thirds of the population have also been in the United Provinces (scarcely three-quarters of it in Agra). But the population here has been tending to fall, and that in Bihar to rise; and conditions seem to be worse in Agra than in Oudh, while maximum temperature *falls*, as rainfall rises, in the *lower* latitudes eastward. Thus maximum temperature averages 95° F. at Agra, under 93° F. at Cawnpore, not much over 92° F. at Allahabad, only a clear 91° F. at Benares, and 88° F. at Patna; but

[1] There are at least three-quarters of a million villages in India.

the rainfall varies from over 44″ at Patna and nearly 41″ at Benares to just over 32″ at Cawnpore and under 29″ at Agra. While Agra, too, like Delhi, has its temperature maximum in June, the other four have their maxima in May.

Under such circumstances, plants—in the lower latitudes of the western area—must have been in great need of water for fully four months (March–June), during which the average rainfall in many places does not aggregate four inches; and anxious peasants must have persistently over-watered—for a fiery sun to convert the excess into a film of salt. A few years would be sufficient for successive layers of this *reh* to make patches of soil sterile, *usar*; and far too much of The Doab is covered with this leprous crust. But, in the earliest days of their physical history, these western lands were dry first, just as the old delta to-day is naturally drier than the new; and, in their political history, all the great waves of invasion have come from the west. These lands, therefore, were the first used, and have been the most used and—during years of turmoil—the most neglected; and so they are not only "tired," but also often saline, and are declining in fertility and in population. **Agra.**

The eastern lands—Oudh, Rohilkhand, and Gorakhpur—are damper, cooler in summer, and better [1] wooded; with the narrowing of the trough as the Himalayas and the Vindhyas converge, they have better drainage and a higher water-table; and their soil is "bottomless"—for borings well below 1200 feet have not reached rock. As the *Terai* belt in these longitudes belongs wholly to Nepal, the percentage of useful land and of dense population is high; and this is, typically, the rice-growing part of the province. The Gumti, which rises in the Pilibhit region of the Rohilkhand (below 1000 feet)—where all the districts can grow rice, *e.g.* Bareilly, Rampur, and Moradabad—has not yet filled up its bed, as the greater rivers have; and so the belt is free from the constant shifting of channels that is so troublesome elsewhere—though the old beds (*jhils*) act as "escapes" for flood and even as reservoirs, round which wild rice often grows. **Oudh.**

In proportion as rainfall is less, or extremes of temperature are greater, more use must be made of rivers and wells; and this allows a great variety of crops, *e.g.* every grain that is grown in India, and two crops can be grown in the year. And, perhaps, nothing helps one to realise the climatic conditions so clearly as a realisation of the distribution of staple crops. Typical winter crops are wheat, barley, and gram; typical summer crops are millet, maize, and rice. Oil-seeds are raised in both seasons, rape and mustard in winter, and linseed and cotton-seed in summer. Cotton for fibre is grown specially in the west, *e.g.* round Aligarh, Muttra, and Agra; and **Crops.**

[1] Northward from Meerut The Doab is fairly well wooded, and *all* this middle basin of the Ganges was natural woodland in Vedic times.

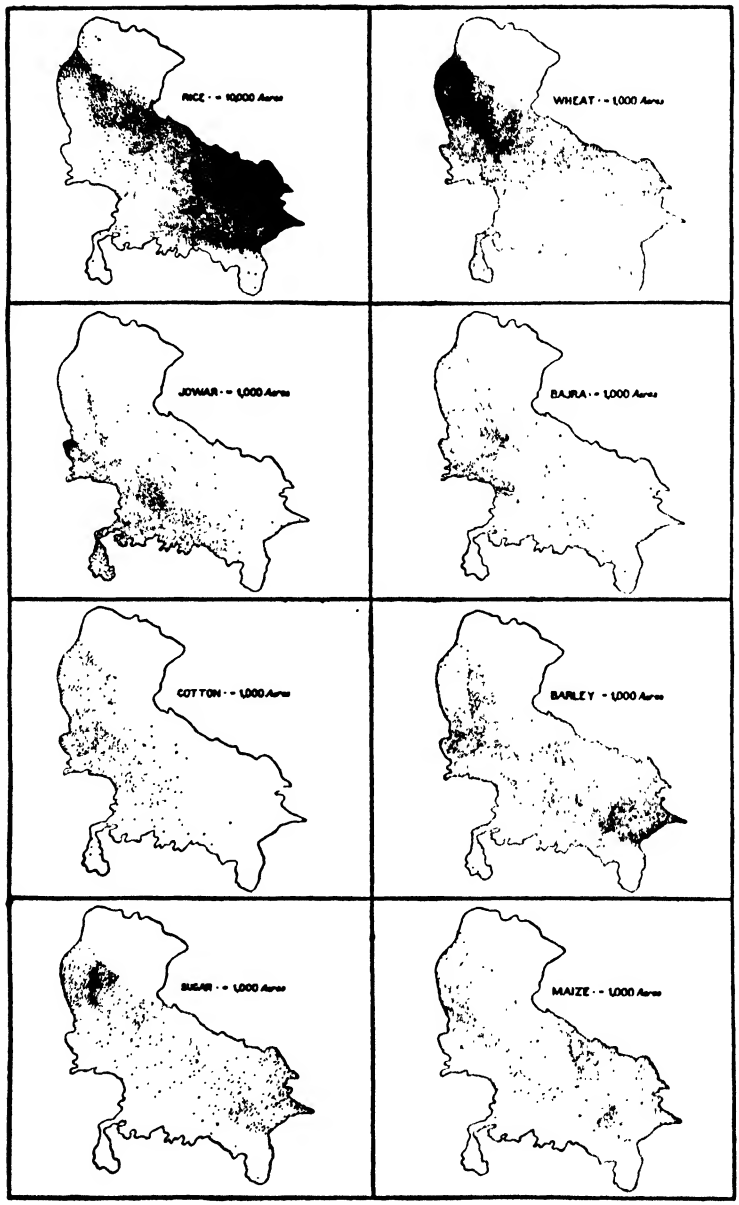

FIG. 84.—Crops of United Provinces.

Aligarh and Agra manufacture it, mainly into blankets—much finer than those made farther east, especially along the Ganges, *e.g.* at Cawnpore and Farrukhabad, but also at Bareilly and Moradabad. But cotton is grown everywhere, especially south of the Jumna, for "oil-cake"—for the ill-fed cattle. At the same time, it is illuminating that the special cotton lands should be in the extreme west and the best barley lands in the extreme east, where straight lines joining Lucknow to Allahabad, Allahabad to Benares, Benares to Gorakhpur, and Gorakhpur (*via* "Oudh") to Lucknow, enclose land that produces half of all the barley raised in India. The United Provinces also produce half of all the gram.

Industries.

As the first part of Hindustan that became densely peopled, rich and famous, with centres of immense importance in religion and politics, *e.g.* Delhi and Agra, Benares and Hardwar, it came to represent almost every Indian development, philosophic or economic, political or religious; and legacies of its old activities can still be traced in many ways. Thus, Kanauj, in the days before the Ganges deserted it and its battlefields, was a place of great political and historic importance, the capital of Northern India in the sixth century; and it still retains—as an example of one of the most ancient of Indian industries, *i.e.* the extraction of vegetable oils—its (primitive and wasteful) production of sandalwood[1] oil, for which it is the greatest centre in the world.

The lac industry is almost equally old, but is located in the damper heat of the eastern lands, *e.g.* round Balrampur and Mirzapur; and in the excessively damp heat of the Mirzapur-Ghazipur valley are the indigo and the opium industries. The indigo in the older lands is still made in the primitive way, but in the younger (Bihar) lands the methods are rather better. Opium is not allowed to be grown now outside the United Provinces, so that there is no longer any real "Patna" opium—for the "Patna" rice-growers or anyone else; but the "Benares" opium is made at Ghazipur—and wisely, for the place is cursed with an "ideal" combination of high temperature and high humidity during the weeks after the capsules have been harvested. It is equally typical that the dry belt of an ancient world should have—in Farrukhabad, a famine-stricken place, but dry enough to be one of the healthiest in the whole Doab, and with navigation on the Ganges—the chief saltpetre centre in India.

To balance these ancient industries and their primitive methods, Monghyr (in Bihar) has the largest manufacture of cigarettes (from local tobacco) in India; Cawnpore has a world-wide reputation for brushes—their excellence associated with an indifference to the plucking of the bristles out of *living* animals; Bareilly and Bhowali

[1] Hindus everywhere smear the sacred paste on their foreheads, and use the oil as soap, scent, etc., and the wood is burnt in the Fire-Temples.

distil very good turpentine, and the Hazaribagh and Gaya mica is the finest in the world—practically essential in certain electrical industries for the high dielectric coefficient.

Cities. Some individual attention to the half-dozen cities of the area may help to emphasise the unique position of these provinces in India and their consequent importance; for they represent India far better than any other province or provinces, and are much the most famous.

Benares. We may begin our survey of the big cities with Benares, and make use of a Fairy tale. Those pre-historic travellers were moving eastward early in the morning of a cold-weather season, and the tendency of the great river to cut into its right bank had induced the habit of marching on the left bank; and those who were going ahead by water—the current running strongly even in the cold weather—were looking out for a good camping spot for their friends. In the northward reach below (our) Chunar the sun rose upon them over the low eastern bank, and lit up a long row of terraces on the high western bank between two tributaries of the Ganges, the Barna and the Assi,[1] terminal moats for a water-front camp; and, when this had become a permanent home, it was realised that the Ganga (" River ") had turned northward here to " bow to the White Bull " of the Himalayan snows (the home of Siva) and their bellowing avalanches. Many honest people at sixty Ghats would swear that this was fact and not Fairy tale.

Its Sanctity. It at least reminds us of the position of the sacred city—above the sacred river and towards the rising sun; and it prepares us for the images of Siva's sacred ox in every temple, for the Brahmini bulls loafing about every street, and of the real danger to anyone who honestly and wisely believes that beef is a more wholesome food than pork. A glance at the wretched cattle or at the more sacred *Ghats* convinces us that this is a land of poverty and disease—where poverty and disease are of no importance, or are regarded with reverence rather than resentment and repugnance.

The city has some sanctity for Buddhists, as a home of the Buddha,[2] and was visited by Hsüan Tsang; but its special sanctity is for the Hindus, and that is the main cause of the ubiquity of diseased persons. For every Hindu who dies within the radius of the " Five Kos " (7½ miles) road, is sure of admittance to Siva's heaven; and this attracts the wealthy sick, and their alms attract the swarms of beggars and of poor sick. The demand for accommodation, too, has made it a city of sky-scrapers, the houses often having five and even six storeys; and the presence of the rich supports the typical work in gold and silver thread and filigree,

[1] The old name, *Varan-asi*, is probably not a corruption of " Barna-Assi.

[2] The Samath ruins seem to be Buddhist, not Brahminical.

which is much more important than the (better known) brass work. The city has little or no industrial importance, but is an important railway junction, and can be reached by the large river-steamers.

Lucknow. But Lucknow is the capital of the province of Oudh, as it was of the old kingdom, and the largest city; and it has been as distinctly political as Benares has been religious. It is one of the three places which are most suitable for a capital here—the two others being Fyzabad and Cawnpore; and it is a much more important railway junction than Benares, though less important than Cawnpore. It became the capital in succession to the old Ajodhya, or Oudh, (cf. p. 401) in 1775; it was a city built round a fortified palace, and Court patronage gave rise to its typical industries in gold and silver, ivory and silk. It is full of temples and mosques, palaces and gardens, and the fertility of the Gumti plain gives it some commercial importance; but the plain is old enough to have—like the Benares plain—too much *usar*, and the position is too near Cawnpore for it to have now much economic importance.[1]

Cawnpore. Cawnpore is a purely modern British creation, almost more like a Yorkshire than an Indian city. Clive selected it as one of the "commanding positions" in the region; and, as soon as the railway bridge at Allahabad gave it direct connexion south-eastward, —emphasised by the Jhansi line south-westward,—the importance of the position became clear—on the Ganges, in The Doab, with the centrality of the old Kanauj. It is purely industrial and concerned, not with luxuries in gold and silver and ivory, but with necessaries of everyday use in cotton and wool and leather. The special development in the last was due to the large proportion of the local population that belonged to the Chamar caste, especially in days before organised irrigation, when shortage of fodder at once threw skins and hides on the market, and when that market was not very sensitive to the "deterioration" of pelts from drought, from the age of the beasts, or from disease. As the skins (sheep and goat) are largely obtained from animals slaughtered for food, they are usually much finer than the hides, and the Cawnpore *glacé kid* is exceptionally good. The city is probably the most important centre of the leather trade in Asia, and much the most important inland industrial city in India.

Agra. Agra links Benares with Cawnpore, and both with Lucknow; it is old in history and modern in development, a political as well as an industrial centre. Akbar founded it—or, rather, refounded it,—and proper use was made of the Rajput marble and the Vindhyan sandstone, so that it is the finest city in the whole region—apart from the special beauty of some of its buildings, *e.g.* that "Bubble in Marble which we call the Taj Mahal"; and the thrift of the "Steppe" masons founded the famous mosaic work, so that those

[1] It is regaining much of its old political ("judicial") importance.

who "designed like Titans finished like jewellers." The Rajput Steppe also provided wool and pelts of unusual quality, which laid the foundations of its woollen and leather trades, though the climate favours only open work in wool (carpets) or cotton (embroideries). Its position on the great elbow of the Jumna made it from the first a real land-and-water junction, and enabled it to collect from a wide area, *e.g.* grain and cotton; and it rivals Cawnpore now both as a leather centre and as a railway junction, while it remains supreme in India for its stone-work. The unfordable river was also a great protection, especially to the Aryo-Dravidians, against later raiders from the west. The great market became, therefore, a great frontier fortress before it became a political capital; and it gave place to Allahabad, as the regional capital, only after the Mutiny.

Allahabad. Allahabad—like Agra, refounded by Akbar—is an appropriate capital for the united provinces only because it is a very important traffic centre for Hindustan generally. It sprang up at the first great confluence of the sacred river, at a "Place of Sacrifice" (Prayag being its original Hindu name), which Moslems called "the House of God"; and there seems to have been some vague idea of a Trinity connected with the place, possibly from the three great waterways, which were of immense importance in early days. Of course, the "third" is also the (Lower) Ganges, but was replaced by a Spirit river—which flows underground from the sands of Sirhind (cp. p. 393). Even now 250,000 persons may make pilgrimage to this House of God at Christmas, and the concentration of possible buyers led here—just as similar concentration at the confluence of Marne and Seine led to the Fair of St. Denys—to the institution of great fairs, the Magh Mela lasting for a month from Christmas. The city is, and has always been, only a busy traffic centre,[1] and—besides its railways (*E.I.R.*, *B. & N.W.R.*, etc.)—has more than 400 miles of river "kept open for navigation."

Bareilly. Three minor towns in the United Provinces are associated closely with religious fanaticism. Bareilly was a frontier fort of the Moghuls, and certainly commanded the Ramganga navigation "to" Kanauj, even if that did not reach above Jalalabad; and it has always retained a military importance, especially while the capital of the Rohillas. But the Pathans left a legacy from swashbuckler *sawars* ("cavaliers"), who began a fanatical antagonism to the Hindus that has never ceased.

Muttra. Meerut and Muttra were Buddhist creations. The latter—Ptolemy's "Modoura of the Gods"—was very important (especially in the fifth century), because it was an "Asoka" foundation on a spot very sacred to the Indo-Aryans, whose Krishna "circle" still survives; but the place was so terribly exposed to the Moslems that it was sacked time after time—*c.* A.D. 1000, *c.* 1500, in 1636

[1] This has greatly favoured the growth of the University and the Press.

and 1670, in 1756, etc.—and the blood of the martyrs is still held sacred.

Meerut was of much less importance, but much safer; its really central position between the two great rivers, on the highest axis (over 700 feet) of the Doab, puts it above flood, and helps the higher latitude to make it an unusually healthy place—for the region. Of course, its connexion with the Mutiny has given it an artificial importance both historically and politically; and it stands near the Great Trunk Road. Its summer (June–September) rainfall is only 24 inches. **Meerut.**

Though the Bihar valley is still part of the old delta, it is a narrow valley, and not far from the sea; and the foothills of the Himalayas and Vindhyas are near and inclined to be rough. The rainfall is much heavier, and the climate less healthy; and, though the population is dense, on the limited alluvium it is only just self-sufficient, and has no surplus. Rice—which gave its name of "Patna" to any high quality of the grain—is the natural staple; but in the high humidity indigo and opium used to grow well, especially just in the lee of the Rajmahal hills. But the differentiating factor is that, in the "narrows," there are few natural tributaries of the great river, and practically only one important confluence—where all the four big rivers (Ganges, Gogra, Gandak, and Son) converge on Patna, and made the district a paradise for the rice plant, if very unhealthy for men. But the old opium trade is forbidden here, rail has ruined the river traffic, and the direct line from Calcutta to Benares *via* Gaya and the mica belt (p. 408) has actually put Patna on a branch line! Chapra, the old indigo centre, has suffered in the same way. **Patna.**

(2) *Bihar and Orissa*

A summary of these details, with some emphasis on regional differences, may give us a glance at the most interesting page in the whole historical geography of India, and also throw some light on the political mind [1]—as revealed by what it thought suitable and congruent for combination in the single political unit of Bihar-and-Orissa. Almost the only thing that the three regions involved have in common is a certain approximation to a uniform rainfall; and even this increases steadily from 50-52″ in Bihar to 54-56″ in Chota Nagpur and 58-60″ in Orissa.

Bihar, then, is a narrow, but very fertile valley that lies for 250 miles along both sides of a navigable river, between the towering young folds of the Himalayas and the terraced old block of Chota Nagpur. The convergence of the two highlands, as we have seen, makes the riverine lands rough as well as narrow; but there are some differences in the relation of the two highlands to their respective lowlands. **Bihar.**

[1] Since this was in print, the absurd arrangement has been cancelled, and Orissa is independent.

Northern Plain.

The northern plain is the wider, the less rough, and the more fertile; and the original Aryan invaders seem to have been travelling along the northern bank of the river—from which their descendants still prefer to bathe,—and certainly the mass of them settled on that side of the river. The width and the fertility of this northern area depend on its nearness to the mighty mountains, scarcely 200 miles away—the peak of Everest being visible (occasionally) from

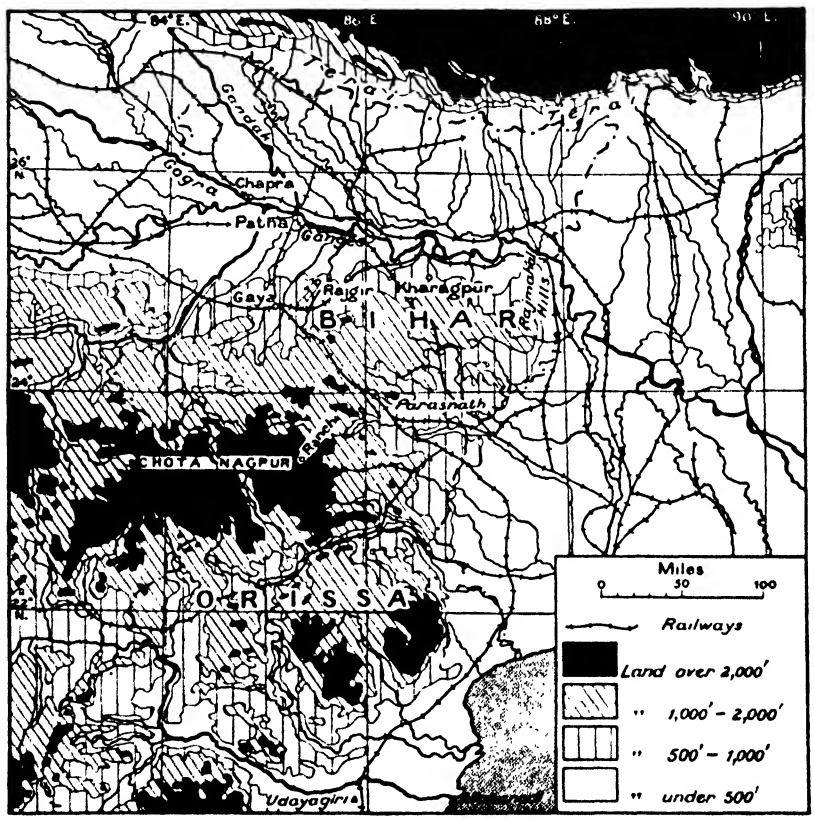

FIG. 85.—Bihar and Orissa: Drainage.

Patna; but it is precisely this nearness that exposes northern Bihar to terrific floods, and yet makes it difficult to use the larger rivers for irrigation. At the same time, except for the Kosi and its micaceous sand, the floods do much good and relatively little harm—much less harm than is done by drought; and the heaviest crops of real "Patna" rice are won off the great islands of silt (*diaras*) left in the Ganges by the very heavy July–August floods.

Crops.

The fine quality of these heavy crops is largely due to the climate. There are generally—late spring or early summer (see p. 107)—rains

of sufficient duration to facilitate the preparation of the soil; the latter half of June brings heavy rains for transplanting the rice-seedlings; and the latter half of September brings the terminal storms on which the harvest so largely depends. As there are two rice harvests (October and "Christmas"), with a very useful pulse and oil-seed harvest (Easter), the land can support a dense population (1000 per square mile), and has been always able to recover from calamities, whether war or flood or drought; in fact, its history has been more continuous and better known than that of any other part of India. The river made a great moat along the south; below the great mountains was an impassable belt of filthy *Terai*; and Patna was for centuries an immensely strong fortress.

Southern Plain.

South of the river the plain is nowhere more than 100 miles wide and generally much less, and spurs from the old block intrude, especially from the Kaimur and the Rajmahal hills, *e.g.* in the Rajgir hills south of Patna and the "Kharagpur" hills south of Monghyr. But the block does not average much above 1500 feet; and, though the run-off from the less densely forested parts, *i.e.* the farthest west, is very rapid, *e.g.* in the Son, the rivers have neither high watersheds nor large basins, and their floods can easily be used for irrigation—so successfully that for some weeks many of them do not quite reach the Ganges. There is, therefore, a double distinction from the northern plain: the natural conditions make daily life easier, if less luxurious; and there is no real barrier against the Dravidian and Kolarian tribes of the forested highland.

Pataliputra.

Certain Magadha tribes from Panchanada (Punjab) had reached Praki ("The East Land") by the seventh century before Christ, and had settled round the great river centre of Pataliputra, as the focus on which all subsequent movements from the west must converge, though their actual headquarters were on the Rajgir hills; and here developed the first great power in India of which we have any real historical knowledge. The fortress built at the confluence soon became the political capital, and the kingdom became an empire; and the capital of this first Indian empire became a great intellectual centre, famous for its grammarians and its physicians. Buddha studied here before he found enlightenment at Gaya, and so did Mahavira before he formulated his Jain creed; and Chandragupta, Asoka's grandfather, who was mainly responsible for ejecting Alexander's garrisons from India, had a marvellous organisation here, which included even agricultural returns and the registration of births and deaths!

Some 500 years later another Chandragupta revived the old imperial glories, and encouraged the builders of the wonderful Bodh Gaya and Nalanda monasteries; but eventually the Huns swept over the land, and left it in desolation. When it was recovering, it became a battlefield for rival Afghan and Mogul powers; and

meantime old pile-built Pataliputra had rotted away, and sunk beneath yards of river mud.

Orissa. Except for their religion there was no more in common then than there is now between Bihar and Orissa, between these landsmen of the river valley and the seamen of the surf-scourged delta of the Mahanadi. Then, as now, they spoke different languages, and had quite different outlook and aptitudes. For these old Dravidians still had that aptitude for the sea which they had brought with them into this peninsula that was so un-peninsular. They had all the sailor's handiness with a rope and understanding of the stars; they built cattle-boats, and "cradled" elephants on to and off them; they built a temple to the sun—at Kanarak,—and "cradled" to the dome of its four-square walls a coping-stone estimated to weigh 2000 tons! When they built a great pagoda on the Puri sands—the Jagannath or Juggernaut,—they raised its "flagstaff" to 200 feet, a landmark visible for miles out to sea; but the old naval aptitudes have largely died out, for they were always alien to India.

Seamen. Asoka's empire had broken up soon after his death, and the delta seamen of this Golconda coast were the first to break away; and on this narrow seaboard, with the arc of the Eastern Ghats broken only by the Mahanadi gorge—a terror to any but seamen—and crowned by hill-forts such as that of Mahendragiri (*c.* 4900′), they remained aloof as Kalinga and as Orissa (cf. p. 433). Their most famous king, Kharavela (200 B.C.), was a devout Jain, a great musician, a shipbuilder, and an architect—of the cave temples near Udayagiri, at the foot of Mahendragiri. He seems to have begun the processions connected with the Juggernaut, but the first "car" carried a wooden image of King Ketu, his predecessor by 1300 years.

Chota Nagpur. Chota Nagpur has really nothing in common with either the Bihar valley or the Orissa delta, for it is a mineralised plateau; and, as such, it asks for aptitudes that are again alien to India. Its coal and iron, mica and manganese, are products of to-day; and their natural market is neither in Bihar nor in Orissa, but in Bengal. Its rock, too, is as old as the muds of Orissa and even Bihar are young; but still large areas are over 2000 feet, *e.g.* round Ranchi; many smaller areas are over 3000, and one crest rises above 4000,—in Parasnath (*c.* 4500′). It is the only part of Hindustan where Palæolithic weapons have been found; the people were always foresters, using fire to clear forest patches for their millet and their pulse and smelting the copper from innumerable mines. Somewhere over the plateau there are, surely, deposits of tin, for there were ornaments and vessels of bronze as well as of copper—unless imported tin was sent up the Mahanadi by the Dravidian seamen to the Dravidian foresters.

INDIA —IV

CHAPTER XXV

EASTERN HINDUSTAN

(1) *The Great Deltas*

There are four of them, the deposits of Ganges and Brahmaputra, Meghna and Mahánadi; and all of them are new deltas, and in an India that is also "new". We have left behind the old stable land, with its great tributaries and great confluences, its Aryo-Dravidian people; and this new land is unstable, with great distributaries and great swamps, and a Mongolo-Dravidian blend of population. **"New" India.**

We have lost some essential climatic links, and left behind the atmosphere of ubiquitous sanctity. The winter storms of the Anti-trade cyclonic track do not go beyond the Gandak basin, though spring storms of local origin arrive from the Bay of Bengal; and Nature provides canals *galore*, where neither canals nor wells are really needed. So, too, the shrines of supreme sanctity—Brahman or Buddhist or Jain—are in Agra and Oudh and Bihar. The sacred river rolls on, but with some doubts—in this unstable land—as to the line of sanctity; and where there is least doubt, it is a dead river—the *Hogha* ("Bulrush").

On these new deltas, the rivers are still engaged in their struggle with the sea, even if it is for them a victorious struggle; they have ceased to carry and to collect, and have begun to drop and to distribute; their work is a chaos of swamp and silt, of flood and refuse. Every day there is a shifting of some channel, a wreck on the "James and Mary," a new chart—which only a registered pilot may use, and even he only for a few hours on the certified day of issue. Calcutta is only of yesterday, and Bengal has a special branch of jurisprudence for dealing with rights in "property" that changes its position or character or even disappears! **Distributaries.**

The bulk of this unit is a square—300 miles each way—of saturated alluvium, lying roughly between the longitudes of Malda and Chittagong and the latitudes of Cooch Behar and Calcutta,

Nucleus. where borings have failed to reach marine deposits even at 500 feet; but this distributary nucleus is fenced east and west by converging highlands and faced by the southernmost arc of the great Himalayan rampart. Diamond Harbour, at the mouth of the Hugli, is on the same meridian as Kanchenjunga (*c.* 88° E.), and *not* 400 *miles away from it*; and the narrow-gauge railway from Darjiling (*c.* 7400 feet)

FIG. 86.—The Great Deltas.

climbs down 6000 feet in the first 20 miles. The fencing arms, too, send out lava-tipped spurs, the Rajmahal and the Garo hills, parallel with the Himalayas, which leave a gap of only 170 miles between the 1000-foot contours—not 140 miles between the 500-foot—between Pakaur and Tura; and through this narrow "Rajshahi" gap the two great rivers converge, over a dead level of swamp and shifting channels, on Goalanda.

Goalanda. Perhaps, this great eastward swing was in obedience to some sinkage in the south-eastern quadrant of the joint delta, which countered

all the natural rotational deflection westward, and set the confluence practically as far south as the tropic and as far east as the 90° E. meridian. The 200-fathom contour, which runs almost due north-and-south—possibly associated with the seismic lines of Assam—comes within 30 miles of the Sundarbans coast here; and it is only those 400 miles from the 28,000-odd feet of Kanchenjunga.

Physical History.

While there is some evidence of sinkage to the south-east, there is also evidence of some "rising" in the south-west, for the marked uniformity of relief must not be allowed to suggest any similar uniformity of *régime* and development in the distributaries. Not only does the rainfall increase eastward, but the mass of water and silt in the Ganges flood is being definitely carried farther and farther eastward; and the probable reason for this is the reckless deforesting of the plateau spurs to westward. This seems to have upset the *régime* of the rivers coming into the Bhagirathi from the west, and the interruption of the southward flow of the Ganges diverted the water eastward. The impoverishment of the soil that has followed the interruption of the old flooding and silting has also been accompanied by an increase of malaria, and the ravages of this have been exaggerated by the decreased standard of natural food-supply.

Tributaries.

These conditions are the setting for the unstable and unfinished distributary plain, but their influence is almost equally strong on the tributaries of the margins. Whether these flow from an old block worn down to 2000 feet, or from young folds that tower to heaven, or from a watershed intermediate in both age and height, they behave like the distributaries—shifting their channels and flooding their plains, actually broken up into distributaries and disturbed by earth-movements. Their vagaries are, naturally, much less important than those of the distributaries, as their commercial value is less; but they illustrate very clearly just what is happening over the wider area, as one example from each watershed may show, the river chosen in each case being the chief artery from the particular watershed.

The Barak.

The Barak is a typical Indo-Pacific river, flowing almost due south from the Japvo shoulder (*c.* 10,000 feet) of the Barail range—to make an abrupt reverse, and flow almost due north to the Silchar lowland (*c.* 100 feet), with its rainfall of 120 inches. There it began to form a delta, the "Sylhet plain," the two chief distributaries being known as the Surma and the Kusiyara; and, as the former is navigable in the rains to Sunamganj and even Chhatak, the whole river is often called the Surma, and the Sylhet plain is called the Surma valley. Then the two distributaries *joined again*—to form the Meghna, which is sometimes allowed to give its name to the united streams of the Ganges and the Brahmaputra through the Sundarbans; and the dangerous bores, at least 15 feet high and

moving at a rate of 15 miles an hour, do at least give proof of a terrific water-pressure.

Surma Valley. This Surma valley gives direct rail from Dacca *via* the Cachar gap to Sadiya, and provides a magnificent route for all storms, in spring and in summer, off the Bay of Bengal; for they are all pressing rotationally eastward, and the convergence of the Khasi and the Barail walls is reflected in a 456″ rainfall at Cherrapunji, while the easy access through the gap is reflected in the 10-months rains which make the Assam valley a paradise for the tea-bush. Of course, in the immediate lee of the Khasi-Jaintia hills there is a sudden falling off in the actual rainfall, though the humidity remains very high; and this used to be as favourable to the growing of indigo, *e.g.* in the Gauhati district (60–70″), as it was unfavourable to the health of the people.

The Damodar. Though the Damodar rises on the scarp of the low eastern block of the Chota Nagpur highland, it lies very close to the natural track of cyclonic storms working directly inland across the Orissa coast; and, though below the confluence of the Barakar—*i.e.* through the Raniganj coalfield—the river is navigable to the mouth of the Hugli, its flood is very strong. It originally entered the Hugli about 40 miles above Calcutta, but a series of very heavy floods in the eighteenth century broke through its right bank, and it found a new route to the Hugli 75 miles lower down the river, *i.e.* much more under tidal influence, where the estuary is broadening out to ten miles. It was the check on the Hugli current here from the impact of the Damodar that led to the formation of the James and Mary Sands, and the danger of these is due to the pace (often above 20 miles an hour) at which bores race up the narrowed channel.

The Tista. The catchment basin of the Tista is a horse-shoe of precipitous ravines, dominated by Kanchenjunga and with their floors apparently 26,000 feet below the peak; and the river has been noted for centuries for the very sudden and frequent and violent changes of its course, and this culminated in an eastward swing of 150 miles—for it to become a tributary of the Brahmaputra instead of the Ganges. With such a force commanding the " link " between the two great rivers north of the Garo-Rajmahal line, it is no wonder that there was a minimum of movement between their valleys, and that the narrow Brahmaputra valley remained an unknown wilderness, while the broad Ganges valley was an age-old thoroughfare. Of course, now the main railway routes do not take either valley, *via* Bhagulpur or Gauhati, but use the Damodar and the Surma valleys.

Naturally, as we have seen, in all parts of such a low plain at the very foot of such a gigantic watershed, rivers must be expected to develop all kinds of vagaries; and we do not need to go farther upstream than Patna to find a tributary changing its course, for Patna stood once—when it was Asoka's capital, the old wooden

city rebuilt in stone and brick—on the strategic peninsula between the Ganges and the Son, which now joins the Ganges 12 miles above the city.

(2) *The Ganges Delta*

The Hugli.

Sanskrit geography seems to make the presence of distributaries the differentiating feature between the old and the new deltas of the Ganges, for Banga—or Bengal—began below the Rajmahal ridge at Bhagalpur; and apparently the Ganga then hugged its right bank normally, and so—once it was round the end of the ridge—it worked westward to the belt of stiff clay and nodular limestone which makes a firm western "bank" for the Hugli or Bhagirathi. The Himalayan Ganges is still the Bhagirathi, and so it is the "old" Ganges here, before it becomes the Hugli; and, as the Hugli is the *sacred* distributary, it must have once been the main stream, as the sacred Adi Ganga ("Old River") must have been the original passage-way through the Sundarbans. To-day the Hugli is not fed by the Ganges directly, but by three "Nadia" distributaries[1]—Bhagirathi, Jalanji, and Matabhanga—of which the Bhagirathi is the most important because it is the most westerly and because of its Damodar and other tributaries from the west; and it ends at the sacred island of Saugor, which is now not on the Bay at all. Indeed the navigable channel continues for some 40 miles farther—over the Middleton bar to the Sandheads, *i.e.* 120 miles from Calcutta; and it is here that the pilot joins the incoming ship or leaves the outgoing (cf. p. 415).

Racial Divide.

The relation of this sacred distributary to the scarp of the old block recalls that of the Indus to the Sulaiman folds; but the ocean link and the monsoon *régime* introduce factors alien to the Indus belt, and even the land relations are different. The "Hugli" is, and must have been for centuries, a real divide—between the old and the new; it still roughly separates the Aryo-Dravidians of the Ganges valley and the Dravidians of the old block from the Monglo-Dravidians of the deltas. In 1686, Job Charnock and his friends considered it a reasonable limit for Mahratta territory, and an excellent moat against Mahratta attacks; and the Calcutta Port Trust might, with advantage, meditate on *all* the aspects of the problem which those worthies studied.

Calcutta Village.

For Job had been there before, and knew all the villages; and he fully realised that the Natives attached great sanctity to Adi-Ganga and that, apparently, the village of Kali-ghat was specially sacred to Kali. While, therefore, the Natives had this attitude to the Hugli and Kali's village, Job also realised that the neighbouring village of Calcutta had much the best anchorage—in what is now the Long Reach (the Garden Reach)—because it had deep water along

[1] Which now flow across the skirts of the battlefield of Plassey.

the *eastern* bank, and was narrow enough (at its narrowest point, now the Howrah bridge) to be easily crossed for trade without being easily crossed by Mahratta raiders. Calcutta, then, began its post-village career as a fort on the eastern bank of a deep river, where there was good anchorage and a narrow crossing.

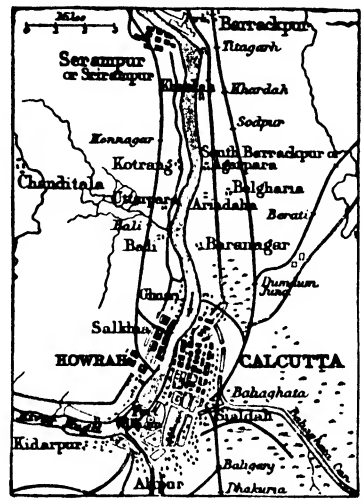

FIG. 87.—Site of Calcutta.

Calcutta Port.

The port extends now for fully 20 miles along the river—from Konnagar to the oil-wharf of Baj-Baj (Budge-Budge !), and the Trust authority extends over the whole "200" miles from the Sandheads to Kalna ; but, before the construction of the Kidarpur docks—not half a century ago—and the Naihati bridge across the Hugli, the port was essentially what Charnock had envisaged—a jetty port, the foreign imports being still dealt with almost entirely at the jetties. In his choice, Charnock had at least decided on a village where the river was deep enough to carry the largest vessel of which he knew. It is simply a stupid and useless waste to provide docks capable of accommodating vessels of *maximum* size and draught for Suez Canal traffic, *if* the river cannot carry these large boats up to the docks ! It is just possible, at spring tides, for vessels drawing 30 feet to reach them, and the cost and the difficulty of deepening the channel are not prohibitive ; but the normal limit of draught is 27 feet, and a boat carrying 6200 tons of rice for the Kidarpur docks has broken her back on her way up the river, and become a total loss ! And even if the decisively terminal character of Calcutta as a port implies that most vessels have discharged *some* cargo on the way, it does not seem economical—or even sensible—to assume either that they will not fill up, if possible, or that they want to leave again not quite fully laden !

Flood *v.* Tide.

Of course, all deltaic channels have somewhat similar troubles ; but these are complicated here by the monsoon *régime*, with its sharp distinction between a dry season and a wet season. During the dry season, when the river would normally be very low, the influence of the flood-tide is supreme, for it extends far above the city—to Nadia, and its volume is four or five times as great as that of the fresh-water flood-discharge ; but during the wet season the ebb has behind it the full scouring weight of the Ganges proper, of the Nadia rivers, and of all the western tributaries of the Hugli. The Hugli remains,

therefore, a better waterway than its eastern neighbour, the Matlah, with a mean range of spring tides varying from over 15½ feet at Diamond Harbour to over 11½ at Calcutta; and the cross-delta navigation-canal must have its termini on the lateral distributaries, *i.e.* at Barisal and Calcutta.

Old Capitals.

Before the development of ocean traffic here, the natural foci were likely to be found above the swampiest levels and either near the Ganges valley, *e.g.* while there was a stable Afghan or Moghul empire ruling Hindustan, or at the greatest distance from that—in times of danger and instability. Gaur had been a Moslem capital for three centuries before the Ganges deserted it; in the seventeenth century the capital moved to the far south-east, Dacca, on the Buriganga (" The Old River "); in the eighteenth it was again in the north-west, at Murshidabad on the Bhagirathi. All three were river ports and north of the tropic; and both Gaur and Murshidabad were on the *eastern* bank of the river, though at Murshidabad there is a tract of hard clay and nodular limestone on the western bank.

Old Bazaars.

Commercial centres had a similar fate. Within 10 miles of Murshidabad the so-called island of Kasim (Cossim)-*Bazar* was a purely commercial centre, with water-fronts on both the Bhagirathi and the Padma (Ganges), and was the most important commercial city in the country; but the competition of Calcutta was ruining it before it was deserted by the Bhagirathi—a century ago. In any case, there could be little doubt that—with the opening up of ocean trade—the natural focus was bound to be on a tidal reach of one of the distributaries.

Howrah.

With the advent of railways, however, and the passing of the Mahratta danger, it was obvious that no position could compete with one on the west bank of the most westerly [1] distributary; and even Calcutta to-day, as a railway terminus—if not also as an industrial centre—is only a suburb of Howrah. For the mineral wealth of the old block has been a vital factor in the continued growth of the city, and ten-elevenths of all its millions of tons of traffic is *rail-borne*! The Howrah-Calcutta unit has now a population of practically a million and a half (*c.* 1,485,600); it has increased by nearly 160,000 since 1921, while Bombay has actually decreased—by nearly 15,000; and it has been an enormous vampire to its immediate hinterland, draining away their life-blood from the older centres of population. Murshidabad seems to have dwindled by 150,000 during the last 100 years; and Calcutta has " survived," and recovered from, the opening of the Suez Canal.

Calcutta Province.

The two prime factors at work here, fertility and transport, were effectively active at least as long ago as the rise of Tamluk

[1] The story of Tamluk shows that this was the " Home " side of the delta even in the seventh century.

and Gaur and Dacca; but, as essentially "a Calcutta province," the unit is modern and British, and needs special attention from that point of view. This alone would justify the provision of a frame for the unit that included a Hill Station, and even the attempt to value the influence of the ocean on the Bengalis.

The Bengalis. The last seems to be a matter of importance quite apart from the direct relation of the ocean to the climate and the commerce of the region; for the influence of Bengal and the Bengali on British beliefs about India has been very great—unduly great, and it has come to us through Calcutta. Obviously, the outlook of rural illiterates in such a land must be very limited, even if the pressure of (a 90 p.c. rural) population, on the margin of subsistence, is leading now to considerable movement to less densely peopled areas—less densely peopled only because less fertile. But to the 10 p.c. of urban [1] population World-commerce must bring something of World-control, including new standards, *e.g.* of education and its "advantages," and urban movement is likely to quicken mental reactions. At the same time, a vapour bath does not encourage energy, and even penalises the energetic; and, perhaps, a wise inactivity of body leads to a compensating activity of mind, such as is always apt to impress the casual observer. But, in a link of busy commerce dependent on aliens from better climates overseas, there is always a risk of such activity being subtle and deferential; and Bengal may give a less true impression of India than, *e.g.*, the Punjab, as a worker in such an alien product as cotton may give a less true impression of England than, *e.g.*, a worker in such a native product as wool.

Sub-Divisions. It is quite possible to subdivide even the purely lowland part of the unit, and there are lines which even offer themselves for such a purpose; but the differences are trivial, and have been wholly neutralised by a practical unity of geographical conditions and the actual unity of Calcutta control. The plain in the west is a trifle older and firmer than that in the east, it is fed by a less powerful river, and it has a smaller rainfall, especially in March–May; the plains of the Surma and the Tista are better drained than those of the Ganges and the Brahmaputra, and yet have heavier rainfall at all seasons; the floods in Assam and in the Sundarbans produce more spectacular results than elsewhere—with 98,000 persons drowned in Backergunge during one October night, followed by a November toll of 215,000.

Unity of Conditions. But there is an overwhelming unity of conditions. Almost everywhere there is a soil that is more or less saturated, covered

[1] The percentage of increase in the urban population in Bengal since 1921 is 15.6, and urban populations all over India are grossly over-represented. The excess, according to the Lothian Report, is, *e.g.*, 64 p.c. in the United Provinces, 78 p.c. in Bombay, 80 p.c. in Bihar and Orissa.

with air that is more or less saturated; practically all parts have their distribution of flood and silt ending at high water in one continuous sea, which makes the range of temperature insignificant, and which is broken only by the inhabited mounds and the embankments (some carrying roads and railways) that guide rather than check the flood; and everywhere the total result of flood and silt is a fertility that can not be exhausted—even by jute. The real contrasts are between a positively vile climate and a relatively healthy peasantry,—between the natural needs of the peasants and the actual products of their activity,—between the badness of the Calcutta harbour and the world-wide trade which it bases on these activities; and the products are essentially agricultural in origin and tropical in character.

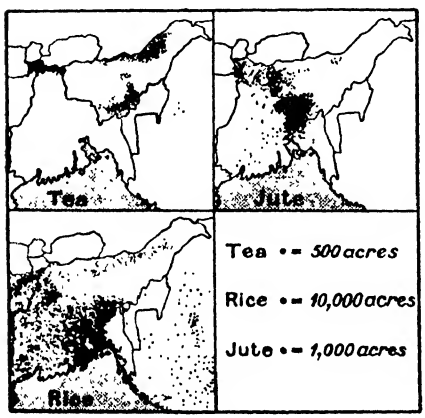

FIG. 88.—Distribution of Tea, Rice, and Jute.

Climate and Crops.

The Wet Monsoon comes to this area off a very warm sea, and what it loses in crossing the coast-line, it regains in crossing the delta "sea"; and, as it is pressing eastwards, the heaviest rainfall must be eastward, especially in the natural *cul de sac* of the Surma valley. East of *c.* 88° E. practically all parts of the region have a rainfall that is seldom below 60″ and a temperature of fully 60° F. even at midwinter; and, where such conditions are found, rice must always be the supremely important food-staple. But vegetable-oils are naturally subsidiary crops to rice, and are equally a necessity of native life; and, where wide flooding brings inexhaustible supplies of soil and "manure," jute is also a subsidiary to rice. Bengal alone has twice as large a rice-acreage as Burma, and Assam alone has about half as much as Burma—the Abors, who—though they live in the "Abor Hills"—are real low-landers (compared with, *e.g.*, the Lushai tribes), being the most persistent clearers of forest for their rice-*jhums*.

Rice.

Two-thirds of the whole cultivated area of our unit—probably more than two-thirds—are under rice, and three harvests can actually be reaped, though most of the cultivators—including the Abors—realise that the third (*boro* or "spring" rice) is not the best way of using time and labour and the available ground. The *aman* (or "winter") harvest is much the most important, for it is a real "low land" crop, sown as soon as the rains begin, and reaped soon after they cease, *i.e.* generally in December, but sometimes in

January—by the Abors even in November, *i.e.* in a real dry season. In December–January even Cherrapunji and Shillong have not one inch of rain, and Calcutta and Dacca have only just over half an inch. The *aus* (or "autumn") crop is also sown as soon as the rains begin, but on the higher land; and the relative lack of water makes it mature six or eight weeks earlier.

Population. With the natural conditions very favourable to the growing of rice and oil-seeds over such a large proportion of the region, there comes the probability of a very dense population over a similar proportion; and the actual density is amazing, reaching in some—purely rural—areas as much as 1800 to the square mile. Indeed, the one natural cause of famines in the region has been the over-population; there has been no serious decline of fertility nor any other cause except occasional catastrophes, and Bengal—with 25,000,000 acres under rice—is the foremost rice-producing region in the world. But such density must necessitate some possibility of raising "cash" crops, and here there are two that are peculiarly suited to the conditions—jute on flooding lands and tea on non-flooding; and, as a world market, our unit has a literal monopoly of the one, as of lac, and an immense superiority in regard to the other, even Ceylon exporting scarcely half as much[1] tea as India.

Jute. The successful production of jute depends on three factors. The basal one is a deep annual flood of water heavily laden with rich silt; and this must, of course, be associated with suitable temperature and rainfall, etc., during the growing season. A considerable area here has the necessary conditions, as very little of the whole lowland is permanently above flood, and the range of temperature is very small; but, as the most important single item is ten inches of rain in May, the crop does better east of 90° E. than west of it. Even so, probably not more than 5 or 6 p.c. of the total cultivated area is really quite satisfactory; and the actual extension of area has been accompanied by a lower quality of fibre. This may, however, be due to the ryot. It is the *only* cash crop that is in his hands from first to last, and he has been tempted to extend his area; but he does not feed his miserable oxen well enough for them to be able to drag even his "shallow" plough effectively over any of it.

But the third factor really decides the distribution of the crop for quality, *i.e.* for real profit; it is clean water for retting. This at once disqualifies the Sacred Ganges, with its burden of filth; and the northern rivers are really more favoured than the eastern. Of course, the Brahmaputra stands alone as a source of heavy flood

[1] India and Ceylon together produce *c.* 75 p.c. of the world's tea-crop, but southern India now produces 13 p.c. of the Indian share, largely because of the greater attention to quality.

rich in silt; but the Meghna has "Cherrapunji" behind it, and the Tista is much cleaner than either of them.

There are, then, two main areas, both associated with the Brahmaputra, one west of the river (*i.e.* west of 90° E.) between 24° and 26° N. and the other east of it between 23° and 25° N. The chief area in the west, though west of 90° E., lies parallel with the Himalayas between the Kosi and the Tista—from Purnea *via* Dinajpur to Rangpur, the last much the most important district; and there is another between the converging Ganges and Brahmaputra north of Goalundo, where Pabna is much more important than Bogra, and the quality of the Sirajganj fibre is very good—thanks to the purity of the water in the long and straight reach of the new (Jamuna) Brahmaputra. East of 90° E., Mymensingh has far the largest area, but Tippera has a large area, while Dacca and Faridpur have larger areas than any "Ganges" district except Jessore (which is less than 50 miles west of Faridpur), and the finest fibre of all comes from the Meghna retting reaches at Narayanganj. **Two Areas.**

This illustrates also the importance of the higher lands, where the plant need not be cut—from fear of flood—before it is fully ripe, and where railway construction is easy. Dacca and Narayanganj have practically the choice of all the three great rivers—Padma (Ganges), Brahmaputra, and Meghna; but here, as at Calcutta, rail is very important, the rivers feeding rather than competing with the railways. Indeed, in normal years three times as much jute reaches Calcutta by rail as by steamer or by native boat; and there are well over 1,000,000 (1,100,000) spindles and over 50,000 (53,000) looms to feed, with an annual export of over 800,000 tons in normal times. **Transport.**

The tea plant is probably a native of Assam, and nearly five-eighths of the total Indian production is from Assam; and Bengal, mainly northern Bengal, produces about two-fifths, over 80 p.c. of the total area under tea in India being in the two provinces. The industry, like the jute industry, is entirely a British creation; and it illustrates admirably the kind of work which we have been doing in India. For within the last 40 years the yield per acre has been increased by nearly 70 p.c. in Assam and by over 70 p.c. in Bengal; and this has been due largely to making use of soils which are very unsuitable for nearly all other crops, and which were thought to be unsuitable for tea—acid soils that are grossly deficient in lime. **Tea.**

Of course, the general conditions in Assam and Eastern Bengal are very favourable. No equal area anywhere else in the world seems to have so many little basins and valleys on forested piedmonts (1000–2000 feet), where the soil is rich in humus and in iron, the humidity always high, the temperature steadily 80° F., **Climate.**

the shelter from wind and bright light perfect, and yet the slope sufficient to give good drainage in deep soil for the long tap root. The minimum rainfall needed is 60", but these gardens often have 90", and sometimes 120"; and the distribution is equally favourable. Even in the "four fatal dry months" (February–May) the great mass of the area has over 20", *i.e.* at least one-third of the total annual minimum; and the two months of dry season are not rainless,[1] but only dry enough to give a useful "winter" check to growth. The result is that in the "Upper" Brahmaputra valley, and to some extent in the Barak valley, there can be from 12 to 15 pickings in the year.

Four Areas. The actual distribution of the gardens and the quality of the tea are very closely related to the climate, and specially to the rainfall. The special line is, of course, the cyclonic track through the Cachar gap; but there are three very important areas, and a fourth of considerable importance. The first and the largest is along the northern watershed of the Surma between Silchar and Shella, *i.e.* "below" Cherrapunji, in the virtual *cul de sac* between the converging walls of the Khasi-Jaintia and the Barail-Lushai hills. The second in importance is the complete *cul de sac* of the Lakhimpur district, on the narrow belt between the 1000 and 3000-foot contours (mainly 2000–3000') crossed by the Dibang, the Luhit, and the Dihing behind Sadiya; but the cyclones on their way up the valley from the Cachar gap catch the Naga bulge of the Patkai range, and an important group of gardens covers much of the Sibsagar lowland between Nazira and Golaghat, though eastward—*i.e.* more in the lee of the Patkais—the rainfall is not much above 90 inches.

Some of the cyclones work west of the Rengma (Mikir) Hills instead of east of them, and give heavy rains to the Himalayan piedmont in the Darrang district; but, though the conditions are very favourable to the plant, it is the wrong side of the great river for easy transport—in spite of a little line from Balipara to the river-port of Tezpur.

Quality *v.* Quantity. The Sikhim highland presents some interesting contrasts to this Bhutan foreground. The political frontier is far to the north, and there are "mountain" gardens, with two months of effective "winter"—*e.g.* temperatures little above 40° F. and not half an inch of rain—and only four months with more than 8 inches of rain; and here the duration and the vigour of the "flushing" are so much restricted that, though the quality is very fine (cf. that of the Dehra Dun and the Kangra gardens), the yield is only half that 7000 feet lower in Jalpaiguri. There are, however, some special advantages in conditions of transport and labour throughout the

[1] East of a straight line from Sadiya through Sylhet to the Bay of Bengal the important areas seem to have *c.* 4" even in December–January.

district. The gardens are much smaller than those in Assam (300–400 acres), and yet the population is much denser; and the railway transport, from Siliguri *via* Jalpaiguri and from Buxa *via* Cooch Behar, is much better. Owing to the height and the steepness of the mountains, the gardens below 1000 feet here have as heavy a rainfall as those above 6000, and the quality of their tea is equal to that of Upper Assam and Cachar, though the yield is less; and even here the eastern gardens come within that 20″ rainfall line for the "four fatal dry months." Except for Ceylon, the only serious competitor with India is Java, and it can compete only in inferior qualities of tea. The abundance of humus and nitrogen gives a large leafage, and there is abundance of good labour for the continuous picking; but the gardens are small and localised, *i.e.* relatively expensive to work, and so deficient in available potash and phosphoric acid that they are again expensive to work, or produce inferior tea.

(3) *The Brahmaputra Delta*

While it seems necessary to think of this Calcutta province first as a great raiser of rice and oil-seeds for a dense population engaged in raising jute and tea as cash crops, several parts of the province have a marked individuality of their own, even if this is strictly and everywhere subsidiary to the great metropolis on which the whole complex is focussed.

Brahmaputra Valley.

The most individual is that farthest from Calcutta—the Brahmaputra valley in Assam, a narrow valley dominated as much by its mountain walls as by its central channel. Fortunately, the southern wall is not very high, the Shillong peak being under 6500 feet and the Japvo peak under 10,000; and, still more fortunately, the Cachar gap gives as easy access to the cyclones as to the railway—though earthquakes, landslides, etc., made the construction of the hill section very troublesome. But the northern wall is high and very abrupt, and flings innumerable torrents down into the great river, and these carry huge quantities of rank vegetable refuse to enrich the riverine lands.

The whole valley, roughly 500 miles long by 50 wide, lies in two distinct sections, divided by the Rengma, or Mikir, hills; the upper section lies S.W.–N.E., directly on the cyclonic track, and the lower lies due W.–E., in the lee of the Garo-Khasi hills and at the mercy of their seismic activities. In both the river is very wide, with many channels and constant changes of channel, and with innumerable islands—the 50-mile Majuli made up entirely of the Sibsagar silt. In both sections, too, there is a useless belt of jungled marsh on each bank, so that the solid flats available for rice-growing are very limited in width, and the population on them is correspondingly scanty.

Sadiya. The upper section is much the more important, mainly because of direct exposure to the cyclones, but also because of its rocks and its soils, its levels and its waterways. It contains a much larger area of land above 500 feet, especially in the extreme north-east; and here, too, its waters are definitely collected in the three great head-streams which converge on Sadiya (*c.* 400 feet) by routes that make that town a market for "Tibetan" products, *e.g.* musk, with rail across the Luhit, at Talap. The usual terminus for the Flotilla, however, is Dibrugarh, which is—characteristically—not on the Brahmaputra, but four miles up the Dibru.

Sibsagar. Sibsagar, with a typical 94″ of rain, is in the centre of the river-flank of the Naga gardens, and is a great tea-market, partly because it is one of the few good food districts, being on the western margin

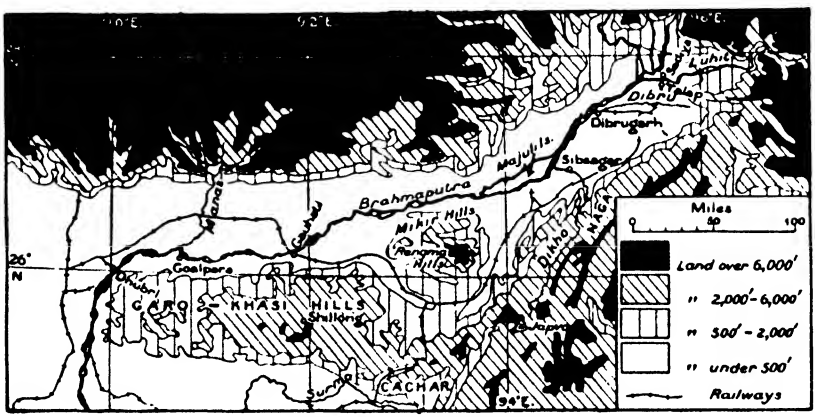

FIG. 89.—Brahmaputra Valley.

of one of the finest belts of "rice" soil in India. Again, the town is not on the Brahmaputra, but about nine miles up the Dikho.

Gauhati. The lower section of the valley is not nearly so important, but interesting as bringing us again into a typical Indian "atmosphere." Gauhati is at the point where the river comes nearest to the Khasi hills, and was chosen as the right point for the railway to cross the river; but the hills blanket the town so much that it is very unhealthy—humid and windless, only 370 feet above sea-level and with a rainfall of less than 70 inches. But it became the largest town in the valley because it has a double sanctity—by land and by water; the island of Umananda is sacred, and so is the Kanakhya hill!

Goalpara. Goalpara takes us from the religious to the political—a fortress and a river mouth. Half a dozen roaring torrents from the Bhutan Himalayas join the Manas, itself navigable to the frontier, and deploy opposite an island-guarded hill on the opposite bank; and the Moslems considered this the easiest place to block the valley, and

built a frontier fortress here. The available area for rice and oil-seeds (mainly mustard) is considerable, and even jute and rubber are grown; but, once the political danger was passed, all commercial importance moved to the great bend on the Brahmaputra, where the western railway reaches it at Dhubri.

Timber

In this Brahmaputra valley, however, there is another product besides the tea that is of serious importance, and that is timber, especially sal. The valley is flanked by dense forests, still producing quantities of ivory and horn (elephant and rhinoceros); in fact, this is the largest area of virgin forest in the whole of India (excluding Burma), and the Government reward for tigers is far from encouraging industry. Indeed, the easy life and the indolence of the Assam peasant—who is not a Bengali—have greatly exaggerated the labour problem. It is, perhaps, significant that two-thirds of the whole cultivated land of Assam is under rice; and it is equally significant that two-thirds of the total trade is done with *Calcutta*, rather more than 90 p.c. of the inward and rather less than 90 p.c. of the outward trade being done by the Flotilla steamers.

Surma-Chittagong Line.

The Surma valley gives us almost a repetition of the conditions in the Upper Brahmaputra valley except in this one respect, for rather more than half of both the import and the export trade is done by rail—largely *via* Chittagong, not Calcutta. This, again, is mainly a climatic response, for neither tea nor jute is improved by the cross-delta journey. Of course, the damp heat does not injure the quality of the fibre, as it does that of the tea; but jute-freightage is by space and not by weight, and the bales are apt to swell. In the case of the tea, too, direct loading from rail to ship greatly diminishes the pilferage, which was very serious, and various other difficulties which raise insurance.

Chittagong.

Before the construction of the Assam railway there was no shipping of tea at Chittagong, still less were there any tea-gardens on the Chittagong hills; the main trade was in jute, brought by sailing brigs from Narayanganj. The railway gives Chittagong a slight further advantage, because both its branches from Lumding are metre gauge, and this means transhipment for the standard gauge to Calcutta. The Karnaphuli is navigable for *c.* 100 miles, and Chittagong has a busy river trade; and, being 11 miles up the river, the port is very safe, and was very important to the Portuguese in the sixteenth century. Now it has been badly neglected, and the cost of making it fit for large vessels will be heavy; but the suggestion to develop Akyab instead of Chittagong would involve the construction of an expensive coastal railway, and the climate is worse, especially for tea, the rainfall being very nearly double that of Chittagong, and that is *over 100 inches*.

"Surma" Towns.

Of the other centres only Dacca is really important. Sylhet is on ground just high enough to be quite free from flood, but it is not

free from earthquakes; and, though the Surma is navigable by quite large boats, the town itself is not easily accessible by river or rail. Shillong, at 5000 feet, is an unusually healthy hill-station, but much exposed to earthquakes. Silchar is at the head of navigation, with a heavy (120″) and well-distributed rainfall, so that it is an important tea-market; but it is most famous for its pony fair, for ponies bred in the Manipur [1] basin, the home of polo.

Dacca. Though Dacca is outside—just outside—the critical 20″ rainfall line for the "four fatal dry months," and has no effective rain in November–December, it has a total of 74″, and scarcely 50″ falls in June–September; the conditions are, therefore, very favourable to jute, and Dacca is the one large centre in the heart of the jute area. The ground is partly an iron-impregnated kankar, which is very stable, and partly a very rich alluvium, which is deeply flooded every year, and can grow very large harvests of rice; and, as the three great rivers provide here *ten* separate navigable waterways, the city became such an important commercial centre that the Moslems made it the capital of Bengal. The land, which was, like Dacca itself, safe from flood, grew good cotton; and the very high humidity and the hand-spinning combined to produce the famous muslin which was made out of *local* material. In the time of Jahangir a "sheet" (15 × 3 feet) weighed only 900 grains, and was worth £40; last century, when it was still made—though only "to order"—the finest weighed as much as 1600 grains, and was worth only £10. That is to say—though the old shell-carving is still carried on—the fine muslin is practically a thing of the past.

(4) *The Damodar Basin*

The Coalfield. The Damodar valley gives Calcutta an immediate relation to the most important mineral field in India, rich in both coal and iron and with the special advantage of their not being very far apart. The two principal fields are the Raniganj and the Jherria, the latter actually in Bihar; and originally all the coal went to Calcutta, some being sent round by sea from there to Bombay. The coals belong to the lower Gondwana, and give a high percentage of ash—much higher than the Makum coal of Assam; but there is a very large supply, and some of the seams are very thick (more than 100 feet). The best quality is the Karharbari (Giridih), a good steam coal, some of which cokes well; the field (8 square miles) is 200 miles from Calcutta. The Raniganj–Barakar field is much larger (500 square miles) and much nearer Calcutta (130 miles); and the Jherria field (400 square miles) is scarcely 20 miles west of the

[1] Manipur is also famous for the remarkable increase in stature (*c.* 5 inches) in the third generation of the Gurkha settlers.

Raniganj. The least accessible is the Karanpura field (500 square miles), at the very head of the Damodar valley; but the "new" route to Benares *via* Gaya follows the Damodar valley from Raniganj, and at Asansol junction joins the Madhupur (for Giridih) route to Patna and the Purulia route to Raipur.

And Iron.

This Purulia route is joined near to Kharsawan by a direct line from Calcutta *via* Midnapore up the Subarnarekha valley—the main line to Nagpur; and the Gondwana fringe here was found to be excessively rich in fine[1] hematite (*c.* 63 p.c. pure), especially in a hill-belt that runs south from Kalimati junction into the Singhbhum and the Mayurbhanj districts—nowhere more than 200 miles west of Calcutta and in the east not more than 120.

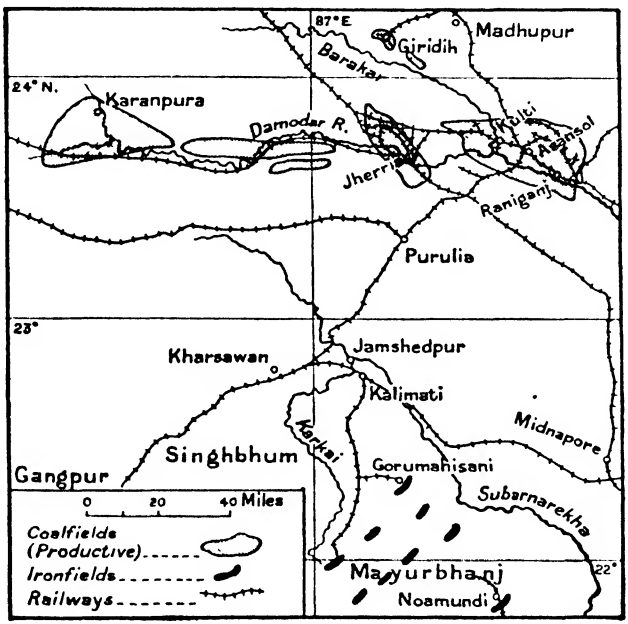

FIG 90.—Damodar Coalfield.

Other Materials.

But in this region are found also every essential for a modern iron and steel industry, *e.g.* iron and manganese ores, gas and coking coal, limestone and dolomite; even quartzite for lining Bessemer converters (acid) is found near Kalimati. The richest deposits of iron ore are round Gorumahisani and Noamundi, respectively about 40 and 80 miles south and south-east of Kalimati (and Jamshedpur); manganese is brought from the neighbouring Singhbhum and Gangpur districts; and limestone and dolomite are

[1] India has been famous for fine metal for centuries, *e.g.* supplies for the real *Damascus* blades; and there are still thousands of native (wood-fired) blast furnaces in the country.

quarried in the latter district. The Gondwana shales also supply fire-clay; and the perennial Subarnarekha and the Karkai guarantee the unfailing supplies of water that are needed for the production of steel. And all these essential materials are won by open working.

Pig-Iron and Steel.

The one relatively weak factor is the coal; but the Jherria field is within 120 miles, and India has certainly enough good coking-coal to provide all the steel required for many years to come. This Jherria coal gives a coke that leaves 20 p.c. of ash, which is very high; but that is not very serious when the ore is so rich, and the mechanical properties of the coke are good, while its sulphur content is quite low. The Jamshedpur works are actually 152 miles from Calcutta, 115 from Jherria, 38 from Gorumahisani, and 78 from Noamundi; they make their own coke; they are less than 50 miles from Mayurbhanj and not much over 100 from the Gangpur limestone and dolomite.

The Tata Iron and Steel Company is not the only one at work in the district, though they produce about 65 p.c. of the pig-iron and the mass of the steel made in India; the Khumardhubi Company makes steel on the Jherria field, and the Tinplate Company has its works in the Golmuri suburb of Jamshedpur. The Bengal Iron Company, while drawing its ore mainly from Noamundi over a 160-miles haul, has its works on the Raniganj field at Kulti, 142 miles from Calcutta; and the Indian Iron and Steel Company has its works 10 miles away at Asansol, drawing its ore also from Singhbhum.

Economic and Climatic Difficulties.

While the advance in this department during recent years has been phenomenal, the importance of an iron and steel industry in India must not be exaggerated. The demand for pig-iron on the mainland of Asia is very small, and depends practically on the demand for "home steel," for which some of the railways have their own little works, *e.g.* the Baroda Company at Ajmer and the East India Railway at Jamalpur; and ocean freights for finished steel from Britain to Karachi and Bombay are less than the local freights for ore or coal. More important still is the climatic control. The normal temperature in the furnace districts for at least a quarter of the year (April–June) is very high, often over 110° F. and at Jamshedpur itself sometimes over 120° F.; and the heat is often nearly as great in both March and October. The intervening months (July–September) are even more trying—with their very high humidity; and, as most of the workings are in recently cleared jungle, water and drainage, housing and hospitals, must be—and have been—supplied by the Companies. The cost of this has been, and must remain, very serious; for there is no skilled labour, no high standard of physique, no real "wish to be an engineer"; and so the men injure themselves, are constantly on the sick-list,

and leave their job from sheer inability to stand the work.[1] The number of men required, then, to ensure punctual fulfilment of orders is very great; and the cost of management—in spite of the Tata Technical Institute in Jamshedpur—is still very high.

(5) *The Mahanadi Delta*

The Mahanadi has built up the fourth of the great deltas, and its historic connexion with Bengal is as close as its geographical; indeed, the Chilka Lake has been one of the most stable frontiers in India, though it is a *fresh-water* "lake" only in the height of the wet season, while for the rest of the year it is merely a very shallow (6 feet) and salt lagoon, connected by a single opening with the Bay of Bengal. **Chilka Lake.**

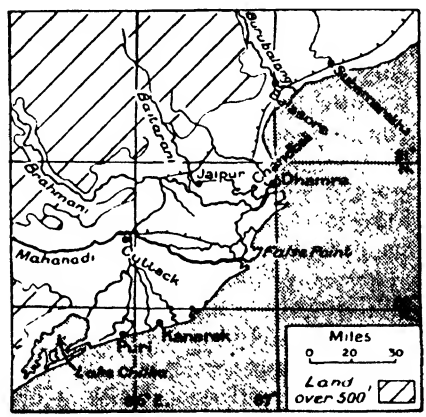

FIG. 91.—Mahanadi Delta.

More than 2000 years ago, under the rule of Asoka, the lake was the boundary between Kalinga and Odradesa; 500 years later it was just the same; in the seventh century Hsüan Tsang found it still the boundary—between Konyodha and Odra; and it was still playing an exactly similar part under the Cholas at the beginning of the eleventh century. A century later the Afghan empire ended to the north of Orissa; a century later, when that empire covered the whole of the rest of India except for the extreme north (Kashmir) and the extreme south (Madura) and Cutch in the far west, Orissa here in the far east was also independent, and based on the Chilka lake. When Gondwana held all the hinterland here, and the coast was divided—first between Telingana and Orissa, and then between Golconda and Orissa—the Chilka lake was still the boundary. It became the south-eastern boundary of the Moghul Empire in 1605; when the Mahratta Confederacy spread to the coast, and included Orissa, the lake was their south-eastern boundary and the north-eastern limit of French influence; and, when the Circars became British, they still found their frontier on the lake.

Behind this extraordinary persistence of influence there has been the strongest of all appeals in India, the appeal of sanctity. **Sanctity.**

[1] Dr. Mukhtar's return for the Jamshedpur works is "270 men discharged every month for absence without leave."

Elsewhere rivers and sites are sacred, but here the whole land is sacred, with its trinity of streams—Mahanadi, Brahmani, and Baitarani—and its "bitter-sweet" lake. The Brahmani and the Baitarani—the latter very sacred to Siva—are not tributaries of the Mahanadi ("The Great River"), but form the fine estuary[1] of Dhamra; and they converge at Jaipur ("The City of Sacrifice"). The land contains, too, in the (hewn) caves of early Buddhism the oldest relics of Indian architecture, and had been Buddhist for 1000 years or so before, towards the end of the fifth century, the Levi dynasty covered the south bank of the Baitarani with shrines to Siva; in the twelfth century, at the opposite end of the land, round Puri, a new dynasty replaced the worship of the Destroyer by that of the Preserver, Vishnu, Jaggernath ("Lord of the World"); and later the land was Afghan, Moghul, and then Mahratta.

"Great River."

But, though the estuary is so fine, the Great River deserves its name; for the old impervious rock of its basin allows it to collect water so rapidly that its maximum discharge down the 40-mile gorge through the Eastern Ghats is greater than that of any other Indian river—with a volume 1300 times the normal! No doubt this 40-mile gorge played a large part in isolating the coast-land from the hinterland, as the 40-mile lagoon isolated the Bengal part of the coast from the Madras part; and an equally important part was probably played by the dense jungle to the north and the dangerous sea to the east, while the land was ravaged by flood and drought alternately, and the lake itself was for ever changing in size and salinity.

Fishing.

At the same time it made a base for an ancient sea-folk (p. 414), and Puri is still one of the chief fishing-ports in India, though much of this east-coast fishing is done by west-coast boats, especially from Ratnagiri and Rajapur, and the chief fish-markets of Madras are Mangalore and Cannanore (see p. 490).

Puri Pivot.

With such a geographical and historical background, Puri was an appropriate home for an attempt to bridge the gulf between Buddhism and Brahmanism, rather as the Sikhs tried to bridge that between Islam and Brahmanism at the opposite end of the great plain. But the dry plain of Amritsar had the snow and ice of the Himalayas behind it; here there was only an impervious old block, devoid not only of snow and ice, but even of a deep and tenacious soil that might have stored water. So the furious flood was in olden days largely wasted—when not dreadfully destructive, —and was often followed by famine. Now, a double canal system, which has been a hopelessly uneconomic undertaking, stores surplus flood for irrigation, and gives continuous navigation between Cuttack and Calcutta.

In two respects Puri (the Charitra of Hsüan Tsang's age) had

[1] The bar is very dangerous, and there are very bad storms.

more chance than Amritsar of success as a mediator, for the sun-temple at Kanarak suggests that to its series of pure Brahmanism, Buddhism, Hinduism, was added a link with the religions of the desert and the dry plateau; and, so far from the "Juggernaut Car" procession being a scene of merciless sacrifice of human lives, a single drop of blood from some hysterical suicide defiled the ceremony, and made it ineffectual!

Cuttack.

Apart from Puri only Cuttack and Balasore are of any great importance. Cuttack, though actually on the Mahanadi—with its "100" miles of navigation up to Sambalpur, and chosen by the early Hindu rulers as the site of a great fortress—commands all the three rivers and their roadsteads, the best anchorage being behind the False Point islands. The old rulers protected the fortress from the river floods by a long embankment made of enormous blocks of hewn stone, and this is now the natural centre of the whole canal system. Between its forested hills (2500 feet) and the (10–20 miles wide) belt of Sundarbans there is a very fertile rice-growing plain, with a rainfall of nearly 60 inches; and the town is at once the military key to the hill territory behind it and the commercial key to the canal system in front of it.

Balasore.

Balasore was probably the most important of all the commercial centres in the early days of the East India Company, with a fine harbour in a strategic paradise. Though only 6 miles from the ocean, it is 16 miles up the Burabalang river, and the coast-land is a line of sterile sand-dunes (not more than 80 feet high), behind which there used to be a very productive salt-industry. The old riverine marsh-lands (*patis*, "cups") produced famous crops of rice; and, with the neighbouring English settlement at Pippli commanding the Subarnarekha valley (cf. p. 431), the position was extraordinarily good for trade with Bengal. The town, like Dhamra and Chandbali, does a large coasting trade, and is a regular exporter of rice, *e.g.* to Ceylon and Mauritius; but it has always been exposed to cyclones, and these were so bad during the eighteenth century that a very dangerous bar was formed in the river. This can be waded across easily at low water, and the rice-boats lie out in the open roadstead.

For References to all the "Indian" chapters see p. 748.

INDIA—V

CHAPTER XXVI

PENINSULAR INDIA—I

ALL of India that does not belong to the mountain border or to the continental plain, is largely of peninsular form and plateau character, and it lies almost wholly within the tropics; and it should show, therefore, certain differences of climate as well as of structure and relief, but there is much more unity in climatic than in the other respects.

The Old Block. The nucleus of the area is a triangular block of very old rock that occupies the greater part of the peninsula—from the Ajantas to the Nilgiris; it has typically plateau relief, but is tilted up to the west, like the Arabian block; and its upturned edge in the west makes a steep buttress in the Western Ghats, while in the east it is naturally much less marked. The hard old rock is probably rich in metal, but certainly infertile, and sheds rain very quickly; the sloping plateau aids the quick run-off from all impervious crystalline rocks, but allows of quick evaporation and quick run-through where there are any porous and horizontal sedimentary rocks. And, as the pronounced tilt is up towards the west, and as the Wet Monsoon blows from the west, the Western Ghats have maximum rainfall (*c.* 300″), and drainage is conspicuously eastward.

Its Flanks. But on every side this old block is flanked by belts which, though closely related to it—in different ways, are all more correctly described as peninsular than the block itself. East and west there are coastal lowlands—very narrow and rough and wet in the west, but much wider and smoother and drier on the east; north and south there are plateau forms—the northern having much affinity with the continental plain, and the southern having much affinity with Ceylon. If both the lowlands grow rice, the western rather specialises in palms and spice, while the eastern rather specialises in sugar and tobacco; and, if the northern and the southern annexes are very similar in relief, they are definitely dissimilar in climate.

In structure and relief there is much affinity between the northern, or Malwa, plateau and the central block, or Dekkan, especially as both have large areas of their old rock covered with a deep flow of lava; but there are very marked differences in their drainage systems. In the north the drainage is largely concentrated in long and narrow valleys, and works out westward; in the Dekkan it is widely distributed over broad and flat basins, and works out eastward. As a result, the westward valleys in the north, especially the remarkable Narbada-Son trough, give easy access inland for the Wet Monsoon, as seen conspicuously in the wide spread of forest **Drainage.**

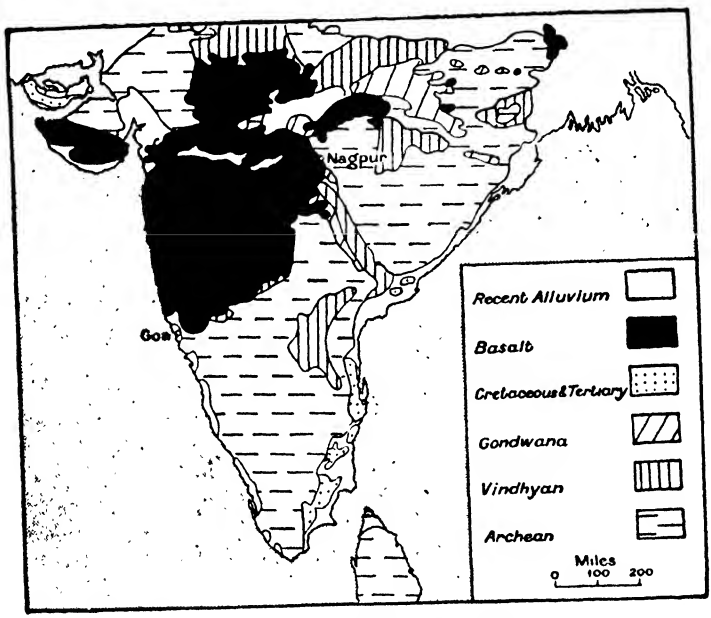

FIG. 92.—Simple Geology of the Dekkan.

along the line of the Satpuras and their supports in the Vindhyas and the Ajantas; to the south the Dekkan valleys are robbed of rain by the sierra-like line of the Western Ghats, which are not only very near the ocean (cf. p. 359), but also reach 4700 feet in Mahabaleshwar [1] above the Bhor Ghat, 6200 in Kudremukh above its summer retreat for Malabar officials, and 6300 in Mulainagiri, where the hill-station is on the neighbouring Kalbatti.

In the applied geography of the peninsula, alike from historic, political, and economic standpoints, three features have been of special importance. One is the great lava flow, which spreads north-westwards of a line from Goa to Nagpur, and overflows into **Three Features.**

[1] The rainfall is about 300 inches (the station having 292").

the Kathiawar and the Cutch peninsulas; the second is the narrow (20 miles) and low (*c.* 1000 feet) Pal-Ghat gap, on which both the Nilgiris ("The Blue Mountains") and the Anaimalais ("The Elephant Mountains") look down from heights of just under and just over 8800 feet (Anaimudi = 8850 and Dodabetta = 8760); the third is the remarkable Narbada-Son trough, with the parallel lines of the Vindhya-Kaimur and the Satpura-Maikal scarps.

Core of India. This particular belt, as really transitional and as containing the real core of India, needs some detailed attention before we can attempt to analyse the peninsula into natural regions; and, as the real core, it may be related first to India as a whole, and then to the well-named Central Provinces, which may some day provide a United States of India with an appropriate site for a capital in Jubbulpore. "It is perhaps the most important railway station in India" (Chisholm, 1895).

The Great Divide. The critical divide between the deep-soiled plain and the hard rock of the plateau is the Satpura-Mahadeo-Maikal line, the natural divide between the Narbada-Son and the Tapti-Mahanadi, and the historic divide between Indo-Aryans and Dravidians, thanks partly to the Thar desert,—partly to the triple wall of Vindhyas, Satpuras, and Ajantas,—and partly to the direct invitation to movement east-and-west not only by the Narbada and the Son, but also by the Banas and the Sabarmati, the Mahi and the Chambal. The Khandwa gap allows the Tapti to give the same invitation. It is of special importance, too, that north of the Vindhyas and south of the Ajantas this belt drains eastward—north-eastward to the holy city of Benares and south-eastward to the holy land of Orissa, while between them it drains westward to the lava and the ocean. The rivers here have no snow or rain to guarantee unfailing, even if variable, supplies of water, nor have they easy plains to irrigate, still less to supply with transport; and the supply varies far more than that from melting snow, while the horizontal flows in the dry climate have been deeply dissected by the rivers, and thus more completely drained of water. It is no compensation that much of the land is unsuited for irrigation.

Physical Focus. The physical focus here is the Maikal watershed—east of the lava shield. Though Amarkantak scarcely reaches 3500 feet, it crowns the most central watershed in India, feeding the Narbada and the Mahanadi directly and the Ganges and the Godavari through the Son and the Wainganga; and its old crystalline rock sheds water much more quickly than the lava of the Mahadeo district. The centrality even reminds us how the Central Provinces, in a vague way, recall the shape of India, with their northern oblong and its east-and-west feature lines, their southern triangle and its north-and-south lines, even its Saugor offshoot as a tiny

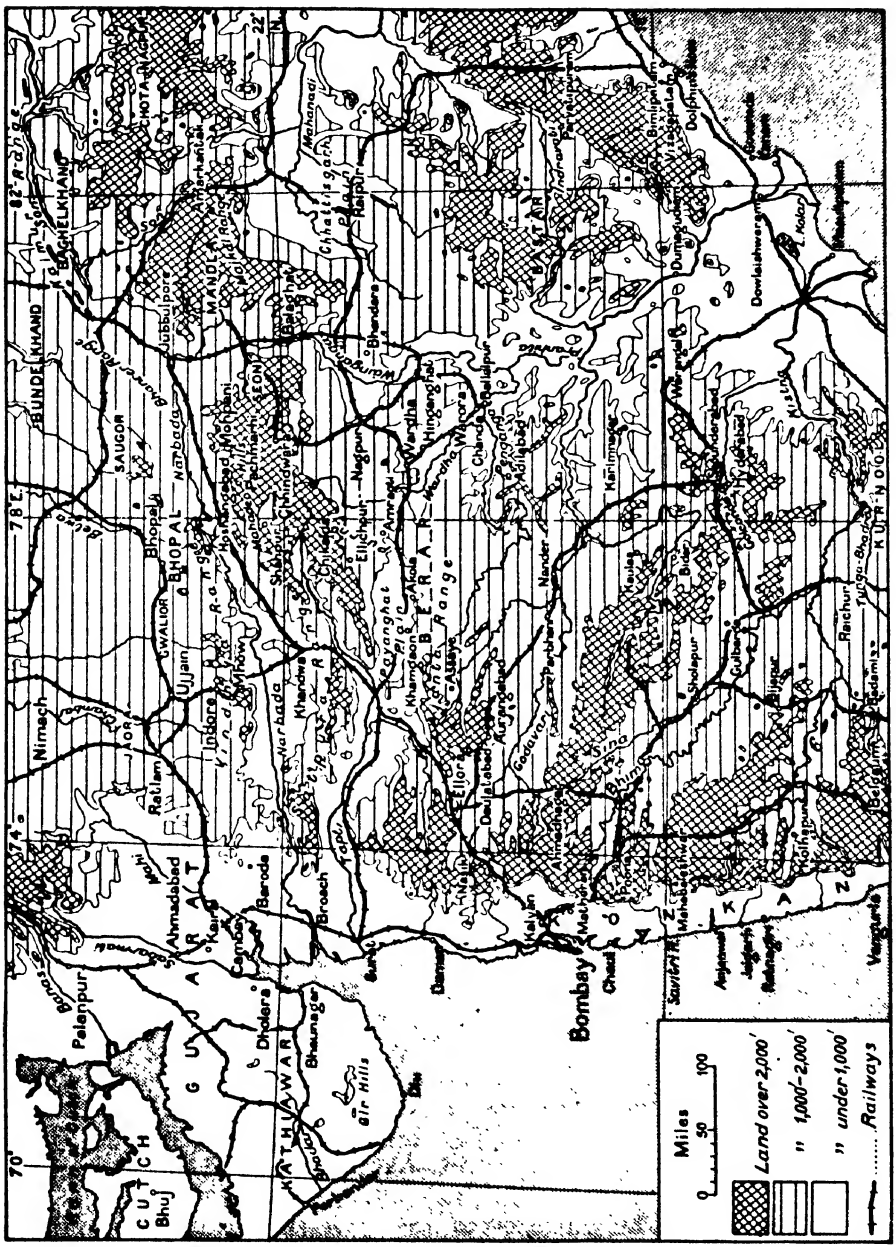

FIG. 93.—Relief of the Peninsula—Northern Half.

Kashmir and its Mardian hills for the Nilgiris. Except in November and December there is an effective rainfall in every month in the year; for the hills get the storms from the Bay of Bengal as well as the Wet Monsoon up the Narbada and Tapti valleys.

Political Focus. The political focus is the lava shield, as the historic home of the Mahrattas—a very remarkable people, whose character and genius have suffered from the fact that their history has been written by Moslem enemies. From the earliest historic times they had found a race-home here—on the lava, and in the seventh century their southern frontier reached the old Chalukya capital of Vatapi (Badami), near the southern limit of the lava! At the height of the Bahmini power (*c.* A.D. 1400), there was still an independent strip here, with access to the ports of Chaul and Dabul; and from this base (*c.* A.D. 1700) they occupied the Tapti and Narbada basins and then the country on to the right bank of the Chambal and Jumna, to the left bank of the Godavari, and to Orissa, the Wainganga and the Penganga becoming very significant "racial" barriers. But their permanent home was on the lava, and their sure retreat, *e.g.* from Aurangzeb, was in the recesses of the Ghats; and it was actually the Moghul successes against the Golconda and allied powers that proved fatal to that empire, and allowed the Mahrattas to rise to supremacy on its ruins. For Aurangzeb had accepted Sivaji's help, and rewarded it by allowing him to "own" the Konkan; and only internal disunity prevented the Mahrattas from holding India at their mercy, for their homeland was profoundly fertile, a natural fortress, and in a very vital position, from which in 1795 they held the mass of India—over 15 degrees of latitude (15°–30° N.) and fully 15 degrees of longitude (70°–85° E.).

Human Note. The human note here is of immense importance, but cannot be divorced from the geographical. If the Rajput was "the most worthy antagonist," the Mahratta—who claimed to be a Rajput—was "the most formidable enemy"; and Shahji Bhonsla's son, Sivaji, formed his "national party"—against the Moslems of both Hindustan and the Dekkan—out of the Hindu highlanders who held the wedge between the two hostile groups of Moslems, and whose homes centred round a number of impregnable hill-forts,[1] while their mobility was assured by sea and land. Their Brahman leaders, who have always been men of great ability, came from the Konkan coast; and their Sudra peasantry were small and wiry men who bred one of the hardiest types of pony that the world has ever seen,—man and beast making the raw material of the famous "Deccan Horse."

Commercial Focus. If the Maikal heights are the great river focus, and the Malwa lava has been the political focus, Gujarat has certainly been the

[1] Sir R. Temple gave some remarkable illustrations of these in the *Geographical Journal* for 1882.

commercial focus. Even in relief it is more or less a distinct unit, including all land below 1500 feet south of the Aravallis, west of the Vindhyas and north of the Western Ghats; and historically and economically it has obvious claims to recognition, if only because Gujarati, as the Parsi tongue, practically controls the Bombay press, while Bombay "city" uses it as its commercial medium. This is almost a comment on the "transitional" position and character of the area, as already noticed (p. 438).

Regional Units:—Transitional

Central India.

The group of Native States known as the Central India Agency, though it does not include the two most famous of the earlier Mahratta centres, Poona and Nagpur, includes in the Holkar and the Sindhia territories nearly all that is typical of Mahratta country; and the Agency capital of Indore has owed much of its influence to its command of the Khandwa gap and the fact that it is half-way both between Nagpur and Baroda and between Gwalior and Poona.

Physical Details.

We may ignore the Bundelkhand and Baghelkhand lowlands, which belong entirely to the Ganges plain, and confine our attention to the lands west of the Betwa (78° E.); and here the three important features are the Malwa plateau, the Vindhyas, and the Narbada valley. The plateau is a flat "terraced" land rising from 1500 to 2500 feet, but mainly between 1500 and 1700, with "valleys" denuded by rain and rivers; its base is the Vindhyan sandstone or shale, but the mass is covered with the lava, which is found as far north-west as Nimach (1600 feet) and as far south-east as Hoshangabad—down in the Narbada valley. The river flows mainly down a trough in the Vindhya sandstone, but towards the west both the trough and its Satpura flank are covered with lava; and in the dry climate the river has cut down through the horizontal sandstone so that the whole course—like that of the Tapti between the Satpuras and the Ajantas—is a succession of narrow and deep gorges which might almost be called a cañon.

Gwalior.

Gwalior is much the largest State, but is compact only in what may be called the Sindh basin; it has a long stretch of rather densely peopled lowland along the Chambal, where there is a fairly assured rainfall of about 30 inches, but its more effective rainfall—though 2 or 3 inches *less*—is in the detached parts of the State that are up on the Malwa plateau, where the black volcanic soil is very economical of water as well as immensely fertile. Nothing could be more typical of Mahratta history than these scattered and incoherent elements of the State, and we have the same phenomenon in Indore; and the hill-fortresses are equally typical, the Gwalior rock standing nearly 350 feet above the city. It is significant, too,

that so many of the old State capitals are to-day important railway junctions, *e.g.* Ratlam, Ujjain, and Bhopal, while others are marked by large military stations, such as Mhow.

Ujjain. Ujjain is one of the Seven Sacred Cities of Hinduism; under Akbar it was the capital of the old Malwa State, and it was afterwards a capital of Sindhia; it is a bit of Gwalior *in what is naturally Indore*. But its special interest is that the old Hindu geographers —who seem to have thought that it was literally on the Tropic, though it is really 23·9° N. (75·43° E.)—took it to mark the prime meridian of India.

Bhopal. From one point of view, Bhopal, like Jaora, may seem to be out of place in a Mahratta "confederacy"; but both really strike an appropriate note. For in their age-long struggle with the Mahrattas, the Moslem emperors were alert to imitate their enemy and seize natural fortress-hills on their flank, such as the Fatehgarh hill at Bhopal; and the fighting adventurers of the north-west, tired of fighting the soft Bengalis and disgusted with the growing degeneration of their rulers, were delighted to offer their swords to the inspiring Mahratta leaders, like the founders of Jaora.

Vindhyan Belt. While the whole "Vindhyan" belt has been primarily a transition area, it has tended to include the Cutch-Kathiawar peninsula, and to have a very definite frontier on the Narbada. Though the basalt is usually shown as including only the southern half of Kathiawar, the main watershed of Cutch—and, for more than half its length, the actual water-parting—is the "trap" of the Gavia, Chitrana, and Dera hills; and the surface layers of Cambay are very recent alluvium. In the time of Alexander the Rann was an open bay, giving immediate access inland south of the Aravallis, as it made an Arab highway in A.D. 712; and later Turan "satraps," Yavanas (Greeks), and Pallavas (Parthians) were dominant all over the belt—in Cutch, Kathiawar (Saurashtra), Gujarat, and Malwa. But the Narbada remained continuously a frontier—for the great Dravidian Kingdom of Andra, the Gupta Empire, the empires of the White Huns and of Harsha and—for some time—of the Afghans. There was always a tendency to unity east-and-west—though this did not extend to the Orissa coast (cf. p. 433), and the Garkwar possessions go much farther west than Baroda; but there was a divide between north and south.

Cutch-Kathiawar. The title includes Cutch (? *Kach*, "Sea-Coast") and Kathiawar, which illustrate the same point. Thus, the hills that run across Cutch from east to west, carved by earthquakes and blown sand (in both seasons) into weird shapes, separate a belt of desert sand from one of "Dekkan" lava; and the Gir hills in Kathiawar almost do the same. Both areas are often described as "almost rainless"; but the range above Bhuj—with its fortress-hill rising to 500 feet above the town—is well wooded (p. 112), and the Gir

range—rising to a sacred granite peak of 3500 feet—is actually forested, while the Bhadar valley to the north-west grows wheat over a fertile belt of 100 miles, even if the peninsula is better known for its Bhaunagar salt and its " adhesive " Porbandar limestone.

Gujarat.

Gujarat proper, and the Native States within it, can show the same transition from the desert to the sown ; but, again, the natural cover seems to throw either doubt on the statistics of rainfall or light on the use which plants can adapt themselves to make of a given rainfall. Statistical reports, *e.g.* the General Report of the Census and the Statistical Atlas of Bombay, do not agree in their descriptions or in their interpretations. According to some the Gujarat rainfall " is not uncertain," and according to others " the liability to deficiency is serious." The rainfall in the upper half of the Banas valley is given as *c.* 25″, nearly 24″ falling in June–September; but the tiny ring of hills round Palanpur is wooded ! Ahmadabad has a rainfall of 37″ ; and, though it can no longer ship cotton from the old port of Dholera, the latter—long before the days of modern irrigation—gave its name to a type of cotton on the Liverpool market ! Of course, the cotton is grown on the black soil, but rice is grown on the Sabarmati alluvium ; and how did the plain get its old title of " the Garden of India " ? The 40″ isohyet runs fairly through the best land, and some parts have fully 50″, if not slightly more ; Surat, some 14 miles up the Tapti valley, has 42″—which, on the lava, is worth 60″.

Cambay Gulf.

It really seems possible that the whole area—north of the Konkan strip—has been discredited by the decay of its old ports, from Diu and Daman to Cambay. The latter has fared almost as badly as Dholera, and from the same cause—" this alien Bay of Fundy that we call the Gulf of Cambay," with its amazing tides and bores. The Gulf has even ruined itself, for it has silted up so rapidly that all its old importance, *e.g.* to the Arabs, has gone ; and Cambay (Ptolemy's *Camanes*) has gone with it, though it can still be reached on a 30-foot spring tide up the Mahi estuary.

The Portuguese centres, whether on islands or on the mainland, were less harbours than *fortresses*—first to give footholds against the " Moors," then to inspire respect in Native chiefs, then as toll-stations to support the trade monopoly ; but the island harbours were real harbours, *e.g.* Diu and Bombay, and Daman—the southern limit of Gujarat—was an important frontier post between the Moghul and the Mahratta lands.

Broach.

The objective of the " Moors " was the Narbada-Son trough, and that explains why Broach was so much older than Surat ; but, though the " safe " distance up the river (30 miles), the value of the high, firm bank, the fertility of its hinterland, and the importance of the great route, were all recognised, there were complaints—nearly 2000 years ago !—of the difficulty of approaching the harbour.

Small vessels can still reach it on the tide, and its name is still a label for cotton; but the town is no longer of any importance.

Surat. Surat, though it did not supersede Broach till the sixteenth century, was always a much better harbour, and for two centuries the most important commercial centre in India; for the Swally Roads were safe even for large ships during the winter, and small vessels could reach the town—14 miles upstream. But the banks of the river there are low and unfirm, and Broach—which had been so convenient to the Arabs in Sind—gave place to Surat mainly because the Europeans came to India round the Cape. Once Bombay was connected with the mainland, the day of Surat was past.

Ahmadabad. Ahmadabad stands next to the capital in the Bombay Presidency both for population and as an industrial centre; indeed, it is the headquarters of the Millowners' Association. Its natural advantages were that it sprang up in the very centre of the fertile lowland, at a natural crossing of the Sabarmati, so that it had a better position than the much older Kaira for collecting and distributing; and its easy access to fine stone (cf. p. 409) resulted in its being almost as well built a city as Agra, except for some clash of Moslem, Hindu, and Jain theories of architecture. The whole of the district, with the adjoining tracts of Baroda and Kathiawar, produce "Dholeras" cotton ($\frac{6}{8}$–$\frac{7}{8}$″) over considerably more than 200,000 acres; and Ahmadabad has 37 p.c. of all the mills in the Bombay Presidency.

Baroda. The historic importance of Baroda has been political, as one of the great Mahratta centres, distinguished specially by a very high standard of education; but this has been reflected in its economic development, *e.g.* its agriculture as applied to cotton. The whole area east of the Cambay gulf grows Broach cotton, with normally a staple of only $\frac{7}{8}$″; but in the Baroda territory it is quite common to find it 1″ on soil no better than that in the Broach and Surat districts and with maximum rain in July.

Regional Units:—Peninsular

16° N. The rest of Southern India is a single plateau unit, with—in winter—a typical tropical climate; but it seems desirable to divide it, along latitude 16° N., into two areas differentiated by configuration and climate, and then to subdivide these more particularly on a basis of climate or structure. South of 16° N. the unit becomes more truly peninsular, it has very marked relief, and its great Carnatic plain has been very much isolated historically from the rest of India. North of 16° N. the 200,000 square miles of the Dekkan lava are the dominant feature, but need to be related to the relief of the Western Ghats and to the eastward trend of the Golconda coast for 600 miles; and it is this eastward trend that is of

such importance to the crystalline dome of the " Indravati " forest as a race-home and as a watershed.

Konkan Coast.

The west coast, from Daman to Trivandrum, has enough unity of structure, relief, and even climate, to be considered a single region; but it is certainly helpful to subdivide it, especially with some attention to physical history and modifications of climate. It may be called a lowland, but not a plain ; it is all narrow, and all more or less rough. In front of the lava-capped Ghats, *i.e.* in the Konkan part, blocks of land often rise to 1000 feet, and sometimes to 1500—a feature, no doubt, reflected very directly in the very heavy rainfall; the Matheran hill behind Bombay is over 2000 feet, and has over 200″ of rain. The Konkan coast, too, is relatively firm and unbroken; and the "trap" cliffs behind it are in many places almost inaccessible, though the Mahrattas forced their way to points of great natural strength—which they then fortified !

Climate.

The whole of this region is hot and humid, Bombay having a total rainfall of *c.* 74″ and a midwinter temperature of *c.* 74° F., with a range of only 10° F. ; but the Konkan section has the advantage of having its rainfall concentrated, Bombay having 71″ in June–September, and yet with a larger total, the Tata engineers having recorded *540 inches in 90 days* in their catchment basin. This concentration throws light on the importance of such a typically "monsoon" product as the deciduous teak in the dense forests which clothe the highland belt—nearly a quarter of the whole area; but the forest here is too much mixed for really economic working, though the torrents are useful for floating the logs and providing power.

Lagoon Life.

Along the larger of these torrents, *e.g.* the Savitri (Bankot), the Shastri (Jaigarh), the Vashisti (Anjanwel), there are lowlands that may run for 40 or even 50 miles inland ; but in most parts the lowland is very narrow—not more than 5 miles, and even this is encroached on by the belt of sand-dunes blown up by the Wet Monsoon, and by the effect of the dunes—and the torrent *débris*—in preventing the flood water from working out to sea. The result is a belt—though less continuous—of lagoons, with alluvial fans along them ; and, as these provide ideal sites for rice and areca-nut (betel) palms, the population is very much denser than might be expected. It is more or less amphibious, composed of the descendants of the old Mahratta [1] pirates ; it supplies Bombay with Lascars for its huge shipping trade, and India with its best fishermen.

Ports.

The number of possible harbours here is very small, and those of most historic importance, *e.g.* Chaul and Vengurla, owed their importance more to access inland, *e.g.* to " Poona " and " Belgaum," than to their merits as harbours ; indeed, the pirates' preference for

[1] Their typical centres combined, as at Alibagh and Harnai, a mainland base with a fortified island (Kolaba and Suvarndrug or Janjira) in front of it. At Bankot the fortress-hill, on the south side of the Savitri river, is now crowned by Fort Victoria ; at Malvan the hill (Rajkot) is inside the town, but with sea on three sides.

Vengurla was partly due to the fact that—to ordinary sailors—it was, and still is, more or less inaccessible for 10 weeks during the height of the Wet Monsoon. Fishing-points[1] such as Ratnagiri were never important; but the immense power possibilities in the Shastri river here may make Jaigarh, if not Ratnagiri itself, important.

Goa. Historically, there has been only one really valuable harbour here,—that of Goa. Two navigable rivers, the Mandovi and the Inari, converge on a group of deltaic islands, and work out to sea between two headlands, the Aguadas and the Marmagoa, while there is easy access inland by the Kwissim Ghat. But several little ports became famous for their spice trade (pepper, cinnamon, etc.), *e.g.* Aguada and Tiracol; and one of them was Velha, or Old Goa, where Albuquerque built a new city, Panjim, or New Goa. It has a rainfall of 120", with a mean temperature well above 80° F.; and it has always been very unhealthy. But the differential erosion between the trap and the crystalline gave it from the first easy access to much of the area which Madras served, and now it is 1000 miles nearer than Madras to Aden, while large vessels can lie alongside railway wharfs; it is also as near to Aden as Bombay, and far enough from Bombay (250 miles) to be fairly free from the Bombay dominion and certainly to be a rival of Madras rather than Bombay. It has easy access to the military centres of Bellary and Belgaum, the Mysore coffee plantations, and the gold and manganese of Kolar, Shimoga, Ramarburg, etc.; and it still has a trade in spice and drugs, as well as in teak, the local manganese, and thousands of tons of "solar" salt—made in the estuary.

Bombay

Historic Development. Bombay is also one of a group of high-peaked islands (Ptolemy's Heptanesia, *Seven Isles*), inhabited 2000 years ago by Koli fishermen; but at first the British did not own the others, as the Portuguese owned all the Goa islands, and the chief port (Puri) was on the island of Elephanta. Here there was no navigable river, still less any easy route up the Ghats; and, later on, there was no coal or iron, as near Calcutta. For many years, then, the island was simply a collecting station for coasting traffic, with the one supreme advantage of having to the east of the island the only natural harbour in India that is safe in all weather, at all seasons, for vessels of all kinds and sizes, and in any number,—though it did not prove at all safe from Moghuls and Mahrattas by land, and Mahratta and Malabar pirates by sea. Even so it had to wait for its opportunity till it was connected by rail—*via* the Bhor Ghat (just over 2000 feet)—with the Dekkan "Black Cotton" soil, and this was completed in 1861, *i.e.* just in time for the city to profit enormously from the

[1] Fishing is relegated to the lowest caste. See p. 491.

Cotton Famine due to the Civil War in the United States. The end of the war promised, and to some extent produced, a collapse ; but again, just in time the Suez Canal was finished, and Bombay was the nearest British port in India to that except the immature Karachi. The replacement of sails by steam, too, was changing the "Cape Route" track across the Indian Ocean, and this, again, was in favour of Bombay.

Economic Advantages.

By the time that the city was provided—*via* Salsette island, the Bhor Ghat, the Thal Ghat, etc.—with railway links with the whole of India, it was realised that it was the nearest port of all to the true centre of India, and thus had a very large hinterland, such as justified very large expenditure on docks, etc. But in the meantime, nearness to the cotton lands and to cheap labour, easy import of cheap coal and machinery, and an atmosphere very favourable to cotton-spinning without being prohibitively unhealthy, had made it the most important centre of the cotton industry in Asia, turning out 75 p.c. of the yarn and 75 p.c. of the calico of India. The development of water-power from the Ghats further facilitated operations, not only in the cotton mills, but in the flour mills, for transport, etc.; the power-station at the great junction of Kalyan—a town of importance for 2000 years—operates both of the Ghat sections of the *G.I.P.* railway.

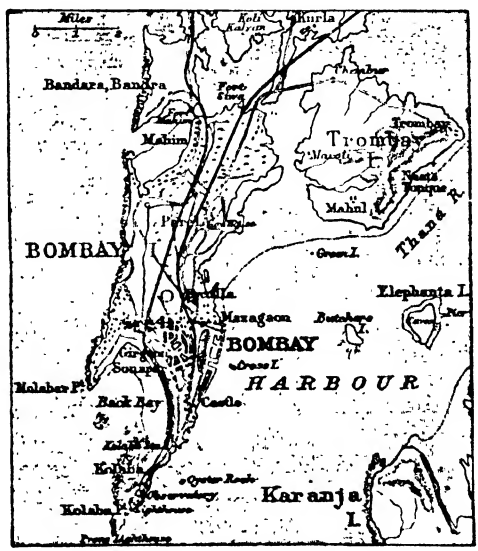

FIG. 94.—Site of Bombay.

Textile Market.

The total result has been remarkable. Before the War, Indian mills were already producing nine-tenths of all the yarns which were used in India, but only one-fourth of the cloth ; and the one-tenth of the yarns—the *finer* counts—came almost entirely from Lancashire, as the rest—the *finer*—of the cloth did. But the English share in the yarn-trade had fallen by 1931 from a pre-War 88 p.c. to 35 p.c., India producing nine-tenths of the *finer* yarns ; and the English share in the cloth-trade had fallen from a pre-War 97 p.c. to 59 p c. All the gain had not, however, gone to India. Japan, starting from a practical zero, had won over 30 p.c. in 20 years ; and the reason lay in the price. That has been, and will

be for ages still, the determining consideration on the Indian market; and Japan has concentrated on the mass production of standard (low-quality) cloths at very low prices. For the best qualities of yarns and cloths neither India nor Japan can approach Lancashire, but such goods cannot be placed on the Indian market —even in the absence of a high tariff—at competitive prices.

The "Good Bay."

Nature had, however, some further favours. For Bombay is on practically the only natural harbour in India where the tide—an average of 14 feet, with 17 on the highest spring tides—allows the existence of docks on the largest scale; and this unique advantage has led to over-emphasis on docks here, though with more excuse than at Calcutta. At the same time the port has been suffering from the lack of room which island-sites so often feel (cf. New York, Venice, etc.); and the alternative to more and more docks is obviously the construction of a huge deep-water railway-wharf—by works which would add a considerable area to the port.

The Island.

For the island is a hill-flanked valley, the central plain stretching for eleven miles almost due north and south, with a breadth of about three miles; and both lines of hills run out to sea southward, while the plain runs out landward (into Salsette) to the north. Though the south-eastern prong, with the city and the docks, runs out the farther, the south-western runs out for nearly three miles; and, between the two, Back Bay is a shallow and muddy basin. Modern dredgers could, without any difficulty, as Sir George Buchanan has suggested, cut a wide channel up the eastern strip of this basin, to make a deep-water railway-wharf, with direct access to the *G.I.P.*, the *Baroda*, and the *Central Indian* railways; and the material dredged up could be used to reclaim another strip of the basin farther west, which could presently be transformed into a second long line of wharfs.

Dredging.

This would, naturally, require more material than would be dredged up in the first instance; but both the main entrance to the port and the anchorage really need dredging, for the mean of the lowest spring tides leaves a depth of only 24 feet (22 to 26) a mile from the docks, while the mean of the highest neap tides leaves only 32 feet in the entrance channel. All this extra material could go to the reclamation work; and the result would be a great extension of accommodation at a cost much less than that needed for dock-extension. As a matter of fact, a large proportion of the Port Trust dockland is on land that was itself reclaimed.

Port.

In this connexion, too, we may notice two details. Though the total area of the island is only 22 square miles, it contains 75 of the 290 cotton mills in India; and so space is of unusual value everywhere, and the demands on it involve unusually lofty buildings. At the same time, though the port handles about one-third of all Indian imports and one-fourth of all the exports, its coasting trade

is actually larger than its foreign trade, engaging over 38,000 vessels for nearly 3,000,000 tons of cargo (against under 800 vessels for not much over 2,500,000 tons). And much light is thrown on old Arab and Portuguese activities by the fact that 36,000 out of the odd 38,200 coasters are sailing vessels, with their seasons and their tracks closely related to the monsoons.

Malabar Coast.

The primeval godparents of Malabar seem to have thought that the distinguishing feature of the belt was relief (*mala*, " mountains "); and, no doubt, that is its most obvious feature. But structure and climate are really the differentiating factors, and they work together very closely—on the same relief details as in the Konkan belt except for a series of laterite terraces. The strength of the northward current during the Wet Monsoon, the large westerly element in the wind, the height and the steepness of the Ghats, their rapid weathering in the great heat and high humidity, the slightly greater width of the lowland (up to 70 miles), all combine to accentuate three features—the height, width, and continuity of the coastal dunes,—the long belts of " cleaner " crystalline alluvium, which make an ideal soil for rice,—and the great difficulty in the way of the torrents finding a line to the sea. The belt is, therefore, essentially a lagoon land, with an almost continuous chain of lagoons, fringed everywhere by palms (coconut and areca-nut) and flanked by the " rice plains." Half the population of Travancore and more than half that of Cochin are found in this belt of land-fringed water and water-fringed land—the water dotted with a multitude of coconut-covered islands inside the marginal fringes of land, and the land intersected in every direction by a network of palm-shaded creeks. These lagoons were always a scene of busy life, and now are linked together by canals, so that they form a really important thoroughfare, associated with a local fishing industry and with the most important coconut trade in the world, its only drawback being the shortness—or, to the south, the practical absence—of any true dry season.

Products.

At the same time the climate is sufficiently monsoonal for the dense forests on the Ghats to include some of the very best Indian teak, while the rainfall and the humidity are sufficient to have encouraged the planting of rubber—an economic mistake, if " botanically " sound. The forest fringe produces a wealth of spice, especially pepper and cardamoms, and the Malabar ginger is famous ; but, again, the market for these is much smaller and less profitable than in the days before refrigeration. At the same time, for many years now, the large-scale production of coconut[1] products —of a quality that has set the standard for the world—has revived some of the economic importance of the old days, when the Malabar

[1] " That most excellent tree sacred to Janesha which conveys to man 360 blessings."

coast had practically a monopoly of both the pepper and the cardamom trades.

History. Historically, the most significant fact has been the political isolation of the area from India, and this was actually associated with remarkable commercial relations with Europe. Our earliest knowledge of the area shows it as an independent kingdom; when the "Cochin" part broke away, both units—Chera and Satiya—remained independent, even from the empire of Asoka. They traded with the Roman Empire, and with the Arabs; indeed, it was the Arab trade that brought in the fanatical Moplahs—to Calicut, Cannanore, etc.,—whose bodily and spiritual descendants have been causing so much trouble lately.

Anaimalais. Perhaps, the major influence in this political isolation was in the fact that the Anaimalais are a double barrier, the higher line causing the lower to have an excessive rainfall, which clothes the hills themselves and the intervening valleys with real *terai*—still haunted by the elephants that gave a name to the mountains, as the abundance of the spice gave a name to the Cardamom mountains. It is equally suggestive that the East India Company had a factory at Karwar specially concerned with the export of the fine Kanara muslin.

Karwar. No doubt the choice of Karwar, with its pirate-loved oyster islands, was due mainly to its value as a harbour; for the Kali estuary gives the only refuge between Cochin and Bombay that is really always and entirely safe. Like Goa, too, the town has very strong N.W. winds in the three dry months (February–April), which are so valuable to its salt industry. At the same time, neither the Kali valley, nor the neighbouring Sharavati—though the latter flows right through the Ghats from Mysore, to plunge down the Gersoppa falls (one of them 830 feet)—taps the Dekkan lava, and that decided the direction of the (Goa) railway, and the railway has ruined the trade of Karwar and Kumta.[1]

Mangalore and Tellicherri. Southern Kanara has suffered in much the same way, though more recently; its lowland is rather wider than that in Northern Kanara (± 10 miles), and it has quite a long dry season; for instance, Mangalore, with a range of only 7° (76° F. to 83° F.), has 126″ out of its total 131″ of rain in May–October. The Netravati estuary is tidal, and has good lagoon connexions; and so the port is a favourite with the Laccadive islanders for their coconut products, and has railway connexion with Calicut. But its old prosperity was associated with the palmy days of the Coorg and Mysore coffee industry, and large vessels have to lie 2 or 3 miles out.

The same is true of Tellicherri (specially a cinnamon and cardamom port), but here there is a natural breakwater, which

[1] The decay of the sandal-wood trade seems to have affected some of these towns, *e.g.* Kumta, more than the decay of the spice trade

allows work to go on when all the neighbouring ports are "closed"; and the rocky-spur is part of a fine hill promontory which makes the town on it one of the healthiest along the whole coast. The French settlement at Mahé has a similar advantage, but the bar at the mouth of the Mahé is rock, and admits only very small vessels.

Calicut.

Calicut, if slightly more interesting than Tellicherri—as the first point reached by the Portuguese,—is actually an inferior port, and is practically closed during the first three months of the Wet Monsoon; and, even when it is open, steamers have to lie three miles out, though Calicut actually claims to have a "wharf" on the Beypore river—seven miles away! But there was a magnificent bulwark in the background, the Nilgiris, and the Pal-Ghat gap was "one of the keys of India," the ascent being very easy and Pal-Ghat itself at a height of only 800 feet. Cochin was a Native State, too, and Calicut lay between Mahé and Trichinopoli; and in railway days the natural route from Coimbatore to the ocean kept to the right bank of the Ponnani.

Cochin and Travancore.

If the two Native States have been much isolated historically, the isolation has in no way kept them backward; indeed, it has rather acted in the opposite direction. For instance, it has preserved much of the original purity of Brahmanism, and still more of the original Tamil culture, dating back to days before Sanskrit intrusion had corrupted their speech into Malayalam; and the occupational control exercised by a wide sea-trade on a small population is still shown in the tracing of descent through the mother. For this shows maritime or "Malay" feeling, not continental or "Turanian"; so far from it implying any degradation of the women, it gives them special honour. Education generally, and specially the education of women, are at a higher standard here than anywhere else in India, if not in Asia. There is a flourishing coir industry along the whole of the Malabar coast, the workers being mainly women; but in Cochin and Travancore the spinning is done by machinery, not by hand, Anjengo giving its name to the finest grade of coir in the world. But the population must always have been small, and its males were scattered over the broad waters of the Ancient World. If Sayce's date of 3000 B.C. for the import of Malabar teak into Babylon has not been accepted, there is at least no doubt about the teak beams (called "cedar") in Nebuchadnezzar's temple; and, if the export trade was not both much larger and much more varied than the import, why are so many European coins found throughout the south-eastern quadrant of the peninsula, *e.g.* in the beryl mines of the Cauvery basin?

Their Trade.

Rice and coconuts are the two great products of the lowlands, teak and spice (especially cardamom) of the forested piedmont; but ginger and areca-nut are also of some importance on the low-

land, and tea and ground-nuts from the highland are likely to be of more importance, especially with the use of ground-nut seed from Senegal and Mozambique (with much higher oil-content). Cochin is the most important harbour now between Bombay and Colombo, and its trade is inferior in the Madras Presidency only to that of Madras itself and Tuticorin; and when the bar is completely removed, it will be a very fine harbour. At present, steamers have to lie out fully two miles; but cargo *can* be worked even when the port is practically closed—*i.e.* for 12 weeks from the end of May—under the shelter of the Maliapuram bank, and the lagoon navigation is wonderful. Kranganur (Kodungalur), the scene of the mythical mission of St. Thomas the Apostle, and Quilon (Marco Polo's Koilon) are both older ports, and the Native capital of Ernakulam is the right side of the lagoon for railway connexions; but the growth of the Native twin-town of Mattancheri beside the British port shows the overwhelming importance of the coconut products. As the trade in these is very small in June–August, the "closing" of the port is immaterial.

Alleppi. Alleppi has also a sheltering bank, but it is the backwater navigation—improved by canals—that has made it the premier port of Travancore; and even the railway through the Shencottah Gap has not diverted trade to Quilon at the expense of Alleppi, for the two are connected by backwater navigation, and the Tangasseri reef seems to be more dangerous than it used to be. Trivandrum, though actually built on the coast hills, has not a regular port, but is linked by canal with the whole backwater system of the State.

The safety behind these sheltering "banks," *e.g.* off Alleppi, deserves more attention and less ridicule than it has received. There is no question about the mouths of all these lagoons being more or less "blocked" at the height of the Wet Monsoon, when torrents are pouring down from a hinterland watershed that exceeds a maximum of 8000 feet; and there is, equally, no doubt about the rise and the spread of the lagoon, *e.g.* along the (12 × 1 mile) Cochin finger. Even if this is not responsible for the broad film of oil out at sea, which is said to be the main protection for the shipping, the oil problem seems to merit investigation.

INDIA—VI

CHAPTER XXVII

PENINSULAR INDIA—II

Asiatic Relief.

To go from the west coast to the western plateau is to make a change of environment that is essentially typical of Asia, for the Ghats have one foot up on the plateau and the other practically at sea-level; and from the plateau they look un-Alpine, uninspiring, even unimpressive. There are no great contrasts of relief, no prodigious rainfall, no luxuriant vegetation. The higher crests in the south have more variety, but only of the "down" type, and the plateau there is also high; and so they look just what they are—the upturned edge of the old block. In the north the scenic effect is further impaired by the flat sheets of lava, which would give a flat impression to any relief.

Climate.

The climatic change is almost as great. Utakamund is certainly rather in a bowl, but it is at a height of over 7200 feet, and its mean temperature even for May is below 60° F.; and yet its rainfall is not much above 45″. Poona, at 1850 feet, has not 30″; Belgaum, at 2550 feet, and with a very steady total, still does not reach 50″; and within 30 miles of the crest of the Ghats practically no place has 30″. The height, the latitude, the narrowing of the peninsula to the south (S. of 16° N.) increase the total, lengthen the rainy season, and maintain a higher humidity; but the natural cover even here is scrub or poor grassland, and the Madras Dekkan is less valuable than the Bombay Dekkan.

"Black Soil."

The key to the apparent contradiction is in the lava shield, and specially in those parts of it which have weathered into the "Black Cotton Soil," very rich in lime and loadstone, very fertile, and very tenacious of water; it is, therefore, admirably suited to plants which do not need irrigation, and 60 p.c. of the grain area throughout the lava country is under millets. Unfortunately, there is always the risk of a furious downpour and of a stark drought; and the light is very bright. These conditions are very

unfavourable to exotics of any kind—which also suffer greatly from insects,—and they have aided and abetted the poor farming in reducing both the quantity and the quality of the native cottons.

At the same time raw cotton generally accounts for 33 p.c. of the total value of Indian raw materials exported, and for more than 40 p.c. of the total exports from the Bombay Presidency, which has much the largest area under cotton (30 p.c. of the Indian total), even if it is slightly behind Berar (and the Central Provinces) in yield; and this lava sheet is much the most important producer, with its main area related to slight differences of relief and climate, and its limits are important because they separate the irrigated [1] from the unirrigated.

Indian Cotton. And this Indian cotton is of growing importance, for fluctuations in yield have recently varied inversely with those of the American crop. India is, of course, the only really large and old-established producer of cotton in the Empire; its yield has become very much steadier recently, with minima raised from *c.* 60 lb. an acre to *c.* 80; about 40 p.c. of the total comes well up to the standard of the ordinary American varieties—partly, perhaps, because these have diminished in quality as well as in yield, especially in Texas, so that a large proportion of the U.S.A. crop is not better [2] than the best Indian varieties. The real trouble is in the Indian textile industry—in the gap between the price of the raw fibre and that of the manufactured fabric, which is usually quite 30 p.c. above parity.

Berar. In the north the deep valley of the Tapti and the valley of its Purna tributary are of special importance, from Amraoti to Surat. In the Berar section, with millet as the food staple, cotton and oil-seeds make the great cash crops; and the cotton yield is exceptionally good, well over one bale being picked from four acres, as against about five in Bombay. Much of the land is only some 900 feet above sea-level (Akola = 930), and the normal rainfall is slightly above 30 inches. The Khandesh cotton in the Tapti valley has similar general conditions, but is all grown at a lower level (below 600 feet) and in a higher humidity; and in the extreme west the rainfall rises above 40 inches.

North of Poona the Ghats do not reach 3000 feet, and access inland for the monsoon is facilitated by the low level. One of the main areas here, the Nasik, lies directly beyond the inner mouth of the Thal Ghat; and the second, the Ahmadnagar, stands at a height of above 2100 feet on the ridged water-parting between the

[1] They are also very interesting because they separate quite obviously a Mahratta from a purely Dravidian peasantry.

[2] The best way of avoiding trouble from boll-weevil is to plant early-maturing varieties, but practically all of these have short staple.

Godavari and the Bhima. The third is, like the Akola area, in a low basin—round the confluence of the Bhima and the Sina on the margin of the Akalkot lava between Sholapur and Bijapur.

Poona. Much the largest and most important centre in this Bombay Dekkan is Poona, but simply for its relations to the Bhor Ghat. It is at a height of 1850 feet, east of the summit (over 2000 feet), and with the Ghat crest to the south-west well over 3000.[1] It is sufficiently continental to have its minimum temperature in December, with a mean *below* 69° F., and its maximum in April, with a mean *below* 84° F.; and, with such conditions and such easy access to Bombay, it has become merely an annex of the great port. It never had any economic importance, but always much political importance—no doubt, as commanding much the easiest line of movement between the coastal and the continental Mahrattas, and it was the home of Sivaji.

Other Cotton Areas. Two other areas are of special interest. In the highland of the Bombay Carnatic, especially between Belgaum and Hubli (but spreading along the Ghats to Kolhapur), where the Wet Monsoon has easy access by the Londa gap, American Dharwar and Kumpta[2] Dharwar cottons are grown over an area of 1,500,000 acres. The other is really an annex of the Berar district, but is in the Godavari basin in the Nagpur, Wardha, Hinganghat district; and, once the lava is left and irrigation comes in, Chanda actually grows cotton as a "cold"-weather crop! The Wardha valley is the special centre, and Wardha town is on the main line to Bombay; and Warora produces excellent coal both for the railway and for the cotton industry—for which Wardha and Hinganghat have long been famous. (See diagram on p. 477.)

Central Provinces

The first and the last of these groups form the most important part of the Central Provinces (and Berar); but, as the real core-land of India—with Jubbulpore practically on both the central meridian and the central parallel of the country—the area requires attention as a whole, with special reference to both physical and economic geography. And this is all the more necessary because the area is still largely a wild tract of forested hills, with a sparse population—predominantly Hindu Dravidians, but with the mixture of tongues and types that may be expected in a central district, *e.g.* at least four tongues—Hindi, Marathi, Gondi, and Oriya, many of the Gondi-speaking hillmen being Animists.

Physical Basis. The backbone of the area is the long wedge—broadening eastwards (to 100 miles)—of the Satpura hill and plateau system. It

[1] The dam at Bhatgarh is the largest in the world, 5000′ long and *c.* 200′ high, impounding more than 14 square miles of water.

[2] Kumta (Coompta) was the port until the building of the railway to Goa.

has a mean height of about 2500 feet, but its objective in the Maikals reaches 3500 in Amarkantak (the source of the Narbada), and its Mahadeo (" Great God ") centre reaches 4500 in the Dhokgarh peak above Pachmarhi. The Khandwa gap between the Mahadeo and the Satpura proper is buttressed on the south by the long spur which is known as the Ganilgarh hills ; and these divide the Tapti from its Purna tributary, both rising—along with the Wardha—in the long high ridge (3700 feet) between Ellichpur and the beautiful hill-station of Chikalda.

The Saugor valley, north of the Bhanrar hills—the link between the Vindhyas and the Kaimurs,—and the Penganga valley, south of the Ajantas, are both really alien to the unit; but the rest is compact and simple, with its essential features very distinct as typical parts of three great river basins, those of the Narbada, the Mahanadi, and the Godavari.

Narbada Trough. Along the north of the backbone, from Jubbulpore—where the Narbada turns abruptly westward soon after freeing itself from the Mandla hill-country—to Hoshangabad, lies the river trough, 300 miles long by 30 wide, only some 300 feet lower at Hoshangabad (1100') than at Jubbulpore, an aggregate of over 4000 square miles of amazing fertility, the deep alluvium being very favourable to wheat ; in fact, the Central Provinces have had a larger proportion of their area under wheat than any other province in India except the Punjab. As the river is not used for irrigation here, its volume is steady enough for navigation over the first 200 miles westward from Jubbulpore.

Three Basins. South of the backbone are the three great basins of Amraoti, Nagpur, and Raipur, drained respectively westward, southward, and eastward. The greater part of all these basins seems to be about 1000 feet (Nagpur, 1000 ; Raipur, 950 ; Akola, 930), though the Wardha basin drops to 750 feet at Chanda ; the Payanghat[1] plain of Berar is almost wholly Black Cotton soil, and the Chhattisgarh plain is wholly devoid of black soil, while the Nagpur plain has only a thin lava cover in the west, but none in the east. Berar (*c.* 18,000 square miles), while only three-fourths of the size of the other two basins, has a richer soil ; but the rainfall is only about three-fifths of that farther east (*c.* 50″), though 65″ are recorded on the Balaghat face of the Ajantas. Nagpur, 400 miles from the sea eastward and westward, shows its continentality by a *December* minimum (68° F.), and a range of nearly 30° F., but the relief is favourable to rainfall (44″). Raipur, only 160 miles farther east, has fully 55 inches.

Temperatures being much the same and quite normal from east to west, soil and rainfall become very important ; and cotton and

[1] Payan-ghat is the lowland—" below the Ghat," as Bala-ghat is the highland—" above the Ghat."

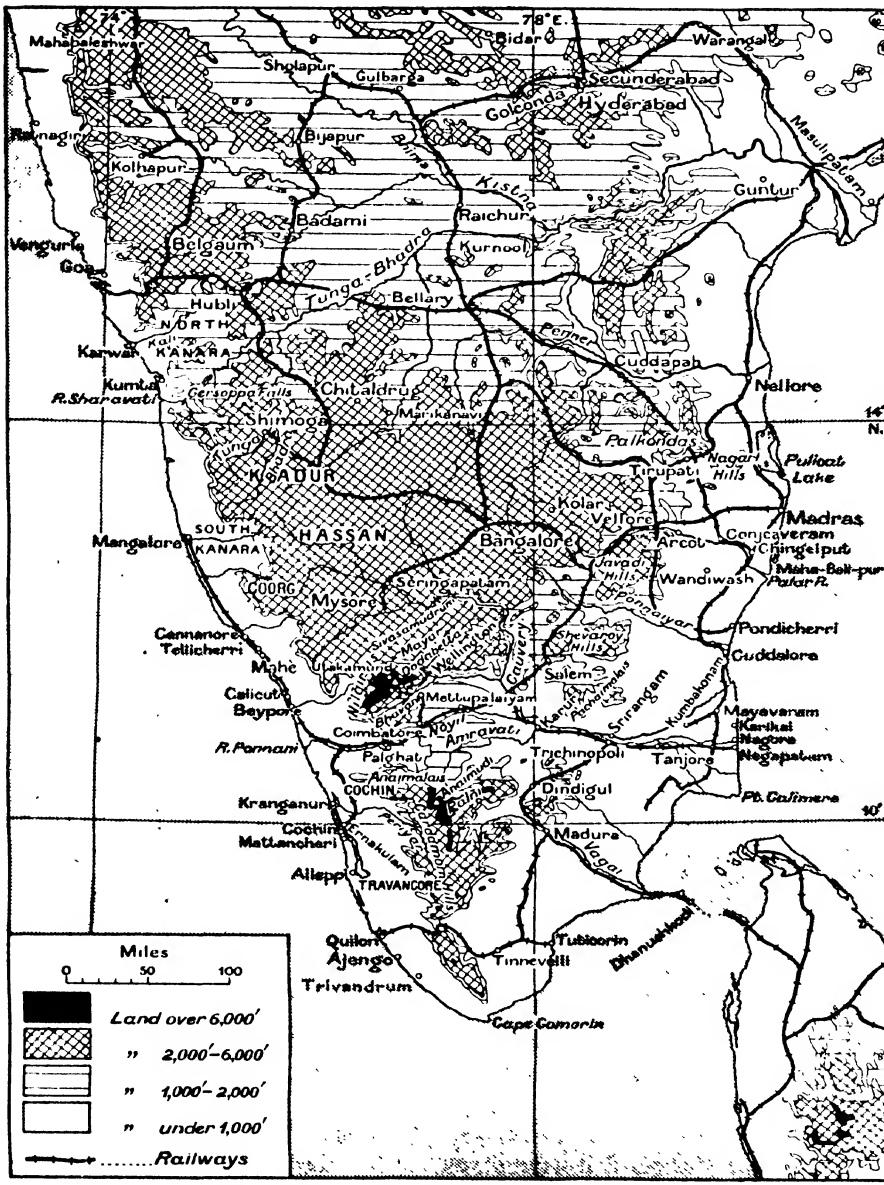

FIG. 95.—Relief of the Peninsula—Southern Half.

millet are as typical of the Purna basin—Amraoti having given its name to a cotton [1] on the Liverpool Exchange—as wheat is of the Narbada basin, and rice of the Mahanadi. But wheat can be grown on the Chhattisgarh plain, though rice does not grow well on the Purna black soil; and the Chhattisgarh ("Land of Threshing-Floors") grows much wheat, though rice is the staple.

Towns. Nagpur, though the old Mahratta capital, owes its present importance directly to the railway development; and so does the modern town of Jubbulpore, though it has certain little graces of its own. For its height prevents its mean temperature from being much above 60° F. in December or above 90° F. in May, and the "broken cups" of the Marble Rocks gorge have been converted into very pretty artificial lakes. Raipur, again, owes its present importance to the railway, but has facilities for collecting various forest products, such as lac and tasar-silk and even the valuable *sal* timber.

Mineral Wealth. The east of the Central Provinces, like the east of the Central India Agency and the west of Orissa, comes within the limits of the flat crystalline dome which stretches from the extreme north of Chota Nagpur to the Indravati basin in Bastar. Some of the hill-tops in the north-east are flattened with lava (*pats*), but the great mass of the area is an expanse of unfertile old rock, much broken with ridges and ravines and with a rainfall heavy enough and sufficiently prolonged to support a dense cover of forest. The area has a great variety and a fair abundance of mineral wealth, especially in the Wainganga basin. The manganese ores are of fine quality and high content, distributed from Nagpur to Balaghat, and from Chhindwara to Bhandara; the richest bauxite deposits are also round Balaghat, but the Mandla and Seoni districts are nearly as valuable; and even the coal is very usefully placed, if not very extensive, *e.g.* along the Narbada at Mohpani and Shahpur, and on the other side of the Mahadeo, *e.g.* in the Pench valley of Chhindwara. The Warora mines of the Wardha field have been ruined by fire and flood, but there are a number of little centres producing coal, *e.g.* Ballarpur.

Forested Dome. These wild forested hills conceal remnants of the oldest of Indian tribes, *e.g.* Kolarians conquered by the Gonds, and remains of wonderful ancient architecture (temples and tanks); but their importance now is only as a very fine watershed, mainly for the Mahanadi. The railway has practically put an end to the old navigation on the "Great River," especially in the reaches above the 40-mile Baramul gorge through the Eastern Ghats; but immense quantities of water are carried down from a basin of fully

[1] Khamgaon has also been an important market, *e.g.* the Ajanta cotton being marketed as "Khamgaon."

50,000 square miles, though the actual length of the river is not much more than 500 miles. Cf. p. 434.

The historic importance of this forested dome has been as the greatest of all barriers between Hindustan and the Dekkan, far more effective than the Mahratta lava, though that made an admirable race-home for a people able to hold the Gate between north and south ; but in the east there was no Gate to hold, nor was there any natural race-home for a great people. At the same time, the architectural remains suggest the continuity of the line of sanctity—from the Jain sanctuary on Mt. Abu *via* the two banks of the Narbada to the Jain sanctuary on Mt. Parasnath (*c.* 4000 feet), with its *Samat* or Sikkar (" Peak of Bliss "), that broods over the alien Damodar coalfield.

"The South."

A little attention to the line and its story should confound those who assert that the name *Dekkan* is properly applied only to the southern and south-eastern part of the plateau. For the word means " South," and only people very conscious of their *east-and-west* position or movements would ever have given such a name to any area. But the Narbada stands next to the Ganges in sanctity, and its sanctity was specially associated with the banks ; and the supreme merit was won by walking from the extreme west of the Vindhyan line to the source of the river on Mt. Amarkantak and back to the Cambay gulf—on one bank eastward and on the other westward. It is difficult to believe that the old users of this primeval line of pilgrimage did not give the name of " The South " to all the land that lay southward of this line. What other possible line is there to the south anywhere north of the Pal-Ghat gap ? The old ridgeway from Golconda to Nasik lies N.N.W.–S.S.E.

Climate.

The most obvious division of the Dekkan as a single unit is on a relief basis roughly along latitude 16° N., and this is emphasised by the climate, for the lower north has a much wider longitudinal extension. A typical centre such as Madak or Kaulas is just under 2000 feet, but about 350 miles from the sea eastward and westward ; Bangalore is well over 3000 feet (*c.* 3100), but not 200 miles from it in either direction. Both areas agree, however, in having a rainfall that is low and uncertain and very variable, with maxima associated with the beginning and the ending of the Wet Monsoon ; and so, as in Mediterranean lands, their cultural season begins with " rains," and then plants are fortified by " rains " before the drought begins. At the same time, except during January and February, when the mass of India west of 80° E. is drought-stricken, there is effective rain in all parts in every month ; there are relatively good rains when all northern India is most drought-stricken (*i.e.* during November and December), especially towards the south-east, and nearly as good in the Hot Season, especially towards the south-west. Here, in the Mysore *malnad*, the annual fall reaches 40", as

it does in the north-eastern corner of Hyderabad; but the normal varies from 20 to 30 inches.

Like the north-eastern dome, the mass of this south-western region is of old crystalline formation, with some metallic wealth—gold, manganese, iron—but with an unfertile soil; and the rainfall is too small—as well as too uncertain and variable—for much use to be made of such soil. This has been, therefore, the scene of terrible famines; and these have been worst where the rainfall was best—just because more reliance was laid on it, and the terrible variability never taken fully into consideration.

Relief Control. The feature which has been specially effective in blocking the access of the Wet Monsoon to the lower northern division, is the arc of the Nallamalai hills which runs parallel with the Madras coast; and north of the Nandikanama Pass (now followed by the main line west to Goa) the control of that feature on the course of the Kistna made the river one of the persistent frontiers in the peninsula. In the basin behind it, occupied now by the Hyderabad State, there has been a strong and independent kingdom during many epochs in the story of India, *e.g.* Andhra and Chalukya, Bahmini and Bidar; and the political unit here is to be preferred—a roughly triangular unit, with its base in the Bombay *malnad*, and its two sides showing nearly 1000 miles of river-frontier—Penganga, Pranhita and Godavari, Tunga-Bhadra and Kistna.

Hyderabad

Natural Division. The Hyderabad plateau, the average level of which is not above 1300 feet, slopes steadily down to the convergence of the Godavari and the Kistna in the south-east corner; and completely across the centre, dividing the two basins, runs the belt of high land on the south-eastern butt of which stand the present capital, 2000 feet above sea-level, and—half a dozen miles away—the old capital of Golconda, where there sprang up a famous diamond-cutting [1] industry. The great railway junction of Secunderabad (*c.* 1800 feet), with the largest military cantonment in India, stands also on this high land; and the ruins of the old city, like the size of the cantonment, are a testimony to centuries of struggle that ended in a chaos of anarchy. Nearly every town in the State has been at some time the capital of an independent State, *e.g.* Gulbarga and Bidar, Warangal and Aurangabad—the last near the famous old fortress and Yadava capital of Daulatabad, itself almost within sight of the battlefield of Assaye. Even the villages have forts, and up to our own time Hyderabad has been the most warlike city in India, most of its male population—Arab and Turk, Afghan and

[1] The diamonds seem to have come from the sandstones and shales of Kurnool and Cuddapah.

Pathan, Rohilla and Mahratta—going about armed to the teeth. During the present century, however, under a fine body of Afghan police, there have been great changes for the better.

Cotton. No doubt this chequered history has added to the difficulties in which a poor soil and a precarious rainfall have involved agriculture; but it has at least kept the population from pressing unbearably on the supplies of food. Naturally, it is "a land of tanks and millets"; but it has its belt of Black Cotton Soil in the west and north-west, and the heavier rainfall in the south and south-east allows cotton to be grown also in the alluvial valleys of the great rivers. The best *Bani* staple ($1-1\frac{1}{8}$") is grown on the high plain of the Godavari basin, *e.g.* round Parbhani and Nander, and the second best *Buri* ($\frac{7}{8}-1$") on the lower plain farther east, *e.g.* round Adilabad and Karimnagar, both types being *Ovruras*. In the Kistna basin, even in the Bhima valley between Gulbarga and Raichur, Madras *Western* is grown, and the staple is very poor ($\frac{5}{8}$"), with a ginning percentage of only 25.

Live-stock. The historic poverty of the area is confirmed by the number of cave-temples, such as those at Ajanta and Ellora, excavated by Buddhists, but often sacred to Hindus, Buddhists, Jains, and Moslems alike; and the conditions should be more favourable to pastoral than to agricultural development. The name *Godavari* means "Cattle-giver," but the State is much better supplied with sheep and horses than with cattle. None of the stock is good, most of the sheep producing only hair,[1] *i.e.* a material useless for felting; and, though the Kistna cattle are like the famous Nellore breed of Madras, they are really a lowland breed. But the beasts have to be largely "hand-fed," for which the area produces abundance of pulse and of oil-seeds.

Mineral Wealth. The rapid pace and the rocky course of the Kistna make it useless for navigation; but the Godavari valley has been quite important, the Wardha-Pranhita-Godavari forming a very useful—though broken, *e.g.* at Dumagudiem—line of navigation through a fertile belt with some useful (Gondwana) coalfields, *e.g.* at Singareni and Sasti, the latter an offshoot from the Chanda district (p. 455). But there seems to be so little mineral wealth now in Hyderabad that it is difficult to account for a famous old metal-ware industry, *e.g.* at the old Bidar capital, particularly when it specialised in an alloy containing so many metals—copper, lead, tin, and zinc; and the combination is so suggestive of the Bawdwin field of Burma that one may almost assume some ancient trade-route between the Godavari—which is navigable through the Eastern Ghats into Hyderabad—and the Salwin.

[1] The Black Dekkan sheep of the lava-belt yield wool, and so do the sheep of the Kistna valley ("Kurnool").

Mysore and Coorg

Physical Basis. Though the Mysore and Coorg triangle touches the Nilgiris, it is based on the Ghats; but its main water-parting is not the Ghats, but the "Bangalore" ridge, which runs across the country from (south) east to (north) west at a height of about 3000 feet. The unit may, therefore, be divided, or cross-divided, into four parts—both the *malnad*, or western hills, and the *mainad*, or eastern flats, draining partly northward and partly southward, *e.g.* by the (North) Penner and the Ponnaiyar (South Penner), while the Palar flows eastward from the eastern scarp of the plateau. The average level is probably about 1000 feet below that of the water-parting, but is broken by *drugs*—typical fortress-hills,—which rise to 2000 or 3000 feet above the normal plateau. At Nandidrug, north of Bangalore, the total height is fully 4800 feet, *i.e.* fully 1500 feet above the plateau; at Savandrug the total is only 4000.

Coorg Coffee. Though Mysore is more important than all the rest of India for the production of coffee, and though some Mysore coffee brings higher prices than real Mocha, Coorg ("The Crushed") is really the typical coffee State, with 25 acres of coffee (*v.* 4 in Mysore) for every square mile of territory; and, if the old prosperity of "the 'Sixties" has never been recovered, at least things have not become worse during the present century, though the yield is very dependent on rain in the flowering season.

If the ideal conditions for the plant include moderate heat and heavy rainfall, rich soil with good drainage, and shelter from wind and bright light, Coorg comes very near to filling them. It is all *malnad*, and one-third of it is still uncleared forest; drainage is perfect, and yet the soil is rich in humus; the normal temperature range of the plantations is from *c.* 63° F. to *c.* 73° F., with fully 120″ of rain, "all" (except *c.* 6″) falling in May-October; and the crest of the Ghats (Tadiandomol is over 5700′) keeps off heavy winds without seriously affecting rainfall. The old Mahé (French) export trade now goes *via* Tellicherri.

Mysore Coffee. The actual area under coffee in Mysore is more than double that in Coorg, the mass coming from the Hassan and Kadur districts—exported by road to Mangalore and Tellicherri; and the best is still grown on the Baba Budan hills, which are a spur of the Ghats—characteristically rich in iron—that runs eastward for 15 miles, and then makes a right-angled bend southward for 20 miles, shutting in a valley that is as rich vegetationally as it is unhealthy for human beings. On the spur three or four peaks reach 6000 feet, including the summit of the Western Ghats, Mulaina-giri (6300′) and the site of the hill-station, Kalhatti. These western forests produce very good teak, of which many of the houses in Mysore city were built.

Both slopes of the undulating *mainad* have poor soil and light

rainfall (*c.* 35″), *ragi* and other millets being the staples; but the scarp of the *malnad* gives birth to a number of streams, which feed the Cauvery. As the great river rises in Coorg at a height of 5000 feet, and—like the Godavari—within 50 miles of the Arabian Sea, it is the key to the whole prosperity of eastern Mysore, with a series of great anicuts (some very ancient) that feed tanks or irrigate oil-seeds and even rice, with three harvests a year. These tanks used to be all made by throwing earth "bunds" across a river, and generally there was a series down each valley; but now they are of masonry, as at (Marik)-Kuppam (30 square miles) and Kankanhballi. Areas that are too dry and too stony for any other important "crop" make Mysore the most important producer of sandal-wood in the world, the wood being exported specially westward, while the oil goes eastward; but Mangalore exports both. Large quantities of the wood are converted into charcoal in the kilns of the Bhadravati ironworks. **Irrigation.**

Mysore is relatively rich in minerals, including the Chitaldrug and Kadur manganese and the magnesite and chromite of Hassan and "Mysore," especially of Dod Katur and Dod Kanya, all with fairly easy access to the Malabar coast; but the one really important product is the Kolar gold, which seems to have been worked for centuries. There is only one vein, about 4 miles long and 4 feet thick, worked in places at a depth below 4000 feet; but the working is made relatively cheap by hydro-electric power from the beautiful Sivasamudram Falls on the Cauvery more than 90 miles away. Great irrigation works in the *malnad*, *e.g.* on the Bhadra, can supply power to the Bhadravati ironworks, and the little Malabar port of Bhatkal is within 15 miles of the Mysore frontier. **Mineral Wealth.**

Though Mysore is the capital of the State, Bangalore is much the largest town. Its height (over 3000 feet), its distance from both the coasts (± 200 miles), and its exposure to both the monsoons—for high humidity and moving air, though the mass of its rain[1] comes in May–October—make it a wonderfully healthy place, where the mean for the hottest month (April) is only 80° F., and the thermometer is said never to reach 100° F. and sometimes to fall (at night) below 50° F. It has a dry and porous and clean soil—having been founded only in the sixteenth century; and it is almost the only place in India—at such a reasonable height—at which June, July, and August can be called pleasant months. **Bangalore.**

Seringapatam is an island fortress (3 m. × 1), and its historic fairs are really religious in origin; for, as the name *Sri Ranga* shows, the island is sacred to Vishnu. There are two other sacred islands in the Cauvery, Sivasamudram and the one actually called Srirangam—near Trichinopoli.

[1] The mean rainfall is *c.* 37″, but the rainfall in the reservoir basin varies from a maximum of over 40″ to a minimum of 17″.

Madras Presidency

Three Units. The Madras Presidency includes three distinct areas, which may be called generally the Malabar, the Coromandel, and the Golconda; but the name in each case must be taken to include all the natural hinterland of the particular coast that falls within the political unit. There is one striking difference in the distribution of relief between the Coromandel area and the two others; for in the latter the Ghats run strictly parallel with the coast and near to it, while in the Coromandel area the Eastern Ghats trend away from the coast southward to converge with the Western Ghats in the Nilgiris. There are offshoots relatively near the coast, *e.g.* the Palkonda, the Javadi, and the Pachaimalais; but the "Carnatic," or Tamil, plain increases steadily in width southwards, until in the Cauvery basin, due west of Karikal, it stretches for *c.* 170 miles.

This distribution had its sequel in what might be called a natural expansion of the political unit westwards, especially at two points. One is behind Nellore, where the Penner valley gives easy access to the Ceded Districts round Bellary, with very easy access on over an arid plain (18″ of rain) to Hubli and Goa; and the other is the Palghat valley, easily reached up the Noyil valley and with easy access on over the Coimbatore saddle to Calicut.

Natural Poverty. The infertility of the Bellary belt cannot be divorced from the poor soil and the feeble rainfall, but it may have been increased by the constant wars for what the Bahmini kingdom regarded as "the rich plain bounded by the Kistna and Tunga-Bhadra rivers"; and to the west, in Chitaldrug especially, the innumerable *drugs* gave sites for forts almost everywhere, including the famous old Vijayanagar capital and Raichur (cf. p. 461). Even now fair cotton is grown, not only in the Kurnool-Cuddapah valley behind the Nallamalais ("Black Hills"), but also on the higher land round Bellary and Anantapur; and the poor, dry soil is favourable to ground-nuts. The Kurnool-Cuddapah valley was of special importance when the Golconda kingdom was pressing southwards from the Kistna to the Penner, and the Gurran Ronda hill (500 feet, and precipitous on three sides) became a frontier fortress, "the oven of Cuddapah"—insufferably hot in its ring of bare sandstone crags. At Bellary the drug rises nearly as high (450′), and measures nearly two miles in circumference.

Irrigation. The rivers are so old that, in the dry climate of the plateau, they have cut narrow gorges down to rocky beds, and they flood so rapidly that nearly all the flood was wasted in the old days; but the three great rivers which rise in the Western Ghats are often in flood when the regional streams—Penner, Palar, and Ponnaiyar—are practically dry. Thus their value is doubled, and trebled, by the irrigation and storage works, mainly

tanks; and Madras actually stands next to the Punjab in the scope of its irrigation work.

Tamil Plain.

What we may still call the Carnatic plain, even if the name applies properly to the area of Kanarese speech (in and round Mysore), presents a very great contrast to the Madras Dekkan in topography and climate and in history. For this is the real Old India, unravaged India, the India of unnumbered temples, of indigenous art, of almost pre-historic industries. The differentiating factor is the climate, which contradicts in many ways that of the rest of India.

Climate.

In the lee of the crest of the Malabar Ghats during the S.W. Monsoon, the summer rain is quite small, Madras having only *c.* 15″ out of *c.* 49″ in June–September; in January and February, when the N.E. Trade is fully established, the winter rain is very small; in the spring, March–May, effective rain follows the northward march of the sun, the amount naturally increasing westward and southward and being mainly orographic; in the autumn, "round" October or November, there is heavy rain off the retreating Wet Monsoon, the amount naturally increasing eastward and northward and being mainly cyclonic, and the maximum coming earlier (October) to the north-east. The total annual fall is nowhere very great, though the monthly fall in places is heavy, *e.g.* over 20″ in November–December along the whole coast between Mayavaram and Point Calimere, and 24″ in October–November at Madras; but there is no rainless month. The humidity remains fairly high, and the climate generally approximates to semi-marine.

Pal Ghat.

Though the shape and size and latitude of the presidency give it a much greater proportion of coast to surface than any other province has, there is not a single real harbour in the entire stretch of it; and so historic entrance for Europeans has been easiest by the Pal-Ghat gap, where the railway summit to-day is at a height of only 800 feet, and its great portals are still specially "European" in their value for hill-stations.

Nilgiris.

The Nilgiris are "Blue Peaks", on a plateau some 700 miles square and 6500 feet high; it is connected with the Dekkan and the two lines of Ghats by the Wynaad saddle (2000–3000 feet), graven by the Moyar river, but elsewhere has a descent so sudden and abrupt that the extension of the Coimbatore railway from Mettupalaiyam up the Coonour Ghat (6000 feet) to Utakamund is not only metre-gauge, but of the rack-and-pinion type. The plateau is much broken by high ridges and rocky summits, Kudiakad and Bevoibetta being not 300, and Makrati and Davarsolabetta not 400, feet lower than Dodabetta, while Kunda is quite as much above 8000 feet as Kundamoge is below. Three or four other summits reach *c.* 7300 or more, including Utakamund (7360). The total hydro-electric power available is sufficient, in the Pykara plant, to electrify

three sections of the *South Indian* railway and to transmit power as far as Trichinopoli; and the clearings in the teak forests are very suitable for tea and cinchona.

Utakamund. The climate at the hill-station (7200) is really temperate, with a minimum temperature of 48° F. (in January) and a maximum of only 59° F. (in May), while the rainfall is only 48 inches. If these figures are compared with those for Wellington, which is 1000 feet lower and on the opposite side of the hills, we see the importance of aspect. For Utakamund faces south-westward down the Calicut valley, while Wellington faces north-eastward down the Bhavani valley; but, though the temperatures at Wellington are 7° F. higher all the year through, the rainfall is also a trifle higher, and three-eighths of it (18″) falls in October–November. It is an interesting coincidence—if not a "response" to these climatic conditions—that the tall, bearded, Toda highlanders, with their "plaids," are unusually fair (cf. the Kadogas of Coorg).

The Palni spur of the Cardamoms reproduces these conditions in miniature. The plateau is only about 100 square miles, but averages 500 feet higher, and is fenced by summits of 8000 feet; and the climatic effect may be judged from the fact that at the hill-station of Kodaikanal there is an observatory specially concerned with the study of sun-spots.

Vaigai Basin. The Nilgiri watershed is as closely connected by the Moyar with the Cauvery basin and its Trichinopoli plain as the Palni-Nagamalai watershed is with the Vaigai basin and its Madura plain; but the one overlooks a primeval thoroughfare which gives direct access to the S.W. Monsoon, while the other blankets the Madura lowland entirely from the west, and the north-eastern half of the Nagamalais—beyond the Vaigai gorge—even blankets it to some extent from the north-east. The Vaigai has fed the sacred plains of Madura since time immemorial, and they have suffered little from famine or war, though their actual rainfall does not exceed 36 inches (two-thirds of it in August–November); but even the eastern edge of Travancore is not densely forested, and the trees are mainly deciduous.

With mean temperatures not below *c.* 75° F. (January)—though not much above 85° F. (May)—a 36-inch rainfall does not do much towards feeding a dense population of vegetarians; and, when the city was—for 1500 years on from the 5th century B.C.—a Pandyan capital, political causes added to the pressure of population. The result was that the more accessible riverine lands became seriously overworked, while the volume of the Vaigai was insufficient for a growing population. So at the end of last century the decision was made to procure water from the *western* face of the Cardamoms.

Periyar Diversion. Two V-shaped gorges were found, the one in the Vaigai basin and the other in the Periyar basin, the Periyar gorge only 200 feet

wide at the bottom, but over 1200 at the top (of the dam); and now more than 9,000,000 cubic feet out of 15,000,000 [1] are always available for diversion, through a mile of cutting each side into the crest and then a tunnel of 1¼ miles through its core. The dangers and difficulties of the undertaking—including disease (malaria) and storm-rain at a rate of an inch an hour (!)—were enormous; but the work has nearly trebled the land under cultivation, guaranteed it an unfailing supply of water, and—been a complete financial success.

Madura District.

Apart from its sanctity, as the "Benares of the South," Madura has some importance as a textile centre, specialising in the weaving and dyeing of silk and cotton; and it commands much of the tobacco, if not also of the cotton, trade of the Vaigai plains. Both the Vaigai and the Cauvery basins grow large quantities of tobacco and cotton, and the Vaigai tobacco goes to the great manufacturing centre of Dindigul, between the two basins. The cotton is widely grown between Tinnevelli and Tuticorin, and the latter is one of the cotton-exporting centres of India. Most of the area is under "Tinnevellis," on patches of unirrigated black soil; but well-irrigated "Cambodias" [2] on the red soil give a much higher yield and a rather longer staple (1⅛″).

Tuticorin owes its large trade (the next to Madras in the Presidency) to the fertility and the sanctity of its hinterland, and to the shelter of the Comorin pensinsula, in the lee of which it is always accessible, whatever the season or the weather; but it is a wretched port, so shallow that, even with constant dredging, steamers have to lie about five miles out, the only merit being in the shelter afforded by Hare Island. Since the construction of the railway to Dhanushkodi the town has lost much of its old trade with Ceylon, but still ships coolies for the Ceylon tea-gardens and conch-shells to Bengal. It is said that the famous old pearl-fishing was ruined mainly by the horrible filth carried away daily by the tide from the Tuticorin beach.

Cauvery Basin.

The Cauvery repeats on a large scale what is typical of the Vaigai basin. The vast age of the land and the combination of high temperature with high humidity have left it with a very large area of deep-soiled lowland; and the river itself is, as a carrier of water, one of the most important in India, with religious sanctity along its whole course from Coorg to Nagore—associated with the quality of the water. Indeed, it is known to devout Hindus as *Dakshini Ganga*, "The Ganges of the South;" and once a year Mother Ganges herself has to come underground to the mountain jungles of Coorg to purge herself, in the springs of the Cauvery,

[1] Only the top "50" feet can be used, the lower 120 being needed to raise the surface layers to a height at which it is possible to divert them.

[2] An American upland, grown in Cambodia originally.

from the physical and moral pollution involved in her great work of salvation in Hindustan.

Behind this, perhaps, is the solid fact that the river winds down from its Coorg heights (5000) in densely forested ravines, and even in Mysore flows often in deep rocky glens, where evaporation and population are alike at a minimum. A good deal of water is taken from it in Mysore by a dozen anicuts, specially by the famous "Madadhatte channel," which lights Mysore city, and irrigates the 70 odd miles between that and Seringapatam; but it probably loses less of its volume than any other of the great Dekkan rivers before it reaches its lowland.

Trichinopoli District.

The size and the fertility of this lowland, which spreads northward and southward behind the Pachaimalais and the Nagamalais, have made it of great importance for several thousand years. It runs due west for 120 miles to Karur, the old capital of the ancient Chera kingdom (cf. p. 450), at the great elbow on the river, and then runs on south-westward up the Amravati valley towards the Palnis and north-westward up the Noyil valley towards the Nilgiris and still farther northwards up the main valley, almost to Bhavani, "where the Seven Roads meet."

Irrigation of the fertile riverine belt between Karur and Tanjore must be almost as ancient as agriculture itself. After sweeping past the temple-crowned rock of Trichinopoli, the river breaks—on the island of Srirangam—into two distributaries; and the dam that is still used (repaired and re-equipped)—to prevent the water of the direct, higher (silt-raised) Cauvery branch from working across into the north-eastward, lower (less-silted) branch—is certainly 1600 years old! It has been a model to our own engineers during the last century; and the delta irrigation which they based on it has for many years paid from 15 to 17 p.c. on the capital.

Crops.

In the semi-marine climate cotton and tobacco thrive, for the seasonal distribution of the rain gives it full value; and even where the fall is only *c.* 20″, *e.g.* at Coimbatore, the Palghat gap assures a relatively high humidity. The "Salem" staple—with a 32″ rainfall—is only $\frac{6}{8}$″, and its ginning percentage is low, and some of the Cambodia, especially if unirrigated, is no better; but a large proportion of the crop comes up to a fair standard, and there is a steady export. The same is true of the tobacco, for which the small holdings are very suitable; and, though the bulk is used locally, there is again a steady export, *e.g.* for "filling" Burma cheroots, that from the southern districts reaching Negapatam by water. Trichinopoli (*c.* 35″ rainfall) is a great collecting centre.

The actual delta lands—which are very large for a river which is scarcely 500 miles long, and collects its water from less than 30,000 square miles—have special facilities for growing rice, with oil-seeds as the supplementary crop; and thousands of tons are

exported, from Negapatam and Tuticorin, though again the latter has lost most of its trade to Dhanushkodi. Tanjore—like its neighbour, the sacred city of Kumbakonam, an old Chola capital—is the great centre, 75 p.c. of the delta lands being under rice; and most of the export goes to Ceylon from Negapatam, along with a constant stream of coolies for the tea-gardens, where the Tamils do much better work than the Sinhalese.

Industry and Art.

There are several interesting and very ancient industries which still survive in some shape or form, *e.g.* the textile industry (especially in silk) of Tanjore and Mayavaram, the latter—like Nagore—a sacred centre; and, though the absence of coal, etc., has ruined the working of the rich Shevaroy iron-field, Salem still carries on its famous old cutlery industry, though now most important as a cotton and tobacco market in a district with a good 32″ rainfall. Still more important are the sheep and goat skins from the hill-country behind Trichinopoli, *e.g.* round Dindigul and Coimbatore, where centuries of experience have brought tanning to a very high standard.

In the domain of Art, too, the region is very famous, even if its work is almost repulsive to Europeans. The artists have striven to express the difficulty of human life and the ease of plant life in the damp heat; and the result is spiritual asceticism with material luxuriance. Emotion must be subdued, and can never be an ideal—a motive in Art; and the entire absence of expression on the faces of gods and goddesses makes even the finest work repulsive. On the other hand, in decorative work there is no more restraint than there is in a jungle, and form and proportion are lost in exuberance.

Anglo-French Footholds.

The rest of this Coromandel unit is of much less interest apart from its political history in recent centuries, and even that centres on Madras and its immediate hinterland, including Pondicherri; and it is significant that the typical trade of the one should be leather, made mainly from sheep and goat skins (that are tanned with local cassia), and that the typical trade of the other should be ground-nuts, essentially a *poor*-soil crop. The rainfall is sufficient, but the hinterland is very narrow, the soil is poor, and the rivers are only magnified *wadis*—though water can generally be raised from wells in their beds during the height of the dry and hot season. The Ponnaiyar is the least useful, but there are artesian wells in the French territory; and the Palar, "the Milk River," is more useful than the Penner only because the Nellore coast is so saline and sterile. Indeed, the salt industry is as important at Nellore as the mica.

Pondicherri.

Pondicherri has the best anchorage along the coast, but no harbour; and the Shevaroy hills (5400′) gave it a substantial background, a link still preserved in a bone-manure industry in the city

connected with the plantations on the Shevaroys. But Cuddalore, with its backwater wharves, competes in the ground-nut trade, even for export to Marseilles, and has some trade of its own in sugar and coconut products.

Madras

Madras City.

The history of the area suggests, however, that the Madras elbow was always really the vital point; and that makes it all the more significant that Madras was the parent of the port, not its child. But behind all the political development there seems to have been, as usual, a strong religious motive. The land is not sacred, and there is not even a sacred river; but there are sacred spots on every side—on hill and river and sea. If in the ancient days the Vellore flank of the Javadis was thought more important than the Arcot-Wandiwash flank—as it is now by our military authorities, who have made Vellore the military station—that was because the base of power was on the plateau behind, not on the sea in front; the objective was the same—the mouth of the Palar valley. Off the estuary of the river, the Isle of the Seven Pagodas made a Maha-Bali-pur ("City of the Great Bali"); above the last great bend on the river stood Conjeaveram[1] (really Kanchi-puram, "Gold City"), one of the Seven Sacred Cities, with—like Madura—a Hall of a Thousand Pillars and immensely rich in historic inscriptions; and between the great bend and the coast, the Vijayanagar rulers, in their days of peril, built Chingelput ("Brick Town") amid the lakes and swamps that provided mud and reeds for "bricks." Hsüan Tsang calculated the walk round the walls as a distance of six miles.

Hill Fence.

The encroachment of the Pulicat Lake on the narrow lowland between the Tirupati hills (2500′) and the sea narrowed the approach from the north to Madras, and even then it is broken up by the Nagari hills,—the "Nose" of which exceeds 2800′, and was a very valuable landmark for Madras in the early days to English seamen, being visible 50 miles away. This looks as if it would have made a sacred peak; but behind it the Turipati rises in *Seven* Peaks, and a pagoda was built amongst them *before* 3000 B.C., and the whole circuit of the hills was made Holy Ground, on which no unbeliever might tread. To the south the single-peaked Tiruvannamalai, nearly 200 feet higher (*c.* 2670′), was only crowned with a fort.

The Harbour.

Madras occupies, therefore, a position which was as important politically from the land-side as from the sea in earlier days; and it has now been provided with a large artificial harbour, and has facilities for inland water-transport on the Pulicat Lake and the Buckingham Canal. It may even be urged that it was absolutely

[1] This is not, as asserted, an English corruption, for it dates back to early in the thirteenth century!

essential that there should be *some* well-equipped port somewhere along this Coromandel coast; and probably this was the best place for it. But the harbour is certainly not safe, and will never be a really important one; but it does a considerable trade in leather and skins, in oil-seeds (especially sesame) and raw cotton. The one merit of the city itself is that, as the poor land was not valuable, there was little demand on it, and so—for an eastern city—Madras is widely spread and openly spaced. The elbow also slightly increases the rainfall—to *c.* 50″, *i.e.* above what is normal for the rest of the coast.

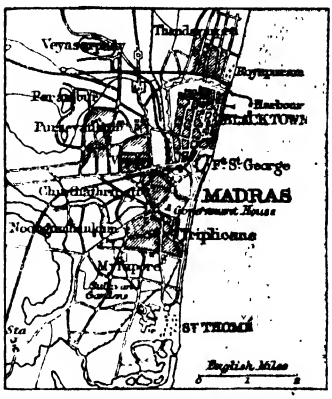

FIG. 96.—Site of Madras.

Golconda Coast.

The Golconda coast and the Northern Circars recall in several ways the Coromandel coast and the Carnatic, especially in the entire absence of natural harbours and the concentration of their importance on their delta lands; but there are several points in which differences of structure and relief and configuration are reflected in differences of climate and soil and relations.

Both the Kistna and the Godavari are twice as long as the Cauvery, and the Godavari has a basin fully three times, and the Kistna has one more than twice as large; and both drain largely from the fertile lava, while the Cauvery basin only contains a few small "Dharwar" patches. But, while the main streams flow from the lava-capped crests, the south-western affluents of the Kistna and the north-eastern affluents of the Godavari flow from crystalline watersheds. With their immense quantities of water and of rich black mud, therefore, they have created a great "double" delta extending over 1,000,000 acres round the 300 square miles of Lake Kolar.

The Deltas.

These delta lands, too, have their own effective rainfall. In November–February they are not nearly so fortunate as the Cauvery delta, but in June–September they fare better; and the trend of the coast and the nearness of the Ghats to it give them very good rains in the Hot Season, and the rainfall does not decrease inland, as farther south. During the advance and the retreat of the Wet Monsoon the protruding deltas, like the Madras elbow, receive an extra 5–10 inches of rain above the normal for the rest of the Golconda coast, Cocanada getting actually over 20 p.c. of its total in October. The conditions are, therefore, exceedingly favourable for the production of rice; and all the ports—except Bimlipatam,

the special roadstead for Bimlipatam "jute" (*hibiscus cannabinus*, not *corchorus*)—export rice (and sesame, etc.); the islands (*lankas*) in the deltas also grow good tobacco (the "lunka" of the English market) and fair cotton, *e.g.* round Guntur.

Bad Ports. The poorness of these ports is very serious when related to the size of the Godavari basin that is the natural hinterland of the coast, even if the Kistna and the Mahanadi basins are ignored; and the need for a proper outlet is obvious. Even at Masulipatam large vessels must lie five miles out from the mouth of the tidal distributary, and then the wharves are three miles up this, and even native craft (up to 150 tons) can work up it only at high tide; at Cocanada the large boats must lie seven miles out, but the wharves are on a ship-canal (to the head of the Godavari delta at Dowlaishweram). Indeed, the only excuses for the use of such roadsteads are that the hinterland *must* be served, and that both—like the French Yanam—are in the lee of the deltas during the S.W. Monsoon; and Cocanada, the best sheltered—really "behind" the horn of the delta—has been winning most of the trade of the delta.

Fishing. The fishing industry which gave Masulipatam its original start—(?) to supply Golconda, of which it was made the port—is of little importance, though the coast does provide a large quantity of so-called fish-manure (much of it really guano); but the industry is commemorated not only in the name of the town (*Machli-patnam*, "Fish Town"), but in the "port" at the mouth of the creek, Bandar, really Machli-bandar, ("Fish Port"). The famous old chintz industry, however, is practically dead.

Vizagapatam. There remains the roadstead of Vizagapatam, well in the centre of the Golconda coast, and about half-way between Madras (*c.* 485 miles) and Calcutta (545). Though actually only a roadstead, it is quite well protected from S.W. gales by the high promontory known as the Dolphin's Nose; and in the lee of this bluff a tidal creek works out through six square miles of swamp, through which a channel is to be dredged to a deep-water quay. The port is being made into the best on the whole of this eastern coast of India.

The hinterland, with all its manganese and coal and other wealth, is far the largest "untapped" area in India; the town commands the only good line of access across the Eastern Ghats here, *via* Parvatipuram—to Raipur, etc.; and the port is only two miles from Waltair, where the *Madras and South Mahratta* line from Bezwada meets the *Bengal and Nagpur* line from Cuttack.

Some Economic Aspects of the Great Problem

Any summary of Indian geography which is as much concerned with the human note as with the physical, is apt to leave an impression of a world of maladjustment; and, perhaps, this is precisely the impression that it ought to leave. For India is a collection of lands and climates, with divers races and creeds, and with multitudinous castes and tongues; and these show a persistent series of glaring contrasts and timeless antagonisms. Caste is a tremendous force, but its amenities are rather these of an autocratic Trade Union administering an automatic Poor Law, from the aid of which those are excluded who need it most. **Political Note.**

It is in the nature of things that there should be some antagonisms, if only subconscious, between rulers and ruled, when the former are aliens; and this has been deepened by the fundamental differences between West and East—between the mind that feels a constant urge towards practical work, and aims at what seems to be progress, and the mind that instinctively takes refuge in meditative contemplation, and believes that truth is always the same, and changes not. The West has done, and is doing, an immense amount of good to India, but is doing some of it in a way unnatural to Indians; and just because it is being done in an inappropriate way, it causes unrest and resentment, and misses its full reward. **West *v.* East.**

An equally great and much more amazing contrast is that between the greatness of India and the littleness of the hands that have made it great. Behind all its historical and political and economic importance to the World is the very humble and feeble tiller of the soil, the essential unit in many millions of nonentities. He is very ignorant as well as weak, overwhelmed with debt, and crippled by dirt and disease; but, if only he is properly trained for his work, and if only new methods are presented in a natural instead of an unnatural way, he is no obstacle to progress. No one is more glad to see a crop doubled or toil halved; and in some ways he is the most important producer in the World whose products enter on a large scale into World trade. **The Ryot.**

For 2000 years the chief features of Indian trade have been an absorption of precious metals and a tendency to trade westward. Even within the past half-dozen years India has consumed[1]—mainly for jewellery and for hoarding—over 60 p.c. of the World's gold and over 40 p.c. of its silver; and, from the time of the Roman Empire until the East India Company was firmly established, export westward had to face difficulties of land traffic which limited the trade to articles of high value in small bulk, *e.g.* silks and muslins, gems, **Indian Trade.**

[1] This absorption has ceased during 1931–32 The import of silver has dropped by *over* 97 *p.c.* from the 5-year mean (Rs. 20 crores), and in 15 months £85,000,000 of gold have been *exported*!

and spices. The Suez Canal changed the conditions, and India became specially an exporter of raw materials with low value and large bulk, *e.g.* wheat and rice, cotton and jute, oil-seeds and pelts. With tea, these six products make up nearly 90 p.c. of her export values, and her exports are some 20 p.c. above her imports.

Recent Changes. Though India is still much our best customer—25 p.c. better than the U.S.A.—the sources of her import trade have been changing significantly. At the time of the Crimean War we enjoyed 76 p.c. of the total, France being the only other European competitor—with 3½ p.c.; but China did 5 p.c. of the trade, and Australia did 4 p.c. At the beginning of the Great War we were doing 64 p.c., Germany being the most serious European competitor —with 7 p.c.; but Java had nearly 6 p.c., and Japan and U.S.A. had about 2½ p.c. apiece. At the end of the War we were doing only 45 p.c., while Japan was doing 20 p.c., and U.S.A. fully 9½ p.c. Japan had displaced the cheap German goods; and various causes, especially the use of African and Asiatic troops by the combatants, had lowered Indian appreciation of things European.

Trade Balance. This was all the more disastrous because, before the War, India had been "exporting to the World, but importing from Europe," even if—since the U.S.A. Civil War and specially since 1900—excess of exports had been a steady and growing feature of her trade, and even if there had been an increasing export—relative and absolute—of manufactured or partly manufactured goods, *e.g.* jute and cotton fabrics,[1] oils, leather. No doubt, eventually India will make the mass of what she wants, which may embarrass temporarily producers elsewhere; but in the long run a rich India must be a better customer to the World than a poor India.

Its Basis. India has not very easy access to Asiatic markets that want her products, and Asia has been less than half as important as Europe to her even without the British market; and this has been far the best of all, especially as till recently India preferred to buy inside the Empire while selling outside of it. But the vital fact is that she has not been a large buyer anywhere, for Indians have very few wants, and want only cheap goods, though the aggregate of consumption, especially when she is prosperous and peaceful, is of real importance. Nine-tenths of her people live in villages, and work on tiny holdings; and, unless they have some good "cash" crop, they can make no effective demand, even if they can feed themselves.

On the other hand, she is immensely important as the exporter of raw materials, though the individual contributions to the aggregate are tiny; and some 40,000 miles of railway and 250,000 miles of road are bringing markets nearer and increasing the mobility of

[1] Raw jute is only *c.* 40 p.c. of the total jute exports, but raw cotton is nearly 90 p.c. of the total cotton exports.

labour. They are also ending the ages of isolation, and are bringing ideas as well as merchandise; and in the English language India has the first commercial medium in the world.

Labour Problem.

The contribution of the individual to the aggregate might be much greater than it is, for labour is nearly always inefficient and often insufficient; but the inefficiency is least in agriculture, the foundation of everything, and is more typical of machine industries than of hand industries,[1] *i.e.* in towns than villages. For the mechanical industries, in origin and equipment and distribution, are associated with European enterprises, while the fine old Indian hand industries are associated with special localities that were specially suitable for them. Race and religion do affect industries, but less than is believed, *e.g.* Castes seldom being Trade Guilds. At the same time wood and metal are obviously more free from "suspicion" than, *e.g.*, fats and skins (cf. the "greased cartridges" of the Mutiny); and the most typical village industries are in wood and metal, all utensils being usually of metal and not of glass or earthenware—generally brass in Hindu villages and copper in Moslem villages. The different attitudes, too, of the Hindu and the Moslem to particular animals is obviously important in the case of hides and skins, which come from the Dravidian Dekkan.

The Village.

This is merely a minor illustration of a fundamental truth, realised only too well by the I.C.S. men on the spot, but apparently unknown to or disregarded by the politicians, *i.e.* that the heart of India and the hope for it are in the village,—far the most valuable, but the least voluble unit. Indeed, the whole population problem has been rather obscured by the amount of attention paid by politicians to the least valuable because also the most voluble. For instance, taken as a whole, India is no more over-populated than France[2] or Austria or Poland; and the most healthy parts are the least densely peopled. Any surplus from the less healthy and the more dense could be distributed in the healthier parts of India with less discomfort to themselves and with less disturbance to other lands; but successful village-life must be assured—which means water,—and interested propaganda must be ignored.

Water Waste.

As a matter of fact, far more water is running to waste in India than is needed to make habitable all but the very driest regions, and to supply them with quantities of "power" for all their needs, especially heat for cooking and air for cooling,—quite apart from agricultural and sanitary operations on a large scale. The application to the soil of the manure now used for fuel would of itself double the harvest in many cases, and wide settlement on an irrigation basis would have deep psychological results. For the new

[1] No machine can compete with the hand, *e.g.*, in spinning the very short cotton.

[2] India, with 195 persons to the square mile, is slightly above France (192), but below Austria (205) and Poland (206).

generation would be adjusted and educated *ad hoc*; it could sow again at once if a crop was accidentally lost,—it could vary its crops to guard against accidents,—it could have regular work of a reasonable kind instead of an overwhelming seasonal rush,—it could grow proper fodder crops, and so lack neither milk nor haulage.

"Power." Whatever may be thought of Simla or Westminster, there can be no doubt about the amazingly good work done by the I.C.S. rank and file; but no great improvement was possible so long as coal was more or less the only source of power, for Indian coal is neither plentiful nor good, though it has been—nominally—cheap. But it has been cheap mainly because it is poor, though it lies so near the surface that it has been easy to reach, and labour is cheap, —too cheap for efficiency; but the distribution has involved long distances, and poor coal "travels" badly. Water-power can change all this, and without any encroachment on irrigation; indeed, the two will advance side by side if developed on right lines.

Use of Water. In this connexion two facts have been established beyond doubt. The one is that in many areas drainage must come *before* irrigation, and the other is that for many crops irrigation must come *before* sowing or planting. In the Quetta experiments irrigation before sowing more than doubled the yield[1] of wheat to 25 bushels; but three waterings *after* sowing decreased that average by fully 25 p.c. In the Punjab two waterings *after* sowing decreased the yield by fully 80 lb. as compared with that on a parallel belt watered only *before* sowing, on which the yield was 800 lb. (over 13 bushels) per acre.

Oil-seeds. Almost as important as the drainage problem is that of nitrogen-supply; for at present manure is used for fuel,—the export of oil-seeds (in various forms—raw, oil, cake, etc.) approaches 2,000,000 tons a year,—land is constantly water-logged during the rains,—and even such useful leguminous fodder crops as lucerne and berseem are scarcely ever grown.

In many years over 20 p.c. of the total exports, in weight and in value, consists of oil-seeds, after all the home demands have been met; and in quality or quantity or both India is supreme—with half the world's supply of ground-nuts and of sesame (Madras), a third of its cotton (Bombay), two-thirds of its rape and mustard (United Provinces), a quarter of its linseed (Central Provinces), the best of its coconut (Malabar), and 100 p.c. of its castor (Dekkan). In some cases, *e.g.* the cotton-seed, improved varieties would greatly increase the yield of seed, though the peasant's need for oil already makes him prefer a variety that yields more seed than fibre.

Cotton Fibre. The evil reputation of Indian cotton is not altogether deserved. Till 1820 India supplied the bulk of the raw cotton used in Lanca-

[1] Actually one yield of over 45 bushels to the acre was obtained, but the wheat had had 6½" of rain during the (winter) season.

shire, and at first it was only the cleanliness of U.S.A. cotton that attracted. Even now, if the Indian cotton was not dirty and injured by bad ginning, it would be much more useful than it is; and it would be still more useful if it was pure and true to sample. Indeed, the superiority of Madras cotton, though partly due to "the rain coming before the heat," is due also to the fact that it is largely in the hands of Europeans, who are too wise to mix and adulterate.

The points involved are simply matters of education, devoted to the real needs of the peasant; for, if the grower was assured of his full share of the value, good cotton would pay as well as any other cash crop, and better than most others. But at present all

Education.

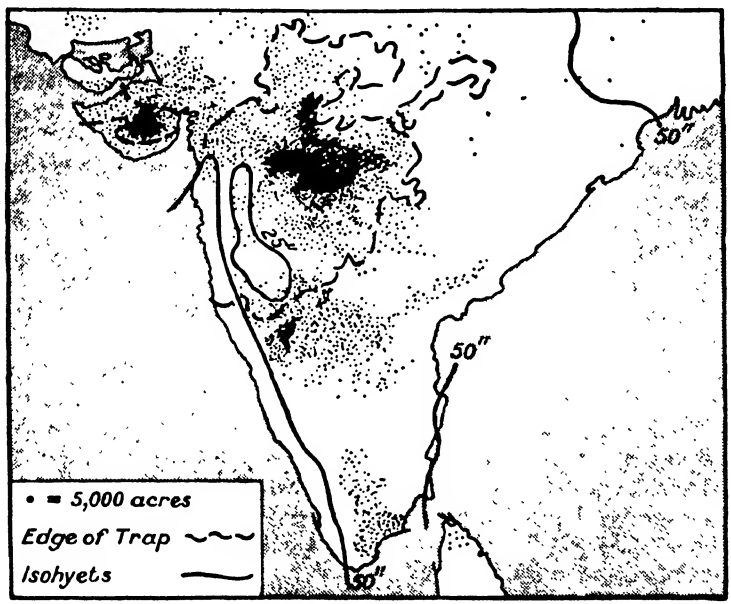

FIG. 97.—Distribution of Cotton.

over India the peasants value the crop by the total output—of *seed and fibre*, not by its quality, which does unfortunately tend to vary inversely with the quantity, so that a very prolific "short" variety, *e.g. roseum*, with a staple not much above *half an inch*, does pay better than a less prolific "long" variety. Only on the "new" lands, where there are no traditions and prejudices, *e.g.* in the Punjab, is there a wiser attitude of mind; and even there much has yet to be done, though the standard of the staple has been steadily rising. At present, with an acreage two-thirds that of U.S.A., India, as a whole, has the lowest yield for cotton in the world, not half the U.S.A. yield, nor a quarter of the Egyptian. If India decides to keep all her cotton at home, that will relieve the

pressure on markets elsewhere, and will be an additional reason for improving the quality; but all depends on the education of the peasant, safeguarded from debt and with easy access to experienced agricultural chemists.

Jute Industry. Somewhat the same improvement is needed for jute-growing, for it needs more care in the choice of seed, more labour, and better tillage. There are long-pod and round-pod varieties; the long is the easier to decorticate, but prefers the lower ground nearer the sea, where there is maximum fertility, and where the water-temperature is highest. There, of course, it is seriously liable to flood, though the best quality comes from the higher parts of the low ground; and so it is often cut too soon,—for fear of flood. This escapes proper notice because so much of the fibre is used on the spot by the peasants in their hand industry. This jute industry is the most typical of all the Indian industries, and its exported products are half a dozen times as important as the raw fibre exported, while the raw cotton exported is three times as important as the cotton goods.

Seed *v.* Fibre. Here again it seems as if much improvement might be made with little trouble or cost. As a fibre crop, jute requires light showers and sunshine in the early stages, and then really good rains for the rest of the season; and the Brahmaputra delta gives this to perfection. But the conditions do not produce the best seed, for there is too much rain and too little sun; and so the seed from the Ganges delta, especially from the upper part, is much the better, though the water there is too dirty and too scanty to suit the fibre either when growing or when being retted. In the meantime, however, no other area in the world can really compete, because here there are also a large population needing a cash crop, an assured market to take the crop, and very cheap and easy access to the market.

Rice. This "Bengal" unit produces also fully 35 p.c. of the total output of rice in India (excluding Burma), a "wet area" producing a "wet crop," but a crop which should be considered as a monsoon rather than a tropical crop; and there are several reasons for this. Rice does not make bread because of its lack of gluten, and—even when not polished—it is far inferior to wheat as a food; but its high content of starch enables it more or less to take the place of both bread and potatoes, so long as it is associated with peas and beans. But, like wheat, it is really almost a "luxury," and not more than about 30 p.c. of the Indian population can afford to live on it; and all over the world the finest qualities are both grown and consumed in high latitudes, "super-Carolina" being grown in Lombardy (45° N.). For, as rice is an annual, and has a very short growing-season, it can ripen perfectly even where the mean winter temperature is below 32° F.; but it must have a large amount of skilled and yet cheap hand labour—for weeding as well as transplanting—in

addition to an assured supply of water, and 95 p.c. of the World's total output is grown in the Indo-Japanese lands.

Deltas in a monsoon climate enjoy the ideal conditions. They have high summer temperatures associated with the necessary alternation of sunshine and rain; their soil is normally a rich sandy loam loose enough to drain,[1] but heavy enough to drain slowly; and the film of algae on the mud supplies the necessary modicum of (bacterial) nitrogen and the oxygen which is so vital to a crop that is intermittently submerged for 80 to 90 days. At the same time over 1 p.c. of unhusked rice is nitrogen, and the plant does not seem to need much nitrogen, as it can be grown on the same land year after year with impunity. Rice can be grown "extensively" —by machinery—*e.g.* in Louisiana and Texas; but, where the relations of rainfall and temperature are most suitable, small holdings are also most suitable. These are unfit not only for machines, but even for much animal labour; and the work is so intensive that there is little hope of increasing output except by improvement of seed. The prospects here are good, for only a skilled and intelligent population can raise rice; and in the main rice-lands the population is so dense [2] that experiments can easily be carried out on a large scale. Rice yields *c.* 500 lb. of grain more *per* acre than even maize, and India—with *c.* 30,000,000 tons —is the largest producer (over 30 p.c.) in the world. **Monsoon Deltas.**

The one serious drawback to rice as a staple food is the very high percentage of starch, and this fact probably lies behind the persistent undernourishment of the poorer members of a rice civilisation; for the high percentage of starch so dilutes the protein, *e.g.* of the soya bean, that the digestion cannot absorb, or even tolerate, the quantity which ought to be taken to neutralise the excess of starch. There should be, therefore, every possible effort made, especially in India and Japan, to make rice *supplementary*— to a better staple, *e.g.* the soya. The soya flour contains over 41 p.c. of protein, while oatmeal has less than 14 p.c., and wheat has less than 11; and it contains over 20 p.c. of fat, while oatmeal contains just over 6 p.c., and wheat just over 1 p.c. **Protein.**

Wheat in India is described as "a dry season and a dry area" crop, *i.e.* a winter crop—in either the north-west of Hindustan or the north-west of the Deccan; and *c.* 75 p.c. of the total is raised on the alluvial soils of the Punjab, where the dryness is both an advantage and a disadvantage. The soil must be allowed to get "cool" before sowing, and this loose soil in the dry climate and the relatively high latitude cools quickly; but—for the same reasons—the temperature rises very fast at the beginning of the hot weather, and **Wheat.**

[1] Transplanting pays probably only because so much care is devoted to tilling —which means airing—the nurseries.

[2] Where a rice-growing population is sparse, the variety grown is nearly always an "upland" or "dry" one.

so the season is very short, and there is great need for a quick maturing variety. Some of the Pusa wheats, *e.g.* Nos. 12 and 4, are exceedingly fast growers, and are of much better quality than the old Indian varieties ; and yet they have the same low percentage of moisture and high percentage of flour. The alluvial soil is more suited to "bread" wheats and less suited to "macaroni" wheats than the lava.

Sugar. While wheat is typical of the dry Punjab, and rice of the damp Bengal, cane-sugar—"a dry area, but a wet-season crop"—is typical of the United Provinces, which produce 50 p.c. of the whole Indian output, while the east of the Punjab produces 15 p.c., and the west of Bihar 10 p.c. The approximate limits are from Gurdaspur and Amritsar to Darbhanga and Patna, the soil east of Darbhanga lacking air and the wide flooding attracting rice-growers. For, though sugar-cane requires plenty of subsoil water and high humidity, it must have a well-aired soil ; and so here it is grown on the northern belt, *i.e.* the best-drained, *e.g.* from Rurki to Meerut, round Bareilly, and between Fyzabad and Gorakhpur. Even so, as it is planted in February, it has to face the hot weather, and so it ripens too quickly to give a large crop ; indeed, the Indian yield is only about 1 ton per acre, compared with at least 2 tons in Cuba and 4 in Java.

Tea. Tea, like rice, is associated with a dense population of skilled cultivators ; and the last point is reflected in the very high yield per acre (nearly 600 lb) in Travancore (with 200 persons to 1 square mile), though, of course, the relative humidity on the Cardamom hills during the dry season is very high, and there is nothing resembling the "real winter" (41° F.) of Darjiling. The Nilgiri gardens are nearly as much favoured as Travancore, though they do not yield more than *c.* 400 lb per acre, but their relative humidity in February–May is less, and most of them do not reach the optimum 90″ rainfall. At the same time, their total yield—especially at *c.* 3000 feet—is much greater, though it does not approach even the Darjiling total ; and they do not suffer, as Assam does, from a remote situation, which involves much expense and difficulty in organising labour.

Millet. Millet is a native of south-eastern Asia, and bears rather the same relation to rice there as rye bears to wheat in Europe ; for it is a "poverty" crop, that can accommodate itself to lack of rain, rough ground, and poor soil, and almost any other drawback except low temperature. Some varieties will ripen in every part of India in almost every season—dry or wet, hot or cool ; and some will mature within six weeks of sowing. But it is foolish to expect good physique and vitality in persons who live mainly on *birdseed* !

CHAPTER XXVIII

CEYLON

CEYLON is really a small portion of peninsular India that is just broken off from the rest, and—according to the legend—the break was as recent as A.D. 1480 (!), and occurred during the course of a terrific series of storms; but it would not be beyond the power of the engineer to re-unite the two—by a pile-and-causeway railway track across Adam's Bridge. **Adam's Bridge.**

This is a bank of fine coralline sand resting on solid rock that runs more or less continuously from Dhanushkodi, on the south-eastern corner of the sacred island of Rameswaram, to Talai Manar, on the north-western corner of Manar island—a distance of 21 miles. Some parts of the bank are normally dry land, very few parts are much more than four feet below water at high tide, and the exceptions are narrow and intricate creeks, in which the mean depth of the water is not more than 40 feet. Of the two chief creeks the Manar Passage is useless, but the Paumben has been deepened sufficiently to be useful to coasting craft between the Malabar and the Coromandel coasts, saving 600 miles on the journey round Ceylon.

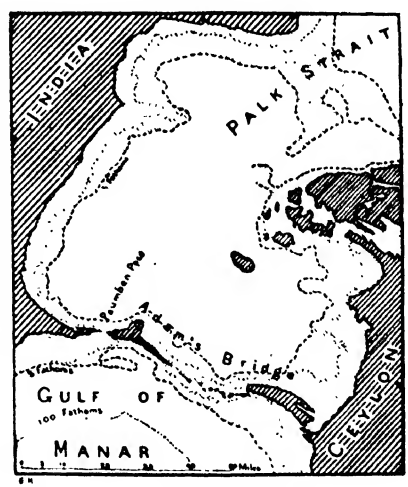

FIG. 98.—Adam's Bridge.

Except for this, it would be much better to convert Adam's Bridge into a pile-and-causeway railway track; and this would present such an obstacle to travelling sand that the two islands of Manar and Rameswaram would very soon be linked up again. Even now the rapid growth of coral and the heavy deposit from the Coromandel current, when flowing southward, necessitate con- **Drift Sand.**

stant attention to the Passage; both the Palk Strait and the Manar Gulf lie directly on the line of the regular winds; the former is seldom more than seven fathoms in depth, most of it west of Pedro Point being much less than that; and during the height of each monsoon, though the base of the Bridge seldom exceeds 10 miles in width, the sea-level may be 18 inches higher to windward than to leeward.

The Coromandel coast is the main source of the sand, and the Palk Strait is both narrower and much shallower than the Manar Gulf; and, as the deterioration of the "Oriental" pearls since Phoenician days seems to have been due entirely to the drifting sand,[1] any closing of the passage would improve the pearls in the Manar Gulf. The *paars*, or pearl-banks, here that are well out to sea, *e.g.* the Cheval and the Modragama, a dozen miles out from the Arippu coast, are still valuable sources of fine pearls.

"Indian" Features. Though Ceylon is quite small, only about half the size of England, it reproduces almost everything that is typical of the mainland. For the Straits are no wider than the Pal-Ghat valley, the old crystalline rock is similar to that of the Anaimalais, etc., heights are comparable with those of the Western Ghats generally, and the parallel ridges of the core follow exactly the same N.W.–S.E. trend. Indeed, the most marked dissimilarity is the absence of the hill-knobs that are so typical of the Dekkan; and even of these there are examples. The ruins of the sacred city of Anuradhapura, the ancient capital, are overlooked by Mihintale (Missiaka); Sigiri has a very steep "plug," 400 feet high, on the flat top of which there was once a fortified palace; and Kurunegala is crowned with the 600 feet of Adagalla ("Tusked Elephant").

Again, the west and south-west coasts closely resemble the Malabar coast, being low and lined with backwaters; these are relatively large, and provide refuges for the native craft, but have no great natural harbour; their shores are covered with coconut-palms; and their hinterlands, though low, are often very rough. The Dutch connected most of them by canals, and made a safe thoroughfare, which is still very useful, *e.g.* between Colombo and Negombo; but it is quite inadequate to modern needs.

Trincomali. There are some similar lagoons on the east coast, *e.g.* those of Batticaloa (30 miles long) and Mullaittivu, and the island of Jaffna is made by the meeting of two; there is a minor coconut industry along this coast, mainly on Jaffna, off which there is a chank fishery, and there used to be a pearl industry, *e.g.* in the Tambalagam (Tampalakam) lagoon near Trincomali. But, generally, the east coast is bolder and barer than the west, and its one great advantage is relatively "wasted"; it has in Trincomali one of the great

[1] The irritant round which the nacre is deposited, is *not* the sand itself, but a tiny tape-worm (from fish-eating rays).

natural harbours of the world—large and deep and finely protected by low promontories that leave a wide entrance. But for both internal and external trade this is now a position on the wrong side of the island.

Galle and Colombo.

Galle is on the right side, and at the right end, for World trade, and not badly placed for home and Indian trade; and it is large and deep. But it has one great drawback—it is exposed to the most stormy (S.W.) quarter, and so is difficult and dangerous to enter during the Wet Monsoon. On the other hand, Puttalam—a very ancient pearling station—and even Negombo are too far north for the World trade, and it would have been very expensive work equipping them as Colombo has been equipped. The latter is in the best position for the sea-trade, and commands the natural relation of the mountain core to the most fertile part of the northern plain; and it is also the most central for coconut, rubber, and tea exports. But it is—except for a small promontory to the south—a purely artificial, though finely equipped, harbour, with its main breakwater running for three-quarters of a mile along the west side, with just enough trend east of due north to "give" to the S.W. gales.

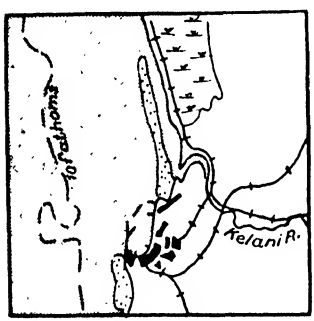

FIG. 99.—Site of Colombo.

Mountain Core.

The island is divided into two fairly equal parts—a northern lowland and a southern highland; and fully one-third of the southern half is filled with a mountain core, a forested triangular dome, much of which is above 5000 feet, while its central summit reaches *c.* 8300 feet in Pedrotallagalla (Pidurutalagala), and Kirigalpota and Totapellakanda are respectively just over and just under 7800 feet. The famous Adam's Peak is only *c.* 7350 feet, but—apart from the curious foot-shaped depression on its conical crest, to which it owes its sanctity—it stands out boldly to the south-west, where the plain is narrowest; and so it has much the most spectacular appearance, and even "blankets" some of the higher peaks.

Its Rainfall.

Though this mountain core covers only some 4200 square miles, it is of very great climatic importance. Its north-eastern face guarantees a maximum of orographic rain off the "Dry" Monsoon, nearly all the exposed parts having 100″ of rain, and many of them 150″, while 200″ are registered in the extreme north-east. Its south-western angle, dominated by Adam's Peak, with above 200″, spreads the cyclonic rains along both the other faces of the core; but the nearness of the great heights to the S.W. coast

causes such torrential and complete precipitation that the total area receiving really heavy rain is curiously limited, not reaching half-way up the west coast or half-way along the south coast. In fact, there are no parts of the whole island that have not an assured rainfall above 25″ except behind the northern part of the west coast and the eastern part of the south coast.

N.E. *v.* S.W. Monsoon.

The rest of the island is far from being all lowland, still less level; but its relief does admit both monsoons to the heart of the land, so that—in spite of the latitude—there is nearly always and everywhere a good enough circulation of air to make the climate relatively healthy, and no part has less than 50″ of rain except the north-west and the south-east. But the N.E. Monsoon reaches farther inland than the S.W. Monsoon, and affects the country more generally. When the north-east coast is having its month of heaviest rain (fully 20″), the south-west coast has at least 14″ or 15″, and during the two driest months (January–February), Colombo has as much (5″) as Mullaittivu; but, when Colombo is having its heaviest rain, Batticaloa does not have 30 p.c. as much. The N.E. Monsoon is, therefore, really more valuable to the island as a whole, if not to the mountain core—so largely also the economic core; and to describe the north-eastern half of the island as "a dry region" is simply incorrect. Jaffna has *c.* 60″ and Trincomali *c.* 63″ of rain; the hinterland of Trincomali, round the Kantalai tank, has 75″, and so has the hinterland of Mullaittivu. The Mahavilla[1] (*Maha-weli-ganga*, "Great Sandy River"), which empties into Trincomali Bay, is more than 200 miles long, and much of its basin is well enough forested to shelter herds of wild elephants, while even in its upper valley, at a height of only 1700 feet, the old capital of Kandy has a rainfall of nearly 85″,—over 80″ in October–December, *i.e.* directly off the N.E. Monsoon.

Equability.

The exposure to both monsoons is further emphasised both by the latitude and by the insularity, so that the climate is extraordinarily equable. The annual range of temperature at Colombo, where the length of day does not vary one hour throughout the year, is only 3° F.; on the north-east coast it is 7° F. at Trincomali and 8° F. at Jaffna, *i.e.* at most only two-thirds of the *daily* range at Colombo. But the rhythm of the rainfall is definitely monsoonal, not equatorial, even if there are marked rains at the equinoxes. Thus, in May, when Colombo has over 12″, Trincomali has less than 2½″, and Jaffna has not much over 1½″;" and the difference in April is almost as great. The latitude is the cause of the very early start of the S.W. Monsoon (April); the insularity is the cause of the heavy autumn rains everywhere—even Colombo, like Trincomali and Jaffna, having its heaviest rains then, though "autumn"

[1] The river seems to owe its name *less* to its decrease in volume during the S.W. Monsoon than to the network of channels through which it works out into the lagoon.

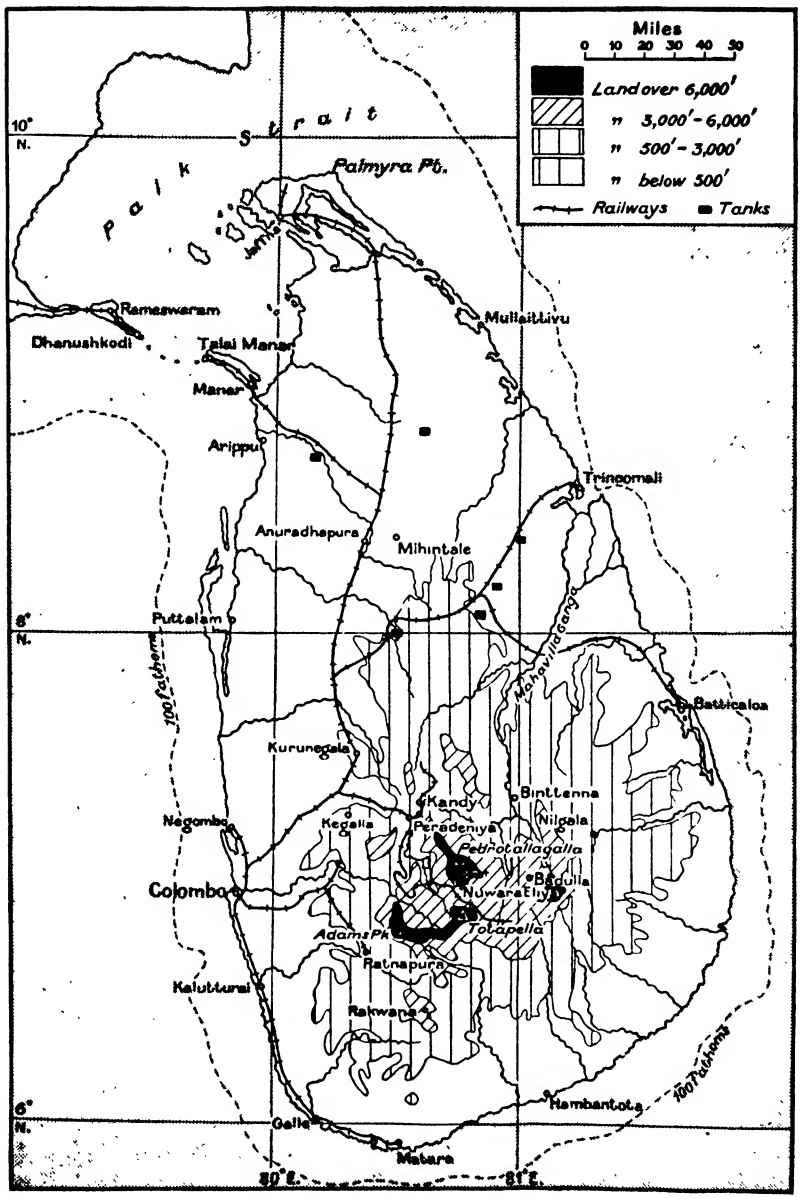

FIG. 100.—Relief of Ceylon.
Land below 500 feet is left unlined.

in the west means October–November, and in the east November–December.

Structure. Away from the mountain core in all directions, but specially to the north, structure is more important than relief, and wind is more important than rain. The main feature is the very wide extension of gneiss, disintegrated [1] into laterite or overlaid—especially in the north—by thick limestone, and fringed almost everywhere with a coastal belt of sand. In many places this is a threefold belt—of dunes, lagoons, and a narrow leeward strip (2–3 miles wide) on the mainland dominated by blown sand, much of it pure white in colour. Where this is free from humus, it is the natural home of the cinnamon; but where *débris* from torrents has been distributed along river banks or along the shore, there is an equally admirable location for the coconut-palm, which grows in great luxuriance, especially from Puttalam to Matara, and even on to Hambantota, on the edge of the dry belt (25–50″). It spreads inland too—up to the highland piedmont, *e.g.* as far as Kurunegala, one of the ancient capitals of Ceylon and a place of sanctity to Buddhists, and now the centre of the graphite mining.

Western Lands. At the same time, much of the land between this west-coast belt and the core is rough and rather intractable, of very little value except where it is crossed by valleys. Where these are not spoilt by beds of ferruginous clay, they can be used—though far from fertile—for raising areca-nut palms and ample crops of rice; for, owing to the unfailing alternation of sunshine [2] and rain, "if you drive an iron crow-bar into a macadamised road in Ceylon, it will blossom like Aaron's Rod." The rice is very nearly as important to the Sinhalese as the coconut,—more so, simply as a food-staple; and it covers nearly as much land, twice as much as either tea or rubber.

Eastern Lands. To the east of the core there is a piedmont of somewhat similar relief, but much broader and with much more widely spread belts of deep alluvium, brought down from heights where there are veins of lava; and this forms a foreground from Kandy to Badulla, and deploys on to the great belt of forested laterite in the Mahavilla basin. Under the Kandy sovereigns there was a dense population here, raising very large harvests of grain; and the ruins of ancient irrigation works throw some light on the origin of the widely spread swamps of to-day.

Irrigation. With drainage these lands would again be "the granary of southern Asia," as they were before constant war caused them to be devastated—mainly from broken dams, not by man; and here, as often in India, drainage is more needed than irrigation, for most of the area has 70″ of rain. But, for continuous cropping, and specially

[1] In the Galle hinterland disintegrated felspar has formed huge deposits of kaolin.

[2] The Hindu name for this Sinhala, "Land of the Lion" (I) is *Lanka-Dwipa*, "Shining Land".

for summer harvest, irrigation is essential; and some of the old works (tanks) were of great size, *e.g.* at Minueri, where the Government has restored a dam that held up a lake 20 miles in circumference, and many thousands of acres are now being irrigated from it, after receiving 75″ to 100″ of rain during the wet season.

These great tanks were almost confined to the land north-east of a rough line from the Pumpalancholai and Rugam tanks behind Batticaloa to the Giant's Tank behind Arippu, the latter *inside* the north-western Dry Region (under 50″); and the line practically passes through this Minueri tank and through the Tirappana tank near Anuradhapura, where the rainfall is over 50″, but under 75″, as a rule.

"Old" Tamils.

The limestone country to the north is occupied by the descendants of the old Tamil conquerors of Ceylon, who are as industrious as they are skilful both as cultivators and as irrigators; and they produce a great variety of crops, especially grain and tobacco, the latter exported in considerable quantities from Jaffna. The more sandy part of this area, *i.e.* the north-east, including the whole island of Jaffna, is largely covered with the valuable timber palm which has given its name to Palmyra Point.

Forested Core.

The mountain core has been the economic core of the country from the days of the Dutch, if not of the Portuguese; and the fundamental fact was always that it was densely forested, even on the highest ridges. Indeed, the distribution of the ancient ancestors of the Veddahs in the lower basin of the Mahavilla was probably due to the forest there being less dense, though thick enough to shelter—as it still does—swarms of wild pigs; and, no doubt, the densest forest of all was round the piedmont of the montane core. There was originally a great deal of valuable timber here, and the ebony and the satinwood are still of some importance; but the finest was always between 2000 and 4000 feet, and was recklessly felled—and burnt!—by the early planters of coffee.

Coffee.

The main cause of this was that it was only at these levels that they found the very rich "chocolate" soils that were so perfectly suited to the coffee—clean weatherings from gneiss or limestone, with age-old accumulations of humus, on quite steep slopes. Of course, this collected only in special "saucers," and miles of fine forest were destroyed to find the precious beds; but, as good tea can be grown on poorer soil than good coffee, the "wasted" land came into use with the substitution of tea for coffee, and has even attracted rubber-growers lately. It was also, fortunately, well suited to cinchona, which helped greatly in the upheaval caused by the failure of the coffee, though a fair quantity of (good) coffee is still actually grown in Ceylon.

Tea is much the most important export in value (50 p.c. of the total); and the higher levels, with their constant fine rain and their

Tea. thick mists, are almost ideal for the production of fine tea. Some lowland tea is grown, *e.g.* some 3,000,000 lb. in both the Galle and the Kalutturai districts; but the mass is grown above 3000 feet, and the best above 6000, *e.g.* on the Nuwara Eliya flats, where the temperature range is less than 5° F. (57°–62° F.), with nearly 100″ of rainfall, 25″ in June–July and 20″ in October–November. Though there is now no more land in Ceylon quite suited to the production of fine tea, the skill and the care devoted to intensive culture are still raising the output both in quality and in quantity (equal to 60 p.c. of the Indian total).

Rubber. The growing of rubber here has been a mixture of the wise and the unwise. The rainfall along the whole of the western flank, from Kurunegala to Ratnapura, varies from 100″ to 200″; and the crop has been so well "covered" (with "permanent" cover crops) and well manured that the quality of the product has been very fine. But the temptation to use old coffee-plantations should have been resisted, for above 1500 feet—however heavy and constant the rainfall—night temperatures retard the growth of the plant, and the yield is lessened, even when disease is not much more rampant. The mistake may have been unconsciously encouraged by the altitude of the Peradeniya Research Station.

Cacao. The success of the cacao plantations—though the export is quite small, less than that of areca-nut and much less than that of cinnamon—shows what might have been done with the rubber, if the plantations had not been too high; but it is suggestive of the insular and semi-equatorial equability of the climate. It is very significant that the plantations are on the north-eastern and not the south-western flanks of the highland, the largest in the Mahavilla valley (with 150–200″ of rain) and the next two between Kurunegala and Kegalla (with 100–150″). The success of the Research work[1] here, as in both coconut and tea, has been very remarkable; and equal attention has been paid to the export machinery, *e.g.* for the various coconut products, of which copra is far the most important, while desiccated nuts are more important than oil. The total harvest is estimated at 1,000,000,000 nuts—off some 900,000 acres.

Minerals. There is a large amount of iron in Ceylon, some of it of exceptionally fine quality; but, in the absence of coal, there is little or no demand for it. Indeed, apart from the graphite (plumbago) industry, centred in the Kurunegala district, the only mining that is at all regularly carried on—or that suits the Sinhalese!—is the digging for gems in the alluvial deposits south of Adam's Peak. Even this is done only during the dry season; and the impossibility of preventing wholesale theft has prevented Europeans from taking any practical interest in the industry. Of course, the main

[1] Ceylon cacao has been fetching very high prices on the London market—50 p.c. above Trinidad and 100 p.c. above West Africa.

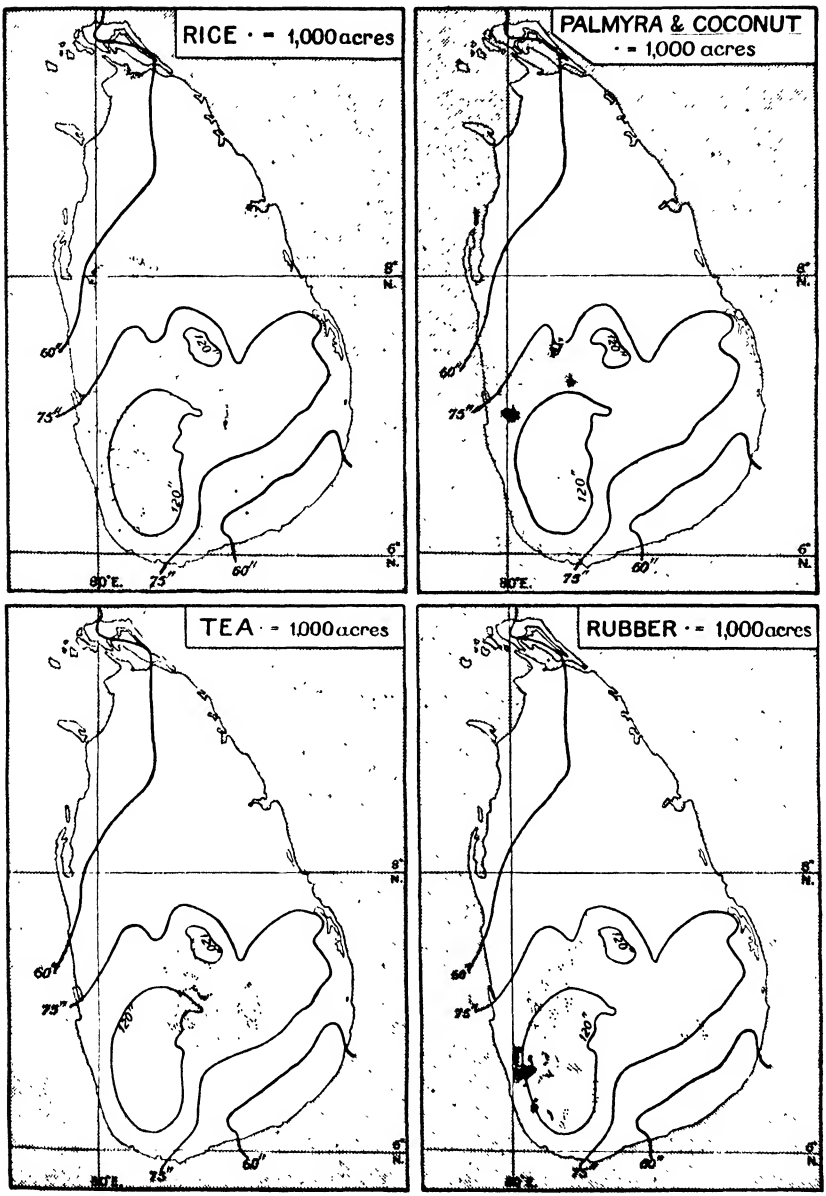

FIG. 101.—Crops of Ceylon.

value is in the corundum products, sapphires and rubies; and the sands and gravels in which they are found are distributed "between" Adam's Peak and Matara, *e.g.* round Ratnapura and Rakwana. The chrysoberyl products, *e.g.* the real cat's-eyes, though nearly as hard as the diamond, are much less important.

Fishing. Ceylon has very good facilities for fishing, for the Pedro and the Wadge banks are large (1000 and 4000 square miles) and rich (bonito, seer, and other "mackerel"). Stormy weather on the two comes at different seasons; they are both convenient for Colombo—the Pedro by rail *via* Kantesanturai; and the ports are well distributed, *e.g.* Jaffna and Matara, Puttalam and Batticaloa. But the fishing is as much neglected as in India, though it might be a useful source of nitrogenous food and of cheap fertiliser; indeed, more divers come to the pearl and the chank fisheries from Tuticorin and Kalikarai than from Paumben and Jaffna.

The reasons for the neglect are the same in both countries; religious scruples prevent many people from eating fish, and the fishing is left to the poorest and most ignorant; and, in their catamarans and dug-outs, the fishermen scarcely venture beyond the 5-fathom contour, though there are fully 40,000 square miles of the continental shelf in the two countries within the 100-fathom line and perfectly safe for half the year.

"Aryan" Capitals. Historically, the northern half of the island has been the more important, probably because the original "Aryan" conquerors from India (*c.* 500 B.C.) found the forest to the south too dense to penetrate. They seem to have known of the high flats, for Nuwara[1] Eliya and Sita Eliya are mentioned in very ancient legends; but the essential core of the early kingdoms was north of the mountains, at first round Anuradhapura. It was only in the face of repeated Tamil invasions that the capital was drawn southward—to Polonnaruwa, to Kurunegala, to Kandy, even to Kotta (Colombo); and there are still clear distinctions between the Lowland Sinhalese and the Kandy Sinhalese, as between the Tamil settlers (the descendants of old conquerors) and the Tamil coolies, who are of much more use, especially in the mountains, than the Sinhalese.

The Veddahs. The great surprise that has been expressed at the aborigines choosing Anuradhpura for their early centre (? 1000 B.C.), seems to ignore the fact that they were (Dravidian) Veddahs from the Malabar coast, possibly part of an armada the rest of which reached Australia. After all, they were Veddahs ("Hunters"), and wanted forests in which to hunt—deer and pig, fowl and fish, not high grasslands on which to feed domestic animals; even their favourite kind of habitation was a *rukula* ("house," but literally a "hollow tree"). The land was flat, but covered with open forest; the water-supply was small, but so was the population; the soil was

[1] The name is pronounced "Newralia".

poor, and "drought" (50″ of rain) was fairly common, but they were not agriculturalists. As numbers increased, tanks were dug—as early as 505 B.C.; a millennium later there was a vast reservoir, Kala Balalu Wawa, 50 miles north of the mountains, but reached by two rivers from the mountains, and joined to Anuradhapura by 50 odd miles of canal!

There is abundant evidence of the coast having risen, but even to-day the old Veddah fleet could come safely to shore in the Puttalam lagoon, as the pearling boats do; and Anuradhapura is near enough to the coast for coconut-palms to flourish. No doubt, "the place was exposed on every side," but to what? In the days of Asoka the people became—and have remained to this day,—devoted Buddhists, and Buddhism is not a military creed; if there was danger, the forest had abundance of fine timber[1] for making a stockade; and a climb up the 1800 great blocks of granite that were built up as a staircase to Mihintale, suggests that at all events the city need never have been taken by surprise—at least by day. **Buddhism.**

Even when it seemed wiser to remove the capital to the royal seat at Polonnaruwa, the old capital did not suffer much ill-treatment from invaders. The Thuparama Dagoba and Buddha's Bo-tree have survived for well over 2200 years; and, if the Brazen Palace lies in complete ruins, the 1600 granite monoliths that still survive show that the masons were carving "trees" in stone. And the surviving Veddahs are still "hunters," and still live in the forests, though mainly in the hill-forests of Bintenna and Nilgala and Badulla—the latter at a height of over 2000 feet.

[1] Chinese records say that it was surrounded by a wall (of "brick"); but, if it was brick, and not wood, there ought to have been some traces left of it

CHAPTER XXIX

THE INDO-PACIFIC FAN

Kham Focus. At each end of the Tibet plateau there is an orographic focus with a hydrographic focus to windward of it, but they are alike in almost no other vital respect. In the Pamir core of Asia the trinity of great mountain systems had room to expand in a natural fan, and it is so far, and so much cut off, from the ocean that its climate is purely continental; but this Kham focus is crushed into a corner of Asia, with no room to expand naturally, and below it—*i.e.* south of 28° N. and east of 98° E.—the climate is sufficiently oceanic to justify its description as Indo-Pacific.

95°-100° E. In any case we are in the critical 95°–100° E. longitudes, and the feature-lines trend north-and-south; and the fierce Pacific warping is bound to be reflected in narrow and tortuous valleys, where violent torrents are constantly obstructed by obstacles, until —in the words of Mr. Kingdon Ward—"every valley has a broken back." These valleys, too, and the towering ranges above them are exposed, alike by their nearness to the ocean and by their orientation, to the whole force of the S.W. Monsoon, even if there is no rain left in it by the time that it reaches their culminating eastern crests. The constriction that is typical of this crumpled corner of Asia is illustrated remarkably at the core of the critical longitudes, *i.e.* 28° N., 98° E. For here, between the east end of the present Himalayas and the west end of what was (cf. p. 562) their original extension eastward—which we may call Ta-shuch-shan—three great rivers [1] converge on a 70-mile bottle-neck, to diverge again to an extreme of some 700 miles between Cape Negrais and Cap St. Jacques.

The Three Rivers. All three are rushing southwards in parallel courses down deep and narrow gorges that are overhung by steep and towering walls; and, while the rains come from the south-west, the walls rise progressively to the north-east—to a maximum of *c.* 21,000 feet in Tsaya and of possibly 22,000 in Damyon. Even in the far west, however, the height is great enough to rob the winds of most of their

[1] The Irawadi (Taron) is, of course, much smaller than the two others.

rain ; and, while valleys are deepened, and gradients are steeper in the west, the snow-line rises, and crests are blunter, in the east.

Even the Hapi-pu-lo, the Irawadi *v.* Salwin divide—according to Mr. Ward—seems to reach 19,000 feet ; but this is exceptional, and Gomba La (" The Monastery Mount ") is not more than 16,000, though it is snow-capped for 1000 feet, and receives heavy falls of snow in October–November even at 11,000 feet. At 28° S. the Salwin is below 5000 feet, but the Irawadi is lower, and has a steeper grade ; and to cross the divide is to go from the stagnant air **Snow-line.**

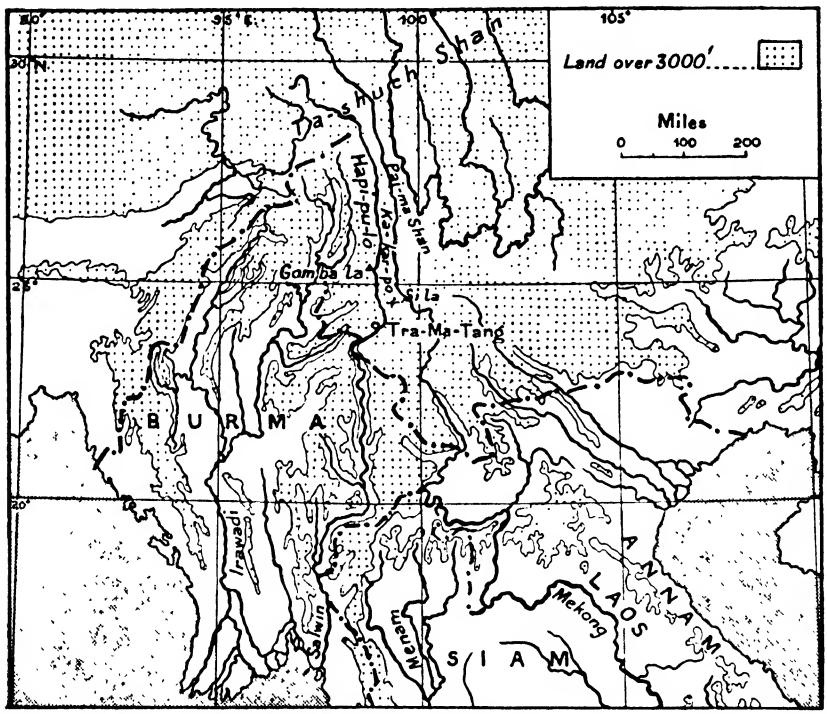

FIG. 102.—Indo-Pacific River-fan.

of forested glens to the wind-swept moors of arid terraces. But the Ka-kar-po crest between the Salwin and the Mekong is 1000 feet higher—though the Si La pass is only 14,000 feet—with a snowline 2000 feet higher ; and, as a matter of fact, the Mekong *v.* Yangtze divide is again 1000 feet higher in the Pai-Ma-shan, with its snow-line at *c.* 19,000 feet, and it is sierra and not an Alpine line, like that of the Salwin *v.* Mekong divide.

These heights and the steady rise to leeward are explained by the narrowness of the bottle-neck. Not one of the rivers has any width of basin to allow of any great bends or any great tributaries ; the Salwin, in some places, is less than 100 yards wide, it drops over **Bottle-neck.**

1000 feet in less than 100 miles, and 40 miles would bridge both the Mekong and the Salwin basins[1] or take us from the bank of the Mekong to that of the Irawadi. Indeed, Mr. Ward suggests that our ignorance of the height and the glaciation of these ranges may be due to the narrowness, deepness, and straightness of the gorges, which make it difficult for travellers on the river-banks to see any peaks; but suspicion might—and should—have been roused by such names as *Kari* ("Snow-peak") when used so frequently by the scanty population.

Central Yoma.

South of this bottle-neck, *e.g.* south of Tra-Ma-Tang on the Salwin, the grip is lifted; the basins widen, their axes fan out, their enclosing walls sink rapidly, and wet winds can reach as far as the Salwin *v.* Mekong divide, though the fault at the western foot of the Shan plateau leaves a wall of 4000 odd feet which the wet winds have to climb. This does so far dry the wind that the Salwin *v.* Mekong divide becomes much the most important in the whole area, separating the Indo-Malay from the Chinese flora and fauna, as the Irawadi *v.* Salwin divide does farther north. It is even the great racial divide—between the Tibeto-Burmans and the Sino-Siamese. It is also the central rib of the fan, the "Kun-lun" of the trinity; and, inside our area, we may call it the Shan or Siamo-Malay, for it is the great *yoma* ("spine") of the peninsula—to its termination in Cape Romania. On each side of this spine of very ancient rock, with its mineral wealth, there are two river-valleys—those of the Irawadi and the Salwin, the Menam and the Mekong; and, as the eastern pair are east of 100° E., their older rock has been less crushed, and their basins are wider.

Fan of Valleys.

Each pair of valleys is flanked outwards by minor and younger yomas, and in each case the two valleys are separated by similar divides; and so we may expect all the radiating valleys to be too long for their width. This, no doubt, facilitates movement up them now, *e.g.* by rail, as it once facilitated tribal movement down them; but it must always have favoured a considerable amount of incoherence and political subdivision. The various valleys must always have been more or less independent of one another, and each of them must have tended to break up into—or to be settled in—sections or groups that were also independent. No doubt, the constant exposure to raids from the north—for all movement then must have tended to follow the natural trend of the feature-lines—and the incoherence of the valleys themselves account for the inability of their peoples to develop any real culture or even agricultural systems of their own; and these conditions in turn help to account for the sparse population throughout the peninsula.

A political map at once draws attention to this political inco-

[1] South of the Lu-pe pass (12,300′, 26.40 N., 99° E.) the Salwin is only 18 miles from the Mekong.

herence. The Mekong basin is French, the Menam basin is Siamese, the Irawadi basin is British. The Siamese are the only *T'hai* (" Free Men ") left here to-day, planted on the Menam delta as a fairly natural unit, like the Burmese on the Irawadi delta ; but the French territory is subdivided. The Mekong isolates Lower Cochin China, as the Song-koi delta isolates Tong-king ; Cambodia is a lake plain, the rest of Cochin China is a coastal plain, and Annam is a mountain system. Yet there is a very wide unity—of climatic control, and everywhere on the lowlands human life is more or less the same. **Political Incoherence.**

In the extreme south it may be better to press the equatorial than the monsoonal features of the climate, but in the extreme north it is essential to do the opposite—to emphasise the desiccating influence of a really dry season in a region that is already abnormally dry. If relief rains account for the wide foresting of the yomas, the dry seasons mean the valuable deciduous types ; if the river-floods rise to 40 feet even on the deltas, and spread for a dozen miles over each bank for 8 or 10 weeks every year (September–October, cf. the Nile), there may be a shortage of half the food-supply, fish, in the upper rivers during the dry season, especially on the Upper Menam; many typical plants have feathery leaves and thorny bark, *e.g.* the cutch that supplies the yellow dye which Buddhists use so much ; and the typical cattle, if sleek, are humped. We are in " the land of fire and flood "—of summer cloud and winter flowers. **Climate.**

The food consists of rice and fish, with fruit. All of it is rather flavourless ; and, as the climate affects the appetite—except amongst children—as well as the energy, there is a steady demand for pungent sauces (into the origin and preparation of which it is better not to pry). But there is no demand for more than two meals a day,—the one well before, and the other well after, the hours of great heat. In the narrow valleys the land available for food-crops is too small for a large population, and too precious to be much built over, especially where a house-boat can provide both a home and transport; and, as maximum crop can be won with minimum work, there is no urgent need for energy or decision, nor any great ambition, social or financial. River-life is made easy by a good wind up-stream for more than half the year and a good current down-stream all the year, and social life is made friendly by the absence of these ambitions and jealousies. On the hills, especially in the north, things are otherwise, and the people are different—even in physique and in colour ; but once all of them, in each basin, were much akin. **Food.**

The character and the date of any early racial movements here, as well as their direction, were predetermined by the relation of the relief to the climate. It could not be expected that the very narrow and badly crushed valleys west of the central yoma would give easy access to or from Tibet, or that the population of eastern Tibet **Racial Elements.**

would be as large as that of western China; and the vegetational response to the climate made any access doubly difficult, while it suggested a threefold movement of primitive peoples in obedience to the threefold geographical division. The earliest, according to Major Enriquez, was by Mon-Kher peoples; and they naturally came from the north-east, and preferred the dry and relatively open valley of the Mekong, even if they eventually worked westward as the Talaings. Then the Tai-Chinese spread an industrious peasantry over the healthy Shan plateau, Shans and sturdy Karens (Red and White), whose descendants are great admirers of the British people, but also great respecters of ghosts (*nats*),—propitiated with rice and cheroots and consulted by means of chicken-bones, especially in the spirit-shrine at Sawlon; and the earliest intruders were pushed down off the plateau into Siam. Last of all came the Tibeto-Burman movement, beginning with the (polyglot) Chins and ending—only 200 or 300 years ago—with the Kachins, whose whole lives are tormented by fear of the *nats*.

Kachin Hills.

These Kachins would naturally strike the N'mai-Hka valley first, and found its river, as they called it, a "Bad River"; and even when they reached the Mali-Irawadi, the main stream was still too rapid to deposit anything except coarse gravel—and they were not dredgers for gold—until it escaped from the hills at Myitkyina. Probably the old course of the river, over the dead flat due south from Myitkyina to Bhamo, was too swampy for any settlement; and so they turned away westward over the dry Pidaung plain—now crossed by the railway from Mogaung,—and found their way to the "Kachin hills," for the "Gates" of the "Third Defile" at Lema forbade movement southward by the river. In any case, the Kachins—though they raise fine rice and opium on the low, flat valley of Hukawng, especially round Maingkwan—are essentially highlanders.

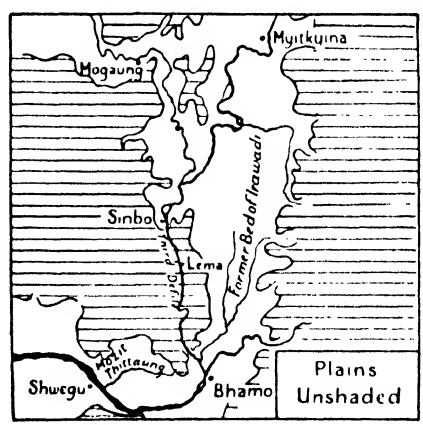

FIG. 103.—The Old Course of the Irawadi.

Physical History.

Dr. Malcolm Maclaren's survey here established that, when the river ran due south to Bhamo, it also ran due west [1] from there *via* the "Thittaung" valley; and it had two tributaries from the "Lema" hills (*c.* 3400′), the northward

[1] From the second great western bend it used to flow on due south down the present Sittang valley.

"Sinbo" Hka and the southward "Bhamo" Hka, both rising at the northern end of the "Mozit" *cul de sac*, up which the S.W. Monsoon still drives its rain. When these two had cut back until their continuous valleys were about the same level as the old bed (below 400′ at the Bhamo end, though the rainfall is well above 70″), some terrific flood carried the Irawadi "up" the one valley and "down" the other, sweeping thousands of tons of gravel before it to be deposited at Shwegu. "The Gates," at the Kachin village of Lema, are only 50 yards wide even now; the average width of the defile for 30 miles is not more than 150 yards; and the flood even at Sinbo sometimes rises 100 feet above low-water level.

Burma

We have already distinguished the Indo-Pacific area, including Burma, from India in all climatic essentials (pp. 131, 132); and the distinction is equally clear in structure, relief, and configuration, in ethnic character and in economic opportunity. The northern mountains here are massed; when they radiate as ranges, they enclose valleys—all of them narrow—rather than plains; the proportion of coast to surface is high; the north-western yomas have been a real barrier; and Singapore is at least a rival of Colombo.

Isolation.

The peninsularity of the whole is marked except in the "temperate" latitudes of Upper Burma; and here the mountain belt is of a very intricate character, which has kept the peoples on the opposite flanks quite separate for many centuries in race and speech, in ways of thought and life. If the Patkai Hills, like the Arakan yomas, are very narrow, they are very continuous; and they give westward only on to the upper valley of the Brahmaputra. Even here neither the valley nor the river has in any way threatened Burma. The climate has always weakened settlers so much that they have been an easy prey to invaders from the north; the dense vegetation has overwhelmed human efforts and aims; and the river and the constant earthquakes have destroyed thousands of villages. The primitive character of the hill tribes, with their bewildering variety of languages—"one for every village"—is the best evidence of the geographical nature of the mountain frontier. The ranges are so high (over 12,000′ in places) and so steep, and the valleys are so deep and so narrow, that movement east-and-west would in any case be extremely difficult and tedious; but the terrific rainfall is reflected in ubiquitous jungle, alive with leeches and mosquitoes, and in swift and dangerous torrents. Movement in any direction, then, becomes incredibly difficult—along "tunnelled" paths, where the Nagas are forever lying in ambush for one another.

Forest. Burning the jungle[1] for rice (or taro, among the Konyaks) led to prodigious denudation and consequent choking of every torrent; and "there is only one place in the whole region from which you can get anywhere"—Kohima, *e.g.* southward round Japvo (*c.* 9800′) to Manipur for the Lower Chindwin, or northward down the Dikko valley to Sibsagar, or eastward round Saramatti (*c.* 12,500′) to the Upper Chindwin.

Farther south, the Lushai and Chin Hills are much wider, and form series of long and steep ranges running due north-and-south and divided by narrow and deep valleys. Any intervening basins have been occupied by wild tribes; and, even if the average height of the ranges is not more than 6000 feet, there are heights which approach and even exceed double[2] that. Above all, the whole is still densely forested—in spite of the destruction done by the tribes in burning off forest for clearings; and, as the hills increase in height, and the valleys decrease in width, northwards, intrusion here from east or west is immensely difficult, especially as the rivers are still in their mountain stages—at least to the southern latitudes of the Kachin hills.

Valley Land. Though the political units of this Indo-Pacific peninsula show a close general likeness in their Pacific trend of feature-lines and their Indo-Pacific climatic phenomena, there is in each case one marked feature which differentiates the particular unit from the other units; and in the case of Burma this is its character as a land of river-valleys. All the three great rivers of the peninsula drain some part of Burma; but the Mekong is of no importance except as a useful frontier for 100 miles to the Shan States, and it is walled off on the Burmese side by ranges which seem to reach at least 7500 feet.

The Salwin. Like the Mekong, the Salwin—also useful as a frontier (to Lower Burma)—is a Tibetan river, far longer than the Irawadi; but it is not much more than a terrific mountain torrent. It rushes along over a rocky bed at the bottom of a narrow trough with steep walls rising from 3000 to 6000 feet; while its general trend is due south into the Gulf of Martaban, it screws through innumerable sharp angles; when it is just ready to deploy on to a plain 100 miles from the sea, it is joined—from the *south*—by the Thaung-yin, and its course is broken by "the Great Rapids,"—in which even teak logs are often torn to pieces, and these lead down to "Little Rapids." Its basin is so narrow that, in spite of its source and its length, it does not carry very much water, and it has no real delta. Moulmein is a *hill* town and not on the river, for the harbour is really made by the island of Bilu-Gyun (*c.* 100 square miles) and the Ataran.

[1] Called *jhuming* here, but *taungya* farther south.

[2] Saramatti is estimated at 12,500 feet, and Sabu and Worung are certainly above 11,000′, while the Arakan yomas reach nearly 10,000′ in Lihlang.

The river is navigable in places for considerable distances, *e.g.* below Kunlon Ferry; but it has really only two merits—beauty and facilities for floating teak. It is one of the most picturesque rivers in Asia—picturesque not only in the bad gorges, *e.g.* east of Papun, but for hundreds of miles, even ferry-villages being perched up 1000 feet above low water, and always high enough to allow for regular rises of 60 feet during flood and occasional rises of 90. The facilities for floating teak when the river is not too high or the current too strong, are largely due to the absence of traffic. Even at Kyodan, below the north-western spur of the Dawna range, the whole stream can be "netted," and then the logs collected into rafts to be piloted down to Kado.[1] **Teak.**

The direction of the Ataran—like that of its greater neighbour, the Haungtharaw—which also helps to make the Moulmein harbour—emphasises the persistence with which the rivers follow meridional courses, whether southward or not. Any deviation is made by sudden and short right-angled bends. The Chindwin and the Sittang—like smaller rivers, *e.g.* the Shweli, north of the Mogok ruby mines—at first flow north; about 24° N. both the Salwin (west of Ming Ping) and the Irawadi (west of Bhamo) take 50-mile sweeps westward, and the Irawadi repeats this at Mandalay, as the Salwin does near Mong Tung. **"Pacific" Trend.**

The Irawadi is of supreme importance; even its Chindwin tributary is navigable up to Kindat, and to Homalin—100 miles farther—in the rains, though shifting sandbanks and the swift current are troublesome. The Sittang, too—which may be taken as an annex of the Irawadi basin,—is navigable up to Shwegyin, and has deposited a fertile delta, helped by the strength of the tides up the long, southward estuary. Indeed, since the Nyit-kyo canal gave direct access westward to Pegu, boats have avoided the estuary, as the bores are exceedingly violent. **The Irawadi.**

The Irawadi is formed of two head streams, the Mali and the N'mai, which meet at Kwitao, and small steamers can reach this point at high water, so that the whole of the waterway known as the Irawadi is actually navigable; but it is not always navigable, and different reaches are navigable at different times. For instance, in this reach above Myitkyina it is navigable only at high water; but in the Sinbo gorge, between Myitkyina and Bhamo, navigation is impossible at high water. There is a second gorge below Bhamo, at Sinkan, but it is wider, and the current is weaker; and below this, at Shwegu, the river definitely enters its plain stage, and then below Shwedaung it enters its delta stage, though the tide is not felt above Myanaung.

The only distributary that is used by ocean vessels is the extreme

[1] There is no other traffic on the first part, *i.e.* above Shwegun, and that is reached only by small steamers.

Rangoon. western one *via* Bassein; for the "Rangoon river" is formed by the Pegu and the Hlaing, which is not really a distributary of the Irawadi. Rangoon, however, does *c.* 85 p.c. of all the sea-trade of Burma, for it is really on a spur of the Pegu yoma, and so commands both the Irawadi and the Sittang valleys; and, though 40 miles up the river, it has magnificent pontoon accommodation for its immense river trade.

Outlying Areas. It is almost true that "Burma is practically the Irawadi basin," for the Arakan and the Tenasserim divisions of the country are of relatively little importance, and the Shan plateau is very imperfectly known. Of course, the Arakan yomas and their continuation in the Chin-Patkai hills are large feeders of the Irawadi basin; but the area to the west of the Arakans is quite small, and the northern part is hilly and barren, making a natural frontier-belt. The southern part, however, is very fertile, though too narrow for any large [1] rivers; indeed, in relief and climate and products, it is exceedingly like the Malabar coast except that the outer spits of the backwaters appear here as actual islands, *e.g.* the Barongas and Ramree, which produce petroleum.

Coastal Climate. The concave tendency of the coast is of climatic importance, for it gives full strength to the monsoon, so that even the shore has a rainfall of *c.* 200 inches, extending over May–October, but with very nearly, or even more than, half in the two months of June and July, *e.g.* at Moulmein and Akyab. The equability is very marked, the range at Moulmein being only *c.* 10° F. (from 76° F. in January to 86.1° F. in April), and that at Akyab being 15° F. (from under 70° F. in January to under 85° F. in May); and the thermometer at Akyab never rises to 100° F. As the harbour is well protected in itself and in its approach from all S.W. storms, while the Kaladan river is generally navigable for nearly 100 miles, Akyab has become a very important rice-port, though more as a feeder of Calcutta or Rangoon than independently; and it is now the third port in the country. Boats from Sandoway, where the rainfall is over 200″ (214″), can reach Akyab in any weather behind a continuous succession of islands.

Rice. The bulk of the Burma rice crop is admittedly of poor quality; and the excuses given for this are, no doubt, partly justified, *e.g.* such a rush of work in the ports—with a normal scarcity of labour—that much of the rice is broken, and the poor cultivation in the areas nearest markets owing to the absence of proper rotation and of cattle-keeping. But some blame should be laid on this absence of responsibility amongst feeder-ports, as at Akyab, and on the fact that the chief markets are in eastern Asia, where cheapness is of more importance than quality; but our increasing import of Spanish

[1] Even the small ones, *e.g.* the Sandoway and the An, make a determined effort to flow due northward or due southward.

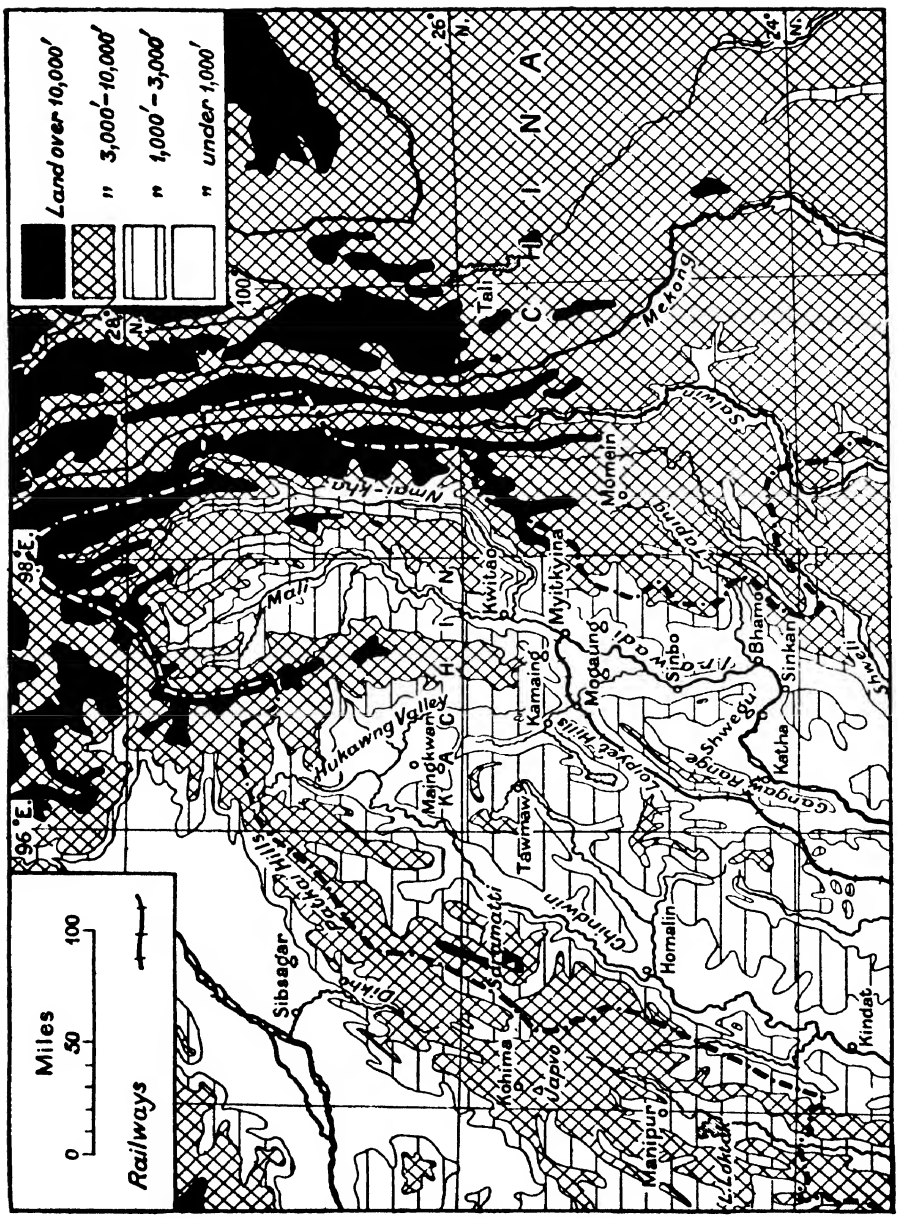

FIG. 104.—Northern Burma.

and Italian rice ought to have some significance for the largest exporters of rice in the world.

Tenasserim. The Tenasserim strip, which was the original nucleus of the whole province, is a narrow, hilly strip, 400 miles long and nowhere more than 50 miles wide, with a very heavy rainfall and innumerable streams; but even here the same extraordinary persistence in a meridional course is seen in the rivers. Both the Tavoy and the Tenasserim rise *farther west* than their mouths, and the latter flows southward for 150 miles never more than 40 miles from the sea and sometimes less than 20; and this provides wonderful transport for the timber from the Bilauktaung range (5000 feet) to the port of Tenasserim.

Mineral Wealth. But the region is far more important than the Arakan strip because of its mineral wealth. For the granite core of these "Malay" mountains is associated with a variety of valuable minerals, especially wolfram (tungsten) and tin; and bismuth is found in the quartz veins that are worked for the wolfram and the tin, while petroleum is found in the islands, *e.g.* the Barongas and Ramree. The Tavoy and Mergui areas are much the most important, and the tin is rather the more accessible, because it is present in the river alluvium. The tin is the more important in Mergui, especially to the south, *e.g.* Karathuri; but the wolfram is the more important in Tavoy, which is rich in other minerals, *e.g.* mica. The port of Tavoy is not as good as Port Owen, on Tavoy island,—famous, like all these islands, especially in the Mergui archipelago, for edible birds'-nests; and there are numerous rubber plantations in both Tavoy and Mergui.

"Rubber" Climate. The conditions for the rubber here are exceedingly favourable, not only in respect of climate and convenience of transport, but also in respect of access to good and sufficient labour. Mergui may be considered thoroughly typical of the whole stretch of country, with a temperature range of little more than 7° F.—from 76.1° F. in December to 83.3° F. in April—and a rainfall of fully 163″, of which nearly 136″ fall in May–October. Farther south, with approximately the same rainfall (over 160″ at Victoria Point), rather more falls in the May–October season (144″), and the annual range of temperature is rather less—only 5° F., from 79° F. in September to 84° F. in April.

Shan Plateau. The Shan plateau is an old block of gneiss and ancient limestone, with an average height of probably at least 3000 [1] feet; and, as the native money is in the form of metal ingots, it is probably very rich in mineral wealth. At present, there are only two important mining centres—the Mogok ruby mines and the Bawdwin mines, with their extraordinary wealth of metals—lead, silver, and zinc in mass, with

[1] The hill-station of Maymyo is *c.* 3500 feet above sea-level, and Kalaw—on the way to the Shan capital of Taung-gyi—is 1000 feet higher still.

copper, nickel, etc. in smaller quantities. The crystalline limestone which contains the rubies produces also supplies of lapis lazuli ; but the proportion of blue corundum is much less than that of the red, and the sapphires are much inferior to the rubies. The Bawdwin mines have been worked by the Chinese for 500 years, but would probably have been unknown if they had been in the south and not in the north of the Shan area.

Access. Access to the mines and to the smelting centre of Namtu has been made relatively easy by the railway from Mandalay to Lashio, which climbs the scarp from the Ava plains on a gradient of 1 in 25 ; and there would have to be a similar gradient at almost any point on the scarp, for it is an abrupt wall of gneiss. The plateau is very rough, with torrential rivers everywhere ; but its margin is covered with—largely deciduous—forest, and the leaf-fall and the dense fogs make it rather unhealthy. Even so, if only the Salwin were of some real use as a waterway or merely as a valley route, the plateau would probably be developed rapidly ; for the evidences of mineral wealth are very widely spread, *e.g.* wolfram in Karenni, the rich wolfram and tin of Mawchi, and coal in old lake-basins, and probably the alluvial deposits are very rich in tin. It is significant, however, that Lashio is in the basin of the Myit-nye ("*Little* River"), the river of Ava ; but the railway entirely avoids the valley up to Hsipaw.[1]

Irawadi Basin. Between the Arakan-Chin wall and the scarp of the Shan plateau lies the great basin of the Irawadi, once a gulf of the sea. Even when stripped of its containing margins, it is still larger than any other Indian province, larger even than the Madras or the Bombay Presidency, though the population of the whole of Burma is not much more than that of Hyderabad State, *i.e.* only two-thirds of the Bombay Presidency and not one-third of the Madras. The discrepancy, which is related to both historic and geographical causes, means that Bombay has 100 persons more, and Madras well above 200 more, to the square mile than Burma has ; but the latter, like Madras and unlike Bombay, has been increasing in population during the present century, though not enough to diminish seriously the surplus of rice for export.

The North. The basin may be divided into three areas on the basis of relief as reflected in climate. The northern arc is a hilly country round the sources of all the rivers, with the feature-lines tending generally north-and-south except in the Kachin hills. There is, therefore, free access for the wet monsoon, bringing heavy enough rain for the hills to be densely forested, and contributing a great deal of water

[1] Hsipaw is the richest and most civilised State; the neighbouring Tawngpeng is the tea State ; and the capital is in the little Yaung-hwe State, with its famous Intha lake.

from the west, *i.e. via* the Chindwin, to the lower Irawadi, for the easterly trend of the ranges northward from the Lushai hills favours the access of the wet wind to the transverse Kachins. It is only south of these hills that "peace is enforced" on the hill tribes, who are Mongolian, but not Buddhists. The upper part of the Chindwin basin seems to be rich in minerals, including the Tawmaw jade and the Maingkwan amber—both worked by the Chinese; and jade is also found farther east in the Loipyet hills, *e.g.* at Kamaing, which can be reached by steamers for four months in the year up the Mogaung river.

Centres. Though well outside the tropics, this region has what must be called a tropical climate, and its northern third is covered with tropical evergreens, while its southern half is covered with monsoon forest, specially teak. If the region is limited southward by parallel 25° N., then the only centre of any real importance is the rail-terminus and rail-and-river junction of Myitkyina; but this limitation seems to be quite a mistake. Bhamo,[1] Shwegu, and Katha get at least 50″ of rain in June-October, and the quality of the teak confirms this, for the best teak is a response to a mean annual temperature of *c.* 75° F. and a mean annual rainfall of *c.* 75 inches; and, even if the mineral wealth of the Katha district (coal and gold) has been overrated, and Shwegu is only a fishing centre, Bhamo is very important, as the permanent head of steam navigation on the Irawadi, and the terminus of the ancient Chinese trade-route down the Taping valley (from Tali and Momein)—a broad glade cut through the forest, and known as "the Road to China"—a rather significant formula.

Dry Belt. Though Katha is occasionally touched by drought, this should be related rather to the very low level (*c.* 250 feet) and to the height of the Gangaw crest (over 2000′) immediately to windward; and the Tropic may be taken, most appropriately, as the northern limit of the Dry Belt of the country, while the southern limit may be taken as parallel 20° N., where the Arakan yomas not only begin to trend south-*east*ward, but also narrow from a good 50 miles to a scanty 15. This, too, is just south of the point where the transverse highland that is crowned with the dead Popa volcano (*c.* 5000′), comes nearest to the Arakan scarp. A straight line drawn *south-westward* across the 140 miles between Pagan and Akyab shows a difference of *175″ of rain* between the two ends; and we have here on a small scale a good example of the general distribution of rain over the whole area.

Climate. It is worthy of notice that this dry belt is a real central basin. Mandalay (22° N., 96° E.) is exactly half-way between Maingkwan and Rangoon, and between the Indian and the Chinese frontiers;

[1] Bhamo has 72″, with mean temperatures 62°–87° F. and extremes below 40° F. and above 105° F.

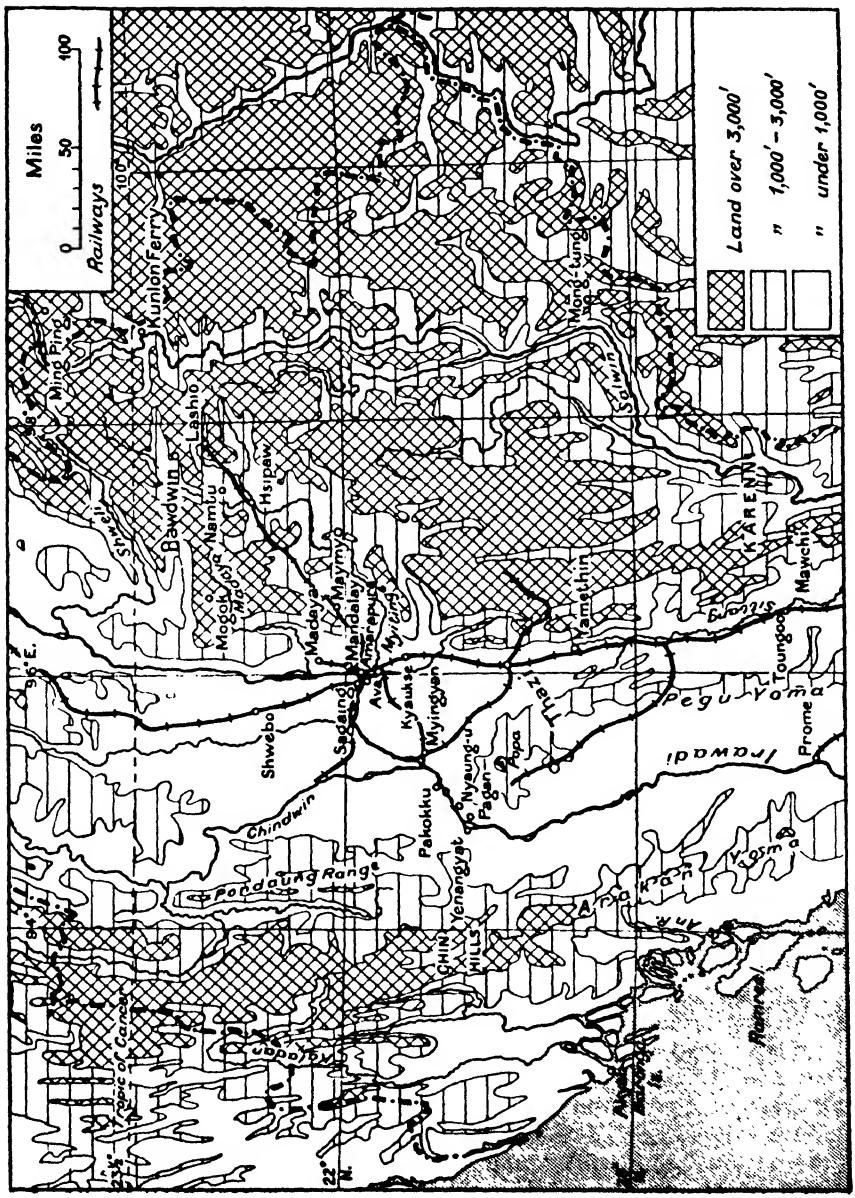

FIG. 105.—Central Burma.

and Crops. and the floor of the basin, much of it below 300 feet, is far the widest area of lowland in Burma outside the Irawadi delta. The trend, the width, and the steep face of the southern Chin hills, too, form a real barrier to south-west winds; and, though both monsoons follow the trend of the feature-lines northward and southward throughout the Irawadi valley, both the Pegu yoma and the Karenni scarp actually lie *west* of north and *east* of south. As a result of these conditions S.W. winds can scarcely reach the basin at all; and, when diverted into S. winds, they are largely dried on the eastern ridges of the Irawadi and the Sittang troughs. Some of the soil, too, is very light and sandy—"the dust of Mandalay"; and, of course, the summer temperatures vary inversely with the rainfall. That very seldom exceeds 40″, and in the lee of the Popa ridge is seldom much above 25″, and rice—which grows admirably within the limits of the monsoon forest to the north—gives place to millet, with oil-seeds (ground-nut and cotton) and pulses, ground-nuts being a special product in the lee of the Popa ridge, *e.g.* round Myingyan; and most of the production is still "post-flood agriculture," *i.e.* confined to the lands reached by the seasonal floods. But there was some organised irrigation even in the old days, especially in belts on the margin of the dry basin, *e.g.* Minbu, and there are now two or three good canals, *e.g.* the Mandalay and the Shwebo, inside the "basin."

Oil. But the essential value of the "basin" except as a political centre is in its mineral wealth. Down the central depression, parallel with the Pondaung folds and the Shan scarp, and with the series of dead volcanoes that culminates in Mt. Popa, there is an important oil-field, which has been supplying well over 80 p.c. of the total Indian output of petroleum. It extends from Indaw to Minbu, and deposits of brown coal lie parallel with it, especially in the Chindwin valley; but the important section is in the dry "basin" from Yenangyat to Yenangyaung.[1] In the same latitude in the Sittang valley the Yamethin scarp of the plateau seems to be rich in wolfram, especially at Byingyi.

Political Focus. As a political focus this central basin has been of unique importance; and the story of its actual centres—though none of them are very old—shows a curious monotony. In the ninth century the Burmese population seems to have been concentrated round a deep gulf that reached as far north as Prome, and the most important centre was at the foot of an outlier of the Shan scarp at Thaton, between the Gulf of Martaban and the Salwin, and commanding all movement round the scarp between the "Sittang" plain and a remarkable 10,000 square miles of fertile lowland that still makes the natural hinterland of the gulf eastward, *i.e.* the natural hinterland of Moulmein. It was a place of safety and assured food-

[1] Yenang—(*yaung*) means "stinking (river)."

supply, and had become the home of a very pure form of Buddhism.

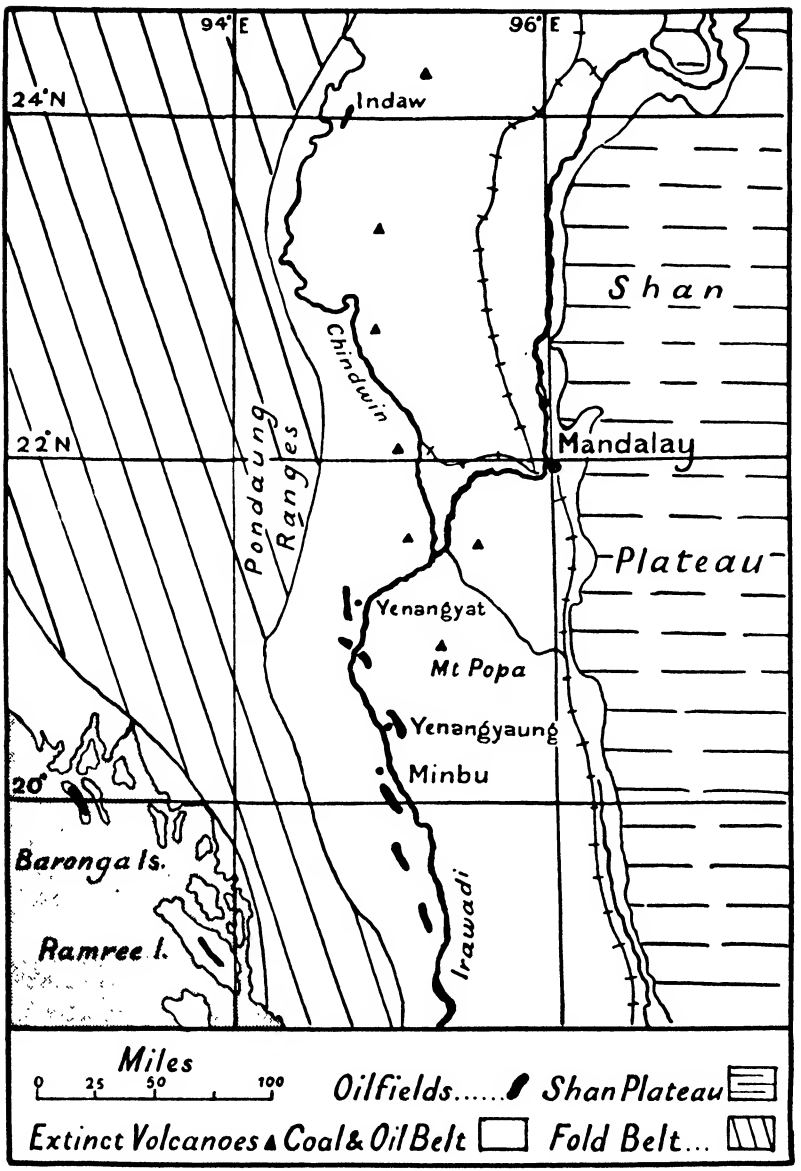

FIG. 106.—Coal and Oil Belt.

In consequence of civil wars at Prome one tribe, who have left their

name on the map (in the railway station of Pyu), migrated 250 miles up the Irawadi to an island between the present oil-town of Yenangyat and a collection of "Pagan" villages near the foot of the Popa platform; and here they developed into the Burmans, and *c.* A.D. 1050 came under the rule of that remarkable man Anawra-hta.

Pagan. Disgusted with the impure form of Buddhism prevalent in Pagan, he sent to Thaton for a copy of the sacred books; and, when this was refused, he despatched a fleet which captured the city, and brought home some 30,000 prisoners, including a multitude of architects and craftsmen. He set these men to work, and provided Pagan—on the model of Thaton—with 20,000 sacred buildings, of which 5000 still remain in the form of ruins. Persecution of Buddhists in India made Pagan a city of refuge, and it became the greatest Buddhist city in the world—until it was sacked by Kublai Khan (*c.* A.D. 1280). So the group of villages that had been made into a great capital on the model of an older "sanctuary," came to an end.

Bhamo. If this was the first example, the prestige of the great city guaranteed that it should be faithfully followed; for the essential details, alike in the political geography and in the religious history, apply practically to every city that was ever a capital, and to some that never were capitals. For instance, Bhamo was a group of villages on the Chinese bank of the Irawadi (now 50 miles from the Yunnan frontier), protected from Kachin and other dacoits by the Irawadi and the Taping (cf. p. 504) and laid out in direct imitation of Pagan, *e.g.* over-embellished with religious "ornaments." There we have the co-operation for defence, the unity presently symbolised in a moat or a wall, and then a jungle crop of pagodas springing up—personal and public. The personal ones drop quickly to pieces, for there is no "merit" in repairing another man's pagoda; but the public ones are added to and ornamented and endowed in various ways. Bhamo happens to be rather Chinese, *e.g.* in its bazaar, but it can show a bell-shaped *stupa* which no other Burmese pagoda can excel.

Brick Pagodas. The example of Pagan in one respect may have been momentous. Human habitations in Burma are of teak and bamboo, but Anawra-hta decided that his pagodas must be of brick. There were about a score of villages, and each village was to have 1000 "pagodas"; and to bake bricks for 20,000 sacred structures, however small some of them were, meant wholesale destruction of the surrounding forest. For there was forest here then, and the staple crop was *rice*; and neither fact is surprising, for the ocean was not 200 miles away. Doubling the distance must have increased the range of temperature, and decreased the rainfall; and the destruction of the forest must have affected the "run-off" of the rainfall and the *régime* of

the rivers ; the suitability, therefore, of the place for the first capital of " Burma " must not be judged from its present environment.

When the Pagan kingdom came to an end, and a new capital was being chosen—above, instead of below, the great " naval station " of Pakokku, at the confluence of the Chindwin with the Irawadi—the decisive factors were the swing of the river and the relation to China. The Irawadi systematically cuts into its western bank, leaving an alluvial plain behind it on the east ; and, though this may involve building houses on piles, it offers fine flats for rice. And, as the easiest access to China was—and is—up the Myitnge valley, we expect to find attention concentrated on the great elbow of the Irawadi where that tributary joins the main stream. 22° N. 96° E.

The first site chosen was Ava, actually at the confluence of the Myitnge and the Myittha, with the great river to the north and the joint tributaries on the east ; and here the capital remained for more than 400 years, in the middle of what is still " a sea of paddy-land," modelled on Pagan as a city and in its shrines, a park dotted with houses and pagodas rather than a city well-planted with trees. Before it was made the capital, it was merely Yadanapura (" the City of Jewels "), and it was probably an important collecting place for the Chinese trade. Rubies are actually mined at Madaya and Sagyin, and there may once have been finer qualities found there than are found now ; but the Madaya valley is the easiest route up to the Mogok mines, and the Mu valley is the shortest route to the jade country. **Ava.**

All these rivers shift their channels, and deposit enormous sand-bars ; and a confluence site has special dangers. This particular point, too, as the great outpost for China, was of special interest to the hereditary foes of the Pagan dynasty ; and in the middle of the eighteenth century Pegu princes of Toungoo sacked Ava. The Ava dynasty, with English help, recovered its position in spite of French help being given to the Pegu tribes ; but it seemed advisable to move from the unhealthy Ava position, and so a new city was built about half-a-dozen miles farther up the Irawadi, *i.e.* to the north-east. It was a model of the old Ava, which had been a model of Thaton *via* Pagan, and it was called Amarapura (" The Immortals' [1] City "), and endowed with a colossal bronze statue of Buddha. The position was much better than that of Ava, apart from being more healthy and safer from floods ; and it is now one of the most important railway-junctions in Burma—for the summer station of Maymyo and the Lashio line generally and for Rangoon *via* Kyaukse, Thazi, and Toungoo. **Amara-pura.**

As houses are merely wooden bungalows, it is really easy to

[1] This might mean, simply, " The City of the Gods," *i.e.* a city blessed of heaven ; but it might mean, literally, " The city of those who do (did) not die," *i.e.* the refuge of those who escaped from the Ava massacre.

move a city if some untoward event has made it " unlucky ; " and there can be no doubt of the supremacy of this central lowland between the far eastern elbow of the Irawadi at Mandalay and its far western elbow at Pagan, with its wide lowlands and its great confluences. Nor can there be much doubt about the greater importance of the eastern elbow with its command of the China trade and its easy access to the Sittang valley, though the latter river is too much choked with sandbanks to be of any real use for navigation now.

Sagaing. In centuries of cutting into its right bank the Irawadi has left behind it on the other a low floor of mud, alternately damp and dusty, exposed to floods and very malarial at the end of the wet season ; but both evils are more or less absent from the right bank, and that seems to be the proper site for towns. One capital was tried there, pagoda-crowned Sagaing, rising on terraced hills, with easy access to very fertile lands (millet, sesamum, etc.), a rainfall rather higher (35″) than that on the opposite bank, winter temperatures very seldom below 55° F. and summer temperatures seldom above 100° F. But experience proved that it was on the wrong bank—wrong for China and wrong for Pegu.

Mandalay. But the western bank, at a point where the river is relatively narrow, is quite an appropriate place for the magnified village of Mandalay, with all its modernity. It stands back a safe two miles from the river, leaving a fine gathering-ground for dust during the dry season ; and the 100-foot moat which surrounds " the fort "—and provides the city with drinking-water !—is not much protection against the dust. As the Gates tell you, " The Great Golden Royal City was founded on the night of the 6th and the entry of the 7th waning Kason 1221 " (*i.e.* May 23rd, 1859), on a strictly American model, in rectangles, with four main streets, A, B, C, and D, running at right angles to the river—instead of parallel with it and so parallel with the strong winds which blow from May to August, and which do greatly cleanse and freshen the cross (N.–S.) streets. There is a hill as well as a fort, but they are not combined in one ; and the city has been properly provided with pagodas and palaces, bazaars and bungalows, police and even population (200,000). But it might have been built on a Burmese or at least an Asiatic or even a British model ; nothing could be less appropriate than a New York one, unless the " New " was appropriate.

The Delta. The deltaic region is really a unit, if a somewhat complex one, its two upper belts being divided by the Pegu yoma, while the Irawadi creeklands are obviously unlike the Sittang estuary. Prome and Toungoo mark the approximate northern limits as far as structure and relief are concerned ; but the nearness to the Shaukbin crest of the Arakan yomas makes Prome unusually dry, with a rainfall of less than 50″ (*c.* 48″). The humidity is high,

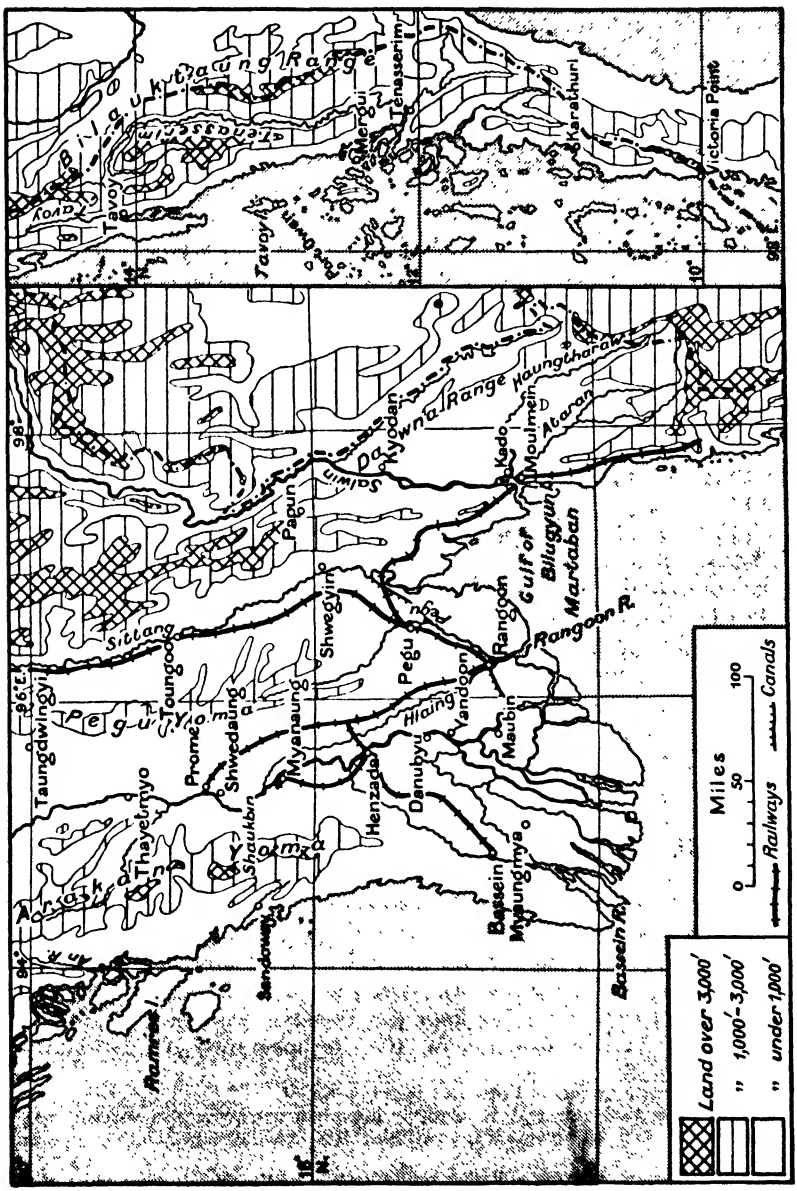

FIG. 107.—Southern Burma.

however, and the district is as famous for its soft fruit [1] as Thayet-myo ("Mango City"), with a mean range of less than 20° F. (January 68° F.–April 87° F. and *c.* 46″); and the hills produce quantities of teak [2] and cutch, the teak in the wetter and the acacia in the drier areas, cutch-boiling being a typical peasant industry between Prome and Thayet-myo.

Rice. The rich alluvial deposits widen out to nearly 150 miles between the Bassein and the Rangoon rivers, and are immensely fertile, while the intricate network of "creeks" teems with fish. The sea is skirted by a feeble imitation of the Bengal Sundarbans, still haunted by tigers, but useful for firewood; and behind that is an almost continuous rice-land, rice being the typical crop over some 10,000 square miles, with tobacco coming next. So much swamp—teeming with fish—is left by the floods that buffaloes displace oxen for ploughing; but irrigation enables a second (hot season) crop to be grown. Most of the work is done by non-Burman peoples, *e.g.* Karens and Shans—to the great advantage of the crop.

The great fishing-centres are on the flood-lagoons of the Bassein and the Thongwa districts, *e.g.* Myaungmya and Maubin, Yandoon and Henzada; and the rice-centres tend to be in the same place, and they attract the tobacco trade also. The actual making of the cheroots is a special industry at Danabyu, as the rice-milling is a special industry at the ports, particularly Rangoon and Bassein. The head of the delta is also very important for all three products, Prome having a famous fish-paste industry.

People. The climate of the delta is very equable, but the humidity—which may be judged from the light skin-colour of the inhabitants—is very enervating. On the other hand, the fertility has given much leisure, and this has been well used. The standard of comfort—except among the immigrant Hindus and Chinese—is very high; Burmese eat rice and fish, and wear silk. The standard of education is equally high, literacy amongst women being 900 *p.c.* higher than in Bengal. Many of the typical industries, too, are more or less "luxury" crafts, especially when associated with old capitals, *e.g.* the lacquer of Prome and the silk of Taungdwingyi (cf. the lacquer of Nyaung-u, *i.e.* practically Pagan,[3] and the fine silk-weaving of Amarapura). On the other hand, though the isolation of their land has kept the Burmese wonderfully pure in race, their history accounts for the disappearance of all military

[1] The special product of Prome is custard-apples.

[2] In these places the teak is relatively important not because of specially fine quality (cf. p. 504) but because it is accessible. The cutch, like the ironwood, prefers the light rainfall.

[3] The lacquer workers still live round Pagan itself—though their chief raw material, *thitsi*, is not found in the district—partly from "inertia" and partly because of the abundance of bamboo for the "frames."

and even virile elements of the population; and, as the country was generally under absolute tyranny, regional development was not encouraged. This led to an absence of towns and thus to a purely rural and village life, which seems to have suited a leisure-loving people; all the towns are modern, and at points easy of access by sea or river; and more than half the population in the largest is not Burman at all, but foreign.

Rangoon.

Rangoon (really Yan-Kon, "End of War"—1753) began its life as a group of monasteries round the Shwe-Dagon pagoda, said to be the greatest [1] Buddhist shrine in the world; the *stupa* is solid brick faced with pure gold, and rises about 370 feet above a hill of about 170, so that the top is more than 500 feet above the sea. The city has developed as the one great seaport for the whole foreign trade of the country, the greatest rice-shipping port in the world, and a very important exporter of teak. As it is also the great railway terminus for a large port that has safe and easy approach, it has developed great milling industries, especially in rice and teak; and no other port, *e.g.* Akyab or Bassein or Moulmein, has any chance of displacing it from its supremacy. The natural Burman dislike of town life, too, has resulted in all the activities of the city falling into the hands of aliens, whose presence there suggests alike enterprise and capacity, *e.g.* Chinese and Parsis; and, if the Lashio line is presently continued to Yunnan, the port may almost come to rival even Calcutta. It is at least a much better harbour.

Siam

Buffer State.

Siam bears a strong likeness to Burma in its essential features and phenomena—its northern hills, its southern finger, its delta, its dry belt; they have the same type of climate, associated specifically with rice and teak; they are both scantily peopled. The obvious difference is in the political geography, with Siam an independent State, the independence of which is assured by its rôle as a Buffer State; and the absence of serious political responsibility, like the religion of the mass of the people,[2] seems to help in making life easy for patient, playful, peaceable believers in Buddha.

Climate.

Latitude and an accident of relief give "climatic" results more favourable than might be expected at first sight from a survey of the Me-Nam basin. While the annual rainfall round Bangkok is seldom much above 50″, that round Palaw—not very much more than 100 miles farther west—approaches 200″; and, as the rainfall at Thaton also approaches 200″, a similar contrast to the east inland would suggest a rainfall of not very much above 50″ to feed the Me-Nam. But the Thaton-Amherst plain (cf. p. 506) makes

[1] Pegu claims that its Shwe-maw-daw pagoda, though only about 325 feet in height, is "more holy." [2] The Laos are only veneered with Buddhism.

almost a complete break in the backbone of the peninsula; and, except for the Dawna range (under 1500′), winds which have dropped 240″ of rain in Moulmein and Kawkareik have an uninterrupted course to the north-east corner of the Me-Nam basin, where the Luong crest is just under 7000′ (6937′).

Northern Hills.

If we ignore the little area that feeds the Mekong, and gives a fictitious importance to the two frontier towns, Chieng-Kong and Ban Huei Sai, that face each other above the chain of rapids, the "Northern Hills" may be called a pear-shaped region with its stalk ending at Pak-nam-po, and the entire northern half is a series of mountain ranges running generally north and south; but, in the north, the outer ranges both to the east and to the extreme west seem to diverge slightly from the central meridian, while in the south they slightly converge on the great confluence at Pak-nam-po, on the same meridian (100° E.).

From the north-western heights (over 7000′) and the north-eastern (nearly 7000′) two great rivers flow, the Me-Ping and the Me-Nam, each collecting a considerable tributary from the central heights—the Me-Wang and the Mei-Yome. The steepness of the range above Chieng Mai (8200′) makes the Me-Ping very rapid, though small boats can actually reach the town; the very heavy rain on the Luong range makes the Me-Nam ("Mother of Waters") a large river, it has graded naturally a long, straight valley up to Nan, and in flood it can carry even large river steamers. In the jungle-covered depression of Pichai it has a natural "escape," in which the floods are held up long enough to diminish greatly any dangerous violence; and the special industry of Pichai is fish-curing, thousands of tons of fish being left stranded when the floods abate.

As life south of Raheng and Pitsanulok—and even north of Pitsanulok, with its floating houses, to Utaradit—is purely lowland and Siamese, latitude 17° N. might be made the southern limit of this region; but the Mieng crest rises above 6200 feet within 50 miles east of Pitsanulok, and Raheng is almost as closely related to Moulmein as to Bangkok. Certainly the double river-system has its natural pivot in the double township, Paknampo and Nakawn Sawan, at the confluence.

Teak.

At the same time, the Laos of the hills are as much rice-growers as the Siamese of the lowland, though they badly need a second crop (? cotton), as the teak industry is declining. There is abundance of country with favourable altitudes (±2000′) and climate (rainfall certainly below 100″, and usually not above 75″); but there has been a series of years during which the flood has been so meagre that only "accessible" stocks of logs could be sent down. This has complicated a problem that was present thirty years ago, when the forests accessible from Chieng-mai,[1] the headquarters of

[1] The Burmese themselves corrupted this into *Zimme*.

the teak industry, began to show signs of exhaustion ; but it was not of great importance then, as the town was really a huge caravan centre, trading with Russia, Yunnan, Cambodia, etc. Even twenty years ago the journey by boat over the 450 miles from Bangkok to Chieng-mai took at least three weeks—at high water, and at most three months—at low water ; but now express trains take about twelve hours for the journey !

The forests still teem with food, *e.g.* pigs and jungle-fowl ; there is little mining or carrying to be done (? the Nakawn Tai salt); and real foresters can find work in the rosewood, boxwood, and ebony felling farther south. But the prospects—even with compulsory primary education !—do not seem good, and it is difficult to see the value of good motor-roads through the region. From the economic standpoint, then, it might be better to curtail the southward limits of the region, and at least put the rail and river junction of Pitsanulok into the Central region. In any case, the magnified villages, such as Lampang and Nan, are merely little political centres, the homes of Lao chiefs.

Eastern Basin.

The total area of the Northern Hills is given officially at *c.* 60,000 square miles ; the Eastern basin is certainly larger—by, perhaps, 16,000 square miles, though it is almost valueless, for it is a real basin—cursed with drought. On the right bank of the Mekong, which makes the frontier in both the north and the east, there is a continuous belt of hills, which minimise any outward drainage ; and in the south the Dang-Bek range is even higher than these Mekong hills, and rises westward in the Kampeng to over 3000 feet. To rainward in the west there is a really formidable wall, including the butt of the Kampeng—the ill-omened Don Pia Fai (really Dong P'hya) ; the east bank of the Pa-Sak is a line of continuous high land up to Lom-Sak, which is flanked by the 6200 odd feet of Mieng ; and in the extreme south a 3000-foot barrier runs along the coast for over 60 miles, rising to 3400′ in Chumnao on its windward face and to nearly 5500′ in Saidao towards the south-east.

Korat.

The effect of this great basin on two areas of lowland that abut on it may be left to be dealt with in relation to the Central Plain ; but its general effect may be gauged from the fact that the whole length of the western scarp of this Korat plateau, as it is usually called, is a broad belt of evergreen forest, Don Pia Fai owing its evil reputation to the virulent malaria that attacks every traveller across it. So far from the area being really plateau, the Nam Mun flows eastward across it, through Korat, for more than 250 miles below 500 feet, and the eastern part of its basin is below 300 feet ; and its chief tributary, the Nam Pao-Si, is below 500 feet when it emerges from the Nong-Han-Noi marshes, which are less than 50 miles from the frontier town of Nong-Kai (*c.* 600′).

It is precisely to these conditions that the region owes its

dangerous floods in the rainy season and its dreadful drought for the rest of the year; and even the marginal hills, especially where the "cover" is on laterite, are almost useless. The conditions may have been better in the days when the great Cambodian empire ruled it, for otherwise there would seem to have been no excuse for the magnificent Khmer ("Angkor") temples, such as that of Pnom-Ust near Korat; but it is now a dreary and even deadly[1] waste of sand and swamp, and it was always a frontier land with frontier drawbacks. Indeed, Korat—like Ubun in the east, a divisional capital—stands in a "division" which the Cambodians called Nakawn Racha Seine ("The Frontier Country"); and they may have worked the copper mines in the neighbourhood. But since the founding of Ayuthia (fourteenth century) Korat has been under Siam; and, since the completion of the railway to Korat, there has been some development of sericulture.

Central Plain. The Central Plain is the natural heart of the kingdom—Muang Thai ("The Land of the Free") or Muang Sayam ("The Land of the Shans"). The first Lao-Tai capital was at Lampun (sixth century); but, after Kublai Khan expelled the Lao-Tais from China (*c.* A.D. 1250), the Lao-Tais and the Khmers began to move southward—to Sawankalok, Sokotai, Nakawn Sawan, Lopburi. By 1350 their fusion was complete, and the first true Siamese king ruled all Siam from Ayuthia.

In the extreme west the Me-Klong runs due south along meridian 99° E. for 150 miles down a typical Indo-Pacific valley in the "Malay" backbone, and then makes a sharp detour, through Kanburi and Ratburi, into the Bight of Bangkok; and in the extreme south-east the Saidao and the Don Pia Fai send the Bang Pakawng by a very circuitous route to the same destiny—a separate mouth on the Bight. This basin is also of some importance, for the Pachin valley is very fertile, the northern face of the Saidao farther up the Srakeo valley produces gold at Kabin and Batong (cf. Watana), and the southern face produces rubies and sapphires near Chantabum. The lowland here, with its high temperatures and heavy rainfall, grows "Malabar" products, *e.g.* coconuts and rubber, pepper and cardamoms. The little harbour of Chantabun ships a good deal of pepper, and shares in the very productive fishery in the Bight (cf. Bang Pla Soi); it is significant that Chinese coolies are engaged for the rice-industry of Petriu.

Me-Nam. All the rest of this region is in the basin of the Me-Nam, and its deltaic character is as clear as that of the Surma in Eastern Bengal. Even below Paknampo (the teak Customs-centre) the river winds along in several channels; and near Chainat it definitely breaks up into distributaries, of which two are important, the Suphan (or Tachin) and the Me-Nam. Thanks to the Pichai "escape" there

[1] The presence of goitre may throw some light on the physical history of the area.

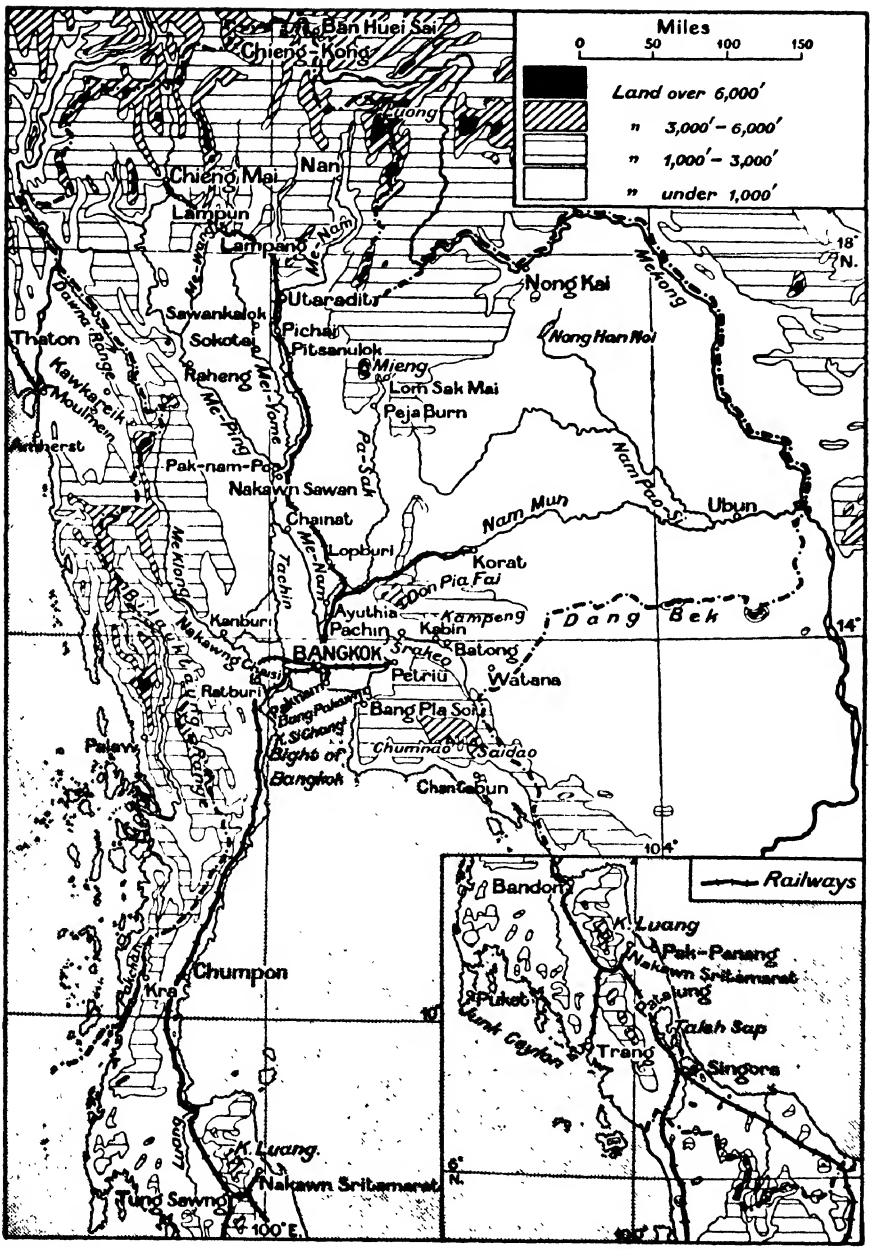

FIG. 108.—Relief of Siam.

are no sudden freshets ; and, as there is a series of navigation canals —some of them very old—across the land from east to west, there is an excellent system of water-communications. This is all the more valuable because much of the land is actually or practically under water for quite three months in the year ; and in any case there is no " metal " for road-making.

Water-supply. Unfortunately, though some good canals have been cut during the past twenty years, *e.g.* between Bangkok and Petriu, there is little efficient irrigation machinery ; and so everything really depends on the flood and the local rainfall. The wet season begins early (May), and is long (May-October) ; and there may be " spring " rains off the Bight—like those off the Bay of Bengal—in the form of thunderstorms, for three or four weeks before the rains are properly started. There is something, therefore, to compensate for the relative smallness of the rainfall.

Rice. Outside the metropolitan area, with its large Chinese element, practically the whole population is engaged in the cultivation of rice, 90 p.c. of the total tilled area being under the crop. A good deal of tobacco is also grown, much of it being of very good quality, *e.g.* in the Pasak valley and between Peja Burn and Meng Praeg, if the latter may be counted as an annex of this Central Plain. The Pasak valley, though very narrow, is amazingly flat, even above Peja Burn ; and the exhaustion of the gold mines at Lom-Sak has given an impetus to agriculture. Indeed, real progress in irrigation has been made here, perhaps because the Dry Monsoon is so cool and bracing and " dry ", as it blows strongly down the deep meridional trough.

Towns. Except for Bangkok and Ayuthia none of the towns are of any great importance, not even the tidal " ports," *e.g.* Paknam at the mouth of the Me-Nam and Nakawn Chaisi at that of the Tachin ; for Ayuthia is the only important railway-junction inland, and Bangkok simply monopolises the sea-trade—though its outport on the island of Kaw-Chang is south of the bar. But all the coastal towns share the productive fishery in the shallow waters of the Bight, and even export fish to China and Java ; and those that are on rivers, as Nakawn Chaisi and Paknam, naturally have special advantages, for the rivers are very productive in spite of excessive fishing. Even Ayuthia, or Krang Kao (" Old Capital "), is not of much importance. It stands on an island at the confluence of the Pasak with a branch of the Me-Nam, and is mainly a collection of ruins of ancient pagodas and palaces, the mass of its population living in house-boats moored to the banks of the main stream or to the edges of innumerable creeks.

Bangkok. The heart of Bangkok is the royal palace, to which the river makes a moat that is strengthened by a wall ; a mile away another wall rings this round, enclosing the " city," which is to some extent

built of brick ; and outside this second wall are the pile-houses and the raft-streets (8 or 10 houses). Four miles of the river make the port, to which the bar—five miles below the mouth of the estuary—forbids the entry of large vessels ; and four railways radiate from four different stations to the four points of the compass. The city is also important as an international air-station.

Climatic Changes.

Careful records of temperatures before and since 1900 show that there have been marked increase of maximum temperature [1] and marked decrease of humidity, and this may throw some light on the decrease in the volume of flood on the Me-Nam, with the increased difficulty of floating teak. A minimum temperature below 60° F. and a maximum above 100° F. are now recorded, and this maximum seems to be " normal " at present ; but thirty years ago a maximum of 92° F. was considered high. It seems reasonable to infer that drainage and the clearance of " malarial " vegetation have decreased the humidity, with a natural reaction on the temperature ; and somewhat similar precautions, with increased canalisation and felling of forest, may have something to do with a more even volume but a decreased flood on the Me-Nam.

Southern Isthmus.

The Southern Isthmus is Malayan in structure and relief, climate and typical products. Though it stretches for 750 miles from north to south, it does not aggregate more than 20,000 square miles in area ; and, though its connexion with Bangkok by rail may have strengthened political bonds, nothing in the economic geography justified the cost. Where it is narrowest (not 10 miles wide), it has a very steep frontier in the Bilauktaung range ; and where it is widest, the Nakawn Sritamarat heights (K.[2] Luang = 5800′) separate coastlands of quite different character with quite different climates. The railway keeps to the " home " side even south of the Burmese frontier, serving the fertile lowlands of the Luang valley and the Taleh Sap lake-plain ; and the Tung Sawng gap facilitates cross connexion between Nakawn Sritamarat and Trang as well as the direct route from Bandon to Patalung and Singora. Bandon is the headquarters of the timber industry ; and the Singora (Sawng Kla) lagoon might be made into a fine harbour, with access *via* the Taleh Sap (" Inland Sea ") to Patalung.

Sritamarat (or Lakhon, once Ligore) is a very ancient city of great antiquarian interest. It was once the capital of a feudatory State that ruled most of Malay (for Siam), and had a fine position for a political and military centre, between rich rice-lands and the high crest of Luang, a safe distance from the sea and yet with a bay in front of it in which ships can lie safely at all seasons and in any

[1] The mean monthly maximum now is 86° F. in April ; and the only really wet month is September (*c.* 12″).

[2] K = *Kʻao* or *Kʻhao* (" hill ") ; *ban* means " village," and *huei* means " river."

weather, *e.g.* off Pak-Panang, from which there is a regular export of rice. The western centres are mainly concerned with tin-mining, a very old industry here, specially in what we miscall Junk Ceylon—really Ujong Salung—where Puket is still the headquarters of the industry.

Kra. At the Kra isthmus there is a cross-route even more remarkable than that *via* Tung Sawng. The international fairway of the Pakchan river is navigable up to Kra, and the distance across to Chum-Pon is not more than 40 miles even by a rather circuitous route that is *below 100 feet* for very nearly the whole way. A canal here would save fully 600 miles between Calcutta and Canton, and at least 1200 between Rangoon and Bangkok ; but to be of any great use, it would have to be a real ship-canal—so as to avoid all break of bulk.

Malaya

Land Frontier. The cession of territory by Siam in 1909 set the Malay frontier in a very appropriate position, for it now includes the whole area that is blanketed from the west and south-west by the folded mountains of Sumatra. It is also the point near which the average width of the peninsula is practically doubled, to a maximum of about 200 miles,—from which the land southward is exposed to the full violence of the South China Sea, especially during the N.E. Monsoon,—and at which there is a very low 60-mile isthmus, broken only by a narrow and low (under 1000 feet) block-ridge of the ancient Malayan spine.

South of this gap, with the widening of the peninsula, though the huge mass of the land is a great square of mountains—150 miles in each direction—maxima heights are along the western edge, not the eastern. At the same time, with the lighter rainfall in the lee of Sumatra, the weathering has been less, and the descent is more gradual, than in the east. There, too, the N.E. Monsoon has kept the coast free from the mangrove swamps and mud flats that defile the west coast, and both the mainland and the marginal islands are fringed with beaches of clean and beautiful sand.

Relief and Structure. The core of the highland is in the three peaks (*gunong*) of Tahan (7186′), Kerbau (7160′), and Hulu Temengor (7020′), Tahan being the link between the eastern and the western ranges. In the east, Tapis practically reaches 5000′, and Mandi Angin is *c.* 4800′, associated with the two great tin-lodes of Khantan and Bandi ; and Temiang and Irong are respectively just above and below 4000′. To the west, Batu Puteh just touches 7000′, and Benom is over 6900′, while farther south Nuang is 4900′, and Hantu is 4800′ ; and though all the axial zone is crystalline, mainly granite, which is often decomposed and rotten, there are large sheets of limestone on both flanks, and in some of the bluffs there are wonderful caves,

e.g. at Batu and Chadu ; and these distributions may be related to the details of the river-system and to the mineral wealth, *e.g.* tin and coal, wolfram and kaolin. The tin is, of course, much the most [1] important ; indeed, the 1200-mile strip of old rock that runs from Lower Burma to Banka and Billiton, might be well described as the Eastern Tin Belt, with Perak as its mainland centre.

Meridional Drainage.

But, again, the significant feature here is in the strictly meridional development of the drainage. Telok Anson, where the Perak approaches latitude 4° N., is only *c.* 25 miles farther west than Merah (*c.* 4700′) on which the river rises just below 6° N. Feeders of the Kelantan or Tahan lie on the same meridian as Kota Bharu at the mouth of the river. Except for the two great eastern sweeps, below Kuala Lipis, and above Pekan, all the elements of the Pahang flow almost due northward or due southward. The importance of this may be illustrated by the hydro-electric works on the Perak (" The *Silver*," *i.e.* really " tin," river), with all the great feeders of its eastern wall—from Besar (5700′) to Batu Putch—within 50 miles of the coast, and the Larut hills of its western wall within 20 miles of it.

Routes.

As the rainfall is everywhere sufficient to make the whole peninsula naturally one vast stretch of forest, some of it very dense and untrodden even by the aborigines, these rivers are as important for routes as for distributing power for miles and miles parallel with the two coasts. The Perak is navigable by native craft for over 150 miles and by steamers for nearly 50 ; and the Pahang and the Kelantan are almost equally useful, but—like all the eastern rivers —they have bad bars, and navigation is dangerous during the N.E. Monsoon.

Climate and Soil.

Rain falls everywhere on half the days in the year, but more heavily in the east than in the west,—often rather above 150″ in the former, and not often above 100″ in the latter ; but it comes in the form of short bursts rather than as persistent rains, and the temperatures in the intervals and in the dry season are not high, especially in the east. The humidity to which this is due, is trying to Europeans ; but the bad reputation of the country came from its original opening up being connected specially with the felling of timber and the first cultivation of coastal tracts, both still serious causes of trouble (mainly malaria). Even at Singapore the temperature seldom reaches 100° F. ; and the Malays are a well-formed and healthy people.

Fertility.

When such conditions of temperature and rainfall are related to a soil that has been enriched for ages by layers of humus, and yet is often rich in lime, we may infer that the fertility on highland and lowland alike must be remarkable. The old vegetable products were mainly rattans and camphor, sago and pepper ; now the

[1] Only 32 p.c. of the assessment is at present allowed.

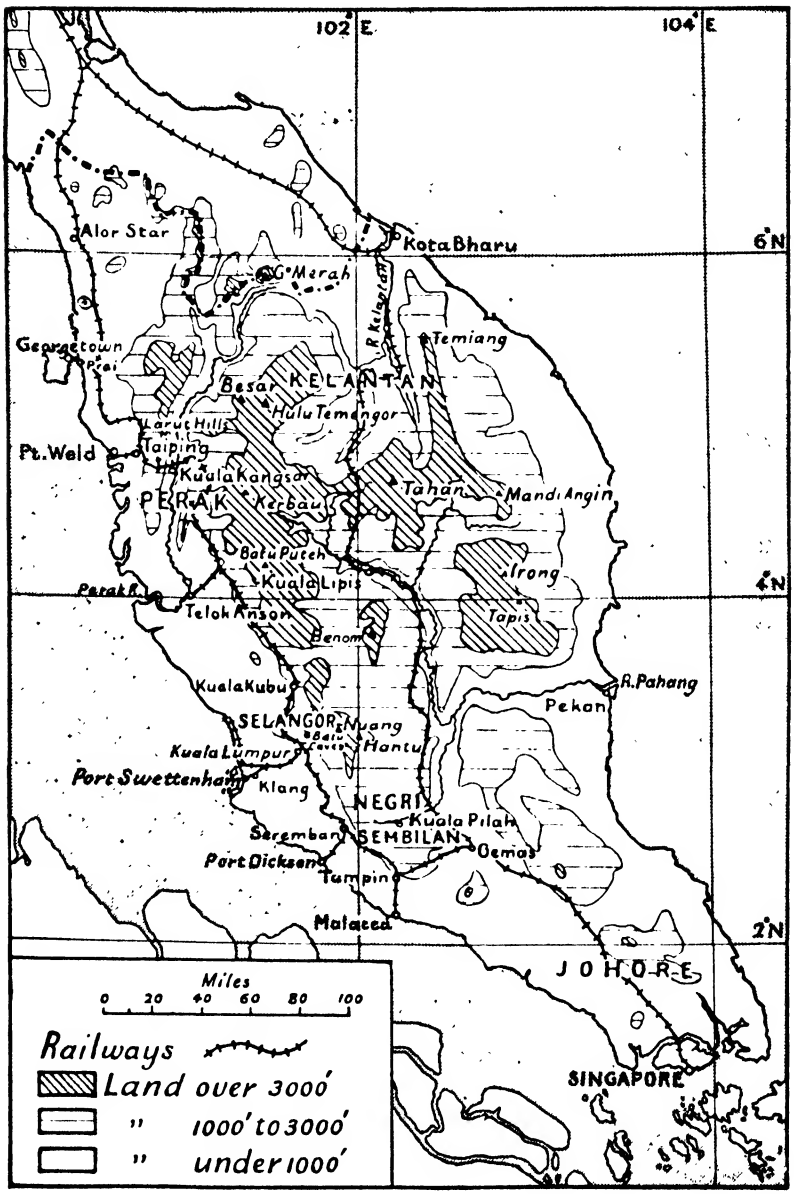

FIG. 109.—Relief of Malaya.

important products are rubber[1] and palm-oil, coconuts and pine-apples. Climate and soil are exceedingly favourable, and there is easy access to abundance of good imported labour, especially Chinese (*e.g.* for tin-mining) and Tamils (*e.g.* for rubber-growing).

Oil-palm. The oil-palm is more important in some ways than the rubber, for the demand for palm-oil and palm-kernels is far ahead of the world's supply; and the price varies very closely with the quality of the oil, especially the percentage of free fatty acids. Malaya produces an excellent oil with a free fatty acid below 5 p.c., while much of the oil put on the market from other sources has over 30 p.c., and some of it up to 40 p.c. The largest plantations in full bearing are in Selangor and Johore.

Other Products. The various products are widely distributed all round the coasts, but there is a certain amount of specialisation. For instance, the copra industry is largely connected with the west coast, as in India —Perak, Selangor, and Negri Sembilan, though it is also important in Kelantan, the special rice area; rubber is specially associated with the south—south of 4° N., and east of 102° E., half of the tilled area in Johore being under it; pine-apples, like sago and tapioca, are also more important in the south, *i.e.* with easy access to the great port of Singapore.

Singapore. That owes its importance to the possession of a magnificent harbour at one of the most critical points on the greatest long-distance sea-route in the world; and, fortunately, the steady movement of the air and the large proportion of sandstone formation make the island relatively healthy. Apart from its shipping business, it has a number of industries associated with the "preparation" of rubber, sago, palm-oil, pine-apples, etc., for export. Georgetown—usually spoken of as Penang (really *Pulau Pinang*, "Areca-nut Isle")—has nearly as good a harbour in the lee of the island, with its mountain crest (*c.* 2900′) to windward and the *F.M.S.* railway-terminus across the Strait at Prai; but it is at a much less critical point, though it has not suffered—like Malacca—from nearness to Singapore. The island is only half the size of Singapore (*c.* 220 square miles), and has no important industries.

Railways. Several useful, if inferior, ports are distributed at convenient points along this west coast, *e.g.* Prai and Port Weld, Port Swettenham and Port Dickson; and the coastal waters are as safe as those off the east coast are dangerous. The railway, therefore, naturally hugs the inner margin of the lowland; and so, in a long belt covered with 4000–5000 square miles of jungle, all the centres are either railway junctions, *e.g.* Tampin and Seremban, Kuala Lumpur and Taiping, or rail and river junctions, *e.g.* Kuala Kubu and Kuala

[1] Though the rubber exports are being fairly maintained, the reduction of price from a five-year mean of 1s. 6d. to a minimum of 1½d. has reduced the Treasury profits from £1,600,000 to £50,000.

Kangsar. Unimportant little capitals are benefited by the International communications, *e.g.* Alor Star and Kota Bharu, though the Malay part of the eastern line is not yet completed north of Merapoh.

Ports. This eastern line avoids the coast entirely, and follows the north and south valleys along the foot of Benom and Tahan, but there are only two places of any importance on the whole line, Kuala[1] Lipis and Kuala Pilah; and the only link between the eastern and the western lines is *via* the important Negri Sembilan junction of Gemas. Until the eastern line is completed to make a through route, there is no prospect of any little branch-lines being built, such as are so useful in the west, *e.g.* to Telok Anson and the Batu Caves, but specially to the ports—Malacca and Port Dickson, Port Weld and Prai. The most important of these is the one from the large (80,000) town of Kuala Lumpur to Klang, Port Swettenham, and Kuala Selangor, and which serves the Rawang coal-field; but the Klang river does not admit large boats to Klang, and the town never had the equipment of Port Swettenham. The islands off the mouth of the Klang give much better shelter than Kuala Selangor enjoys; but all the ports are merely and specifically collecting centres for Penang or Singapore, though the stupidity of the official regulations in the colony is driving trade away from the colonial ports to Port Swettenham.

Political Divisions. The political and historical geography is interesting as presenting some of our most difficult Imperial problems in a regional environment which makes them rather more easily handled than elsewhere.

The three Settlements of Singapore, Malacca, and Penang form a Crown Colony; the four central and Federated Native States are "protected"; the five others, though not Federated, "accept" British advisers. The great State of Johore, which occupies the whole of the south, and is entirely isolated from the other non-Federated States, remains non-Federated.

Policy. The wholesome tendency of the Empire to form a few large units began to work here in a region that was rich in vegetational and mineral wealth, and had a native population so "reasonable" and "sociable" that it was possible to make, and carry out successfully, a large scheme of "coloured" colonisation[2] by Chinese and Tamils; but the mania for self-determination and decentralisation has prevented a complete success. There are various kinds of rules, a multitude of Customs-houses, an Agency for North Borneo, and other pertinent and non-pertinent confusions which impede

[1] Kwala (Kuala) means "River-mouth," but is an appropriate description of these piedmont towns on their little "deltaic" fans.

[2] The great depression in the tin and the rubber industries is not only restricting immigration (to 1000 males *per mensem*), but also necessitating repatriation of a large number of Chinese and Indian coolies.

development ; it is as unfair to the Malays that the Chinese should control the whole area—through their newspapers and otherwise, as it is absurd that a postage-stamp bought in Penang may not be used on a letter posted " across the road "—in Old Kedah.

French Indo-China

Representative.

This area seems almost to sum up the Indo-Pacific Fan in a composite unit which largely combines the problems of a great central river, as seen in Burma and Siam, with those of a great central spine, as seen in Malaya. Here, however, the mountain spine makes a double curve, which takes roughly the form of an immense S—the two loops and a bar which have been described as " two bags of rice hanging from the two ends of a yoke."

Spine.

This yoke, or mountain spine, is not very high ; but in the north it forms a great square block of tangled and densely forested highland, a huge " hammer-head," which makes such an obstacle that it has practically thwarted the high hopes that took the French to the Tong-king basin—hopes of an easy route to the mineral wealth in and round Yunnan. Parallel with the north-eastern scarp of this block a series of ridges and valleys, *e.g.* the Sip Song Chau Thai between the Song-Ma and the Song-Bo (*Bo* = " Black," *i.e.* " Muddy ") tributaries of the Song-Koi, trends south-eastward for more than 200 miles, like the Song-Ka to the south-west and the Song-Koi to the north-east ; and along the south-western scarp the Mekong makes a political frontier to the Laos hill-country.

Northern Section.

The backbone of the peninsula, which marks off the Laos country from Annam, may be divided into two sections. The northern section, 16°–19° N. follows the same south-eastward trend from 104° E. to 107° E., at first narrow but continuous,—in the Pu Luong, which ends in the 6500 feet of the Pu Hak,—and then much broken by plateaus, *e.g.* north and south of the Tiger's Tooth (*c.* 4300′), but reaching a maximum height of 8200′ in Pu Atwat. Intricate transverse ravines and spurs and dense forest are very adverse to the exploitation of any mineral wealth, even where there is any population ; but the plateaus are low enough (not often above 4000′) to be less densely forested and yet high enough to be fairly healthy, and they give fairly easy access by road between Annam and Laos. Where this spine becomes parallel with, and very near, the coast, a narrow strip of fertile alluvium has collected between the scarp and a belt of sand-dunes piled up by tide and wind, forming even a long island off the mouth of the Hué river ; and this is the really habitable part of Annam. It is precisely because the crest of this backbone hugs the shore rather than the Mekong line that the mass of Laos is wholly exposed to the full force of the S.W. Monsoon, and so is densely forested, while Annam gets its rain in winter

off the N.E. Monsoon—accompanied by typhoons,—and never has the very great heat that the western flank suffers from in April and May, with a maximum of 113° F.

Southern Section. The southern section, 16°–11° N., trends due north-and-south between 107° E. and 109° E.; but both to the north and to the south it stretches completely across the French territory from the Mekong to the South China Sea. Maximum height, however, is still to the east, the Mother and Child reaching nearly 7000 feet above Nha-Trang; and there are some extensive plateaus, *e.g.* the Boloven. A number of considerable rivers, especially the Sé-Khong and the Sé-San, greatly facilitated Annamite invasion of Cambodia in olden times. Throughout its whole course the Mekong valley—which swarms with mosquitoes and leeches—is of very slight importance; and navigation is even more interrupted in Cambodia, especially in the Kratie and the Khong reaches, than in Laos. Indeed, most of the river from Bassac to Vien Tiane is continuously navigable, and it is specially good between Savannaket and Pak-Hin-Bun; but even here large boats are not used because they are useless for the through traffic. Though both Laos and Annam are much larger than Cambodia and Tong-king, they are much less important; but Cambodia cannot be isolated from Cochin-China, and together they are larger than Annam and nearly as large as Laos. The south-western "Rice-bag" is, therefore, more important in itself than the north-eastern, even if its international possibilities are less, and its climate is even less favourable to Europeans; but even so it compares favourably with Siam. Bangkok and Rangsit are in practically the same latitude and at the same elevation, but the latter is nearly 200 miles inland; and yet the mean maximum temperature here is delayed till May, and is below 86° F., while the heaviest rainfall—though also in September—is below 12 inches (cf. p. 133).

The Monsoon. Everywhere in this French territory, however, both heat and humidity are oppressive and enervating, and they generally reinforce each other; but there are obvious differences between east and west, and some between north and south. In the south-west the seasons change so regularly that it is usual to hear that the S.W. Monsoon "begins on April 15, and ends on October 15," though this rather overrates the importance of April, when Saigon gets *less than* 2″ of rain, and underrates that of November, when it gets nearly 5″; and during this last season the range of temperature from day to night and from month to month is very slight, generally well below 5° F. and very seldom above 5° F. The greatest contrast with this is found in the winter climate of the north-east, where frequent fog keeps even the maximum temperature low, and the minimum may fall to 50° F.—occasionally, to 45° F.—even on the Song-Koi delta. Between the two, Annam has winter rains off

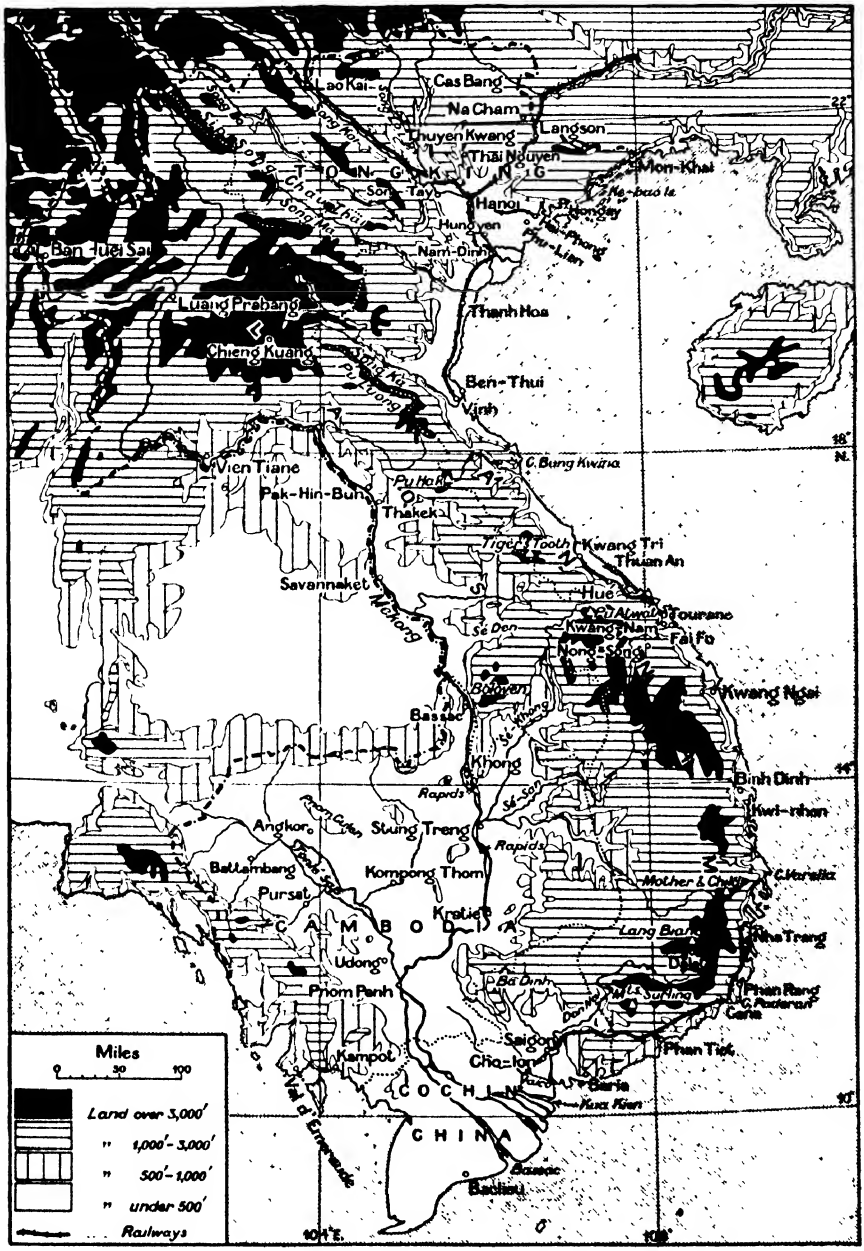

FIG. 110.—French Indo-China.

relatively cool N.E. winds, when the temperature may be below 60° F.; but in the dry summer maxima may reach 95° F.

Rainfall. The double exposure and the N.W.–S.E. trend make the mountain backbone of exceptional importance; the rainfall is described as "copious" everywhere west of the divide and "sufficient" everywhere east of it. But there is a remarkable uniformity, as illustrated by the averages recorded by the Director of the Phu Lien Observatory. Both Cochin China and Cambodia, as units, seem to have rather over 60″ a year, the number of rainy days being respectively rather below and rather above 110; the east-coast provinces have slightly above 70″, Annam with rather under 120 rainy days, and Tong-king with rather under 130, the 10 "extra" days being due to "spring" storms. In the west, however, there may be excessive falls of rain, and in the continental Laos there may be great extremes of temperature. The one outstanding record of rainfall is for the Val d'Emeraude—250″ in 225 days; but, in Annam, Tientaka has had 20″ in 20 hours—on November 16, during a typhoon, and the Phu Lien Observatory in Tong-king has recorded over 4″ in an hour. These heavy falls are specifically thunder-rain, which is of great value here for vegetation: for in all parts there is a good deal of poor soil, and the electrical discharges promote the formation of soluble salts that are of high fertilising power. Unfortunately, the greatest number of such storms is not where the soil is least fertile; for instance, Phu Lien has thunder on 28 days in July, the month of maximum rainfall (*c.* 12″, on 16 days).

The Divide. In spite of its relative lowness the great divide seems to put an effectual check on both monsoons. There is not quite a real dry season in the north-east, but that is only because squalls and storms from the south-east are diverted northwards by the divide itself to end, during February and March, in irregular, but considerable, rains and mists (*crachin*) in Tong-king. There is, of course, no similar compensation for the Mekong flank during the N.E. Monsoon; and, while Laos seems to have a rough average of nearly 80 (? 78″) inches of rain, its temperature extremes may be as high as 113° F. and as low as 33° F.

Dry and Wet Belts. Two special cases are exceptional. Along part of the railway between Phan Rang and Phan Tiet, where the coast-line takes its sudden right-angled bend to the west, there is a strip where neither monsoon is effective. At 520 feet above sea-level on Cape Padaran there is a mean of only *c.* 32 inches, of which about 8 fall in May–July, and 16 in September–November, the last month being the wettest in the year in nearly all parts of Annam. The opposite of this is found where the highland widens out, and has its highest point, in the latitude of Pu Atwat (8200′), *i.e.* where both spring and autumn typhoons are felt. Even Hué has a rainfall of 116 inches, two-thirds of it in September–December, with *c.* 26″ in October,

and *c.* 29″ in November, while on the crest of the divide only one-third seems to fall in those four months.

Cochin China

The historic link with Europe, Cochin China, like the "Malacca" link, is a colony ; but this colony is a continuous expanse of low and monotonous delta,—so low that a considerable area is more or less permanently flooded, *e.g.* the Plaine des Joncs. South of the Kratie rapids the river swings westward round the Ba Dinh block (2900′) ; below Pnom-Penh it divides into two branches (the Bassac and the " Mekong ") ; and south of the colonial frontier it swings back eastward round the block. From this and other heights, especially the Surling mountains (*c.* 5200′) of Annam, the Don-Nai, the Saigon proper and the Vaico, combine to form the " Saigon river," with a delta which is merely an annex of the Mekong delta physically, but its core commercially. **The Deltas.**

For the " Mekong " and the Bassac break up into nine distributaries, of which only those on the extreme west (Bassac) and the extreme east (Kua-Kien) are important—tidal waterways up which the tide works to Pnom-Penh ; but even of these two only the Kua-Kien, or " Mekong," is navigable by sea-going vessels. The other distributaries, however, with a perfect net of cross channels and canals, provide a wonderful system of transport, which has made Cholon one of the greatest river-ports in Asia.

Well over 90 p.c. (*c.* 93) of the cultivated area is under rice, worked largely by buffaloes ; and amongst other typical and important products is pepper. The ordinary food-stuffs include sweet-potatoes, bananas, and sugar ; tobacco, too, may almost be counted as a food-(substitute) ; and huge quantities of fish are caught, and cured,—or, when sufficiently decayed, made into sauces and pastes. Partly in connexion with this fishing industry, there is a large salt industry, with its chief centres on the two horns of the delta, at Baria and Baclieu, where the total rainfall in January–March is *less than one inch and a half* ! **Food Products.**

But nothing is really important commercially except the rice, and it is the rice-trade that has converted what is naturally only a canal (*arroyo*) port into the great city of Cholon (" Big Market "). The adjoining sea-port of Saigon, 45 miles up the Saigon river, is quite safe from the occasional typhoons which touch the coast in midwinter ; and, as the tide gives it a depth of over 40 feet, vessels of any kind and size can use it. It is the port for all Cambodian foreign trade, and controls a large proportion of the whole trade of French Indo-China ; and, if nothing else in the colony is French, Saigon city is French. But the climate is very trying, with a mean temperature well above 80° F. (nearly 82° F.), and a rainfall above **Ports.**

80″ (*c.* 81″), four-fifths falling in June–October, though May often has over 8″ and November over 4″; and even December has nearly 3″, with a temperature of 79° F.

Cholon is mainly Chinese, but the best rural workers—everywhere—are Annamese. They succeed here in winning well over 2000 (over 2100) lb. of rice from the acre; but, unfortunately, the very low land is permanently too wet to allow of more than one crop in the year. The French are making a gallant attempt to solve the prime problem of water-control, but it is very difficult; for drainage and protection from salt (tidal) water are quite as important as irrigation and protection from river-floods.

Cambodia

Lake Basin. Cambodia, or Sroc Khmer, lies wholly in the Mekong basin, the present delta beginning at Pnom-Penh; but, as we have seen, the waterway is less use in Cambodia than even in Laos. As a source of flood, too, it is so intimately associated with the Tonlé Sap ("Inland Lake") that Cambodia may be described as a lake basin. The lake varies now from not much over 60 to fully 120 miles in length, and is connected with the head of tide on the river at Pnom-Penh by a channel almost 60 miles long, the *Bras du Lac*; and in June, when the flood may rise 50 feet, the easiest "escape" for it at high tide is along this channel into the Tonlé Sap. The area of the lake at the end of the dry season is not more than 100 square miles, and its maximum depth is not over 5 feet; but the flood expands it to fully 750 square miles, with a maximum depth of nearly 50 feet. The lake thus becomes of very great importance as a reservoir as well as a regulator of flood.

Fish and Rice. It is also of considerable importance as one of the main sources of wealth, for it supports a fishing population of many thousands (possibly, 35,000), who contribute most of the large export of fish from Saigon (some 35,000 tons). The fishing, as elsewhere in Indo-China, is really netting, with *mats* stretched on palisades; and some of the fishermen come long distances, *e.g.* from Annam. Rice-growing is the only other vital occupation, but some other sustenance products are grown, including pepper—of fine enough quality to be exported in considerable quantities, *e.g.* from the little coasting-port of Kampot, behind which it is specially grown.

Three other products are of interest—cotton, silk, and draught cattle, buffaloes being the typical economic fauna of the marshlands, while the height of the lateral plateaus (nearly 5000′ behind Pursat) is favourable to oxen.

Silk and Cotton. Silk is the most typical fibre of Indo-China, and is produced in all parts; but more than half the mulberry avenues are in Cambodia, and there is a really important silk industry in Pnom-Penh.

Cotton is also grown in most parts of the territory, but forms a staple crop only in Cambodia; and Cambodian varieties have a more than local importance. This seems to be due to the conditions of production. The quantity depends on the extent of the Mekong flood, for the seed is sown on the banks of the river as soon as they are free from the flood; there the plant finds abundant moisture, even if only a small area is available, and always completes its growth in real drought and bright sunshine.

At the same time the cotton on these river-banks has to compete for room not only with mulberries, but also with tobacco and oil-seeds, so that there is little or no space for expansion; and the growers cannot choose their sowing-time, but practically must sow in November, *i.e.* when the floods subside. But if and when the rains continue late (cf. p. 528), the temperature may occasionally be too low before the plants are well started, while, if they begin early (March), they may spoil part of the ripe crop. There has been a tendency, therefore, to plant on higher lands that are above flood-level altogether, *e.g.* near Stung Treng and Kompong Svai, and to depend wholly on the rains. This enables sowing to be done in August, and then ripening is very perfect during the dry and sunny January and February; and the fibre, if not quite identical in type, seems to be equally good.

Pnom-Penh and Angkor.

Pnom-Penh, with its pagoda-crowned central hill (*pnom*), is the natural capital and focus, especially for all "foreign" intercourse; but it is of infinitely less interest than the ancient Khmer capital of Angkor, between the northern end of the lake and the foot of Pnom Culen, both the town (Thom) and the great temple (Vat) standing on the banks of the little Siem-Reap. The ruins of temples and palaces, monuments and terraces of bas-relief, are amongst the most wonderful in the world; and the mystery that enfolds their destruction is at least equally wonderful. To-day the ancient site marks the last stage on a great international motor-route [1]—from the Chinese frontier at Langson, in Tong-king, to the Siamese frontier here.

Laos

Forested Highland.

Except for the little strip to the west of the upper river—roughly between Vien Tiane and Ban Huei Sai, Laos lies between the international frontier of the Mekong and the inter-colonial frontier of the "Pu Luong" backbone. Throughout the whole 750 miles from north to south it presents a full face to both monsoons, and so is densely forested, especially between 16° and 19° N., where the highland forest is almost impenetrable; but in these latitudes the country drops to the Mekong in broad terraces—first of sandstone

[1] There is an alternative to this Kompong Thom-Angkor route in a Battambang-Uding route on the opposite shore of the lake.

and then of limestone, where the drainage seems to be conspicuously good and the climate relatively healthy even in the valley. The conditions have encouraged the construction of two good motor-roads across the divide—from Vinh and from Hué to Pak-Hin-Bun or Thakeh and Savannaket; and these are tapping some of the (little) trade, which used to be almost entirely with Siam.

Plateau Basins. Both in the north and in the south there are wide plateau basins, *e.g.* the Trahink basin between Chieng Khuang and Luang Prabang, now connected by a motor-road, and the Boloven, with its river girdle in the Sé Den and the Sé Khong valleys. Both are unusually healthy areas, and persistent efforts to improve the transport conditions on the Mekong have greatly favoured economic as well as political unity.

The People. The repeated assertions that the Laos people are "Aryan" seems to have no foundation, which is a pity; for the racial contrast would emphasise the name Indo-China as a divide between the Lao-Thais and the Sino-Annamese. There does seem to be a considerable sprinkling of "Aryan" elements in the half-castes of some of the tribes; but the pure Laos ("Men"—who prefer to be called *Thais*, "Free-Men") are undoubtedly Mongol.

Laung Prabang. Laung Prabang is the one important centre, and has a naturally fine position, where the Nam-Khan winds round a hilly promontory to join—and make navigable—the Upper Mekong. The town stands at the foot of Pagoda Hill (200′), and commands all the trade of the whole region, including the jungle-products collected by the Khas, or Hill people, *e.g.* lac and wax, silk and spices. These used to be exported *via* Paklan and the Me-Nam; but now those that are not sent by road to Chieng Khuang, are shipped down the Mekong, —though this takes "officially" 32 days, and well over 42 in actual practice. The town stands at a height of about 1000 feet, and has quite a good climate, with a real dry season,—only 4″ of rain in five months (November–March), with mean temperatures of about 70° F. in December and 69° F. in January. August is the one really wet month (over 12″ out of 48″); but May, June, and September all have between 6 and 7 inches, and there are good rains in April (4½″), and fair rains in October.

Annam

Official Divisions. The French have shown a tendency recently to divide Indo-China into economic regions associated with the three chief ports—Saigon, Tourane, and Hai-Phong, and to put Annam south of Cape Varella into the Saigon region, nominally on the ground of it being a rice-growing area. But this grossly overrates the crop yielded by the few thousands of acres irrigated from the Phan-Rang river, and underrates the value to Saigon of Dalat as a summer-station,

4500 feet above the sea and with temperatures[1] ranging from 50° F. to 77° F., while some of the surrounding heights are said to exceed 7500 feet.

Climate.

There is more to be said for linking the Song-Ka delta with that of the Song-Koi, and the iron-mines of Thanh-Hoa with Hai-Phong, to which they export their very fine ore; but the so-called "transverse barrier" that runs *south*ward in Cape Bung-Kwina is concordant and not transverse at all,—the mines export to Hong-Kong and other places besides Hai-Phong,—and the rainfall of the Song-ka delta is more typical of Annam than of Tong-king. Out of very nearly 72″ in the year, Vinh has nearly 30″ in September and October (14″), with 8 or 9 in November; but Hanoi has less than 2″ in November and not much above 4″ in October, while it has 27″ —out of fully 72″—in July and August (14″), and June has *c.* 11″, *i.e.* more than September. Again, in November–March Hanoi has only a good 7″, while Vinh has well over 17″; and Thanh-Hoa, with nearly 26″ in September (15″) and October, has still the autumn fall that is typical of Annam.

The Thanh-Hoa plain, indeed, makes a very marked divide between the two regions, with its typical phenomena related to the N.W.-S.E. trend of the Pu Luong crest and the S.W.-N.E. trend of the coast. The N.E. monsoon comes as a land wind; and, if the continental high-pressure develops rapidly, supplies of rain in early winter are cut short. But the plain is too far west to get the late winter rains that are carried across the coast to Tong-king by the S.*E.* wind (cf. p. 528). In summer the S.*W.* monsoon is so much dried in passing over the Pu Luong that it becomes a typical föhn wind, which desiccates rather than drenches in July and August. The total result is an abnormal dryness, which makes for healthiness, but a precarious *régime*, which gives great variations of rainfall, *e.g.* a total of 109″ in 1907, followed by one of 47″ in 1911.

Natural Divisions.

Vinh and Cape Varella may be taken, however, as marking natural divisions of the province; for the broad highland south of the Cape is linked to the long plain north of Vinh by the narrow ribbon of the Binh-Dinh coastland, with its abrupt rise to a crystalline hinterland, narrow to the north of 16° N., and wide to the south of it. Rice is widely grown on the Song-Ka and Song-Ma deltas of the concave coast, and on numerous little alluvial patches along the torrents of the convex coast; but sugar and spices are of more importance than rice here, and even coffee and tea are of some importance. All along the coast, too, there is a busy fishery, especially round the Kwang-Ngai peninsula and south of Cape Varella, associated with a salt industry; indeed, fishing, curing fish, and making the *nuoc-mau* sauce are the chief occupations.

[1] The mean temperature for both December and January is just below 63° F., and that for May just below 70° F.

In the interior quite a number of cattle are raised, and amongst the forest products are drugs, spices, and raw silk.

Wood *v.* Coal. The lack of industries and the abundance of timber—even the railways using wood by preference—have rather impeded the development of the mineral wealth as based essentially on coal; but an additional difficulty has been the character of the coal. The Nong-Son coalfield is large, and there is easy transport—mainly by water—to Tourane; but it contains no bituminous coal, and is not of much use even to the Kwang-Nam goldfield.

Hué. As a capital, Hué has no merit except centrality; its four "summer" months (May–August) have a mean temperature of 84° F., with a range of *less than* 2° F., while its four "winter" months (September–December) have 84″ of rain; and, though its river is actually open to launches for the 8 miles from the sea, Thuan An is not a port. Indeed, Tourane acts as the port of the whole area, from Kwang-Tri to Fai-Fo, just because it is on a riverless bay shut in by two rocky peninsulas; and Kwi-Nhen acts as the port of the Binh-Dinh coast for the same reasons.

Hill Station. The southern highland has a real sanatorium in "Lang Biang," a large part being above 4000 feet, with considerable areas—north, south, and centre—above 5000. Dalat is easily reached by train from Phan-Rang, though the climb is 3000 feet in a dozen miles; but it is only a few hours from Saigon by either rail or road (8 hours). Phan-Tiet may almost be called a suburb of Saigon, and the little seaside resort of Cana is in the Padaran dry belt.

Vinh. The only important centre in the north is Vinh, as a rail, river, and road junction. Its road connexion with Laos is better, and likely to be much more important, than that from Kwang-Tri; and, while safely above the extensive floods, it has a 3-mile railway to the little port of Ben-Thui, which may become a place of importance when the navigation on the Song-Ka is regulated.

Tong-king

Distinct Area. Tong-king, by both climate and location, is distinct from the rest of French Indo-China, and the Union capital was appropriately moved to Hanoi from Saigon. Midwinter temperatures correspond with those of the Thames valley in summer, and yet the midsummer mean is below 85° E.; and a really important transit trade between Yunnan and Hong-kong, *e.g.* exchange of tin and cotton yarns, passes through the province. This trade was considerable even before the opening of the Yunnan railway, going by water between Haï-Phong and Lao-Kay.

"Chinese." The land is not only a natural link between Tali-fu (where the Song-Koi rises) and Canton, but it was for centuries under Chinese rule; and the methods and aptitudes of its "Annamese" people are

largely Chinese. It is even significant that the two great tributaries of the " Red river," Song-Bo (" Black river "), Song-Lo (" White river ") are still known locally by Chinese names, Ho-ha and Tsin-ho ; and one of the chief problems of the province is the result of the long time since the rivers were first embanked—*700 years* in the case of the bank at Hanoi.

River Silt.

The river is exceedingly difficult to control, and embankment— as usual—only increases the real difficulty. The annual load of silt in the Red river alone is estimated at 70,000,000,000 cubic feet ; and the great mass of this is carried down into the sea. Hanoi itself, now fully 60 miles from the sea, occupies a site that was on the coast in the seventh century ; and Hung-Yen, now 35 miles inland, was on the coast in the seventeenth century. But there is also continual deposit in the beds and on the banks of all the rivers ; the level of the water at Hanoi is sometimes *seven yards* above that of the riverine land. Then both the date and the quantity of the flood vary greatly ; it comes at times too soon, and then it fails before harvest,—at times too late, and so delays sowing,—at times too strongly, and spreads ruin far and wide through burst banks. And the constriction of the delta, which begins at Son-Tay, means that some of the flood-water descends very suddenly, the hills behind Son-Tay itself rising to over 4000 feet *within 10 miles* of the town.

Dams.

Every effort has been made to cope with the danger, including the reinforcement of the banks with masonry in critical reaches, *e.g.* on the right bank at Son-Tay; and a proposal has even been seriously considered for doing away with all the dams, for all the extra protection only increases the difficulty of both irrigating and draining. But the wide destruction of forest below 2500 feet, and even up to 5000, forbids suppression of the dams unless— ? until— all the large rivers are dammed far up their valleys. This is, surely, the only hopeful expedient ; and yet it is one which seems never to be mentioned.

Scanty Population.

These conditions are sufficient in themselves to account for the relative scantiness of population ; and this in turn, as in Burma, throws some light on the large surplus of rice for export, two crops in the year compensating for the relatively small yield per acre (*c.* 1600 lb.). But a much larger proportion of the population here (than elsewhere in Indo-China) is engaged in mining and other industries, especially textiles, *e.g.* the famous silk industry of Nam-Dinh and the cotton and the paper industries of Nam-Dinh, Hanoi, and Hai-Phong.

Coal.

The mineral wealth is considerable in both coal and metals, and the working and the transport of the coal are very easy. The principal field lies in a long (*c.* 110 miles) arc between Seven Pagodas and Mon-Kai, especially in the Dong-Tren and behind the beautiful Bay of Along ; it contains good smokeless coal, within easy reach of

barge transport in the Dong-Tren, while large vessels (± 5000 tons) can lie close inshore in the Bay of Along below the open cuts in which the coal is won. Hongay is much the most important shipping-point; but the island of Kebao has a fine harbour in Port Walhut. Fortunately, some bituminous coal has also been found recently, which can be shipped from Thai-Nguyen, and there are lignite mines farther west—above Thuyen-Kwang. A mixture (40 p.c.) of the Thai-Nguyen bituminous with the Hongay smokeless coal produces a good steam-fuel for locomotives.

Metals. The metallic wealth of the surrounding highland is unquestionably very great, and the quality generally seems to be as satisfactory as the quantity; but lack of cheap transport is often a fatal obstacle in the case of the inferior minerals. Thus, tin and wolfram can be carried by coolies or pack-mules down to roads where carts can take the loads on to rail or river; but, *e.g.* zinc cannot bear the cost of this, and it comes next to coal in abundance and potential importance. But some of the richest zinc deposits (with argentiferous lead) are conveniently near to water transport on the White river above Thuyen-Kwang and on the Song-Cai above Thai-Nguyen, being connected with the ancient limestone that lies along and east of the White river. There are also large quantities of very rich and very pure iron-ore here (hematite and magnetite), which increases the importance of Thai-Nguyen.

The tin and the tungsten are associated with the crystalline formation north of the old limestone, especially the Pia Wak (6300′); and, when the Langson line was extended to Na-Cham, a motor-road was built *via* Cas-Bang to within easy reach of the mines. The alluvial deposits here, as elsewhere in the province, were worked ages ago by the Chinese.

Hai-Phong. Hai-Phong, even with all its improvements, is far from being a good harbour; but it is more on the main line of movement—the Hainan Strait—than any of the better harbours along the rocky coast north and north-east of the delta, *e.g.* any on the Along Bay. These are as remarkable for their natural excellence as harbours as for their extraordinary beauty, but are of no direct use to Hanoi. The latter has lost almost all traces of its Chinese origin, and is now as typically European—and even as specifically French—as Saigon; and its potential importance may, perhaps, be suggested by its historic names, *e.g.* Keshol (" Great Market "), Bacthauh (" Northern Citadel "), and Donglinh (" Eastern Capital ").

For references to all the Indo-Pacific lands, see p. 748.

CHINA.—I

CHAPTER XXX

PEOPLE AND PLACE

China is a land the geographical phenomena of which have full significance only in the light of time values. Probably the most important fact in both the political and the economic geography is the conspicuous success with which the particular blend of peoples has adapted itself to an alien environment without losing the fundamental aptitudes acquired elsewhere. The most important fact in the historical geography is, probably, that primeval China was a land of " broken bits," *e.g.* with its loess plateau in the north-west covered with a scanty steppe vegetation, and its alluvial plain in the north-east covered—like the natural boundaries of those " broken bits "—with dense temperate forest. **Time Values.**

There are two questions which we can ask about that primeval China before attempting to survey and analyse the region itself. The one is as to the source from which we would expect any natural drift of peoples or cultures to have reached the region ; and the other is as to the fundamental aptitudes which the actual intruders brought with them. **Origin of People.**

Exactly where, then, was primeval China in relation to any regions of the ancient world in which there seems to have been anything approaching a dense population ? Geography can give us an approximation to an exact answer, however far back we wish to put the date of the intrusion ; history confirms the general tenour of the answer, but only in the form of legend or of inferences made no long time before the Christian era.

For thousands of years the Pacific spread a hemisphere of estranging sea eastward and southward from China ; and so we must look to the north and the west for lines of access. But, if 100° E. and 120° E. are accepted as the natural longitudinal limits of the land, the Gobi (" Desert ") spreads its *sha-mo* (" sea of sand ") or *sha-ho* (" river of sand ") along the north, even if it is not quite strictly desert, or all sand, still less all moving sand ; but the mass **Ocean *v.* Desert.**

of the sand and of the moving sand is certainly within those longitudes and in the southern latitudes (*c.* 40° N.) of the "desert," and in the early days the Pacific flank of the desert was covered with forest and swamp.

N.W. *v.* S.W.

When we look westward, we are facing the great race-homes of the Eurasian peoples; but the huge Tibetan block could not be the source of any great outflow or the route for such to China, and we are compelled to confine our attention to the routes which turn the block in the north-west and the south-west. A relatively dense and cultured population was nearer to China in the south-west, but access was easier in the north-west, where the approach was wholly by land and over unforested land. The approach here, too, was of precisely the type favourable to nomads—and so to the spread of Moslems in many parts of Asia and Africa; and it is surprising that China had to wait till the eighteenth century before that great Manchu statesman, the Emperor Kienlung, realised the importance of organising both Kansu and Yunnan as frontier provinces, and delimited both by friendly agreement with his foreign neighbours.

To-day Kansu is not much more than 25 p.c. Moslem, but the Moslems are concentrated in the centre—between the Tibetans of the flying western buttress and the Chinese of the loess lands in the east; and the wisdom of Kienlung was shown as much in his refusal to overrate the obvious danger in the north-west as in his emphasis on the extra-Chinese influences that were bound to affect a province that touched Tibet and Burma and "Annam."

Seres *v.* Sinoe.

Our historical evidence confirms all this, even if it is of relatively recent date. For early Europe knew of two lands, as some thought, —or of one land with two sets of names—in these longitudes and the pertinent latitudes; the northern land was *Seres*, and the southern was *Sin*, the latter with several forms—*Sin* and *Sinoe*, *Ch'in* and *China*, even *Ts'in* and *Thîn*. According to the School of Ptolemy "the Sinoe lie at the very end of the habitable world" —so that no people or culture could reach them from "beyond"; Cosmas said that "beyond Tzinista there is neither habitation *nor navigation*," while Ptolemy's conception of the Indian Ocean as a closed basin almost suggests facilities for "Mediterranean" navigation.

"South Sea."

Whether he was in any way indebted to the Chinese for the conception or not, this was what they themselves actually thought. Indeed, almost down to modern times they regarded their "South Sea"—our Indian Ocean—as a sort of Gondwana Mediterranean, with a continuous coast from Canton to Zanzibar; and, when they really began to use it, their essential object was a double one—to reach Buddhist India and Ceylon, and so to win allies to help them in checking the constant pressure of intruders northwards *via* Burma. Until *c.* 200 B.C. the Chinese were definitely a northern

people, knowing almost nothing about any land to the *south* of the Yangtze; and later, owing to the difficulties and the dangers—from typhoons and pirates—of navigating the "Malay" seas, early Roman trade with China was conducted almost wholly by the Irawadi-Yangtze route. But there seems to have been no direct sea-trade between the two till well on in the second century A.D., *i.e.* not till a century after Hippalos had established the use of the monsoons for direct journeys between the Gulf of Aden and the Malabar coast.

N.W. Access.

Early drifts of peoples and cultures into China, then, practically must have come into the country at the north-west or the south-west corner; and, as the Chinese development of the Yangtze basin was 2000 years later than that of the Hwangho, we are concerned only with the north-west, even though the development of the Yangtze took the form of a struggle between culture drifts from Central Asia *via* Kansu and Shensi and from Southern Asia *via* Burma and Yunnan—the one lodged naturally in the Wei valley and the other in the Red Basin. Neither could move eastward easily, for an eastern exit in the north was blocked—to the farmers and the fighters of the loess lands—by swamp and forest, and in the south was blocked—even to the river-men of the Irawadi and the Upper Yangtze—by the gorges. Even when the northerns did begin to move eastward, they moved *north*-eastward—up the Fên valley, the home of the First (*Hsin*) Dynasty, and *south*-eastward—down the Lo valley, which was going to give them a grip on the eastern course of the Yangtze.

So far, therefore, from early China having been isolated from the West, it probably was western in origin, with some essentials clearly Western, like those of Sumerian Mesopotamia, as illustrated by its earliest ("Dragon") myths; and everywhere along the line of approach *via* Kansu there was only a single type of world-landscape, a vast core of steppe—or even desert—ringed round by a ribbon of oasis.

Indo-Pacific Elements.

This does not mean, however, that there were no Indo-Pacific elements in the country, but only that they were alien, and Indian rather than Pacific. The country was utterly isolated on its Pacific face, but reasonably accessible on its Indian face—to any peoples or cultures that could be spread by sea and river transport; and there were such aliens. Certainly as early as 1000 B.C. Indo-Pacific Tais, or Chus, were occupying the Hu-Kwang ("Broad Lakes") basin while it was still forested—Ching Chou ("Jungle Country"); and the Ch'ins had to work round the Ta-Pa-Shan ("The Great *Northern* Mountains") and to seize the upper waters of the Kialing and the Han (especially Han-chung, near the head of navigation), *i.e.* to cut the westward supports of the Chus, before they could force them down the Yangtze valley—into the lakes and marshes

of the Hwai basin, where river-men were safe from loess-men. There were still earlier Indo-Pacific elements actually on the south-east coast—*e.g.* in the "Annamite" kingdom of Yueh, as early as 2000 B.C. (which survived till 300 B.C.), and the later Wu Kingdom (1100–400 B.C.), north of their Yueh kinsmen and so actually on the Yangtze delta (cf. Wu-hu and Wu-sung). And it was not until the Ch'in ruler had ousted the (Wu)-Yueh watermen from their headquarters on Hang-chow Bay that he changed his title of *Wang* ("King") to that of Shi-Hwang-Ti ("First Universal[1] Emperor").

Ch'ins. The lateness of this assumption of the imperial title has caused, or encouraged, some misconceptions about the importance of these Ch'ins, or Ts'ins, and their relations to the rest of China. From the eighth century B.C., a principality of this name was in complete control of the Chinese and of the Zungarian gateways to and from the West, and it gradually spread southward through the Red Basin, until in the fourth century it had control also of the Yangtze link with the Irawadi. This was at the very time when Persia, on the Indus and the Amu, was controlling the western ends of both these lines of approach; and from this time onward Ch'in, though it did not conquer the rest of China till late in the third century B.C., completely controlled all natural intercourse between China and the West. It is difficult, therefore,—and quite unnecessary,—to avoid the conclusion that Western Asia and Europe extended to the lands farther east—knowledge of which, and products from which, they obtained only through and from Ch'in—the name of the great State that they did know directly. At any rate it is obvious that Ch'in, both before and after it conquered the rest of China, was far from avoiding intercourse with the West.

Wei *v.* Yangtze. It seems probable, too, that the Ch'ins were users of iron—for weapons as well as domestic utensils; for up till the eighth century B.C. the Wei valley had been the centre of the strong Chou dynasty, named—from a *Bronze*-Age duchy on its *western* frontier—by its first king (not "emperor"), Wu-wang; and it was under him that the constituent little units of the area were drawn into a loose confederation under one priest-king or liege-lord, who represented them all in *religious* ceremonies. But the economic basis of life was hardy grain (millet and wheat) and hand culture; and it was only after the Ch'in conquest of the Red Basin that rice and cane-sugar came into use—with the buffalo as the irrigating animal. With the advent of rice the supremacy of the Yangtze basin began.

"Counties." These little constituent units (*hsien* or *hien*) probably date back formally to the time of the first Hwang-Ti (±2600 B.C.) and informally to the very beginning of the movement from the west. Hwang-Ti is said to have "founded" 10,000 such *hsien* ("district centres"

[1] The Chinese characters for the *Hwang* are not those denoting "yellow."

or, possibly, " counties "), and to have " united " them by the single bond of a common religion ; but the movement seems to have been always a series of " family " drifts rather than a horde invasion. Each successive drift was absorbed and assimilated by earlier settlers, or formed a tiny new centre of its own, a big village or even a city-state of co-operating families, under a patriarch distinguished for great age and many children and grand-children. Even when they are now important little caravan-stages, these villages betray their origin and history in their names, *e.g.* Sanchia (" Three Families ") and Pachitas'un (" Eight Families Village ").

Racial Dowry.

The earliest colonists or conquerors of China, then, like those of Sumer, brought with them from their original areas of racial characterisation two fundamental aptitudes which are normally antagonistic—the aptitude of steppe nomads for co-operation under patriarchal guidance, and that of oasis gardeners for village life. It is reasonable to assume that the mass of each drift was composed of wanderers, but even to-day we know of drift from oases to desert ; and, if nomad aptitudes were strengthened in the course of the eastward wandering, oasis aptitudes were going to have their chance at the end of the journey—on the loess. There, at least, any Sarts in the drift would feel at home.

Patriarch *v.* Gardener.

The link between the two types of society was in the appreciation of the vital value of water, though used for very different purposes ; and, as the wandering over wide spaces gave place to settlement on small spots, the autocracy of the patriarch and the autonomy of any family were alike weakened, while the one permanent interest was in the fertile soil round the local water-supply. As we have seen (p. 325), a pastoral society that wanders over wide spaces can scarcely be successful, or even survive, except when under someone with much knowledge of weather-signs, tribal limits of pasture, etc. ; a premium is put on age and on a large family. The clearest antithesis of this is in the gardener's family, settled on a tiny patch of very fertile soil, which can supply all the food the family needs, often with some additional products, such as flax. Patient waiting for harvest on the spot replaces constant search for new " harvests " elsewhere.

"Bits of Country."

Even if the mass of such drifts were nomads, each settlement was in a " broken bit " of country ; and, though the family and the little co-operative group remained the controlling units,—for as many hands were needed to carry the water to the individual plants as had been needed to milk and tend the individual animals,—the basis of life became sedentary tillage, and accumulation of goods became easy. The new environment was bound to perpetuate the strongest aptitudes of the old one ; and, as the hold of the family in its village became stronger, there was less and less chance of the nation and the state being serious objectives.

The Family. The Chinese unit for centuries, then, has been the family, and China has been simply the aggregate of millions of family-communities; but we may intrude some of the meaning which Natural History gives to the word *family*, into that given by Political History. The hamlet was a group of households, but extra-household obligations were limited to what was required by sheer necessity. There was no sense of duty or debt, only a sense that what was hostile to all was hostile—in exactly the same way and to the same degree—to each. It was not a question of laws, about the wisdom of which there might be reasonable doubts, but of customs, violation of which was fatal—to yourself! Such conviction needed no political machinery.

Sustenance. The compelling necessity was, of course, the provision of sustenance; and that required many workers, all working in the same way and for the same end. The family provided its full strength as a social unit, honoured in proportion to its numbers, especially of males; and all families co-operated in the semi-political unit of the village. The result was a measure of social solidarity as remarkable as the political weakness; and, in a vast land of complicated topography and difficult movement, even an imperial patriarch was forced to tolerate local autonomy. In the end the unit of the family-group in its village-home became supreme, depending for its survival on the industry and the honesty of its individuals; they wanted practically nothing from outside, still less did they feel any "patriotic" or "national" obligations to that outside. Once the social unit of the family and the political unit of the village had been completely adjusted to the problem of sustenance agriculture, the resultant fabric was re-enforced with great potency by the moral sanctions of the Confucian code of behaviour; but the system was not likely to throw up a supply of natural leaders for a nation, such as Japan had in her *samurai*.

"Divine Right." We may bear in mind, too, that during its first 2000 years of history China was no larger than the area over which any major group of steppe nomads wandered in the course of a year; and over all of it there was as much identity of interest as there had been in the old pastoral life. There could be nothing strange, therefore, in the whole being under a "divine" patriarch; but the obvious identity of interest was strictly local and limited. There was no longer any constant movement, still less movement in a major group; each unit became disunited from the rest, and each centre became decentralised. But there were two forces at work which were of supreme importance. There was no possibility of continuing the normal phases of the old pastoral life, for the land did not allow of that; and the only essential of it that was possible under the new conditions was the continuance of the family

supremacy. For this the new conditions were actually most favourable. Groups of families could make a community, and a group of communities could make a " province "—over an area that had both natural limits and natural unity; but the emperor was only the chief head of a family, of the combined families, and not the head of any feudal system, still less the representative of a nation.

China *v.* Sumer.

The conditions of adaptation were hard, especially for the real nomads; and, no doubt, those who survived were the most fitted to survive in the particular environment. The sequel is a nation of immense physical vigour with a unique climatic adaptability; and it is precisely this adaptability that differentiates the Chinese from the Japanese, for the latter are very sensitive to changes of climate. If the development here differed from that on the Sumerian plain, we must remember that Mesopotamia continued both of the fundamental features of the old home in West Central Asia—steppe nomadism and oasis agriculture, while it was not a network of " broken bits " of country, in which little groups could be isolated. In most parts of China, on the contrary, the nomadism was as unnecessary as it was impossible; for the local supplies of food were prodigious, even if the earliest China was only a land of millet and wheat, and the *pays* had " fixed boundaries."

Cultural Unity.

This would throw light upon several remarkable features of the people. Their civilisation as a whole has been conspicuously homogeneous, and they have been curiously free from disintegrating jealousies and interests,—racial and religious, social and economic; civilisation has not sapped their vitality, or weakened their virility. The only discordancy is between their social stability and coherence and their political weakness and incoherence; and it is the unity as well as the character of their culture that has made them such good colonisers, and that now opens such possibilities to them in Sinkiang and Manchukuo. They do not squander their strength in individual adventures, but " squat " as families, using every foot of land and every trickle of water; and they use them with one fundamental object—subsistence agriculture, which is at once a guarantee of aloof self-sufficiency and a guard against living beyond their means.

Regional Variety.

Of course, as we have seen, this contrast was a perfectly natural sequel to geographic controls operating in the old race-homes and along those lines of approach to China; and there are to-day in China, and have been for long, marked differences—even something like antagonisms—of speech and temperament, of relationships and aims, even of religion in later days, *e.g.* between Kansu and Kiangsi or Kwangsi. But most of these differences are not greater than those between the East Anglian fens and the Welsh or the Scottish mountains, and the improvement of communication

is removing the geographical isolation to which most of them were largely due.

Land *v.* Sea. But this improvement of communication, especially the easier intercourse with " Foreign Devils," was precisely the greatest upheaval that could disturb the old stagnation. Shi-Hwang-Ti's " Great Wall " was the outward and visible sign of an inward and political unity imposed on the discordant and incoherent bits of China ; but, when the Ch'in dynasty of the Hwangho lands gave place to the Han dynasty of the Yangtze lands, the real danger lay beyond coasts, not beyond walls, at the end of sea-ways and not land-ways, and foreign seamen had already even held rule in the Yangtze delta.

" Democracy." " Farmers of Forty Centuries " can scarcely be expected—in spite of some marvellous assertions by very eminent politicians at a recent Albert Hall meeting—to discard in forty years the habits and inheritances of those centuries ; but the sea has brought them into touch with the outward forms of democracy under circumstances which suggested that the foreign " democrats " were very effective politically and economically. This inspired a tiny body of Chinese intelligentsia to clamour for these forms, and even to wish to impose them on China, and to do that by means of that precise anti-foreign bias which has been common—perhaps the only common political trait—to all parts of China since the building of the Great Wall ; but it is important to remember that this anti-foreign bias was based on *contempt*, for during the centuries of isolation the Ch'ins (" *The* Men ") came into contact only with surrounding peoples who were very much their inferiors.

Two Regions. Those two great avenues of approach from the west, both of them essentially " Silk [1] Roads ", lead to a land which, in the first instance, is itself very clearly divided into two natural regions, which we may call the Yellow and the Blue basins ; and the differences between them may be indicated roughly by describing them as a region of yellow dust and wheat and a region of red mud and rice, the one as suggestive of Western Asia or even Europe as the other is of Southern Asia and specially India.

Culture *v.* Environment. If we examine the origin and the value of soil and crop, the most fertile of all soils is associated with the most nutritious of all grains ; but it is a grain that grows slowly, and is not very prolific. The slightly less fertile soil is associated with the most prolific of all grains ; and, as it grows more quickly than any other, two or three crops may be harvested in the year. And there are other factors at work. In the one case drought has been associated for centuries with famine and steppe raids ; in the other an unfailing rainfall has

[1] Bhamo was a silk-market by the seventh century B.C., though the " Silk Road " may have developed out of a " Salt Trail."

been associated with forested ramparts and an assured food-supply. Naturally, these different environments demanded different qualities in their inhabitants, and encouraged different lines of development; but the methods of the north—ideally suited only to the north—were imposed, like the Mandarin speech, on the south, and natural evolution was sacrificed to cultural unity. As the people here were not originally Chinese—certainly not pure Chinese,—racial variety was also, to some degree, sacrificed.

Third Region.

Of course, there is a third region, the river of which is wholly Chinese, if its racial character is almost wholly alien; but its western portion is essentially allied to Indo-China, while the rest is in many ways Malayan or East Indian. On the other hand, Richthofen divided China into two parts, and made the Tsinling the northern boundary of South China, while grouping the lowlands of Hunan—and even Hupeh—with the provinces of this south-east coast.

Tsinling Divide.

Each of the two great regions has its east-and-west thoroughfare; and so each offers to its own avenue of approach a line of natural extension from the west eastward, the line in the north being very easy. But movement north-and-south is as difficult as that east-and-west is easy, for the divide—the Tsinling system—is essentially latitudinal, and it is of continental as well as regional importance.

For the Tsinling, or Ch'inling, is merely a continuation of the great Kun-lun spine of the continent, as the Nan-shan is that of its Himalayan rampart; and the name may be extended to the whole of the mountain development which divides the Hwangho from the Yangtze—to the old coast behind Kaifeng and Nanking. The Tsinling proper, as Europeans generally use the term, is a broad system of parallel ranges, with intervening troughs often filled up to form a narrow "plateau", at an average height of well over 7000 feet; and the continuation of the northern line is seen in the Siung-Erh and Sung ranges, the latter reaching 8000 feet above the old course of the Hwangho, and that of the southern line in the Fu-niu, Hwai-yang, and Muling ranges, to the last gorge on the Yangtze at the head of the delta. That is to say, the continental spine once ended on the coast.

Two Sections.

This extension of the name is all the more pardonable because even the section usually called Tsinling is really two sections, the T'ai Pai and the Pe-ling; and both names deserve attention. For ranges called Pe-ling ("*Northern* Mountains") must have been named from the south, and so it is particularly interesting to find them being occasionally called—or miscalled—Nanling ("*Southern* Mountains"), especially by the people of the Wei valley; and *Pai* is the Chinese form of *Tai*—the name of the people whom the Burmese call Shans, and the Chinese also call

Laos (" the Ancients "), and who have left plenty of traces of themselves in the Yangtze basin (cf. p. 540). It adds to the interest that perhaps the name Tsinling should be applied, as it is now applied on the spot, only to the passes, especially to the passes by which the Ch'ins turned the Chus out of the Upper Yangtze basin.

A Great Barrier. The system is a veritable Pyrenean barrier, in parallel ranges of 8000 to 10,000 feet, and exceeding even 12,000 in the Tai (" Towering ") Pai ; and the sandstone scarps, often topped with limestone or shale, are very steep, with the passes [1] normally above 7000 feet, and involving sometimes even a scramble on hands and knees, *e.g.* the Wu-ting (" Five Nails "). The crest carries heavy snow till July, while the flanks are densely forested, this being one of the three remaining areas in China of which that may be said ; and in some typical stretches it is " a week's good going " to cross four belts from 8000 to 10,000 feet high, separated by narrow and deeply-sunk defiles. Where the ranges are not forested, they are very bare and rough ; and there is more forest on the upper than on the lower levels, where reckless destruction for firewood and actual forest fires have denuded long stretches. This destruction of the most accessible timber and the roughness of the terrain make it almost impossible to make use of the good timber, though it is greatly needed ; and so the region remains one of the great game preserves of China (bear, leopard, pig, etc.).

Climatic Divide. It is not surprising, then, that the system has been one of the two great divides in the land, politically and economically, as well as structurally and climatically. The two prime facts climatically are that the system marks the southern limit—not only in China, but in the world—for the January isotherm of 32° F., and the northern limit of a 40-inch rainfall in China. Its northern piedmont is bare and stony, with dusty hills and crisp dry air, while its southern is furrowed by a succession of clear streams with wooded banks and often wrapped in morning mist ; and, while the ancient beds to the north are very nearly horizontal, to the south they are thrown into a series of folds parallel with the young folds. It is true that a whole section of the northern plateau is called Shan-si (" Western *Mountains* "), but they are not really mountains, only the stair of faults by which the limestone and the sandstone terraces of the plateau drop to the lowland.

Wei *v.* Han. Differences of climate, as already suggested, emphasise topographical differences. For instance, the base levels of the Wei and the Han valleys are comparable in all longitudes between 107° and 110° E. ; but the Wei,—though rather better than its neighbour, the Lo—is of relatively little value for navigation, while the Han is navigable by large junks to Fancheng (for the Tsinling Pass,

[1] The highest passes are sometimes the easiest, *e.g.* the Sin-lung (over 9000') between Hanchung and Feng-Siang—because they are the most weathered.

4100'), and by small junks to above Hanchung, for the eastern scarp of the Ta-Pa is so abrupt that the river is said to be "navigable right up to its source." It is rather broken by a long series of rapids in passing through the carboniferous belt, but they are all navigable, as some of the tributaries of the river are also.

Wheat v. Rice.

The heavier rainfall on the southern face of the Tsinling, too, has led to the riverine lowlands—*i.e.* the whole riverine stretch outside the gorges—being covered with deep alluvium; and this, though wholly devoid of loess historically,[1] is very fertile. Of course, through the depression in which Kansu, Shensi, and Szechwan meet, loess has always penetrated to the Ta-Pa ranges; and the exception here is very significant as to the relations of climate and topography in the distribution of economic vegetation, *e.g.* the divide between wheat and rice. Both may be growing in the same longitude and at the same height (*e.g.* 5000') on opposite sides of the system, but the absence of loess is associated with the presence of multitudinous streams that meander over a hundred "ledges." Rice grows farther west as well as farther east than the Ta-Pa, even at a height of 7000 feet; but where the loess has penetrated, it is accompanied by wheat and not by rice.

Political Divide.

These economic details are of more importance than any political "accidents," but even here the influence of the system as a barrier has been very marked. For instance, the T'ai-ping rebels could not work northwards across it, nor did the Moslem raiders work southward, and the Han valley has been famous for its freedom from brigands. The westward extension of the Alpine wall in the Min-shan has a double political importance. As the water-parting between the Tao (Hwangho) and the Kialing (Yangtze) basins, it makes an appropriate northern frontier for Szechwan, especially as its wild limestone crags reach to *c.* 17,000 feet in Tagurna, and even the famous Shi-men ("Shi-gate") pass seems to approach 15,000. But, between the Min-shan and the parallel Yangpa-shan, the valley of the Pei-shui (Kialing) is the home of the wild Tebbus, who seem to be the sole survivors of the Chiang people of the Kuku Nor country; and they have made movement across the Min-shan from the Tao thoroughfare practically impossible.

Passes.

Like the Pyrenees, then, the Tsinling may be described as "uncrossable"; and, if so, traffic must go round the ends. But exactly where are the ends? And, if the barrier is so complete, why does the province of Shensi, like old Navarre, span the barrier? Both the human and the topographic notes are important; for the people of Shensi have been noted for ages as, probably, the finest type in China—for virility and intelligence, and the *Tsinling* Pass

[1] It is somewhat disquieting that in recent years there has been a tendency for dust-storms to cross the Tsinling!

is quite exceptional. It was obviously desirable, as a political precaution, to protect the flank of the Wei valley east and west of Sian; and it was equally desirable, as an economic precaution in a drought-cursed land, to have access to the unfailing food-supply of the Han valley.

Siam. The Tsinling Pass led south-*east*ward down the Tan valley—to the east end of the Han valley—and on along the Tan-Sia-Shan to the swamps of the Hwai basin; but it was so easy to cross that it became *the* Tsinling Pass, whatever the objective of the journey. But it was probably not the vital pass in the relations of the Ch'ins with the Chus. There is another pass that leads south-*west*ward, *i.e.* not only to the west end of the Han valley, but also to Chengtu and the Red Basin generally,—the Tung Pass; but it was obviously not called *Tung* ("Eastern") by the people of Sian or any part of Shensi. Evidently it was a very early route from the Red Basin, between the Tai-Pai and the Pe-ling, to Sian and the Wei valley generally. Sian thus became the place where the two trans-Asian avenues eventually met, at the northern foot of the great divide, in the days when only North China mattered.

Land *v.* Sea Face. The unit thus divided lies roughly between latitudes 20° N. and 40° N. and longitudes 100° E. and 120° E.,—a great block of the largest land-surface in the world where it faces the unfrozen coasts of the largest water-surface in the world; and, if almost all that was significant in its ancient history was associated with its land-relations, almost all that has been significant in its modern history has been associated with its sea-relations.

Sea Power. For in modern times three Powers have been vitally concerned about the eastern coasts of Asia in temperate latitudes,—Russia, China, and Japan; and the focus of interest was bound to be at the most northerly point at which the coastal waters are unfrozen throughout the year, *i.e.* on the Yellow Sea—between 30° N. and 40° N. and between 120° E. and 130° E. The ocean entrance here is obviously flanked by the two great ports of Shanghai and Nagasaki, as the landward exit is by the peninsulas of Shantung and Liaotung; but north of Shanghai the deltaic mud makes a harbourless, if unfrozen, coast, while north of Nagasaki the concordant coast of Chosen is both harbourless and frozen in winter.

All this was of little moment till Eastern Asia came in touch with Sea Power, and Sea Power that was anxious for commercial development of the hinterland; but, from that time onward, both political and economic interests were bound to give rise to some very difficult problems. For as soon as outsiders from overseas began to exploit and export the wealth of the hinterland, economic movements in Manchuria and Mongolia and even Siberia were bound to have their normal objective *southward* rather than east-

ward. Thus the natural line of movement from Irkutsk was *via* Kiakhta, Urga and Kalgan to Tientsin, not *via* Chita and Harbin or Khabarovsk to Vladivostok.

Great Wall.

The character of the other natural boundaries of the unit emphasised this. The northern boundary includes mountain, desert, and steppe, reinforced by the 2000 miles[1] of the Great Wall; but the mass is steppe, all of it poor, and most of it very poor. Perhaps, when the wall was built, the steppe was richer than it is now,—for the name of the old market of *Yulin*, in the Ordos desert, means "Elm-wood,"—and it always led to the really good steppe of Manchuria. The Gobi, too, even now not typical desert, may have had more cover then. But it is significant that, east of Kansu ("The Dry Place"), the wall was in two sections, with its apex on the southernmost butt (6000′) of the Khingan, *i.e.* the natural divide between Mongolia and Manchuria; its long section faced north-westward to the Gobi, and its short section faced north-eastward to Manchuria; the former was built of earth, sometimes just cut out of the loess—with no inner walls east of Lanchow, while the latter was built of masonry—duplicated for nearly 300 miles west of Peking. In any case, the Hwangho was of little or no importance, or the wall would not have crossed it; but in the west, above Ning-sia, the river makes a moat to it for many miles. In the east the steppe raiders could do nothing against an absolutely continuous wall of stone, at least 20 feet high and 20 feet wide at the base, with towers of *c.* 50 feet every 200 yards; and even to the west, under the Mings, masonry was added where the wall itself was perched up so high that it could be seen for any great distance against the sky-line, or where a river-valley running north-and-south offered a likely route for raiders, *e.g.* north of the Lo valley in Shensi.

Tibetan Alps.

In the west the parallel buttresses of Tibet form a terrific obstacle for fully 300 miles (95° E.–100° E.), with only one natural route up them—in the centre (30° N.), with Ta-tsien-lu at the eastern and Litang at the western foot of the advanced guard of the Yunling range, and then Batang (Ba'an) below the great scarp in the Kinsha (Upper Yangtze) gorge. This was the line of the imperial road from Peking to Lhasa; and it is suggestive of the height of Ta-tsien-lu (8400′) that there coolies are replaced by yak.

S.W. Ranges.

The south-western boundary is in some ways the most serious, and it seems to have been far the most effective check on Chinese or Tibetan expansion. For it is a terrific barrier of river, range,

[1] The Great Wall proper seems to have been rather over 2000 miles in length; but it was reinforced by inner "Frontier Walls," which seem to have aggregated nearly as much. It was also extended eastwards from Shanhaikwan, as "Palisades," to the Yalu river and westward from Suchow to the Sulei-ho.

and jungle, repeated over and over again, with its heights wrapped in snow and its depths in mist, both of them approachable only through rain-drenched and leech-cursed jungle. The total distance across it is so short that its difficulties have been minimised—though the complete isolation of Assam from Yunnan should have been too significant to sanction that; but the height and the steepness of the ranges more than cancel their narrowness,—the narrowness of the gorges only increases the depth and the turbulence of the torrents,—and the leech has a crowd of rivals in his blood-sucking revels. Only the lure of salt draws Nungs and Nagas, Mishmis and Marus along the jungle paths; and it was from ocean footholds in Burma and Tongking that White men drove railways to the lands behind the triple barrier.

Cultural Unity. The "Middle Kingdom," then, has been isolated by broad belts of natural obstacles; and it is now least accessible where it was once most accessible—in the north-west, and most accessible where it was once least so—by sea. Such isolation must have favoured homogeneity as well as stagnation; and yet size (1,500,000 square miles) guaranteed enough variety for useful temperamental contrasts, *e.g.* between north and south, coastland and core. The whole, too, was developed from the north. The forested south did not really attract the northerns till their loess lands were saturated (in the third century B.C.); and then, as we have seen, it was organised on *northern* lines, the second nature of 3000 years of practice,—*i.e.* on the loess theory of everyone being a gardener. This throws further light on both the marked individuality and the wide homogeneity of the people.

Natural Unity. For the identity of habit over the large area was associated with density of population round each centre and an immense aggregate—in spite of flood and famine and infanticide. Intruders, *e.g.* Mongols and Manchus, had no chance of escaping absorption; and they would have been absorbed even if they had been at the same level of civilisation as the Chinese, and the oneness of the type tended to keep the whole a stable unit. This was also favoured by the evolution of the minor political units. Always there was a tendency for the social units in the small river-basins to form small semi-political units; and then these were amalgamated into larger units in the larger basins. But all the large rivers follow a west-to-east course, so that the climatic and other conditions of life remained similar, especially as nearly all movement was by river.

Social Virtues. But when climate and soil stimulate industry, and reward foresight, and yet intensive holdings are very tiny and very much crowded together, conditions are exceedingly favourable for the development of social virtues; and the modern World should have been immensely concerned about the survival and the independence

of 320,000,000 people, the mass of whom had the social sense developed to a maximum—honest and trustworthy, sober and temperate, industrious and intelligent, brave and cheerful. It is profoundly to be hoped that this loose confederacy of families, in struggling to the formulas of a nation-state, will not lose these precious social virtues.

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CHINA.—II

CHAPTER XXXI

PHYSICAL CONDITIONS

Structural Units. The young folds of the Tsinling, in the extended application of the name, *i.e.* to their extreme end in the An-Hwei heights above the Hung-tze lake, divide the whole unit of China proper into two great latitudinal belts, each of which may be subdivided into three elements ; and each great belt is divided into roughly equal halves by a gigantic longitudinal fault, which is absolutely in the centre of the county near I-chang (*c.* 30° N., 110° E.), but lies eastward of 110° E. in the north, as the eastern frontier of Shansi and westward of it in the south, as—approximately—the eastern frontier of Kweichow. In both belts there is a large proportion of both mountain and plain, but in each case the keystone is plateau ; and, if we compare the significance of fundamental details, the more important seem to be associated generally in the north with fracturing, but in the south with folding.

The North. The central feature in the north is the loess plateau of Shansi, Shensi, and Eastern Kansu, of which the eastern part is divided up by mighty faults running more or less parallel with the Hwangho gorge, but converging on the Wei-Hwangho elbow and merging there in the single transverse Wei-ho fault. On this great block there impinge—from the north-west the lofty young folds of the (northern) Nan-shan, and from the north-east the much older, much lower, more closely folded ridges to which we may extend Richthofen's name for their most important element, the Peking Grid. The lofty young folds of the Nan-shan merely flank the north-western plateau, while the Palaeozoic folds of the grid are embossed on to the north-eastern, later material (*e.g.* Jurassic) being undisturbed. We may see presently that it is of some importance, too, that the Nan-shan folds are concave to the north, like the containing heights of the Baikal basin, while those of the grid are concave to the south, *i.e.* seaward and rainward, like the containing heights of

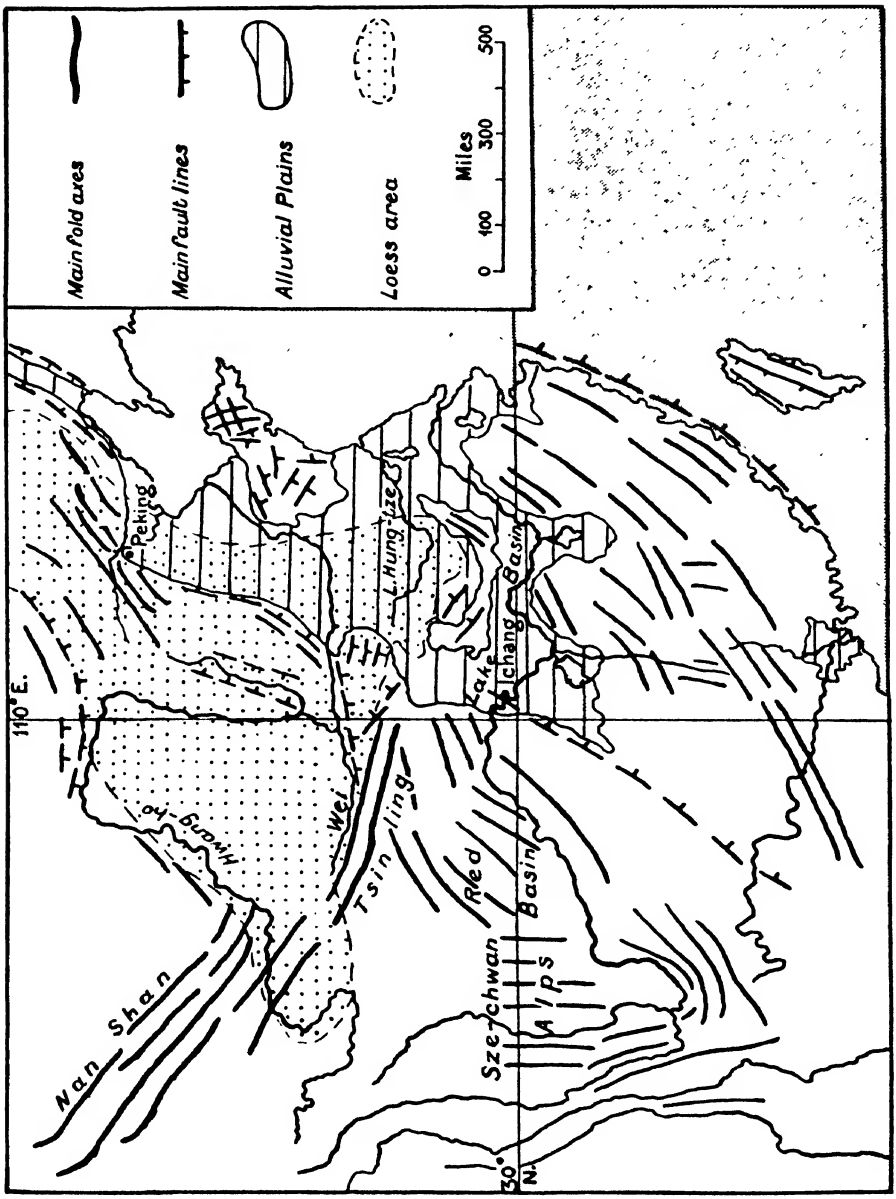

FIG. 111.—Structure of China.

Based on the work of Lee, Wong, and others.

the Sungari basin ; and, though the mighty ranges of the Nan-shan system are of much greater magnitude than those of the grid, they are largely outside the loess region.

The South. The dominant feature in the south-west is the plateau block, to which we may extend the name of its main political unit, Yunnan. On this there impinge—from the north the lofty and highly compressed young folds of the so-called Szechwan Alps, which make a landward flank to the Red Basin, and from the east the great arc of much longer and much lower folds which make a seaward flank to the great Lake Basin, and to which we may extend the name of its most important element, the (southern) Nan-shan. Between the northern butt of this area and the southern butt of the grid lies the densely-peopled delta plain, the economic future of which may be closely associated with the coal-basins of the Lower Hwang-ho (between the folds of the grid in Shansi) and with the Treaty ports of the Lower Yangtze ; and this delta plain must also be associated with the alluvial plain[1] of the Lake Basin, even if the physical history of the latter—*e.g.* its underlying structure and its external relationships,—is akin to that of the Red Basin and not that of the delta. The Alps open out southward, lapping round both the Tibetan and the Yunnan plateaus, and their westward folds are the "link" between the latter and the Red Basin ; but the plateau drops by a gigantic flexure or fracture—or both—to the Nan-shan arc and its piedmonts.

Great Plain. To the north the human note is at a maximum on the Great Plain, which is made mainly by the old and new deltas of the Hwang-ho, south and north of Shan-tung ("Eastern Mountains") ; but these are continuous with the dry-grain lowlands of the Pei-ho "basin" in the north and with the wet-grain lowlands of the Hwai basin in the south, so that the extreme latitudinal limits are the Great Wall near Cheng-te (41° N.) and the Mu-ling flank of the Hwai basin near Kwang-chow (32° N.). The western limits are suggested very closely by the main line of rail from Peking to Hankow—as far south as Sinyang-chow, the junction of the Kwang-chow branch line ; for the line hugs the foothills of the great fault-scarps of the Heng, the Tai-hang, and the Hwai-lung heights. These limits include parts of five provinces—the mass of Chihli, the east of Honan and the west of Shantung,[2] the north of An-Hwei and the north of Kiang-su (the old delta of the Hwangho) ; and they delimit one of the five areas of dense population in China, though even here the really dense units are relatively localised.

The entire absence or the primitive character of roads, the

[1] But it is typical that the great fault line should divide the relatively high Red Basin from the really low Lake Basin.

[2] Much of western Shantung, though physically separate, is technically akin to the Shansi block.

cheapness of human porterage, and the cumbersome clumsiness of all vehicles except the ubiquitous barrow, have combined to make water-transport historically of immense importance; and, as this has practically meant river-transport, it has been largely confined to lowland areas, and cross-communication between the great rivers has been a real difficulty. The chief area where there seem to have been equal facilities for longitudinal and latitudinal movement is this Great Plain, and it illustrates admirably the very difficult problems associated with what has been for centuries the only medium of bulk-transport in China. **River Transport.**

The fundamental problem, as Dr. Chatley pointed out long ago, is that these delta lands are so young that Man began to use them before Nature had finished making them ready for use, *i.e.* before they had been raised to a level above that of the normal annual inundation. For Man's first impulse was to use the land that was nearest to the water, but to protect it from the yearly flood; and so he began at once to build levees, and built them as near as possible to the *winter* limit of the river. Two results were particularly unfortunate. **The Problem.**

One was that the two levees of each river were much too close together to leave proper room for the huge increase of volume in the summer flood, while the need for constant "sluices," to admit the water to the riverine lands made it impossible to strengthen them, especially on sharp curves, sufficiently to bear the terrific pressure of abnormal flood. From the very first, then, risk of burst banks and flood catastrophes was literally "endemic." **The Results.**

The other result was that, as there was no natural escape laterally for the silt—to complete the preparation of the lands for Man's use,—the whole load had to be carried down-stream to cause an abnormally rapid extension of the coast, and to ruin even naturally good harbours by a succession of bars; and the difficulty here is not lessened by the increased draught of the most economically worked modern vessels. Even if we eliminate the Hwangho as almost hopeless,—in its own problems and its past or possible interference with the Pai, the Wei, and the Hwai,—the Yangtze (with the Whangpu and the Siang) remains as an immense problem. When the C.P.R. "Empress" steamers can be held up for three days at Wusung, unable to embark or disembark mails or passengers, it almost looks as though the Whangpu must be converted into a huge (14-mile) wet dock, or that Shanghai must become merely a railway collecting and distributing centre, shipping *via* a great new harbour on Hangchow Bay.

This very young plain is wrapped round the ancient massif of Shantung, the trend lines of which correspond with its configuration, *i.e.* run N.N.E. at right angles to the Muling lines of the Tsinling system. This suggests *ria* harbours in the truncated **Shantung.**

northern end, *e.g.* Chefoo and Wei-hai-wei; but the horst has been shattered, and there is a natural depression across it between its north-eastern, or Lai Shan, and its south-western, or Tai Shan, divisions. This depression ends seaward in Kiao-chow Bay, which provides a fine harbour for Tsing-tao, with easy access inland and to the Chihli Gulf.

Coast-line. Of course, the whole coast-line of China expresses the relief of its hinterland; and the apparent similarities of a political map must not mislead us. The huge semicircle—2000 miles direct, and 4000 as articulated—has very obvious similarities in its terminal sections. At each end there is a gulf behind a peninsula, the Tongking gulf behind the Luichow peninsula and the Chihli gulf behind the Shantung; and the ex-centric position resulted in foreigners wanting—and gaining—a foothold on the most southerly reach of the coast, where France acquired the Tung-Hai island and its Kwang-chow-wan hinterland (cf. Hong-Kong, with Kowloon), as Britain acquired Wei-hai-wei, and Germany acquired Tsing-tao, on the most easterly reach of it.

Southern Coast. But the southern half of the coast is rocky and concordant, with bays and islands fronting deep sea, and so with many fine ports. The transverse north-eastern end of the system has such *ria* harbours as Ningpo and Hangchow, and there is one effective breach in the concordant lines near the south-western end, where Canton, Macao, and Hong-Kong, mark a great sea-entrance to China near one extremity of her coast, and where frost has access through the breach even to Hong-Kong. There is obviously another such entrance where the Yangtze sweeps seaward past the transverse end of this concordant coast, with one of the great historic capitals of China in the immediate hinterland, where Nanking is practically in touch with the south of the great plain.

Northern Coast. There should be a similar entrance to Peking, practically at the north end of the coast. But, except for the Shantung massif, the whole of the northern half of the coast is made of delta mud, distributed in straight lines or regular curves, with a flat and marshy hinterland and a shallow and shoaly sea. Here there can be no natural harbours except where navigable rivers have cut channels, or followed troughs, through the mud; and, though there are such rivers, their navigation is ruined by bars. In the dry season a tall man can even walk across the Hwangho below Tsinan! Indeed, its discharge at high water is only half that of the Yangtze at low water, though the load of silt is actually greater; and, as it seems to carry far *more than 50 p.c.* of the total load out to sea, the distant future of the Chihli gulf is not bright.

Loess Plateaus. West of the fault-scarp which divides Shansi from Chihli and over the north of Chihli are spread the North China plateaus, the mass deeply covered with loess, but with considerable variety

of topography. The maximum development of the loess is immediately to the south-east (*i.e.* to leeward in winter) of the Ala Shan desert, so that the wind-blown dust is distributed first over the east of Kansu and the north of Shensi; but the final deposits —against the northern flank of the Tsinling—are also very deep. It is in the former that we find the maximum distribution of loess dwellings, whether of the cave or the constructional type; and they must not be interpreted simply as emblems of poverty, even if the very dry climate tends to replace wheat by millet as the bread staple, *e.g.* round Yen-an. Apart from their obvious merits, —*e.g.* warmth in winter and coolness in summer, absence of damp and of "sky-scrapers" (which are quite impossible),—they may be related to the entire absence of wood for building purposes and to the exposure of meridional valleys to raids, *e.g.* down the valleys of the Ma and the Lo; but, where these valleys are lines of structural weakness, with consequent liability to earthquakes, the cave-dwellings are simply death-traps. The cleavage and the porosity of the loess raise serious difficulties of transport and water-supply; and the looseness of the surface makes for very rapid changes and very great extremes of temperature.

Loess.

An unnecessary amount of ingenuity and zeal has been spent on criticism of Richthofen's theory of the origin of loess; for the essential conditions—of a windy dry season in a region where there is fine material on a surface not covered with vegetation—are not confined to the climate of an Ice-Age, and all the grains dropped by wind at any given point tend to be of the same size and weight. Unstratified deposits can scarcely be of *directly* fluvial or fluvio-glacial origin; and dust, as opposed to fine sediments, must be formed *in situ* and *in sicco* on the surface of parent rock which gives its own qualities, *e.g.* silicates and carbonates, to the super-incumbent dust. Where unstratified fine material is found covering rock of *alien* character, *e.g.* not rich in silicates and carbonates, it must have been brought there by wind, whatever its prime origin; and even in the Tarim basin there are billions of tons of dust raised by wind in a single year that must be deposited somewhere.

The Grid.

The topographical variety of these plateaus takes three forms: East of the Ordos, *i.e.* north of Tai-yuen (38° N.), from the eastern ridge of the Hwangho valley to the western ridge of the Lwan-ho valley, the plateau is corrugated by the grid of diagonal ridges already referred to, which rise well above 6000 feet. At most there are half a dozen, at least—east of the Hun-ho—only one or two; but they all lie S.W.–N.E., and they often carry the Great Wall itself, *e.g.* the Kulu Shan, or the supporting Frontier Wall, *e.g.* the Man-ton Shan. They not only force the Hwangho to take its 500-miles sweep southward, and contain the great coal-basins of Shansi, but also form the great water-shed of the whole Pei-ho

basin, lying at right angles to the Wet Monsoon, and with some of their crests, *e.g.* in the Wu-tai (" Five Peaks "), approaching 10,000 feet. The Kalgan railway runs up the Hun-ho valley round the ends of the great grid, and then turns along the flank of the Kulu on its way *via* Ta-tung to Pao-tow.

Loess Basins. South of the Ordos and of this north-eastern lobe of the Ridged Plateau runs the lower " Loess " Plateau with the Hwangho valley from Pao-teh to Pu as its mid-rib and its flanks largely the basins of the Lo and the Fên, the one as important for intrusions from the north-west as the other was for expansion to the north-east ; and along the south of the region between the scarp of the loess plateau and the piedmont of the Tsinling, runs for 400 miles the corridor of the Wei-ho and the Hwangho. Its pivot is where the Ta-Hwa and the Feng-Tiao converge, below the triple confluence and the great eastward bend on the Hwangho, *i.e.* the castled crag of Tung-Kwan (" Eastern *Bar* "—whether " barrier " or " gate ")—the so-called " Gate of Asia." The Lo and the Fên valleys are so similar to the Wei valley in their general character and in their historic meaning, if of much less political and economic importance, that it seems to be a mistake to treat the Wei valley as a separate natural region.

Hwangho Gorge. The Hwangho valley here has almost no value at all apart from its mineral wealth, though the river itself makes a useful provincial frontier, for this section of its course seems to be very young geologically (Quaternary), even if the river has easily cut down through 1000 or 1200 feet of loess. The rock walls above, for 500 miles, are seldom more than one mile apart and often much less ; and in places the loess gorges approach 2000 feet in depth. But the exposure of good coal gives importance to such riverside places as Pao-teh, for boats can be dragged through the rapids and even over some of the " falls "—excluding, of course, those at Lung-wang-chan (" Dragon Prince Falls "). There the boats are dragged overland for about 1200 yards, the falls being not more than 40 feet, but the gorge—or fissure—in some places is not 20 yards wide. The two other places of special danger are at the Yumingkou narrows (60 yards), at the southern end of the Lung-Men gorge (10 miles), and the Saumen rapids.

Upper Hwangho. The High Plateau occupies all the rest of our unit, and it is mainly occupied by the Upper Basin of the (Chinese) Hwangho, a region of immense importance in the political and commercial history of the country ; and the key to that importance is precisely in the Hwangho itself.

It enters Kansu from the Kuku Nor (" Blue Lake ") basin, at a height of fully 8000 feet, flowing *south*-eastward, parallel with its own Sining tributary and with the Tatung tributary of the Sining ; and, if it had maintained its *south*-eastward direction for

150 miles farther, it would have linked into the Wei-ho. The great elbow above the Moslem market (tobacco and fur) of Lanchow, where it begins its 500 miles of *north*-eastward wandering along the flank of the Ordos, is less than 150 miles from the headwaters of the Wei; and the Tao tributary of the Hwangho bridges the whole gap except for some dozen miles—rather as the Yang-pi, though not a tributary of the Yangtze, almost bridges the gap between Shihku and Menghwa.

Though the mass of this area is above 6000 feet, and the fringe of mountains along the Tibet frontier is above 12,000, the relief of the north-eastward valley from Lanchow to Ning-sia suggests a more favourable environment; and the river is navigable by rafts, and is not frozen for more than 6 or 7 weeks in the year. But the consistent characteristic of it is the depth to which it has cut down its bed. In some places, where it has changed its course to a considerable extent, there are deserted flats, which can be converted into "oases," *e.g.* at Chung-wei and Ning-sia; but there are miles and miles of narrow and precipitous gorges, or even cañons, with swirling rapids hundreds of feet below. **Navigation.**

The truth is that the Yellow River, though credited with a drainage area of 400,000 square miles and a length of 2400 miles, is not much more than a gigantic culvert for washing silt down to the Yellow Sea. It has a very narrow basin and an average fall of 6 feet per mile; immense quantities of loess are actually blown on to its waters, and far greater quantities are de-graded from its precipitous banks; and so it has a minimum of water and a maximum of silt, with a minimum power of carrying silt in spite of its gradient and a maximum power of cutting and shifting its bed when in flood. Its normal discharge per second at low water is certainly not 40,000 cubic feet, and its normal deposit of silt is sufficient to make it practically useless everywhere for ordinary navigation, for which it is too shallow in winter and too turbulent in summer. Its most useful section may prove to be that to Ning-sia from the railway terminus of Pao-tow. **Silt Culvert.**

More than half of China proper lies to the south of the Tsinling divide, and the distribution of the three elements of which it is composed differs rather from that of the northern three; but there is a considerable amount of similarity in the detailed topography and in the relations of the three units, and both the plateaus and the plains of the two regions must have been continuous before the upfolding of the Tsinling. Except on the western margin, the whole of the west is plateau, high plateau to the south and basined plateau to the north, while the margin is a belt of Alpine folds that flanks the basined plateau rather than the high plateau, "Four Streams" rather than "South of the Clouds"—a very appropriate **Structure in South.**

name for a plateau, especially a high plateau south of a marked nursery of Low Pressure phenomena.

Alpine Belt. This Alpine belt is of immense interest, not only because of its political and economic importance to Szechwan—though this is not sufficient to justify a separate province of Tsing-hai (Si-kang and Kuku Nor)—but also because of its relation to the whole of South China; and we may review some of the details which have already been noticed. West of the critical 95° E. meridian the Do Chu (Yangtze), the Dse Chu (Mekong) and the Gia-ma-nu Chu (Salwin) are all flowing normally from west to east, parallel with the Tsanpo; and the Salwin is within 50 miles of both the Nok Chu and the De Chu tributaries of the Tsanpo across the Shiar-gung La divide (*c.* 16,500 feet), *i.e.* in the latitude of Chamdo, while the Mekong is nearly 150 miles farther north than the Salwin, and the Yangtze about 100 farther north than the Mekong. But scarcely 150 miles farther east the Mekong is flowing due south through Chamdo, and the Yangtze is flowing parallel with it less than 100 miles farther east.

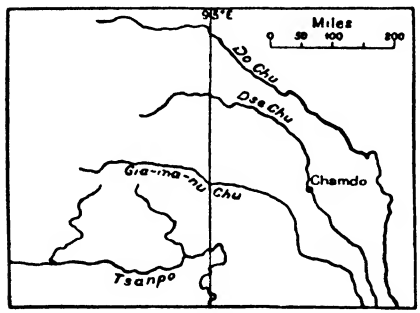

FIG. 112.—Western Watershed of China.

N.-S. Gorges. This is the latitudinal beginning of the formidable gorge-country—the Tibetan "Nam-Grog-Chi" ("Land of Deep Corrosions"), of which the longitudinal beginning is below the abrupt butt of the Himalayas in Namcha Barwa (*c.* 25,450 feet). The total width of the belt is not more than 200 miles, and the Salwin is often within 50 miles of the Yangtze; but, for the moment, its structure and physical history, and even its relations to South China, are of less importance than its economic importance to West China. For its trinity of parallel funnels offers a clear passage northward to the Wet Monsoon, with incalculable results on the volume and the *régime* of the Hwangho and the Yangtze and the Min; and it is a pity that the distribution of the big forests on the northward course of the storms should be misunderstood. Even in the Kuku Nor basin these are usually found on the *northern* face of the mountains, but that is just because of the terrific denudation on the southern face both by the force of the rains and by the flood-melting of the snow, for the snow-line is much lower on the southern face and lower in the hot season than in the cold season.

E.-W. Crest Lines. But to the north of these Indo-Pacific feature lines, in the latitude of the other great Kham market of Jyekundo, the fundamental

west-and-east trend of the Tibetan feature-lines is continued, *e.g.* in the Ta *Shinh* Shan ("Great *Snow* Mountains") of Sze-chwan; and so there is a relatively easy, if very circuitous, route from Ta-tsien-lu along the continuous levels of the upfold, with none of the terrific climbing down into and up from deep defiles which is necessary across the Nam-Grog-Chi on the direct road westward from Batang to Chamdo.

Yangtze Lowlands.

East of the "Four Streams" and their Red Basin, *i.e.* between 28° and 32° N., lie the lowlands of the Yangtze and the rough country that feeds them immediately—the lakelands of Hu-peh ("North of the Lake") and Hu-nan ("South of the Lake"), the delta-lands of An-Hwei and Kiang-su ("Many Rivers," *i.e.* distributaries), and the intervening Kiang-si plain. The unit is somewhat on the same general plan as the "Rice-Bags" of French Indo-China, the wide triangular plains of Hu-Kwang ("Broad Lakes"), and the wide triangular flats of the delta being linked by a narrow bar—here of riverine lowland; and in the east the Yangtze lands—except in the chemical character of the soil—are indistinguishable from those of the old Hwangho. Indeed, the Yangtze delta may be said to reach exactly to the old course of the Hwangho.

S.E. China.

Certain Archaean elements in the south-eastern quadrant of the country have encouraged the description of it as the "South China Block" or "Southern Plateaus," but neither description suggests anything that is really typical of the area; for the land is essentially a land of hill and vale, long valleys fenced by low mountains, with a topography in many places so intricate that—in spite of the lowness of the crests—the Nan-shan divide has really isolated Southern China in race and speech, in outlook and interests, from the rest of the country.

Alpine Folds.

But the problem of special interest is the physical history of the belt; and there is already some evidence forthcoming—thanks to the work of, *e.g.* Duprat and Bacot, Ward and Gregory—of intense Alpine folding both in the gorge-country and to the east of it. For instance, in the Drognen reach the Salwin is cutting through definite Alpine folds that are transverse to the trend of the river; on the eastern margin of the gorges, *i.e.* in western Yunnan, salt-bearing red sandstones have been intensely folded; and, across Yunnan into Kweichow, where the Nan-shan, in the narrow sense, starts, there is an east-and-west line along which mercury ores are found—a phenomenon associated almost everywhere else in the world with intense Alpine folding.

Alpine Flora.

The work of Mr. Kingdon Ward here has been specially valuable, and all the more so because essentially "incidental" and dissociated from any geological theories and prepossessions. For he has traced a continuous belt of "hill-jungle" from Nepal and Sikkim,

across Assam and Burma, to Yunnan; and he traced Himalayan flora eastwards as well as Nan-shan flora westwards, linking up the two by a remarkable number of tree species. In fact, he established, beyond controversy, the definite and normal *continuity* of the "hill-jungle" flora from east to west. The older Sino-Malayan mountains have neither carried the flora northward and southward nor barred the movement eastward and westward. We can, therefore, now assume that this Nan-shan system is a continuation of the Himalayan folds.

Nan-shan Alps. The assumption at once makes the ubiquitous hill-fenced valley natural and not alien,—exactly what we would have expected from the physical history; but, of course, the difference of climatic exposure on the opposite flanks of the system must be reflected in differences of detail,—a landward and a seaward topography, associated with landward and seaward outlook and aptitudes in the inhabitants. Consequently, we expect to find certain contrasts between the western and the eastern halves of the belt, and between its northern and its southern slopes.

Western Drainage. In the west the valleys tend to fan out from the scarp of the high plateau,—to the Hu-Kwang and to the Nan-Hai, as those of the Yuen-kiang and the Hung-shui, the whole water-parting being called the Nan-shan, and being low enough for passes to have such significant names as Chi-ling ("Plum-tree Pass"); but the character of the northward drainage is different from that of the southward. For northward all the rivers tend to converge north-eastward—on the Tung-ting lake, ultimately on Hankow; and this central "Wu-Han" basin not only lies directly between the four other areas of dense population in China—the Great Plain and the Red Basin, the Wei valley and the Pearl delta,—but also has direct and relatively easy access to the ex-centric Yunnan. Southward there is a single artery, and one which—in its character and *régime*—seems to be a typical Indo-China river, shouldered eastward from its proper southward course; for it is a wide river rushing down over a very narrow plain between beetling crags—a paradise for "Wild Men." Its basin is so incoherent as a unit that the river changes its name at every abrupt bend—from Pa-ta-ho ("Great North River") to Hung-shui[1] ("Red Water"), and then to Wu-ni-kiang ("Five[2] Muds River"), and then finally to Si-kiang ("West River").

Eastern Drainage. In the east the whole of the water-parting may be called the Ta-Ching-shan, after the one continuous line of considerable height that makes a political frontier between Fukien and Kiangsi—

[1] Neither the *-ho* nor the *-kiang* is needed with the *-shui*; and the Chinese seem averse to using the southern word *kiang*, even in the south, when it is associated with the idea of "north," as in *Pa*-ta-*ho*.

[2] *Wu* is used as a general term for "all kinds of" or "lots of"; so the river is "The Very Muddy River".

its southern half being known locally as Ta-In-ling, and its northern as Bohea; but there is a series of parallel ranges or ridges on both flanks, *e.g.* the Ta-ling and the Ma-kin in the green-tea district, and the Siang and the Ma in the black-tea district. These are of vital importance to the tea industry (cf. p. 153), lying parallel with the S.W.–N.E. trend of the coast and the water-parting, and so at right angles to the Wet Monsoon. Nothing could be less appropriate than to describe such a highland as a Block or a Plateau except, perhaps, to associate a plateau with tea-gardens!

The objective of the rivers is, naturally, to the north-west (the Yangtze) or the south-east (the Formosa Strait); but a large part of the drainage follows the fundamental trend north-eastward or south-westward along the longitudinal valleys, thus giving rise to a number of gap-towns, *e.g.* Kien-chang and Kien-ning. Landward, however, the drainage is very clearly collected in the Po-yang lake-basin, making Kiang-si a natural river-basin unit, as the collection in the Tung-ting makes Hunan; but seaward it is, like the topography generally, quite incoherent, each river worrying its own way independently to the sea, as the Han and the Min, giving rise to a number of isolated ports, *e.g.* Swatow and Foochow (cf. Amoy and Wenchow), the exits from (*chekiang*, "crooked river") basins of political particularism and linguistic confusion.

Climate

S.E. Monsoon.

The trend of the feature-lines in this south-eastern quadrant—"the Tea Gardens"—is of special importance to a perennial with value only in its leafage. We have already noticed the relation of the Wet Monsoon to the concordance and concentricity of the "tea" ranges here, but the effective rainfall off the S.E. winds does not begin till the end of May, and does not continue beyond the end of September; and far too much emphasis is laid on the so-called "two maxima" of Central China, while the vital facts are ignored, *e.g.* that the greatest disturbances, alike in Mediterranean and in Monsoon lands, are at the two periods of wind-change,—that typhoon rains to this south-eastern watershed are confined to narrower limits of time and space than even the Monsoon rains, seldom touching the centre of it in June or August, or either end of it in July or September,—and that many typical places in Central China, *e.g.* Hankow, have no sign whatever of "two maxima," while others, *e.g.* Shanghai, have signs of three.

N.E. Monsoon.

The prime factors that need to be emphasised, are the direction and the strength of the wind outside the Wet Monsoon (and Typhoon) season. It is very misleading, if not actually a mistake, to assert that "the general direction of the wind in winter is from the north" at Hankow; the important facts are that Hankow is on the

edge of the N.E. monsoon in winter (cf. p. 94),—that this is a regular and strong wind, associated here with orographic rains over the Mu-ling range,—and that off it the city gets 25 p.c. of its total rainfall. Everywhere south of latitude 35° N. and east of the longitude of Hankow the wind is twice as strong in winter as in summer, and it blows from the north-*east*, *i.e.* off a sea which is never subject to a mean temperature below 32° F.

Distribution of Rain.

Almost everywhere this south-east coast is mountainous, with the 2000-foot contour—and in places even the 3000—quite close to the sea; and the summer typhoons are not blanketed by the long and lofty backbone of Taiwan (Formosa), for their tracks are *landward* of the island. But there is actually a narrow coastal strip here stretching for 300 miles north-eastward from the Tropic (Swatow-Foochow) where the annual rainfall is below 40 inches. On the contrary, a straight (N.E.–S.W.) line from Shanghai to Canton follows both the course of the N.E. wind in winter and the crest of the Bohea ranges, and is accompanied by the heaviest regional rainfall in the whole of China—the exposed areas having from *c.* 65 to *c.* 75 inches. Such a rainfall, spread over a region that is more than 700 miles long and approaches 350 miles in width, is scarcely what one expects over a plateau! But here it is as typical as the alternation of range and valley.

Three Details.

When we are differentiating these regions, there are three other climatic details about which something might be added to what has been said about the climate generally (p. 130); and, though the main object is to suggest special emphasis in each case on some particular phenomenon, there seems to be a real need also to call attention to some remarkable dogmas that are current—and, unfortunately, accepted—about them.

Wind Strength.

The first detail is the character of the Dry Monsoon, especially in North China. The important fact here is not the frequency of a northerly wind in winter, but the actual strength of the wind, *i.e.* the measure of its power to carry the yellow dust. The frequency of northerly winds in winter, even in North China, is only 5 p.c. higher than the frequency of southerly winds in summer (57 *v.* 52 p.c.); but the winter winds blow from very high pressure to much warmer latitudes, and are as strong and as steady as they are dry. It is, of course, their strength that is responsible for the wide spread of an impalpable veil of dust far south of the southern limits of obvious loess deposit; and it is this veil that makes the Yangtze valley so foggy, especially in the north-western Tea districts, where the fog is very useful to the shrubs.

Low Pressure Focus.

A second detail is the objective of the Wet Monsoon in early summer, *i.e.* after the third week in April. Now, during April there is no marked appreciation of temperature in any part of the Chinese

"hinterland" eastward of our critical 95° E. meridian except in the Tarim basin; but by the end of May this area of appreciation has spread—in the north, but *not* in the south—completely across the 95°–100° E. belt. It spreads very rapidly to the north-east, until it dominates the whole Tarim-Gobi trough, with maximum appreciation—for the whole of Asia—lying along parallel 40° N.; the area concerned is half a dozen times the size of that in North-West India, which is most nearly comparable; and its intensity is about thrice as great, even the actual rise of temperature in the Turfan or round Lop Nor and Kalachi Nor being *50 p.c. greater* than that at Lahore or Multan or Jacobabad. Even if the last point is minimised, the temperature anomaly remains; for, though the Indus towns are "too" warm for their latitude, the *excess* in the Tarim basin is nearly *70 p.c. greater*. The assertion, then, that the objective of the S.E. Monsoon here is "a great secondary extension from the centre of lowest pressure in North-West India" seems to be one for which there is no particle of evidence.

Winter Pressures.

The third detail is the origin of the winter rains in the Yangtze basin, and here there is only one thing to be added to what was said above (p. 564). It would be as foolish to deny that there are some cyclonic rains here as it is to assert that there are no relief rains. Shallow cyclones, like those in the Punjab, do form in the west, and work their way down the Yangtze valley; and they end, quite typically, with the wind in the north-west, but are far too inactive to be described as "intensifying the north-west monsoon." The fundamental fact in connexion with winter precipitation (rain and snow) in the Lower Yangtze basin is that it follows *intensification* of pressure in Eastern Siberia or a *movement* (south-eastward) of the high-pressure area there; and therefore the rain comes either on an E. wind off the East China Sea, or on a N.E. wind from the Yellow Sea. The feeble influence of some local low-pressure phenomena in the Red Basin is powerless against the semi-continental influence of the terrific high pressure in north-eastern Asia, especially when intensified or moved southwards.

Winter Cyclones.

But this must not be allowed to minimise the vital effect of the breakdown of the Himalayan barrier in giving here an unrivalled opportunity for the meeting of very cold and very warm air, such as is essential in cyclonic developments; and often both the pressure net and the temperature changes are identical with those of normal, if feeble, cyclones. Thus, Shanghai may have rain falling at mid-day from a S.E. wind, with a temperature of 62° F.; and six hours later the wind is from the N.W., and the temperature is 23° F.! This is, of course, exactly typical of the latitudes; and often at the same time Georgia (U.S.A.) is having exactly the same kind of weather—one of the typical storms which give a winter maximum to the rainfall *régime*, and which are followed by a "cold wave."

Climatic Units. For many purposes the human geography of China can be studied best on a division of the country into three great river-belts, and the land is often divided into three climatic regions on the same basis; but there are some considerable objections to this. One is the great variety of conditions within each river-belt, especially between the east and the west; a second is that the river-belts are latitudinal, while the two vital influences—as represented by the low temperature of the N.W. Monsoon and the high humidity of the S.E. Monsoon—sweep across the land diagonally. It is even better to accept Richthofen's division into only two regions—north and south of the Tsinling; for, so far as temperature is concerned, this makes an admirable southern limit to North China in winter, marking the most southerly line in the world for the 32° F. isotherm in January, and a fairly correct one in summer for the 75° F. isotherm. It even makes a fairly good rainfall divide.

N.W. *v.* S.E. It seems best, therefore, first to divide the country into two belts by a line from the south-west corner of Kwangsi to the N.E. corner of Shantung, the large north-western triangle having a continental, and the small south-eastern one having a marine, environment, and then to try to correlate relief to wind-direction, the character of the wind being associated with its direction. We shall at once have our attention drawn to two pairs of parallel lines, which cross at right-angles, the one pair lying parallel with isotherm 60° F. as it hugs practically the mass of the south coast in winter, and the other pair lying parallel with isotherm 80° F. in its somewhat similar relation to the east coast (except Shantung) in summer.

Winter Conditions. In winter the isotherms are a series of roughly latitudinal lines that rise very slightly seaward, with values from 5° F. in the latitude of the Imperial Hunting Park, (Dolon Nor), to 30° F. on the northern face of the Tsinling; but the magnificent shelter of the Tai Pai section of the Tsinling is reflected at once in the northerly position of the 40° F. line south of it, while the access of the N.W. wind round the east end of the system drives both the 40° F. and the 50° F. lines southward across the lake plains till they come eastward under the influence of the sea. On the other hand, parallel with this descent of cold wind from the north-west over the central lowland, there is a line of access over the delta lowland for the humid south-east wind; and this carries 40 inches of rain to the eastern outliers of the Tsinling and 30 inches to the southern elbow of the Tai-hang-shan. It was along this line that the storm of August 1931 moved, discharging 30,000,000 cubic feet of rain *per* second on the Mu-ling water-parting between the Han and the Hwai, destroying 3000 miles of dykes, flooding more than 40,000 square miles of land, and drowning or otherwise causing the deaths of some 150,000 persons.

Of the other pair of parallel lines one has already been drawn—

from Shanghai to Canton, along the Bohea crest, through the region of maximum rainfall (about 65″); and the line of maximum temperature runs parallel with it, only to landward, with a mean of 85° F. The area of maximum temperature is north-west of that of maximum rainfall—a very characteristic monsoonal coincidence,—and naturally avoids the coast, while the area of maximum rainfall spreads, as naturally, westward along the whole coast to the Tong-king frontier. **Summer Conditions.**

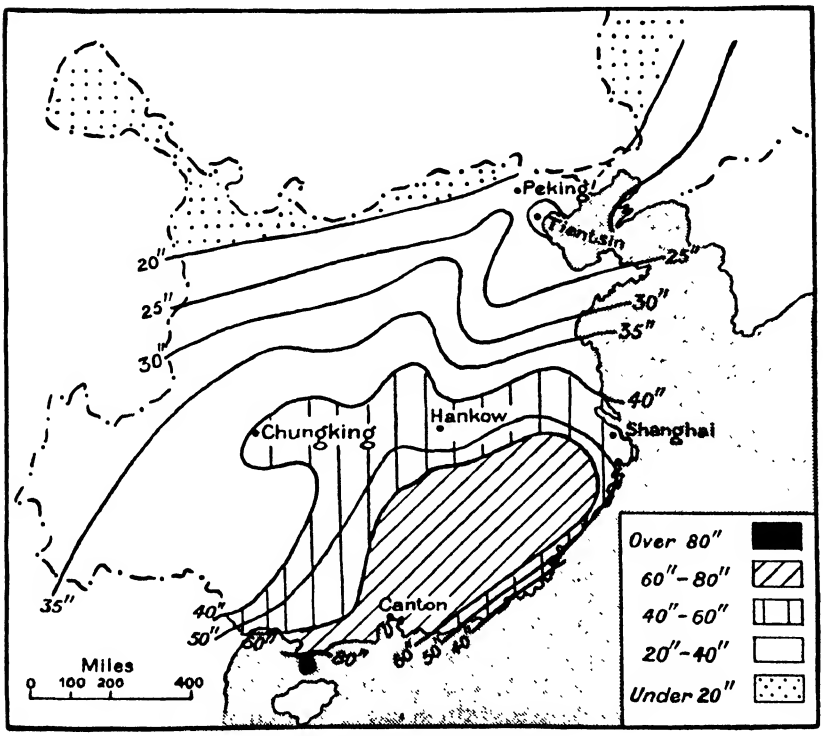

FIG. 113.—Rainfall of China.

Average rainfall and average temperature, then, are highest in the south-east,[1] and decrease steadily to the north-west, the rainfall being heaviest on the higher land and nearer the sea, and the temperature highest on the low land and rather away from the sea. Everywhere there are both relief and cyclonic rains; and, when they interact in periods of high temperature, the combination of heavy rain from both sources may produce terrific floods, *e.g.* a rise of 108 feet in 5 days, during August 1905, on the Kialing. The danger **Floods.**

[1] In a tiny strip along the extreme south-west coast, round the rough *cul-de-sac* made by the Lui-chow peninsula, there is a rainfall of over 80″, Hong-Kong having 90″.

from the actual volume of water is doubled by the pace and the burden of silt, for the dryness of the cold monsoon pulverises the surface-soil everywhere to such a fine condition that it is easily shifted by wind and swept away " in cubic yards " by heavy rain.

Some Conventions Criticised

North China. The common division into three latitudinal belts, corresponding with the three river-basins, is associated with conventional statistics, which may be supported by isolated and exceptional instances, but which give quite a false idea of the belts. Thus, North China is described as a " belt with 20 to 40 inches of rain, the amount decreasing rapidly inland " ; but, actually, the fall is as much below even that " 20 inches " within 70 miles north of the Chihli gulf as it is 700 miles west of it in Kansu. Even at Tientsin, though that may be said to be blanketed by the Shantung highland, the fall is well below 20 inches, while at Peking—70 miles farther inland and to the north-west—it is very nearly 25.

1. Rainfall. The rainfall of the area, as an area, may be reasonably stated as ±20 inches ; and the apparent insufficiency of this, to do what it actually does as a producer of food-stuffs, is explained by the character of the soil and of the precipitation. The vertical cleavage, which is so adverse to " roads " and to irrigation, is immensely favourable to the raising of sub-soil water by capillary action ; the looseness of the surface-soil minimises loss by evaporation ; and the constant haze is some protection against bright light. The low temperature would reduce all growth to a standstill, even if there were any precipitation ; but the three winter months are rainless, not producing an aggregate of half an inch even in Peking or Tientsin, though the great dust-storms do not come till the desert begins to heat up in February. At the same time, though the maximum fall comes in the last week of July and the first part of August, not more than 60 p.c. seems usually [1] to fall during the three summer months ; and the mass of the remaining 40 p.c. falls as snow, *i.e.* in the ideally economic form.

2. Temperature. The biting wind makes the cold very perceptible, but the actual temperatures are not excessively low, though extremes here tend naturally to cold rather than to heat. Tientsin does register minima below zero, and the mean at Peking for the whole three months of winter is below freezing-point ; but the mean winter temperature for the area may be stated as ±20° F., as its mean annual rainfall may be stated as ±20″. The mean maximum scarcely reaches 79° F. at Peking and only just 80° F. at Tientsin, though the landward maximum comes in July, while the coastal one is delayed till August ; and the significant phenomena are in the character

[1] But the percentage at Tientsin is *c.* 65 and at Peking *c.* 75.

of spring and autumn, the temperature in April being 13° F. at Tientsin and nearly 16° F. at Peking above that in March, while the corresponding drop in November is 15° F. at Tientsin and 16° F. at Peking.

Central China.

The Yangtze basin is described as having "a rainfall of 40 to 60 inches, decreasing slowly from the coast inland, with the maximum in July"; and again figures can be found to support the statement. For instance, the rainfall even at Chungking in 1903 was practically 60″ (59.34″), and in three years out of eleven it has just touched, or been below, 35 inches; and the maximum at Hankow and I-chang is in July, but at Shanghai and Chungking it is in June. It is equally true, in the same limited way, that "there is little variation of temperature here in the wet season"; a great many places in the Yangtze valley have temperatures of *c.* 76° F. in June, 80° F. in July, and 78° F. in August. But there are very considerable extremes both from year to year and in the same year, even in the same month in the same place. Thus, at Chungking the following temperatures, referring in the case of each pair to the *same* year, have been registered—105° F. and 56° F. in May, 100° F. and 58° F. in June (the beginning of the rains), 105° F. and 59° F. in July, and 101° F. and 63° F. in August (with the exceptionally low [1] rainfall of 1.43″).

W. *v.* E.

Under the circumstances it seems best to divide the basin into two—an eastern and a western area, and to emphasise what is essentially normal and typical. In the eastern half the rainfall does vary normally from 40″ to 60″, as you go from north to south, and as you go from west to east; and the winter temperature is normally a trifle above 40° F., and the summer temperature normally a trifle above 80° F. But skating is normal on the lakes that lie in the path of the N.W. Monsoon, and the July mean is actually above 85° F. at the leeward foot of the Ta-ching-shan. In the western half the normal is ±35″ everywhere except to the east, *i.e.* on the path by which the cyclones work out of the Red Basin; the typical winter temperature is 45° F., and the typical summer temperature is 75° F. As in the eastern half, there are rains in winter as well as summer, but normally 80 p.c. falls in summer; on the other hand, the amount of cloud and mist [2] in winter allows the 20 p.c. rainfall to be very effective. Indeed, it is the mists and the marshes that make Kweichow, if not Sze-chwan, so unhealthy; they strike the note of greatest contrast with the land behind and above the Low Pressure basin, Yunnan (cf. p. 559).

South China.

South China is described as a land having "60 to 80 inches of rain on the coast, and 40 to 60 inland, mainly summer rain"; but it is better to divide the area into two. In the west the normal

[1] The mean for the following five Augusts was 6.75″, with a maximum of 8.52″.

[2] There is a local saying—"If the sun shines, every dog barks."

rainfall is ±35 inches over the habitable area, but the mountains in both Yunnan and Kwangsi are thickly forested—so much so as to be a refuge for numerous aboriginal groups, for whom destruction of the forests would be suicidal. Temperature decreases steadily inland, *i.e.* westward, with increase of altitude; but the Tropic runs through the heart of the area, and probably ±50° F. is as normal in the winter as ±75° F. is in the summer.

Tropical Coast. The coastal belt also should be divided—on the basis of wind-direction. On the tropical coast the dominant wind blows normally as a true south wind, often with a touch of west in it; and this blows directly across the rugged and elevated coastland, with heavy precipitation, especially behind the *cul-de-sac* of the Tongking gulf. But all through the summer (June–September) this section of the coast is in the track of typhoons, which vary from almost due east to south-east; and so the whole coastline, and especially the Luichow peninsula, is drenched with typhoon rains. The result is a rainfall normally approaching or even exceeding 100 inches (even Hong-Kong registering over 90″), a maximum for China; but the amount decreases very rapidly inland, where the most typical rainfall is probably ±55 inches. The winter temperature throughout the strip is normally ±55° F.; the summer temperature is slightly above 80° F., and rises slightly inland.

Temperate Coast. On the extra-tropical coast the dominant wind is the S.E. Monsoon; and to this Taiwan offers, within *c.* 100 miles of the Fu-kien coast, a continuous transverse crest of fully 12,000 feet—13,000 and 14,000 in places—with a registered precipitation approaching 300 inches. The typhoons here, too, blow more often from the south (and even south-west) than from the south-east; and so, like the N.E. Monsoon in winter, they blow parallel with the coast rather than across it. The rainfall, then, so far from decreasing inland, increases rapidly and considerably; and, while there are actually spots on the coast with less than 40″, the rainfall on the parallel ranges behind it, *e.g.* the Ma and the Hsiang, is probably double that. The normal winter temperature is again ±55° F., but the lower humidity makes the normal summer temperature slightly higher than farther west.

CHINA.—III

CHAPTER XXXII

YANGTZE BASIN

The Yangtze

A rapid survey of the whole basin of the river may give a useful approach to an analysis of its natural divisions; and we may focus both on the one point which suggests—better than any other—what the Yangtze means to China.

Centre of China.

I-chang, the eastward limit of the Palæozoic formation and the westward limit of the Lower Yangtze, is the mathematical centre of China. It stands below the great fault scarp, which cuts China into two approximately equal "halves," the landward region containing only two great cities, Sian and Chengtu; and it marks off the vast arc of plateau—from northern Chihli to southern Yunnan—which makes China a very typical piece of Asia.

Through I-chang runs the natural link between the three largest areas of dense population in China; it is the natural limit of easy access from the sea and from two of these areas by that link; and the area of dense population that is nearest to I-chang on the accessible seaward side must ultimately control the destinies of the whole country. The greatest hope for the Chinese is that the political capital should be established there with as little delay as possible.

Chinese Capitals.

This would mean suppressing the dreams of ancient Sian, the defiance of alien Canton, and the intrigues and jealousies of Peking and Nanking; but there would be far more than that behind the change. The incoherent China can be made coherent only from its natural centre; it is far too large to be centralised in these days from any ex-centric capital, least of all from Peking[1]—on the Russo-Japanese fringe. Centrality is vital; but, geographically, centrality means—on the Blue River. For this Blue River divides the political

[1] Since Peking ceased to be the (Northern) capital, its name has been changed to Peiping ("Northern Peace").

units of Old China into two groups—of equal value, separating the eight northern provinces from the eight southern provinces, and passing across the two eastern provinces. If the Tsing-hai province in the far west is to be also included, it crosses that too. The river is the one supremely important feature in the political and the economic geography of China; it drains 750,000 square miles, and its basin is the home of *c.* 200,000,000 people.

Source of Yangtze. Rising in the lakeland between the Marco Polo and the Dangla ranges, the river seems to meander eastward and south-eastward for 500 miles under a variety of names until, as the Ta-kiang (" Great River "), it makes its sudden southward sweep into China along the western flank of the Li-Mu-shan; and the sudden north-*west*ward detour of the old political frontier north of Batang seems to have been associated with the ancient trade route—up the present Ta valley from Ta-tsien-lu—parallel with the course of the Yangtze.

Torrent Stage. Between the critical longitudes of 99° and 104° E., as the Kin-sha (" Gold Sand "), it is a typical Indo-Pacific torrent, with the mass of its basin above 8000 feet and most of the rest, especially through the Yunnan limestone, above 6000; and, when it deploys on to the sandstone at Ping-shan (" Mountain Plain "), *i.e.* about half-way between its source and its mouth, it has dropped 15,000 feet in 1500 miles, and has only 1000 feet more to drop in its second 1500 miles. In China, then, this mountain stage is perfectly useless for navigation and practically so for irrigation. The town of Ba'an (Batang) is about 8300 feet above sea-level, and the bridge across the Kin-sha there is more than 1200 feet above the river, which is dropping a foot every 200 yards; and the Yunnan block—which diverts the river, even when reinforced by its great Ya-lung tributary, north-eastward round the end of the Ta-Liang-shan (" Great Ridge Mountains ")—is so steep on its northern face (as on its western face also) that its valley is simply a narrow, damp, dark, deadly, uninhabited abyss, which isolates Yunnan from Sze-chwan.

Alps of Tsing-hai. There is a tendency to exaggerate the importance of Tsing-hai as a real political unit, if not also that of the Alpine folds as a separate physical unit; but the provisional province has no importance except as carrying the Lhasa roads, and as providing a watershed that is intimately associated with the Red Basin; for it was the protection of the Alpine ramparts that isolated that basin, and so protected it from most of the invasions suffered by Kansu and Yunnan, though it did succumb to Kublai Khan.

Middle Basin. The intermediate basin of the river—now the Yangtze to Europeans, but the Chang (" Long ") to Chinese—presents a great contrast to this high basin, but has some glaring contrasts within its own limits; for it includes the Gorges as well as the good waterway of the Red Basin, to which it holds much the same marginal relation as the Wei holds to Shensi and Shansi. But in this part

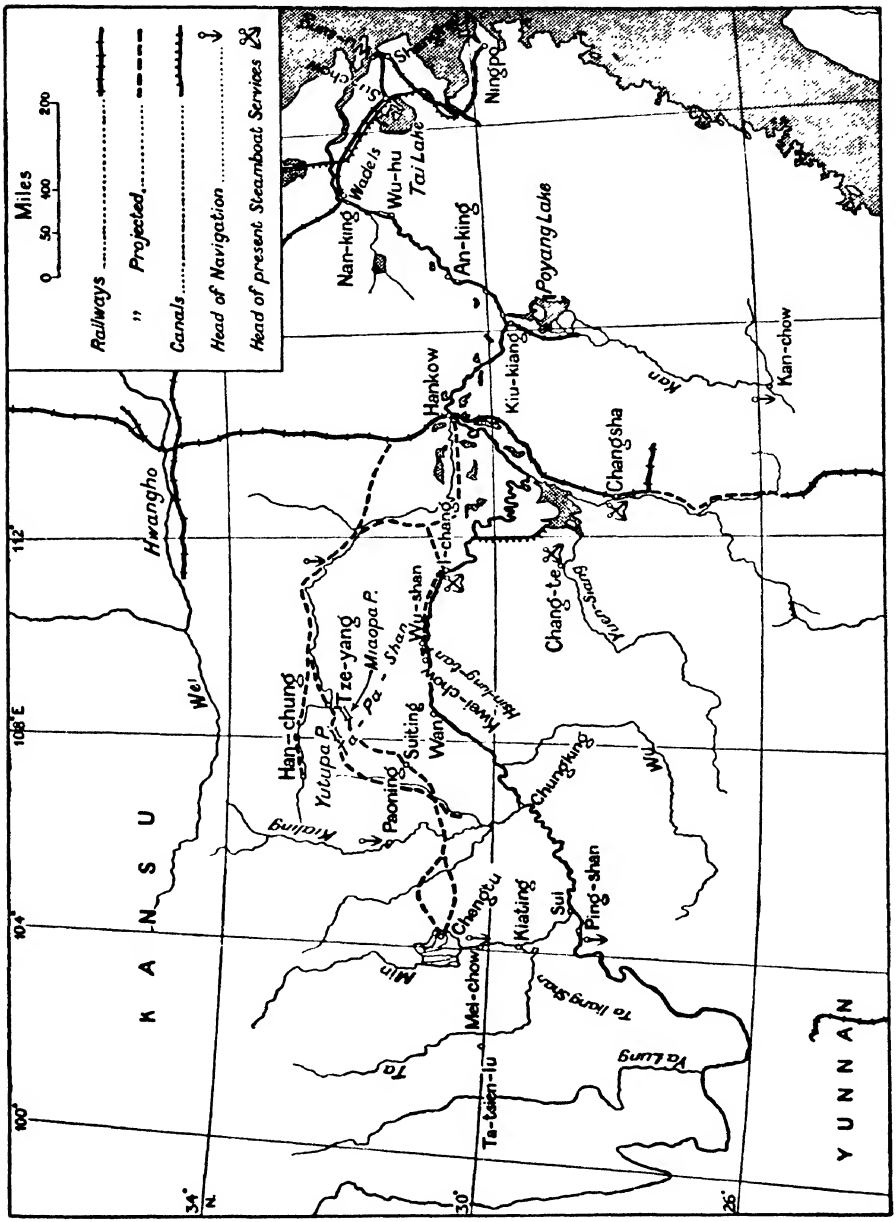

FIG. 114.—Yangtze Basin.
For relief features, see figures 115 and 117.

of its course it receives, unlike the Wei, an immense increase of volume from great tributaries, the Chinese themselves considering the Min as the Upper Yangtze; and its variations in width and level are terrific, the maximum range between low and high water exceeding 100 feet. Through navigation is, therefore, both very dangerous and slightly intermittent, though traffic is generally very busy between Sui and Chungking—in spite of flood-rises of from 70 to 90 feet.

Pace of River. The pace of the river at first is great, for it drops 100 feet in the 40 miles from Ping-shan (1040′) to the Min confluence at Sui, and then drops 350 feet more in the 150 miles to the Kialing confluence at Chungking; but there are few reefs and no whirlpools as far east as Wan (Hutan). Even in the whole 350 miles from Chungking to I-chang the total fall is not more than 500 feet, though it includes the Great Gorge—which is not in Szechwan. Below Wan navigation is difficult, but not very difficult as far east as the convergence of the Ta-Pa-shan and the Wu-shan on the river below Kwei-chow.

Navigation. Steamers run now more or less regularly and even profitably between I-chang and Chungking for at least nine months in the year, generally ten, and occasionally eleven; and some of these run on to Sui and even Ping-shan, while—at high water—they can also reach Kiating on the Min and even Mei-chow (Mei-shan). The rapids themselves could certainly be much improved—at a very great cost; but it is impossible to control the rise of water-level in the Great Gorge during flood, and even the other problems seem too intricate to justify any attempt to make the river properly and permanently navigable. For the rapids are worst at low water and the gorges at high water, the maximum rise recorded in the narrowest reach (600 feet) having actually touched 150 feet; but there are whirlpools below the rapids, and some of these are worst at low water, *e.g.* that at Hsin-lung-tan, while others are worst at high water, *e.g.* that at Hu-tan. Junks of less than 40-tons burden can be warped the whole way by gangs (100 men) of coolies, but the work takes three months, and one vessel in every ten is wrecked; and it is amazing that so much foreign trade has been done to and from the Red Basin in this way. On the other hand, the channels are so intricate, and the current is so strong, that the size of the steamers has to be limited, and yet there must be room for high engine-power; and cargo carried under such conditions must pay such heavy freightage that it will never be able to compete with rail-borne cargo, once the railway to the Red Basin is completed.

Lower Basin. The Lower Yangtze has almost obliterated the steps by which it works eastward *across* the underlying north-and-south trend of the Pacific feature-lines; but, as each step seems to overlap slightly on to the next, there is a natural tendency for water to be held up in

lakes and marshes. These are a real protection against flood; and, in any case, the dangers here are infinitely less than in the Hwangho basin. For the two great lateral watersheds which concentrate on the course of the Yangtze, are 700 miles apart in the most critical longitudes, so that their rainfall-seasons are slightly different; they seem to contribute approximately equal volumes—by Min, Kialing, and Han, by Wu, Yuen-Siang, and Kan; and, if the two large lakes are south of the river, the total lake area is actually greater north of it.

Navigation.

Of the total 750,000 square miles of drainage in the basin, well over 500,000 lie above Hankow; and, while the average fall between I-chang and Hankow is less than three inches a mile, that below Hankow is little more than one inch. Large vessels can reach Wade Island (40 miles below Wu-hu); and, though Wu-hu is generally said to be the head of the tidal delta, the tide can actually be felt to the outlet of the Po-yang lake. But the shoals are very troublesome; in winter near Wu-hu (200 miles from the sea) the channel has a normal depth of only 20 feet, below An-king it has only 15, and at Kiu-kiang only 10. There are two other bars between Kiu-kiang (400 miles) and Hankow (600 miles), but they are less important; and in summer all the obstacles can be passed by vessels drawing up to 12 feet of water. In this region, too, the wind "always" blows up-stream—from the south-east in summer and the north-east in winter.

Floods.

Near Wu-hu the hills fall away from the right bank of the river, with a consequent risk of a high flood—fully 40 feet—pressing so heavily on the right bank as to make it give way; and it has probably done so more than once, and the Tai lake may be a relic of such an event. The discharge at Wu-hu during flood is equal to the normal discharge of the Amazon, and the load of silt is tremendous; and the probable cause for the "return" to the present course—or the opening of a new and circuitous course farther from the hills, on which the three delta provinces meet—was the sinking of the delta under the accumulation of silt.

Silt.

The total annual deposit—at 20 cubic feet to the ton—reaches something like 400,000,000 tons! This must mean roughly an extension of the coastline one mile in sixty years, and the ancient records of the founding of the "delta" cities suggest a remarkable confirmation of the estimate, cities east of 120° E. being on the average 500 years younger than those west of it; but even so the combined action of tide and stream has not yet filled up all the old estuary, *e.g.* the Tai-hu and the other lakes.

The Delta.

In the whole 60 miles of the delta-front there are only two good distributaries, and the one along the extreme right bank is naturally the better. Even this is much troubled by shifting bars, but there is a depth of *c.* 17 feet at dead low water, and the mean tide runs

c. 14 feet. Unfortunately for Shanghai ("*On* the Sea"!),the Suchow creek—made of the two rivers Wusung and Hwangpu ("Yellow *Bank*"!)—is specially troubled with deposits two miles above the port of Wusung. The summer deposit is largely cleared in winter, and straightening the fairway has helped in this; but really large boats cannot reach Shanghai loaded.

Dredging. At the same time, there are no serious dredging difficulties either inside the river or outside. At any date during the past ten years deepening the channel through the Fairy Flats (on the approach to the South Channel) by 9 feet would have admitted boats drawing 32 feet of water at ordinary neap high-water; and the cost need not have been prohibitive, if the work had been intrusted to an honest and competent body. Such improvements cannot be expected during years of fierce political unrest; in any case, they would not be undertaken simply for the benefit of Shanghai, but for the sake of the great artery and all the provinces that it serves. For

> On this chord of life the jade beads are strung.

Tsing-hai

Its Importance. The prime interest in the Si-kang division of Tsing-hai may some day be found in the elucidation of its physical history; but, in view of the relative strength of China and Tibet and the actual populations of Tibet and even the Red Basin— ? under 2,500,000 and over 50,000,000,—the area does not seem of sufficient political importance to be made a neutral or provisional province (called "Chwanpien" when made an administrative district in 1913) in the debatable frontier belt. On the other hand, it is of real importance as carrying two great thoroughfares; and the mineral wealth of the Ya-lung basin seems to be considerable and fairly accessible.

A Watershed. In the meantime the great importance of the belt is as the main watershed of Western China, and its value in this respect depends directly on the trend of the feature-lines as giving access to the Wet Monsoon; and this is further facilitated by the opening out of the folds in the south both eastward and westward, the latter rounding off the elbow of the Tibetan plateau, while the former follow the elbow of the Yangtze. At the same time, as the structure is obviously reflected in the relief, the contrast with the Yunnan-Kweichow plateau is sharp enough to suggest the differentiation of the Alpine area as a separate unit, but it is not differentiated in the same way from Sze-chwan.

The Waterway. It seems, therefore, a mistake to call the belt the Szechwan Alps; for three of the "Four Streams"—or, better, "Four River Systems"—of the Red Basin are fed, not from these Alps, but

almost entirely from the Tsinling; and the largest stream of the four, the Min—though magnified in importance by the Chinese (cf. p. 574)—is a very much smaller river than even the Ya-lung. But the Ya-lung and the Kin-sha not only offer easier access to the Wet Monsoon than the Mekong and the Salwin offer; they have also—from "the Parting of the Ways" near Shiku, 100° E. and 27° N.—the vital advantage of being diverted eastward, carrying with them the destiny of at least 200,000,000 people. For eastward the "Son of the Ocean", the "Blue" or "Great" (*Ta*) or "Long" (*Chang*) river, while retaining the essential character of an Indo-Pacific river—in its subdivisions, its gorges, its floods, etc.—traverses a region which differs widely from that traversed by the Mekong and the Salwin.

Size of Basin.

In the first place, it has room—room to expand into a great basin, and in that basin a great people has developed. Then, all of it is well within temperate latitudes, even if its climate is intemperate; and, though the heat and the humidity here in summer are almost as trying as in Burma and Siam, in winter the climate is hard and extreme,—cleansing and pulverising soil, compelling plants to rest, and bracing man. And at least equal importance must be attached to the historic ease of access to the basin from the north, contrasted with the isolation of south-eastern Asia on all its faces.

Access.

This ease of access is reflected in—or from—the character of the Alpine belt, for to the north there are broad and relatively shallow valleys running east-and-west, while to the south there are narrow and deep valleys running north-and-south. Not only, then, is travel much easier to the north, especially eastward or westward, but the general conditions of life are also easier, *e.g.* the Mekong valley below Atun-tse being a nursery of malignant malaria. Of course, even to the north it is a wide and inhospitable country, very scantily inhabited—by Tibetans,—but not uninhabitable; the snow-line round Chamdo is not below 17,500 feet in winter, and a fair quantity of grain is actually grown—barley being typical above, but wheat being present below, 12,000 feet. And, though summer and autumn are the "wet" seasons, the grain ripens properly, a great asset being the relatively heavy falls of snow in late spring—after a stone-dry winter that lasts from the end of October to at least the beginning of March. Jyekundo even makes the dubious claim that its countryside grows "the best wool in Asia."

Jyekundo.

However absurd the particular claim, the "village" is probably the most important centre in the whole of Kham, regular caravan-routes converging on it from every point of the compass from north round to south-west—from Sining (the rival of Kalgan as a great wool-market), Lanchow, Ta-tsien-lu, Chamdo, Lhasa. From

Ta-tsien-lu there is a stiff climb up to the Gila Pass (*c.* 12,400′), but the rest of the route remains at a high level, and even the Yangtze *v.* Mekong divide on the Shung-la (" Middle Pass ") west of Jyekundo scarcely reaches 16,000 feet. The southern route *via* Batang to Chamdo has practically nothing to recommend it except access to some mineral wealth, *e.g.* the Mekong salt-beds, being a constant succession of precipitous scarps and impetuous torrents.

Ta-tsien-lu.

Ta-tsien-lu, therefore, became the natural gateway into Tibet for Chinese influences—conquest, commerce, culture ; and it stands on a line of ethnic as well as geographical cleavage at the foot of the Yun-ling, a natural " change-house "—for barter of different products, the special item being brick-tea, and for change of transport medium from coolies to yaks and mules and ponies. Its importance depends on its command of both the great routes westward, the direct one very difficult, the circuitous one fairly easy; but, though the latter is centuries old, some very remarkable " discoveries " about it have been announced recently. From a correlation of available material, however, we may venture to draw some very general conclusions, especially if we first relate the area in question to its major natural region. For this at once suggests two rather important considerations, concerned respectively with the relief and the climate of the area in relation to its longitude.

Viewpoint.

In the first place meridian 102° E. is the first westward along parallel 30° N. from the Pacific where there are any ranges or peaks of real magnitude and magnificence ; and, when westward travellers suddenly find themselves having to scale these mighty parallel walls from the torrent-deepened gorges at their base, they must feel something of Ruskin's surprise at glimpse after glimpse of distant crests and peaks : " Suddenly,—behold,—beyond ! " At any rate, the highest estimates of these Sino-Tibetan heights have been made by men who were working westwards, and the lowest have been made by men who were working eastward—stepping down instead of climbing up.

Snow-line.

In the second place, owing to the trend of the feature-lines, these are also the first longitudes westward from the Pacific along 30° N. where there can be really heavy snow ; and it *must* be heavier than at similar altitudes in similar latitudes farther west, *e.g.* west of *c.* 98° E. Consequently, if any estimate of these heights is being based on—or seriously modified by—the line of permanent snow, the lowness of this must be kept in mind. That line cannot be much above 17,000 feet at 102° E., 30° N.

Unmarked Landmarks.

The local conditions may also justify two further suggestions. If longitudes 95°–100° E. are as critical as we have been trying to prove, we may expect them to show certain exceptional details, such as are produced under similar conditions, *e.g.* above the Brahma-

putra gorge in the "unexpected" height of Namcha Barwa; but in this case, so far from there being only a mysterious defile of which the world has known nothing till the last few years, we have an area carrying two world-old thoroughfares. These diverge from Ta-tsien-lu, and actually skirt both the foci of special interest in the regional relief; and it seems quite incredible that men should have been using these thoroughfares for more than 2000 years, and have remained quite ignorant of peaks "higher than Mt. Everest," especially if they "stand up 5000 or 6000 feet above their neighbours," and are of a remarkable shape. It would be as credible that any normal *commis voyageur* on a Zermatt-Interlaken round should have "missed" the Matterhorn or the Jungfrau!

Trinity of Peaks.

It seems clear that Ta-tsien-lu is the eastward apex of a triangle the north-eastern side of which skirts a peak called Ja-ra, while its south-eastern side skirts one called Minya Gonka; and the triangle is roughly bisected by the 30° N. parallel, along which there is a series of snowy peaks, one of which is known as Bokunka. If we may be roughly guided by the only instrumental heights allotted to any of these peaks, Ja-ra (? "Mountain-King") is the highest, and reaches at least 26,500 feet, and Bokunka—as, probably, Minya Gonka—is 1000 feet less; but Rockhill *estimated* Ja-ra as "about 16,500 feet," and it is not easy to believe that he was *10,000 feet* wrong. Above all, we must remember that Ja-ra overlooks the caravan-route to Jyekundo from Ta-tsien-lu, and that Bokunka overlooks that to Chamdo!

Tyumai.

A similar problem is presented to the south, for above the caravan-route from Ta-tsien-lu, *via* the Ta-Hsiung Ling ("Great Elephant Pass"), to Yung-ning there stands a fine snowy peak—29° N., 102° E. It is easily seen from the pass, and every one is agreed as to its name—Tyumai. Staveley Gordon estimated this as "19,000 to 20,000 feet," but some of the staff from Chengtu University claim that it is "certainly over 28,000 feet, probably over 29,000." If so, it must be a unique spectacle, standing 10,000 feet above its neighbours; and yet, though it is on the Survey of India 1/1,000,000 sheet (Kiating), it has failed to attract pilgrimages!

Sze-chwan

The Name.

The word *Sze-chwan* seems to mean "Four-Streams *System*," and, if so, it must refer to the Red Basin and not to the whole province. Indeed, it seems to have been used originally only to describe the actual river-system north of parallel 30° N.; it related the divergence of the distributaries of the Min over the face of its old lake-delta, before uniting again to form a tributary of the Yangtze, with the convergence of the other three rivers on Ho-chow to form another tributary of the Yangtze.

The Four. All the four—Fu, Ku, and Kialing as well as Min—are navigable to the shore of the old lake; and the Yangtze also becomes so on dropping to the old lake-floor, and remains without serious impediments as long as it is on the sandstone, *i.e.* from Ping-shan to Wan. But, if the "Four Streams" were, as asserted, the Yangtze, Yalung, Min, and Kialing, the *chwan* or *ch'uen* would no longer be appropriate, for they do not obviously make a "net."

Boundaries. For some time, too, the western boundary of the (vague) political unit seems to have been the 12,000-foot wall along the western bank of the Ta (or Tung) tributary of the Min; then it seems to have been moved westward to the Yalung; and China even claimed the land westward to the Kin-sha, though the Min has been a clear ethnic divide, many Tibetans claiming the Miniak (north-west of Ta-tsien-lu) as the cradle of their race. On the other hand, the Liang-shan "ridges" of the Lolos, between the Lower Kin-sha and the curious "Kien-chang valley" of the Anning—which looks very like a tectonic continuation of the Ta (Tung) trough—were apparently, for centuries, not included in the province. We may regard the province, then, as the natural region of the Red Basin *with* its mountain frame; and this is young and complex on the west and the north, with consequent evidence of renewed activity, *e.g.* on the Min, but old and simple on the east and the south, where the Yangtze was able to cut down through the massive old rock fast enough to maintain an eastward course.

Floor of Basin. But it was a much easier task for the southward streams from the Tsinling to degrade the soft red sandstone of the old lake-floor—not into a plain, for the original "floor" was a "Pacific" grid of corrugated limestone, but into a series of parallel valleys, fenced by ridges from 2000 to 6000 feet high. Indeed, even the valleys are muddled hill-country rather than plain except for riverine flats along the tortuous courses of the torrents; and these flats seem to be due rather to the damming back of the three collecting rivers, as they converge on Ho-chow, than to deposit by the torrents. This may have encouraged a dense population to extend its terracing of the low hills to the containing mountains, and even to carry the terraces to the very summits of these—a task made successful only by the vast supplies of fertilising material in the night-soil of a densely peopled area.

Size. The province is much the largest in China (*c.* 220,000 square miles), Yunnan coming second (*c.* 150,000); and the relation of its size to its position has been an important factor in its history, minimising its natural isolation. This isolation is due, of course, in the first instance to the height and the continuity of the frontier mountains, a large proportion in the west and the north being above 10,000 feet, while maxima heights range from 16,000 to 19,000, the latter even within 60 miles north of Chengtu—in the

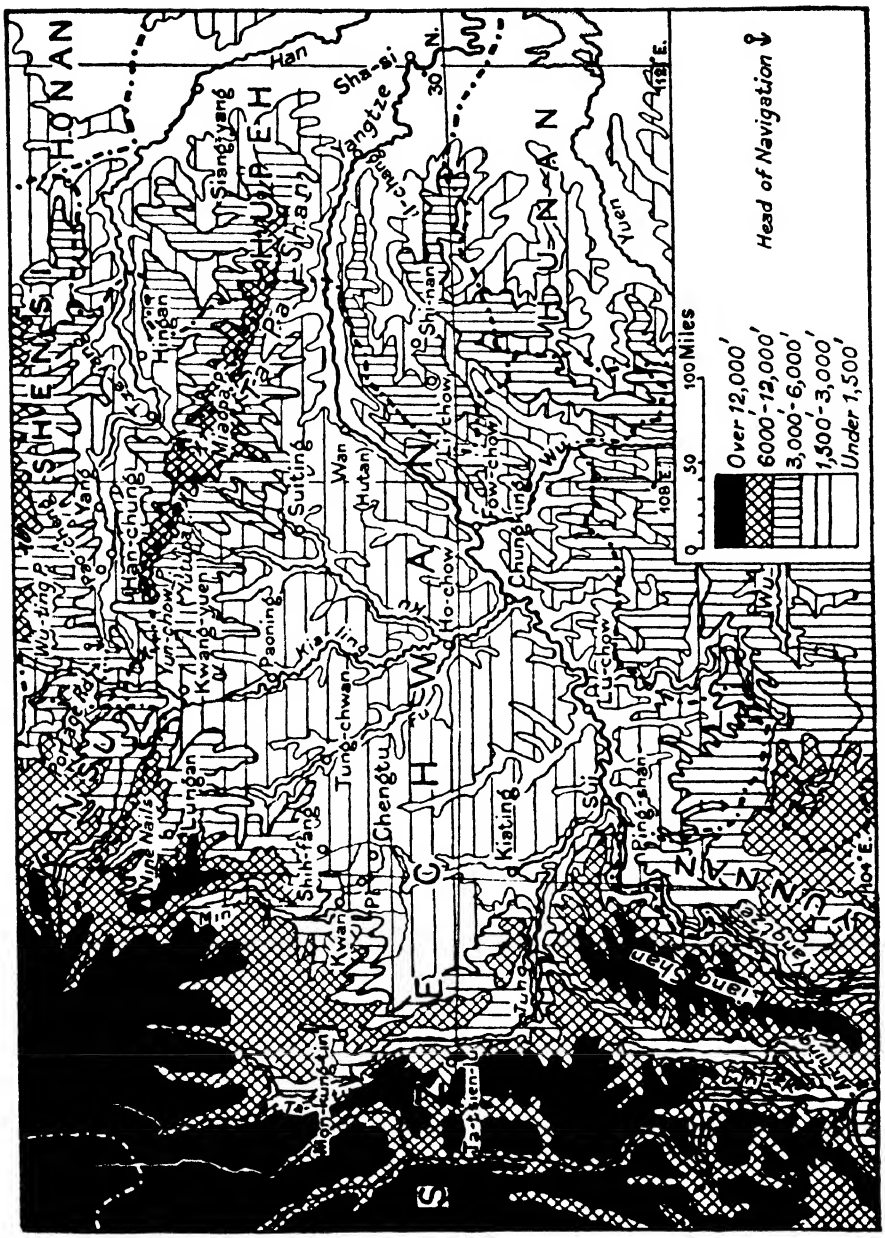

FIG. 115.—Sze-chwan.

"Nine Nails" peak of the Chun-Chan-shan. But, as the province fills the whole gap between Kansu and Yunnan, it has linked Turkestan and the Moslems round Tibet with Indo-China and the Buddhists; indeed, the south of Kansu *should* belong to Sze-chwan, and the distance from Tali to Myitkyina is only 200 miles.

Access. Perhaps, then, we must distinguish the practical inaccessibility of the basin from its natural isolation, for it does occupy the very heart and core of Western China; and even the practical inaccessibility seems scarcely as bad as it is reputed to be, or as its historic influence might suggest at first sight. And, if this is so, we might infer that the Tsinling barrier is less troubled with snow than it used to be, and that some of the obstacles to access were purely political or due to the character of the mountaineers. At the same time, undoubtedly, the western or even the southern passes are very difficult, the Great Siang-ling—between Chengtu and Ta-tsien-lu—being nearly 9500 feet, while the neighbouring pass to the Anning valley is more than 9500.

History. The isolation has not saved it from one or two catastrophes, and easier communications during the present century have brought much evil with them; but, historically, it had centuries of peace and prosperity before Kublai Khan devastated it, massacring 1,000,000 people in Chengtu alone, and it was horribly ravaged in the seventeenth century by a bloodthirsty maniac called Changhsien-Chung. After the Manchu conquest, however, it was recolonised—very largely as a place of exile "at the end of the earth"—for political offenders; and under them it became the most prosperous and peaceful unit in China. For—given an industrious population—it was almost self-supporting, with a serious lack only of cotton; its mountain margin supplied mineral wealth, water-power, forest, and pasture, and a great variety of soil-elements; and this composite soil proved so fertile that famine was unknown, especially as the "convicts" seem to have been distributed—in lonely farms dotted all over the land, and not in villages. Here was another reason for the very high proportion of the total area that was actually under regular cultivation.

Divisions. The province may be divided simply into two—the Tibetan west and the Red Basin; for the excrescences towards the north-west and the south-east are of quite minor importance. In the north-west the desire was merely to include the whole of the Min basin—the Lungan plateau as well as the lake-plain; in the south-east it was partly to hold the approach from Yunnan to Sui and from Kweichow to Chungking, but mainly to control the trade from Hunan (and Kweichow). This has been focussed for ages on Fow-chow, and has been quite important, for the Yuen-Wu route is the only natural route *round* the Yangtze gorges.

West of the Min valley the whole area is a corrugated highland, with feature-lines running typically north-and-south, so that there is relatively easy movement, *e.g.* southward from Choss-Chia *via* Chang-ku to Ta-tsien-lu—practically along meridian 102° E., but movement eastward from there to Mou-kung-ting in the central valley means a climb to 16,000 feet, and on to Kwan in the Min valley one of 15,000. Farther north, however, the passes are much lower in all the longitudes, while in the latitude of Ta-tsien-lu the feature-lines are beginning to trend east-and-west, as they do in the lower valley of the Ta-tu (or Tung). **Tibetan West.**

The Red Basin fills not much more than one-third of the province, and the most important part is the Chengtu plain (60–70 miles long by 30–40 wide); but the central artery of the basin is the Kialing, for the Min is strictly marginal. Indeed, the Kialing is navigable for 50 miles north of the limits of the sandstone floor, *i.e.* practically to the frontiers of both Kansu and Shensi, from which there is a relatively easy portage to navigable water on the Han. This throws some light on the southern extension of Shensi into the Han basin and on the fact that that basin once belonged to Sze-chwan, and was peopled from the Red Basin; and the Lhasa road from Sian has always run along the north bank of the Han to the real head of navigation, and then struck diagonally across the Yun-chow pass to Kwang-yuen (where the Kialing drops on to the sandstone), instead of following the portage to the real head of navigation on the Kialing. **Red Basin.**

The mean altitude of "the plain" is given roughly as "1200–1300 feet"; but this must be interpreted as referring only to what can fairly be called plain, *i.e.* the narrow riverine flats, for the average for the basin is much higher. Even Chengtu stands above 1500 feet, and the famous tobacco-lands of Shih-fang and Pi are respectively rather below and rather above 1750 feet; and yet there is rather more lowland in the Min basin than in that of the Kialing. In such a latitude, however, an actual average of 1600–1700 feet is of no moment, if not actually an advantage, especially where practically all the rivers are more or less navigable to the limit of the red sandstone; and, though their currents are strong, there is a very busy traffic on them, which has contributed greatly to the coherence of the unit. Special trade-centres sprang up at the first important confluences on the various rivers, *e.g.* Tung-chwan on the Fu, Pao-ning on the main Kialing, and Suiting on the Ku. Lower down each river a confluence is less desirable, *e.g.* the coal-market of Ho-chow being simply submerged during the flood-time. Chungking escapes danger, and even profits; for it stands on nine hills which jut out boldly between the Kialing and the Yangtze, and so it has a double water-front for its traffic; but the soil is very near saturation, and there is almost continuous fog. **Altitude and Drainage.**

Lines of Entry. Locally, the lower river is not called Kialing, but Suiting; and that suggests both the importance of the intense fertility of the narrow plain on which the town stands, and that of the north-eastward relations. If the railway projects materialise, Suiting will almost certainly become still more important, especially in view of its local supplies of coal, oil, and iron. For, though the Han valley scheme must have Han-chung as its immediate objective, there must be a branch from Tze-yang up the Jen valley; and the shortest route into the Red Basin is by the Miaopa Pass (*c.* 4370′) into the Taiping-Ku valley—for Chengtu *via* Suiting and the silk-market of Shunking, with its 3000-foot bridge across the Kialing and its busy junk trade (mainly 20-ton boats). At the same time, there are at least two other possible routes. One is by the Yutupa Pass (*c.* 5000′) and the Tung valley, but it is (15 miles) longer as well as higher, and would tap no big town. The other is a direct route from the Wei valley by the Wu-ting (*c.* 4000′) Pass, and this would then follow the Lhasa road; but it is very circuitous, and would not even serve the Pao-ning silk district.

Fertility. Though the Suiting plain is specially fertile, the whole of the Kialing basin is very productive; and, in the favourable climate, crops "never" fail, even if the pressure of population is great. For more than half the total population is in the Kialing basin, though the densest concentration is in the Min basin; and, as the province is so much isolated that it has to depend more or less on its own resources, the actual standard of living is rather low even for China. Perhaps something should be allowed for the effect of a sultry summer and a very humid winter on the health of the people; but there is marked cyclonic activity in winter, and even in summer gritty, but dry and bracing, north winds sweep across the land at fairly frequent intervals. Any defect is not due to the quality of the food. The staple is rice, and the rice-marshes simply swarm with ducks and geese; and both cane-sugar and tea grow well—an illuminating comment on the climate.

Min Basin

But the Min basin enjoys a maximum of favourable conditions, and attracted population in the very early days by its Alpine ramparts and its Alpine water-supply; and the significance of an Alpine torrent being called the Min ("The Clear") invites some attention to its history.

Irrigation. As far back as 200 B.C., below the well-named Hung-shan ("Red Mountains"), a Chinese Nimrod dammed the river at Kwan and provided it with a complete scheme of irrigation, in which drainage was treated as being as important as the actual irrigation; and amongst other results, he freed the basin for ever from the menace

of flood, and the clear water became a perfect paradise for fish—the whole way to Sui. The scheme was confined, however, to the Chengtu plain, which includes to-day an area the size of Middlesex with a population five times that of Middlesex; and the 50 miles between Chengtu and Sui *via* Kiating is "one long street," backed on both sides by "gardens" that produce from 3 to 5 crops a year, including the beloved beans and peanuts and tobacco, and feed pigs that are almost as numerous and ubiquitous as the ducks and geese.

The lower part of this Min basin produces the three special exports of the province—silk, salt, and wax, and handles such **Products.**

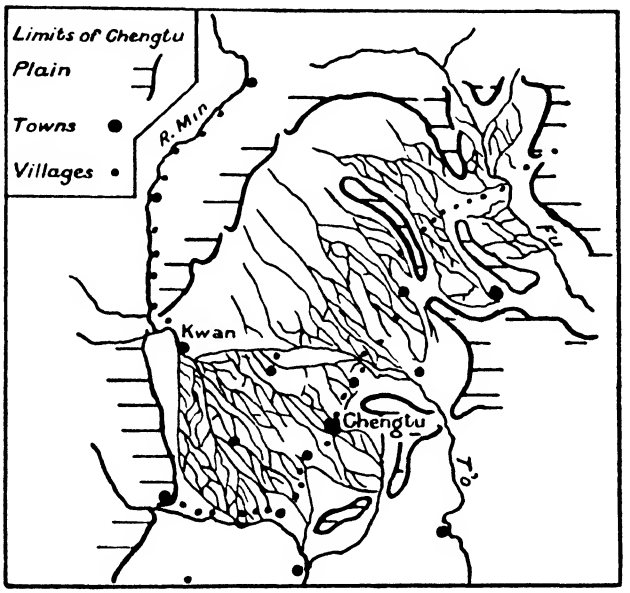

FIG. 116.—Chengtu Irrigation.

typical Tibetan exports as rhubarb and musk. Sze-chwan produces more silk—though only yellow silk—than any other province except Shantung and Kiangsu; and it has more or less a monopoly of wax—vegetable wax, with silk and salt, being a special product round Kiating, and insect wax round the still more important market of Sui. Luchow—like Kiating and Sui, a great confluence town—is the outlet for the 60-square miles of the Tze-lin-tsing saltfield, where the wells are hand-sunk to a depth of more than 3000 feet; and, in the work, quantities of oil and natural gas have been tapped, the gas being used in evaporating the brine.

Chengtu and Chungking are natural rivals, and are thought to

Chengtu *v.* Chungking.

represent the past and the future; but the projected railway would dim the prospects of Chungking, and revive the old importance of Chengtu, as the junction of the Imperial road with the main regional road—*via* Shunking and Suiting to Wan. This little port does a small share (? 5 p.c.) of the Yangtze traffic, specially in coal and cotton; it is the recognised place of transfer in connexion with the Hutan rapids; and it is in the centre of the wood-oil district, for the *tung-yu* [1] is more or less confined to the poor soil of the bare hills along the river between I-chang and Chungking. Further, though a South Bank railway through the north of Hunan seems to be really outside practical considerations, the suggested route for one is not *via* the Yuen and Wu valleys, but from Sha-shil *via* Li-chow and Shih-nan to Wan! The actual trade of Chungking is, however, far below its reputation, though it represents *c.* 95 p.c. of all the river trade here; for at present there is no adequate outlet or inlet, silk and wax not being bulky and raw cotton and cotton yarn being the only imports of much bulk or value. Indeed, though the province is rich in many ways, *e.g.* in food-stuffs (rice, wheat, and maize, beans, sugar, and oranges),—in minerals (*e.g.* coal, oil, and salt, copper, gold, and iron),—in textile materials (silk, wool, and hemp),—and in abundance of good and cheap labour, it is too remote from world markets; and the coal, which might have made all the difference, is very poor. It is abundant, specially in bituminous fields along the north of the basin and in anthracite fields along the southern hills; but even the bituminous is not good enough to attract outside buyers, or even to be able to bear the journey to them. It is, however, so widely spread that it is very useful for local purposes, and is even used now on the river steamers.

The Lower Yangtze

The Core Land.

The eastern division of the Yangtze basin contains a very large proportion of low and level land, over which the river meanders amid and across a net of lake and marsh, a valuable check alike on danger from flood and on extremes of temperature; and in this division the river receives three of its most important tributaries. The Han is at present a very poor link with the north, even if its valley is destined some day to carry the main line of rail westward to the Red Basin; but the Kan and the Siang are fine links with the south, the Lei-Siang being navigable for most of the 400 miles between the Tung-ting Lake and the Che-ling Pass, as the Kan is for most of the 500 miles between the Po-yang Lake and the Mei-ling Pass, both with Canton as the objective.

[1] Some *mu-yu* oil is produced in Kwangsi, especially round Wuchow; but the *tung-yu* oil is not only much more abundant, but unrivalled in the world as a fast-drying oil for varnish.

This eastern unit can be divided into two—at the Wu-hu narrows; for, though the two parts are much alike in essentials, the west is lacustrine and riverine, while the east is deltaic and tidal. And, if the Past has somewhat exaggerated the actual importance of Nanking, the Future will certainly reveal the natural importance of Hankow. The basin of the Hu-kwang ("Broad Lakes") gave his title to the Viceroy of Hupeh and Hunan as the two flanks of the same eastward-sloping basin of the Middle Yangtze; and its politico-economic pivot, Professor Roxby's "Wu-Han," is the geometrical and nodal centre of a great oval touching Peking, Chengtu, Yunnan, Canton, and Shanghai. On a 500-mile radius the circumference of the circle goes practically through Lanchow and Foochow as well as Chengtu, Canton, and Shanghai, leaving Peking ex-centric to the north-east, and Yunnan ex-centric to the south-west. The latter is of little moment; but, if Peking was reasonably nodal for the old empire, it is purely peripheral for the new republic.

Physical Character.

The whole plain is the floor of an ancient lake, a fact which throws some light both on the firmness and the fertility of the soil and on its dampness, especially to the east and the south. Even I-chang is less than 200 feet above sea-level, and the mass of the plain is very little above *low*-water level in the Yangtze; and this, if complicating drainage and flood problems, has been invaluable to navigation. At high water the Han is navigable for more than 900 miles, *i.e.* above Han-chung, and nearly all its tributaries are navigable. At the same time the abrupt descent from the Ta-Pa source and the nearness of the lateral mountains make the pace considerable, the journey up-stream to Han-chung averaging twelve weeks as against one week down-stream; and the navigation is not really good above the confluences of the Tan and the Pei at Siang-yang—hence the prominence of this town in railway schemes.

Hu-Peh *v.* **Hu-Nan.**

Though the economic and the political balance lies in Hu-peh ("North of the Lake"), the conditions of human life are really better—apart from the Han valley proper—in Hu-nan ("South of the Lake"); for the latter is mainly a well-drained upland (above 1300′), the basin of a single lake large[1] enough to have suggested the names of both provinces, while most of Hupeh is very low, dotted with a multitude of small lakes that are linked together by marshy flats. But the assets to the north favoured earlier development, *e.g.* facilities for agriculture, commerce, and even industry (based on the agriculture—rice and cotton), while those to the south are increasing rapidly in relative importance now, *e.g.* the precious forests and the great mineral wealth, especially in coal.

Han Basin.

The rough basin of the Tsing in the massive limestone of the Gorges, like the proposal to construct a railway across it, may be

[1] At mean level, the Tung-ting is the size of the Dead Sea or half the size of Lake Onega.

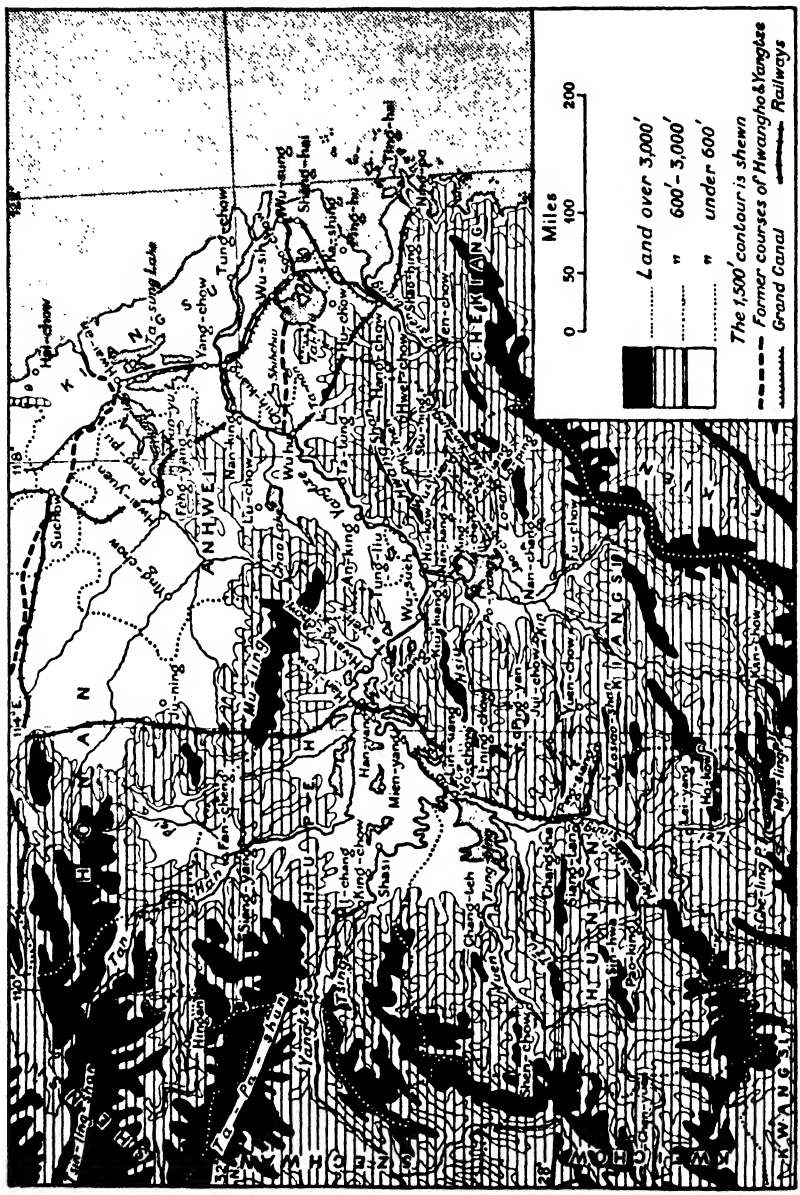

FIG. 117.—Lower Yangtze Region.

ignored; and then we see at once that the province may be divided naturally into a Yangtze lake-land and a Han river-land, with its capital where the two meet—in Wu-chang, the political member of the Wu-Han trinity. But the Han basin should be subdivided; for its eastern half is essentially a typical Hupeh lowland, with the river navigable by large junks up to Fan-cheng (for the Tsinling Pass), while its western half, though politically part of Shensi, is geographically an annex of Sze-chwan.

Another "Sze-chwan."

Like Sze-chwan, it is a rich and remote region, shut in by the Tsinling and the Ta-Pa, with its fertile riverine and its navigable tributaries, producing such a variety of products that it has been naturally self-contained; and many of these are similar to those of Sze-chwan, *e.g.* wood-oil and wax (and vegetable tallow), tobacco and silk—though the silk is rather coarse. Its capital, Han-chung, is in its inner, north-west corner, and its outlet, Hingan, in its outer, south-east corner. It even shows scattered homesteads such as are typical of Sze-chwan, and hills crowned with tiny walled strongholds (*chaitzu*), built by the Szechwanese; but the distribution of the farms here reflects only the safety and not any penal measures (cf. p. 582), and there was no need for the *chaitzu*.

Gorges.

Again, it has its own series of gorges, where the Han breaks through the south-eastern wing of an arc of which the south-western wing divides the basin of the Kialing from that of the Han; Yang is its "Wan," as Hingan is its "I-chang," and the cotton grown between Mien and Yang, especially round Pao-chêng, is actually exported westward and down the Kialing rather than eastward and down the Han rapids.

Products.

The standard of life here, however, is rather higher than in Sze-chwan, partly because of the marvellous freedom from invasion and brigandage. The valley grows wheat as well as rice, and the people eat *wheaten* bread; it produces cotton as well as silk, but food is not sacrificed to fibre. In the shelter of the Tsinling, spring crops mature very quickly, but no attempt is made to "force" an early harvest; and, as the cotton has to wait till the food-crops are properly ripe and off the land, its quality leaves much to be desired, *e.g.* compared with that in the Wei valley.

Hupeh

Cotton Land.

The Yangtze lake-land is specially devoted to cotton, and the climate not only allows American varieties to be grown with success, but is very favourable to the textile industry. Very large quantities are grown between King-chow and Hwang-chow, specially round Shasi and Mien-yang; and a canal from Hankow directly through "the cotton lakes" to Shasi saves a very long detour on the Yangtze, and has seriously affected I-chang. The latter is a Treaty Port,

with some (poor) local coal, and has done 2 p.c. or 3 p.c. of the river traffic; but, with the improvement of the navigation, it has ceased to be a transfer station for the Gorges, and it is too near Shasi, with its good facilities for shipping the cotton.

Iron Ore. The province generally is very deficient in mineral wealth, but the hills on the right bank of the Yangtze contain an iron field of considerable size and with a fine quality of ore (magnetite-hæmatite). Ta-Yeh is the chief centre, with ore approaching 60 p.c of purity; and, though the Ling-Hsiang resources are less—less even than those at O-Cheng—their standard is above the 60 p.c.

Wu-Han. The Wu-Han pivot is in the exact centre of the (still incomplete) railway route from Peking to Canton and of the river route from Shanghai to Chungking; and, as the river westward becomes too narrow for large boats, it is the natural head of navigation for ocean-going traffic, accessible by 4000-ton boats at all times and for at least 10,000-ton boats in summer. Any boat of a length appropriate to a draught of 25 feet can reach the harbour in flood-time. There are also the advantages for canal traffic, especially on the canal to I-chang *via* Shasi; and river, rail, and canal combine to give the cities a very large trade, including at least 5 p.c. of all the foreign trade of China—*i.e.* equivalent to $\frac{1}{6}$ of the Shanghai foreign trade, $\frac{7}{11}$ of that at Canton, and $\frac{5}{7}$ of that at Tientsin. Of this trade—during the less disturbed years after the War—50 p.c. was with Japan, 30 p.c. with Britain, and 17 p.c. with the United States.

Population. The Wu-Han population, as estimated by the Chinese Maritime Customs, is curiously small, not much over 800,000, while Shasi is nearly 200,000, and even I-chang is over 100,000. Hankow itself, as the farthest down the river, on the "Peking" bank of the Han, and with a double water-front, is the right place for the port; but Han-yang also has a double water-front and more room for expansion, and is the right place for the industrial centre, with its arsenal, steel works, etc. Wu-chang, on the apex of the concave arc of the river, *i.e.* where the river is narrowest, is the political centre, aloof hitherto alike from foreign commerce and from modern industry. But Wu-chang itself has cotton mills now, and the original city here was Han-yang, *between* the two rivers, whereas Hankow—which the Chinese consider a suburb of Han-yang—is *along* them.

Hunan

Frontier. The frontier between North-of-the-Lake and South-of-the-Lake is not the lake nor yet the river, except for the curious tongue of Hunan that runs northwards along the river, enclosing the Lin-siang marsh and guarding the approach on the Treaty Port of Yo-chow; for the area covered by the lake expands and contracts as wildly

as the Yangtze meanders, and its great curse is silt—from the Yangtze and from the Yuen.

The province is about one-seventh larger than Hupeh (*c.* 72,000 square miles), but contains only about 1,000,000 more people (*c.* 28,500,000); and they are markedly anti-foreign and relatively prosperous. The prosperity seems to be partly related to the position of the great Siang artery on the direct line between Hankow and Canton, while the anti-foreign bias seems to have been a reaction against the early opening of Canton to foreign trade; but the abundance of spring rain and the long humid summer not only give great certainty to agriculture, but allow three crops of rice and three pickings of tea every summer. **Size and Population.**

The area is mainly a forested highland, and the most marked feature in the relief is a typically diagonal (S.W.–N.E.) water-parting, which may be called generally the Heng-shan. This flings down an impetuous torrent, the Tzu, which divides the whole into two basins, those of the Yuen and the Siang; and its own small basin is important because it contains a useful little coalfield and the richest deposits of antimony known in the world. The richest mines are near the river between Pao-king and Sin-hwa, especially at Si-king Shan, but navigation is very precarious and possible only for very small boats. Even these are very often wrecked, for they are "put together" specially for the coal-traffic, and the planks are sold in Hankow. The mercury-line already referred to (p. 561) also seems to end in the Heng-shan. The basins of the Yuen and the Siang comprise ten-elevenths of the total area; and the Yuen basin, though slightly the larger, is much the less important—for several reasons. It is much the rougher in character; it is off the Hankow-Canton line; and the navigation on the Yuen is very poor except as far as the open port of Chang-teh. It is said to be navigable right up to Chen-yuen, but the rapids above Shen-chow are really too dangerous for any through traffic, impeding access even to the Chenki and Supu antimony mines, and Yuen-chow is in no real sense "a Yuen market." **Yuen *v.* Siang.**

The Siang basin is very important in several ways, though the river—like the Yuen—has carved a deep bed in the carboniferous sandstone; its local name of Heng-kiang suggests a sudden descent from the 3000 odd feet of the Heng-shan, one of the five Sacred Mountains of China, and the edge of the coalfield is marked—only some 20 odd miles south of Chang-sha—by Siang-tan ("Siang *Rapids*"). But from Heng-chow the valley of the navigable Lei is on the direct route to the Cheling Pass (*below* 1200′), and crosses one of the most important coalfields in China. The Siang is navigable to Yung-chow, and the Lei to Lei-yang; but during the two mid-winter months of very low water the head of navigation is generally at the Heng-chow confluence. **Siang Basin.**

Ping-siang Coal. The coal here is a good anthracite, but it is flanked westward in the main Siang valley by a field of good bituminous coal. Further, on the flank of the Losiao-shan—in Kiangsi, but with easy export only westward, to Siang-tan,—the Ping-siang field produces a soft coal that makes admirable coke, which has been as valuable as the Ta-Yeh iron to the industries of Han-yang. And along this eastern margin of the province are deposits of both tungsten and zinc, the latter making Changsha the greatest lead and zinc market in China. The *ping-siang* (" Siang *plain* ") insures easy rail transport, but most of the Kiangsi coal does four-fifths of its journey to Hanyang by water.

Chang-sha. Changsha (" Long Sand "), in spite of its ill-omened name, can be reached by boats of 500-tons burden ; and, for this reason, it has been the ruin of the Treaty Port of Yo-chow, 120 miles farther down the river and at the actual outlet of the lake. Indeed, Changsha has a larger export and import trade than any other port on the Yangtze except Shanghai, Hankow, and An-king. It uses the forest-wealth of its hinterland in a great furniture industry ; it has a busy pottery industry ; it draws cotton from the west of the lake and excellent black tea from the east of it ; it largely controls the coal (and iron) shipping, and is in a very productive rice area. The quality of the tea, *e.g.* from Gan-hwa, and the great quantity, especially in the Ping-kiang valley, make the city—now a Treaty Port—one of the great tea-markets of China. Choice of a site for the provincial capital could scarcely have avoided Changsha.

Siang-tan. But, though Changsha has raised its own population to about 500,000, and reduced that of Yo-chow below 5000, it is not the largest centre in the province. At least, Siang-tan claims to have nearly 1,000,000 ! This seems to be highly improbable ; but the city does stand on the export-edge of the mineral wealth ; before the advent of the railway its rapids meant transfer of all through cargo; and even now it may be said to command the whole Siang-Lei valley up to the Lei-yang mines. Its use of the river-flats has made it the market of the largest drug-producing area on the face of the earth.

Tung-ting Lake. Though there is no deficiency of rain or irrigation-water for all agricultural purposes, the great variation of the Tung-ting Lake is not due to any heaviness of flood on the feeding rivers, but to the terrific pressure of the Yangtze flood, which dams back the overflow of the lake. At low water on the great river most of the 2000 [1] square miles of the " lake " is a bare sandy plain, and the two rivers maintain (broad) separate courses across this ; and, even so, it was found necessary to supplement the rivers by canals, actually with three connexions with the Yangtze, though the chief one is that at Yo-chow.

[1] It has reached an extreme size of 6000 square miles.

Kiangsi

Although Kiangsi has not only been included with An-hwei and Kiang-su in a single viceregal province, but has also had much the same political and economic history, associated with the Ambassadors' Road and the Taiping rebels, the region belongs geographically to the central basin of the Lower Yangtze rather than to the delta. Even the Viceroy looked upon it as his *Kiang-si* ("Western River" district). **River Unit.**

For physically it has very little in common with the delta and much in common with the central basin. Like Hunan, it is a lake basin, and the Po-yang basin almost coincides with the basin of the single Kan river, which rises at the foot of the Mei-ling Pass. The river is more or less navigable, as the name *Kan-chow* suggests, up to that great ink and wood-oil market below the Nan-shan, and its valley carries the Ambassadors' Road. This seems always to have attracted notable personages or some who wished to be considered notable, and the province struck Richthofen as a sort of Chinese "Dukeries." **Lake Unit.**

It is, perhaps, the simplest and the most perfect unit in China, the mountain-girt basin of a single river, with a single natural outlet in the lake; and, though its soil is poor, its relief, its orientation, and its climate fully compensate for that, the rainfall on the lateral ranges—with their typical S.W.-N.E. trend—being both ample and very well distributed in time and in place. For this reason the lake is fed more or less steadily; and, though it is still variable, and its local flood is dammed back by the Yangtze flood, it is less variable than the Tung-ting, if rather more stormy. Indeed, its most marked shrinkage seems to be almost more secular than seasonal; for the old lake-port of Nan-kang is now 35 miles away from the lake for most of the year, and is not approached even in summer by the highest flood. At the same time, the seasonal variation is great enough to have led to the construction of a canal link between the Kan and the Yangtze and to the choice of a Yangtze-bank town for the Treaty Port, Kiu-kiang. **Simple Unit.**

The port has done a fair amount (? 17 p.c.) of the river trade of the Hu-Kwang, especially in tea, and has ruined the chances of its neighbours, the frontier port of Wu-sueh and the lake port of Hu-kow ("Lake Mouth"); but it was a mistaken choice for the Treaty Port, based on its historical importance. For it stands on the very brink of the great river, with two large lakes defending it on the west and the south, the western one reinforced by the Pun river; and its strategic importance led to its economic value being greatly exaggerated. A position above the outlet of the lake was better than one below it only as freer from silt, but 15 miles was far too much—both for easy access to the transit trade on the Kan **Kiu-kiang.**

and for any stabilisation of minimum low-water from the tidal pressure. Modern development of the mineral wealth, however, is favouring the position ; and the canal link with the lake was always easier to navigate than the Hu-kow channel.

Mineral Wealth. Structural variety has endowed the province with a very valuable coalfield (of good coking coal) in the sedimentary rocks of one diagonal rib, and with kaolin in the crystalline rocks of another rib, the basis of the most famous *china* industry in the world. The development of the coal at the Ping-siang end of the field on the northern flank of the Losiao (or Lu)-shan, as we have seen, has been associated with Hunan ; but the field stretches right across the basin to the northern flank of the Ma-kin-ling in the north-east, where Loping and Fow-liang have easy access to the lake, though their coal is not as good as that at Ping-siang. But the deposits of iron-ore—a continuation of the Ta-Yeh field into the Poyang basin—are larger and more valuable than those round Ping-siang, though the ore nearest to the lake (Chengmen-shan) has a metal content of only 40 p.c.

Tea Ranges. These mineralised ranges, too, form one of the most valuable tea-areas in China, especially between Ping-yang and I-ning-chow, Ho-kow and Jui-chow ; and both the Kin and the Hsiu are navigable. The Kin valley " Kaisow " teas are probably the better known, but the I-ning-chow district really produces the finer quality —most of the very best black tea grown in China. The " Moyuna " tea—from the green-tea district round Wu-yuen—comes down the Lo-an valley to Jao-chow, and is handled by the Wu-cheng market ; but, of course, it is grown in An-hwei. The port of Wu-cheng, between the mouths of the Kan and the Hsiu (Siao), became the natural market for the very fine I-ning and Wu-ning teas ; but the railway has made Takiapu now the commercial centre of all the Lower Kan valley.

Lushan Ranges. Between the effete Nan-kang and Kiu-kiang there is another Lushan range, which is of special interest alike for its structure, its relief, its climate, and its history. Structurally it is an outlier of the folded region of south-eastern China, with its folds lying naturally S.W.-N.E. ; and its relief is peculiarly " mountainous." The average height is 3500 feet ; but many of the peaks exceed this, Ta-Hanyang-Feng (" Great Hanyang Peak ") approaching 5000 feet. There has been some volcanic intrusion, the Tsaotipo cone being *c.* 4300 feet ; and the seaward (and lakeward) face of the range has been much weathered, and falls to the lake above Nan-kang by magnificent cliffs. The whole system has abundance of rain in summer and quite heavy snow in winter—off the N.E. monsoon ; it is beautifully forested, and has an excellent climate. Indeed, Kuling (*c.* 1500′) is the most popular " hill-station " in China, with a perfect summer climate and with tobogganing in

winter; and it is now only 10 miles from the railway—at Shaho. But upon the flank of the Hanyang there is the famous little city of Pai-lu-tung ("White Deer Grotto"), which has been a University centre since A.D. 960; and the neighbourhood is so beautiful that it attracted hermits and holy men—to the Lushan ("Hut Mountains")—where they surrounded themselves with shrines and temples, such as the Yellow Cliff Temple and the Temple of Ten-Thousand Pines.

Porcelain.

Some tea is grown on the crystalline ridges in the north-east corner of the province, but it is of poor quality; the gardens are rather in the lee of the Kauling—or *Kaolin* ("High Ridge")—crest, with less rain and poorer soil. And, in any case, the value of this ridge is in its feldspar; and, again, most of the porcelain earths come from An-hwei (Ki-men), though the Imperial Porcelain works remain where the emperor King-tè founded them in the eleventh century—at King-te-chen. Both Ki-men and King-te-chen are on the Chang, which gave the latter town its ancient name of *Chang-nan-chen*, "the town to the south of the Chang."

The factories still do very fine work that is truly Chinese, and there is a very large demand for ordinary domestic ware for Chinamen in foreign lands, who will use only the "Imperial" ware; but there is also very clever imitation of the most highly prized European porcelain. Curiously enough, though domestic ware is made in many parts of China, the preference is for the rather "alien" ware of Swatow; and the Canton district exports large quantities of clever imitations of old Chinese ware

Nan-Chang.

The whole tea and pottery trade centres on the lake *via* Jao-chow and Jui-chow for Nan-kang; but the capital, Nan-chang, like Chang-sha in Hunan, stands in the rear of the lake, where the lake-plain is just within the belt of heavy rice and cotton production—the typical crop-combination in the Lower Yangtze basin. Like Chang-sha, too, the city has direct connexion with the timber of its western hinterland—in the basin of the Lin-kiang ("*Forest*-river"), which is navigable up to Yuen-chow; and there is a very ancient paper industry here, *e.g.* at Fuchow.

An-hwei

A Link Land.

The composite province of An-hwei is essentially a link land, linking the lake basin with the delta, the north-eastern plain with the south-eastern mountains; but its union was based on catastrophe. For centuries the Yellow River discharged directly into the Yellow Sea at about 35° N.; but in the thirteenth century, during a terrific flood, it burst its right bank, and even broke out of its bed. In swinging to its right, it found itself in what was then the bed of the Hwai, and turned the latter out of it to find a new course;

and it did this, naturally, by finding the lowest and the levellest line. This brought it first into the Hungtze lake, and through that into the Grand Canal; and from the Grand Canal it became a tributary of the Blue River.

Hwai Marshes. One result of all this was that above the head of the lake near Peng-pu the lower basin of the Hwai has been a waste of intermittent marsh, or at least has been liable to perpetual flooding. Another result has been that the tributaries of the Hwai are very shallow, but almost as level as canals; and necessity mothered the invention of a bamboo cargo-raft that draws only a few *inches* of water. A third result was to give direct water-traffic between the Yangtze and the Hwai *via* the lake.

Feature-lines. The southern flank of the Hwai basin is the eastern arm of the terminal (Mu-ling) arc of the Hwai-yang-shan, which is the most northerly of the diagonal (S.W.–N.E.) ranges; and the Hwai flows parallel with this on the north as the Yangtze does on the south. Farther south again the Hwang-shan, reaching nearly 6000 feet, runs parallel with these three feature-lines.

The Plain. The Yangtze valley here is devoted to the heavy rice and cotton production, while the flanking mountains, especially the forested Hwang-shan, form one of the chief areas of heavy tea-production; but the Hwai plain is essentially part of the Great Plain, with harder climate and hardier crops, *e.g.* wheat and maize, beans and oil-seeds (sesamum, etc.). And two great towns, An-king, on the river flank of the Hwang-shan, and Hwei-chow, on the sea flank of it, combined to seize the northern plain with its patches of loess, and to form a single province, which was to be endowed with their joint blessings of *an*, "peace," and *hwei*, "plenty" (? "excellence").

Lüchow. The proper place for the capital of the province is the ancient and enlightened city of Lüchow, one of the very few centres of real intellectual development in China. It is quite central, below the lowest and narrowest part of the Mu-ling arc, across which it even sends timber by road to Feng-yang—Kiangsi timber, imported from the Po-yang lake to the Chao lake *via* Wu-hu, though the waterway between the Chao lake and Lüchow needs regulation.

An-king *v.* Hwei-chow. An-king, the actual capital, has some historic claim to be capital, for it is less ex-centric than Hwei-chow; it is on the great river, in the very heart of the rice lands, and with easy access to the tea-gardens of the piedmont from Tung-liu to Ta-tung. But these are to leeward of the Hwang-shan for summer rain, and better tea is grown on the seaward flank of the range, where Hwei-chow is within 100 miles of tidal water at Hang-chow—in fact, actually in the Tsien-tang basin. In the days of Marco Polo Hwei-chow seems to have been the home of the literary and professional (banking) leaders of Kinsay[1] (Hang-chow); and there may be a hint of

[1] Marco Polo's word, *Kinsai* or *Quinsay*, means "The Capital!"

that in the fame of the city to-day as the greatest ink-market in the world. For the supreme excellence of the real "*Chinese* ink"—often miscalled "*Indian* ink"—is due to the extreme care with which the most resinous timber of the Hwang-shan is reduced to an absolutely pure soot, and to the quality of the sesame oil; the actual works are 25 miles away from Hwei-chow, in the hill-town of Sui-ning.

Wu-hu.

But neither An-king nor Hwei-chow is really as important as the Treaty Port of Wu-hu, a tidal port at the sea end of a very rich rice-producing area, and the busiest rice-port in China. The actual position of the town is typical and significant, for it stands back four miles from the Yangtze; and, like all the rest of the region, its population suffered terribly in the Taiping ("Universal Peace"!) rebellion. Like the neighbouring town of Taiping, it has controlled all movement along the eastern bank of the Yangtze between the river and the Shih-chiu lake.

Feng-yang.

In the extreme north-eastern horn of the Mu-ling arc the city of Feng-yang ("The Rising Phoenix,") was well named, for it was the first capital of the Mings (A.D. 1350). The Hwang-ho was again rolling a mile-wide moat of yellow flood down into the Yellow Sea; and behind the moat, ringed round by hills on the east and the south, the site offered special attractions to the new dynasty. This accounts for the old road *via* Ying-chow to Ju-ning, which can also be reached by water from Feng-yang—an advantage to the good (coking) coal of Hwai-yuen.

Kiang-su

Its Limits.

The northern and the southern limits of Kiang-su may be marked roughly—very roughly in the north—by the old courses of the Hwang-ho and the Yangtze; and the relative value of the two rivers to-day may almost be estimated from the absence and the presence of cities along their old courses. Indeed, we may almost ignore the area north of the old course of the Hwang-ho (though that accounts for the curious detour of the Kiang-su frontier in the north-west), except for the good cotton grown in the slightly salt lands between Su-chow and Hai-chow—conveniently near to the good (coking) coal of the Chiawung (Tung-shan) field—and the actual salt industry of Hwai-an. This is carried on "inland," but is based on the very shallow sea off the old delta. But we must add to our unit the area south of the course of the Yangtze, *i.e.* the Hang-chow Bay. For Chekiang is a large source of the prosperity of Shanghai, especially in regard to silk.

Hang-chow Bay.

All round the bay and the allied feature of the Tai-hu there is a fringe of great, if not very old, industrial cities—from Soochow to Shao-hing, *e.g.* Hu-chow and Ka-shing (Kia-hsing) and Hang-chow itself; and in the very high humidity near the sea, with easy access to Shanghai, even machine development has been con-

siderable. Shanghai itself has fully 1,900,000 cotton spindles working and at least 18,000 looms; and Pinghu has 10,000 knitting machines. Shanghai was an appropriate place for the development of modern "machine" industries, as it is itself essentially modern. It was of no importance before 1840; it has neither a history nor any architectural dignity; and, if it really is "the most representative city in China," it is so as embodying the worst features of all the great Chinese cities.

Tsien-tang. The Tsien-tang ("Copper Dyke") is actually navigable to Yen-chow, but large boats cannot reach even Hang-chow, the shifting sands making it the most treacherous river in China; and the prospects of the city becoming the great railway-junction for traffic round the long bay have been completely clouded by the failure to find a possible foundation for a bridge across the river, in the face of a 15-foot bore rushing up the 120-mile funnel of the shallow bay—involving an *86-mile* viaduct, on 40,000 arches, along the Shao-hing front, a work worthy of days (2000 years ago) when Shao-hing was a royal capital.

Hang-chow. Hang-chow is a Treaty Port; but, even if it could be provided with a good harbour, it is too near Shanghai on the landward side, while on the seaward side it is too near the fine harbour of Ting-hai in the island of Chusan ("Ship Mountain"). It is also the terminus of the Grand Canal, but that can no longer compete with the railway. In any case, the city seems to have resigned itself to being merely the "home of pleasure and pilgrimage and political plotting"; the Si-hu ("West Lake"), that delighted Marco Polo so much, is still embowered in trees, made golden by its great water-lilies, and dotted with island palaces; and of the old industries, *e.g.* in gold, silver, silk, etc.—the silk alone employing 60,000 persons only 60 years ago—at least one seems appropriate, that in tinsel.

Products. The whole delta, from 30° to 34° N., comes within the area of heavy rice-production; the landward half in the north comes within that of a heavy cotton-production, and the poor Chinese varieties could be much improved by careful choice of seed, etc.; and the whole area south of the Nanking-Shanghai railway is within that of heavy production of both cotton and silk, a good deal of silk being also produced as far north of the river as Yang-chow. Kiang-su claims to be the largest producer of both silk (? Kwantung) and cotton, the silk mainly for export; and cotton industries are widely distributed along the railway from Shanghai to Nanking, sometimes associated with silk, as at Wu-sih (140,000 spindles and the largest export of lace from China). In most parts cotton as a crop comes next to rice, especially on the Tung-chow peninsula; and Kiang-su produces *c.* 30 p.c. of the Chinese output.

The landward pivot of the province, as the present Yangtze

delta, lying between the Kao-yu and Ta-sung lakes in the north and the Tai and Ta-nan lakes in the south, is evidently Nanking (" South Capital "), with Wusung-Shanghai as its out-port and Chinkiang-Kwachow as its in-port, and the ferry between Pukow and Hain-kwan (" Lower Customs ") making it the most important railway-junction between Shanghai and Peking and the most important rail-and-river junction in China except Hankow. Though the site had been occupied under a variety of names (Kin-ling, Tan-yang, Kiang-nan, etc.), Nanking itself was built—or rebuilt—by the Ming dynasty (*c.* A.D. 1400), and was given by them its name of " Southern Capital " ; but its rise in political and literary importance had to wait for the decline of Soochow. **Nanking.**

It was a good site for the Taiping capital, and is a useful meeting-place for a Republican senate and entirely the best viceregal capital for the three provinces of Kiang-nan ; but it is not much more suitable than Peking for the capital of a new China, and it has little or no commercial importance, being too near Chinkiang (" River Mart "). Its command of the last of the defiles on the Yangtze did give it once some commercial as well as military importance, so that all the *yellow* cotton-cloth from China came to be known as *nankeen* ; but, even in the days when South China was independent alike of the Kin empire of the Great Plain and the Hia kingdom of the Loess Plateau, the Sungs—after full trial—gave up Nanking for Hang-chow.

Soochow, like Chinkiang, recovered so rapidly from the terrible devastation of the Taipings that its natural advantages must be very great, even if less than when the Tai lake actually reached its 10-mile wall. It is the most important city on the Grand Canal, a canal and railway junction, with a perfect net of natural and artificial waterways, that make it a very busy Treaty Port ; the old delta has been drained, and so is immensely fertile ; the city has a better climate than its coastal neighbours, and yet has easy access to the coast and across the Tai lake to the spurs of the Nan-shan ranges along its western shore. Its climate has given it a busy flour-milling industry—behind the port at which *c.* 90 p.c. of the imported wheat enters China, specially for use in the rice-growing areas ; but its creek is so shallow that the wheat has to be landed in sacks and not in bulk. Its printing and embroidery are world-famous, but its main industry is based on its " forests of mulberry-trees "—silk, satin, and gauze. It is, proverbially, one of the two most beautiful cities in China : **Soochow.**

Above is Paradise, below are Soo and Hang.

CHINA.—IV

CHAPTER XXXIII

HWANG-HO BASIN

The Great Plain

Its Unity. The patches of loess in the lower part of the Hwai basin show that the north of An-hwei belongs to the Great Plain, where tillage is very easy, and fertilisers are not needed. The same is true of the mass of the upper part of the basin in Honan ("South of *the* River"), while most of the rest of the area drains northward into that river.

From one point of view the Great Plain must be regarded as the whole consecutive low and level expanse between 30° and 40° N., between Hang-chow and Peking. It has been linked up for centuries by the Grand Canal, as a roughly central link, and the Peking-Hankow railway is doing along its western edge what coast-wise shipping has done for centuries along its eastern edge; and the whole is to a large extent a human unit,[1] with about 40 p.c. of the population of China concentrated on about 12 p.c. of its area, with the two historic foci of Peking and Nanking—representing respectively an empire and a kingdom.

"Loess" Delta. But it seems exceedingly desirable in dealing with China to distinguish the region in which the loess theory of land-usage was natural from the region in which it was not natural, and not always or everywhere appropriate; and the divide is very closely associated with the Tsinling line, and the loess sphere with the Hwang-ho region. And, though Honan is a real transition area in a remarkable number of ways, the Great Plain here is treated as the region of the Hwang-ho deltas, old and new.

River Changes. For the river has made a complete change of course more than a dozen times in the past 2500 years. For two spells of about 500 years, from *c.* 360 B.C. and *c.* A.D. 1300, it preferred the natural

[1] The Hwai marshes (p. 596), which *still show up* on a population map of the plain, have made a serious break in this unity from the thirteenth century

course, *i.e.* working to the right on leaving its valley; and on this course it needed less regulation, and did less harm both to the land and to its outlet in the Yellow Sea. But, as early as 2300 B.C., it was emptying into the Chihli Gulf; it was doing the same for nearly 1200 years before A.D. 1300, and it has been doing it since 1852. But it finds the unnatural course a strain, and has already moved its mouth to the right—from 39° N. to south of 38° N., and its rôle as the seaward frontier of Chihli has passed to the Wei. The morphological apex of the whole lowland, the apex of the oldest of all the deltas, at the mouth of the Honan gorge, lies directly on the trend of the old Shantung block round which the plain is wrapped; and that block further differentiates between the two courses.

Old *v.* New.

The flood-plain of the present course is so salt, with a rainfall—in the lee of the Shantung mountains—of less than 20″, that it is of as little use as the river itself; but the flood-plain of the old course, open to a 40″ rainfall, is a great producer of grain and cotton, and carries both the Grand Canal and the Peking-Shanghai railway. The cotton is specially good round the rail and canal junction of Suchow and on the slightly salt lands that have been reclaimed behind the Yu (" Pearl ") peninsula.

Honan

Representative.

Honan is the most representative province in China. It combines plain and mountain (Fu-niu) with faulted block (Hwai-lung), it drains to the Yangtze as well as to the Hwang-ho, it includes both the Siung-erh and the Fu-niu ranges of the great Tsinling divide, and the Yu-tsai peaks look straight down from 8000 feet upon a railway that runs southward from Peking for 900 miles—almost as directly as the neighbouring meridian, 114° E. The Ju tributary of the Hwai rises in the longitude of I-chang, and the Lo actually on the Ta-hwa-shan flank of the Wei valley.

Capitals.

The old rulers of China, with their extraordinarily keen geographical sense,[1] fully realised these relationships and the representative character of the province. The limits and the relief of their dominion forced them to look for a capital somewhere in one 250-mile, mountain-flanked valley—east of the narrow Tung-kwan Gate and west of the apex of the delta. Any place along that line had easy access eastward and westward, but only one—outside the valley—had easy movement northward and southward; and so for 2000 years the capital stood here—for over 1000 at Kai-feng and over 900 at Lo-yang (Honan).

[1] Still, in many parts of China, even the peasants will say, not " Turn to your left (or right)," but " Turn to the *east* (or west or north or south)!" And the greatest Chinese painters (from Sung times) have specialised in *Landscapes*—mountain, mist, and moving water.

Pai Basin. The little Pai basin, though lacking the loess that covers the rest of the province, has very fertile alluvium, and is very well irrigated both by the Pai from the Fu-niu and by the Tung from the Hwai-lung; and the Pai is navigable from Nan-yang to its confluence with the Han at Siang-yang, while the whole plain from Nan-yang to She-ki-chen is devoted to cotton-growing. This seems to be a very old industry here, for one of the main caravan routes from Peking to Hankow went through She-ki-chen; and, if this cotton was included in the Hupeh returns, that province would stand above Chihli (20 p.c. of the Chinese output) for production of cotton.

Hwai Plain. The Hwai plain, though very productive and densely populated, has no important towns, the largest being transport centres which are either quite modern rail-and-river junctions, such as Hsü-chow, or on old river-points, *e.g.* towns at the head of navigation, as Ju-ning, or at important confluences, as Chow-kia-kow, where the Ku-lu and the Ju combine to form the Sha ("The Sandy").

Hwang Valley. But the Hwang valley and the Hwang plain are exceedingly important, and were so long before the days of railways, though the railways have greatly increased their importance; and, though the mineral wealth so largely responsible for this is mainly in Shansi, Honan itself is fairly rich in coal. The field along the Hwang-ho between Shen-chow and Honan is anthracite and not of good quality; but on both flanks of the Fu-niu spur in the Ju basin there is abundance of good bituminous (coking) coal, *e.g.* at Ju-chow and Lushan.

Shansi Minerals. The coal-and-iron field of southern Shansi has its obvious economic outlet towards the transport ganglion at the mouth of the Hwang-ho valley, and it was the Peking-Hankow railway that vitalised the mining; and the products have an industrial as well as a commercial market here, for there is a dense population in an exceedingly fertile area. The fan that opens from the valley to fill up the whole plain between the old and the new courses of the Hwang-ho, is covered with a rich alluvium that is mainly flood-borne loess; it has an assured rainfall of *c.* 30 inches, with a winter temperature of *c.* 30° F. and a summer temperature of *c.* 75° F.; and it has become—in Honan, Shantung, and Chihli—the most important producer of (American) cotton in northern China. There is also enough forest still left on the Fu-niu to produce a fair quantity of wild silk; and the Chengchow-Kaifeng-Hsüchow triangle is one of the great silk areas of China.

Bridge-Towns. The immediate objective of the Shansi coal and iron is on the immensely fertile Hwai-king plain at Tsing-hwa-chen, but its ultimate destination is by the Peking-Hankow railway from Sin-siang junction; and it is typical that the only bridge-town on "China's Sorrow", Yungtse, is much less important than bridge-

towns on the smaller and less dangerous rivers, *e.g.* Wei-hwei on the Wei (cf. Chang-te) and Cheng-chow on the Ku-lu. The latter is already one of the most important railway-junctions in China, and must be made more important with every extension of the Suchow line westward—to Sian and eventually Europe. It is the greatest cotton-distributing centre in China, drawing its best supplies from the Wei-Hwang-ho valley.

Hwai-king Plain.

The Hwai-king plain, with its southern exposure and facilities for irrigation and good rainfall, is immensely productive; but it specialises in grain rather than in cotton, and its Tai-hang piedmont is a famous orchard belt. The exposure south of the river is not quite so favourable, but the fertility is equally great; for the Lo—"the Central Flower" river—in its annual flood, redistributes more loess than the Tsin-shui, and the amount of sub-soil (10–12 feet) water is extraordinary, "every field having a spring of its own." But from the time that the province expanded north of the river, and became so largely a Great Plain province, Lo-yang became less and less appropriate as a capital. The present provincial capital of Kai-feng—a safe 9 or 10 miles away from the river—was once (A.D. 1280–1405), under the name of Tung-king ("Eastern Capital" or "Court"), as it had been for 1000 years before 1100 B.C., the imperial capital; and it has been sufficiently cosmopolitan to have given shelter even to a Jewish colony.

Old Capitals.

The whole story of the relations between Lo-yang and Kai-feng and Sian has been put into its proper geographical setting by Dr. Cornish; but its significance in the general geography of the Hwang-ho basin is in illustrating the value of the tributaries compared with that of the main stream. The Hwang-ho valley here was safer than the Wei valley or the Hwang-ho plain; and Lo-yang was safer than Sian or Kai-feng, for raids came from the north-east (cf. the Kin raiders) as well as the north-west. The Hwang-ho valley was safer, too, than the Hwang-ho plain from floods; and the "peninsula" between the Hwang-ho and the Lo is 500 feet above sea-level. Lo-yang is just about the centre of the valley; the railway route *via* Tsing-hwa-chen to Tseh-chu shows that Lo-yang had easier access than Kai-feng to the loess plateau; and the gap between the Siung-erh and the Sung ranges gave it easier access to the Han basin, if not actually to Wu-Han,—the Ju valley leading southward here, as the King valley leads northward from Sian. Indeed, the King really led *to* rather than from Sian, while the Ju valley here had no threat for Lo-yang.

Lo Valley.

Though the Lo valley is now specially famous for its cotton, the rise of the city was based on its prodigious food-supplies; and the upper part of the basin still grows rice (and indigo). These products, even 150 years ago, were easily brought down to Lo-yang by river, but the Lo is now so badly silted up that it is of real use

only when it is frozen, and when the heavy November snowfalls have come *before* the hard frost. In most years the ice seems to need a " matting " of millet-stalks before the river can be used by carts as a road.

Shantung Plain. In Shantung the plain is less fertile except round the numerous lakes, which also keep the humidity relatively high, and it is specially an area of hardy grain, mainly wheat and millet, with pulse ; but maize is also grown, and so—to the south—is rice. Indeed, the Grand Canal was in origin the *Grain* Canal or Grain-tribute Canal ; and, though the river is so dangerous, and the lake atmosphere so much less pleasant, that south of the river towns avoid both, *e.g.* Tsao-chow and the railway-junction of Yen-chow, north of the river they are on the canal, *e.g.* Cheng-kia-kow and the very ancient city of Tung-chang, the centre of an important cotton area that runs along both sides of the canal from the Wei valley to the Ta-tsze lake. There is a smaller, but productive, cotton area between the Hwang-ho and the railway from Tsinan to Wei. The most favoured region of all, with fertile flood-plain, water-way, railway, dense population, and coal and salt in the sedimentary frame of the old rock, is between Yen-chow on the railway and Tsining on the canal.

Chihli Plain. In Chihli the plain is no longer at the mercy of the Hwang-ho, for the province has no natural connexion with the river, though the Taming finger gives it a foothold on the banks. Except for this tiny southern finger and the Lwan peninsula in the north-east, the whole plain is nominally the work of the Pei (Pai) system, which recalls the Ural system of the Tobol. Probably the Hun (" the Muddy ") is really the main stream even in the north ; but the mass of the plain is not fed from the north at all, but from the west—all the tributaries, the Shang-si and the Pu-to, the Lao-chang and the Wei, draining from the Tai-hang section of the Shansi fault-scarp. All of them, too, are useful. The Wei, which is actually canalised to make the Grand Canal northward from Ling-tsing, is always navigable,—except when frozen—to rail-head at Tao-kow, and often to Tsing-hwa, at the very foot of the Tai-hang scarp in the Hwang-ho valley ; and it can compete with the branch line from Wei-hwei for the Tze-chow trade in coal, iron, fire-clay, etc. So, the Hu-to is navigable to Cheng-ting, and feeds the line from there to Tai-yuen,—the Yen to Pao-ting,—and the Hun and the Pei to the latitude of Peking.

Products. Not only are they much more useful than the Hwang-ho, on which there is practically no traffic here, but their floods are less dangerous, if the dust-storms are more troublesome ; and their flood-plains are densely peopled and assiduously cultivated. In

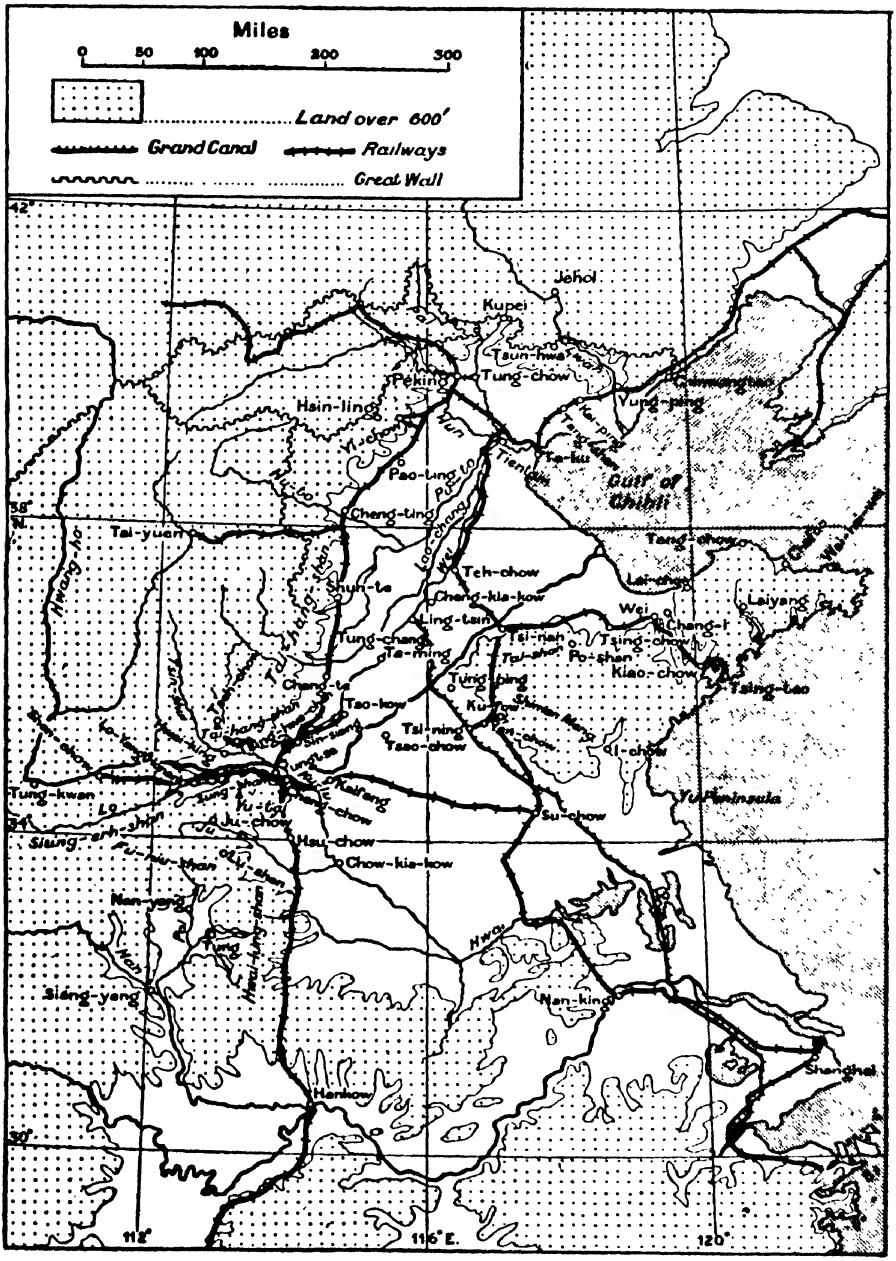

FIG. 118.—The Great Plain.

the harder climate, hardy grain, especially sorghums and wheat, and vegetables, especially beans and potatoes, become the staple food-crops. Chihli is the largest producer of wheat in China, the proportion of the cultivated land along the Grand Canal that is under it reaching 40 p.c., as in neighbouring parts of Honan and Shantung; and it is still more predominant as a producer of the millets (sorghum and other), the heavy production—which in the case of wheat does not extend much north of 38° N.—extending northwards to the very end of the plain and the associated piedmont round Cheng-te (Jehol). The province also stands next to Kiangsu for the production of cotton, and produces a much better fibre, the Pu-to basin producing really good American cotton, especially along the railway between Cheng-ting and Shun-teh; and, again, the neighbouring parts of both Honan and Shantung show similar results.

Cotton Trade. While the Kiangsu (-Chekiang) and Hupeh (-Hunan) areas have been the great raisers of cotton for centuries, the development of these north-eastern areas is more recent; and consequently modern cotton industries have tended to spring up in the chief raw-cotton markets, especially Tientsin, while the greater ease of importing food has freed land for other than food-crops. But the smaller yield of the hardy grains, and the difficulty of raising two crops a year off the land, tend at once to involve larger farms and yet less labour—horses and mules being largely used,—thus leaving man-power for textile and other industries. On this north-eastern plain the farms are from three to four acres, but employ only from five to six people; but south of the Yangtze no province shows an average size much more than an acre and a half, and yet the "staff" is usually seven!

Wool. Again, the upper Hwang-ho basin is the only part of China producing much wool, and this gravitates eastward to the port of Tientsin, especially from Kansu, whether grown locally or imported *via* the great wool market of Sining; and the handling of the raw wool has led to the rise of local woollen industries, especially in rugs and carpets, many "Tientsin" rugs being made in the provincial capital of Pao-ting, through which the carriers [1] have passed on their way to Tientsin. The city, as its name explains, was a "Fortified Court-outpost," at the foot of the Inner Wall, the objective of pilgrims from the south to the Hsinling [2] tombs of the kings below the sacred Wu-tai peaks.

Tientsin. The concentration on Tientsin is due not to any merits of the place as port or city, but merely to ease of access—to it from the west, and from it to Peking. The Pei, though it is frozen in winter (December–February) and often has not more than ten feet of

[1] The Tai-yuen branch line joins the main line south of Pao-ting.

[2] These are now reached from north and south by train to Yi-chow junction!

water on its two miles of bar, is navigable over its 100 miles (70 miles direct) to Tungchow, the port of Peking and joined to the city by rail. In recent times, too, the city has been within very easy access of the Kaiping coalfield, which is just inside the Great Wall; and the dense population, the convergence of canal and river and rail, and the importance of Peking, have combined to make Tientsin the third port in China, its northern relations illustrated by the typical exports [1]—wool, furs and skins, bristles, etc. But the Taku port is sometimes frozen from November till March; there is a broad fringe of ice round the gulf in winter, and ice off the banks collects on the coast; and large vessels have to lie seven or eight miles out even when there is no ice. Indeed, there is no natural harbour at all *in* the gulf, the nearest being Chin-wang-tao or Chefoo.

Peking.

If Lo-yang and Wu-Han were, undoubtedly, the right centres respectively for the capital of the old kingdom and the new republic of China proper, Peking was probably the best centre for the capital of the Chinese empire in its prime; but this means that its essential significance is associated with its external rather than its internal relationships, and it may be treated with the Chihli highland rather than with the Great Plain (see p. 610).

Shan-tung

The Pivot of the Plain.

Shan-tung ("Eastern Mountains"), the home of Confucius, is essentially a mountainous peninsula, ringed round on its three landward sides by the "horseshoe" of the Great Plain—its eastern bulwark, as Shan-si ("Western Mountains") is its western. Being outside the region of loess as a wind-borne—not as a water-borne—deposit, the ancient rock of the highlands offers very little except mineral wealth; and, though the redistributed loess of its horseshoe of plain ought to be—and is on the west and the south—very fertile, on the north the persistent floods of the Hwang-ho are not only ruinous to agriculture, but also have left much of the soil far too salt to be of any use at present. At the same time, where it is not *too* saline, *i.e.* on the higher level between the river and the Tsinan-Tsingchow section of the railway, a large area is under cotton. In the west and the south, the fine shelter of the Tai-shan from the bitter N.E. winds, the better rainfall off the S.E. winds, and the easy access to the Grand Canal, have combined to make the area very productive, especially of cotton and grain, while on the Shimen and Meng-shan piedmonts the mulberry flourishes so well as to make Yen-chow and I-chow very important silk-markets.

[1] Tientsin, like Shanghai, but unlike Hankow and Canton, is specially an importer and not an exporter.

"Eastern Mountains."

The highland, as we have seen, is broken into two sections—the western Tai-shan, with its associated Shimen, Meng, and I spurs, and the eastern Lao, with its Ai-shan spur. The west of the Tai proper rises above 5000 feet, and has attracted a never-ending stream of pilgrims for almost as many thousands of years; and it distributes a number of rivers in all directions, the Wei and the I into the Grand Canal. The Lao crest does not rise much above 3000 feet—in the Ai, but its forests of dwarf-oaks supply the food of millions of silkworms in a climate adverse to the mulberry, however favourable it may be to the castor-oil plant and to the "wax"-tree,—the latter specially in the sheltered Lai-yang valley, where the wax insects are very abundant.

Coal.

The valleys in the highlands, especially to the south-west, like two-thirds of the surrounding plain, with its sedimentary piedmont round the crystalline highland, are very fertile; but, except for the large production of (wild) silk, the real value of the highland lies in its mineral wealth, especially the coal. This is well distributed round the Tai block, specially on its northern (6 fields) and southern (3 fields) flanks; and nearly all of it is of good quality, varying from semi-bituminous to semi-anthracite. The Poshan field seems to be the richest, and yields a good coking coal that leaves very little ash; farther eastward, *e.g.* at Chang-chien and Wei (Fangtze) the coal leaves more ash, but is a good steam coal, especially at Wei, which has very easy access to the ports, and abuts on the Chin-ling-chen iron-field (magnetite and haematite, of 55 p.c. iron content). It is, again, interesting that the "field" between Po-shan and Wei was typically marshy, as suggested by the name *Tsing-chow* ("Green Land").

In the south both the I-shan and the Tung-shan fields also yield good coking coal, and there is another iron-field of similar quality between I-shan and I-chow—all with easy access to the Grand Canal and the Shanghai railway. The salt-field near the head of the lake lies actually along the railway from Yen-chow junction to the Canal port of Tsi-ning.

Silk.

The real pongee, *i.e.* unbleached, silk industry is interesting, because it throws a direct light on climatic controls. The best should be from worms fed on mulberry leaves; but, whether they are fed on mulberry or on oak leaves, its quality depends on the exposure, worms fed on the same kind of leaf yielding a different quality of silk according to their "northward" or "southward" exposure. The best, if not the largest quantity, comes from the south-eastward flanks of both blocks round Kiao-chow Bay, and is known as "Tsing-tao"; and the marine exposure round Chefoo produces—from either wild or domestic worms, fed alike on oak-leaves—better quality than the landward exposure round Yen-chow. The so-called "Shantung," the third quality, is really Manchurian

silk, imported at Chefoo, and sent to Chang-i to be woven. Chefoo, too, stands next to "Shanghai" (really Wu-sih) for the export of lace.

Ports. Though the lateral coasts are concordant, the truncated terminal coast has fine natural harbours in Chefoo and Wei-hai-wei, and the gap between the two mountain blocks develops seaward into the natural harbour of Kiao-chow Bay, with Tsing-tao in its most sheltered corner, *i.e.* sheltered from the S.E. storms. The modern history of these foreign footholds illustrates the Manchu indifference to things maritime, for the International importance of the peninsula is associated with them and not with its natural wealth, though the abundance of good coal definitely increased the value of the ports. The best of these is Port Edward, behind the island which shelters Wei-hai-wei Bay; it is large and very deep in the lee of the island, and the climate is so good that the place was used by the Chinese as a sanatorium, though that of Chefoo is even better. Indeed, Europeans were originally attracted to the latter because it is the healthiest place on the whole coast of China. Its famous hair-net industry has—for obvious reasons—suffered collapse!

Chefoo But the port had, and has, a real commercial importance apart from its good climate and its strategic value, for it is the most northerly of the unfrozen ports; and, as such, it has had a very important *winter* trade with Tientsin and Peking. This is the real cause of its rather bad reputation as a natural harbour; for its one real defect is its exposure to the north-east, *i.e.* exposure to the prevailing *winter* wind. There is not much room for expansion of the port, but it is really the port of Teng-chow, where the river is too shallow to be of use to shipping, but there is plenty of room for industrial expansion.

Kiao-chow. Somewhat the same kind of position is found on Kiao-chow Bay. For Tapoh, the port of Kiao-chow town, was not only badly silted, but also exposed to the S.E. wind; Tsing-tao is in a better position commercially and strategically, though its access inland is less direct; but this is immaterial, if not actually an advantage, to a foreign foothold.

Tsinan. Tsinan is in the best position for the provincial capital—four miles away from the Yellow river, just where the lowland rises towards the Tai block, with its own canalised route to the Lai-chow *wam*. It is the natural junction for three very important ancient thoroughfares—all followed now by sections of the Chinese railway system, and is within easy reach north-westward of the Grand Canal at the great arsenal of Teh-chow, the terminus of an ancient route to Pao-ting, while the south-western approach between the Hwang-ho and the Canal, from Tsao-chow to Tung-ping-Sung, is a waste of intermittent swamp. The city itself, at the foot of the Sacred Mountain, is the terminus of the sacred line associated with Confucius—from Sian *via* Lo-yang and Lu (Yen-chow), where he was

born and died. His tomb, in the Kung cemetery in Kufow, is approached by a cypress avenue and guarded by a marble statue of " The All-accomplished, the All-informed."

The Northern Highlands

Yangtze v. Hwang-ho.

In studying the basin of the Yangtze we can never get away from the grip of the great river—its lakes and irrigation systems, its cultivated flats, its busy commerce, its dense and fixed riverside population, its long series of cities. But in studying the basin of the Hwang-ho we can ignore the river,—we must lift up our eyes to the hills to find assured rain-fed crops,—land trade takes the place of water trade, for the river is a battle-field rather than a route,—and the population is highland, not lowland, and as restless as the wind-blown dust. To China proper, the Hwang-ho has been more of a barrier and less of a benefit than the Great Wall.

Plain v. Highland.

The relations of inner plain to marginal mountains in Chihli is exactly the opposite of that in Shantung. There the plain is wrapped round the old block, and Tsinan stands out on the landward apex of the block ; but here the grid-crowned block is wrapped round the plain, and Peking lies on the landward apex of the plain. The latter, therefore, with exactly the same relation as the former to the piedmont of its highland, really faces outward and hillward instead of inward and plainward. Its history confirms its geography. For, in this connexion, nothing could be more significant than the fact that its Manchu rulers looked to the Manchu road for a home ; but the character of that home is nearly as significant. For Jehol, like Brusa and Antioch (cf. p. 270), as its name tells us, is a valley blessed with a " Hot Stream," outside the Great Wall ; and only inside that was there *chih-li*, " direct rule."

Jehol.

At the same time, to call Jehol " the Fontainebleau of China " shows a sad misunderstanding of the geography and the history of one or the other. No Diane de Poictiers or Henri IV. could have hunted through forest here. The temples and the palaces date at least 200 years later than even the Cour Ovale of Francis I., and Thomas à Becket consecrated the old Fontainebleau chapel ! The whole object here was propaganda, magnificent and extravagant propaganda—a spectacle to awe the uncultured Mongols, as they suddenly rode down to it over the crest of the eastern hills, or a bribe to bind to the Manchu dynasty the lamas [1] of the distant western tableland.

Peking.

If Peking stands on 600 feet of mud, and marks the apex of the plain, we must not misinterpret either fact. The fertile soil and the fertilising showers made a basis of food-power, not of man-power ; there is an apex only because the enclosing mountains

[1] The Potala, however, with its Golden Pavilion, was not built till 1771.

make an arc concave to the plain, and the concave arms force the lowland routes to converge naturally on the city; and the encroachment of the plain is associated with that narrowing and with a lowering of the mountain barrier which allowed the real main stream—the Yang-Sangkan-Hun [1]—to link Kalgan with Peking *via* Süan-hwa and the Nan-kow (" South Pass," 2000 feet). Even modern railway engineers agree that this is the right link.

Its Story.

Peking, therefore, became the natural focus, where the seamen and the canal-men, who had joined forces at Tientsin, met the camel-men and the horsemen, converging from Kalgan (Chang-kia-kow). The place as Yu-Chou, " Chou Pearl," was of interest to the Chinese as the birthplace of Chou Kwang-yin, the founder of the Sung dynasty; but its story has otherwise been essentially linked with foreign intruders—Khitan Tatars, who made it *Liao*, " the Iron City "; Proto-Manchus, who called themselves *Kin*, " the Gold men," and called the *southern* city, *Yen-king*, " the Swallow-City"; and Kublai Khan, who discarded Yen-king (to be the foundation of the " Chinese City " of to-day), and built a new *Khan Baligh*, " Khan City " (Cambaluc), when he removed his capital from Karakorum.

The fact that the city was called the Swallow City and approached through the " South Pass," suggests that Kublai Khan made a mistake in moving his capital—a mistake on his eastern margin, which his successors paid for speedily on their western margin. But the fact that the city is north of the natural northern limit of rice-culture suggests also that it was not a suitable place for the capital of China proper. On the other hand, China proper could no more have been ruled from Karakorum than Mongolia proper could have been ruled from Sian or Lo-yang, not to mention Nan-king or Hang-chow.

Peking *v.* Sian.

The whole story of Jenghiz and Kublai, then, it may be urged, supports the attitude taken up here with regard to Peking. Karakorum was equally distant (*c.* 1000 miles) from Sian and from Peking; but the approach to the one was reasonably easy and over relatively " familiar " country, while the approach to the other was difficult and across a mountain grid that was unfamiliar to the raiders of the rolling downs. Jenghiz found it quite easy to conquer the Hia kingdom of the loess plateau and its Sian focus, and fairly easy to conquer the purely Chinese kingdom of the Sungs in the Yangtze valley; but even Kublai had to enlist the Hias and the Sungs before he could conquer the Kins of the mountain-girt north-eastern fortress.

Function of Plain.

The plain, then, should be regarded simply as a larder, reinforced in modern times by the sea-traffic, which has been so predominantly in imports; and the landward links should have their military

[1] All three within the Great Wall, which—for part of its course—the Pei is not.

rather than their commercial features emphasised, for they are passes—the Nankow *to* the Great Wall at Kalgan for Urga, and the Kupei *in* the Great Wall for Cheng-te and the Lwan valley—to the Dolon Nor and the Imperial hunting reserve at Wei-chang.

The Coal-fields. But the Hun basin now has acquired a new economic importance, as it contains a large quantity of good coal, which is being developed on modern lines; and all the units of the system, in the Peking Grid and the Peking Basin, share in this. The Yang fares worst, as the Chi-ning-shan field near Süan-hwa has the poorest coal; but it has been very useful to the railway, and there is some compensation in the rich iron-field of Süan-lung, which supplies ore to smelting works in Peking. The Singkan field—now in Suiyuen province—has much the largest area, but with its best coal in the far west at Tatung; but there is a field of quite good quality in the centre of the valley between Yu and Sining. The abundance and the quality of the coal, especially at Tatung, have entirely justified the extension of the railway from Kalgan *via* Tatung and the still more westerly Suiyuen coalfield—like the Tatung, in *Shansi* until 1928—to Paotow; and the railway in turn has greatly aided the development of the fields.

Kaiping. Off the south-western edge of the Grid on the Hun lowland is the anthracite field of Fang-shan; and off the extreme south-eastern edge of it, within a direct 50 miles of Taku, is the still more important Kaiping field. Here the coal is a very good bituminous, some of it yielding good metallurgical coke; and so the field can support furnaces and engineering works—at Tang-shan, as well as the textile industries and bunker trade of Tientsin, while its export through the ice-free port of Chinwangtao has made that port the greatest exporter of coal (and coke) in Eastern Asia. The railway from Kaiping to the port, in crossing the Lwan near Yung-ping, taps the age-old trade from the "Jehol" silver and gold mines *via* Tsun-hwa; and this is reasonably convenient for the silver mines (Yan Shu Lin and Ku Shan), but the gold should go direct to the Liao-hsi railway—from Chieng-Chang, if not from Chuan Shan.

Tai-hang. The Tai-hang piedmont—as, perhaps, the whole plain—is underlain by coal, which must presently be properly worked; and such development will be a great asset along the railway, for—except in a few places, *e.g.* Chang-te and Cheng-ting—the soil is too loose to reward irrigation, and has to depend on a rather precarious rainfall that is never much above 20 inches. In the meantime, the largest output has been at Tsing-hsing, but the best coal has come from Liu-ho-kou, which has supplied coke both to Peking and to Hanyang. Po-hsüng and Lin-cheng have even easier access to the main line; and, like Tsing-hsing, they produce bituminous coal.

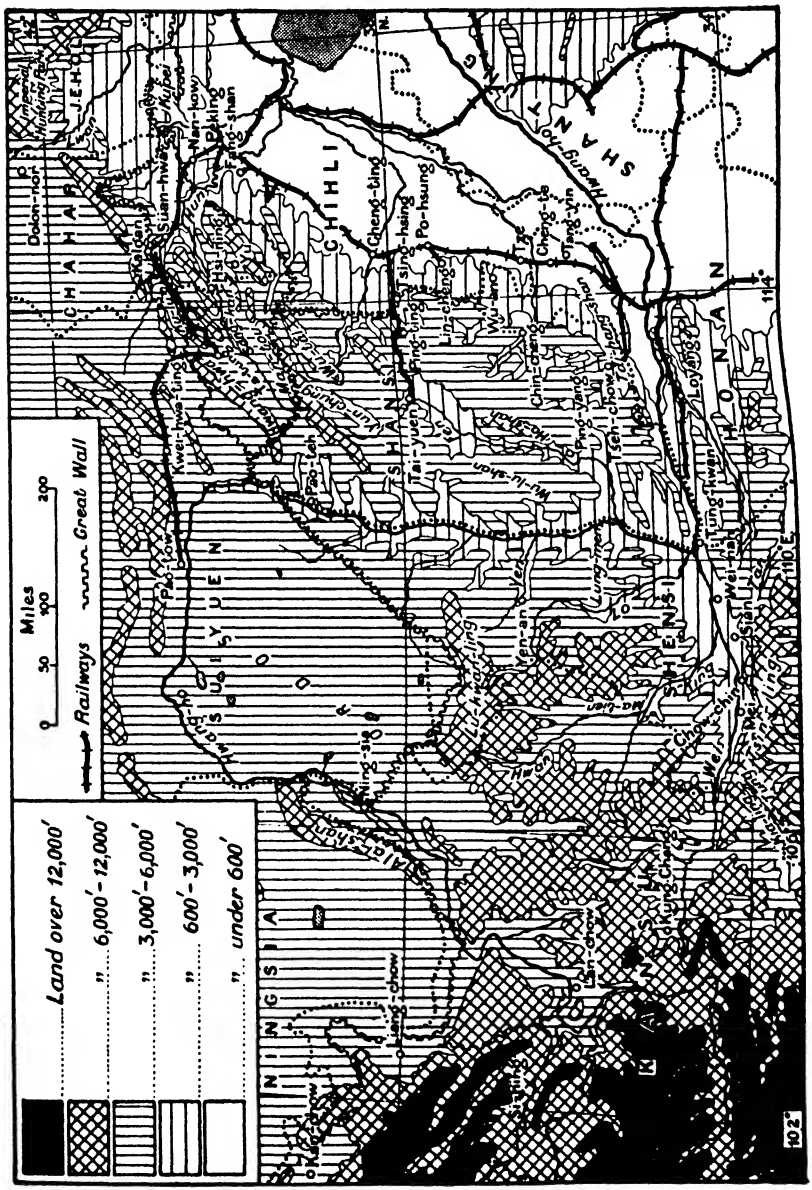

FIG. 119.—North-Western Highland.

The Loess Plateau

The Loess Plateau, as a whole, continues to some extent the S.W.–N.E. trend of the Grid,—it lies nearly everywhere at a height of at least 3000 feet, a large fraction being twice as high,—and some of its marginal features reach at least 12,000 feet. Further, it is set to windward—for the dominant wind—in a frame of desert, to which Kansu, as "the Dry Place," is an appropriate avenue; and, so far as the dryness is *not* due to the increased absorption of water by the spread of tillage, it should make an appropriate home for followers of "the Desert Creed." But, as the Moslems are not mainly Chinese, there must be serious risk of racial as well as religious friction.

Values of Rivers. What ought to be the one great influence, the river which drains this area, has a minimum of control; for it drops nearly 2500 feet merely in crossing Kansu. But it follows a route which graved deeply—in its meridional trough—into a vast block of carboniferous sandstone that is rich in salt and iron as well as in coal; and it offers certain reaches as frontiers, *e.g.* between the Ordos and north-eastern Kansu and north-western Shansi. At the same time the uselessness of the main stream here must increase immensely the value of any tributaries that are not equally turbulent, *e.g.* the Wei and the King, the Lo and the Fen, especially when they follow—without any "Ordos" detour—the general seaward trend of the main stream, as illustrated by the relations of Kung-chang and Ping-liang to Lanchow. That the "Castle" river is the natural line of least resistance here is proved by the endless flights of goose and heron and snipe up and down its valley.

Kansu Saddle. The Kansu saddle has difficult relief and a hard climate, and is separated from the Wei valley by passes of 10,000 feet and from Shensi generally by the water-parting between the Ma-tien and the Lo. But it is the natural gateway to the West, and dips southward as well as northward, to Sze-chwan as well as to the Hwang-ho valley; and the local supplies of coal will facilitate the construction and the working of the proposed railway.

Products. The hard climate has great extremes, summer temperatures rising to 104° F.; but there is abundance of loess and of water where the relief is most favourable, *e.g.* round Lan-chow and Ning-sia. The natural food staples are millet and beans, but there is a wealth of vegetables, including rhubarb, and of fruit, including even the walnut. The area is, however, specially devoted to tobacco—of a very mild type; and there is so little available arable land, and both soil and climate suit the tobacco so well, that there is always a lack of bread-stuffs, which are imported from farther *west*, *e.g.* Sining and Liang-chow, Kanchow and even Suchow. This lack might easily be remedied; but the isolation, the "desert" environ-

ment, and the Moslem attitude to agriculture—even for tobacco!—have kept the province backward.

Shensi, "West of the Pass" (*i.e.* Tung-kwan), as we have seen, worked southward for both strategic and economic reasons—to command the Tan and the Tung routes across the great divide of the Tsinling; and the Han valley, though very nearly a *cul-de-sac* and really in Middle China, supplied Sian with a direct link to Wu-Han *via* the Tan and a natural link to Chengtu *via* the Tung and the Kialing. The development of the province and its relations were southward rather than westward. **Shensi.**

It seems better, then, to subdivide our main unit into two—the upper and the middle basins of the Hwang-ho. The upper basin pivots on Lan-chow, and deploys on the Ning-sia "horn of Kansu," with the river of some commercial use—inside the Great Wall, and in the lee of the Ala Shan; in the middle basin the southward reach of the great river has been historically neither useful commercially nor dangerous politically—as the southward feeders of its Wei tributary have been; and the part that should have been played by the main artery, has been played by the Lo (as really the river of Yen-an) and the Fen. The actual line of movement has been the Wei valley, with its objective—like that of the Lo and the Fen—Tung-kwan and not Sian. At the same time, the province, as a unit, pivots on its old and present capital of Sian, and deploys on Tung-kwan, as the province of Shansi pivots on its present capital of Tai-yuen, and deploys on its old capital of Ping-yang. Each of the three provinces, then, may be reasonably considered a minor natural area—a large block containing a fertile basin that centres on a fortress-market. **Regional Divisions.**

Shansi

From the Great Plain the Tai-hang crest looks sufficiently Alpine to justify the title of "Western Mountains," if not the suggested interpretation of *Shansi* as "West *of* the Mountains"; but the province is a typical piece of the Loess Plateau, differentiated only by a relative infertility and an immense wealth of minerals, especially coal.

For 500 miles the Hwang-ho gorge (111° E.) makes a natural frontier to the province westward, and south of the "Five Peaks" the Border Heights of the Tai-hang mark it off with equal clearness in the east; and the parallel 38° N. divides it, as we have seen, near Tai-yuen, into two approximately equal "halves," the western flank of the Grid in the north and the great block to the south, which is graven deeply by the Fen in accordance with the trend of the Grid, S.W.–N.E. This divides the plateau of South Shansi from the mountain-ribbed basin of North Shansi. **Two Units.**

The Name. The suggestion that *Shansi* may mean "West *of* the Mountains" is perverse rather than persuasive, for it implies that the mass of the province is not *shan*, and that the Tai-hang are real mountains and not merely typical Border Heights. Neither suggestion is acceptable. Indeed, the rest of the province deserves the title better than the Tai-hang, for it includes not only a 200-mile stretch of the Tsinling, but also half a dozen of the Grid ranges—Hwang-hwa and Ku-lu, Yun-chung and Man-tou, and even the sacred "Five Peaks" of the Wu-Tai, amongst the wild gorges and crumpled ridges of which is the most sacred and most frequented shrine in the world of Mongol Buddhists. These peaks are within both the Great Wall and the Inner Wall.

Mineral Wealth. Cross-river traffic in the Hwang-ho gorge is, and seems always to have been, purely local; and access across the Tai-hang is very difficult except at two points. In the east the Tao valley carries the railway *via* the rich coalfield of Ping-ting,—which justified, and even provoked, its construction—to Tai-yuen ("the Great Spring"), a welcome spot for the capital of a drought-stricken plateau; and in the south the Tsing valley carries the railway to Tze-chow ("Marsh-land"), a name which must have turned the thoughts of Chinese geologists to the suspected presence of a coalfield. The presence here of an iron-field which has put out the largest supplies and the best quality of ore produced hitherto in China involved only a short haul—mainly by canal—to the Han-yang iron and steel works.

Agricultural Poverty. The rough relief makes communications difficult, and minimises the area available for tillage; and, even where the relief is not unfavourable, and where irrigation is possible, the horizontal strata and the extreme porosity of the loess make the waste of water so great that the cost is quite prohibitive. The useful tracts, therefore, are more or less confined to the narrow floors of deep valleys that are fed by perennial streams; and much the best of these is a series of rich beds along the line of dried-up lakes that are threaded together by the Fen. Like Kansu, then, though for a different reason, the province does not—cannot—feed itself[1]; but here there is solid compensation in the form of the mineral wealth.

Trade. With relatively small possibility of wide agricultural development, the people have been more or less forced into trade, and have acquired almost a monopoly of the carrying-trade in southern Mongolia; and the occupation has been particularly congenial to the considerable sprinkling of Moslems in the province. Besides the old Imperial road from Peking to Chengtu *via* Ping-ting, Tai-yuen, and Ping-yang, the great Central road from Wu-Han *via* Ta-tung to Kalgan and the Lama capital of Kwei-hwa-ting also goes through Tai-yuen; and the rich salt-beds of the south-

[1] But it does supply itself with tobacco, cf. p. 614.

west, especially round the Wu-sing and Yenchi lakes, are actually beside the area of best food-supply and most man-power, *e.g.* at Ping-yang, as well as beside the Great Road.

Ping-yang *v.* **Tai-yuen.**

The balance of power in the province has shifted in the course of centuries. As long as nearness to Sian, the capital of Eastern China from 1122 B.C. to A.D. 1127, was the great asset, the Fen valley was supreme; and the provincial capital remained at Ping-yang, which is at once one of the holiest cities in China and one of the oldest cities in the world. But, when nearness to Peking became more important, the capital moved to Tai-yuen, where the "Great Spring" seems to refer really to the extraordinary concentration of *30–40* streams in the little basin round the city which makes the great elbow on the Fen. The wealth of good coal at Ping-ting is increasing still more the importance of Tai-yuen.

The Coal.

The wealth of coal is the distinguishing feature of the whole province. We have already noticed the Sui-yuen and Ta-tung fields along the northern railway, and connected them respectively with the edge of the Grid and with a typical basin in it; but the essential structure of the Grid persists beneath the plateau, and includes the great bituminous coalfield of the Fen basin. Indeed, south of the Tai-yuen elbow both sides of the Fen valley are lined with coal, specially below the meridional Ho-shan divide. This marks off the western flank of the horizontal strata of the bare plateau, in which the coal is anthracite.

The flanks of the province are as well provided with coal as its two ends. The left bank of the Hwang-ho from Pao-teh-chow to the Lung-men gorge seems to be almost continuously underlain with coal; and, if Pao-teh may guide us, it is of very good bituminous quality. At Pao-teh it actually crops out on the river-bank, and the lie is almost as convenient in the south; where the river swings westward, the coal is farther away from the river, *e.g.* below the well-named Wu-*lu*-shan ("Five *Stoves* Mountain"), for it clings very closely to meridian 111° E.

Early Mining.

Coal has been used in China, even for smelting iron, since A.D. 1111, though till recently modern methods had not spread beyond the reach of the two great railways from Peking—to Hankow and Shanghai; but the preference had been given to anthracite or to very friable bituminous coal that could be easily puddled up into briquets. The reason for this was that the fuel was needed most for warming purposes in winter, for which an absence of smoke was naturally most desirable; and this accounts for the great number of quarries and mines worked in the various fields that are marginal to the Great Plain, with its dense population and its bitter winters. Obviously, the *best* bituminous coal was left almost untouched, and the distribution of the mineral was so wide, especially along the flanks of the "Eastern Moun-

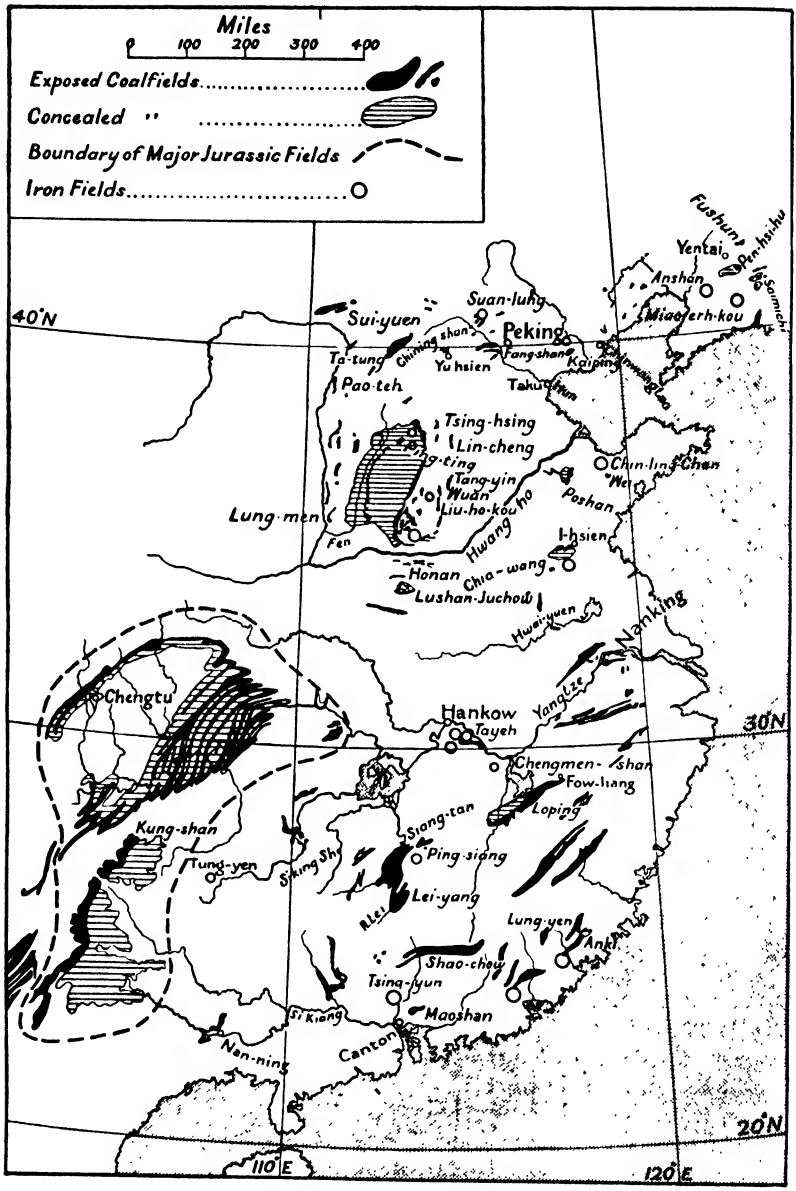

FIG. 120.—Coal and Iron in China.
[Based on Smith's "Coal and Iron in China."]

tains " and the " Western Mountains," that there was little or no trade in coal.

Iron. At the same time, the presence of innumerable small workings gave great encouragement to the development of local iron-fields—so much so that the people perfected a method of smelting with anthracite. The distribution of the richer iron-fields—from Yu-hsien *via* Ping-ting and Wu-an to Chin-cheng—is peculiarly convenient for access to the parallel series of coal-fields in the Tai-hang piedmont—from Tsing-hsing *via* Liu-cheng and Tzu-hsien to Tang-Ying ; and the Wu-an field is certainly within easy reach of the fine metallurgical coke of Liu-ho-kou.

Shensi

Frontiers. Though Shensi has natural frontiers eastward and westward in the Hwang-ho gorge and the Ma-tien *v.* Lo water-parting, it is somewhat incoherent between the Great Wall and the Ta-Pa-shan ; but it is a mistake to emphasise this relative incoherence, for the northern division drains systematically from the marginal Lu-kwan-ling, and the Han valley is almost as much isolated from Szechwan and Hupeh as from the rest of its own province, even its exit to Hupeh being through the series of gorges below Yang-hsien.

Historic China. The province has been more closely linked than any other with the story of China and the Chinese. It contains what is believed to have been the original area of national characterisation, and for several thousand years has been the bulwark of the nation against the barbarism of Central Asia. The city of Sian was—under many names [1]—the most important city in China from 1122 B.C. to A.D. 1127, being actually the Imperial capital during many of those centuries ; it is the most important archaeological centre in China ; it claims to be the best fortified city in the country and the only one that has kept its fortifications in complete repair. In the Moslem outbreak of 1868 it held out successfully against a two-years' siege ; in the Boxer troubles it was again the Imperial capital. It has always been the most important road-junction in China, for the Wei valley carries both the Imperial road—for Lhasa, and the trans-continental road for Samarkand and the " Lands of Sunset."

Geographic Background. The geographical background of this lies in the interaction of relief and location. Shensi has much more lowland than the "Western Mountains " and much better rainfall than the " Dry Place " ; and so relief and climate are very favourable to agriculture—for hardy crops. It is also, as a whole and north of the Tsinling, much more deeply covered with loess than either Kansu or Shansi, especially

[1] Kwan-chung (" Middle Pass "), Wei-nan (*i.e.* on the south bank), Nin-shi, Yung-chow, Kwan-nui, Yung-king, Gan-si. It was known to Marco Polo as Kenian.

in the north and the west. In the north the extension of the Grid coalfield is often hidden beneath 1000 feet, sometimes beneath 1500 feet, of loess; and the Wei enters the province through a 600-foot gorge in the loess.

Agriculture and Trade. The province has been, therefore, specifically agricultural, growing very large crops of wheat round Chow-chin and Mei; and the Keepers of the Gate have generally had an assured supply of food and man-power for the opportunities and the responsibilities of their work—keeping *an*[1] (" peace ") in *si* (" the West "). These, too, have demanded, and seem to have favoured the development of, a fine human type—virile, enterprising, and not afraid of responsibility; and the city of Sian has been one of the greatest trade-centres in Asia, handling an immense variety of products, but specially tea and silk (even from Chekiang)—destined, before the Great War, mainly for the Russian market. Either its industrial importance has declined since the days of Marco Polo, or he underrated the amazing extent of its trade.

***Land* Trade.** It was all land trade, too. Even the Wei is not navigable above Sian, where the King brings in the waters of the Hwan and the Ma-tien; and it seems rather curious that the little port of the city should be called Hsien-yang, the " *Sea*-limit." In any case, except for its cotton—which is abundant and good, especially in the King valley—the trade was not a bulky one; the local products were mainly opium and furs, and the transit was mainly of tea and silk.

Crops. Cotton is now occupying nearly all the land once devoted to opium, but the one staple product is wheat, of which very large crops are raised; millet and barley are also important, and pulse and tobacco are widely spread. Of course,—here, as elsewhere,—the loess is too porous to be cultivated on steep slopes without terraces, and it is impossible to irrigate on the upper levels of the plateau; but these are precisely the levels which enjoy the best rainfall, and—given good rain—most of the crops will mature perfectly even at 8000 feet. Everywhere the grim February dust-storms renew the surface-soil every year, but they greatly increase the burden of the rivers. Indeed, the amount of " silt " in the King has been actually recorded as high as *46 p.c.*, and it is always too great to allow of any ordinary storage, in reservoir or otherwise.

Roads. Access to these high levels is not as difficult as it might be thought, for the loess is perfectly firm—hard enough for wheeled traffic—even on quite sharp crests; and the only serious difficulty is in the deep gorges, which do make the land incoherent, and which provide in the north innumerable caves—natural or artificial—for unwelcome intruders from beyond the Great Wall.

The only centre north of the Tsinling which is of any real

[1] The great fortress that commanded the approach from the north *via* the Fen valley to the Lo valley was Fen-*an*.

importance except Sian, is Tung-kwan, at once a fortress and a great commercial centre. For the gorge is so narrow that the city commands it entirely—for military, commercial, or administrative purposes. Of course, it was too far south of Peking, and the detour round the Tai-hang elbow was too long, for it to attract the Imperial road; but the first section of the Trans-continental railway, from its twin termini in Tientsin and Shanghai, is already within 50 miles of it, and it has always been the central point for three very important cities—Sian, Ping-yang, and Lo-yang. **Tung-kwan.**

The Han valley in Shensi is so much isolated that it has been a little world to itself, with its racial sympathies with Sze-chwan rather than with Shensi or Hupeh. Hanchung has been the natural capital of it, as Hingan has been its main outlet, though the navigation on the lower reaches of the Han is very difficult and dangerous. The number of little tributary valleys has encouraged a corresponding variety of products, mainly of good value in small bulk or weight, *e.g.* drugs and feathers, paper and paint. The main valley is, however, very fertile, and is devoted to the staples—wheat, rice, and cotton, the grain specially between Han-chung and Chengku, where population is densest, and the fibre specially between Chengku and Yang. **Han Valley.**

From the 9000 feet of the Liu-pan Pass a glance reveals the unfortunate difference between the essential slopes of Shensi and Kansu; for the latter drains northward and not southward, and so turns its back on any possible rainfall. The loess, at least in the north-eastern quadrant of the province, is as deep as in most parts of Shensi; but, in the absence of effective precipitation, it is useless. Even the pools of water left by the infrequent rains are apt to be brackish—north of the Tsinling. Like Shensi, however, Kansu spreads southward across the Tsinling into the forested Kialing basin, where the people—as in the Han valley of Shensi—are really Szechwanese, and include very few Moslems. **Kansu.**

In great contrast to this southern area, the north-western part of the province may almost be described as a waste of snowy heights (Nan-shan) and sandy flats (Gobi), divided—along the Great Road—by a belt of walled oases and fortified farms; and Sining is the key to the heights, as Liangchow is to the flats, while Lanchow stands on the Great Road. The population is too small and too poor to have taken advantage of the road beside which they have lived. Even at Lanchow and Ningsia the rainfall is seriously below 20 inches, while temperatures range from zero to over 100° F. There has probably *not* been "reckless destruction of forest here"—any more than elsewhere on the Loess Plateau; for loess is not the home of forest. But it is impossible to estimate how much of the poverty is due to wars and their legacies, *e.g.* from the Tanguts or **Towns.**

Jenghiz Khan or the Moslem rebels ; certainly, Ningsia has suffered from all three. Lanchow, in its fortified rock-basin, has suffered rather less, and its position on the Great Road made it a natural collecting centre for Sining, Epo, and other markets for wool and hair ; and it has forwarded a fair quantity of Tibetan products. When the railway reaches it, its little coalfields will become really useful.

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(2) THEICHMAN, *Travels in North-West China* (1921) ; articles in the *Geographical Review* (by CLAPP, 1920–1922 ; FULLER, 1922, FULLER and CLAPP, 1924),—in the *Geographical Journal* (by WILTON, 1917 ; and TOMS, 1923),—in the *Annales de Géographie* (by LEVAINVILLE, 1925).

CHINA.—V

CHAPTER XXXIV

SOUTHERN CHINA

ALL the rest of China may be regarded as an outward flank of the Nan-shan, but it is divided naturally into three areas—an inland plateau in the west, a coastal highland in the east, and a long ribbon of river plain in the centre; and it is better to keep them separate.

(1) *South-Western China*

The Plateau.

The " Yunnan " plateau is a very distinct unit, which does not seem to belong naturally to either Middle China or South China, though it drains to both the Yangtze and the Si, but which may be isolated as definitely South-western China. For it is a high block of limestone, pure enough in places to have a typical Karst character, with few streams, but numerous *dolinas*; and quite a considerable portion of its frontier faces foreign countries, Burma and Siam, Annam and Tongking. The capital of the Yunnan province, Yunnan-fu, is 2000 miles from Peking, and even an Imperial " express " took 100 days for the journey.

Access to Yunnan.

The relations of Yunnan to the western approaches to China have been very similar to those of Kansu (p. 538), and the province has suffered in a similar way from " Wars of Religion," and even more seriously from racial troubles; but greater isolation from China has prevented its main line of access from continuing to be a great thoroughfare. This isolation is, of course, mainly due to the physical conditions; but the effect of these has been exaggerated by the " political " conditions. In the first place, the province is too large for its population. No doubt, the size of the three western provinces, as determined by the Emperor Kienlung, had real value and importance at the time (A.D. 1750–70); and Sze-chwan, though much the largest, has an adequate population. But both Kansu and Yunnan have been decimated by war, the 16 years of the

Moslem rebellion (A.D. 1856–72) having cost Yunnan nearly 10,000,000 lives; and, though it is the second largest province in China (*c.* 150,000 square miles), its population now is probably not more than 10,000,000.

Relations of Yunnan.

Of this total, too, not more than 50 p.c. can be considered as really Chinese; and the various bodies of Shans and Lolos, Musus and Miaotse, are not only alien in type, *e.g.* Siamo-Burmese, but quite incoherent, and their geographical conditions are much more favourable to their relations with Burma and Siam and French Indo-China than with the rest of China. The city of Yunnan is actually reached by the French railway, which in the Namti valley "cost a life for every sleeper"—by disease; Tali is not 200 miles from the British rail-head at Myitkyina, and Momein (Teng-yueh) is only 100 from Bhamo. Though it is no longer possible to trace the actual course of the story, prehistoric China seems to have owed a heavy debt to the relations of the Yangtze across Yunnan with the Irawadi, the Mekong, and the Songkoi; certainly, rice and the water-buffalo, on which the rice-culture so largely depended, came to China from India.

N.W. Horn.

The province is also incoherent in itself. In the west it is purely Indo-Pacific in character, dominated by the deep valleys and the mountain margins of Salwin and Mekong and Kinsha. The "north-western horn" of this is the old kingdom of the Musus, with its capital at Li-kiang; and, in the critical bottle-neck of 97°–100° E., it has enough rain to be a fine cattle and sheep country and to be well forested (pine and spruce).[1] But it is wild mountain to the latitude of Tali (25° N.), where the Salwin and the Mekong begin to draw apart, and the lowered relief allows easier movement east-and-west *via* Yung-chang and Teng-yueh. But even here the average level is above 6000 feet to within sight of 600-foot lowlands on Irawadi and Salwin and Mekong, where the caverned[2] scarp looks like a vast staircase dropping to a gulf; and Tali and Kien-chwan are great *fur* markets.

N.E. Horn.

The "north-eastern horn" of the Lolos, with its immense wealth of metal—especially the gold-bearing copper of Tung-chwan, the zinc of the Kung-shan coalfield, and the silver-bearing lead of Chao-tung,—has its easiest access to markets in Sze-chwan; but that access is by the Heng valley and not by the Upper Yangtze gorge, and practically the whole of the rest of the province drains southward—most of it directly southward—into the valley of the Songkoi, which rises near Tali. This is actually the case as far west as the longitude of Tali, though only south of the road from Tali to Yunnan-fu.

[1] The forest is largely snow-fed, heavy snow falling generally by the very beginning of September.

[2] Many of the caves are inhabited, with a drop of 1000–2000 feet at the door.

Drainage.

This southward and south-eastward drainage differentiates Yunnan proper from Kweichow, with its northward and north-eastward drainage; and this is not the only difference. The two parts of this "Yunnan" plateau have much in common, especially in structure, but may be distinguished in relief; for the political frontier roughly divides the unit into two areas of different altitude—the much larger western area averaging above, and the smaller eastern one distinctly below, 6000 feet. In the extreme south and south-east the level drops to not much above 4000 feet, *e.g.* at Kai-hwa and Kwang-nan; but the average of the whole, which varies from 6000 to 9000 feet, is probably ± 6500 feet. And yet the mis-interpreter of *Shansi* as "West of the Mountains," who should have been consistent enough to translate *Yunnan* as "South of the Clouds," goes out of his way to assert that this wind-swept plateau is a "Cloudy South"!

Topography.

The surface of the plateau is very rough and broken, the two conspicuous features being gorges and basins. The gorges are sometimes very deep and very unhealthy, but contain riverine strips of very fertile soil and an unfailing water-supply, while the homes of the goitre-cursed cultivators—hundreds of feet above—seldom have a rainfall of more than 36 inches, a very small supply in latitude 26° N. The basins are small, encircled by heights that deserve to be called mountains, and often centring on small lakes or *dolinas*; and this is really the differentiating feature of the province, so that—like Sze-chwan—it is a basined plateau, only with a multitude of small basins instead of a single large basin. Fully 40 p.c. of the population, including all the Chinese, can be found in these basins. The "natives" are on the rougher parts of the province—"the Miaotsze on the real heights, the Lolos on the hills, and the Shans in the gullies."

Towns.

Practically every important centre in the province lies in such a basin. The two central cities of Yunnan-fu and Cheng-kiang stand at the opposite ends of the Kun-Yung (Tien-chi) lake—at a height of only 6400 feet, but set in an oval of heights with wooded piedmonts. Its central position justifies the choice of the place for the capital; and, though it is 100 miles from Tung-chwan, the French railway is maintaining its importance as the chief copper market of China. Even on or near the railway all the chief centres have a similar setting. Mengtse, the chief outlet of the whole province and the local market for the rich Kotchin tin, though within 30 miles of the head of navigation on the Songkoi, stands in a little (20 × 12 miles) mountain-girt basin at a height of *c.* 4400 feet; and the centre of the neighbouring Linan coalfield stands in an exactly similar basin, though a trifle nearer to its lake (*-tse*), at a height of over 5200 feet. Tali, the historic *entrepot* between Burma and Sze-chwan, with its beautiful Erh-hai lake—almost exactly the size and the shape of

Loch Lomond,—is so much shut in that it is scarcely accessible except by two defiles, directly north-west and south-west of the lake—a "Glen Falloch" and a "Strath Leven."

Food. The food-supply is sufficient for the small population, and the distribution of the staples is typical; rice is more or less confined to the lower and larger plains in the south-west, with their better rainfall, *e.g.* round Teng-yueh (Momein),—though that town lies in a typical mountain-girt basin,—while maize, the world's one natural plateau grain, is the common staple elsewhere. In spite of the opium regulations, the poppy is very widely grown; and in the far south some of the finest tea in the world is grown, on the Puerh hills, at a height of about 5000 feet.

Climate. The mountains and the lake hills seem all to have been once well forested outside the limits of the pure limestone; and this is only what we would expect in an area where the rainfall is well distributed, if not usually or in most parts very heavy, and it accounts for the volume of the streams in winter. Certainly, our view of the climate should be based on full consideration not of isolated statistics, but of the significant fact that the plateau was probably the original home of the maize plant, which still grows wild. Almost everywhere the rainfall is 35–40 inches, Yunnan-fu having *c.* 39 and Linan *c.* 36.

Mineral Wealth. But the special importance of the province must be found in the great mineral wealth, especially in metals—*e.g.* the copper of Tung-chwan and Hung-chow, the tin of Kotchin, the antimony of Kwang-nan. Coal is widely spread, and is of much use locally for domestic purposes; but it is of poor quality, and is found in thin seams. Even the smelters of ore have preferred to strip the scanty supplies of wood to using the coal in any form. But, owing to the rough relief, the infertile soil, the inaccessibility of the region, the effects of religious and racial wars, the population is so backward—as well as scanty—that industrial development even now must be confined largely to exploiting the metal resources.

Kwei-chow. Kwei-chow bears somewhat the same relation to Yunnan as the Han valley bears to Sze-chwan, even owing its original Miaotsze people to its western neighbour; but, while the main trend of the feature-lines, whether ridge or river, is south-eastward in Yunnan, in Kweichow it is north-eastward, giving the first suggestion of what is to be the fundamental character of south-eastern China.

At the same time the proportion of mountain in the province is small, being practically confined to the frontier belt of the Nan-shan; and the mass of the area is plateau, marked by the same kind of hill-fenced basins as mark Yunnan, though the hills are more of the sugar-loaf type, and once were well forested. The lower levels, with their higher temperatures and their gentler gradients, allow of

much accumulation of water,—marsh rather than lake,—which makes the province a hotbed of virulent malaria; and there is enough fog to have earned here such a name as "The Cloudy South," though there is as much fog in the Sze-chwan valley to the north, from which it would have been named. This endemic malaria has been one cause of the small population, but there have been increasing racial troubles between the Miaotsze and the Chinese, and the province suffered badly from the spread of the Moslem rebellion from Yunnan in 1861. The infertile soil has also grudged a good food-supply, though the plateau has suited maize,—the least nourishing of cereals suitable for human food; and, in the part of the province that drains into Kwang-si, the useful Chinese element was wiped out during the Taiping rebellion.

Mineral Wealth.

As in Yunnan, then, the destiny of the province and its development must rest on the mineral wealth; and, as in Yunnan, this is great and varied. In fact, it seems as if only the mineral wealth could have given the land its name of *Kwei-chow*, "the Rich Region." It is rich specially in mercury, which is distributed along the divide[1] between the Wu and the Yuen valleys from Sze-nan *via* Kwei-yang to An-shun and even southward across the Nan-shan water-parting towards Hing-yi. As the "cañoned Wu" is navigable to Sze-nan, the mercury tended to find a market in Sze-chwan —in exchange for salt.

The Yuen.

The Yuen, however, is much the more valuable river to the province, because it maintains the north-eastern trend steadily; and so the ancient Yunnan road followed it to its head near Kwei-yang, and all the products—specifically *forest* products—of the province converged on Chen-Yuen, "Yuen Market," *e.g.* tallow and wax, camphor and silk, wood-oil and varnish. On this eastern margin, too, both the main stream and its tributaries carried gold, especially in the copper-field round Chen-Yuen and the iron-field of the neighbouring Tung-jen. Even southern centres like Li-ping and Tu-yun preferred the Yuen route to any across the precipitous scarps down to the Si valley, really the nearer market.

South China

"The Plains."

South China is an arc of narrow and intricate highlands that enclose a narrow *Kwang-tung* ("Eastern Plain") and a still narrower *Kwang-si* ("Western Plain"); and the narrow western plain, with its fence of broader plateau-like highland, resembles the floors of the deep Yunnan valleys, while the broader plain is overlooked by the peaks and passes of the Nan-shan and parallel ranges, *e.g.* the Kailung-shan. But both the plateau and the ranges are

[1] In nearly horizontal beds of magnesian limestone, the richest one (nearly 3 p.c. of mercury) being at Yuan Shan Chiung (cf. p. 561).

greatly dissected. Available lowland for crops must, however, be limited, and we may expect to find forest and mineral wealth relatively important. But the land is at least semi-tropical and only semi-Chinese, so that vegetable products may be very varied, and government may be very difficult, especially in the forested highlands.

Hu-kwang

There was an old province here called Hu-kwang ("Lake Plain," *i.e.* delta swamp), which seems to have been practically limited to the Pearl delta, and there are two or three references in old Chinese books which have been interpreted to mean that Kwang-si and Kwang-tung were named from their positions, respectively west and east of Hu-kwang. But this is not what the Chinese themselves understand by the names to-day; and, if the interpretation is correct, it is curious that rather more than half of "East of the Delta" is actually *west* of it. Kwang-si is only the *upper* basin of the West river.

Kwang-si.

The economic axis of the double-plained valley hangs from the Tropic, and there is one large river, the Si ("West"), which is navigable for 800 out of its total course of 1200 miles; but it is not the main artery, it lies—except for a few miles near Sun-chow—wholly south of the Tropic, and it does not represent the physical trend of the province as the western half of the "Nan-shan" arc. It is, therefore, probably not the main stream; and, in any case, continuous navigation is ruined, as on the Yangtze, by rapids and gorges in its middle course, where it is cutting through the limestone. This is what is alluded to in the local saying that "There are 100,000 hills between Nan-ning and Wu-chow" (*c.* 300 miles); and the Ta Tan ("Great Rapids") and Pan Tan ("Slab Rapids") are really dangerous—because of the limestone ridges or "slabs."

Si-kiang.

But the province was obviously named from the Pearl delta; and, though there are bad rapids above the Treaty Port of Wu-chow, the river is easily navigable up to Sun-chow, *i.e.* the confluence with the Wu. Above the confluence the southern waterway is navigable much farther than the northern,—the latter being navigable only to Tsien-kiang, while the southern is more or less navigable to the Treaty Port of Lung-chow on its Tso feeder and up to the Po-se-ting[1] coalfield on its Yu feeder, with no rapids in the 250 miles between Po-se (640 feet) and the new provincial capital of Nan-ning (380 feet), though the water is shallow. On the other hand, between Sun-chow and Tsien-kiang the Wu receives what is really the most important waterway in the province, the Liu, itself navigable to above King-yuen and with its Ping and I-kiang tributaries also navigable, the latter almost to the Hunan frontier. Unfortunately, the Liu, like the Wu, led up directly to the Miaotsze, "the Wild

[1] The names are interesting as showing that the godparents were from Nan-ning, and were probably Shias; for Chinese would not have called the *northern* Yu ("Right-hand") and the *southern* Tso ("Left-hand").

Men of the Wilderness"; and this was probably the main reason for the neglect of the main stream of the Si-kiang.

The Wild Men are now much less wild, especially since the regular development of their *kwei-lin* ("cinnamon[1] forest"), which gave its name to the old provincial capital of Kwei-lin; and the Cinnamon river is actually connected by canal with the Siang, giving as easy access from Wu-chow to Wu-chang as there is from Canton to Nanking, but a route too far west to have been politically important for an "Ambassadors' Road." It is probably going to be very important industrially for the transport of Hunan coal to Canton, and this would aid the development of the tin and the tungsten round Fu-chwan; but there is a large coalfield in the Yu-Tso basin above Nan-ning, stretching from Chenan and the head of navigation at Po-se-ting to Taiping and the head of navigation at Lung-chow, and this field may be a strong competitor for the Canton market. **Coal.**

The forests contain valuable timber as well as spice (mace, anise, cinnamon, etc.), and the slopes that they cover seem to be rich in metal—tin and copper, gold and silver, the silver especially in the Kwei basin. The river-flats grow fine crops of cotton, especially the Wu-Ni reach and the main valley between Tsien-kiang and Sun-chow, where it is associated with a large output of cane-sugar. Ginger, camphor, and ramie are also special products. The commercial capital of Wu-chow is much the most important centre in Kwang-si, as a Treaty Port on the actual frontier and at the natural point on which all the activities of the province converge. Steamers drawing not more than 8 feet of water have always been able to reach the port below the confluence of the Wu, and the river could easily be regulated to take quite large vessels. Even now Wu-chow does sufficient foreign trade for its competition to be noticeable in Canton; but it is subject to such fierce and sudden floods that either of its rivers, when in flood, may dam back the other effectively. In June 1908 the joint river rose 60 feet in 8 days; and in July 1915 it was very nearly 80 feet above the winter level. **Wu-chow.**

Although Kwang-tung (*c.* 100,000 square miles) is only about one-third as large again as Kwang-si, its population (*c.* 38,000,000) is more than three times as large; but there are obvious reasons for the difference, far the most important being the entire monopoly of the sea-coast—including Hai-nan—even where that clearly should belong to Kwang-si. If Kwang-tung has itself lost Macao, Hong-Kong, and Kwang-chow to foreigners, it has reaped an abundant reward from their owners; and four of the five Treaty Ports are literally sea-ports, Canton and Swatow, Pakhoi (for Limchow) and Kiung-chow (in Hainan), while the fifth, Sam-shui, is on tidal water. **Kwang-tung.**

[1] Much of it is really the inferior cassia.

Coast. The coast is much articulated—with nearly a score of fine bays, *e.g.* Bias Bay, the best of them well protected by islands from the Wet Monsoon and nearly all of them with protective highland to windward, making splendid fishing-grounds (for turtle, etc.), and the basis of very valuable salt and coral industries; but the excellence of Canton and its neighbours has prevented any of these being developed except Swatow—in the far-eastern corner of the province, with its inevitable monopoly of the fertile Han basin behind it. The maritime activity—peaceful and otherwise—of the Cantonese, their readiness to emigrate, even their gift for handling poles (for sedan-chairs or well-lifts), can scarcely be divorced from the character of their coast. It is no accident that the city has a "Temple of the *Ocean* Banner."

Delta. A large proportion of the province is mountainous, and reckless destruction of forest has left the crystalline ranges stony and bare of all except the mulberry avenues of their piedmonts; but the valleys and the delta are very fertile, and the river-system is normally admirable for transport and irrigation. Indeed, the ease with which nearly all parts of the province can be reached by river or canal has been very adverse to other means of communication, the problem of *bridging* the water-net being practically insoluble. The tropical heat and humidity, too, however unfavourable to human health and comfort, are very favourable to vegetation—rice and sugar, fruit and vegetables (mulberry and melon), ginger, etc.; and the ubiquitous swamps, if they "breed dysentery," are a paradise for ducks.

Mineral Wealth. There is a great variety of mineral wealth, including mercury and marble; but development has been largely confined to the (accessible) basin of the Pei,—tin and tungsten in the west, specially round the butt of the Nan-shan on which the three provinces meet, and coal and iron in the east, specially the Shao-chow (Shiu-chow) and Mao-shan coalfields. Considerable quantities of iron-ore are mined between the Mao-shan coal and the head of the Pei lowland at Tsing-yun, and feed the great iron and steel industries at Fatshan; but the Shao-chow field is much the larger and the richer, producing good bituminous coal of sound coking quality, and it is on the direct route to the Meiling Pass *via* Nam-yung. It is mainly the ease of procuring good coal—as well as abundance of silk, wild and domestic—that accounts for Kwang-tung having 75 p.c. of the steam filatures in China; and this makes Canton really a more important silk-centre than Shanghai, though between them they monopolise the export of silk, *i.e.* the most important of all Chinese exports.

The Roads. If the name of the province led the Portuguese to call Sheng-Cheng ("the City of Perfection") Canton, the city has made Europeans more familiar with the name of the province than with that of any other province of China; and, if for 400 years Europeans have associated the city with the Meiling Pass and the Ambassadors'

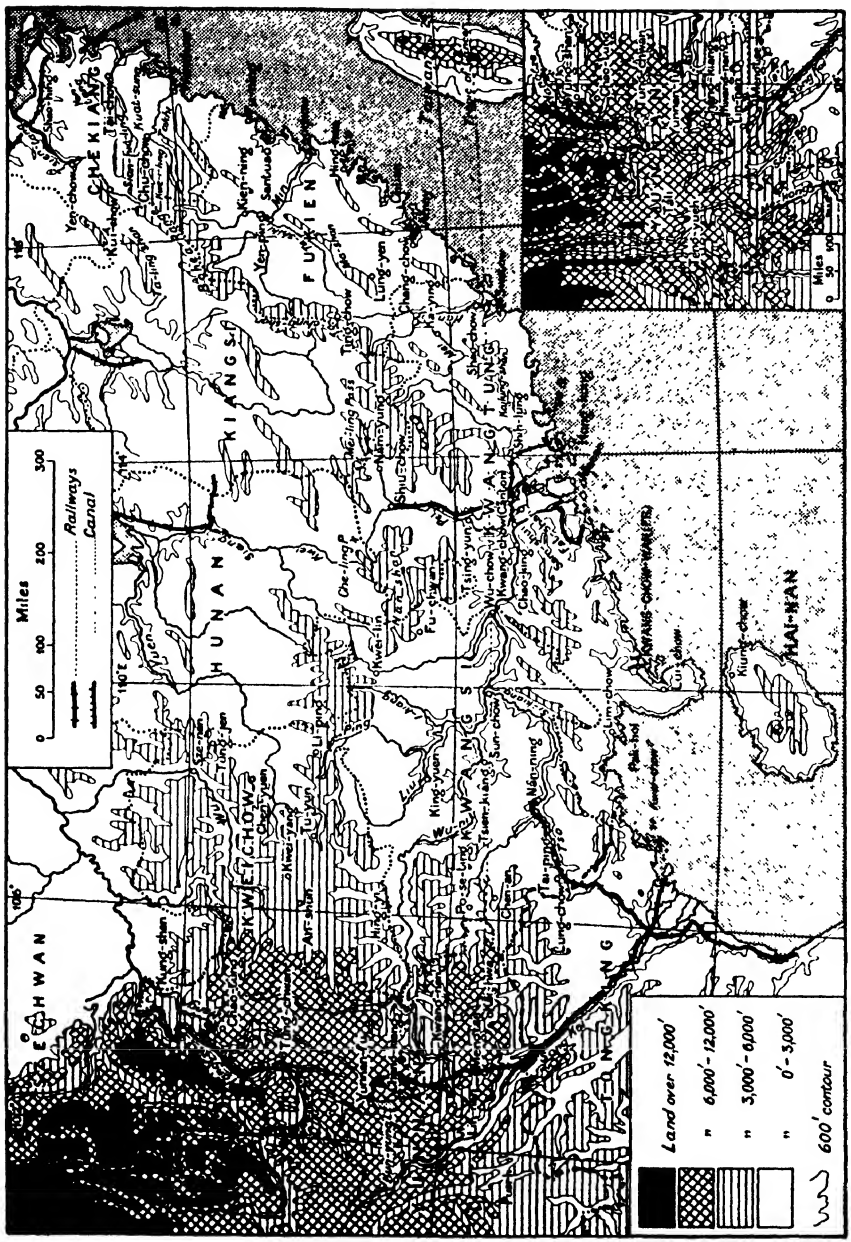

FIG. 121.—Southern China: Relief and Place-Names.

Road, in the immediate future they will be associating it with the Cheling Pass and the Commercial Travellers' Railroad. The completion of the line will give a route, almost as direct as the meridian beside it (113° E.), between the Pearl estuary and the Tungting lake; and it will be a route between the *natural* capital of China and the harbour nearest to Europe.

The Rivers. A glance at the river-system suggests at least some geographical background for the history of the city and its port—at a point with remarkable facilities for movement by both land and sea. For the Pearl River is a veritable "Humber," with Whampoa for its Hull. The two great rivers are the *Si* from the "West" and the *Pei* from the "North," and the third is the *Tung* from the "East"; and the real apex of the delta is at Sam[1]-shui ("Three Rivers"). They combine in a long embayment which covers 5000 square miles of banks and channels, with 1200 linear miles of "distributaries," 800 of them artificial—really canals and not channels. The submerged valley shows typically steep hills overhanging the water, as in the Hu-mun ("The Tiger's Gate"), which the Portuguese translated into *Boca Tigre* ("The Tiger's Mouth"), for English sailors to corrupt into *Bogey* or *Bogle*; and the varied relief of the old valley-floor is shown in a great variety of depth in the water-way—from 20 to 100 feet.

The Port. Though the port is in the same latitude as Calcutta, and the same distance from the sea, it has a much better climate, and its estuary was naturally much better. It is blanketed by no Himalayas, and has direct acquaintance with both ice and snow; and the Macao passage gives free access to the *cool* current of the Monsoon to cleanse and refresh the city, so that 38° F. and 100° F. are extreme temperatures. And, though large vessels cannot go above Whampoa ("Yellow *Bank*"), a fraction of the money that has been spent on the Hugli would have made Canton equally accessible. In the meantime, however, Canton is as much inferior to Hong-Kong for the foreign trade as the old capital of Chao-king is to Canton; but its importance

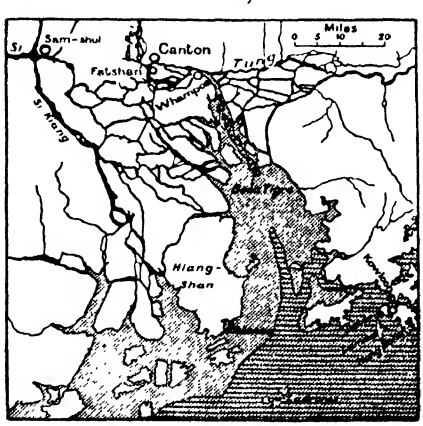

FIG. 122.—Canton Delta.
(Sea between 5 and 16 fathoms ruled)

[1] This spelling is certainly wrong, but the busy trade (in fans and China-grass fabrics) seems to have led to the substitution—by English sailors—of a word with which they were familiar, *Sam*, for the correct *San*.

as a city has paralysed the growth of towns in the immediate hinterland except where they may be regarded more or less as suburbs, *e.g.* Fatshan (really *Fuh*-shan), with its iron and steel works, its textile industries (cotton, silk, and matting), and Shih-lung, with its sugar industry; and the whole weight of the focus is commercial rather than industrial.

The Pei. The Pei has been for many centuries—and still is—the most important river in China for its size—200 miles long, with both its head-streams navigable nearly to their source, and that source respectively in the neighbourhood of the Cheling (under 1200 feet) and the Meiling (under 1000 feet) passes, large junks being able to reach Shiu-chow. The one defect is the tendency to flood very rapidly after occasional "cloud-breaks," *e.g.* in 1915, when the flood drowned 60,000 persons.

Macao. Macao was the natural point for early European visitors to choose for a post and a port, commanding the approach to Canton from the south-west; and the little peninsula which makes the harbour, is joined to the Hiang-shan island by a very narrow isthmus. But the little hills (300 feet), though leaving the town open to the S.W. winds and with a rainfall of less than 70″, leave it badly exposed to both the monsoon and the typhoons. It is pleasantly associated with memories of Camoens, and unpleasantly with the very questionable character of its trade. Lawlessness is even now the main obstacle to traffic on the West river.

Hong-Kong. Hong-Kong (*Hiang-Kiang*, "Sweet Rivers"), as its name might suggest, is—unlike its neighbour (*Sha-men*, "Sandy Flats")—a hilly island of crystalline formation. Its bare wind-swept heights lie at right-angles to the Wet Monsoon, and their crest rises above 1800 feet in Victoria Peak, which must have a rainfall at least twice as heavy as that registered at *c.* 100 feet above sea-level to leeward in Victoria City (*c.* 90″); and it is a land of numerous clear streams, some of which work down to windward into magnificent bays that are sheltered by the smaller Lamma island, *e.g.* Deep Water Bay and Tytam Bay. Farther seaward, Stenhouse Peak (above 1100 feet), like Victoria Peak, has been a famous landmark for sailors, and lent itself to operations which the Portuguese suggested by naming the little archipelago the Ladrones ("The Thieves")—a name which need not be limited to the islands at the south-east corner of the estuary. Indeed, the multitude of hilly islands and the maze of creeks have provoked smuggling and piracy over the whole area.

The Port. In 1930 Hong-Kong was the third port in the world. It is a place of great natural strength on one of the busiest ocean routes, and its commercial importance is at least equal to its strategic importance; for vessels of more than 5000 tons cannot reach Canton. The roads between Victoria and Kowloon are at most scarcely more than

a mile wide, and at the Ly-ee-mun Narrows only a quarter of a mile; and, except in "the deeps" of these narrows, there is good anchorage everywhere, but specially along the four miles in front of Victoria (5–9 fathoms). The excellent water-supply, especially from the Tytam reservoir, the windy exposure, the great variety of both temperature [1] and rainfall, make the place much more healthy than might be expected in a city in which the *mean* density of population is *80,000 to the square mile*. It is this density that has actually involved the island (= Hayling) in some shortage of water; and water is now procured across the strait from the Shing Mun hills of the New Territories.

Lui-chow. The extreme west and the extreme east of the province are mere annexes, the one really part of Kiangsi and the other really part of Fukien; and the Lieu-chow (Lui-chow) peninsula and its "hinterland" are so much isolated that the Kwei-chow island was the headquarters of the pirates in the Tongking Gulf and the refuge of the Hakkas ("Strangers," really half-caste Chinese). The only claim that Pak-hoi (properly *Peh-hai*, "North of the Sea," as *Hai-nan* is "South of the Sea") has to be a Treaty Port is as controlling the export of the famous "star" aniseed; and French interests in the Gulf—including one in *anisette*—prompted the acquisition of Kwang-chow-wan.

The Han. The Han basin is a little world to itself, centred on the city of Shao-chow, with a number of little towns in the valley, especially between Shao-chow and Ka-ying. In spite of typhoons the climate is good, and great crops are raised of sugar and tea, beans, oranges, and pine-apples. There are thriving industries, especially sugar-refining in Swatow, bean-pressing (for cake) in Shao-chow, and the manufacture of grass-cloth, from the local pine-apple fibre and the imported Taiwan hemp, in Ka-ying.

Swatow. Swatow, as its Chinese name shows (*Sha*-chow), was just a little village—probably a fishing-village—on some "Sandy Flat" 5 miles up the Han river; but that was far enough for some protection against the typhoons, there were 16 feet of water even at low tide, and the Han basin was both very fertile and densely peopled. The easy access for pirates and the dense population encouraged slave-raids, which bred a fierce hatred of all foreigners, and tended to keep the population up the river. As the raids ceased, the surplus population had to emigrate, and Swatow is now one of the chief emigrant ports in Asia; and much of its trade is concerned with shipping such local products as tea and grass-cloth to "Hanites" in the East Indies and Malaya.

[1] Ice has been recorded at sea-level—in January, and the year's rainfall occasionally is below 60 inches.

South-Eastern China

This region is treated here as a belt of folded mountains, which lie in parallel lines that trend S.W.–N.E., and so present a full face to the S.E. monsoon and open valleys to the N.E. monsoon. Its crystalline ranges shed rain quickly, and there are hundreds of clear rivers—generally rather short, and the spurs of the marginal ranges supply dozens of good harbours. **Folded Mountains.**

The Han river, like the Pei in Kwang-tung, flows due south for 200 miles from the Ta-chin heights above the Fukien city of Ting-chow; and its Mei tributary is a perfectly typical longitudinal stream, flowing *north*-eastward for 100 miles from its source on the *coastal* Kailing range of Kwang-tung. The basin is, therefore, as admirable an introduction to this region as the northern part of Chekiang is to the Yangtze delta.

As maximum heights are along the inner margin of the area, it has been distinctly isolated from the rest of China; and the isolation has been a disadvantage as well as an advantage, but at least the Taiping atrocities never reached most of it. The survival of old racial types, old languages, and old dress is a response at once to the isolation and to the power of the region to support its own population. Perhaps the wise preservation of forest reflects an appreciation of its protective value as an additional barrier landward and of its constructive value to sea-farers. **Isolation.**

Far more than half the total length of river in the region is longitudinal, following the S.W.–N.E. trend of the folds, and the Alpine character of the ranges involves numerous cols, which allow the interior waters to be collected in a transverse river that cuts its way through the outer folds to a highly articulated coast. If security and fertility made Fukien a "Happy Establishment," these right-angled sweeps on the rivers made it—as well as *Che-kiang*—a "Bent-River" province, and its *Min* river is a crawling "Snake." **Incoherence.**

Fukien is at once essentially mountainous and essentially maritime, and the mass of it is included in the basin of the Min. The Fu-tun-ki may be regarded as the head-stream, flowing almost due south from the western end of the Bohea (Wui) ranges—with their 70 odd inches of rain—to Yenping, where it is joined by the Nui-si from the north-east and the Ta-shi-ki from the south-west. On the seaward flank of the Ma-shan smaller rivers flow parallel with these, respectively from the north-east and the south-west, to feed the Min. But, though the rainfall here is 60 inches, none of these is navigable; and even below Foo-chow the Min itself flows over so many "ridges" that it is navigable only by small native boats. The same is true of the Amoy river, though even 35 miles upstream a bridge—built entirely of granite monoliths!—of 800 feet is needed to span it at **Fukien.**

Chang-chow; but, as with all the other coastal rivers, its floods are very high and very rapid.

Products. Though the pace of these at high water is very fierce, the coast has a series of fine and beautiful harbours, *e.g.* Chuan and Hing-hwa, and the strong currents have helped to train the cleverest fishermen and sailors on the whole coast of China. The familiarity with the sea, the dense population of a peaceful area, and the steady decline of the tea-trade—with the recurring droughts and famines (every 8–10 years) that are so difficult to explain [1]—have combined to favour here too a strong tide of emigration, especially from Chang-chow; but there was emigration (to Formosa) as early as the seventh century. Kien-ning and Shao-chow still have an important trade in the real black "Bohea"; but more attention is being paid to forest products in the mountains and to sugar and oranges in the valleys, the oranges being equal to those of the Han basin, *i.e.* probably the best in the world. There may be development on other lines, for the province contains three coal-basins, running for some miles along the longitudinal valleys of the Amoy hinterland, *e.g.* round Lung-yen (good anthracite) and Anki (bituminous).

Amoy. Amoy, another great emigrant port, has the advantage of being on an island, with an admirable anchorage to leeward and easy access to this coal; but, as it was the most important of all the black-tea ports, its trade was declining even before China surrendered to Japan the Fukien possession of Formosa (Taiwan), the source of much trade for Amoy. Funing, at the other end of the coast, is also a Treaty Port; but it is really of less use than the island harbour of Santuao, on the sheltered Sansa Bay.

Foochow. Foochow, too, is of more importance as the capital than as a Treaty Port. It stands fully three miles from the river, and even then vessels usually have to anchor three miles down the river—at Pagoda island,—and large vessels can scarcely come within 20 miles of it; but it has a fortified hill (500 feet) behind it, and there is an arsenal on Pagoda island. A large "floating population" lives on the river, over almost the whole 35 miles up to Foochow; and here there is another of the remarkable bridges—on forty granite monoliths—"The Bridge of Ten-thousand Ages" (? the twelfth century), from Chung-chow, "the Middle Island," to the north bank of the river, joined even here by a 50-mile stream from the *south*-west.

Che-kiang. Though Chekiang is the smallest province in China, not much larger than Ireland, it is divided into two very different regions by a range to which we may give the general name of Ta-yu-ling ("Great

[1] Perhaps a theory, which has not yet been worked out, may—with due apology for its incompleteness—just be mentioned. The vital factor *may* be the relation of the cyclonic to the typhoon track *in winter*, causing a failure of the all-important winter-rains. The temperate cyclones have a very marked track that hugs the southern flank of the Himalayas and the Nan-shan, from Peshawar to Hong-Kong; and the tropical typhoons are working north at right-angles to this along the Formosa coast.

Stack Ridge "), even if parts of it are known by local names, *e.g.* Kwei-i-ling, Sian-hia-ling, Yen-tang. It is simply the continuation of the Wu-i, or Wu-yi (" Bohea "), range of the Ta-chin system; and its 4000-foot crest makes a clear divide between the basins of the Tsien-tang, or " Hang-chow river," and the Takhi, or " Wen-chow river." The folded system is depressed to the north-east,—to show a higher crest, 50 miles out to sea, in the little Chusan archipelago. Chusan (" Ship Mountains ") itself is a very hilly island, with a fine harbour in Ting-hai; but the currents through and round the archipelago are very fierce, and only men tired of struggling with the Chusan currents or with the 15-foot bore in the Hang-chow Bay would have called their *ria* refuge Ning-po, " Peaceful Wave."

Drainage. The Kuatsang and other coastal ranges enclose some wonderful sounds and bays, *e.g.* Nimrod Sound and San-men Bay (" Three Doors " Bay, though only two of them are important); but the commercial focus is so definitely northwards that most of them are simply collecting-grounds for floated timber or the scene of the great salt-industry of the province. All the rivers here are actually navigable or very useful for floating timber. The whole seaward, or south-eastern, division of the province is essentially mountainous, but the ranges sink seaward as well as north-eastward, often not exceeding 1200 feet; and a large proportion of the river-system is longitudinal, the transverse valley of the Takhi below Chu-chow not being much more than one-third of the total length of the river.

North-west of the Ta-yu-ling divide the scene is very different except in the upper basin of the Tsien-tang, and even there the river is navigable to Kui-chow (Chü-chow) and Kin-hwa; but the innermost range of the system—the Ta-ling (or Makin, or Lung)—makes a real divide between Chekiang and An-hwei, while the whole area north of Yen-chow and Ningpo belongs to the delta and lake plains of the Yangtze. The empoldered coastlands produce quantities of rice and silk, but gave easy access for the Taiping armies.

Ningpo. The forested hills produce very fine tea, and can be terraced to their crests (Tai-chow = " Terrace City "), and their valleys are as beautiful as they are fertile; but the decline of the tea-trade prevented recovery from the devastations of the Taiping rebels, and the ancient glory of Wenchow has quite passed away. Only Ningpo has real vitality, and is making progress. Some 15 miles up its *ria*, with 27 feet of water even at low tide, it is a first-rate harbour; and, though only 100 miles from Shanghai, it can hold its own in foreign trade. This is due partly to its industrial development, especially in textiles—silks, cottons, and the straw-plait (hats) that is associated specially with Shao-hing; but the walls of the *ria* provide fine stone that is easily quarried and as easily shipped, and the *ria* is the base of a very important fishery (largely cuttle) and a busy salt-industry.

A Postscript

True to Type. A summary of the geography of China may suggest that the country is of great interest to the geographer both as inhabited by a people with a very strong geographical sense and an entire absence of political sense, and as reflecting very clearly some of the main characteristics of Asia; for the continent seems to have imposed something of its own isolation, monotony, and incoherence on the Chinese. They are markedly self-contained as individuals and as a group; though there are "local differentiations"—mainly amongst the Nan-Man or "Southern Barbarians"—there is so much uniformity that Haddon[1] says that as a whole they may be regarded as the *average* type of the Yellow Asiatic; and their curious lack of any sense of political coherence is very significant.

"Average Yellow-man." This estimate of them may be restated, and a comparison may stress what is typical of this Average Yellow man. They seem to have the intelligence, the industry, the persistence (*e.g.* to a polished technique in art and craft) of the lank-haired Roundhead; they seem to lack the imagination, the initiative, the individuality (*e.g.* in politics and literature) of the wavy-haired Longhead. If this is so, it seems probable that the appropriate form of government for them in the meantime—as for all typical Asiatics in their present stage of development—is an enlightened tyranny; it must grant and guarantee personal freedom and equality of opportunity to the individual, but it must guide and compel. But any attempt to organise on Western lines will almost certainly fail—unless and until the people have unlearned the lessons of 4000 years.

Family Incubus. For such a people political freedom is not an end, still less an end in itself; the one great end is posterity, and—to ensure that—one family *must* enrich itself at the cost of all other families, as families and as fractions of the State. The ethics of Confucius imposed some check on family greed, but American Mission education seems to be—for such a people—the worst possible substitute for their old "Classics" and for an ancient civilisation which certainly has some points of superiority over the American system. It seems obvious that their one great need is to get rid of family self-determination and to acquire a sense of nationality; until they are a National State, they cannot behave as a National State, any more than they can grow wheat on the Pearl delta. The Throne at least did not disintegrate them, and a strong Throne would at least own all the armies in the land.

[1] Haddon, *The Races of Man*, pp. 30 and 85.

This may seem to be approving of a petrifaction of the stagnation; but the "push" of a New World is quite unsuited to an ancient people, who had a rich Late Neolithic culture in the core of China (Yung-Shao and Sha-Kuo-Tan, in Honan) 2000 years before Christ. But Professor Giles' *Anthology* shows that, even in their poetry, a thousand years have been as one day; the technique of the lyrics was faultless 4000 years ago, but the minds of living poets have not made one lonely year's progress. **Stagnation.**

The same is true in other aspects of life, *e.g.* agriculture. Without any normal aid from beast or machine, they have worked their land in such a way that most village-districts have a density of 1000 to the square mile, and most of the cultivated area produces enough food from the square mile for 3000 persons—in parts of Chekiang for 6000; but the methods are 3000 years old, even on more or less recently reclaimed land.

Further, altitude, rugged relief, persistent drought, set more than half their land beyond the possibility of use for agriculture; and half of the remainder is not devoted to the crops best suited to it. The yields per acre are certainly magnificent compared with some American yields, *e.g.* for rice, but contemptible compared with some European yields, *e.g.* for wheat; and the scanty *per caput* consumption in China, compared with that in Europe and America, is a consequence and a condemnation of this rather than an excuse and a compensation.

Much of the blame lies with the monotony of the environment, the lack of opportunity for initiative and experiment. They have no forest to speak of, no pasture worth mentioning; the pastures are on soil-less mountain sides, and they are soil-less generally because of the reckless destruction of the original forest. Apart from inaccessible corners, *e.g.* in Hunan and Kwei-chow, only the tea-provinces have shown any sense of the value of forest; and the pigs and the poultry, as largely in Europe, are fed on what might make useful food for man, and return—the pigs probably about $\frac{1}{10}$ and the poultry about $\frac{1}{14}$ of the value to man of that food. **The Cause.**

Nature, too, has not been kind in other respects. Considerations of height, soil, water-supply, may allow rice to ripen in Kansu, but prohibit tea-growing in the Hwang-ho basin and sugar-growing north of the Yangtze course except in the Red Basin. Even for crops that can be grown normally in the North, there is always risk of flood or drought,[1] and the most that can be said is that, at all normal levels in all normal years, at least one bread-crop is reaped from the loess—wheat, barley, millet. The Centre is much safer, and shows much more variety; its facilities for trade increase its power of exchange, while its forests can offer products in constant **Annual Croppings.**

[1] The famine of 1877–78 is said to have caused the deaths of 8,000,000 persons in the four north-eastern provinces (Shansi and Chihli, Honan and Shantung).

demand, *e.g.* wood-oil and lacquer, tallow and wax; and it even practically guarantees two crops a year. In the South (and South-east) there is no drought, and there is no winter; even "tropical" crops can be grown outside the tropics; some of them are of supreme quality, *e.g.* oranges and tea; and three crops are expected every year. Quite generally, the chief work and the perpetual function of agriculture is production of rice; but that has to face increasing competition from wheat,—which should be all to the good,—and from cotton. The demand for the cotton comes largely from the Shanghai–Hankow–Tientsin triangle, and has drawn under cotton the neighbouring lands, *i.e.* those where the conditions of agriculture are most favourable.

Emigration. The cost of repairing the ravages of flood and famine has fallen on people impoverished by brigandage and decimated by civil war, or disheartened by the calamities and pledged to parentage. The natural sequel is steady emigration, emigration to fertile lands, and the nearest and best of these, if not the only one suitable, is—Manchuria. And that must be the sequel, for in a land so densely peopled no industrial development can really help; and the reason is *not* that the industrial and commercial development has been almost a monopoly in the hands of foreigners, but that there are too many millions of mouths to feed.

Modern Industries. The old objections to industrial development on modern lines are no longer prohibitive, and the attitude towards that had moved even before 1914; but, when European imports ceased, China had to make things for herself, even modern machinery, and to finance existing schemes, even her railways. But her mineral resources, compared with her area and her population, are certainly *not* of greater value than in some comparable areas elsewhere; and, though probably the *best* of her great wealth of bituminous coal is almost untouched, coal has been mined or quarried for many centuries. At the same time, most of the working is very easy, with almost no drainage problems, and the best fields have easy access to water-carriage; but Hanyang has such advantages in access to ore, fuel, lime, labour, and markets, that its experience is no guide to probable developments elsewhere.

Hong-Kong. The fundamental point at issue can be simply illustrated by the history of Hong-Kong as a "settlement" granted to foreigners *in order to isolate* them from the rest of China. For this purpose a rugged and barren island, inhabited only by a few fishermen, was as suitable a place as a fœtid and wholly uninhabited marsh was for a Concession at Shanghai; and in 1842 the Chinese boasted of how they had tricked the Barbarians into an island prison that was worthless. Yet they knew quite well how, from the second century, sea-trade from the west had been moving its objective nearer and nearer to Canton, till in the eighth century the Arabs narrowed it

down on to Canton, and had kept it there for 800 years. It spread up the coast—to Chuan-chow (replaced by Amoy), Ningpo, Hang-chow; but the Mongol conquest in the thirteenth century reversed the current *via* Wen-chow to Canton. Apart from all its strategic and purely commercial importance, Hong-Kong is to-day the only free market for silver in the Empire.

Extra-Territoriality.

These were the conditions under which "extra-territoriality" commenced in China, and it was no more an "anomaly" there than it had been in Europe, *e.g.* for Turks in Spain (1784) and in Malta (1809), or has been for Italians in Ethiopia (1889). In opening Kalgan to foreign trade *before* the War, the Chinese Government declared that the opening of such ports had "resulted in benefit to all," but that "all the ports had been in the south and east, while the north and west of the Great Wall had been neglected, *and so* trade had languished, and progress been arrested" (Jan. 8, 1914); but it was added that all open ports were *not* Treaty Ports, and that it was the sole right of the Government to draw up required regulations!

Treaty Ports.

But the trade at the open non-Treaty Ports has been very small compared with that at the Treaty Ports, and the reason has been that the latter were chosen for their geographical advantages, and were given stability and credit by foreign control. The foreign control did "diminish Chinese sovereignty," but the localisation "restricted trade" only because the ports were restricted to "the south and east," not because foreigners had Settlements and Concessions, and controlled the trade. Probably, the only vital mistake that the foreigners made was in pressing long lengths of "*through*" railways, when what was really needed was a number of short lines between good waterways, or where there was no proper waterway, as between the Red Basin and the Lake Basin.

The blame should rest on the right shoulders. No country should be expected, or should even be asked, to open its doors to foreigners who claim exemption from its jurisdiction; but any foreigners who have been allowed to enter it are not to blame for such a country being unable or unwilling to enforce law and order, and are entirely right in securing adequate protection. That *may* mean the protection of others as well. The population of the Foreign Settlement in Shanghai, in the 1925 Census, was about 840,000; and of these fully 810,000 were Chinese!

CHAPTER XXXV

Dependencies of China

(Past and Present)

The Great Wall.

The Great Wall was the concrete expression of a statesman's realisation of the lure which the pastoral nomads of hungry steppes found in the fertile gardens of rain-blessed loess ; and yet, none the less, it scarcely fulfilled its primary purpose. But it did a big work, and it taught a bigger lesson. If now and then the few could raid southward with success, why should not the many press steadily northward with greater success ? And the sequel is " writ large " —over the 2,750,000 square miles of steppes and deserts, of sand and snow, in Central Asia.

This needs attention from both the continental and the Chinese standpoints ; and, if it is essential not to overrate grossly the importance of the size of the empire, it is equally essential not to underrate the importance of its character. So, too, if we may minimise the value of desert as an economic asset, we must give it full value as a political barrier.

" Australia " in Asia.

Nothing could be more typical of Asia, as a continent, than this sprawling domain—an area nearly as large as Australia, with a larger proportion of useless surface, and—excluding Manchuria [1]—with a smaller population. The economic significance of the whole should be judged from its population ; and, if—for various reasons —we treat Manchuria separately, the total is less than that of Norway, not half that of Portugal, just twice that of Northern Ireland.

The mere statement of the fact reveals its significance. Pastoral nomadism may earn poor returns, but it needs relatively few hands, and even demands a huge area ; gardening may give a large return off a tiny area, but it is expensive in labour. Geographical conditions here made it easy for China to penetrate, *e.g.* by the oasis

[1] Manchuria, which is rather larger than New South Wales, but rather smaller than South Australia, has 22,000,000. The country is treated separately in a later chapter because of its immense International importance, and the impossibility of analysing that without previous reference to Japan and China.

towns of the Jade Gate, but almost impossible for her to hold. Her surplus people were gardeners, not herdsmen, and wanted tillable soil, not pasture; they might persist in little groups on the oases, but could settle *en masse* only in Manchuria and in some parts of Zungaria.

Mobility v. Resources.

During the past 1000 years the numbers of the nomads have certainly not increased, and have probably decreased; mobility was not everything, and was almost nothing if there were no reserves. The struggle was ultimately as much an economic one as the Civil War in the United States was. If the mobile raiders lost 100 men on some stricken field or outside a city wall, they were literally decimated; but, if the sedentary tillers lost 1,000,000 by flood, as they did from time to time, the loss was literally not perceptible or even a relief. The only permanent advantage that the nomads enjoyed, except their mobility, was their unity under one leader, who knew exactly what he wanted.

Jade Gate.

The single geographical point of greatest interest is the natural meeting-place of the clashing forces—the Jade Gate. The name implies a road, and a divided road; and it is in our critical longitudes, the most westerly at which the Wet Monsoon can approach the Heart of Asia. The name Kansu is equally significant. No area 300 or 400 miles farther west could be differentiated by such a *proper* name, for every one of them is a "Dry Place"; what attracts attention there is the *presence* of water and not its absence. This means that here is the actual Gate between Arcto-Atlantic Asia, with its leagues of lonely steppe, and Indo-Pacific Asia, with its teeming tilth.

The only vital need is not to overrate the relative virility of the raiders. A quite definite sequence of famines extending over many centuries had so far eliminated weaklings that the average Chinaman, whether emigrant or not, was,—as he is now,—a person of great constitutional sturdiness; and the surplus who emigrated into Central Asia, came specially from Northern China, with its severe climate, and were often accustomed to work out of doors in winter at 7000 or even 8000 feet on the Loess Plateau.

Sinkiang

Russia v. China.

The general geographical conditions of Eastern Turkestan are so similar to those of Western Turkestan that it is useful to compare them—with the direct intention of emphasising differences; and the reason for this is that the more favourable geographical conditions are precisely in the region where the ruling Power has had almost as keen a geographical sense as the Chinese, and a political sense to which the Chinese are—and will be for centuries—total strangers.

Elements in Common. Both areas contain two main, sharply differentiated elements—a mass of high land that in both structure and relief is real mountain, and an expanse of what is relatively or positively low land; and the mountains drop so steeply to the lowland that the passes are all high —the important ones being common to the two regions, the Kizil Art (*c.* 14,000 feet) and the Terek (*c.* 12,700 feet). The great peaks, too, in both regions attain about the same height (± 23,000 feet), Khan Tengri and Kaufmann; and in both the low land drops below sea-level, into the Caspian and the Turfan depressions—though the town of Turfan itself is 250 feet above sea-level.

Points of Contrast. Even this mere outline suggests two points of difference between the two regions. As Russian Central Asia is more than twice the size of Sinkiang, the contrasts of relief in the latter are much more glaring; and, while in Russian Central Asia the mountains are only marginal, in Sinkiang the mighty Tian Shan system cuts right across the northern half of the Dominion, and isolates — at a maximum distance from China—the only large area of fertile lowland. Eastward, too, the work of the Tian Shan is taken up by the Chol Tagh ("Desert Range") and Kuruk Tagh ("Dry Range").

Zungaria *v.* Serindia. This Zungarian lowland is comparable with the Balkash plain, both having a mean height of ± 1000 feet, though the Ebi Nor basin is only *c.* 800 feet; but it is the only part of the Chinese area that can be called pastoral, while fully 40 p.c. of the Turan basin is so. There are oases at the northern foot of the Tian Shan, *e.g.* Barkul and Urumtsi; but they are commercial rather than agricultural centres,—they are much higher than the Turan oases, even Kulja standing at *c.* 2100 feet and Urumtsi being above 2800,—and they in no way diminish the hostility between the Zungarian herdsmen and the Tarim gardeners. In general, then, over all the habitable part of Russian Turkestan the pastoral and the horticultural are side by side and on relatively friendly terms; but in Chinese Turkestan they hold quite separate belts of territory, and are more or less natural enemies.

Climates. Again, both the regions are very similar in the general character of their climates and the effect of this on their river and lake systems. In both no river can reach the ocean; most rivers have lost, or are losing, tributaries once of good size; lakes are drying up, or are already dry land; and, therefore, great changes in the topographic detail are going on. The essential cause in each case is the absence of rain—both as influencing the *régime* of the rivers, and as implying an absence of humidity, which involves terrific extremes of temperature. The Lower Syr, in the latitude of Bordeaux, is usually frozen for fully 120 days in the year; Tashkent, in the latitude of Naples, has a maximum range of nearly 120° F. (− 10° F. to over 108° F.); and, as we have seen (p. 75), the air is so dry that the control of temperature by elevation is reduced to a minimum.

We have postulated (p. 92) an increase of range eastward, and so are prepared for greater extremes in the Chinese than in the Russian area. The Lower Tarim, in the latitude of the Lower Tagus, has a mean midwinter temperature *c.* zero, and its midsummer mean (typically in *June* [1]) is *c.* 90° F.; and where Cherchen faces the N.E. *buran*, midwinter temperatures fall to − 26° F. There is a difference of 4000 feet between the heights of Yarkand and Lukchun; but the minima are practically the same, − 4° F. and − 4·5° F., and the maxima are 102° F. and 109° F.

Rivers. It has already been suggested (p. 78) that the southern half of Sinkiang may reasonably be called the Tarim basin, even if there are hundreds of streams which do not reach the Tarim, as there are hundreds in the Turan basin which do not reach either the Amu or the Syr. But the mere fact that there is only one great river in this basin, while there are two in the other basin, may be associated with the position farther eastward, and the Tarim basin may be taken as a microcosm of the vast Afro-Asiatic dry belt,—the climax as well as an epitome of certain apparent processes of secular desiccation in the Old World.

World Features If this World relation had been kept in mind, we should have made fewer mistakes about both the processes at work and their practical results. For the Afro-Asiatic dry belt may itself be called abnormal—but only in one sense, not the other. The typical features and phenomena of it are precisely what we would have expected as the normal consequences of what may be called the abnormal conditions. Nothing that is normal in other parts of the belt may reasonably be called abnormal in this part. For instance, the movements of the Tarim have been much less extensive and less spectacular than those of the Amu—moving from the Caspian to the Aral Sea; and the fall in the level of Lop Nor in the nineteenth century was trifling compared with the rise in that of the Caspian in the seventeenth century.

Fluctuations. Further, if historic fluctuations of this kind elsewhere have been conclusively associated with irregular fluctuations of climate, it seems venturesome to deny that there have been—even "*can* have been"—similar fluctuations here, and to assert that "the lakes here are not drying up,"—that "any changes in Lop Nor *could never* have had anything whatever to do with the three constant sources of supply (the Cherchen, Konche, and Tarim), as these have *never* decreased in volume,"—that "there is *no question* [2] of any advance or retreat of glaciers on the watershed."

The nearest parallel, in location and in the type of problem, is in Western Turkestan; and the differences in the fundamental con-

[1] On the Lower Tagus the midsummer mean is delayed till *August*, and only reaches 70° F.

[2] The italics in this quotation are *not* in the original.

Turan v Tarim.

ditions are not great enough to invalidate the lesson learned there. Whatever the limits of atmospheric inflow, and whatever its sources, the Kun-lun and the Tian Shan present their leeward faces to the Tarim basin, while the containing ranges in Turania present their windward faces to the Aral basin; and, while the Aral rivers rise on the same watershed,—the Syr no farther north of latitude 40° N. than the Amu is south of it,—the three great feeders of Lop Nor have sources far apart, the Tarim and the Cherchen 600 miles apart —on the Karakoram and the Kun-lun, while the Konche rises in the Yulduz core of the Tian Shan.

It may prove presently to be of further importance that in both basins the Tian Shan is much the more important watershed; and so even its minor streams, *e.g.* the Aksu and the Kucha, may be really important, certainly more so than the minor streams of the Kun-lun, *e.g.* the Khotan and the Keria.

Movement Eastward.

In any case, however, there is a further distinction between the two basins. For movement eastward in the Turan basin means movement nearer to the main source of water, while in the Tarim basin it means movement farther from it, so that the area nearest to China is precisely that in which life is hardest—with the *buran* at its fiercest, the range of temperature greatest, the river-load of silt heaviest and so able to work most mischief, and the level so low and dead that the effects of flood are worst. And these conditions prevail in a region where everyone who opens up new land gets free seed and exemption from taxation for three years, so that there is tremendous encouragement to desert old settlements and open up new ones every three years. Of course, it is literally true that "there are fair patches of pasture" in the area, but they are negligible; and any move can be—and nearly always is—to a place where there are reed-beds, and reed-beds actually with the advantage of not having been used, or at least not used recently.

Turan *Data*.

With these precautions we can look to Russian experience for light on the problem. Below the Kopet Dagh and the Hindu Kush the Russians had a very similar position; and their masterly survey and analysis of it were not restricted to local or even to regional phenomena. They found that the terminal oases (comparable with Loulan) suffered more than the lateral ones (comparable with Tikkenlik), and that everywhere there tended to be economic retreat up-stream for one or both of two reasons—change in the course or the behaviour of the rivers and change in the number or the needs of the riverine tillers (cf. p. 239).

River Changes.

Changes in the course of the rivers were due mainly to heavily-silted flood—either a breach in the banks or the deposit of an immense quantity of the silt causing the change of course; changes in the behaviour were due mainly to antecedent changes in the precipitation or in the temperature on the watersheds. All the

rivers were, in the nature of things, extremely erratic; and their seasonal and secular variations were proved to be of great magnitude. But the rivers here are longer, and have larger basins, than those in Western Turkestan—apart from the Amu and the Syr; and what was found normal there must not be over-emphasised as abnormal here. For instance, the Lower Tarim, where it is again called the Yarkand,—*not* the Kashgar,—has evidently been choked with silt in recent years in such a way as to block the Chong Köl,[1] which was at once and consequently diverted eastward into the Konche—to reform the Kuruk and promise resurrection for Loulan; and it was perfectly normal that the first sign of the change should be given in the *autumn*, *i.e.* when the summer flood had deposited the "last straw" of the silt, and the cultivators were no longer taking off water for irrigation.

Economic Changes.

The changes in the number or the needs of the population were due occasionally to "accidents" of plague or war, sandstorm or saline efflorescence, but mainly to normal economic development; and they were in some ways *more* complex than the other changes. For instance, down-stream people whose animals had been decimated by disease turned to agriculture, and needed half-a-dozen times as much water as before; or up-stream people who had had some good seasons, wished to extend their tillage,—as has been the case very widely round Yarkand recently—at the expense of down-stream users of the water, for there is no cropping apart from irrigation. In any case, everywhere settlements were apt to be deserted, and fell into ruins; but the failure of water-supply did not necessarily mean failure at the source, even though there was at times great variation of supply from the source.

Main Tarim Factors.

If we approach the Tarim problem in the same open-minded way, not anxious either to affirm or to deny climatic changes, or to press a single and rigid cause for all dead forests and dead reed-beds, derelict towns and derelict fields, the fascination of the problems remains equally great, and their geographical interest is much increased, specially with regard to the relative importance of the main factors. In the orographic system these are, of course, the Tian Shan, the Kun-lun, and the Pamirs; in the hydrographic system they are the Yarkand, the Aksu, and the Konche.

Pamirs *not* One.

In this connexion it seems important not to overrate the Pamirs, as has been done lately; for they contribute almost nothing to the Tarim. South of Muztagh-ata the Tashkurgan is the only stream of any real importance flowing eastward, and it rises in *Kashmir*; and the "Stone Fort" that was the capital of the ancient kingdom of Sarikol, takes its toll of the waters before they plunge down through Shindi into the Yarkand. North of the Tashkurgan no permanent streams reach the Yarkand till the Kizil or Kashgar;

[1] Colonel Schomberg dates this as "1923, or more probably 1924."

and during the flood-season it contributes practically nothing to the Yarkand, and often *does not reach it at all.* The overwhelming proportion of the Yarkand comes from east of the Shimshal Pass, mainly from the Rimo glacier—as the Raskam; and, though old Kashgar (Su-lek) was on the Tuman, the overwhelming proportion of the Kashgar river comes from east of the Kizil Art, *i.e.* from the Trans-Alai and the Terek ranges. The contribution from the Pamirs is negligible, another reason for *not* calling the basin Kashgaria.

Kashgar. The over-emphasis on the Kashgar river is probably due to the great importance of the city, the place-relations of which are very much better than those of Yarkand or any other centre in the basin. No doubt, in the earliest days conquest, commerce, and culture alike moved along the southern "links" between Inner and Outer Scythia; for the Oxus (Amu) was the great artery *via* Bactria and Sogdiana—Marco Polo's route. It is almost certain that the silk trade originated with the Tokharians, or Yue-chi, who would have preferred to hug the Iran parapet; the Wakhan finger and the Little Pamir gave a relatively easy approach from the west; and all the habitable part of the Sarikol area (kingdom) was to the *south*, *e.g.* the Taghdumbash pamir.

Yarkand. Probably, too, in those early days the route continued along the foot of the Kun-lun; but, once traffic began to move regularly along the southern foot of the Tian Shan, Kashgar became the one supremely important junction, and the northern route became definitely the commercial route. So long, then, as Europe was more important than India as a market, Kashgar was more important than Yarkand as a junction. But, simply as an oasis, it cannot compare with Yarkand, which is the richest in the whole Tarim basin, and which always monopolised the most typical of all the trades, that in jade; for the famous nephrite deposits are mainly to the south-west of the city. The two cities are most alike in altitude, Yarkand being just below and Kashgar just above 4000 feet; and that is about the height of all the oases in this western section of the basin.

The Watersheds. Before attempting to describe the typical or the exceptional features of the region, we may sum up the relations of watershed and waterway in a general statement about the mountain watersheds and their physical history as watersheds. As we have seen (p. 96), the inner face of all the systems in this central bowl of the continent is not only permanently deficient in precipitation, but has been progressively deficient in precipitated material. There are evidences *galore* of the retreat of the "cover" on both the Tian Shan and the Kun-lun, *e.g.* the *débris* on the Kun-lun glaciers being of immense thickness; and, therefore, its *power* to supply must be less than it

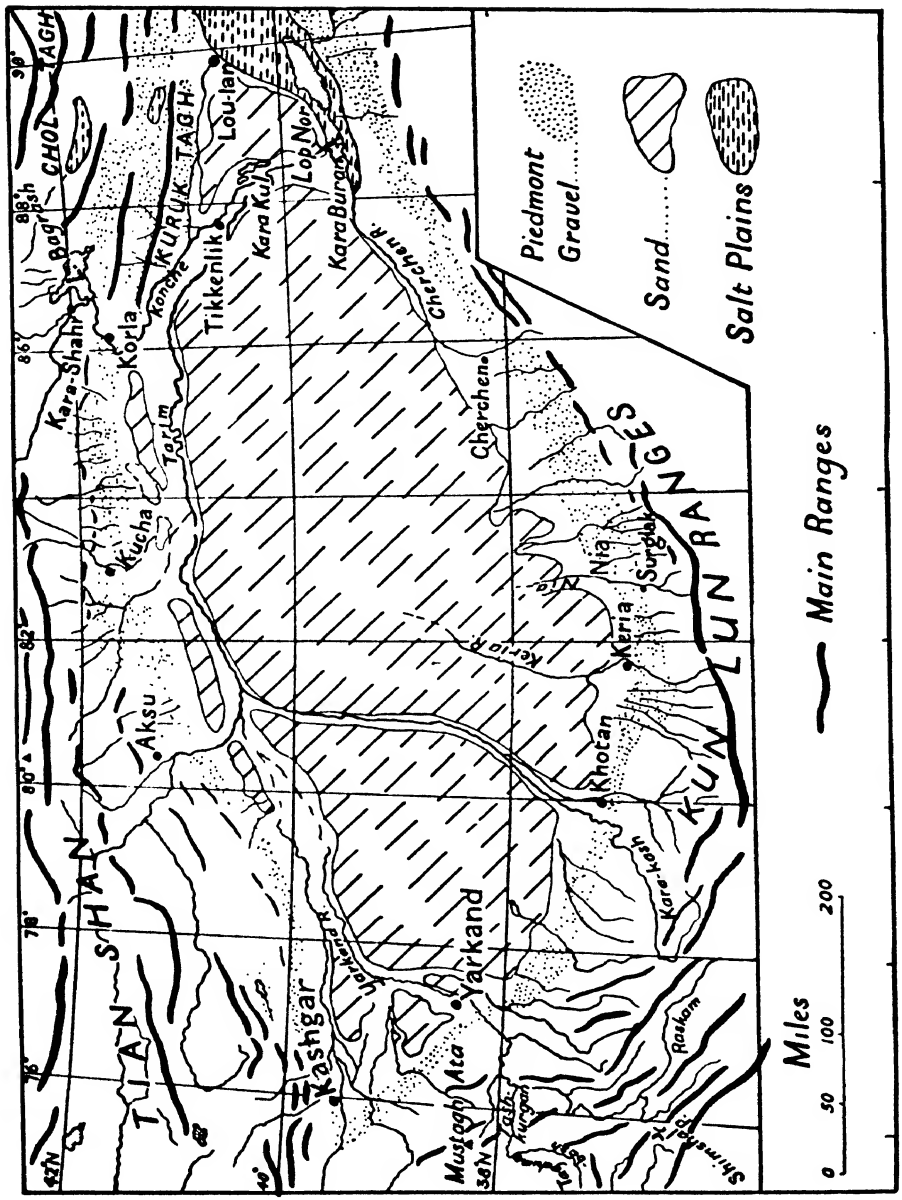

FIG. 123.—The Tarim Basin.
[Based mainly on Huntington & Stein.]

was once, even if no historic change of climate can be traced, still less proved, over the floor of the basin. It seems probable that the cover is now actually supplying a little less than it did a century or two ago, and it seems certain that it must supply progressively less and less ; and it is curious that this should be questioned by any one who does not believe that we are living in a Great Ice Age.

As people living in an inter-glacial epoch, then, and satisfied that cosmic changes are very slow, and that there is little or no evidence for historic changes here, we may decide to interpret sudden and catastrophic changes as the work of the river under some "accident," whether natural or artificial, and to consider only the slow and progressive changes as climatic.[1]

The *Débris.*

The *débris* from the rivers of all these central basins is both coarse and fine—boulders and gravel, sand and soil ; and the latter pair, when deposited and sun-dried, come here under the influence of the high winds—to be swept up into dunes near at hand or to be carried as dust to great distances. These find their extremes in the Takla-Makan of Sinkiang and in the Loess Plateau of Kansu-Shansi, both being proportionate to the volume of water sent down into the basin ; and we may estimate roughly from this, as from the multitudes of *karez*, how vast the total supply of water is, or has been. Where basins are fed by few rivers, we must expect few dunes and little dust, as in the western Gobi ; where there are many dunes and much dust, we may count on the presence of water, even if not visible. In the Cherchen desert it can often be reached at a depth of only three or four feet !

40° N. 85° E.

While this may be accepted—on the authority of Colonel Schomberg, an essentially scientific observer—as a general truth, we must not try to over-simplify the problem. Location and relief here have produced an almost unique complex, because they are themselves almost unique, even if the processes and their results can be rightly described as perfectly normal, *i.e.* exactly what should be expected from the conditions. Latitude 40° N. may fairly be called the central parallel of Asia, and longitude 85° E. is literally the central meridian between the Chihli Gulf (120° E.) and the Caspian Sea (50° E.) ; and both lines cross the wind-scoured, sun-scorched " dish of moving sand " that we know as the Takla-Makan.

Conditions *Normal.*

There is nothing abnormal here in, *e.g.*, the relation of the low humidity to great range of temperature,—the effect of temperature range on disintegration of rock,—the relative distance to which gravel and sand and dust can be respectively carried,—the way in which rivers fighting for their lives against sand actually contribute ammunition to the enemy,—the way in which they weaken their

[1] A decrease of 50 p.c. in the rainfall, during the course of 50 years, is calculated to reduce the number of animals that a grassland can carry to $\frac{1}{50}$ of the original total. The worst of recorded floods has not equalled this.

own power by wasting volume in overflows through burst banks and in feeding lateral swamps, especially when their beds have been raised *above* the level of the lateral lands. Even man's interference, with his irrigation-plots and with the fish-ponds which furnish half of his total food-supply, is not abnormal. Indeed, the one abnormality—for this twentieth century—is his failure to give scientific assistance to the weaker and yet the benevolent antagonist in the fatal battle; and the assistance might be given in more than one form.

Solar Energy.

It is calculated that even in England the amount of solar energy *per* acre during a bright summer day exceeds 1000 h.p., and the Meadi plant in Egypt[1] has developed a power per kilometre equal to that raised by 1000 tons of ordinary coal. The conditions here are far more favourable than even in Egypt, and there seems every encouragement to make experiments in the application of the solar radiation to the production of power.

Tarim Unity.

No doubt, a number of reasonable subdivisions of the unit can be isolated, and can be given more or less appropriate names, *e.g.* the Keria, the Cherchen, the Lop deserts ; and some of the native names for landmarks are very suggestive, *e.g.* Chol Tagh (" Desert Range "), Kuruk Tagh (" Dry Range "), Kum Tagh (" Sand Range ")—Kum Daria and Yangi (" New ") Daria. The west may be described as River-land, with special reference to the Yarkand and the Aksu, even to the Kashgar and the Khotan,—the east as Lake-land, with special reference to the Kara-kul, the Kara-buran, the Lop Nor,—and the centre as Desert or Dune-land. But such subdivisions blur the picture rather than develop it, and suggest a complexity of causes and processes which is not inherent. There is more vegetation at 14,000 feet on the Tian Shan or the Kun-lun than on the dune-embossed Takla-Makan or the salt-encrusted Lop Nor only because the glaciers irrigate better than men do ; piedmont towns are " lost " or ruined by being pushed too far out into the desert only because 30 or 40 miles of gravel "beach" prevent them from being nearer to the mountain source of water.

The human note here must always have been specially associated with the ring of these piedmont oases, but it has been much stronger in the north than in the south—in Kashgar and Aksu, Kucha and Korla, than in Khotan and Keria, Nia and Cherchen, while there has been more equality between the specifically west and the specifically east, between Yarkand and Loulan.

Tian Shan.

The primary importance of the Tian Shan in this connexion is probably as a climatic barrier, dividing the wide steppe-plateau and fertile valleys of Zungaria from the oases and the barren sands of the Tarim basin ; but the fundamental conditions that made it a climatic divide, made it also a political and an economic divide. For the food-value of some valleys, *e.g.* the Ili and the Tekes, or

[1] Amberg, in *Himmel und Erde*, Vol. 27. 204.

their fodder-value, *e.g.* the Yulduz and the Tekes, as of all the steppe, proved an irresistible attraction to the nomads of Central Eurasia; and each group in turn, from Huns to Mongols, soon discovered how easy it was to raid the oases and their trading caravans—by the various depressions, whether valleys or saddles or cols, by which the great rivers feed the Tarim, *e.g.* the Kucha and the Aksu, the Tashitz and the Tapuncheng, the last only *c.* 3000 feet above sea-level. Even the higher passes, *e.g.* the Barkul (*c.* 9000′) across the Kurluk (" Snowy ") range, are open and relatively easy for horses and camels for more than half the year.

Flank Raids. Unfortunately, some of the widest gaps are very near to the richest steppes, *e.g.* the Bagrash basin being a direct link *via* Kara Shahr and Korla between the Yulduz " prairies " and the Konche valley; or the richest oases are *vis-à-vis*—though often across a high, if not very wide, barrier—with the richest steppe, as the Kucha to both the pleasant Tekes and the unpleasant Yulduz grass-lands. Even a pass at a height of 12,000 feet may be a slighter obstacle than the height would suggest, *e.g.* the Terek (" Poplar "); for fuel, fodder, and food (including water) are far more vital than height and gradient and surface. Elsewhere animal names may be similarly suggestive and even discriminating, *e.g.* the Barkul passes of Tuge (" Camel," below 8500′) and Ishek (" Ass," above 8500′).

Lines and Spots. If, then, the Tian Shan was putting economic values into political forms, it should have been made, or maintained as, a political divide—between Zungaria and Serindia, dividing pastoral nomads from oases cultivators. To the south a purely arid region, mainly stark desert, is penetrated along certain very definite lines by streams from the containing mountains; and at certain very definite spots along those lines there were—and are—special facilities for using the water, *e.g.* where distance from the rampart just makes the advantage of finer soil cancel the disadvantage of the risk of the water-supply being diverted or exhausted. Communications for each spot were probably always easiest up its own stream—to timber, or alp for transport-animals, or mineral wealth, *e.g.* jade and gold; but this up-stream traffic was along a definitely fixed line, like the traffic between any two of the fixed spots (oases), and so it was very vulnerable, specially by very mobile raiders.

Space and Freedom. To the north the region is only sub-arid, at the worst only semi-desert; and, though no spot was likely to be able to support a large settled population in much comfort, pastures are wide, and wells are numerous. At the same time, quite apart from any abnormal drought, no pastures and no wells can—or ever could—be used continuously without risk of exhaustion, or even—if there were many sheep or goats—without great risk of actual destruction of the pasture. Wandering was, therefore, as inevitable in the sub-arid

as it was impossible in the arid ; to the north life was not glued to fixed spots, and never moved along fixed lines.

Takla-Makan.

If the human note has been at a maximum on the Tian Shan piedmont, it has been at a minimum in the Takla-Makan waste, a sea of ever-shifting waves of sand. The total length of the belt along the parallel that crosses the old delta of the dead Keria to the Lower Tarim is *c.* 600 miles, and the meridional cross-section at the same place is fully 250 miles ; but the drift sand continues along the river to the old—and the very new—course of the Kuruk, *i.e.* practically to within sight of Loulan.

Wind Control.

Where the wind is steady, the sand-waves maintain a steady trend parallel with it, though they change in size and in shape ; where it is variable, they change their trend as well as their size and their shape. The strength of the wind is as important as its direction and its steadiness ; and, though the Keria is a more or less central line across the desert, it is not the critical line. That is made by the Khotan; for, with nearness to the head of the *cul-de-sac*, the character of the wind changes. Its strength perceptibly decreases, so that its carrying power is slightly, and its graving power is greatly, decreased ; the body of it has an almost due westward trend ; and its wings come more under the influence of the containing ramparts.

The Dunes.

West of the Khotan, then, in what is called the Takla-Makan proper, the dunes are smaller, and there are no graven *bayirs*. The larger dunes, which lie due east-and-west, do reach 300 feet in height ; but the average is probably below 200 feet, and the position of the steep face varies. It often faces southward, and sometimes even eastward, showing that it is the work of a west wind ; and so, though there is complete uniformity of dune-surface more or less everywhere, the details of the topography are capricious and inconstant. To the east of the Khotan, on the contrary, in what is often called the Cherchen desert, the winds are so strong and so steady that the dunes are distinctly higher, probably averaging at least 100 feet higher than those in the west ; and, parallel with the lines of dunes, there are chains of *bayirs*.

East *v.* West.

That both features are the work of the wind seems certain. For both are most strongly developed to the south-east of the basin, where the N.E. wind is strongest ; and westward the dunes not only fall in height, but spread out with their concentric arcs steadily widening, and the *bayirs* also become fewer and shallower. The force of the impact of the *buran* on the Kun-lun scarp may be judged from the fact that the reflected *S*.E. current is strong enough, 100 miles to the north, to twist the dunes *north*-westward ; it is strongest in early spring, when it is accompanied by 40–45° F. of frost ; and, while the eastern half of the desert has the heavier sprinkling of snow, the western has the denser and wider layer of dust. In both parts the

winter temperature is always low enough for water-supplies to be carried anywhere in the form of ice.

In the Takla-Makan most of the sand and all the loess seem to be of Kun-lun origin, detritus from the river-fans of the piedmont, where deposition was very rapid during the Ice Age; but the loess is much the older, being of inter-glacial age and origin or very little later. It is significant that now precipitation tends to be in early winter, and the sand-storms are worst in early summer.

"Life." As the sand over the whole desert-area—well over 110,000 square miles west of the Khotan, and approaching 150,000 east of it—is never still or stable, vegetable life is almost impossible; and so animal life is at a minimum, *e.g.* a few rodents. The tamarisks and the poplars which do survive must evidently be associated with the falls of snow, which are at times much heavier than can be reasonably expected. So long as the resultant moisture is "mulched" with loose sand, seeds can germinate, and "trees" or shrubs can grow; and well-established tamarisks send their roots down to such a great depth that they can survive even if the protective sand is blown away. But, in the absence of the cover, the evaporation of the melted snow leads to the formation of a salt crust, and this kills the poplars; and, when tamarisks and poplars do spring up together, the faster-growing tamarisk is able to monopolise the water-supply, and again the poplar is killed.

Mineral Wealth. The scantiness of the vegetable and animal life may have led to some overrating of the mineral wealth; for this is so closely linked with the piedmont streams that it must have had centuries of attention. Jade and gold are found along the Kun-lun piedmont, and copper and oil along the Tian Shan piedmont. Jade "pebbles" are carried down by all the rivers from the Yarkand to the Keria, especially by two that tear down by inaccessible gorges from behind the northernmost main range of the Kun-lun (20,000′)—the Kara-kash and the Yurung-kash, between which Khotan stands; and placer gold is worked farther east, especially on the Nia near Surglak. Both the copper and the oil (and poor coal) are worked behind Aksu.

History. The amount and the quality of the evidence and the arguments produced, especially by Colonel Schomberg, for the stability of the climate here during historic centuries have only one serious difficulty to face; and that is the amazing treasure of coins and tablets, images and frescoes, pictures and manuscripts unearthed, mainly by Sir Aurel Stein, in the 300-mile line of old Buddhist settlements along the *southern* edge of the Takla-Makan. That proved to the hilt the complete penetration of a very flourishing civilisation for five centuries before A.D. 800 by the Graeco-Buddhist art that had been supreme in north-west India and north-east Irania since before Christ. Later explorers proved that a similar line of treasures stretched along the northern edge of the Takla-Makan; but their

presence in the south is more important, and at least justifies the attitude adopted here to the *oldest* Nan-lu of the Silk Trade.

We may return to the comparison between Russian and Chinese Turkestan, for it may throw some light on the problems of the future of Sinkiang as related to its possible population. So much attention has been concentrated on the Past of Serindia that its Future has been neglected; but this is well worth attention, and is at last receiving some.

Population

Professor Penck has estimated that the whole of "Central Asia" cannot support more than 40,000,000 persons; but he did not specify what he included in that area, and so the figure is useless. At the same time, "Central Asia" *must* include Serindia, if not the whole of Sinkiang; and that fact justifies us at once in discounting the estimate. Indeed, an estimate so lacking in vision is even less use than a meticulous application of the Square Measure Table. The riverine lowland of the Tarim alone, if the river were properly regulated, would offer a water-front to 8000 Quarter-Sections; and, if these were occupied by immigrants from any of the numerous parts of China where a family of five persons lives on one acre, they would obviously absorb at once about 6,500,000 Chinese.

v. Organisation.

But it is more practical to ask why, if Russian Turkestan can already support nearly 24 persons to the square mile, Chinese Turkestan should halt at 4 persons; and, if we may reasonably multiply the 4 by 6, and take our time from the rate at which Chinese peasants have drifted on foot into Manchuria—10,000,000 since the beginning of this century—the estimate is obviously ill-founded. For Serindia has a more stable climate and a greater abundance of falling water than the Turan basin, and agriculture here might be as stable as in Egypt; and, if so, the county would very quickly absorb 25,000,000 immigrants—always provided that they were Chinese gardeners and not Mongol herdsmen. But, of course, for this both the water-supply and the methods of cultivation must be properly organised; and, *inter alia*, nomad herding must be eliminated, even if piedmont tillers, with access up river gorges, should be encouraged to combine animal husbandry (transhumance) with their tillage, as the nomads are now trying—in self-defence—to combine some tillage with their pastoral organisation.

The River.

From both points of view the value of the land used would be greatly increased, and it would carry at least double the present population; but that would not be much more than playing with the problem, for much of the waste land is land that was actually in use, but was ruined by neglect or ignorance or inability to cope with the river. Everything really begins, and ends, with the river; and, if this problem is a single one, there is a double frame for it,

for the Aksu—as we have seen (p. 78)—is almost as important as the main stream.

Intensive Tillage.

If the Tarim itself and the Aksu alone were regulated properly, *i.e.* at their exits from the piedmont gorges, an end would be put at once to all serious bursting of banks—with all the waste of water and the waste of time and toil in raising crops which are destined to be ruined or actually washed away, and in repairing banks which need never have been broken. If the protective works were also associated with hydro-electric plant for heating and lighting purposes, another source of waste and loss would disappear, *e.g.* the use of manure as fuel instead of as fertiliser; and, if the 25,000,000 immigrants came from the overcrowded loess-lands of Northern China, the grossly inefficient Turki—and even the Pamiri—cultivators would have to mend their methods, or they too would disappear. For there is no room here for the stupid, the lazy, or the careless, whether the faults are shown in the use of poor seed or in neglect to irrigate *at night* or in the choice of less valuable but more easily raised crops; but there are great possibilities for an intensive agriculture based on a scientific system of water-control and devoted—by preference—to sustenance crops and not to surplus for foreign markets.

Zungaria

The nucleus of the ancient kingdom of Zungaria was the natural region of the Zungarian "basin," as we may describe it to-day; and its name is very suggestive, as the *Zungar* Kalmucks could be the "Left hand," *i.e.* left wing, of the Mongol army *only if* that was based on the well-watered northern flank of the Tian Shan barrier, and faced northward, with no fear of danger from the Tarim desert. The political division [1] of the region between Sinkiang and Outer Mongolia was, therefore, a typical mistake—for a people with the political mentality of the Chinese.

Limits.

The "basin" is essentially the great wedge of land between the Altai and the Tian Shan, with its relatively open end blocked westward by the butt of the Tarbagatai and its Saur (Mus-tau) and Ala-tau (Jair) annexes; and the true Zungarian Gate, *via* Chuguchak, unquestionably had its objective in Lake Balkash and the "Land of the Seven Streams," not round the end of the Tarbagatai in the Irtysh steppe. But, as the Gate actually drains at once by the Emil into the Ala-kul, we may isolate the really "external" drainage of the region—by the Black Irtysh into the Zaisan Nor *en route* for the ocean, and by the Ili into Lake Balkash—from the rest of it. The Gate itself is a 10-mile gorge, only 700 feet above sea-level, between the Ala-tau and the Barlik.

[1] The name "Sin-kiang" is usually interpreted as "New Dominion," but it may also mean "New *Frontier*"; and the frontier was new, but the dominion was not.

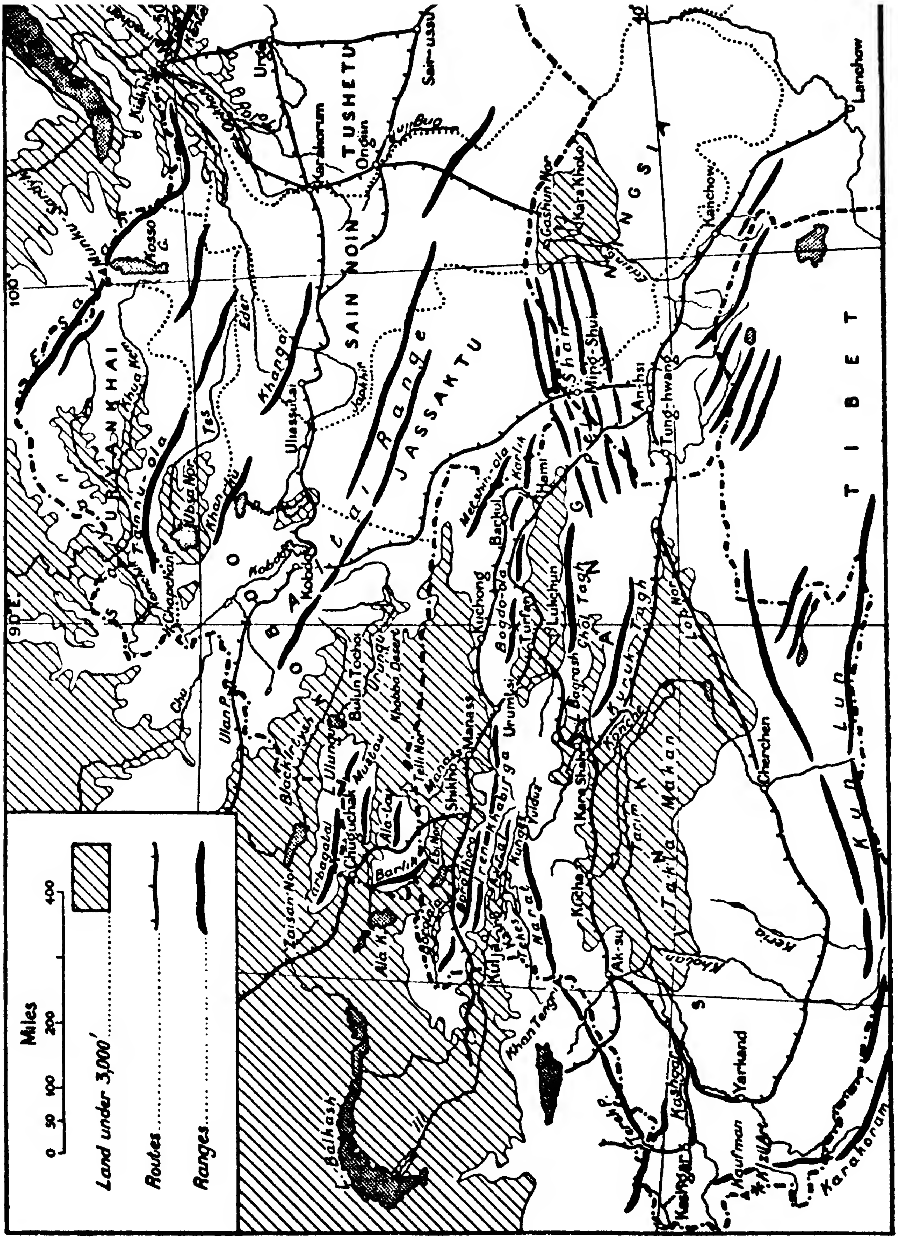

FIG. 124.—Zungaria and Western Mongolia.

The Core. The core is the triangular lowland (some of it below 500 feet) of what may be called the Manass "basin," even if the Ebi Nor drainage is now quite separate from that of the Telli Nor—itself dry (? temporarily) in 1928; for Manass is the one really important centre, and is linked directly—by the Imperial Road from Urumtsi—*via* Shikho with the Ebi Nor and the very fertile Borotala valley. The triangle is set in four ex-centric drainage areas, two of them " external " and two purely internal; and, while the two " external " areas are the two river-valleys of the Black Irtysh and the Ili—300 miles apart, the two internal are lake-basins on opposite flanks of the " Sacred Lake " range of the Bogdo-ola—the Turfan and the Barkul.

" External " Rivers. If not the more interesting, the two valleys of " external " drainage have been much the more important. The linking ranges mark the frontier between Russia and China; within them, on the Manass prairie, Jenghiz Khan usually collected his armies; and nearly every wave of migration or conquest that has swept over Central Asia started from—or recuperated on—this prairie. But in their physical history both valleys may be called Arcto-Atlantic, while the two lake-basins are quite definitely of Central Asia, and repeat the typical processes and phenomena of the Tarim basin. This means that, again, conditions become harder, as in Serindia, with nearness to China!

Ili Basin. The Ili basin consists of typical Tian Shan valleys, between the Khan Tengri (Narat) and the Iren-Khabirga (Boro-Khoro) chains; all the three arteries of it—Tekes, Kunges, and Kash—rush down some very narrow and very deep gorges; and, while the higher and exposed ranges are well forested, the lower and sheltered are bare, *e.g.* the Avral divide between the Kunges and the Kash. The river has a total length of about 1000 miles; its most westerly unit, the Tekes, rises at very nearly 12,000 feet; and the supplies of rain and snow are great and assured, both heavy rain and heavy snow falling even in August at relatively low altitudes. The feature lines trend east-and-west, and the mighty southern wall guarantees humidity and quiet light to the valleys below it; indeed, the conditions lend special interest to the fact that the earliest known inhabitants were *fair*-haired and *blue*-eyed (Usuns)—a very appropriate type for what was once a *ria* on the Ob-Sea coast. No Yellow men occupied the basin till the sixth century A.D.

Fertility. In the lower parts of the basin the valley floors are very fertile, especially the Ili plain and the Uta plain of the Kunges. The former at its widest is about 50 miles, and grows good crops of wheat and barley and lucerne, with abundance of fruit (apple, pear, apricot); and its pastures are very rich and well stocked—with sheep, cattle, and horses. There is abundance of fine forest on the northward faces of the ranges and in northward-facing valleys, *e.g.*

the Shi-ho ; and there is a field of neglected, but very good, coal near Kulja. The remains of old irrigation-systems suggest that the earlier inhabitants were mainly agricultural, and the Teranchi villages are surrounded by well-tilled " allotments " ; but fully 40 p.c. of the population consists of pastoral nomads, who use a still larger percentage of the available lowlands, and so the basin is not quite able to feed itself.

Kulja.

Even most of the cultivators are Moslems, with something of the desert attitude to tillage ; and, in this debatable belt between Islam and Buddhism, perhaps insecurity suggested the wisdom of having portable possessions, especially such as could be moved speedily and on their own feet. The city of Kulja is still almost a fortress, with walls 30 feet high and 10 feet wide at the top ; the Huns, the Uighurs, the Kara-Khitai, and Jenghiz Khan, all in turn conquered the valley, and some desert-dweller must have introduced the inappropriate custom of building houses with *flat* roofs.

Irtysh Basin.

The Black Irtysh basin is of no importance apart from its contribution of water from the Altai to the White Irtysh. The Urungu no longer reaches it, but evaporates from Lake Ulungur, with the population of its basin concentrated on its little delta (Bulun-Tochoi) ; but the lake is within 5 miles of the river, and the Salburtai heights are within 10 miles to the south. The Irtysh basin, therefore, is circumscribed, and has now only local importance, for all intercourse across the political frontier is forbidden.

The Altai cannot be considered either grand or beautiful ; but the relatively high latitude compensates largely for the relatively low altitude, and the rainfall is heavy, and the snowfall is very heavy. A great quantity of water, therefore, is carried by both the main stream and its chief tributaries, *e.g.* the Kran and the Burchun ; and the town of Burchun was quite an important steamer-terminus a generation ago. There was a double source of traffic, an important through-trade with Mongolia—mainly by the Urmogaitu Pass—and a seasonal local trade with the gold-mines. It was the combined trade that made Sharasumë, with its command of the pass, the " Altai " capital ; but the loss of the through-trade has favoured Burchun, and the absence of traffic seems to have led to a great increase in the steppe fauna, especially the hares.

"Internal" Lakes.

The two lake basins in the east show something of the same inequality of interest as the two valleys in the west, but the interest is in the physical and not the political history ; and again the major interest lies to the south. For the Barkul basin is merely a blind alley, a pleasant backwater, stretching for 60–70 miles both east and west of its meridional lake, where the width is not much more than 20 miles ; the floor is not below 5000 feet, very narrow west of the lake, and fenced by precipitous walls that rise within 10 miles to a

height of at least 8000 feet, even here protecting the narrow floor from excessive scorching in the early afternoon. East of the lake the valley widens for 30–40 miles, and the Barkul range trends slightly southward; but it rises to a snow-crowned crest, with peaks over 13,000 feet, before completing its work of linking the Bogdo-ola with the Karlik. Below the latter, which rises to nearly 15,000 feet, lies the upper lake Turkul.

Barkul. The northern, *i.e.* rainward, face of the Barkul range is covered with fine forest, though it is steeper than the bare southern face; and the whole floor of the basin is saturated with sub-soil water and there are innumerable springs. Even to-day it is dotted with little (Chinese) farms, with their patches of tillage; but it is a land of lush meadow—in the heart of a continent!—rather than arable acres, and the better response is in the black yurts and the thousands of "wild" horses. Even last century the Taghliks used to send 15,000 horses every year to Peking; and, though the town of Barkul was founded only 200 years ago, the story of the basin goes back for many centuries.

"Beasts' Lake." For it was the "remount farm" for the armies of Jenghiz and Kublai and the other Khans. No horses could escape from it, camels could seldom climb the Tuga Pass, and donkeys could not always climb the Ishek; the narrow approach from the Manass rendezvous is cluttered up with ruined watch-towers and guard-houses; and the pastoral nomads made no mistake in naming the lake "*Bar*-kul" ("The Beasts' Lake"). But, as the great hordes declined in power, the demand for cavalry-

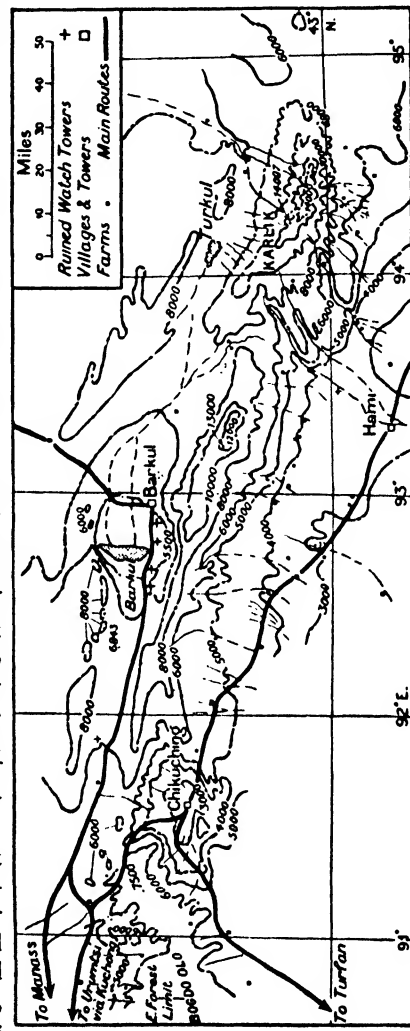

FIG. 125.—Barkul Basin.

mounts declined, and the prosperity of the basin declined; and meantime the basin was drying, the Turkul was no longer feeding the Barkul, and was becoming salt.[1] To-day very little traffic reaches the town round the west end of the range—*via* Chikuching, and still less round the east end—*via* Hami; and the old road *via* Kuchong as far as Urumtsi is deserted, like the little town itself.

Turfan. In the Turfan basin the Bogdo and the Chol ranges play the part of the Metshin-ola and the Barkul ranges; but the floor is 6000 feet lower than in the Barkul basin, at its lowest *minus* 980 feet, and the lowland does not stretch more than 40 miles east and west of the "Lake." The mere difference of level *should* make a considerable difference of temperature-range; and not only is the greater Bogdo range to the north, but the lower Chol Tagh on the south was not called "the Desert Range" without good reason. So we have a narrow alluvial lowland flanked by lofty ranges in a region where the climate is so dry that small streams are naturally evaporated as they flow, or empty into impermanent salt-swamps; but the *forested* Bogdo heights send down a great quantity of water in the larger streams, and these burrow underground in *kariz* tunnels. Natural tunnels were supplemented by artificial ones; and where there is access to the underground water, vegetation is actually luxuriant.

Climate. So far as the derelict towns and fields are concerned, their story is that of similar derelicts in the Tarim basin; but the slight differences are significant. The intense dryness, of course, causes a very great range of temperature, especially when the level is below sea datum; and a January mean of 13° F. or a July mean of over 90° F. is really less impressive than a range of 56° F. between sunrise and noon on a windless day at the March equinox—in the latitude of Corunna! As snow never falls on the lowland, and rain practically never except for stray storms (10-12 years apart), the quantity of fruit grown is astonishing, even if its quality is not.

But along the northern flank of the depression the Bogdo extension of the Tian Shan has an average height of *c.* 13,000 feet for 150 miles, and receives a considerable supply of rain and snow; and in the extreme north-west, *i.e.* the direction in which the largest (Doksun) river rises, the main range reaches 17–18,000 feet and then 22–23,000 feet, while the Davan-Chin pass—down which that river runs—is below 4000 feet. This gully admits to the basin the furious N.W. blizzards which have given the lake its title of "Lake of the Winds."

Streams. A dozen other *sais* (*wadis*), which rush down from the Bogdo to cut through the "Fire" (only "bright-red") Mountains, especially near Turfan town and Kara Khoja, have worn precipitous

[1] It is now 35 p.c. salt, and the Barkul is *c.* 5 p.c.

gorges, fairly well protected from the fierce sunlight till the afternoon, as in the east the range trends slightly southward, and the valleys trend slightly westward; and they have piled up a huge "beach" of piedmont gravel, generally about 15 miles wide. Beneath this gravel all the *sais* practically disappear, and so are conserved—to reappear at the southern foot of the Fire Mountains, where the gravel gives place to a belt of fine soil, which is the belt of habitation and cultivation. Here, too, the concave arc of the Fire range gives some protection against the N.W. blizzards; and the level is so dead that in spring the underground water just oozes to the surface everywhere. The famous seedless raisins of Tuyok are raised at the very foot of the Fire range east of Kara Khoja.

History. Lukchun is scarcely the best centre from which to collect climatic statistics; for it stands out on the plain, where the soil is becoming saline, and towards the south-eastern quarter. It gets, therefore, no shelter from the Fire range, but is exposed to the full blast of the great blizzards and sand-storms from the north-west,—the latter fierce enough to have blocked up the south-eastern end of the basin with enormous dunes 500 to 600 feet high. At present the total population seems to be not more than 50,000 persons, more than half of them depending on surface water, not on *kariz*, for food and on dead reeds for fuel; but 2000 years ago the whole basin was very prosperous, and again from the eighth to the seventeenth century. During the five centuries of drought (3rd–8th) it almost disappeared from Chinese history, so that its condition then may have been worse than it is now.

Manass Basin. If the Chinese showed a typical lack of political sense in choosing a frontier in this Zungarian basin, they showed as clearly their possession of a keen geographical sense; for the Manass basin is much the fittest part of Sinkiang for colonisation, for development, for an administrative centre. It is the only large area of useful lowland (up to 1500 feet), it carries an ancient thoroughfare, which is bound to become much more important—with railway development, and it has a good climate—well suited to Chinese, as the immigrants here and in the Ili basin have already proved. If not a New Dominion, it is certainly a new colony; and settlers from the Tarim basin—*e.g.* displaced Turkis—might be, in the first instance, the best immigrants; for the behaviour of the rivers is what they have been accustomed to farther south. But, with proper regulation of the rivers here, there would be at once a good reason for settling the irrigable land under Chinese gardeners; and, again, there will be room for millions of them—probably at least 20,000,000. At the same time, the conditions here are quite different from those in Serindia, and the real opportunity is for mixed farming, with

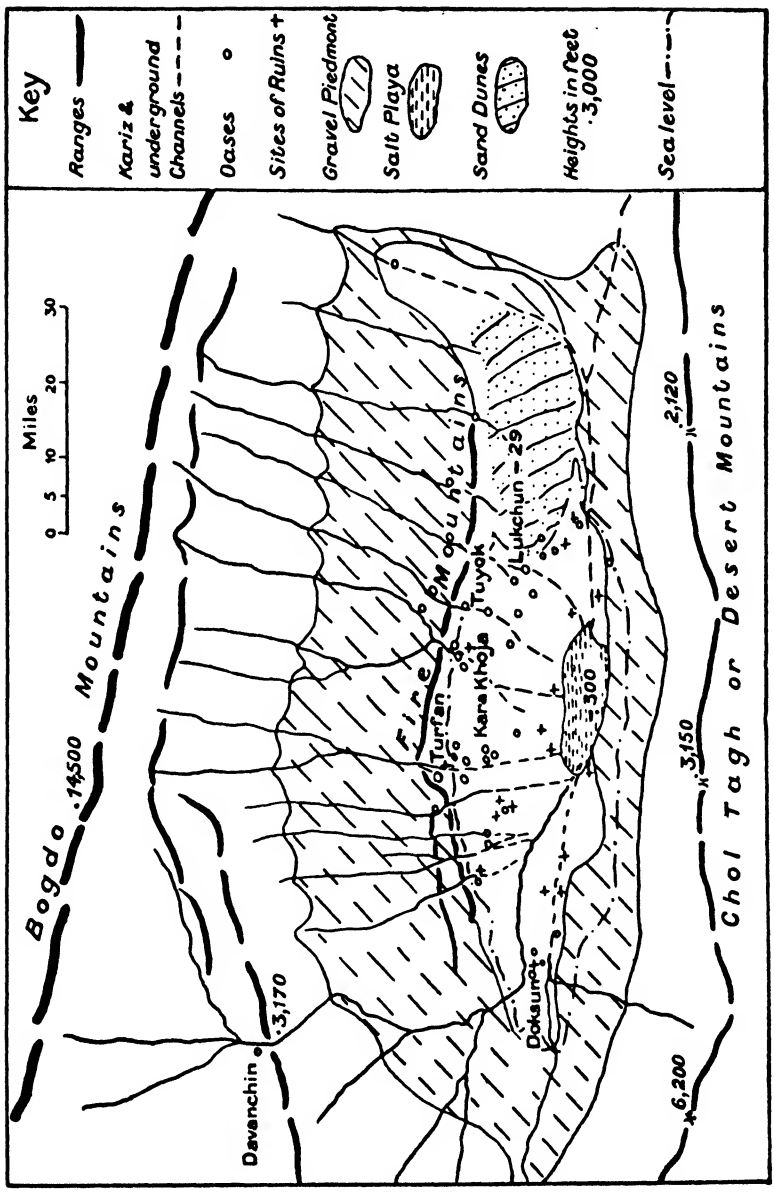

FIG. 126.—Turfan Basin.
[Based mainly on Huntington.]

the emphasis on its dairy work, especially if there was unity of political control up to the Altai, and if a railway were constructed up the Zungarian Gate.

Agriculture. The pastures, which for centuries attracted the nomads, are fertile enough to repay cultivation; and there will always be good pasture where agriculture is practically impossible, *e.g.* the Yulduz and the Tekes valleys and the upper valleys of all the rivers. Being on the north of the mountain wall, they have a full exposure to the Arcto-Atlantic climatic influences, especially the Borotala valley; there is abundance of fine forest—up to 8000 feet; the lakes, though saline, and the riverine swamps and backwaters swarm with ducks and geese; and the only necessities are drainage and regulation of the rivers,—the latter quite easy if dealt with at their exit from the gorges. A good deal of the lowland, owing to the great abundance of subsoil water, is rather soft and rather saline; but the drainage and other works would remedy this, and in the meantime crops such as cotton and sugar-beet would actually prefer the slightly saline soil. Where there is no wandering water, the land is good firm steppe and prairie, with an altitude of 1500 to 3000 feet, rising in the extreme east to 4000 where the "mountainous" gap between the Bogdo-ola and the Baitch-Bogdo leads to the Gobi.

Peoples. The Charkars, who became so troublesome on the Chakar flank of the Great Wall that they were transported *en masse* to the "World's End" in the Borotala, found that valley so fertile and safe and generally attractive that they have been weaned completely from pastoral nomadism to sedentary gardening. The strong and turbulent Dungans also, if they are really *Chinese* Moslems, may have come to the Tian Shan piedmont in the same way; but they may be a remnant of the ancient Uighurs. They certainly maintained—till the massacre (1870)—the reputation of Zungaria as a "Land of Struggles" as well as the "Land of Promise."

Towns. Urumtsi is the capital of the whole New Dominion, occupying the only natural gateway between Zungaria and Serindia, the only possible route for a modern army to move between the two; and it is really a group (9 or 10) of little fortified towns enclosed in a common double wall. But, as an administrative centre for the Zungarian part, it is inferior to Shik-ho, where the Imperial road divides—for the Zungarian Gate and for the Ili Gate. Manass must be the agricultural market, at least until the lower lands of the basin are properly reclaimed; and Kulja combines the features of all these towns in the Ili valley. There remains only the caravan centre of Ku-chengtze (Ku-chong); and, so long as the traffic from Hami goes by the Ta-shi-to Pass, it will be an important centre. But, if the traffic returns to the old Turfan route, that will impoverish Ku-chengtze and enrich Urumtsi; and, of course, the latter com-

pletely controls all the traffic that there is from the south-west *via* the Bagrash Gate and Kara-shahr.

The Imperial High-road, which links Sinkiang with China, has a threefold interest apart from its purely geographical details ; for it illustrates the character and the genius of the Chinese,—it is one of the two very old roads the length of which justifies calling them trans-continental,—and it combines in itself both of the two types of thoroughfare that make the vital arteries of Central Asia.

Traders' "Roads."

In the absence of any historic evidence—even if we admit the extreme difficulty of finding such—it is impossible to connect the Proto-Chinese with the Turan basin ; but we have historic evidence connecting them with Imams, *i.e.* the Pamirs, and they were certainly settled in the Tarim basin at the earliest date of which we have record. They were, therefore, not a pastoral people ; and that almost guarantees that they were not a military people, and the Neolithic finds in Kansu prove that they were a civilised people, living by agriculture 2000 years before Christ. When they " returned " to Turkestan (? 200 B.C.), it was as traders and not as conquerors ; and their route was an oasis route, with small fixed centres linked by narrow fixed lines. Along such a route no large migrations of any kind could ever move easily, no pastoral nomads could move at all, and no agriculturalists were tempted to move their " labour " from one oasis to another—the only temptation being to move up-stream. For Chinese purposes of peaceful trade—even of " peaceful penetration "—the only valuable route in *Central* Asia was an *oasis* route.

Nomads' "Ways."

But pastoral nomads were forced to move as often and as regularly as peaceful traders normally wished to move—at the beginning and the end of each great season, when the equinoctial equality of day and night was a real asset to camel-caravans ; and the pastoralists did move in large numbers, with still larger numbers of beasts, needing a wide source of fodder. Where there was enough water for fodder, there was also enough for human needs ; but millions of acres that could provide this could not support any tillage. The cultural type was definitely associated with the geographical features and phenomena, even if it is better not to say that the one was a response to the control exercised by the other.

Pei-shan Block.

The key to the route-problem lay with the " North Mountains " and the " South Mountains," flanking the one natural corridor in middle latitudes between Eastern and Central Asia ; but, while the Nan-shan are real folded mountains, the Pei-shan is mainly a coign of the great continental plateau. Like the Gobi, it is a warped block ; but it is warped so as to be convex and not concave, with its meridional axis a ridge and not a runnel. As it seems to be slightly tilted down westward, this ridge tends to throw off water to the

margins, as from Ming-shui (" Clear Water "), rather than to collect it, as the Gobi does ; and it gives some protection westward, *i.e.* in the direction of the better water-supply, from the furious N.E. *buran*.

Pei-shan Folds. There is a flat and dreary trough between Hami and the northern face of the Pei-shan block, but it is only about 25 miles across, and maintains a fairly steady level below 3000 feet ; and the great corridor in the south is somewhat similar in relief, but 60 miles across and approaching 5000 feet in altitude. Between the two longitudinal depressions the block is embossed with the real Pei-*shan* system of old folds. There are five parallel lines, following the fundamental S.W.-N.E. trend of these longitudes of Asia ; and they are divided by wide troughs similar to the corridor. The most northerly—(? a link with the Chol-tagh)—is higher than the most southerly—(? a link with the Kuruk),—but maximum heights, which are above 8000 feet, are central ; and, where the crystalline rocks merge in sedimentary—which, unfortunately, is eastward,—there seems to be an extensive coalfield. There is enough vegetation for this belt to carry a limited animal life, including the ass and the antelope, sheep and hares.

Edsin Gol. The south-eastern flank of the block is marked by the Edsin Gol and the Gashun Nor and the south-western by the Kuruk Tagh and the Lop Nor. The former, with its scrub and its *sai*, its fodder and its fuel, was an ideal pastoral road ; it is the only road that crosses—or goes round—the Gobi from south to north ; and it has been the one great route for nomad raiders and Tatar and Mongol invaders, Jenghiz Khan and the others. It was, therefore, out of the question as a trade-route for the Chinese ; and, in any case, it led to the north-east through the sphere of the Torgut Mongols.

Pei-shan Traverse. The Lop Nor route was very long and circuitous to the Zungarian " Land of Promise " in the north-west, however direct to the old Nan-lu or Pei-lu routes of the Tarim basin ; but it seems to have been well known *via* Loulan and Ying-pan to Korla. The route on, too, *via* the Bagrash Lake and Kara-shahr to Turfan was relatively easy and still purely an oasis route, with a positively easy extension to Urumtsi. But, as we have seen, there was an age-old connexion, *via* Ku-chengtze (Ku-chong) and Ta-shi-to, between Urumtsi and the Barkul basin ; and from the latter a climb of *less than 3000 feet* to the Barkul Daban gave a *direct* road to Hami. With their extraordinary " feeling " for general direction—even in the entire absence of known landmarks—the Chinese must very soon have realised the " latitude and longitude " of Hami—only 200 miles from An-hsi ; *but* the first crossing of the western Pei-shan was probably made *southward*.

Hami-Kumal. The double Chinese-Turki town of Hami-Kumal is a little " City of Discords,"—the Turki Moslems, in their urban " camp," being inveterate foes of the Chinese Buddhists, in their walled town ; but

the Taranchis are not wholly irreconcilable, and the smallness of the oasis (7 × 5 miles) and the importance of its trade have combined to make the carriers and the gardeners essential to one another. The great fertility of the oasis, too, and its unfailing water-supply have made it a vital commissariat centre. The streams from the Karlik range disappear bodily under the gravel piedmont, and are wholly protected from evaporation—and from any use—till they ooze up as springs (" kul ") 20 miles away in the unleached desert-dust of the little basin. At high water there is an overflow from the lower end of the basin, but within 20 miles it disappears in salt marsh.

Once the route was known, its shortness cancelled the other drawbacks. The central Pei-shan may be a howling wilderness of *buran* blizzards all the winter and a fiery furnace of sand-storms all the summer, but its western flank gives a possible route in late spring and early autumn, *i.e.* exactly when the caravans were moving, and it became the regular route to Urumtsi. Of course, there was the choice of two routes westward from Hami, Pei-lu and Nan-lu, the former characteristically the better provided with water and grass and timber ; but the Bar-kul basin was a pastoral and not an oasis road, and it was wholly in the hands of the Horsemen ; and so the inferior oasis-road was followed, and Turfan became the great junction for traffic from both the south-west and the south-east, both following typical oasis-roads. 95° E.-100° E.

While the work of the Pei-shan,—with its trinity of streams and towns,—was to divide and differentiate, that of the Nan-shan was to focus and concentrate. We are still dealing with our critical longitudes, 95°-100° E., for Tung-hwang is just west of 95° E. and Kanchow a little east of 100° E. ; and, as the most southerly of the ranges, the Suess, is above 20,000 feet in several peaks, and nearly reaches 21,000 in one peak, while the crest for 50 miles maintains a steady average of over 19,000, the Wet Monsoon has an obstacle of magnitude to cross. The three towns—Kanchow, Suchow, and An-hsi—mark an arc of about 300 miles, An-hsi being about as far east of 95° E. as Kanchow is east of 100° E. ; the three rivers rise all close together in the very core of the system, and flow parallel with one another for 100 miles ; and then each river feeds one of the towns. The Su-lo (Su-lei) is really the greatest ; it rises between the Suess and the Alexander ranges, and flows steadily north-westward to longitude 97° E., and then steadily north to latitude 40° N. There it fans out against the butt of the Pei-shan, and its most westerly " distributary " turns due west—to An-hsi and the edge of the old Lop Nor bed. The Pei-ta rises between the Alexander and the To-lai ranges, both reaching at least 18,000 feet ; it flows north-westward to longitude 98° E., and then northward, but works eastward to Suchow to join the Kanchow near Maomei and so to make the Edsin Gol. The Kanchow rises farthest west of the three, **Nan-shan.**

between the To-lai and the Richthofen ranges, the latter exceeding 18,000 feet, and flows south-eastward to longitude 100° E., where it begins the great sweep that takes it north-east to Kanchow and then north-west to join the Pei-ta.

Climatic Focus. The central town of An-hsi (" Western Garrison ") marks the longitude of a climatic divide, for eastward the vegetation undergoes a rapid change for the better, and east of Kanchow crops are raised on the fertile Nan-shan piedmont without irrigation, though they owe more to the snowfall than to the rainfall. Suchow becomes, therefore, a focus for cultural and economic influences of three kinds, associated with—a densely peopled agricultural area in the east, agricultural spots of dense population round the oasis-dotted desert in the west, and pastoral areas of scanty population in the north. And the Pei-shan would be a real barrier between the tiny aggregate of the oases and the steppes, even if the aggregate of both was great; for it spreads between them a stark desolation that measures 400 miles from east to west and 200 from north to south, and the brackish wells between An-hsi and Hami are so few and so shallow that there could never be any migration-track for pastoral nomads, still less any permanent occupation by them.

An-hsi. But, as the natural objective for the raiders, Suchow has had a more troubled history than even An-hsi or Kanchow. An-hsi has not prospered much more than the three or four dead towns round it, but the main reason is that the Sulo is flowing parallel with the Nan-shan arc—indeed, rather south of west; and so movement upstream could only mean movement farther away from the scarp. Indeed, it is peculiarly significant that the old frontier wall which protected the Sulo (and the Pei-ta) westward from the Edsin Gol, has here crossed the " river " to the Home bank, treating the Kara Nor (L. Kalachi) as dangerous and hostile. Behind this wall the Tan delta—with its cave refuges, such as shelter the Temple of the Thousand Buddhas—has given Tung-hwang all the prosperity which An-hsi might have enjoyed; but Tung-hwang is a real *Sha*-[1] chow (Sa-chow), and its " sands " are only made fertile by irrigation.

Kanchow. Cultivation on some scale begins immediately east of Suchow, dependent on a dozen springs that converge on Ning-shui; and it continues almost unbroken along the piedmont as far as Kanchow, behind wide areas of gravel or stones or sand. Eastward of 100° E., where the Kanchow river turns away northward, most of the area between the river and the range is cultivated, again irrigated by a number of streams flowing directly down heights of at least 12,000 feet, most of them breaking up into half-a-dozen " distributaries "; and it is this tendency which has been so adverse to Kanchow. For the river has come rushing down 12,000 feet in 150 miles, and begins to " break up " about 20 miles above Kanchow—into a perfect maze

[1] The piedmont is dotted with other *Sha*'s—Shacheng, Shalo, Shaching, etc.

of channels ; and the town, on the great elbow of the river, is simply " sitting on a wet sponge,"—which has made it very unhealthy.

The Gobi

The Gobi, as the name is used here, is a vast area that lies roughly between longitudes 95° E. and 115° E. and southward from latitude 45° N. ; in the north-west it comes close up to the butt of the Altai and the Karlik, but in the north-east keeps well within—though parallel with—the Khingan scarp, beyond the normal reach of the S.E. monsoon (cf. p. 130). If lines are drawn from each horn to the point where the central meridian, 105° E., crosses parallel 40° N. in the Little Gobi, the great " triangle," or " semi-circle," includes all that should probably be called " Gobi " ; and, even so, only the half that is west of 105° E. is truly " Desert." 40° N. 105° E.

This " triangle," or " semi-circle," may be divided into three latitudinal belts, which need subdividing on a climatic base ; and the two lines of division are marked by the In-shan and the Lang-shan, while the line of subdivision remains meridian 105° E. to the north, but must be moved eastward to 110° E. in the south. The north-western quadrant had great importance historically, because it carried the direct route from the Mongol capital of Karakorum *via* the Kuliussai Pass and the Orok Nor to the Gashun Nor and Kara-Khoto for the Edsin Gol ; and it has shared recently in some of the interest concentrated on the north-eastern quadrant. **Divisions.**

The one point of special interest is in the light that may be thrown on the environment of prehistoric life to the north-east, by the actual historic conditions here, *e.g.* in the Edsin Gol basin. For Kara-Khoto (" the Black City "), known also as Baisen-Khoto (" Fortress City "), was a Chinese city built four-square—500 yards each way—on the banks of the Edsin, the old channel of which is easily traced down to the dry Kodon-koshu " lake," *i.e.* a trifle west of the Gashun. Quantities of relics were found here by Captain Kozloff, from the days when " Hsi-hsia "—for the other names are Mongol—was the capital of a Tangut kingdom contemporary with our Norman kings ; and the records proved that the original Torgut Mongols had found the basin so densely forested that they had to burn off the forest before they had room to pitch their camp and pasture their beasts. Whin-chats [1] still haunt the dying relics of the ancient forest. **Edsin Basin.**

The remarkable discoveries of the expedition sent by the American Museum of Natural History to this region are of special interest to the Palaeontologists ; but they have raised again, in a **"Dino-sauria."**

[1] Some of the Wheatears are desert birds, but the whin-chat is not one of them. In fact, it dislikes open country, and is *the* one of the Thrush family that may fairly be called " the tenant of the copse "

different form, the whole problem of secular desiccation, even if that is quite dissociated from any theory of a " Jurassic " Continent of Gobi, and have produced valuable data as to the work of insolation, wind, temperature-range, and various chemical agencies. At the same time at least one important statement and one inferential generalisation cannot be accepted. The geologists who studied the (largely wind-eroded) basins of Iren, Dubassu, Ongiin Gol, etc., " called them *talas* " only because that was their ordinary name, known even to Europeans a century ago ; and the prophecy that the Gobi will be proved to be the home of Man, assumes that the environment of terrestrial dinosaurian reptiles—such as flourished in *all* the continents during the Jurassic and Cretaceous periods—was a suitable one for the evolution of *arboreal* primates or even of birds !

Southern Gobi. Geographically, the important part of the Gobi to-day is the belt south of the In-shan line and north of the China " Marches,"—a crescent-shaped block that has been tilted down to the south. The warp is concave, so that it collects water rather than throws it off ; and the tilt makes the water gravitate towards the southern margin. The encouragement thus given to a richer " cover " along this southern margin makes it the northern limit of the " Marches " —between the Great Wall and the Shamo—which have been reorganised as potential provinces of China proper, Ningsia and Suiyuen, Chahar and Jehol ; but this incorporation has been due rather to a reaction against the alienation of Tibet, Outer Mongolia, and Manchuria, than to the value of the Marches themselves.

China "Marches." This " Land of the Long Grass " has always been able to support a permanent population—of pastoral nomads ; but the aggregate has been quite small, and the component groups have been weak and incoherent—no great danger to China and not very friendly to the nomads from " beyond " the Gobi. At the foot of the Grid ranges in the east, and where the desert environment in the west gives rise to " oasis " life, the area is well suited to Chinamen ; but the mass of it is much more suited to pastoral nomads. Of course, the political meaning of the absorption is that China proper has come out from behind its Great Wall ; and this has now become merely a provincial frontier, so that Ta-tung and Kwei-hwa have been transferred from Shansi to Suiyuen.

Gobi Routes. Even the southern belt of the Gobi, however, has not enough water to attract pastoral nomads, though it is very probable that it used to have more, *e.g.* round the Gashun lake ; and in parts of it, especially the Black Gobi, though that now encloses the Gashun basin, the nomads are very hostile to the Chinese. As it is widest here, too, it is very difficult to cross, and must always have been so, for the Edsin Gol seems to have been the only route. East of 105° E. it becomes much easier, especially from Kwei-hwa *via* the Iren-tala Steppe ; but everywhere the human note is associated with one of

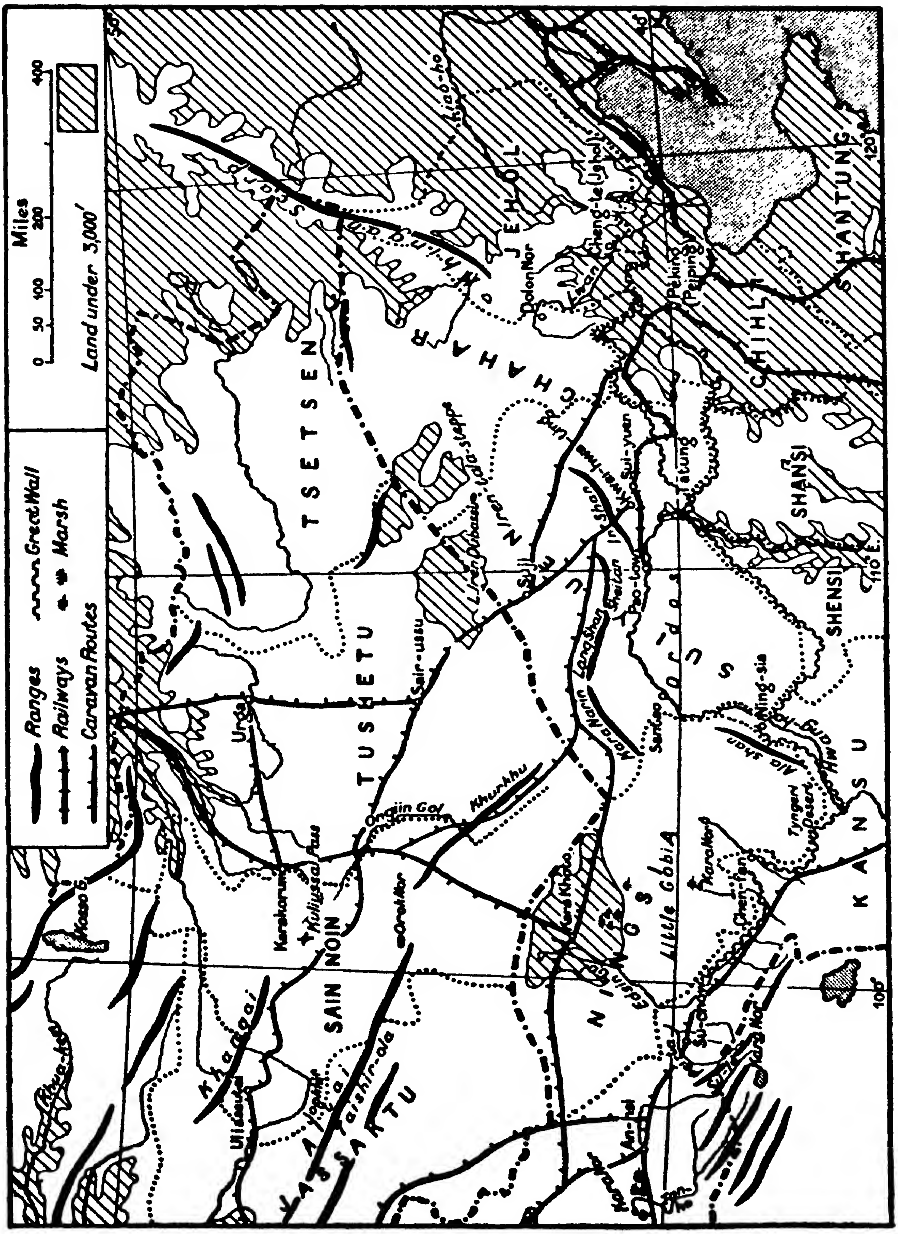

FIG. 127.—The Gobi and Eastern Mongolia.

two features—the water-carrying trough and the crests of the corrugated plateau. Movement is naturally longitudinal, along the floor of the trough; but occupation is of the great embossed ridges, *e.g.* the Khurkhu. These trend almost always N.W.–S.E, and may have some relation to the steadiness of N.W. winds; they have routes along the piedmont of each flank, dry and wet,[1]—just as the Tian Shan, the Bogdo-ola, and the Barkul ranges have; and they join one longitudinal route with another,—the Suji or Sair-ussu route to the Gashun or Sogok Nor route, skirting the southern end of the Khurkhu. They are also connected with the (nominal) frontiers of the Mongolian provinces, *e.g.* the frontier between Sain-Noin and Tushetu running for a long way along the western flank of the Khurkhu, as the Tushetu *v.* Tsetsen line runs along the Argali-ola and the Sain-Noin *v.* Jassaktu line runs along the Taishir-ola.

Inner Mongolia. This is the area known politically as Inner Mongolia. It was too narrow for the development of large groups or the wide extension of pastoral rights; but to the east it becomes steadily less desert-like, and is relatively easy to cross, *e.g.* northward from Kwei-hwa. Even to the west the Ala Shan desert, or Little Gobi, and the Ordos desert may be regarded as rather annexes of the Gobi proper than actually parts of it; but that does not mean that the new incorporation is wise, or will prove even a political success.

Ningsia. Ningsia has certain natural frontiers, in the Hwang-ho and the Edsin Gol, the Chukchur-shan and the Great Wall along the Kansu margin; and China might have been spared centuries of trouble if the Great Wall had followed the crest of the Chukchur, even if a stronger grip on the region now can be no protection to Kansu—against Tibet. The conspicuous feature of the area is its level, which is so marked as to suggest that it is the floor of an old lake; and there are a number of salt marshes which *may* be relics of the old days. But this seems improbable, and such names as *Kara* Nor, when repeated, probably mean "*Dead* Lake" rather than, literally, "Black Lake"; certainly, a similar mistaken interpretation has been given of the "forests of *Black* Poplars" in the Tarim Basin.

"Sky Desert." The Torgut Mongols have called the desert here Tyngeri ("The Sky"); and, remembering the latitude, we may wonder whether the name was suggested to them by the ribs of smooth sand and bare clay overhung by similar ribs of "mackerel" sky. A more prosaic, if not an atom more probable, explanation is that a Buddhist prelate, Baujen-bogdo, opened the road, and it was called the "Sky" (*i.e.* Heavenly) Road in honour of him. But, if the good bishop did this great work, why was only a relatively tiny bit of the great road called after him? And why choose such a bad bit? In fact, however, it is not the stretch of road, but the belt of *desert* that is so named—

[1] The Khangai is an exception, as the "wet" flank is so wet that it is too densely forested for a route.

with its long rolls of pale sand and its narrow lanes of dark clay, in the particular longitudes and latitudes where Mongols would probably have the first opportunity in their lives for seeing cirro-stratus or a " mackerel " sky.

Ningsia, the capital of the " province "—though only two days by camel from Dinyuening,—is cut off by the Ala-shan, with a crest that is seldom below 6000 feet for 150 miles; and its interests lie wholly in the Hwang-ho valley. It seems, therefore, an inappropriate place for the capital; and the choice may simply imply that there is no expectation of any development of the province. At the same time, it seems curious that, if there was to be a capital, the one obvious place should not be chosen. If the Ningsia finger might be taken from Kansu, so might the Chen-fan elbow, from which the Shui-ho does still feed one Khara Nor. The Ala-shan presents a full face to the tail of the Wet Monsoon; and, between the foot of the range and the Hwang-ho, there is a real oasis-belt, which grows abundance of food, including some rice. Even trees are fairly common—in small groves. **Ningsia *v.* Chen-fan.**

Sui-yuen is much larger and very much more populous (15,000,000 *v.* 1,000,000), and here the town of Sui-yuen is recognised as not the best place for a capital, though it is on the railway! The great caravan terminus of Kwei-hwa (Kwei-sui) is the right place; and the " desert " is of some value, especially in the Ordos, for there is enough moisture for some economic vegetation, *e.g.* liquorice, the roots of which can penetrate beneath the loose surface-sand. The grazing is very good, and round Kwei-hwa even grain can be grown without irrigation. The Lang-shan (11,000 feet) and its continuations in the Khara Narin westward and the Sheitan eastward, with the Muni-ola behind it, protect the whole desert bank of the Hwang-ho and the caravan route from rail-head at Pao-tow to Santao. The Muni-ola, or Ta-tsing, reaches a height of 8500 feet, and is well forested; and, as there is no longer any fear of raids, the Inner Wall is taken as the frontier, and so the Ta-tung coalfield passes from Shansi to Sui-yuen. Here again, between the mountains and the river, there is an oasis-belt, growing abundance of grain and having a natural outlet in the river-port and rail-terminus of Pao-tow; and the piedmont of the Khara Narin is almost as productive, with access to the river near Santao. With the railway to Pao-tow and the river-navigation to at least Ningsia, there is here a real " escape " open to the surplus population of the Great Plain. **Sui-yuen.**

The Inner Wall is again chosen as the frontier for Chahar, so that Kalgan is no longer a frontier town; and, in any case, there is no other possible capital for the province, any more than there is any alternative to Chengte (Jehol) for Jehol. The abandonment of a large section of the Grid to Chahar is significant of the reduced status of Peking; for, as it is no longer the capital of China, responsi- **Chahar.**

bility for the frontier has gone elsewhere. There is now no *chih-li* (" direct rule ") here ; so Peking (" The Northern Capital ") has become simply Peiping (" Northern Peace "), and the province is simply Ho-pei (" North of *the* River ").

The change has even a suggestion of economic development, which might have immense political significance. For southern Chahar is equally suited to the best kind of pastoral development—including even dairy farming,—such as is well suited to the Mongol genius, and to agricultural development, such as is equally well suited to the Chinese ; and co-operative development here would give a political stability which has not been known for a long time, and which would be invaluable to the New China.

Jehol. If the future of Manchuria were assured, the Jehol province might be divided along the water-parting between the Lwan and the Liao, and the north-east of Jehol be completely merged in Manchuria, to which it naturally belongs ; and Jehol would then really represent a historic connexion with Old China, linking the Imperial Hunting Grounds with Cheng-te and Peiping. But the future of Manchukuo is not assured, and the location and the character of Jehol give it so much international importance that political difficulties cannot be avoided. There are three factors of major importance. The first is that in 1928 the administrative district of Jehol was made into a (fourth) province of Manchuria ; and it is impossible to deny this and very difficult to cancel it. So long as it was a Manchurian province, there was actually an advantage in its eastern frontier running near (30 miles from) and parallel with the Peking-Mukden railway ; but the case is very different—though the stations are strongly fortified—when Chinese forces are threatening both the main line and the Takushan-Tungliao branch.

Shan-hai-kwan. Conversely, the real danger to China is not at Shan-hai-kwan, even if it is a very " Marathon " in its position and character ; still less is it at Chinwangtao or Changligfu, the importance of which has been both misunderstood and exaggerated. The Boxer Protocol gave to the Powers the right to occupy them—along with other places, *including Tientsin*—simply as a guarantee of open communications between Peking and the sea ; but this 4 to 5-mile strip of " Plain between Mountain and Sea " is no protection against intrusion from the north-east by land. The mountain in question is 2700 feet in height, and at its extreme north-eastern foot the Chin-*men* (" Chin-*gate* ") gives a direct and easy route to Peking, and enables the whole Tashil basin to be turned, and the Peking-Mukden line to be cut *via* the branch line from Shihmenchai to Chinwangtao.

The difficulties are further exaggerated by the fact that the new province was made up of only two of the four hordes or leagues that occupied the eastern section of Inner Mongolia, the Chao-ude and

the Chosotu. The other two were farther away from China; and, **The Hordes.** though their princes did recognise Chinese sovereignty, they and their hordes were much less under Chinese influence. Moreover, the territory of the Silingol horde actually touched Outer Mongolia, while that of Cherim touched Manchuria. The latter was absorbed into the Fengtien province of Manchukuo, and has now been transferred to the new Khingan province, which is specifically Mongol and so anti-Chinese; and the Silingol horde remains semi-independent.

This makes them much more popular than the Chao-ude and **Silingol.** the Chosotu with the Mongols of both Outer Mongolia and Manchukuo; and so they probably hold in their hands the fate of this whole region, with all its international reactions. Certainly, they can, if they wish, protect Manchukuo from Chinese attack by land as effectively as the Japanese can protect it from attack by sea; and, if Silingol and Japan came to a close understanding, based on the essential fact that the Japanese *do not wish to colonise Manchukuo*, the Chinese there would be forced either to return to China or to give unreserved loyalty to Manchukuo.

Tibet

Of the three alienated provinces of the old Chinese Empire, Tibet is the one which is most closely linked with China, and yet from which there is least danger to China. For the petrifying geographical isolation and a profoundly unspiritual development of Buddhism—in the politico-religious lamaism that was instituted by the "founder" of Lhasa, a contemporary of Mahomet,—seem to have submerged the Tibetans in a moral lethargy and a mental laziness that wish only to be left alone.

If we ignore political claims and frontiers, we can divide To- **Divisions.** Bod ("High Bod")—which is the highest large tableland in the world—into two main types of region, Lake-land and River-land; and each of these can be subdivided naturally into two, a High Lake-land and a Low Lake-land, an Indo-Brahman River-land and a Sino-Burman River-land. The distinction of the types is important, as it is precisely the great number of lakes, to absorb the drainage, that has minimised river-erosion in Tibet

The High Lake-land can be determined very simply, if roughly, **"High Lakes."** by a straight line drawn from Leh to Lhasa, and another, drawn at right angles to that, from Lhasa past the eastern end of the 20,000-foot crest of the Dangla to the main Kun-lun range (cf. p. 71). The area northward of these two lines is an arid wind-swept waste that probably has an average height of 16,000 feet, with round-crested ridges, which are no protection against the furious gales, and flat valleys embroidered with boggy soil and salt lakes. Salts of various

kinds are the common characteristics of all parts, but only the borax —and common salt in a few places, especially Chang (or Byang)-gi-tsa (" Northern Salt-field ")—can be really worth collecting and transporting (to India).

"Low Lakes."

The Low Lake-land is what may be called—from the most remarkable feature in it—the Tsaidam, or Chaidam (" Market-Place," in Mongol) —plateau, the great stair-case for traders and pilgrims between Lhasa and all the *Mongol* lands. Of course, China claims to have incorporated the eastern half as the Kuku Nor division of Tsinghai—on the plea that the New Dominion is " essential to the security and the expansion of China " ; but, so far as the plea is not patently false, it can only cause insecurity and even actual trouble. Before the " incorporation " Kansu was in no real danger from Tibet, not even from the Tangut nomads of the Kuku Nor basin—who are inveterate marauders,—and the formation of the Ningsia province may actually have made it safer than it was ; but no Chinese emigrants have wanted, or do want, to go there—because the country is unsuited to them. The official propaganda cannot be accepted for a moment, against the evidence of such an observer as Captain Kozloff, as to the kind of life for which even the Kuku Nor is suited ; and he decided against the agriculturalist and in favour of—not merely the pastoralist, but definitely—the *nomad*.

"Lumpy Stones."

The history of the area is equally significant. The inhabitants have been Mongol, especially Tangut, ever since 1100 B.C., when the Chinese knew them as Kiang (" Shepherds ") ; and they certainly have had a historic connexion with Liang-chow, of which Chen-fan is the outpost (cf. p. 673), *i.e.* with the natural exit from the Kuku Nor basin. The earliest centre upon this Amdo plateau was Tsih-shih (" Lumpy Stones "), which extended its power southward past the spurs of the Dangla into Khamdo far enough to include the upper basin of the Yalung. When the rulers spread their power south-westward into the Tsanpo valley, they translated Tsih-shih into Lha-tho (" Lumpy Stones ") and Yalung into Yarlung, their capital, though they had a palace on the " hill "—Lhasa. But nowhere except amongst the Bod-pa people of this Yarlung government was there any general occupation except pastoral nomadism and the collection of rhubarb and musk—a wanderer's work ; and, where some fraction of the population did practise agriculture in Amdo, they were called Rongwa (" Ravine Folk "), *i.e.* they were not really plateau people, but dwellers in the deep valleys of the Nan-shan.

Mongol Claims.

Even if the political expansion were accomplished, and the area were flooded with Chinese immigrants, not only would any agriculture be hopeless in the water-logged bogs round the lakes—all salt, even the Kuku being salter than the Aral Sea,—but there would be immediate and armed resistance, not only from the Tangut

nomads, but from the Mongol caravans, with their primeval rights of pasture and water. After all, *Kuku* is a Mongol word; and though the Chinese systematically call the lake Tsinghai ("Chinese Sea"), no one else does. When even the surface of the lake is at 10,500 feet, and that of the Khara Nor is well over 13,000, it seems absurd to pretend that the area does not belong to the Tibetan plateau, even if Sining officials have had some formal authority over the whole area; the whole saddle is simply the eastern wall of the great Tsaidam basin, with its thousands of square miles of almost hopeless swamp.

It is worth noting that one of our critical meridians, 95° E., crosses the Marco Polo range and the very core of the swamps, and the other, 100° E., crosses the Kuku Nor on its way to the Nan-shan. Snow makes the passes impracticable before April, and caravans are constantly held up here for days by drenching rain in July and August.

"High Rivers."

The Sino-Burman River-land has already received some attention, but mainly from a single point of view—structure and physical history (cf. pp. 494 and 496); and it has other points of considerable interest, economic and historical. It calls to mind the Armenian river-system, with its upper basin a series of longitudinal flats which offer every encouragement to commerce, and its lower basin a grid of transverse gorges. Its value to Tibet lies in the commercial routes of the upper basin, focussed on Jyekundo and Chamdo (400 miles from Lhasa); and it is of direct importance that no route essential to China has come across the Kuku Nor basin. The real key to the trade of Tibet, as a unit, is in the tea-trade, and this is entirely in the control of Ta-tsien-lu.[1] The historic, or pre-historic, interest is a racial one. The Tibetans, whether the settled Bod-pa of the Great Valley, or the wandering Dru-pa ("Steppe-men") of the Northern Plateau (p. 67), or the Tangut moss-troopers of the Amdo border-lands, are all round-headed and flat-nosed; but in Khamdo, where these transverse defiles give access to and from lands of long heads and shapely noses, the skulls—though, naturally, more massive and rugged than in India—are typically long and with an approximation to the regular features of the Longheads.

"Low Rivers."

The Indo-Brahman valley, though a single great tectonic trough, should be divided in the neighbourhood of the Manasarowar lakes. The Indus valley runs steadily north-westward to parallel 34° N., with its hinterland to the north-east so dry that the snow-line on the Tibetan Karukorum rises to 22,000 feet; and its only value is as a

[1] How much tea goes through every year, definitely smuggled or "by special arrangements," no one except the gentlemen concerned can say; but duty is actually paid in Ta-tsien-lu each year on over 10,000,000 lbs. of tea!

fairly easy route for the exporting of gold and wool,[1] *e.g.* from Jalung and Gartok. Tibet is one of the richest gold-fields in the world, gold being found almost everywhere, though the Thok-Jalung mines are the most famous; and the terrific gales keep any vegetation so free from the little snow that does fall, that there is an almost incredible amount of wild life—yak and ass, sheep and goat, deer and antelope. The long-legged sheep are able to travel over vast areas for their food, but are much less valuable than the yak; the latter seem really to enjoy life only in the teeth of an icy gale and with enough snow at hand to quench their thirst, and their only defect is that—like zebras under very different temperature conditions—the over-stimulation of the very bright light makes their nerves unstable.

"God's Country." The Brahmaputra valley, for about nine-tenths of its length, clings steadily to parallel 29° N.; it works into longitudes of rapidly increasing humidity; and for several hundred miles it is below 12,000 feet. With a high percentage of sunshine and a moist soil of fine quality, agriculture is very successful; excellent crops of barley and very fair wheat are grown, and there is a great abundance of vegetables and "salads," especially peas and mustard. It seems to have been this unfamiliar fertility that made the emigrants from the north-eastern "Land of Lumpy Stones" think they had arrived in God's Own Country, *Lha-sa* ("God's Country").

Shigatze. Shigatze (11,800 feet) has had the advantage of being actually on the great river, and yet with fairly easy access to the Khalamba Pass (*c.* 17,000 feet). It is a typical four-square city, and claims for its Grand Lama equality with the Lama Guru of Lhasa; but its importance lies in its access to the lakes at the *northern* foot of the Trans-Himalayas. That system consists generally of three or four parallel ranges (120 miles wide at most), and has the greatest *average* height of any mountains in the world (cf. p. 70); but its sierra crest is favourable to fairly good climatic conditions to the north, even barley growing well between the Dangra and the Tengri Nor, and the pasturage is excellent.

Lhasa *v.* Gyantse. Lhasa seems to have been chosen for a royal residence because of its sheltered position in the southward valley of the Ki-chu. It is very well sheltered by mountains, and on its western side it has the three-peaked ridge on which the Potala fort stands. It is a circular city, standing in a fertile basin where trees flourish, though the ground is apt to be marshy. In all its history and associations it offers a great contrast to Gyantse, facing northwards from the Himalaya piedmont; but it is this relatively unfortunate position that has made Gyantse the great road-junction of the whole valley, through which it collects nearly all the typical Tibetan products—

[1] The best route out for the northerly centres, *e.g.* Rudok, is by the Baralacha Pass and Patseo to rail-head at Pathankot.

gold and borax, wool and furs, musk and rhubarb. It has easy access to Lhasa *via* the Do La Pass (16,000 feet) above the Yamdok Lake.

Outer Mongolia

Grass-land.

As a unit, this area may be described as a huge horseshoe of grassland round the Gobi desert and semi-desert, with its open heel in the west; and this grassland improves in width and in quality seaward and northward. In the China "Marches" it is narrow and poor; in the lee of the Khingan, from the Yablonoi butt to the Peking Grid, it is wider and much better; and then it improves steadily westward, as it climbs from the Lower Terrace to the Middle Terrace of the great shield (p. 59).

Khingan Hinter-land.

The area between the Dolon Nor and the Dalai Nor (L. Kulun) has had much less attention than it has deserved. For the Khingan scarp, like the New South Wales scarp, is not high enough to *dry* the S.E. winds, so that a rainfall of not less than 10 inches may be regarded as assured for several hundred miles inland; and the gentle slope inland and the sustained humidity of the S.E. wind give the rain full economic value. But the essential basis of the human development of the whole unit was in the highlands of the Upper Terrace; there was no basis for any natural movement north-and-south parallel with the Khingan; and the conditions of life seaward, as illustrated by the hunting and fishing cultures of the "Manchurians," were alien to the Mongols.

Kara-korum Divide.

The rest of the area can be divided into two—by an artificial line, which does follow well-marked natural features, but which tells its own story. It is the ancient route of peace and war from Kiakhta *via* the Orkhon valley and Karakorum to the Edsin-gol and Karakhoto, along which a level of ± 4500 feet is so typical that it may be regarded as a real average. At Ongiin-gol it crosses the Uliassutai–Sairussu track, which is joined at Sair-ussu by a track from Urga; and the common trunk goes on to Kwei-hwa or Kalgan. The name Sair-ussu ("Gravelly waters") is very significant, for this Lower Terrace is essentially a vast expanse of gravelly steppe; even between Sair-ussu and Kwei-hwa there is no considerable belt of sand to be crossed.

Residual Swamps.

In this eastern half of Outer Mongolia there are a number of basins, small and great, *e.g.* the Iren and the Ongiin; and, if the climate once became drier and drier to the north-west, such basins would naturally be the last areas in which vegetation could find any water, and would be the last resort of the natural fauna. To-day the whole area is a huge pasture, producing very healthy, if rather dwarfed, stock—*e.g.* the Urga basin being noted for its ponies; and the rearers of animals in such a region could scarcely avoid evolving into carriers. Kropotkin estimated that 100,000 camels

were employed every year simply in the carriage of tea from the one terminus of Kalgan.

Urga. Urga is the only place of great importance, and this is due to its position and its climate. There are two explanations of the name, both possible and the link between them obvious. It may be a normal metathesis for *Urag*, or Urac (Hurac); and the full title of the city, which is the sacred city of the Mongols, is Bogdo Lama en Hurac ("The Camp of the Supreme Lama"). Or there may be an intrusion of the liquid *r*[1]—the most variable of all the consonants—into *Ugo* ("Palace"); and, in any case, every Mongol palace was encamped.

Its Place and Relations. The city stands at a height of *c.* 4300 feet near the only considerable river on the track from Maimachen to Kalgan,—a convenient place for changing the medium of carriage before or after crossing the Kentei; and, though the rainfall is usually below 10 inches, the July mean is only 64° F. (with a January mean of − 18° F.), and the Kentei guarantees a considerable volume to the Tola, even when not in flood. Urga is, therefore, a great provision-market as well as a great change-station—*c.* 600 miles from Maimachen. Like the Kerulen, too, the Tola flows almost due southward from the Kentei into a very important longitudinal trough, in which the Kerulen turns eastward and the Tola westward, giving a remarkable through-route between Urgo (Kerulen) and Karakorum; and so there was something like 1000 miles of river-valley between the capital and the frontier on the Dalai Nor (L. Kulun)—which no longer empties into the Argun.

Kulun. The Chinese call Urga by this name *Kulun*, and there is a Chinese town beside the Mongol town, while a third "quarter," the Kuren, is the residence of the "Living Buddha," the third in rank of the Lama dignitaries; and, during the British expedition to Tibet in 1904, the Dalai Lama removed to Urga. But the city is so important commercially that—though, till almost the end of last century, the only medium of exchange here was bricks of tea—the Chinese amban has been responsible for the control of Kiakhta and Maimachen ("The Place of Winds").

Maimachen. The commercial importance of Maimachen seems to have given its name to the commercial quarter—or "city"—of all Mongol centres. Thus the prime importance of Urga has been religious, for it shared the sanctity of the Bogdo-ula[2] ("Holy Mount") at the foot of which it stands; and the great monastery in which the Primate of Mongolia lived, made a separate "city." But this attracted a crowd of students—Chinese (Taoists) as well as Mongols

[1] This is found widely in Mongolia, *e.g.* in the Kerulen Urgo, and not only in this particular case.

[2] Though Urga, as a formal *Maimachen*, dates only from the seventeenth century, Jenghiz Khan was born in one of the forested glens on the northern face of the Bogdo-ola.

—for whom a separate "University," Gandan, was created. Quite apart, the third "city" was really a huge market-square, called Maimachen.

In Uliassutai, always more important as an administrative centre, the great monastery is represented by a fortress, and the business quarter—again a Maimachen—is a separate "city" on the opposite bank of the river, the Chinghistu-gol; and Kobdo repeats this on a small scale, the fortress being separated from the business quarter only by a dry moat.

Higher Terrace.

The solid block of Higher Terrace, fully 500 miles across in each direction, is a minor horseshoe, only with its heel opening out eastward on the Karakorum front, where the old capital held the balance between the terraces; and its natural limits on the three other sides are the Altai, the Sailughem, and the Sayan crests. It is quite a typical part of the continental plateau-system. The outer foot of the long and narrow block-ridges of the Altai is down in the Zungarian basin, while the inner foot is 3000 feet higher in the Kobdo basin; the passes between the two, like those of the Sailughem, are at a height of *c.* 10,000 feet; and, though the fall of the south-western scarp is so much greater (L. Ulungur is *c.* 1500 feet), the north-eastern scarp is much the steeper (L. Kobdo nearly 4000 feet).

Ulungur Lake.

The level of Ulungur is important, as it is *below* that of the river; and therefore the river cannot be fed underground from the lake, as has been so confidently asserted. In any case, if there were *any* outlet, the lake could not be so intensely saline; and, if the lake had ever fed the river, it should have contained some of the organisms, *e.g.* species of fish, which Professor Saporzhnikoff has proved to be *peculiar* to the Irtysh.

Feature-lines.

The trend of the feature-lines, as shown very clearly in the 600 miles of the Altai, is definitely N.W.–S.E.; and this is true even of the Uryankhansk basin, *e.g.* in the Khua-kem valley, which has been already related to Siberia (p. 199). At the same time, though ridge and river alike follow this trend—the Tannu-ola and the Artsi-bogdo, the Khan-ku and the Khangai, the Kobdo and the Japkhin, the Tes and the Eder (Upper Selenga), through communication is practically blocked by the difficulties of the Sailughem, with very few passes and these ranging from *c.* 9500 (Ulan) to *c.* 10,500 (Chapchan) feet. The result is a very compact and self-contained unit, which may be divided into three basins, named after the lakes connected with them—Kosso (*c.* 5300′), Kobdo, and Ubsa (*c.* 2300′).

47° N.

A natural line of least resistance runs—roughly along parallel 47° N.—from the Kerulen valley *via* Urga to Karakorum, and then holds steadily on westward *via* Uliassutai to Kobdo—for the Black Irtysh and the Ob valleys, the latter reached by the Chu valley; and the presence of a coalfield in the Kobdo valley may some day be of importance.

The mean height of the basin-floors is ±4000 feet, even the Orok Nor reaching the 4000, and the sky-line of the ridges is ±2000 feet higher. The Ubsa basin is closed, and the low area round it is very small, the total under 3000 feet being no larger than Yorkshire.

Climate. The climatic relations of the area are of immediate importance; for they offer quite remarkable encouragement to development,—they explain the historic value of the highland to the Mongols,—and they illustrate the influence of the Arctic Ocean. Alike on the Tannu-ola, on the Khangai, and on the most northerly of the Altai lines (though *not* on the higher, but more southerly), the north-*eastern* face, but *only* the north-eastern, is densely forested—up to 6000 feet even on the Altai; and the *N.E.* wind—theoretically, the least likely of all winds to be humid—is persistently humid. This may be due in some slight degree to the influence of L. Baikal; but the lake is far too small to have much influence, if any, and the East Sayan scarp rises to 9000 feet with a very steep face to the lake. And yet the humidity is high enough to keep the range of temperature even at Uliassutai,—in the lee of the Khangai and with the pass (strictly north-east of it) reaching very nearly 10,000 feet—less than 80° F. (−12° F. in Jan., to 66° F. in July).

Frontier Walls. As the race-home and the military base of the old Mongol conquerors and their cavalry, North-western Mongolia had two other geographical advantages; and the greater was in its mighty frontier walls, for on all three fronts the walls are high and very steep. The average height of the Sayan crests seems to be about 8000 feet; the lowest pass, the Obo-sarym, is well above 6000, and the Mongol pass is 6500, while the Muztagh and the Tenghyz are about 7500. The western wall in the Sailughem is even more formidable, for its summits approach 15,000 feet—in Byelukha, and several peaks exceed 12,000, *e.g.* Kaitun, while the snow-line is at 6700 feet on the north-western flank and only about 1000 feet higher on the south-eastern.

This north-western flank is very steep and extremely difficult of access, for it is buttressed by parallel lines of "Alps," the Chuyan having a mean height of about 9000 feet, and the Katun Alps one of 10,000; and the Chuyan Alps carry nearly a dozen glaciers. The Ek-tagh, or Mongolian Altai, if not quite as formidable as the Sailughem, or Russian Altai, can be pictured as even more of a wall, for the width is less. In the "Five Holy Mountains" of the Tarbyn (-bogdo-ola), Kiityne nearly reaches 15,000 feet, rising from 100 square miles of ice and snow; and even in the long ridge which declines in height as it runs south-eastward, Mustan exceeds 13,000 feet.

Forested Scarps. This south-eastward trend is very important climatically, for it exposes a high and very steep south-western face to the Atlantic

winds, with the result that the system makes a remarkably effective precipitating medium. There are ten glaciers round the head-waters of the Kobdo river, and twenty round those of the Kanas; and a broad belt of forest clothes the south-western flank between the 3000-foot and the 8000-foot contours. On each of the three closed fronts, then, the outward foot of the wall is down on the lowland, some 3000 feet lower than the "home" foot; and, while the approach to the passes from within is relatively gentle and easy, that from outside is exceedingly steep and difficult, and the difficulty is almost unsurmountable in the forest belt. In fact, the forested wall here is at least twice as formidable as that which stopped the Turkish cavalry "behind" Vienna; and what the Kirghiz thought of it, may be judged from the name which they gave to the first place where they were free from the forest in a retreat down the Ob-Chu valley—*Kosh, agach* ("Good-bye, Trees").

Horse-men.

Conditions within the barrier were greatly favoured by its character, and the soil is as good as the climate. The flora is largely of rich prairie type; steppe flora can be found up to 5000 feet, where a rich Alpine flora can also be found; fine forests—though mainly of birch and aspen—reach up to 6500 feet, which is 1500 feet lower than on the outward flanks of the barrier. Except for the bright light, which is over-stimulating for White races, the whole environment is favourable to human health and strength, and it is a perfect paradise for horses; and its peoples were famous even in Europe 2500 years ago as "drinkers of mares' milk"—which perhaps throws some light on their physique, for it is one of the less fattening milks.

Uryan-khansk Country.

It may help us to realise the character and to understand the history of this core of the old Mongol Empire if we compare it with a strictly comparable area in the immediate neighbourhood, the Uryankhansk country, with a common base in the Tannu-ola and a 7000-foot pass between them. Again we have three forested walls, but they make a closed triangle and not an open-sided rectangle; and they enclose a much smaller area (? 60,000 square miles). In this small area the spurs of the three walls cover more or less the whole surface, but there is a central boss of fully 5000 feet—in a setting which recalls the river-encircled Tatra.

Forested Lakeland.

By relief and climate this is not an expanse of prairie or steppe, but a forested lakeland. Even where the Bei-kem and the Khua-kem unite in the Ulu-kem—to make, with the Kem-chik, the Yenisei—the lakeland is 1700 feet above sea-level. There is a considerable area of rolling grassland, only two of the five "Tuba" tribes being true forest-dwellers; and we must not be misled into exaggerating the amount of forest by the fact that the three other tribes apply the word *Taiga* ("The Wild") even to bare treeless peaks. On

the other hand, we must not be misled by the apparent transhumance —with *reindeer*, which seem to have survived here from some Ice Age, thanks to the shade of the spruce forests that fringe the alp.

Fur Folk. As a unit, this country is a forest-land, a cow country rather than a horse country (cp. p. 174); and the forest is Siberian (fir, larch, spruce) and not Altaic, just as the Finno-Tatar "Tuba" folk are not pure Mongols. The black felt yurts are more numerous, if less conspicuous, than the white birch-bark wigwams; but the typical products are furs and fish, and these are exported by raft—to Siberia, mainly *via* the Cha-kul and the Yenisei. But the fishermen and many of the boatmen are seasonal immigrants from Siberia, and the centre of the Tuba life is in the Upper Bei-kem lakeland, especially round Toji-kul, in a self-contained indifference to the outside world. They are very clever hunters and trappers, but essentially Shamanists—who think that they are Buddhists. They are in no way masters of their fates, but slaves to the spirits of mountain and forest, river and tarn; and their land could never have been the core of a conquering empire, for it lacks both the lure and the threat of an open front.

The Mongol Square. Far different are the conditions in the Mongol square, with its open front and its absence of sodden forest; and there, on the dry grassland, a virile stock faced the open front. As a boy, Jenghiz Khan lived beyond the fencing walls, where the sunny valley of the Onon drains down from the Kentei annex of the Yablonoi. The Orkhon led *north*ward from Karakorum to the "Baikal road" between the Kentei and the Sayan butts, but "the Jordan of the Mongols" was the Kerulen, and the Onon commanded the flank of that as a northern tributary of the river. There was never much fear of any flank attack even outside the walled square, for on the one flank was the Yablonoi and on the other the Gobi; but in the old days the balance of power lay, as it may lie again, where the meridional Orkhon-Edsin route crossed the latitudinal Kerulen-Tola route, *i.e.* Karakorum. In the meantime, however, Karakorum is too far west, and its southward connexion is useless; in any case the Tola is more important than the main stream, and motor transport has minimised the value of the river-routes; and Urga has thus become the natural centre, commercial and strategic, of the whole open front.

Three Basins. The position of the three great centres in relation to the three basins is significant. Movement in the northern basin is only eastward; that is the smallest basin; and the snow-covered Munku-Sardyk bars movement northward from the Kosso-gol. All activity is, therefore, centred eastward, even beyond the mouth of the basin—in Urga. Uliassutai, on the other hand, occupies a very central position in the central basin; and it should be formally recognised as the proper administrative centre, the nearest approximation to

Karakorum in its place-relations. In the southern basin movement is specifically westward, especially by the Chu valley to the Barnaul region ; and Kobdo stands towards the western end of the basin.

Kropotkin once called this highland the Switzerland of Asia ; and, apart from physical history and structure, there is much that is Alpine—ice and snow and real alp (even on the gently warped Khangai). If it were peopled by Swiss, it would be the brightest spot in Asia ; it was the home-base of the Mongols (" The Braves "), as Zungaria was their *rendez-vous* ; and the youngest Khan who ever succeeded—at the age of thirteen—to the supreme authority, Temuchin of the Onon, dared to call himself—20 years before he had proved it true—Jenghiz (" The Invincible ").

" The Braves."

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CHAPTER XXXVI

JAPAN: HISTORIC AND PHYSICAL

The Barrier-Reef.

THE inclusion of the Japanese islands here, on a more generous scale than the mere summary in which the British Isles were included in the *Continent of Europe*, may be defended on several grounds. Even the political geography of nearly half Asia cannot be approached without direct reference to the political barrier-reef by which a Sea Power can control all movement to and from that half by sea; and Japan to-day, in possession of the peninsula by which her "Japanese" people reached the islands, is in a position rather similar to that of England while her kings were still really Dukes of Normandy.

Kublai Khan.

Certainly, one tremendous episode in their history seems to divorce the people and their islands wholly from continental control; and the very close parallel with our Elizabethan story deserves attention. For Kublai Khan, like Philip II, was at the height of his power and his splendour when the buccaneers and the pirates of a little island kingdom ruffled his temper. The emperor of a larger continuous empire than had ever before, or has ever since, obeyed one man, suddenly had to realise that both honour and interest demanded imperatively that these rovers and raiders must be enslaved or swept into the sea; and, when they dared to behead his envoys, their doom was fixed—slavery was too good for them, and the alternative was annihilation.

"Red Horse Barrier."

He used Korea as Philip used the Netherlands, and with as little benefit. Then, as now, the Koreans were quite clever with a paddle or a barge-pole; but they were no more sailors than they are now, or than Medina Sidonia and the rest of the orange-growers were. So the red Mongol flag, which had been carried south to Canton and west to Moscow, was now flown over an Invincible Armada—of 1300 great ships and 2000 transports, carrying 170,000 soldiers across the Shimonoseki, or Bakan Strait ("Red Horse[1] Barrier"); but, like Philip's men, they were soldiers, not even marines, still less

[1] Perhaps this was at first "Red *Space*-Barrier," *i.e.* the belt of sea that was a Barrier against that Red Flag.

mariners. On the day of battle—June 23, 1281—*Afflavit Deus*, as Elizabeth worded it; and the typhoon strewed the coasts and the islands of Kiushiu with flotsam and jetsam of crews and carracks. To this day the Japanese remember, and commemorate, that "Wind of Heaven."

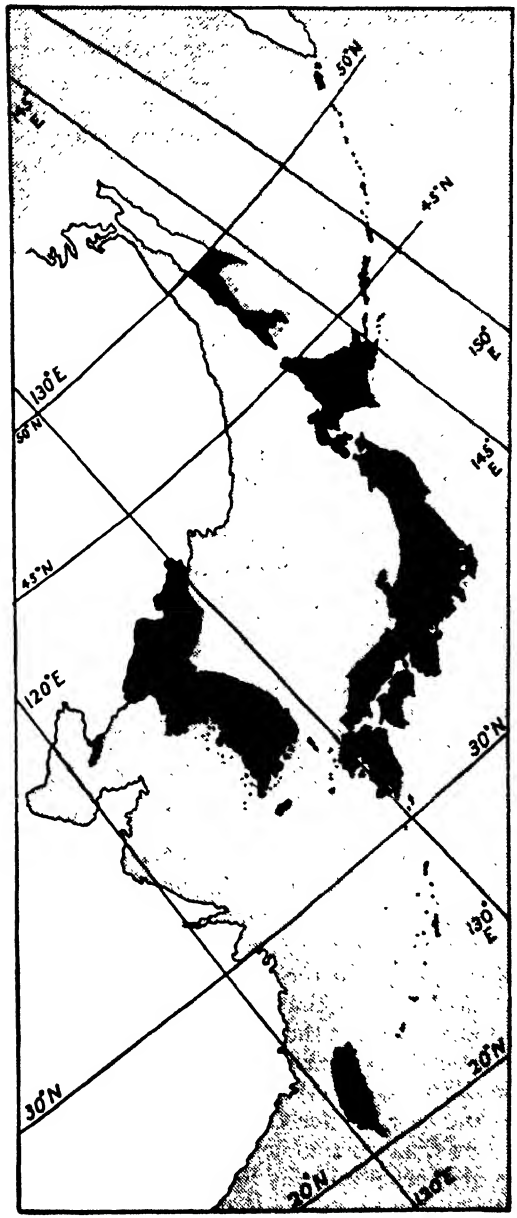

FIG. 128.—Asiatic Political Barrier Reef.

The Ainus.

But just as the Elizabethan story may send our thoughts backward to a Britain invaded by Jute sailors destined to be ruled by Norman knights, so the Japanese story may take them back to a land inhabited by "hairy" Ainus and invaded by Malay seamen, and destined to be ruled by a people to whom the ancient Chinese writers refer as the "white-armed people of Yamato," and whose descendants still regard Yezo rather as a separate part of the empire than as a province of the kingdom.

The Ainus are wavy-haired White men, with that power of the wavy-haired to grow a beard which is such a signal mark of differentiation in the lands of the beardless lank-haired. They were expert fishermen, and seem to have occupied the whole Asiatic coast in these temperate latitudes, whether it was then a

continental rim, or had been separated from the continent as three island arcs; and, for the present argument, they may be called the "Ancient Britons" of the islands.

The Yamato.

The "Jutes" came in the form of the Malayan seamen, following northwards the same island-line as the Ainus had followed southwards—the Riu-kiu arc; but, though they mingled with the Ainus, and were real sailors, they did not play any more part than the Jutes (as distinguished from the Angles) played in Britain. The "Norman" element came in the form of the white-armed daimyo and samurai soldiers, leading a succession of invasions (from 1000 B.C.) by way of the Korean peninsula and the island-bridged Korean Strait. Their followers were the "Old Japanese," but were of very mixed race; probably most of them were Mongoloid,[1] but some were Iranian, and others were even Arabian. If the resultant blend, though organically fused in the sea-girt home, cannot strictly be called a race, it has abundantly proved its right to be called a nation; and both the fusion and the precise qualities developed in the process are worthy of close attention, especially that sense of personal honour which is so feebly developed in most Asiatics.

Their Characterisation.

We would venture to say that the island environment was bound to be as favourable as in Britain—or in any other islands—to a fusion of heterogeneous elements into a national and cultural unit; and the isolation by sea was almost bound to give that unit a distinctive— ? a maritime—character. But the character is more markedly distinctive than we would expect merely as the result of the isolation, even if the Sea of Japan is much more of a barrier than the North Sea—from its size as well as from its climate. Some analysis may suggest that the character of the islands themselves has played a special part in the story, and we may pay attention first to the more obscure problem.

The Core.

The core of the empire (20°–50° N., 120°–150° E.) is the kingdom, the core of the kingdom (30°–45° N., 130°–145° E.) is Honshiu, and the core of Honshiu is a square highland, measuring about 130 miles along parallel 36° N. and 130 along meridian 138° E. This highland is easily marked off, in a rough way, by two parallel straight lines—one from Tokyo to Takata and the other from Toyohashi to Kanazawa; but in the east the Chikuma valley may be called a natural limit, practically separating active from inactive volcanoes, and in the west the Biwa lake-basin was a great historic frontier. Immediately to the east of the Chikuma valley Asama-yama (over 8000′) has been the most violently active of all the Japanese volcanoes in recent times; and the Seto Uchi trough can be traced on through the valleys of the Yamato and the Yodo up to the lake. The provinces to the east of the eastern line were called

[1] They seem to have included a number of Chinese *farmers*

Kwanto ("East of the *Barrier*"), and those to the west of the western line were called *Kwansei* ("West of the *Barrier*").

Through the centre of this highland there runs what would be a very remarkable gash—the "Great Ditch,"—if it had not been largely filled up by the volcanic outpours with which it is associated. The best-known natural features actually included in the Ditch are the Fuji river and the Suwa lake, the Matsumoto trough and the

Topography.

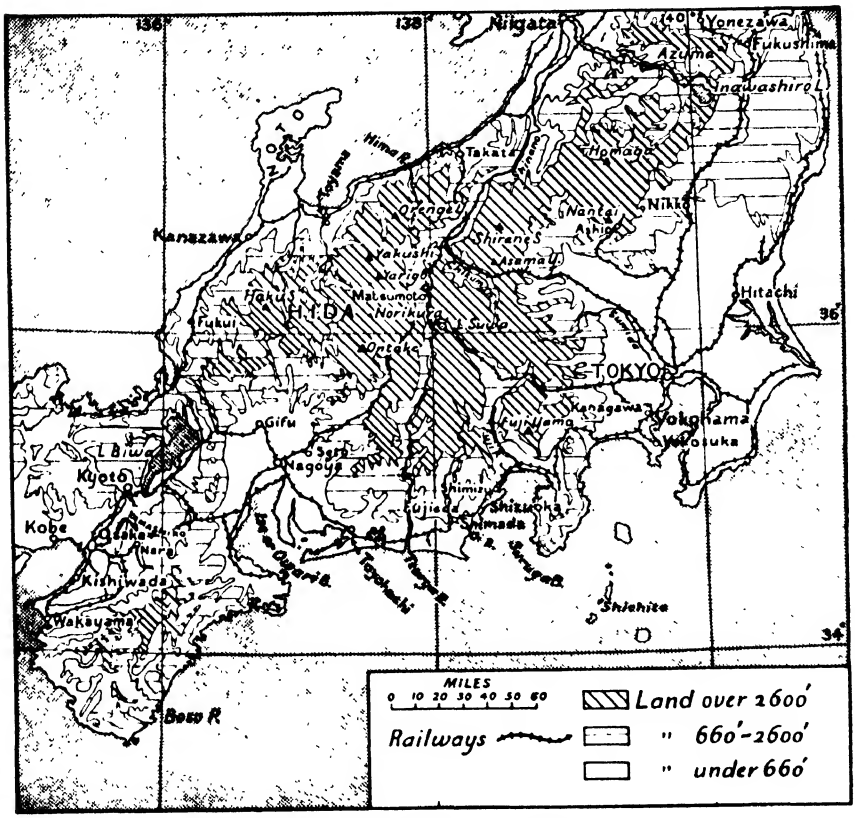

FIG. 129.—Highland Core of Japan.

Hima rift-valley below Orenge-yama (*c.* 10,000'); but the real fame of the gash is due to the overhanging features and the catastrophic disturbances to which some of them have given rise. The western wall is made by two great mountain blocks, the Hida and the Akaishi,—the Shisjiri ridge, at the head of the Suwa basin, marking the divide. The Hida ranges, or Japanese Alps, are the highest system in the country, with a number of peaks above 9000 feet and several above 10,000. Amongst the most famous, Yariga, "the

Matterhorn of Japan," is well over 10,000 feet, and Yakushi is over 9800; and, in the volcanic annex to the southern end of the ranges, Norikura is just on the 10,000, and Ontake is 10,450. In the Akaishi block, again, the most famous features are, naturally, in the most easterly range, the Shiramine (or Shirane-san), where the crowning peak of the Kai province, Kai-gane, reaches over 10,300 feet, and Ai-no reaches 10,200; and, though Komaga is only *c.* 9500 feet, its precipitous granite peaks are immensely spectacular.

Fuji-yama.

The eastern wall is specifically volcanic, and really "starts" in the Marianne Islands, and approaches Japan *via* the Volcano and the Shichito groups, the latter *seven* (*shichito*) in number; but no cone on the mainland reaches 5000 feet south of Fuji-yama ("The Peerless Peak"), which presents to the sea an unbroken curving slope of 12,000 odd feet. The perfect symmetry of the rounded pyramid,—cloaked with forest to 8000 feet, and with the beautiful Kenga-mine cone soaring 4000 feet above that and looking down to leeward on a crescent of lakes, made in the ash-dammed, snow-fed streams,—makes it one of the most famous mountains in the world, and gives it a foremost place in Japanese art. In fact, it is regarded as "Heaven," and the line of cones along the Ditch —of which Yatanga (*c.* 9500′) is the highest—is "the Road from Heaven to Hell," actually ending in Figoku ("Big Hell"), which well deserves its name—for the uncanny noises and unholy smells associated with its outpourings of sulphurous steam.

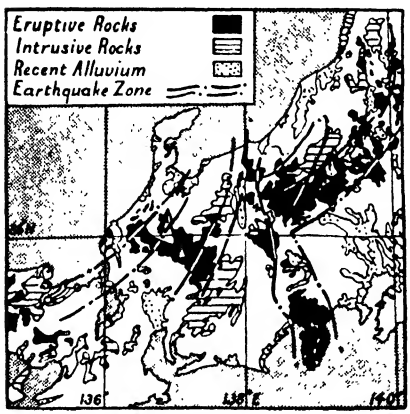

FIG. 130.—Geology of the Core.

"Little Ditch."

West of the Hida range stretches the so-called Hida plateau, which narrows westward between the fertile plains of Nagoya and Toyama towards the Biwa basin. It is one of the wildest parts of Japan, rising westward to a ridge crowned by the cone of Haku-san (over 8000′); and then it again narrows down between the smaller Gifu and Fukui basins to the lake. Along this western edge of the great highland a "Little Ditch" runs northward from Nagoya parallel with the "Great Ditch"; and here, in 1891, every house in the 20 miles between Nagoya and Gifu (222,500!) was destroyed by a series of 2588 seismic shocks.

Lake Biwa.

This Little Ditch almost marks the eastern limit of the Biwa depression. The lake itself, with its "Eight Scenes of Special Beauty" (*Omi-no-hakkei*), is just over 300 feet above sea-level; it

is separated by a very short " strait " from the long Tsuruga Bay; and it is linked southward, by the Yodo and Yamato valleys, with two basins of great historic interest and importance. In the Yamato basin Nara was made the capital of the Fujiwara " king-makers " about A.D. 700; and in the Yamashiro basin, where Kyoto succeeded Nara as capital, an end was put to the custom of changing capital at each change of ruler—to prevent any one place from becoming *too* important. Kyoto, therefore, remained the capital till the revolution of 1868.

Yezo.

The highland eastward of this Biwa depression, with all the land " beyond " it, was called *Yezo* (" Barbary ") by the Yamato folk, and the depression itself became the " Yezo Marches; " and here the Ainus, with their backs to the lofty highland and their faces to the long (40-mile) lake, and with the sea on either flank, defied the waves of landsmen for ages. When—for reasons to be noticed presently—they were forced to retreat, it was a very slow process, lengthened out until, in the end, they could claim that the Yamato conquest had taken 1400 years, and had probably cost as many thousands of Yamato lives. Even when Kyoto was made the permanent capital, they were still holding out in northern Honshiu —in a position almost exactly similar to the old one, with the Inawashiro lake in front of them, the burning bulk of Azuma (7700') behind them, and a transverse trough (now followed by the inter-sea railway from Niigata *via* Wakamatsu) giving easy access to both seas, especially the Sea of Japan.

The Narrow Front.

On both flanks the Ainus had the same two geographical advantages—a narrow front and difficult topography. These conditions made it impossible for the Yamato leaders to use their superior numbers, and the front could be extended only by sea, the domain of their enemies. But, though both positions had the same advantages, the southern was much the more important; and there the supreme struggle took place, for Kwansei was always the heart of Japan—alike in fertility and in sanctity, in commercial and strategic advantages. All these, too, were concentrated in its south-eastern corner, " between the castle of Fushimi and the shrine of Ise," where they are still illustrated by the group of cities—Kobe, Osaka, Kyoto, Nagoya.

The Nagoya-Tsuruga " waist," in a direct line, is only about 55 miles; the 15 miles between Tsuruga and Lake Biwa gave no room for any concentration of force on it, and its flanks were too rough; and the two bays which fence the strategic Kii peninsula, with its Yamato core, are both within 40 miles of the lake. Even here, therefore, there was no broad front; the *eastward* connexion is very rough, and the historic Ise—or Owari—bay is nearer to Tsuruga than the Osaka bay.

On this highland core converge what we may call two composite

"Chugoku" Limb.

peninsulas, one from the west and the other from the north. The western, or Chugoku, is essentially a double system of young folds, its northern folds a continuation of the Tsin-ling-(Kun-lun) and its southern folds a continuation of the Nan-shan-(Himalayas); and the intervening belt is filled, for 250 out of a total 300 miles, with the Seto Uchi. Ages of de-gradation under heavy orographic and cyclonic rains associated with a mean summer temperature of at

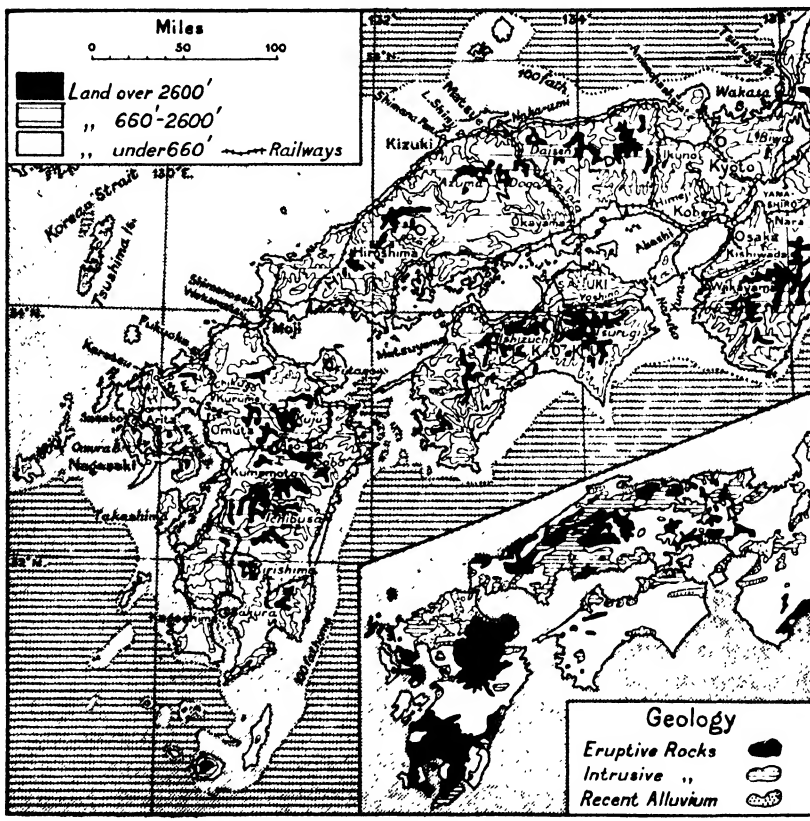

FIG. 131.—Relief of Western Japan.

least 75° F., and the *ejecta* from a thin line of volcanoes along the northern flank, have flattened the crest of the northern, or specifically Chugoku, system; and the relative height of the marginal cones, *e.g.* Dai-sen (*c.* 5000'), Dogo, and Azuma, and the character of the torrent-cut ravines in the granite, accentuate the plateau effect. But the system is one of young folds, and the continuous cover of forest dissipates the illusion of dissected plateau.

The Southern, or Shikoku, system consists of very regular zones,

mainly of crystalline schists, and it reaches a considerably greater height, Ishizuchi exceeding and Tsurugi very nearly reaching 6500 feet; and the Yoshino river, practically fed from both these peaks, has a length of 150 miles, while the most northerly range, the Sanuki, makes a very marked tectonic boundary, being the median line of dislocation in southern Japan. The famous Besshi copper mines are in the Matsuyama piedmont of Ishizuchi. **Its Shikoku Limb.**

This southern system is continued south-westward through Kiushiu, with the same considerable maximum height, *e.g.* in Kunimi, Sobo, and Ichibusa; but both structure and topography are complicated, and there has been remarkable volcanic activity, especially round the beautiful Bay of Kagoshima. The original Yamato base was in Kiushiu, but they seized the Kii peninsula, and so forced the Ainus to withdraw from the Seto Uchi.

What did a full millennium of ceaseless fighting here mean to the Yamato "landsmen"? It meant at least a penetrating persistence of an occupational environment and a complete change of regional environment. For these hordes had come mainly from vast patriarchal grasslands, with wide pastures and soil too fertile for crops to fail, except from drought; and they had come to a mountainous land of islands and peninsulas, where unfailing rains wrapped all the highlands in forest,—where the little flats were far too precious to be used for pasture, even if wholesome grasses had grown, or would grow, on them,—and where in most years lack of bread was due only to lack of land on which to grow the grain. **Occupational Control.**

If the wavy-haired Ainus had been refugees, whose racial pride would not brook the dominion of the lank-haired Mongols, these Yamato hordes were adventurers, looking for contest and conquest. But here there was contest without conquest, or with conquest so slow that century after century saw the struggle going on; and, as the cycle passed, it evolved at least a perfect fighting code—of living and dying, with life dangerous and death speedy. The *daimyo* chief, his *samurai* officers, their serried troops, concentrated all strength of mind and body on the single purpose—helped, no doubt, by the fact that they were true sons of Asia. As such, they were adjusted to their Fatherland, patriarchal and military in organisation and aptitudes, an energetic people well suited to a feudal form of government.

The one advantage that the lank-haired had here over the wavy-haired was an inexhaustible supply of men, for wave after wave of invaders crossed the island[1]-bridged Korean Strait; but, for that reason, the problem of their food-supply must have become acute very soon. The Yamato forces needed no warning that "an army travels on its stomach," but this new land could not fill the particular **Food Problem.**

[1] At low water the Tsushima islands, with their magnificent harbours, make a continuous 35-mile bridge; and their cones are very useful landmarks

stomachs ; and, if so, then the water must contribute its quota. In other words, the invading landsmen had to learn from the invaded seamen to be expert fishermen ; and they had an ideal school in that Inland Sea which presented—to storms from the Pacific—gates too narrow to be forced, though this prime advantage must not mislead us as to the character of the school.

Seto Uchi.

The isolation of the islands as a group was accentuated by the greater articulation of their Pacific coast, which is three times as long as that of the fractured west coast ; and the Seto Uchi (*c.* 1300 square miles = Cornwall)—which was as clearly the race-home of the Japanese as the Aegean was that of the Greeks—is specifically a Pacific margin. It was an ideal school because—it was secret,—it gave a fine training in seamanship,—and the mass of the population was concentrated round its shores ; but its importance as the race-home, and the special importance at all epochs of the fishing industry, deserve further attention.

The physical origin of the sea is quite immaterial from our present point of view, but there are two significant facts, neither of which favours the accepted geological theory. For the name of the sea is Setono Uchiumi (" The Sea within Straits "), and the depth of it is trifling, generally much less then 30 fathoms. Except for the Hayamoto Strait of the Bungo Channel, which is eight miles wide, not one of the three other straits is as much as two miles, both the Shimonoseki and the Yura being *c.* 3000 yards, while the Naruto is not one mile (1500 yards) ; and the only depths deserving of the name are the result of tidal scour in these straits, the wide Bungo Channel showing an extreme depth of *c.* 150 fathoms. In every case, too, these narrows are broken by islands.

The "Koreans."

All early communications from—and with—the continent in latitudes 30°-40° N. seem to have been *via* Korea, and the " Koreans " worked along the *north* coast of Chugoku. The outermost of the ranges here, the Shinji, is truncated in the Shimana peninsula, and the deep valley to landward drops eastward from the Kizuki plain *via* the Shinji lake, to the Naka-umi lagoon ; and this was the sacred land of the proto-historic immigrants, from Kizuki—which claims the oldest [1] Shinto shrine in the world—to Matsue, almost as famous as Ichinokawa for its crystals. Farther east again the Wakasa Bay has its " Bridge to Heaven," *Amano-hashi-date*.

Vulcanism.

The avoidance of the Shimonoseki Strait by these early immigrants seems to have been due to the tremendous volcanic activity in Kiushiu, obvious from a great distance, and to the fierce currents in the strait itself, when they did try it. Eruptions of Aso-san are mentioned in the very earliest records of Japan, and there is an Aso-san *chain*. It includes Kuju (*c.* 6500′) and Yubu, with the famous Bettu springs (carbonic acid) at its foot, and—nearer still to

[1] This is probably the one at Ise, not the Kizuki one.

the strait—Futago. The yet more famous Kirishima group is only about 50 miles south of Aso-san, and the Karakuni cone ascends 5500 feet. Even as lately as 1914 the island cone of Sakura made itself into a peninsula by an immense flow of lava.

Sea Nursery.

In the old days, too, the strait was probably less than 400 yards wide, and the tidal currents must have been at least as fierce as they are still in the Namto strait, where the whirlpools are exceedingly dangerous. It is the relation of these currents to the intricate channels, the reefs and rocks, the bays and islands, that has made the sea such a fine nursery of seamen; and their economic relation to the fishing industry and the food-supply to-day may illustrate the importance of their historic relation to the evolution of a Sea Power.

Three Factors.

If we regard Old Japan as a little sea, teeming with fish but with troubled waters, fenced by forested mountains and sentinelled by smoking cones, in a typically monsoon climate, we can see how a rice civilisation was linked to a wood civilisation by a fishing civilisation. If the rice guaranteed man-power, the fishery was to be the basis of political and economic progress; and, whether or not the little kingdom was isolated from the rest of the world—as it was deliberately from Elizabethan to Victorian days, none going out and none coming [1] in,—there would be no need to anticipate trouble till the time came for the wood civilisation and hand-work to give place to a steel civilisation and machine-work. Even then there was enough coal and iron to *start* the nation on an industrial development, and enough gold and silver to *start* them in foreign trade; but the sufficiency depended on the work of a mercantile marine—and, perhaps, of a royal navy—as the legacy of a fishing fleet. It remains to be seen how a nation of artistic individualists will really respond to the cramp of machinery and standardisation. If all true art is simply the expression of a man's *joy* in work, they are being told to cut art out of their workaday lives.

The Fishery.

The natural cover for mountainous islands in such an environment is forest, and the whole basis of the old architectural and engineering and ship-building activities was wood; the peninsulas of Honshiu and the main promontories of the other islands are marked by high and rocky coasts, and on each face of the group there is a supply of *ria* harbours; the warm and the cold currents guarantee an abundance of fish-food and an abundance of food-fish, especially herrings, that can find the deep water which they need in summer within 25 miles of the coast almost everywhere and within 5 miles in most parts. There are nearly 1,500,000 persons engaged in fishing even on official records, and the actual number is probably double that; for the fishing is no exception to the general tendency of all economic units in Japan to be very small.

And the industry, like the timber industry on which it once

[1] In the years about A.D. 1700 every ship was deliberately destroyed!

Protein. depended, is now becoming steadily more and more important as a food industry. Fish is providing nearly three times as large a proportion of the people's diet as it did in 1900; for anxious attention has been drawn to the relative excess of carbohydrates and the positive lack of protein in that diet by the discovery that the protein value of the soya bean is greatly modified by an excess of rice. The climate makes it impossible for home-grown wheat to displace home-grown rice, and meat is always a very costly way of supplying protein, even if a pastureless land could afford to import it in large quantities. Indeed, even if there were good pastures, the value of arable land is too high for it to be wasted on pasture; and the inferior feeding-ground that can be spared at present gives only 20 cattle and 3 sheep *per* 1000 people. Fish is, therefore, the one alternative to imported [1] meat; and direct use as human food is now being made of what was once, like a large proportion of the *ajimo* seaweed, considered fit only to be fertiliser for the rice-fields. There is, therefore, a world of significance behind the idealisation of fish in Japanese art and the artist's unique fidelity to nature.

Coast Traffic. Coastal traffic was further encouraged by the difficulty of access inland—in the days before railways, with their tunnels and bridges—owing to the relief and the configuration. Honshiu does not reach anywhere a width of 200 miles, and even the "waist" which makes Tsuruga an outport of Osaka is nowhere more than 75 miles. Under such circumstances, unless maxima heights were entirely marginal, there could not be room for the development of any great rivers. But, as we have seen, the widest part of the island—between the Noto and the Boso peninsulas, between Tokyo (Yedo) and Toyama ("Little Yedo")—is a mass of highland; and the longest river, the Shinano (Sai) is only *c.* 215 miles [2] in length. Nearly everywhere, too, the topography is intricate; and the original steepness of the uplift and the depth of the subsequent erosion give a steep gradient to even the lowest passes. All things conspired to encourage communication by sea, especially by the Inland Sea. Here, too, population was concentrated, and it is still here; and so here was the focus on which the Elder Statesmen concentrated their closest attention. But their problem was a legacy from the past, and we may consider the legacy before the problem.

"Rice" Policy. If there is sufficient historic justification for the belief that the "white-armed" leaders very soon realised the value to themselves, politically and economically, of a rice civilisation, then it is of real interest that their philosophy of rice culture had an unmistakably geographical background. Their prime problem was to provide a maximum of food from a minimum of area—a food suited to the

[1] There has been a fourfold increase of meat in the diet since 1900.
[2] The Ishikari is 60 miles longer, but its basin is mainly beyond the highland.

climate for its production and to the population for their nourishment in such a climate; and, as there was no pasture, it had to be a vegetable product, and life had to become sedentary. The further assumptions, even if—surely—formulated very much later, were admirable: that natural products and natural processes would give the best results, and that occupations exercised mental as well as manual activities. Credit cannot be given to any particular leaders except for their readiness to learn.

The Work.

Chen Meng (2800 B.C.) founded the Spring rite of planting staples, with rice taking the *first* blessing from the imperial lips; and from the first its economic "floor" was manual, while its political "roof" was mental. For rice was, and is, the *only* valuable food-crop capable of being grown successfully just where vegetation is most favoured, *i.e.* on a rich and damp plain in a hot and damp season; it is also a very quick grower, immensely prolific, and the only one that can be stored in such a climate. The soft soil was easy to work, and so could be worked with the simplest implements; and, *if* man needed the aid of beasts, such soft wet soil was the playground of the water-buffalo. Everything so far was simple and quite obvious, especially for any Chinese amongst the Yamatos.

Its Results.

But the crop needed such a mentality in its cultivators that the idle, the careless, the insubordinate, would have no food, and—would thus be bred out of the race. The survivors would be those of industry, intelligence, and foresight; and they would *have* to co-operate—for the necessary irrigation, for various other orderly processes and purposes, for storage and fair distribution. In other words, rice was the only basis for a dense population, *i.e.* for a high man-power,—a population dependent on a subsistence agriculture, *i.e.* with self-interest as its motive,—an agriculture possible only with orderly co-operation, *i.e.* with a sedentary population unanimously interested in a strong government.[1] If all this was thought out, or even faintly grasped, 1000 years ago, the early history of Japan deserves more attention than it has received in Europe. The land was certainly known in very early times as *Mizuhono Kuni* ("Land of Rich Rice-crops").

Its Merits and Demerits.

There can be little doubt that such a rice civilisation,—though it must have the three merits of a wide uniformity of interest and status amongst its followers, a relatively high standard of civilisation, and enough variety of work to supply *all* the needs of the (feudal) unit—must also make for immobility, economic as well as political; and, perhaps, one reason why the Yamato leaders never really attempted to oust the Ainus from Yezo may have been the unsuitability—as the Japanese thought till quite recently—of the climate for growing rice. At the same time, the avoidance of the

[1] But some Eastern peoples, *e.g.* the Igorœs, couple rice-culture (or irrigated terraces) with democratic clan organisation!

island by the Japanese ever since it has been growing rice may be an illustration of the precise immobility complex just referred to in relation with the crop. For they are so tightly glued to their homes that they will not readily move, least of all to a land where cotton clothes and homes of bamboo and paper are useless, — where forest has to be cleared before they can plant their rice,— and where they must live on the exposed wastes of ocean margins, not round the snug bays of an inland sea.

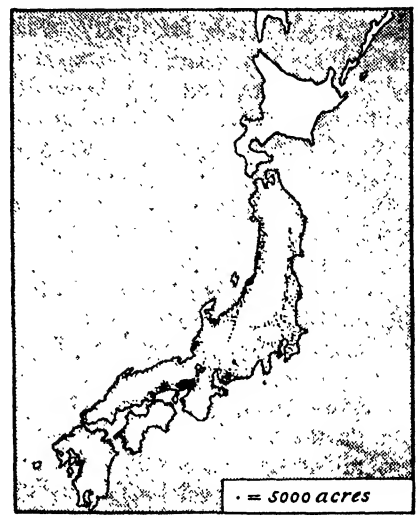

FIG. 132.—Distribution of Rice in Japan.

Insular Control.

In learning to fish, then, the landsmen had become seamen—in 1400 years, and had exchanged a meat-diet for a rice-civilisation; and, once they were adjusted to the new conditions, racial virility and weight of numbers gave them a tardy victory. So the frontier of Yezo was pushed farther and farther eastward and northward until the Ainus were back in the climate from which they had originally come—where then, no doubt, as now, the Japanese could never feel " at home,"—and were safely behind the 10-mile moat of the Tsugaru Strait. But by that time the Yamato people themselves had responded to the new environment. It is an interesting problem whether the general insular environment was as potent in defeating any tendency to a Chinese form of immobility as the particular insular climate seems to have been in preserving and promoting the whiteness of skin which the ancient Chinese thought so distinctive. Certainly, this coast-dwelling people, classified by the anthropologists under the hideous title of Xanthoderms, can show whiter skins [1] than most so-called White men.

"Queen Country."

The Japanese *Kojiki* and *Nihongi* records give us what may be considered conclusive evidence as to the complete conversion of the Yamato people to fishing ideals, *e.g.* by their insistence on the importance of women; and the Chinese records are even more significant. For the *Nihongi* Chronicles date from the eighth century, and the chroniclers may have " read " much of their own contemporary life into the records; but Chinese records even for the first three centuries, *i.e.* covering the reign of the Empress Jingo, continually call the islands " the Queen country." We may, there-

[1] So can their " kinsmen " who live in the forested lakeland of Finland.

fore, give credit to the Chroniclers' stories—of the warrior queen Ata (*c.* 50 B.C.), of "Princess" Tachibana, of Queen Sabo, all of them akin in spirit and work to the Virgin Queen—and Empress—Jingo. It is inconceivable that this transformation in *spirit* should have been completed as early as the Chronicles suggest; but, when it was completed, it deprived the Ainus of the two great advantages which they had enjoyed, as a fishing people with a fishing civilisation,—their free and friendly equality of sex and their "territorial" division of labour by land and sea. Women were paying taxes in the time of the Emperor Sujin (a contemporary of Cicero), and the Viceroy of the Emperor Keiko in Kiushiu was a woman (a contemporary of Cleopatra).

"Yezo."

The recent custom of calling the northern island Hokkaido ignores all this story; and the reason given—that "it is more courteous"—is simply absurd. Even the assertion that *Hokkaido* means "the North Land," is not correct, and misses the significance of the name; it really means "North-shore Route," *i.e.* is rather a water than a land label! And, if "Barbary" is the exact translation of *Yezo*, "Wales"—as used by the Angles, with a suggestion of inferiority—is a very fair translation; and to suggest that the Ainus have forgotten, and are even *ashamed* of the gallant story, and would prefer a regional to an historic name for their present home, is equivalent to saying that the Welsh would like the name of their present home to be changed to "Westland."

Structural Plan.

The foundation plan of the northern peninsula and its attendant island (Yezo) is very similar to that of the western peninsula and its attendant islands; and there is a similar relation to the Pacific belt of volcanic activity. The conspicuous features are arranged in three parallel lines; and two arcs of volcanic activity meet in Yezo, as two meet in Kiushiu. The Kurile arc is more important politically than the Riu-kiu [1] arc, because it blocks the Soya, or La Perouse, Strait (not 30 miles wide); and the port of Shana is not only in a far-western island, Yaturufu, which is exactly east of the strait, but is also on the west coast of that island.

But latitude and orientation are not the only essential differences between this northern limb and the western; there are two others. For here there is no central depression, whether water-filled or not; and there are no volcanic lines running *across* the structural grid. The central line is the ancient and degraded Ou range, which forms the water-parting between the Sea of Japan and the Pacific, though it is seldom more than 3000 feet in elevation; but the conspicuous features are in the chain of volcanic cones embossed on the range. This is known generally as the Nasu chain, though Nasu is far from

[1] These islands should *not* be called the Luchus, because the letter *l* is alien to the Japanese language.

being the highest cone ; and the reason seems to be that not only are there numerous solfataras at all its main vents, but there is at the foot of the cone a remarkable hot-spring, round which " sulphur " baths have existed for 1200 years.

Volcanic Chain. The chain runs almost due south for 300 miles, as the central depression of Chugoku runs eastward (p. 692),—from Yatsukota (*c.* 3000′), or even from Osore on the north of the Matsu gulf, *via* Iwate (*c.* 6800′) and Komaga, Saosan and Azuma (*c.* 7700′) ; and the remarkable transverse valley of the Agano gives easy access across it from the Sea of Japan *via* Niigata, Wakamatsu, and Inawashiro. On the brink of this valley, in 1888, Bandai—by a terrific series of 20 explosions, following an earthquake and followed by an avalanche of earth that buried the whole Nagase valley, with all its villages, four of them simply entombed—taught again the lesson that volcanoes in Japan can never be called dead or extinct, but only inactive. Its lofty neighbour, Azuma, in spite of a beautiful lake in its summit-crater, taught the same lesson five years later.

Western Lines. In the west there is an old, degraded range of the same type as the Ou, known as the Dewa as far south as the Mogami gorge, and then as the Echigo ; but both this and the parallel chain of volcanoes are much less continuous than the central pair. The chain is called after the Chokai cone, which scarcely reaches 7000 feet ; but it stands up so boldly beside the coast, and between two stretches of lowland which are so long (for Japan), that it makes a remarkable landmark. Farther south the greatest heights are in the Echigo range, *e.g.* the granite-peaks of Asahi (over 7000′) and Tidë, and the coastal plain below them is one of the largest plains in the whole country and one of the chief producers of rice. The Dewa (Akita)-Echigo piedmont is the main source of mineral oil in Japan ; and the Omono river does for the oil-market of Akita what the Shinano does for the rice-market of Niigata.

Kwanto "Elbow." Southward from Nasu both the range and the chain work westward as part of the " Kwanto elbow," and the effects of the torsion are seen in the wonderful scenery of the Nikko mountains and the violence of the volcanic and seismic activities on and round the Kwanto plain. The Nantai peak of the Nikko group reaches 8170 feet ; Asama (*c.* 8100′) is the largest active volcano in Japan ; and the Kwanto plain has been the scene of some terrific earthquakes, *e.g.* in 1703, 1855, and 1923. The wide distribution of crystalline rock round this plain and the direct exposure to the S.E. monsoon make this a world of clear streams and wonderful waterfalls ; to the north the rock is rich in copper, *e.g.* round Ashio and Hitachi, while to the west it offers scenic effects so accessible and so remarkable that they seem to have had a close relation even to the artistic development. For instance, the pinnacles of Myagi are merely " photographed " in those classical pictures (*bunjingwa*) in which

the artists are so often accused of having "created nature out of their own fevered imaginations," etc.; the dual landscapes of the Kano School can be seen on every side—with their chequer of pine-trees and sugar-cane, rice and potatoes.

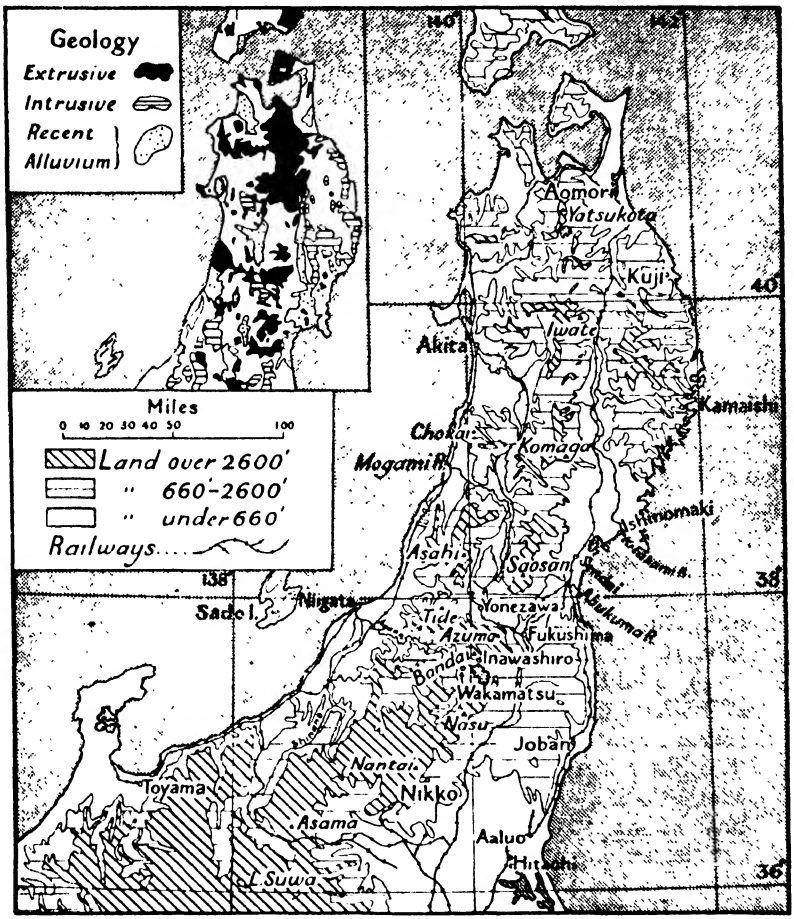

FIG. 133.—Relief of Northern Japan.

The eastern system is even less continuous than the western, and more complicated; but it has some features of special interest. Though the structure east and north of the Great Ditch is very largely concealed everywhere by the volcanic *ejecta*, the foundation from which most of the volcanoes rise is shown here quite clearly —in the Kwanto hills, in the Abukuma "plateau," and in the Kitakami "group"; and in the two latter regions both the proper

Eastern Lines.

names and the common names are worth attention. For both the Kitakami and the Abukuma are not ridges, but rivers, flowing from different ends—*Kita* meaning " North "—of a great tectonic valley into Sendai Bay; and the parallel heights that fence the valley, though structurally mountains, are an irregular network of ridges and " roofs," none of which could give a name to the whole group, unless it might be named from the highest, Kayachinës (*c.* 6500′).

Sendai. The Sendai Bay is world-famous for the beauty of its Matsushima (" Pine-tree Islands ") archipelago, which is one of the *San-Kei* (" Three Supreme Beauties ") of Japan; but it is also quite an important commercial focus, with busy salt and salmon-fishing industries and valuable slate-quarries at Ishinomaki. To the north the Kamaishi *ria* gives access to one of the only two deposits of iron-ore in Japan that are workable under present conditions, a 55 p.c. magnetite, which supplies local iron and steel works. To the south the crystalline schists of the Abukuma plateau are flanked by carboniferous strata, and here—though not in the north—there is a strip of coastal plain, wide enough to carry a railway, which runs through the Joban coalfield; and this ranks next to the Kiushiu and Yezo coalfields, though much below them for both quantity and quality. Where the system swings westward, the old schists of the highest ridges contain the Chugoku ores, mainly copper and magnetic pyrites, the Hitachi mine being actually in the butt of the plateau.

Useful Lowland. The tectonic depressions which separate the central line of this northern limb from the western and the eastern lines, have been exceptionally useful in railway development north of the great junction of Fukushima, the western trough carrying the line *via* Yonezawa and the Mogami and Omono valleys to Akita, while the eastern carries the line from Sendai to Aomori. At the same time the actual amount of low land is small, and that of usable low land is still less, for a large part of the area has been ruined by the heavy showers of ash.

Yezo. Yezo seems to combine a corner broken off from Honshiu by a very slight sinking of what is now the western base of the Tsugaru strait, with a large lobe broken off from Sakhalin— ? by a similar sinking of the La Perouse strait; and the two are welded together by the low Sapporo isthmus, which was probably once the floor of a strait. The " Hidaka " backbone of old rock corresponds in structure and in trend with the eastern range of Sakhalin; and, as there, it is embossed with volcanoes, though the highest cone, Nutapkaushpë (*c.* 7700′) is said to be really a *Kurile* cone, and the activity of the Kurile chain is suggested in the recent (1926) eruption of the neighbouring Tokachi.

The Cretaceous and Tertiary formations of western Sakhalin reappear on the west of the Hidaka system in the Yubari range, with

its valuable seams of coal. Some of the coal, like the Kawakami coal in Sakhalin, is used in local pulp-works,—connected with the Kamikawa forests, a source also of (aspen) match-sticks for Kobe,—and even in the Wamishi iron and steel works; but the railways of the Ishikari plain and the food ports of Otaru and Mororan facilitate

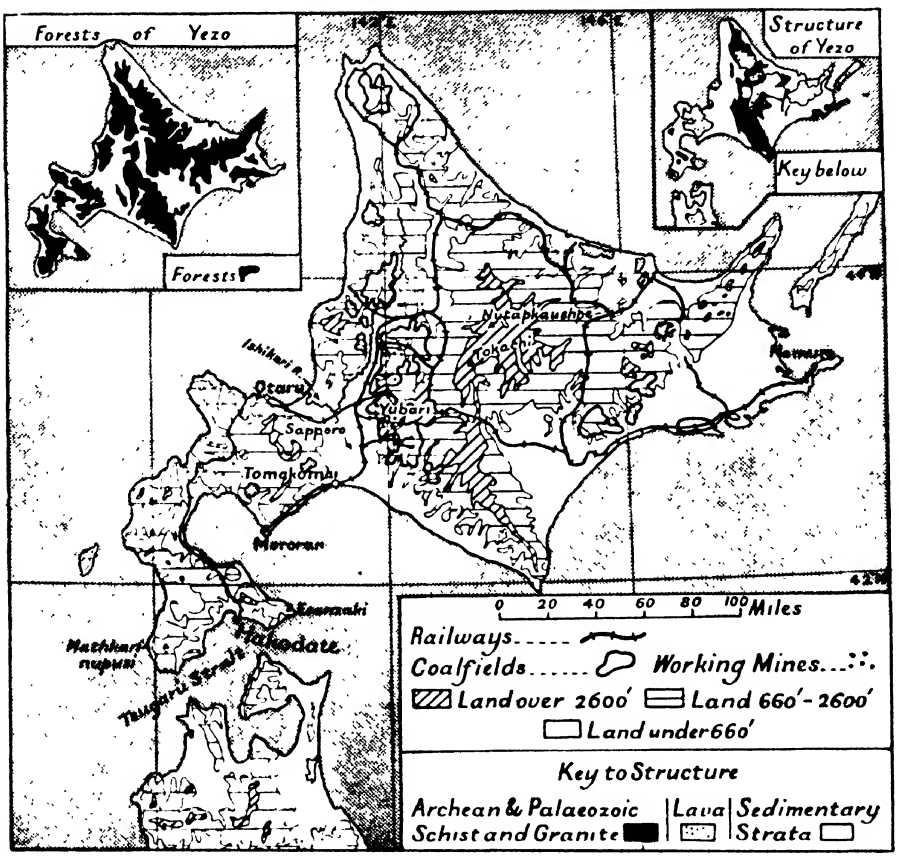

FIG. 134.—Yezo: Relief and Coalfields.

export—to the Seto Uchi industrial region. Hakodate is the best harbour, but is less convenient than Otaru for the agricultural and forest areas of the Ishikari basin, and than Mororan for the Yubari coalfield and the Tomakomai pulp-works. Yezo has fully one-third of the Japanese reserves of coal, *i.e.* nearly as much as Kiushiu; but, mainly owing to lack of population and of tramp steamers, its output (17 p.c. of the total) is only a quarter that of Kiushiu.

CHAPTER XXXVII

JAPAN: ECONOMIC AND REGIONAL

Mountains *v.* Volcanoes.

SUCH an outline of main features may leave the impression that Japan is overwhelmingly mountainous and overwhelmingly volcanic; but, while the one idea is correct, the other is scarcely so. The number of volcanoes, active or inactive, is very great; and the Kuriles ("Smoky"), or Chishima ("Thousand Isles"—really, 27!) are wholly volcanic. That is also partially true of the south-eastern half of Yezo, for most of the northern peninsula, and for much of Kiushiu, where Aso-san is credited with the largest crater in the world. But the mass of the country is gneiss and schist, old schists overlying granite throughout the centre of Honshiu; and, however valuable the disintegrated feldspar may be, *e.g.* near the famous porcelain town of Seto, the disintegrated quartz makes a wretched soil. The mountainous character of the islands is proverbial; but, before analysing the relation of that to the amount of land available for agriculture, we must relate it to the climate. And the fact that, in this monsoon climate, orographic rains are at least as important as cyclonic rains, and winter rains almost as important as summer rains, may take us back to the parallel with the British Isles.

Parallel with Britain.

The geographic parallel is obvious, even if it is not really very close. The islands stand to windward—for the most important wind in the most densely populated regions—of a populous continent, from which the mass of its people came in historic times, and to which there is easier access on the continental side, over shallow seas famed for their fisheries; and there are some very fine natural harbours, so placed with regard to the home resources in coal and iron that they made excellent naval stations for the young Sea Power in modern times. The mainland lies at right angles to both the prevailing winds—no small asset in the days of wind-driven ships, and always in its relation to rainfall; and, like Great Britain, it is much the largest unit in the group, and yet it is small, both being about 88,000 square miles. This was very favourable to coherence and to group-consciousness.

The islands are a relic of the old coast of Asia; and the founder-

ing that isolated them from the continent, carried with it nearly all the enclosed or enclosing lowlands. In the course of ages small plains have been built up in favourable places, *e.g.* at the foot of the ranges having the heaviest rainfall; but they must be marginal, and cannot be large, even those in Yezo not having an aggregate area of more than 5000 square miles. We must presently examine in some detail how this marginal position has affected the general distribution of the population and the particular distribution of great centres, but we may notice in passing that the position has had its grave disadvantages. **Physical History.**

The strains and the stresses between the west of the old coast and the floor of the Tuscarora Deep (*c.* 28,000′ at most, and at least 20,000′ for a distance of 200 miles), between a sinking sea-floor in the west and a rising ocean-floor in the east,—with monsoon rains forever altering the equilibrium between areas of denudation and areas of deposit,—involve unceasing adjustments, which are manifested in almost unceasing seismic disturbances, *literally three or four* definite shocks being recorded normally every day. Unfortunately, the seismic foci are largely both marginal and submarine, and so serious shocks are often followed by immense tidal waves; and in the days—not yet wholly passed—when only bamboo and paper were used in constructing houses, most shocks were also associated with widely spread fires. Even in September 1923 combined shock and fire completely destroyed the city of Yokohama, and half destroyed Tokyo, causing the immediate deaths of nearly 100,000 persons. The only compensation for these catastrophes—apart from the steady, if infinitely slow, removal of weak cleavages—is in the training which they have given the people in facing sudden danger with dignity and composure. **Seismic Foci.**

The physical history of the area has developed, then, a small and mountainous area, with narrow alluvial valleys and narrow coastal plains, which only unceasing industry and conspicuous intelligence could have made useful. The torrents cover acres of the lower land with gravel, and flood so widely that the building of (*wooden*) bridges became an art centuries ago; and volcanic ash has ruined miles of useful land, especially in north-central Honshiu. There are some very rich patches of lava, which conserve both water and fertilisers well, *e.g.* in Kiushiu; and the granite soils are so clean and porous that they absorb water very well, *e.g.* for rice-growing in the Shinano valley. But the total area that can be used is so small that it has been used too much,—the holdings, except in Yezo, are tiny,—the hand method of manuring serves only the particular plant, not the soil,—and even spade culture cannot improve on its present output. **Soils.**

The only compensations seem to be that there is abundance of water everywhere, for power and irrigation; the hill climate is very

favourable to the production of tea and silk, which have such value in small bulk that cost of transport is relatively immaterial, and which can employ a large amount of female and child labour; and easy access to the sea has enabled great use to be made of fish-guano, and quantities of soya-cake and other fertilisers to be easily imported.

Insular Control. But, if the foundering of nearly all the lowland left an almost purely highland unit, it left it in a position which, apart from climate, was very favourable to the development of a marked "racial" type with marked group-consciousness. For it was too far from Asia to be easily reached in early days, too far even to share in the early commercial and other activities of the continent; the population on both sides of the narrowest belts of sea was scanty, and that on the continental side between the narrows was very scanty. Approach from China was easy and natural only during the season when the gardeners were absorbed in the work on their gardens, and they never really acquired the sea-habit that was forced on the islanders.

For Japan is essentially an archipelago, with a coast that is perfectly typical of a mountain group; it is actually calculated that the *ajimo* seaweed is collected (for food, paper, glue, iodine, etc.) over 18,000 miles distributed round *c.* 550 habitable islands. The number and the variety of these islands must have been profoundly favourable to the development of independent units, personal initiative, and self-reliance; and, though the relief did tend to the isolation of basins under a strict feudal *régime*, the total area was so little and so devoid of large lowlands that it was never dominated by the economic tyranny of urban centres. The whole island of Shikoku has an area of only 7000 square miles, and Kiushiu is not much more than twice that, though it is more than half the size of Yezo.

Climate. But the fundamental relation of the islands to the people, whether few or many, is in the climate; and this at once sets them in a category wholly different from any in which the British Isles could be set. Even if Asia was a small continent, far too small for its continental vagaries to upset great world processes, the "east coast" climate would make Japan as unlike Britain as Nova Scotia is unlike Vancouver Island; and the absence of a continental shelf on the ocean side would make it still more unlike. But the practical absence of a continental shelf does not make the climate oceanic; it remains genetically and specifically monsoonal, *i.e.* continental in origin, and that differentiates the life of the people as much as the liability to seismic and volcanic catastrophes does. It also further justifies treatment of the islands as part of "the *Continent* of Asia."

Karafuto. The Karafuto half of Sakhalin may help us to realise the conditions. Its most northerly point is in the latitude of the Scilly Islands or Lizard Head, and its most southerly in that of I. de Oléron; and the latter point is not half as far from Yezo as the

Shetland Islands are from Scotland. But its lowlands, coastal and otherwise, show a true *polar* landscape. Snow falls, and lies, on open flats near the sea and at sea-level till the end of May; and reindeer can be seen feeding on true tundra, in the latitude of Lake Como, alike on the coast and in the great longitudinal valleys of the Poronai and the Tym. If you want to escape from an Arctic environment, you must climb the forest-clad ranges (3000–4000′); the mean annual temperature at the Due coalmines is 33° F., and the *summer* temperature on the east coast, when the Kurile current is further chilled by ice from the Okhotsk Sea, is sometimes not very much above that.

Yezo Climate.

Yezo confirms the suggestion of purely continental winters; in the latitude of southern France it has the conditions of Iceland. Nemuro and Sapporo are in the latitude of Toulon and Narbonne but they have four months with mean temperatures below 32° F.; even the low, "Pacific" peninsula of Nemuro shows a range of 40° F. (23°–63° F.), while the low isthmus of Sapporo shows one of 48° E., with a winter minimum of − 14° F. Even Hakodate, in the latitude of Rome and washed by a branch of the Kuro-Siwo, has three months with a mean below 32° F. and only three with a mean above 60° F. The only clear indications of maritime climate are that the heaviest rainfall (11·3″) is in the autumn, September and October having at least an inch more than any other two months (July and August = 10·3″), and that the relative humidity is above 70 p.c. throughout the year, even though the sea-flank for the N.W. monsoon is the Gulf of Tartary and not the Sea of Japan.

Continental Control.

It is obvious, then, that the latitude and the insularity of the islands are more or less powerless against the monsoon conditions as determined by the continent; and even when there are no actual extremes, there are typical monsoonal abnormalities. For instance, the islands, as a whole, are wetter than other islands in the same latitude, and they are colder. The concavity of the islands to the continent gives a maximum of relatively warm sea to landward, and pushes an elbow into the teeth of the ocean winds, while the main stream of the Kuro-Siwo washes the ocean coast, and sends a branch to wash part[1] of the landward coast. But the Kurile current supplements the N.W. winds from the Pole of Cold in winter; and any comparison of conditions, at least in northern Japan, should be rather with the fog-wreathed island of Newfoundland than with the British Isles. If the average height of the islands lightens the oppressive heat in the more humid season, it increases the cold in winter; even Tokyo, in the latitude of Algiers, expects to have frost on 60 nights during the winter. At the same time there is a

[1] The diversion of the branch current by the Noto peninsula and the shelter of Sado island are reflected in a rainfall of only *c.* 70″ at Niigata compared with one of 100″ at Kanazawa.

very high percentage of sunshine and of air-movement, both of vital importance to human health and development; there is already a good deal of evidence that spells of relatively low temperature that are accompanied by bright sunshine are directly favourable to mental activity.

Contrasts. The Japanese themselves are keenly alive to the "control" exercised by the abnormal conditions. The cold is dry enough to be very bracing, it cleans the soil, it compels many plants to rest, and yet it is accompanied by enough clear sky and sunshine to encourage winter flowers; the damp heat is very trying to man, but promotes very rapid plant-growth—a matter of immense importance where rice should flower *before* the September storms begin. The rapidity of growth is so great that the *dai-kon* ("great radish") of the Kagoshima islands may weigh up to 70 lb. The immense proportion of high relief and of heavy rain guarantees very great water-power; the rather steeper gradients on the landward side compensate for the rather lighter rainfall; the winter is humid enough to minimise evaporation; the very heavy snow-fall along the west coast compensates for the relatively dry summer there; and most of the streams are so short [1] and so rapid that there is no question of navigation on them, while any control actually improves them for irrigation. On the basis of the six months of *minimum* flow the amount of power available is estimated, conservatively, at 14,000,000 h.p.—a tremendous asset to a country so poor in coal and oil.

Granite Watersheds. The granitic watersheds make the character of the water equally important in the bleaching and dyeing and the paper industries. The former is at least as old as the city of Kyoto, for the Imperial dyers and bleachers were using the beautiful water of the Kama and its Tokano tributary in A.D. 800; and the Kyoto district is still the chief centre of dyeing, bleaching, and calico-printing. Similarly, there is a concentration of paper and cardboard industries round Shizuoka, depending on the pure water of the Oi and the Fuji, *e.g.* at Shimada, Fujieda, and Fuji. And the relation of the crystalline rock to the clear water has a counterpart in the relation of the friable volcanic materials to the constant rainfall, as the blizzards and heavy snow of the north-west during the N.W. monsoon have a counterpart in the typhoons (*tai-fu*, "great wind") and high humidity of the south-east during the S.E. monsoon. For nowhere else do volcanoes take such perfect forms as in Japan. Fuji-yama is far from being exceptional except in height; Kaimon (*c.* 3000′) is known as the Satsuma "Fuji," and Esan (*c.* 2000′) is the Esanzaki "Fuji," while Matkkari-nupuri (over 6000′)—at the other end of the Tsugaru Strait—is even more perfect.

[1] Of the more important sources of power, only the Tenryu (*c.* 135 m.) and the Kiso (*c.* 110 m.) on the Pacific flank of Honshiu, and only the Shinano (*c.* 215 m.) and the Mogami (*c.* 150 m.) on the landward flank, are more than 100 miles in length.

" It has been urged that the perfect forms of Nature here are reflected in Japanese Art, but the latter is most perfect in its representation of the *lower* organisms." In a land with such traditions, where the relative value of human life may be fairly judged by the practical caricaturing of the human form in art, when contrasted with the idealising of these lower forms, especially those of fish and birds, it is not surprising to find great attention paid to the environment of some of them. Indeed, only the closest attention could have secured the extraordinary skill and fidelity to nature shown in the representation of some of them, especially the fish. Both of the ocean currents are associated with them, the warm current specially with bonito and turtle and pearl-oyster, and the cold current with herring and cod and salmon; and any artistic " duality " of treatment is as truthful as in the case of the dual landscapes, for the cold current and the N.W. monsoon send southwards shoals of " Okhotsk " forms, while the S.E. monsoon and the warm current bring northwards swarms of Malay and even Indian forms. The cold current is also associated with the fur-bearers—fox and marten, badger and otter, as the warm current is with " the Honourable Mr. Baby," the silk-worm.

Art and Nature.

The great wealth of marine fauna is concentrated in the Sea of Japan; and, once the Ainus were back in Yezo, the Yamato folk held the whole length of the one coast of that sea which is never frozen. And, when there are so many parallels between Old Japan and Ancient Athens, it is interesting that their attitudes were as different in the use that they made of the sea, as in the value that they put on the human body. The percentage of usable land was even less in Japan than in Attica, but the Japanese Sea was much richer than the Aegean in fish—richer even than the North Sea, for it is double the size of that; and so the strong impulse was naturally to make the sea a source of food rather than a medium of trade, especially as the opposite coast was utterly devoid of the dense population and the fine harbours of Anatolia, where ice was unknown.

"Thalassa."

Even in such a recent development as the Kyoto enamel, the old " spirituality "—as embodied in the ancient lacquer work of the Nikko tombs—is still alive, just as the old processes are followed, and the *same* high standard of work maintained. For the enamel " embalms the unity of nature, whether mineral or plant or animal." The base is the national metal, copper; on the mineral is " raised " the vegetable—by preference, camphor laurel; and on the vegetable is laid, or inlaid, the animal—by preference, mother-of-pearl. Both the camphor and the mother-of-pearl were used centuries ago in the lacquer industry.

The Enamel Parable.

The high standard of work in all these industries is perfectly typical of a rice civilisation, and they are epitomised in the art of the

The Garden Parable. landscape gardener, who is trying to "liberate his soul" by communion with *all* of nature in her three aspects—the little hills of real stone, little pines and little fruit-trees, little fish in little ponds feeding at the bottom of little waterfalls. Nature is always the model, and so the design is not a *flower*-garden or the garden of a *house*, but an epitome of the big world round about; and he goes "abroad" not for relaxation, but for inspiration. And all is a parable. The "obedient plum" profits by pruning, and can be trained to any shape; the "rebel cherry" can neither be pruned nor trained, and so it is "the soul of Yamato." The appeal is to the eye, not the nose or the palate; the emphasis is on scale and colour, not on scent and fruit.

"Monsoon" Plants. While the symbolism dominates the whole plan, it is also carried scrupulously into the various details, *e.g.* the choice of plants; and all is related to the monsoon phenomena. Obviously, the dry and sunny winter is more favourable than the summer to flowers, so long as they bloom before the spring storms or after the autumn storms; and the cult of the iris and the chrysanthemum was based on this as well as on the shape of the "sword-blade" leaves of the iris and the spread of the "sun-ray" petals of the chrysanthemum. The same principle was applied to the fruit-trees, *e.g.* the cherry and the plum; but the *Bai-u* ("Plum rains") of June are related to the fruit and not the flower. Except in the extreme south-west, too, few parts of Japan have these heavy June rains even as a secondary maximum, and to describe them as "the June maximum" is very misleading. Even where they are heaviest, *e.g.* at Kochi (*c.* 14″), they are generally much (12 p.c.) lighter than the September rains. Cf. p. 119.

Population. There remains the problem of population, and it is now a very serious one, complicated by the ingrained habits of centuries during which every conceivable encouragement was given to the production of large families. To-day not only have all the mouths to be fed, but the standard of living is steadily improving, *e.g.* as judged by the consumption of wheat and sugar, fish and meat. The output of rice has nearly kept up with the increase of population, *c.* 900,000 *per annum*, but by science and not by area. The total arable area is less than the farmed land of Ireland; it is not naturally very fertile; it includes no wide stretches of natural pasture. But Honshiu alone, with only one-third as much arable land as Great Britain—out of the same total—is carrying nearly 20,000,000 more people (63,000,000 in 1929). Within 50 years Japan has nearly doubled her output of rice, and is now producing twice as much to the acre as even Java does; but even in the Takasaki-Tochigi-Tokyo triangle not half the total area *can* be cultivated.

The basis of population must always have been food-supply, and

that was largest and most assured round the Seto Uchi, especially on the northern coast-lands; for, though famines did occur even there, they were the result more of flood or frost than of typhoons or volcanic or seismic disturbances. In any case, the largest areas of available land were on the Honshiu lowlands, and there conditions of climate and soil were most favourable. In the absence of roads and navigable rivers, too, no other area had such facilities for getting relief from elsewhere; and this is still a controlling factor in dealing with the present crisis. **Its Basis.**

For it has become clear that agriculture cannot do much more than it has done; it is literally impossible to add 125,000 acres to the rice-tilth every year in order to provide the extra 5,000,000 bushels of rice required to feed 900,000 persons; and the possibilities—draining a little more swamp, terracing a little more of the mountains, sweetening and manuring more of the sterile patches, occupying more of the crater-floors [1]—would raise the cost of production, and the return would be low or very risky. There must be imports of bread-stuffs, and they must be paid for; and, as so-called geographical *inertia* is most marked in a rice civilisation, the problem was whether this man-power could be used *in loco* and without serious disturbance or redistribution in such a way as to pay for the imported food. **Arable Limit.**

Two of the essentials were certainly present—abundance of the cheap and intelligent labour which is typical of a rice civilisation, and immediate access to water-transport for both local and world sources of supply or demand. The latter was rather dubious; for Japan is far from the great markets of the world outside of Asia, her Asiatic hinterland is undeveloped or largely self-contained, and—though ocean transport is the cheapest of all media—the Pacific is very large. In any case, one point seemed clear: everything must depend on the southern half of the kingdom, *i.e.* the Seto Uchi and the highland core; and, if the latter was suited only to a single industry of a rural character, then the former must become the scene of varied industries in urban centres. The link between the two, as suggested by the position of the old capital of Kyoto, is closer than it may appear at first sight; and the problem may be approached through the silk industry. **Two Industrial Essentials**

The silk industry is at once specially typical of Japan, and its history shows us almost every detail of principle and process that we shall find at work throughout the important regions of the country. A thousand years ago it was located round the Seto Uchi; but, owing to the growing demand for food and clothes for the mass, the mulberry was gradually pushed off the fertile lowland by rice and cotton—though the cotton was presently also pushed off it. But the mulberry is much more indifferent than the cotton to soil and **Silk.**

[1] That of the great Aso-san crater (12 × 15 miles) is already occupied.

climate; it can grow, and silk is produced, even in Yezo, though the shorter season means less leafage and fewer hatches—practically, only one, in spring. The nearest "refuge" was the highland core, and here the silk industry settled, and here it has remained.

Hida Highland. The highland core is remote, especially from sea influence, and is relatively dry; and, as cocoons are perishable, and need a dry climate for storage, so far this area was actually *better* than the Seto Uchi. It is very rugged, even the valley-floors often being too gravelly to be irrigated and too rough to be tilled; but the mulberry is more or less indifferent to both the height and the roughness, so long as the soil is not sterile, and the climate is not adverse. As a matter of fact, the climate is very favourable indeed both to the mulberry and to the silk-worm. But this rugged and remote highland has been almost inaccessible, so that it has been—and still is—quite impracticable to import quantities of raw materials; and, as there is no other industry competing for labour, and as silk is so light, and has such high value in small bulk, easy access was not of any serious importance. The work requires a very large amount of labour, and the cheapness of labour where there was nothing else to do, far more than compensated for any cost of transport.

Suwa Lake. In the very heart of the highland is the great centre of the industry, round the Suwa lake. An enclosed basin at the foot of the Japanese Alps, it is dry and sheltered from storms; the lake provides the necessary water for reeling; the Alps provide unfailing "power"; the Great Ditch gives relatively easy access *via* the Fuji and the Shinano valleys. Two other river-valleys, those of the Tenryu and the Kiso give fairly easy access to the Seto Uchi; and the water-power, especially from the Tenryu where it leaves the lake, and the little belt of level land round the lake, facilitated the transfer of the reeling from the scattered homes to the lake-side factories.

The railways now make it easy to bring the perishable cocoons from considerable distances to this centre of inherited skill. The Kiso valley leads directly to Nagoya and Kyoto, both piedmont cities to the highland; and silk-working is one of the oldest of all Japanese industries. Nagoya can "anticipate" the consignment of cocoons coming in from a distance, and silk-reeling is its chief industry, while Kyoto maintains the ancient twisting, weaving, bleaching, and dyeing industries, mainly as hand and home industries. Here only in the world now is it easy and normal for a woman to design her own material, and have it made on the spot, absolutely assured that no other woman will have a fabric of the same pattern. It is, too, northward from Kyoto, *i.e.* on the *home* flank of the highland, that the most typical of all the silk industries is centred, the *habutae* of Fukui, Kanazawa, and Toyama, Kanazawa being the only really important city on the Sea of Japan.

Apart from this ancient silk industry, which was specifically a

luxury industry associated with the Court, the other old industries had fed, and clothed, and housed, the people; but wood had been the one basis, and had forbidden machinery,—"power" had been of no importance compared with irrigation,—and there had been no concentration on transport centres, still less on coalfields. All accepted methods and motives, therefore, would have to be changed; and one great political upheaval had greatly facilitated an equally great economic upheaval, and done this in a way which deserves more attention than it seems to have received. **New Conditions.**

It is called the "Revolution of 1868," but it was intellectual as well as political, a Renaissance as well as a Revolution; and it was associated with a Reformation, but one that preceded the Renaissance instead of following it—which may suggest why results were so much better and bigger than they had been in England. For the Shinto revival was provoked by resentment against feudal encroachments on the administrative rights of a semi-divine emperor, and it replaced many regional leaders by one imperial leader. Classes were abolished, and life began afresh; the new leaders of thought had neither official rank nor social status; and the *samurai* were "dispersed" among the people. This was of supreme importance; for, though they had resigned their rights, service to the "State" remained their ideal, and their gifts of leadership and organisation were at the service of the State.[1] And, under these happy conditions, Japan studied Western ways for her own ends, and saved her own culture while remaining mistress in her own territories. The throne was a symbol at once of national unity and of historic continuity, but all was new; and the political novelties were so good that economic novelties were greeted with equal hope and welcome **The 1868.**

But, as there was to be one supreme political head, so there should be one natural economic centre; and the same historic continuity suggested that such a centre must be on the Seto Uchi, but at the "home" end of it, *i.e.* in touch alike with the highland core and with the historic capital—Miyako, which means the same as the *Chinese* "Kyoto" ("Capital"). There was no room for doubt or hesitation; there was no rival to Osaka, and the city (*c.* 2,400,000) to-day is the largest in Eastern Asia—if we ignore the claim of the Shanghai *area* to masquerade as "Shanghai city (3,160,000)." Kobe (*c.* 750,000) is only 15 miles away, and Kyoto (*c.* 750,000) is not 30 miles. **A Single Centre.**

Smoky Osaka is, therefore, in place and purpose, almost a Western city, free enough from earthquakes even to be Western in the height of its buildings—as well as in its dirt and din, its smells and slums; and it had special claims on the attention of the Elder Statesmen in their scheme for foreign trade based on home industries. For it had always been a port. Seven centuries before **Osaka.**

[1] They provided the personnel of an admirable police force.

Christ the first emperor landed there for Yamato; it was the one official open-port for Buddhist and other visitors from China and Korea; in the fourth century after Christ it was even the imperial capital. But its special work had been as the port of Kyoto, with the obligation of providing and storing food, *i.e.* practically rice, for the Court; and it has remained the great rice-port of Japan. But all great commercial centres tend to use industrially what passes through their hands, and Osaka was no exception; but, if it was going to develop manufacturing industries as subordinate to its commerce, what should these be?

The Needs. The question was not answered hastily, and the delay in answering enabled Osaka to start its industrial career with several obvious advantages, *e.g.* the newest methods and machines; and we may usefully follow the Elder Statesmen in their general survey before analysing the particular conditions of Osaka. For our purpose it is immaterial that the men who engineered the Constitution of 1889, and who were able to make traditional methods function under new forms, have passed away; but it is material that, though their successors and their parliamentary system are neither strong nor popular, the daily needs of the people are still very largely independent of World markets and international exchange, only 10 p.c. of their food being imported. It may also prove material that Japan, now over-populated and under-supplied with modern necessaries, was once cruelly disillusioned by the treatment given to her by certain European nations with footholds on the neighbouring coast of the continent; and,—though this is not yet,—the effect of mechanising a people whose genius is as sensitive as that of the ancient Greeks, will probably be evil beyond repair.

Mineral Wealth. The first question which the statesmen had to face was that of mineral wealth; and it remains still much the most important. Two facts became clear from the survey. The first was that the supply of the "national metal," copper, with its bearing on hydro-electric development, was perfectly satisfactory in both quantity and quality; and that in nearly every case the copper areas were relatively rich in gold or silver or both. The Otaru-Sapporo[1] copper belt was rich in silver (and sulphur) at both ends, and in gold at the Sapporo end; the Akita copper belt was rich in silver throughout, and carried some gold (antimony and petroleum); the Kamaishi copper-field contained gold, and so did the neighbouring Sendai field, the latter also rich in silver; the Ashio, the Hitachi, and the Mito copper-fields carried silver, the latter two carrying gold also; both the Okayama and the Ikuno copper-fields carried silver, the latter again carrying gold. The aggregate is not great in either case (*c.* 10,000,000 *gr.* of gold and *c.* 160,000,000

[1] In each case the fields are named from the nearest important towns, not from the actual mines.

gr. of silver *per ann.*), but it was sufficient for the immediate purpose (p. 695).

In several other respects the reports were quite satisfactory. There was abundance of good kaolin, *e.g.* in the Aichi (Seto) and Saga (Arita) prefectures, for the various pottery industries,—of sulphur, especially in Yezo and Kiushiu, for fertiliser and other purposes,—and of salt, from evaporation of sea-water round the Seto

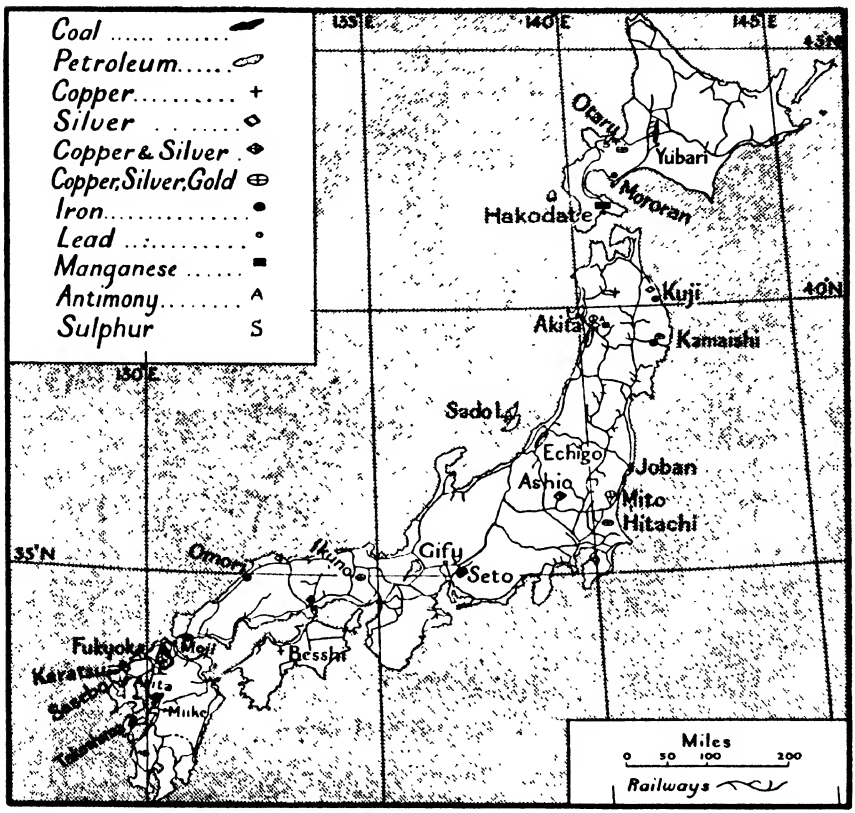

FIG. 135.—The Minerals of Japan.

Uchi. And there are useful deposits of antimony, *e.g.* near Akita, —of lead, *e.g.* near Gifu,—and of manganese, *e.g.* near Hakodate.

But with regard to fuel and iron the reports were very disturbing, especially about the iron. Nearly 90 p.c. of the coal had to be classified as poor; there was very little anthracite (or *semi*-anthracite); and there was nothing that would make good metallurgical coke. In recent years, too, there has been such an increased (90 p.c.) consumption of coal that only 75 p.c. of the extra demand has been

Coal.

supplied by extra output from Japanese mines. The usual map of the coal-deposits shows them scattered over most of the kingdom, from the extreme north-west of Yezo to the extreme south-west of Kiushiu, with additions in Karafuto, Chosen, and Taiwan; but such a map is profoundly misleading.

Only Two Areas.

For practical purposes there are only two areas, one in southern Yezo and the other in northern Kiushiu, even the Joban field being negligible in quantity as well as very poor in quality. The Kiushiu deposits have two advantages; for they are very near the sea, and relatively near the great manufacturing centres in the Seto Uchi

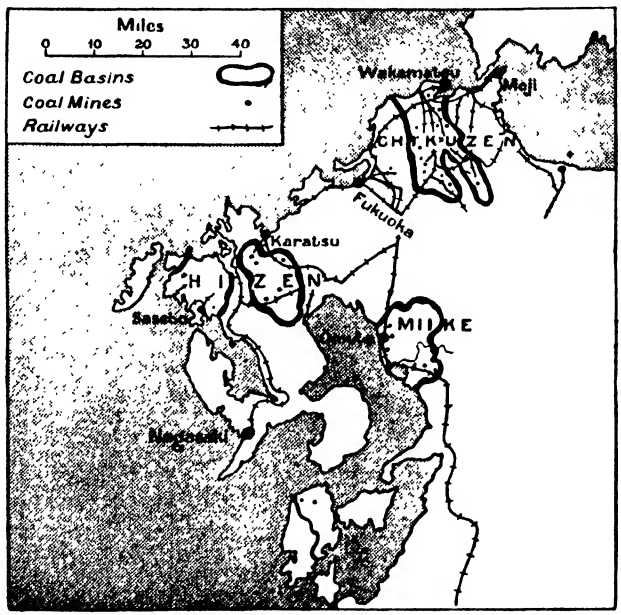

FIG. 136.—The Coalfields of Kiushiu.

belt of dense population. There are four separate fields. The little island field of Takashima is very conveniently placed, seven miles from Nagasaki, and produces a good steam coal; and the Hizen fields have access to the sea at Karatsu and the naval-station of Sasebo. But the large producers are the Chikuho (Chikuzen) and the Miike (Chikugo). The former is so placed at the junction of Mid-land Sea and ocean routes that Moji is called the "Gibraltar" of Japan; but the town is just *off* the field, and owes its importance to the inability of Wakamatsu to accommodate boats above 3000 tons; and the field extends so far south that Fukuoka is also a convenient port. The smaller Miike field (= Forest of Dean) has outlets at Omuta and the mouth of the Suwa, and it contains some

coal that will coke, though too sulphurous for metallurgical coke. The large Ishikari field in Yezo centres on Yubari, which is only about 35 miles directly from either the west coast or the south; but the rail haul to Mororan is fully 90 miles, and still more to Otaru, which is one day's sailing farther than Mororan from Osaka (*c.* 600 miles).

Oil. As Japan does not use coal for domestic purposes, and as all the fields have easy—most of them very easy—access to the sea, there sprang up an important foreign trade in coal; but the great industrial development has completely stopped that, and coal has to be imported—especially coking coal, from Kaiping. At first it was hoped that relief might be found in exploitation of oil and water, but the oil-projects have failed. The "Seven Wonders" (*No nana fushigi*) of Echigo include "burning plants and burning rocks, burning air and burning water"; but the oil is not much more valuable than the peat and lignite and natural gas,—though this other fuel enables the oil to be worked very cheaply,—and the output is steadily declining.

Water-Power. The water-power, however, has been a very great asset, and will be a still greater one. Topography and climate combine to guarantee a heavy, rapid, and even flow, with easy storage in lakes or in natural basins which are easily closed; and the abundance of copper cheapens the hydro-electric installations. At the same time, the power is used very widely—for domestic lighting and agriculture as well as industrial purposes and transport; and, if the industrial development continues at its recent pace, it will strain the water resources to the utmost; and so there will still be an urgent need to import coal.

Iron. The distribution of the iron-ore is rather like that of the coal-fields, but on a much smaller scale. There are scattered patches of various kinds, *e.g.* the "iron-dust" of Omori on the Iwami coast, the magnetic sands of Kuji on the Iwate coast, and the Sendai field; but, for practical purposes, there are only two important fields, the Kamaishi magnetite and the Mororan limonite, both supporting iron and steel works—at Kamaishi and Wanishi—as well as shipping ore or pig-iron. Again, then, there must be import from foreign sources; and it was agreed that the fundamental needs were for coal and iron, the production or the import of textile raw materials being relatively unimportant.

Rice and Cotton. At the same time the agricultural possibilities entered into the problem. For instance, as in China, there is a rice-and-cotton combination, though it is badly balanced. Along the coastlands of the Seto Uchi in Honshiu and Shikoku, especially the former, the rice is overwhelmingly important; on the Kwanto plain that is true only of the cotton, for the volcanic soil is rather sticky for rice. There is also a belt between the Owari and the Suruga bays, with a moist sandy loam and humid sunny climate,—such as are so well suited to

the tea-gardens of the hilly hinterland (" Shizuoka green [1]-tea "),—where cotton is the staple crop. It is not of high quality, but good enough for the Japanese market, *e.g.* in India.

" Wood." Exactly the opposite note is struck in the other industries connected with this belt, the various " wood " industries, whether in home or in factory. The paper industry has no rival for quality in the whole world, and this Shizuoka belt is its chief centre. The mulberry highland, with its crystalline watershed, guarantees abundance of raw material (the inner bark of the white mulberry), and streams that are neither driblets nor muddy ; and cheap labour is associated with great skill. For the supreme merit of the real Japanese paper is that it is made only from the tough and yet pliant inner bark, and that this is never cut in the pulping, but only patiently pounded ; and so the fibre-cells are not severed or even broken. The lacquer work of Shizuoka is equally good.

Of course, other materials are used, either bamboo and other local growths, especially from the volcanic piedmonts, or imported pulp-wood, especially from Yezo ; and there is a busy industry in bamboo-ware, tea-chests, etc., Shimoda being the chief centre and Shimizu the port.

Rush Matting. It seems as if the Japanese devoted to articles of great perfection only raw materials which have been raised with great care ; and that is one reason for the profound deliberation about the encroachments that may be allowed on rice-land, *e.g.* for rush-culture. The supreme excellence of real Japanese matting—apart from the question of colour—is due to the rush being carefully cultivated, so as to be very fine and of a uniform thickness, so that it is infinitely better than Indian or Chinese matting except for very hard use. And, again, the purity of the water in the Takata and the Ota basins is of great importance for dyeing and other purposes. The matting is often called " Kobe," but that is only the export centre ; the industry is concentrated round Okayama and Hiroshima, especially the former.

Inter-culture. The dovetailing of the various crops on the very limited area is a triumph of inter-culture of both kinds. Between tall crops, arboreal or other, it is the simple inter-culture, *e.g.* lines of vegetables between the lines of fruit-trees ; but there is also mixed cropping, a typical winter crop in northern Honshiu being *muji*, *i.e.* wheat and barley with either oats or rye. This ensures that, whether the season is long or short, wet or dry, at least one-third of the crop will be a success. Wheat, especially for " macaroni " products, and barley, especially for braid-straw, are grown separately ; but only rice really has the choice of ground, *e.g.* along the Shinano, from Toyama to Niigata, with a rainfall of at least 75″ off

[1] The Japanese leaf cannot take the " Chinese " fermentation, except for small quantities from the south-west of Kiushiu.

the warm current,—in the Kiso basin behind Nagoya,—in the Yodo basin round Nara.

This rapid summary may enable us to approach the original problem more easily, and even to determine forthwith what the prime needs of the industrial world here must be, and on what lines its great metropolis should be developed. We start with the fundamental fact that a food-staple such as implies industry and intelligence in its growers had concentrated a skilled population on coastal plains and in contiguous basins, *i.e.* on relatively low and level land with immediate access to ocean transport. Very nearly all the urban centres of the country are in the south-western half, *i.e.* where they have relatively easy access to the continent; but the better climate has distributed them specially on the Pacific and not the continental side, *i.e.* with easy access also to ocean transport.

Basal Conditions.

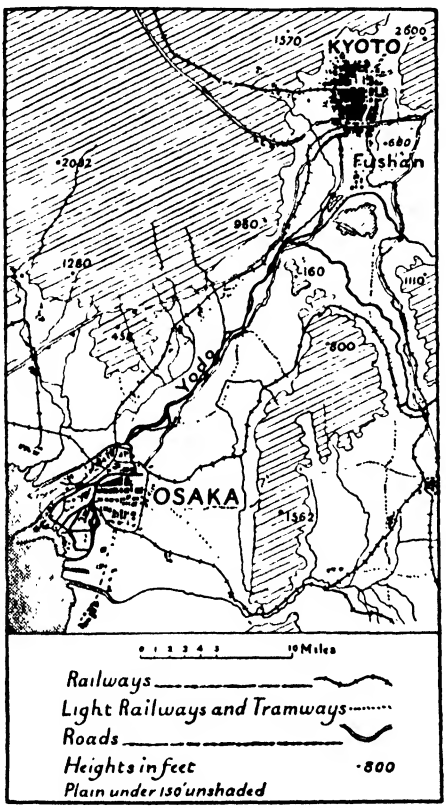

FIG. 137.—Plan of Osaka and Kyoto.

There was an obvious necessity, then, for the great centre to be on this Pacific margin, but with the protection of the inner sea against foes and storms,—accessible by the cheapest form of transport,—within easy reach of food-supplies as deciding the quantity and the cost of labour and the size and the proximity of a potential market,—and with the amount of ground available that is necessary for all the appurtenances of an industrial and commercial metropolis. Obviously, Osaka is able to import all necessaries easily and cheaply, and the Yodo distributaries and linked canals enable the "Venice of Japan" to pass them on again by water. But the size of the Yodo plain, which ear-marked it for rice-culture, left the city with

Local Conditions.

no immediate interests in local raw materials of any kind, *e.g.* silk. What lines of development would at once meet the home needs and offer a surplus for exports, by which to import food and other necessaries ?

Cotton Textiles. Apart from food, far the largest and steadiest home demand was for cottons, and the natural hinterland of Japan for foreign trade contained several hundred millions of cotton-wearers; Osaka was in the centre of the home cotton-growing belt, and not nearly as far from the great harbour of Kobe—by water, as Manchester was from Liverpool—by rail ; and the Yodo made a better harbour (for large junks) than the Irwell had made for Manchester. The climate all round the Seto Uchi is admirably suited to cotton-spinning ; but the spinning was to be a factory industry, needing abundance of cheap labour and of open ground. To-day nearly 25 p.c. of all the spindles in Japan must be credited to Osaka, and half a million more are in the neighbourhood, *e.g.* at Wakayama (over 300,000), Kishiwada, and Nara ; and the city has converted the Yodo into a " Ship-canal," which admits 10,000-ton boats.

The yarn can be distributed easily to the little centres, villages as well as towns, round the fertile plain, where the weaving remains mainly a hand and domestic industry; but the quality of the water makes Osaka the centre for bleaching, dyeing, and printing. One of the demerits of the old products was lack of uniformity, due to the smallness and the independence of the producing units; and the centralisation of processes, even the dyeing, as factory industries in Osaka, has tended to neutralise this defect. The change also greatly facilitated proper organisation, so that it was possible to take advantage at once of the opportunity for penetrating the Chinese and the Indian markets during and after the War ; and the products satisfied the new customers so well that Japan has now a very strong grip on these markets.

Machinery. But, if cotton clothes were an immediate necessity, machinery was going to be at least equally necessary ; and, with its facilities for importing coal and pig-iron, Osaka has become the chief manufacturer of iron and steel goods, especially machinery, electrical apparatus, all kinds of " Birmingham " articles, and cutlery—the last an evolution of the old sword-industry of its Sakai suburb in the days when Kyoto was the capital (p. 714).

A number of " heavy " industries have also been developed, especially glass and chemicals, the large local market for both more than compensating for the cost of importing the raw materials ; and, again, the normal smallness of Japanese units, making it impracticable for the individual units to indulge in specialised machines, gave another advantage to the one great centre where such specialised machinery could be afforded. Further, the deepening of the harbour has enabled Osaka " tramp " steamers to trade

directly with the Yangtze ports,—even cotton textiles being shipped in this way.

But why did not Kobe make a still better use of her natural advantages, as much the finest harbour on the Inland Sea? Only because the very excellence of the harbour is directly related to the encircling heights. There is the deeper water, with any amount of water-front for shipbuilding and many other "water" industries; but the city is cramped on a bench, and there is no room whatever for industrial distributions, still less for the food-base which supports a dense population. "The Kobe-Hyogo front is not much more than a single street"; and, though very large quantities of cotton and even of wool are imported at Kobe, any "local" industries are really outside the city, on the coastal railway between Osaka and Himeji, *e.g.* at Akashi. The only exceptions are in the case of industries that do not require large buildings, *e.g.* match and rubber workshops, both of which were the outcome of the Kobe trade with South China and Malaya; and the same is true of the woollen industry, quite a small one and depending on Australian wool.

Kobe.

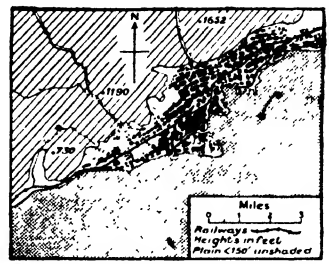

FIG. 138.—Plan of Kobe.

Kyoto must be associated with Osaka and its Kobe outport, but it lost its natural industrial importance when it lost its supreme political importance; and its task in recent times has been to adapt the typically Japanese arts and crafts that were at the service of the Imperial Court to suit an export or a tourist trade in trifles—porcelain, bronze, lacquer, etc. The artistic skill is still able to satisfy the mass of the tourists and the foreign buyers, and there are only hand-made articles (for factories are not allowed in the city); but their value is really in the light which they throw on the old industries of the country.

Kyoto.

Nagoya claims to be the centre of a separate industrial region, but is really subordinate to Osaka; and the apparent similarity in their general environment cannot be pressed far. Nagoya has the Owari plain behind it, with room for industrial development, and the Ise bay in front of it, with possibilities for commerce; and Yokkaidi holds just the same relation to Nagoya as Wakayama does to Osaka. But Nagoya had a worse harbour than the Yodo, and was later than Osaka in providing itself with a 25-foot waterway; and it is a little farther from the main markets, and it never was a "Venice" in its inland connexions. But, standing where the great silk district abuts on the best cotton district, it reels silk, and spins and weaves cotton; and the weaving fame of the city attracted both the woollen trade and that in artificial silk. The special

Nagoya.

industry, however, is based on the immense wealth of china-clay round Seto, 10 miles away, which is the " Stoke " of Japan.

Gifu. We have already noticed the importance of the Kiso valley through the silk country and the connexion of the latter with the paper industry. There is a very easy route from the Kiso valley *via* Gifu to Lake Biwa and Kyoto, and the connexion with the capital seems to have led to the old specialisation of Gifu in the manufacture of paper lanterns and umbrellas. This survives as a typical hand-industry carried on in the homes of the people. The town illustrates well the climatic control of the continent in winter, by a minimum mean temperature as low as 36° F.—in January, and that of the ocean in summer, by a maximum mean of 79° F.—delayed till August.

Quality. The same fundamental difficulty is found in this region as round Osaka. Attention can be paid to cheap goods, especially cottons, for China, or to dear goods, especially silks, for the United States ; but it is recognised that, even before there was any competition from artificial silk, too much was depending on the silk trade. What does not seem to have been recognised is that the dear products, partly from lack of uniformity and truth to sample, are not good enough for the best markets. As the manufactured goods take much less room than the raw materials, too, there is a wish to export the former in local " tramps " rather than by Kobe " liners." This, of course, means inferior organisation ; it also increases the disparity at Kobe between exports and imports.

Tokyo. What may almost be called the " plan " is repeated on the Tokyo Bay—a great city at the mouth of a river that is navigable for 50 miles, the Sumida,—a great port at Yokohama (with the Yokosuka naval-station to guard it),—and the outpost of the city in Kanagawa. The capital of an island empire should be on the ocean coast, and no other location can compare with this from such a standpoint. The old name was Yedo (" Estuary Gate "), and the river drains the largest plain in Japan, though the sixteenth-century Yedo was only a fishing village ; but, when the country became a Great Power, the name was changed to Tokyo (" Eastern Capital ").

Tokyo and Yokohama enjoy fully both the commercial and the industrial advantages of Osaka and Kobe, with the Sumida even more useful than the Yodo and bridged[1] as beautifully ; but the grave dangers from volcanic and seismic disturbances discourage large buildings, for factories or any other purpose, and there are practically no heavy industries. But in small articles, made in small " shops," it is equal to Osaka for " Birmingham " goods and superior for electric apparatus ; and it has a great variety of textile work, though its cotton-spinning is really done in the " suburbs," *e.g.* at Kanagawa (*c.* 170,000 spindles).

[1] All distances in Japan are measured from the Nihon-Bashi, or Bridge of Japan.

Its status as a great capital seems to have determined some of its special lines, *e.g.* in cloth (uniforms, kimonos, etc.) and shoes; but its position between the silk highland and America has made it above all things a silk centre, and it has a huge labour-market behind it. From the first (1868), the city has been identified with a wish for a broad foreign policy in opposition to the narrow home policy of Kyoto.

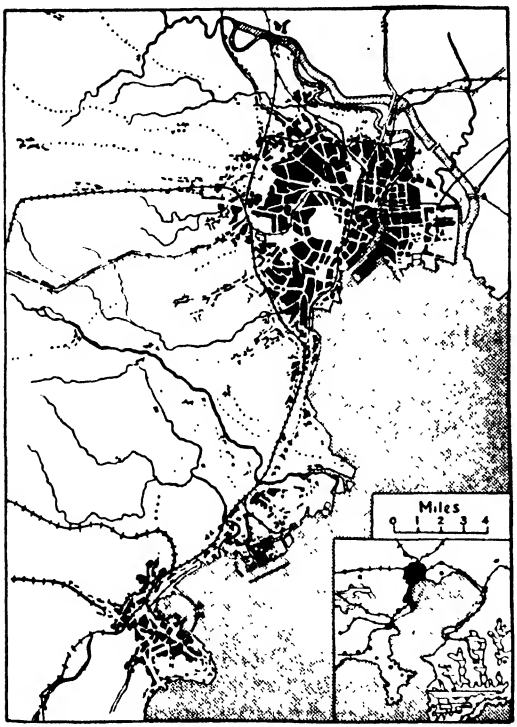

Fig. 139.—Plan of Tokyo and Yokohama.

(Conventions as in Fig. 137. Inset of Tokyo Bay showing towns, railways, and land over 600′ shaded.)

Kiushiu. One other area is already of great importance, and it seems more normal, if less typical of Japan, than the three others; but its normality is limited, for its prime function was to import coking coal and fine iron-ore (and pig-iron) from China and other foreign sources, and to "export" poor coal and pig-iron to the Seto Uchi towns and other home centres. Kiushiu had, however, two advantages; for its location gave it easy access to Asia and Europe, and its configuration provided a number of fine harbours, including some relatively small ones that are quite large enough for the work that they have to do, *e.g.* Hakata, the port of Fukuoka.

Nagasaki. Nagasaki was the focus of the island for 300 years. It is a magnificent harbour; the lowlands round the Ariakë Bay grow abundance of very fine rice, especially round Kumamoto; the hills round the Omura bay contain large quantities of very fine kaolin; and the facilities for fishing (for bonito, etc.) and for boat-building were very great. It, therefore, became the natural gate of Japan to the outside World; and the pleasant memories of European missions (especially Xavier) and of European traders (especially Dutch and English) were a real factor in the readiness of Japan to renew inter-

course with the Western World. Perhaps, this was one reason why Europeans did so much less harm to Japan than to the hostile and exclusive China. Nagasaki, however, is now rather off the main lines of industrial movement, though it is still a very important ship-building centre ; and it never quite recovered from the effects of the Russo-Japanese war.

Industries. The great development has been along the northern edge of the coalfield, though the rocky piedmont of the Tsukushi mountains rather cramps the towns industrially ; and the really " heavy " industries are concentrated along the coast from Fukuoka to Moji, having grown up " round " the government steel-works at Yawata (Wakamatsu). Though the centre of heavy work is to the west, where the coal and iron-ore are imported, the outlet is naturally to the east, at Moji, the nearest port on the Home front of the island on the Seto Uchi ; and the Chikugo valley gives very easy access to and from Saga and Kurume, Saga being almost as important as Seto in the ceramic industry. The richest deposits of the kaolin are between Arita and Takeo, but Saga gave its name to the egg-shell porcelain, and actually sends kaolin to Nagoya.

Chosen

Parallel with Britain. The peninsula of Chosen (" Calm-Dawn-Land ") is an admirable natural link between the islands of Nip-hon (" Sun-Rise ") and the continent, even if the manipulation of its railways as the transport medium is merely a political device that has little or no economic justification. It is about the same size as Honshiu or Great Britain, and has as much claim as Honshiu to be called the " Britain of the East " ; for it has a bold ocean coast facing prolific fishing-grounds, and a low landward coast with very high tides, those on the Han near Chemulpo being as high as those on the Severn near Newport. The main water-parting hugs the ocean coast, and leaves small plains, with longish rivers, to landward. Its island fringe in the south even contains, in Quelpart, a home of " Shetland " ponies, and a magnificent harbour in Port Hamilton.

People. The people represent a modification of the Tungus type as itself modified in the Manchus ; many of them, especially in the south-east, where the climate is most " insular," are tall and *fair*, with brown hair and white skins. They represent a useful labour-reserve, so far as manual capacity is concerned ; but their intelligence and power of organisation are by no means equal to their capacity for manual labour. This might almost have been guessed from the primitive character of all their industries, itself reflected in the absence of large towns even on the river-plains ; but it should be related historically to its fundamental origin.

For the " Land of Quiet Dawn," like the *Anatolian* " Land of

Sunrise," has had a story that is very typical of a peninsula that has also been a debatable " Buffer-land." The recorded story is 3000 years old ; it tells of at least two great invasions by China (200 B.C. and *c.* A.D. 900),—two by Japan (A.D.1, and *c.* 1600),—two by Mongols, and at times by both China and Japan simultaneously, so that the land became an Eastern Belgium. By the end of the sixteenth century, most of her best soldiers had been annihilated ; the mass of her best artisans had been carried into captivity—to lay the foundations of fine handicrafts elsewhere, especially in Japan ; and the dregs of the survivors became corrupted by political intrigue, with no virility except in their hatred of all foreigners. The basis of life for ages now has been fear—fear of foreigners,—fear of gods and devils (more numerous than the total population !),—fear of disease, in a land where 3 out of every 5 babies died,—fear of winter cold in a land where no house was built on the north side of a hill, and only the poorest would live near the top of a south side.

An Eastern "Belgium."

And the most conspicuous feature of the climate is the icy gales in winter, under which the mean temperature—in the latitude of Sicily—varies from 5° F. in the north to 37° F. in the south (Fusan) ; and, as the summer is very humid, with a widely-spread mean of *c.* 75° F., it is very trying, though the considerable range is due to the winter extremes, the humidity (over 80 p.c. in July) making serious extremes then impossible. Of course, there is a large proportion of bright sunlight in winter, and even in summer the steep eastern face of the mountain backbone is relatively dry (35 inches of rain). It seems at least probable that it was to some extent dread of the winter cold that encouraged the systematic *indoor* life in winter ; and this *may* have been one cause of the literary and artistic development, for the old Korean was a student.

Climate.

At the same time, the climate is sufficiently similar to that of Japan to have encouraged the belief that the peninsula might be able to contribute stores of appropriate food and other raw materials of which Japan was in need ; and legends of the wealth of the country in gold and " diamonds " were not wholly baseless, though the " diamonds " were graphite. Gold is actually found on the Unzan ironfield and near Changseng in the north, round Suian in the centre, and near Shokusan towards the south. The whole of the north, from Kangho to Songchin seems to produce graphite, so does the hinterland of Keijo (Seoul), and so does the country south of Shokusan and Chushu (Chengju).

Gold and Graphite.

The peninsula may be divided structurally into two unequal and very different parts—a northern " hammer-head " of lava-covered plateau and a much larger meridional grid of ancient rock. The whole area is clearly separated from Manchuria by the great Chang-pai system and the two rivers which it feeds, the Yalu and the Tumen ; and the Chang-pai wall, with its gigantic crater of

Physical Character.

Paik-to-san determined the essential character of the northern block. For the Kaima plateau, with its steep scarp to the Sea of Japan, is covered with lava-flows from Paik-to-san (" Long White Mountain ") as far as the rift-valley that carries the railway from Keijo (Seoul) to Wensan (Gensan). The Han almost cuts the peninsula in half, and is navigable for fully 150 miles. The volcanic *débris* from this dissected plateau is carried over the plains of such

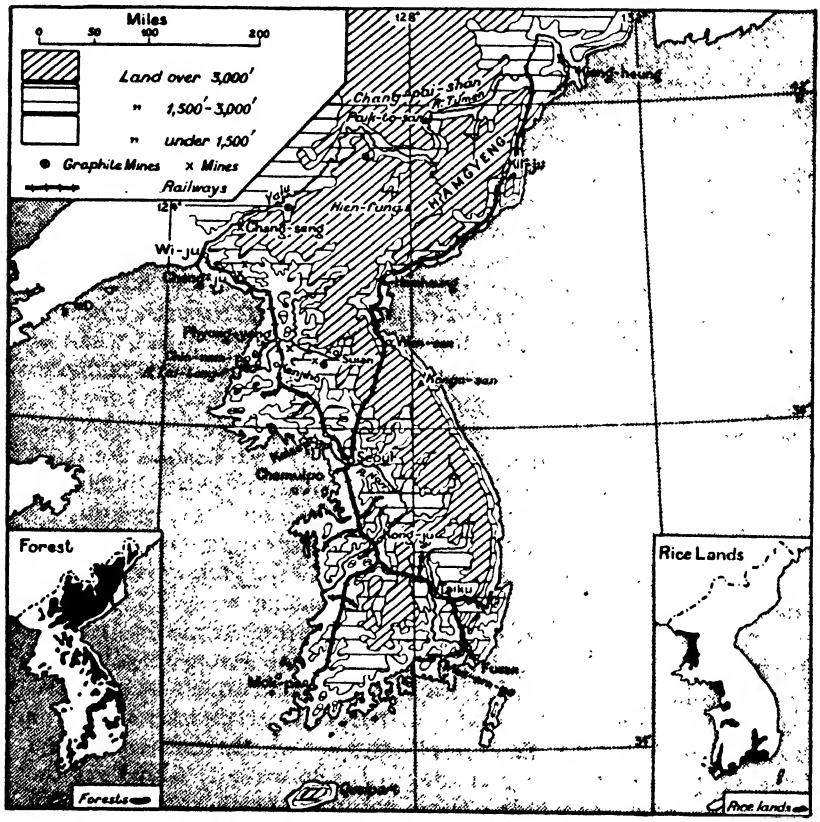

FIG. 140.—Relief of Chosen.

rivers as the Tai-Tong and the Han ; but the strictly seasonal rainfall is adverse to the utility of the numerous short rivers for power and even for irrigation.

Its "Cover."

About five-sixths of the peninsula may be called generally mountainous, with the backbone, as in the Taihaku-san, at right angles to the wet wind ; and the " granite " soil below the ranges of the Gridland, *e.g.* below the beautiful Kongo-san ("*Diamond* Mountains "), is very suitable for rice. As far more than half the area is

above 3000 feet, and very little is below 1500, it ought to be—and was—heavily forested, certainly over 75 p.c. of the area ; but except in the north, where the forest was sedulously preserved as a protective frontier, there has been perfectly reckless destruction—mainly for fuel, as most building " timber " was bamboo, with a straw thatch. The only compensation is in the extension of excellent cattle country, especially in Ham-Gyeng, where Kilju is a large market ; but the Hien-fung mountains (over 8000') block easy access to Wensan.

Agriculture.

Though the amount of tillable lowland is very small (? 10 p.c. of the total area), the richness of the mixed lava and alluvium on the plains, especially in the Tai-tong basin, and in the little valleys should ensure very heavy crops ; and the volcanic element, if not very favourable to rice, should be very favourable to cotton. The yield of rice is fair ($\frac{5}{7}$ of that in Java, *per* acre), especially when we remember that two-thirds of the crop is upland rice—apparently, a sequel to the days of terrorism and piracy. Fully 75 p.c. of the population must be classed as directly agricultural, but it is most dense in the most accessible parts, *i.e.* in the western third of the peninsula ; and until the Japanese have spread their scientific agriculture widely, they must not expect much help from Chosen. The tilth cannot be doubled, or even greatly extended ; but the yield may be, and the quality may be very much improved.

Of course, there are other crops. The mixed soil and the climate are very favourable to pulse, especially the soya bean, and to tobacco ; and wheat and millet succeed as dry crops, the former as a winter crop to the north and the latter as a summer crop elsewhere. Cotton hitherto has only been of poor quality, and very little has been produced ; and, though we may credit the Japanese with the will and the knowledge to make all possible improvements in methods and in type, we can scarcely expect Chosen ever to supply more than, perhaps, 2 p.c. of the Japanese needs. Silk, like soya, is a natural product, and can be exploited scientifically ; but it would probably be far better to encourage crops which will bring a really high return, *e.g.* ginseng, largely from round the old capital (*c.* 900–1400 A.D.) of Saydo (Kaiseng), conveniently near Chemulpo. That will have a market, even at *£80 per ounce*, so long as the Chinese believe in the supreme value of a (perfectly harmless) " drug " because the root does look rather like a human figure !

Mineral Wealth.

There remains the question of coal and iron. There is a small amount of good coal, the anthracite of Phyong-yang (Heijo) being the most important ; but the Kainei field produces a good quality of bituminous coal. The total amount, however, is quite small. The iron-ore is also of good quality (50–55 p.c.), and the largest deposits are near the coast behind Chengju ; but some of the output is used locally, *e.g.* at Kenjiho.

Towns. Keijo is the right place for a capital, in the centre of the country and on the main line from Fusan to Wiju, which followed the old road, *i.e. avoided* the coast. Nearly all the important centres are railway junctions, Phyong-yang, Kong-ju, and Hwang-ju, or ports—Chin-nam-po, for Kwan-tung,—Chemulpo and Mokpo for China,—Masampo and Fusan for Japan. Wensan is less important except as the point where the coast line from the frontier at Kieng-Heung *via* Kanko (Ham-Heung) leaves the coast for the rift valley and Chemulpo *via* Seoul. Some of these ports have now busy fisheries, but Chemulpo (" Muddy Harbour ") is not one of them; and the history of the area has been adverse to coastal settlement, all the old towns being inland, *e.g.* Haiju and Taiku, with its great annual fair.

Under modern conditions, Fusan is the chief port. At the head of Chosen bay, with the shelter of Kai-un-po peninsula to the north-east and Tsiel-yong-to (" Deer Island ") to the south-west, it commands the shortest route (120 miles) to Shimonoseki; and Mokpo and Masampo may be regarded as tributary to it. Chin-nam-po, though splendidly sheltered in the Tai-tong estuary, is a purely modern port, dependent on the mineral development of its immediate hinterland. Wiju (Gishu) owed any importance to overland trade with China, and has given place entirely to Antung; and Chemulpo and Wensan are simply the ports of Keijo (Seoul).

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CHAPTER XXXVIII

MANCHURIA

Manchuria, with its present problems, is one of those countries in which geographical values must be related at once to the historical and political setting. It may be hopeless to end any survey of it with a political forecast, but it must be helpful to begin with a historical summary.

Chinese Occupation.

The natives of Manchuria seem to have been racially akin to the Forest Red-men of North America ; but the Chinese were here even in the Stone Age, using *bronze* weapons against the Tungus, and have been here ever since, even when the land was the scene of endless tribal wars, out of which the Manchus emerged as rulers and unifiers. But the Manchus were very far from being what their name claimed—" Pure-bred " ; they were alien to the Chinese racially and hostile politically ; and they tried to keep their home-land hermetically sealed against the Chinese. At the same time, they had no genius for colonisation, and were too few and too barbarous to stand against the Chinese culture, even when supported by the Mongol element in the west of Manchuria. The Chinese have, therefore, always had some real occupation of the land, and their industry has been as inexhaustible as their persistence and—in recent times—their number.

Russian Intrusion.

But the Tungus, or proto-Manchus, were the " owners," if the Chinese were the occupiers ; and they spread far beyond the present frontiers of Manchuria, the whole of Amuria being held by them till the nineteenth century. But the fur-trade, especially the sable, carried the Russians across Siberia to the Amur in the middle of the seventeenth century, as the fur-trade carried the French and the English across Canada ; and it was only the Manchu conquerors' pre-occupation with China,—Peking being taken in the very year that the Russians reached the Amur, 1644,—that gave the Russians the opportunity of keeping some grip on the north-western corner of Amuria. As Russia increased in power, and China declined, Amuria was lost, and Manchuria was penetrated ; and there has been no real peace in the country since the construction of the

Trans-Manchurian railway,—its first open result being the war in which Russia was so badly defeated. But North Manchuria owed its development really to Russia, as South Manchuria owed its development really to Britain.

At the same time the Russian position always had one fundamentally weak spot—the character of the Russian immigrants. They were real *coloni*—farmers under an obligation to serve as soldiers; and, if fine soldiers, they were very poor farmers. The result was that they became very seriously dependent on Chinese traders, and so there was a strong tendency for Chinese villages and towns to spring up beside the Cossack villages and towns, especially on opposite banks of the Amur and where the Cossack villages lined the river at intervals of about 20 miles. The most important pair of settlements was that of Heiho and Blagovyeshchensk, and Heiho is being connected *via* Mergen with the Nonni valley line, already working as far as Laha.

Japanese Development.

In recent years Chinese have been fleeing in thousands—in some years over 1,200,000—into Manchuria in the desire to escape from war and banditry, famine and flood; and where Japanese influence and control have been working, they have found the land properly policed and progressively provided with all kinds of aids to development. There is no need to multiply details, or to pretend that there are no bandits or floods in Manchuria; but it does seem worth while to emphasise that the controlled area, *e.g.* the railway zones, is almost a model of development,—with experimental stations and model farms, technical schools and training colleges, etc.,—and that the success of the Chinese colonisation has been directly due to this control. Chinese and even Russians have just as free access as Japanese and Koreans to the Mukden hospital; and the country, especially through Dairen, has been doing *more than 50 p.c. of the total foreign trade of China.*

A Great Corridor.

Manchuria is a great Y-shaped lowland, flanked by natural walls to west and east, but open northwards and southwards. The (Great) Khingan makes a continuous wall in the west, but there is easy access for the railway from Harbin to Vladivostok between what may be called comprehensively the Chang-pai and the Kentei systems; and even the Khingan is not a serious obstacle, as its most easterly section is a block ridge scarcely two miles wide, through which a tunnel has been driven with its exit (at Khingan station) below 3500 feet.

The lowland narrows southward on the Liao valley, but widens northward—to be split against the arc of the Bureya (Little Khingan); and the Sungari drains the one limb northwards, while its Nonni tributary drains the other southwards, even Mergen being only 700 feet above sea-level. With the northern outlets to the Amur

and the southern outlet to the sea, the wedge of lowland makes a natural link, inviting movement both northward and southward—from a frozen land to an unfrozen sea, and from a congested south to an empty north. Dairen has played havoc with the trade of Vladivostok, and thousands of Chinese have fanned out northwards from Kwan-cheng [1] (Chang-Chun)—down the Sungari and up the Nonni or along the *Chinese Eastern Railway*. The point where

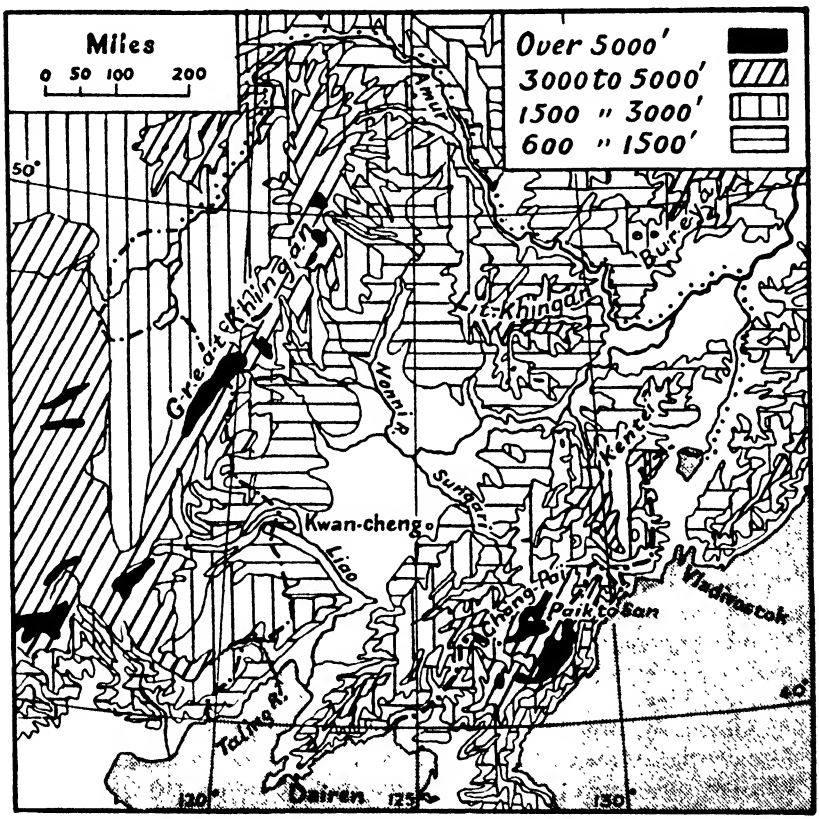

FIG. 141.—Relief of Manchuria.

the railway crossed the great river, with its 1000 miles of navigation, was bound to become the " natural " centre of the whole Russian sphere of influence—Harbin.

Wedged in between Mongolia and Korea, China and Russia, Manchuria was in a difficult and delicate position even before Japan spread her enveloping Sea Power from the Kuriles to Formosa, and began to retrace her pre-historic steps along the coastlands of Korea; **"Water" Frontiers.**

[1] Since it became the capital of the republic, the town has again changed its name—to Hsinking, which would be better spelled Sinking (" New Capital ").

and the country has suffered from almost every kind of political intrigue and turmoil. The one exception is the absence of disputes about her frontiers, and the geographical interest of this is in the very large proportion of the frontiers that is marked by rivers—Argun and Amur, Usuri and Tumen, Yalu and Liao. The sea frontier measures about another 600 miles.

Liao and Taling. At present, with Russia practically out of the picture, the Liao is far the most important of these rivers from the political point of view; and the Taling becomes unexpectedly important as repeating on a small scale and on an inner circuit what is done by the Liao. The natural line of movement on this inner circuit is from Chengteh (Jehol) *via* Pingchuan (Pakow) to the Taling valley for Chaoyang, with the choice there of working north-eastward *via* Takushan to Mukden or south-westward down the Lower Taling valley and so to Chinchow. On the outer circuit Kailu commands the great bend on the Liao, and the Tung-Liao valley gives a north-eastward connexion with Harbin and Kirin *via* Kwan-cheng, while the Lower Liao valley gives a south-eastward connexion with Mukden and Newchwang. Along these two lines Manchus moved south-westward, and Chinese moved north-eastward; and the link between them always lay between Chihfeng and Peipiao—the latter now a railway terminus, and the former always the natural "junction" for Tien-shan, Makhai (or, now, Taonan) and Tsitsihar.

A Colony. The present conditions are the result of the strategic and economic problem in relation to a nationalism that is quite articulate, but equally ineffective. Japan *meant* to colonise, and promised 1,000,000 immigrants in ten years; but they *could not compete* with the Chinese—partly from racial pride, but mainly from the economic standpoint, and they suffered from the extreme cold in winter. So here is an area 25 p.c. the size of China proper, already overwhelmingly Chinese in population, and yet with only 7 p.c. of the population of China.

The Climate. Obviously, the more important factors in the geography of Manchuria, so far as its external relations are concerned, must be location and relief; but in its internal economy structure and climate are more important, and the latter is particularly so. The practice of taking labels from one continent to fix on the other continents of such a small World, if not wholly undesirable, needs to be used with great caution; for it is practically generalising from a single instance. And, in this particular case, the common description of the climate as of the "Laurentian" type is very misleading, because it draws attention away from the two features which are essentially typical,—which differentiate it,—and which are alien to eastern Canada.

The Manchurian climate is purely monsoonal,—alike in its rainfall, its temperatures, and the limitation of cyclonic phenomena

to summer. The mean rainfall at Mukden between the end of September and the beginning of March is *less than* $3\frac{1}{2}$ *inches*, while that at Quebec—*i.e.* twice as far from open sea—is *more than* 19; and the mean temperature at Harbin between the end of November and the end of February drops to − 2° F., and does not rise above 5° F., while that at Montreal—in the same latitude, but 100 miles farther than Harbin from the sea—does not fall to 13° F., and rises above 19° F. At Mukden during the four winter months the total rainfall averages 1·1″, while that at Quebec averages 12·8″; and the July fall at Mukden is more than twice that in June and nearly three times that in May, while at Quebec July has only 1·1″ more than May and ·2″ more than June. **Not "Laurentian."**

These figures reveal the differentiating features of the climate over the greater part of Manchuria. The winter is a typical monsoon season, with practically no precipitation and with temperatures falling often to − 20° F., and sometimes even below − 30° F., at Mukden, *i.e.* in the latitude of Rome; but the air is so dry and clear that the very low temperature is not "sensible," and only in the Lower Sungari basin—*i.e.* north of the Vladivostok Gap—is there enough snow to facilitate "lumbering." Spring is very sudden and very short; and, as soon as the bare Mongolian steppe begins to heat up, as it does very rapidly, fierce dust-storms rage over most of Manchuria,—so fierce that seed-corn is often swept out of the soil; and, therefore, sowing is generally postponed to late in May, which puts a premium on quick-growing varieties. At the same time, these strong winds, even when not carrying much dust, leave the seed-bed in a perfect condition for sowing; and the north-east must be distinguished from the rest of the country. For, as soon as the land begins to heat up here, there follows a drift of soft and humid air through the Vladivostok Gap off the Kuro-Siwo; and it is the earlier and safer sowing ensured by this in the Lower Sungari basin that is attracting the Chinese so steadily to this region. **Winter and Spring.**

The monsoon breaks at the very end of June, and July and August are definitely wet (11 or 12 inches of rain in the south) except in the north-west. There the rainfall is small and irregular, and the mass of the area (200,000 square miles) is much better suited to stock than to tillage; but in the north-east both the temperatures (± 70° F.) and the rainfall are very favourable, especially to a high percentage of gluten in the wheat and of oil in the bean. Further, the retreating monsoon cannot carry its moisture across the Changpai, and swoops northward on to the Sungari plain with a föhn effect; and so the rainfall in September is more than *40 p.c. below* that of August and more than *60 p.c. below* that of July. The consequent combination of warmth and dryness is unusually favourable to harvest work, the beans being pulled up and left to dry until they "shell themselves." As the haulms are not subsequently **Summer and Autumn.**

ploughed-in, this process must—theoretically—impoverish the soil, and the ploughing-in would improve it greatly, especially for a wheat rotation; but it seems possible that what seems so foolish, is really the key to that curious "bacterialisation" of the soil which gives Manchuria[1] almost a monopoly of the soya-bean trade. But all must be finished in September, for the temperature falls very rapidly after the last burst of the monsoon, the October mean being in many places *c.* 20° *F. below* that of September.

Bean Traffic. At the same time, if we take Kwan-cheng as having the nearest approach to a "Manchurian mean" and with temperatures ranging from 6° F. for January to 74° F. for July, it is significant that even October (45° F.) has a mean 5° F. higher than April. This must always have been very favourable to the bean-culture,[2] and transport was aided by the fact that high water lasted till the end of August,—the bean-traffic being essentially river-traffic, which centred on Newchwang. Even 60 years ago the port was shipping bean-products up to a value of £200,000 a year to the one port of Swatow, for the fertilising of the plantations which provided the return cargo—sugar.

Structural Assets. The structural assets of the area are an abundance of mineral wealth, especially in the carboniferous rocks, and the variety of rock in the flanking walls, from which the floor of the basin was built up, especially the volcanic elements, *e.g.* in the rain-washed Chang-pai and the wind-eroded Khingan. Indeed, the name *Chang-pai* ("Ever-White") is really derived from the Paik-to-san peak—with its crater[3] lake at a height of 8700 feet; for half the year it is white with snow, and for the other half its pumice cover looks white. The fertility of the strong, mixed soil in the core of the Sungari basin is very great, especially in what may be called the Shwang-cheng-ting triangle, with Harbin as its apex and the Kirin-Kwancheng railway as its base; and the only area that is really poor is the gravelly basin of the Yalu.

He-Lung-Kiang. At the same time, the differentiation of the large north-western province, the He-Lung-Kiang ("Black-Dragon-River," *i.e.* Amur), is justified; and, as that accounts for 200,000 out of the total 350,000 square miles of the country, it is correct to say that "more than half of Manchuria is only steppe." But it is steppe from climatic reasons, not from any lack of fertility; and quantities of food can be grown, especially in the fertile valleys and below the steep face of the Khingan, with its volcanic veneer (5000–6000 feet), though the growers are not Mongols. The scarp makes a useful divide between

[1] Elsewhere the soil has to be inoculated with the particular bacteria to ensure successful croppings.

[2] The statement that "the plant flourishes in the same climate as maize" is very misleading, as it can stand drought, as well as heavy rain, and even frost.

[3] To the north there is the land of the "Hundred Dragon-Pits" (*Lung-Wan*), really only 70-80 crater-lakes, many of which are now almost dried up.

the range stock of the plateau and the farm stock of the lowland (1500–1600 feet); and there is a direct connexion between the two, as illustrated by the great cattle-markets of Khailar and Manchouli, commanding the famous Dalai Nor pastures. For range cattle are driven during the summer to farms along the railway, where they are kept till the autumn, when the meat-trade has no troubles from either heat or humidity. Of course, all this does not apply to the pigs, which are closely associated with the maize lands and the Chinese of the Kirin province, and which are more than three times as numerous as the sheep and nearly five times as numerous as the cattle; but the Chinese are attracted north-westward only as traders in wool and skins and as miners along the Khingan piedmont, especially mining alluvial gold.

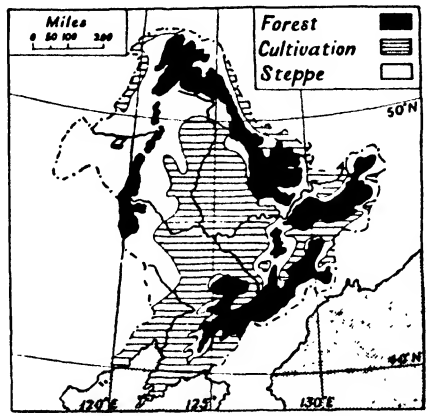

FIG. 142.—Vegetation and Cultivation of Manchuria.

The two other provinces may be fairly described as natural prairie, but the description fits Kirin (100,000 square miles) better than Liao-ning [1] (50,000); for it is a humpy and hilly land, clearly differentiated from the wet Liao flats of Liao-ning (Feng-tien). The latter, too, has been settled by Chinese for a long time; and so the great opening is in Kirin, where conditions are very favourable both to the Chinese settlers and to the crops which they *prefer* to grow. These do *not* include wheat, because its yield *per* acre is relatively small; but they do include opium and indigo, as well as millets and maize—the latter much favoured by the humid nights. The large millet (*kao-liang*) is the great staple, growing to a height of 10-12 feet, and providing fuel and fencing as well as food and fodder. The maize is also grown for both man and beast (pig), and a great deal of wheat is actually grown; but it is rather to supply the local flour-mills and the foreign market than for the growers' use. The most important mills are, naturally, in the Shwang-cheng-ting basin, at that town and at Harbin and at Kwan-cheng, *i.e.* as far as the "Russian" broad-gauge line goes on the *South Manchurian railway*, and at Ashiho and Ninguta; but Kirin is also an important centre, and flour is one of the principal exports of the country. Even the wheat, however, is less important, as a cash crop, than the soya-

Kirin Province.

[1] Formerly known as Liao-*tung*, which really limited the area to "*east* of the Liao," the "*west*" being known as Liao-*hsi*.

bean, for which the conditions seem to be almost ideal, though some harm has certainly been done to the country during the past 400 years by the wasteful and exhausting method of cropping.

Ki-lin. The name Kirin, or Girin, is really *Ki-lin* (" Clear Forest "), and the Chinese called the town of Kirin *Chuen-Chang* (" Naval-Yard ") for it was a great junk-building centre. It is actually accessible by small steamboats, but the river here is much better suited to junk-traffic, and the hundred miles of navigation above the town is done entirely by native boats and barges.

Transport. One good result of political rivalries here is an exceptional development of railways, to supplant the old methods of transport by junk and barge (the Sungari being much broken by shallows), by cart and sledge ; and this has relatively depressed the trade in the luxuries which were the only products that could bear the costly freightage, *e.g.* opium and ginseng, silk and furs. But the railway development has only increased the ruthless and reckless destruction of the forests, especially in Kirin, but also north of the Lower Sungari, where there is a wide (" pioneer ") wheat-growing belt that stretches from Hulan to Ilan (San-sing) and from Payen-chow to Petwan-lintze (Suihwa), and merges westward in a great soya country round Antu. Oak and walnut logs are being used for the locomotives, as for the river-steamers, and the Chang-pai and the Kentei are being denuded, especially within reach of water-transport, as has also been the case along the Yalu. The export, which is very large down the Sungari, is mainly of the coniferous timber ; but the oak and the walnut trees are magnificent in size and quality.

Forest and Steppe. The facilities for moving good steam-coal by rail now, and the relative decline of river-transport, have removed all excuses for such foolish destruction ; but it had already begun to affect even the fur-trade, and the most valuable timber—the Manchurian pine—has been the most accessible, in the Tumen and Yalu basins. The salvation of both the timber and the fur-bearers till quite recently was due directly to the vast area reserved for the Imperial Hunting Grounds ; but the Mutan is navigable throughout the special fox and squirrel region, from San-sing to Ninguta, the two chief fur-markets after Mukden, which is really only the export market. The latter is also a skin-market (sheep and goat), with an old-established and very fine record for tanning ; but its reputation for fine tiger and leopard pelts should belong to Tsitsihar. The latter is also the natural wool-market of the country, as the mass of the sheep are in the He-lung-kiang province ; but the total number in the whole country seems to be well below 3,000,000, and the wool is neither of high nor of uniform quality. The town is becoming an important railway junction ; it has a direct line *via* Hailung to the Fushun coalfield and Mukden, and the Kainei line is already working as far as Tunghwa.

The old idea that each of the Tung-San-Sheng (" Eastern Three Provinces ") was " half as large and twice as important " as the next farthest away from China has been abandoned with the great influx of Chinese immigrants into Kirin ; but He-lung-kiang must remain much the least important economically, while the Kirin development will be as definitely agricultural as that of Liao-ning will be industrial.

He-lung-kiang.

The great steppe-land of He-lung-kiang has other economic interests besides the pastoral, *e.g.* timber and mining, and they even centre largely round Khailar, on the edge of the Dalai Nor coalfield ; and it contains the frontier " port " of Manchouli (Manchuria) and the " Blagovyeshchensk suburbs " of Heiho and Aigun, on the line of the Amur gold strip. We have noticed also the wheat belt along the Sungari, and the economic value of all the Amur riverine is potentially great. But, from the day when the *Chinese Eastern Railway* became a World thoroughfare, there was always a potential political problem looming here, which hampered development ; and to-day it can be stated simply in terms of railway development.

Railway Pacts.

Behind it there is the 1924 agreement between China and Russia. By that agreement Russia acquired the right to operate the railway, which is on the Russian gauge, independently of Chinese authority or control,—a *privilege given to no other country for any railway in all China* and involving the creation of a Russian zone from Manchouli to Kwan-cheng, where the gauge changes ; all officials or workmen must be Russian or Chinese, and all without exception must be under the Syndical Union of Moscow. But from Harbin only one-third of the line to Kwan-cheng belonged to China, for the other two-thirds passed under the power of Japan in 1905 ; and Russia *never owned* the old trans-Manchurian line *via* Harbin to Suifen. Consequently, when—in violation of their formal agreement not to construct any line parallel with or near to the *S.M.R.*—the Chinese built the Takushan-Paintala line, not only parallel with the *S.M.R.* but also between that and the Russianised Mongolia, they deliberately broke an international agreement.

South of Kwan-cheng the standard-gauge line belongs wholly to Japan, but a Sino-Japanese line has been built from Sipingchi (Supingkai) *via* Liaoynan and Taonan, Angangchi and Tsitsihar, to Laha, and is being extended *via* the Mergen lignite field to Aigun and Heiho, *i.e.* to a point directly opposite the branch line from Blagovyeshchensk to the main *Trans-Siberian* line. This western line is actually a trifle shorter than the Harbin route between Tsitsihar and Sipingchi, but only a trifle; and the important thing is that it cuts off all the Mongolian trade between the Toro river (Taonan) and the Liao (Cheng-chia-tun), and carries through trade from the Amur *without* change of gauge—and so without break of bulk—to the southern ports. It is, therefore, taking a great propor-

tion of the trade away from the *Chinese Eastern Railway*, and is even tapping the *Trans-Siberian*; and, in case of war, it would compel all Russian transport to go round by the long Usuri valley route. As the *C.E.R.* gauge is the broader, it would be quite easy—as the Germans proved in Russia during the Great War—to convert the broad gauge into standard and to cut the sleepers, so that speedy conversion back to broad gauge would be impossible.

Tsitsihar. Tsitsihar (90,000 people) was already the one vital centre of the province—the natural centre, at the head of navigation on the Nonni, guarding one of the three great bridges on the *C.E.R.* (where Anganchi has now become one of the chief railway-junctions in Manchuria), with immense potential importance from the military standpoint. This is not lessened by its prestige as the old administrative centre of all the Manchu tribes, even if it acquired a somewhat sinister reputation from its penal settlement (for the worst kinds of criminal).

Russian "Sphere." Conditions in Kirin are much more favourable to Russian interests and possible aims. The *C.E.R.* is wholly Russian, and Suifen is only about 100 miles from Vladivostok; the political frontier runs for 150 miles along the Amur, with the Sungari trade definitely Russian; it runs for nearly 400 miles along the navigable Usuri, and Cossack villages line the river and its Sungacha tributary up to Lake Khanka; the Chang-pai is a tremendous barrier; and the Yenchi, or Hunchun, Gate is held by a body of strongly anti-Japanese exiles. For, when Japan annexed Korea, a large number of virile irreconcilables migrated up the Tumen valley; and they now form a prosperous community, with their headquarters at Chu-tze-chieh and their "treaty-port" at Hunchun.

The long prairies of the Sungari valley, with their advantages of soil and climate, their river transport and their industrious settlers, must become an important factor here in both political and economic problems; and the basin has at least good enough coal to encourage railway development, though the Sansing (Ilan) field is actually along the Sungari, and the Muren field is more convenient to the Russian Usuri line than to the *C.E.R.* near Ninguta. The clearing of forest here between the Mutan and the Sungari is leading to an extension of wheat and soya, and there are very large supplies of millet and fish. This north-eastern quadrant of the country produces four-sevenths of the whole soya crop (*c.* 3,500,000 tons), and every ton of the millet raised may be reckoned to free two tons of rice for export—from *Korea*—to Japan.

The Capital. Harbin is the most important place in the country except Mukden, and must remain the great wheat and soya market; but it is not the head of navigation (Petuna), and its great railway-bridge would immediately attract hostile attention in case of war. On the other hand, the opening of the Kang Yao coalfield, the recent com-

pletion of the line to Kainei—to join the Chosen line from Seishin, —the rising competition of Tsitsihar, even the Chia-Pi-Kou gold-field, are all helping to improve the position of Kirin and to injure Harbin. The advantages of the change of gauge are really combined in Kwan-cheng, now the capital of the republic of Manchukuo.

Originally Liao-ning (Fengtien) owed its importance to the fertile —if rather damp—valley of the Liao (The "*Iron*" river), with its **Liao-ning.**

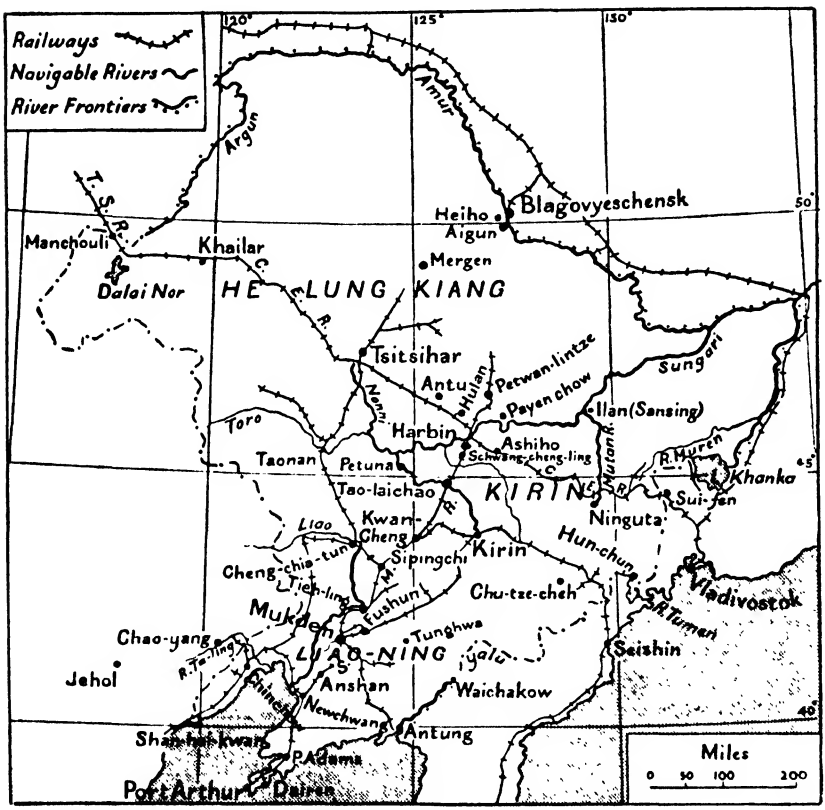

FIG. 143.—Railways and Waterways of Manchuria.

forested walls, and to its nearness to dense populations in Chihli and Shantung; and the Liao-tung forests, as along the Yalu, are still a source of quantities of wild-silk, the worms feeding mainly on a dwarf oak, largely grown for the special purpose. There is also a busy timber industry, mainly on the Yalu, which is navigable for 100 miles—to Waichakow, with coal in the valley of its Hun tributary near Tung-hwa. But the whole outlook and the value of the province have been revolutionised by the development of the

mineral wealth, as the special work of the *South Manchurian Railway*. Even the development of the Pien-wai annex of the Grid, *e.g.* the Piao coalfields in the Ta-ling valley round Chao-yang and the Chieng-Chang goldfield higher up the valley, depends on the Liao-hsi branch of the railway, itself largely supplied with coal from the neighbouring Ta-yao-kow field.

Coal. Interest is centred almost wholly on the coal and the iron; and, though the railway system was designed mainly on political lines, it has been happily mapped for the development of the minerals. The main object was to reach open water at Port Arthur *via* Dairen (then Dalny), and this meant skirting the old Liao-tung block which forms the peninsula; but the connexion with China *via* Shan-Hai-Kwan (" Mountain-Sea-Gate ") was very important, and Japanese interests gave a rapidly growing interest to the Chosen *West Coast Railway* to Antung. The coalfields are rather scattered, but form fairly coherent belts along the flanks of the highlands, especially at Fushun and Yentai, Pen-hsi-hu and Saimachi; and access to the *best* fields was very easy, *e.g.* by the Taitze and the Hun valleys.

Fushun is the great coal centre. The " pit " is a huge bowl, with sides of solid coal, in some places 120-175 feet deep, that is quarried in tiers. It is a good Tertiary coal, of uniform quality, and will coke; and, of course, there are no troubles from fire-damp or water. It was used 3000 years ago for smelting copper, and the Koreans were using it 1000 years ago in their porcelain industry, for which they could get a very pure white kaolin from the Syalin granite. There is a large gas-plant (with ammonia recovery), iron pyrites can be brought cheaply from Yentai, and quite a number of bye-product and other industries are growing up. But the supreme importance of both the coal and the iron (as pig-iron) lies in their relation to the needs of Japan. If the iron content was a trifle higher, and the Chinese found the furnace-work a little less uncongenial, the industrial future here would be assured.

Iron. For the Liao-tung block is also very rich in iron-ores, especially at Anshan and Miao-erh-kou, the former actually on the main line from Mukden to Dairen and the latter quite close to the line from Mukden to Antung; and from the junction of the two lines a short branch line runs to Fushun. As the metal-content is low (35), while the actual amount of ore is immense—massed along the whole water-parting between the Hun and the Yalu—the wiser plan is to smelt it locally, and to export pig-iron—to the Japanese steel-works; and the semi-anthracite at Yentai is used with the Anshan ore in this work. The bituminous coal of Fushun and Pen-hsi-hu also goes largely to Japan. Fortunately, the Pen-hsi-hu coal, though not very good, does coke,—better even than the Fushun coal; and the Miao-erh-kou ore is smelted at Pen-hsi-hu.

But the industrial development has not gone far enough yet to

have its own urban concentrations, the flour and oil and cake industries having sprung up in the old towns that were the natural centres of the wheat and the bean regions,—from Harbin to Tieh-ling; and these towns are closely associated with river or rail. The older towns are, almost without exception, river towns; and the very high percentage of them all over the country suggests the original extent of the forest cover, through which the rivers threaded their way as the natural lines of least resistance. Now rail-and-river junctions are specially favoured, *e.g.* Liao-yang and Taolaichao. **Towns.**

Any subsequent differentiation in time or place has been due to some change either in the transport medium or in the destination of the freight. The natural head of navigation for barges or junks was more important than a confluence,—perhaps, from fear of flood; and change of medium has been important. Kirin made a good head for small junks, and barges could work still farther up the Sungari; but Petuna became the head for large junks, and large steamers stop at Harbin. Apparently, that town mills about two-thirds of the wheat which it collects, and ships one-third down the Sungari in these large steamers. Change in the destination of the freight is, of course, change from local to distant markets; and easy access to an open port is the first need, which gives advantages to the Tieh-ling mills. But rail-transport is also involved, and political considerations at once override the natural tendencies. For instance, manipulation of rates on the Korean railways and on the Antung branch of the *S.M.R.* has taken practically all the sea-trade (with Japan) away from Newchwang and all but the very bulky freight even from Dairen. At the same time, the development of Manchuria in recent years has been mainly due to the enterprise and the foresight of the *S.M.R.* directors. **Transport Changes.**

It is the railway development that has made Mukden so important, as the natural junction of the three great "shipping" routes,—to Hulutao, to Dairen, and to Antung; and its population now (400,000 in 1930) is above that of Harbin and more than twice that of Kirin. Though centrality makes Kwan-cheng (130,000) the best place for the capital of Manchukuo, Mukden was the home of the founders of the Manchu dynasty, and Dairen is its natural "outport," having quite displaced Newchwang (110,000) as the chief port of the country. **Mukden.**

The latter illustrates the points discussed above. Far enough up the Liao (30 miles) to be safe from pirates, and fed by the Liao barges and small junks, it was made a Treaty Port in 1861; and in 30 years it had become the great commercial centre of the province, with 10,000 junks carrying bean-cargoes to it. With increase in the size of junks, the trade moved down-stream to Yinkow, and steamers are now deserting this north-east corner of the gulf altogether. For the river is very tortuous, there are long (1-4 miles) shoals, and at **Newchwang.**

low water there is a depth of only 7 feet on the bar for a mile. Even at spring tides vessels drawing 19 feet cannot reach the port. The river has never recovered from a terrific flood at the end of last century, when it broke its banks 85 miles above Newchwang, and cut a new channel for 60 miles, and enlarged this till it was taking two-thirds of the volume. As this new channel was wider and deeper than the old one, it should have been adopted; but the vested interests [1] of Newchwang succeeded in having it blocked up, and—they have their reward. Even the new channel would have proved to be too near the main line to Dairen and on the wrong side of the gulf for the China trade, which is passing to Hulutao—at the expense of Dairen as well as of Newchwang; and, of course, it would have been ice-bound for four months.

Antung. Antung is in a different position; for the Yalu is a much better river, though its floods (40 feet) are troublesome, and the wind affects the tides very much in the long and narrow estuary. But the timber trade here is very busy, and Antung is one of the great silk-centres. At the same time, the railway, with its great bridge across the river, has done harm to the *port*, as to the other ports, though it has increased the importance of the town.

Kwan-tung. Simply as harbours, Dairen and Port Arthur are in a class by themselves, the Southampton and the Portsmouth of Manchuria, even if their historic importance was only as famous fishing-ports with a great salt-industry. The deep articulation of Society Bay makes Kwan-tung ("Eastern Barrier") almost an island, with Port Adams as its frontier post and port; and the two great harbours are eastward of the peninsular backbone, and so are protected from the Chihli Gulf in winter. The advanced seaward position, the ring of hills, the narrow entrance, have made Port Arthur an ideal naval station or political foothold; and the Ta-lien-wan bay makes the tip of the Kwan-tung peninsula still more nearly an island. Dairen ("Far Away"), once Dalny ("Far Away"), and previously "Victoria Bay,"—as Peter the Great Bay also was—benefits from its landward position commercially without any climatic disadvantage. It is a fine natural harbour, except that good anchorage is rather far out, and is admirably equipped; and in recent years, thanks to the energy and the organisation of the Japanese, it has stood next to Shanghai amongst "Chinese" ports. The importance of both harbours is greatly increased by the abundance of good steam-coal and coking-coal within 200 miles even of Port Arthur; but, if the concentration of the low-grade banded haematite and magnetite ore can now be effected cheaply, Antung may profit at the expense of Dairen.

As far as the outside World is concerned, then, Manchuria is a

[1] In the old days, of only junk traffic, the shallow water and even the shoals were of little importance, for there was practically continuous navigation for 400 miles.

producer of soya and wheat, of coal and timber. Its furs and skins, its good silk, its wool, and its poor cotton, are of quite minor importance; and the importance of its ginseng and kaolin is local, though the export of millet to Korea frees Korean rice for Japan. The soya cash-crop occupies about 25 p.c. of all the land, nearly 50 p.c. in Northern Manchuria; and it accounts for 63-64 p.c. of the whole World output, while *c.* 67 p.c. of the Japanese import of soya products comes from Kwan-tung. But the discovery that bean-cake is an unscientific fertiliser for rice,—the production of sulphate of ammonia, super-phosphate of lime, and atmospheric nitrogen in Japan,—and the production of the sulphate even in Manchuria (*e.g.* at Fushun), must have a considerable effect on the soya trade—for *fertilising* purposes. On the other hand, if the concentration process succeeds, Manchuria may become a very important source of pig-iron for Japan, as it is of coal; and, as the cover of the coal at Fushun is oil-shale, and *must* be removed for access to the coal, the country may become very important as a source of mineral oil, very cheaply distilled with the local coal. **Chief Products.**

The Japanese Problem
(mainly economic)

But the loose assertions which have been industriously circulated lately about Japanese exploitation of Manchuria and the diversion of all the products to Japan are demonstrably[1] false, especially with regard to food-stuffs and industrial raw-materials; and propaganda based on falsification of unimportant details must not expect to be persuasive about the more important. **Propaganda.**

Rice and wheat, pulse and sugar, make up *c.* 71 p.c. of the total food-imports of Japan; and, of these four staples, *only one*, the pulse (soya—beans, oil, cake), comes mainly from Manchuria. But, as Manchuria produces almost two-thirds of the whole world output of soya, and grows the crop specially as a cash-crop for export, the Japanese import of it from the nearest—and best—source of supplies can scarcely be called unnatural or in any way remarkable. Of the rice and the sugar, the great mass of both comes from south-eastern Asia—the rice from Siam (*c.* 52 p.c.), French Indo-China (*c.* 22 p.c.), and India (*c.* 11 p.c.), and the sugar from Java (*c.* 93 p.c.). **Food-stuffs.**

Of the industrial raw-materials which Japan needs most, cotton and wool, the supplies are negligible, and Japan does not monopolise either of them. Cotton has been grown round the Liao-tung peninsula and gulf, *e.g.* in the Chin-Chow district of Liao-hsi, for fully 1200 years, and the Japanese have greatly improved the quality and the yield *per* acre—of "American Upland," grown in Kwan-tung, from *Korean* seed; but the climate is not favourable, **Cotton and Wool.**

[1] Cf. the *Financial and Economic Annual of Japan* up to 1930.

and the total crop is *only about 70,000 bales*! As to the wool, the massed exports of wool and mohair, hides and skins, and leather, from the whole country represent only about 1½ p.c. of the total exports; and Japan gets *c.* 95 p.c. of her imports of wool from Australia. The same general position obtains in connexion with one product much needed in Japan, timber. Both the production and the export of Manchurian timber are steadily declining, the export having declined by fully 72 p.c. in seven recent years; and Japan gets *c.* 82 p.c. of her imported timber from North America and fully 12 p.c. from Siberia.

The International Problem
(mainly political)

This short summary may introduce three definite questions, two of which may be asked at once—"What is the value of Manchuria to its three great neighbours?" and "Has the Manchukuo republic any future except, perhaps, under a mandate extended to some European Power for at least a generation?"

Mandate? The second question may be answered first, so far as it can be answered here at all; and the answer does not pretend to be more than a comment. No such mandate would have any chance of success unless it was entrusted to a Power with a clear record of long and successful experience in ruling colonies, preferably colonies in Asia; and this would suggest that the Power should be Holland. Even then the future of the mandate territory would still depend on three fundamental conditions—political security, settlement of the land by a suitable population, and scientific development of the mineral wealth.

Politically, the most critical area would still be the western marches, which should be specifically Mongol; Jehol should be made as definitely Mongol in population and administration as Khingan has already been made. This would ensure in the first place a friendly Mongolia; but the Mongols are firmly, if at present passively, anti-Russian and fanatically and actively anti-Chinese, so that it would mean also that Russian or Chinese encroachment would be impracticable. The political tension would be immediately relaxed, and the two economic problems would become simple.

The land problem is most acute where the land is most suitable for agriculture, *i.e.* in the north-east; and full settlement of the area on the desirable basis of subsistence agriculture needs only an extension of the facilities which have already drawn some 20,000,000 Chinese to Manchuria, probably 8,000,000 of them to the Kirin province. The exploitation of the mineral wealth of Liao-ning must be principally for export, and would be done best by the Japanese; for they are vitally interested in it, they have shown exceptional

gifts for such development, and they control the natural medium for transport.

Rival Values.

The other question is easier to answer, especially if we outline the position before emphasising it. China is an over-populated country that is still specifically agricultural; Japan is an over-populated country that has been forced to become specifically industrial; "Russia" is an under-populated collection of countries, with thousands of square miles available for agricultural and pastoral development, and great resources of mineral wealth and timber for industrial development. Russia seems, then, to have *no claim whatever* to any footing here; China has peopled the land, and may just be said to have a historic right to rule it, but lacks the power to do so; and Japan has the political genius and the racial virility to rule, but has no right to do so. We may, then, emphasise the answer as thus outlined.

China wants the land as a home for one of her swarms, to make it a hive of bees—that would be very busy, if only they had a queen who could rule. Russia wanted it as a bastion from which to float a red flag over the ocean which is called *Pacific*. Japan wants it as a supply-base for an industrialised sea-folk,—industrialised mainly and necessarily because their land is poor in almost everything except its manhood and their millions.

The attitude of Russia is referred to in the past tense because the excellence of the Japanese railway organisation has practically ruined the economic value of the Russian lines, and greatly endangered their strategic value; and, if Russia could only come to some arrangement with China (and France) about political (and financial) rights and interests, the natural sequel should be the sale of the *Chinese Eastern Railway* to Japan. But this would be followed by the conversion of the line to narrow gauge, which would mean not only the complete commercial supremacy of Japan in Southern Amuria, but also the complete political unimportance of Russia in Eastern Amuria.

Mongols.

But there is a third question:—"Are the Mongols negligible nonentities?", or—reworded—"Do they mean nothing now in their own continent?"

It is one of the big problems of the twentieth century, the first year of which saw the Chinese beginning to *colonise* Manchuria. They were doing this at the expense of the Mongols and by means of the "Russian" railway; and they worked northwards towards parallel 45° N. along the "safe" eastern bank of the Liao and then northwards from that along the "safe" eastern bank of the Nonni, pushing the Mongols back westward; and to-day meridian 125° E. (Mukden-Tsitsihar), marks roughly the western limit of the Chinese belt of occupation.

When the whole meaning of the movement became too clear to

Khingan Province. be ignored any longer, a new province was created, with its western frontier on the Khingan—from which it takes its name—and its eastern frontier roughly along 125° E.; and it was divided into three, each division being placed under a non-Chinese, and even an anti-Chinese, governor. The north-western and the north-eastern, *i.e.* the Khailar and the Nonni, divisions were placed under Daghors, their western flank being in direct touch with the Mongols in Outer Mongolia; the southern, or Cherim, division was placed under a Mongol, with its western flank directly touching the Silingol territory, *i.e.* the only territory in Inner Mongolia on which the Chinese have not yet encroached,—the one which is least accessible from China,—and in which Chinese authority is quite nominal.

Three Groups. In the political geography of Eastern Asia, then, this Khingan province is probably the most significant of all the units; for it is definitely "Mongol"—in the sense of anti-Chinese, and is in the closest touch with the Young Mongols of Outer Mongolia and the Old Mongols of Inner Mongolia. The Manchurian Mongols, then, must be the natural key to any Pan-Mongol problem or movement; and they have obvious links with both the Old and the Young Mongols of Mongolia. Like the Old Mongols, they are not autonomous, but are ruled nominally by their own chieftains; and they are in the happier position of not *wishing* to break away from Manchukuo, as the Old Mongols really wish to break away from China. Like the Young Mongols, they disclaim all allegiance to China—on the ground that they were never conquered by China, though they served the Manchu emperors of China; and they claim that, with the end of the empire, their connexion with China also ended.

Outer Mongolia. It was a similar claim by Outer Mongolia that, in 1919, led to the outrageous attempt of China to assert her authority by force of arms and in a peculiarly brutal way; and this threw the Young Mongols into the arms of Soviet Russia as a recognised enemy to China, and has probably put Outer Mongolia for ever outside of any China State. The Young Mongol Party, though in control at Urga, is a minority and probably too modern and revolutionary for the majority; but Outer Mongolia seems now to be united to a man as anti-Lama, anti-China, and anti-railway, for it is the railway that has spread a flood of Chinese gardeners over the steppe pastures.

Inner Mongolia. Inner Mongolia is scarcely in a position to break away from China, but is equally anti-railway; and its chieftains are *too* subservient and reactionary for their majority. If Manchukuo or Japan made it possible for the Khingan province to become a supply-base for arms and financial backing and other necessaries, that majority would probably rid itself of the chiefs who are viewed with so much dislike and suspicion in Outer Mongolia; and, if the too reactionary Old Mongols and the too revolutionary Young

Mongols were alike eliminated, a Pan-Mongol State would soon settle most of the questions between Russia and China or Russia and Japan or China and Japan, and settle them in its own favour!

In their zeal to imitate Moscow, the Urga leaders have inaugurated what seems to be a successful crusade against religion—at least, as represented by Lamaism; the Living Buddha and his "Mad" (Russian) Baron had broken the shackles even before his death in 1924; and no form of Buddhism was ever appropriate to these "Children of the Blue Wolf" or to the wild region over which they ranged. But all Mongols, like the real Russian people and the Arabs—and, perhaps, all peoples who are sufficiently "continental" to make their sacred colour that of an unclouded sky,—are fundamentally religious; and, once these people have quite shaken off the rags of Lamaism, they will feel again some need of "religion." But it must be a religion that will be appropriate to a people whose chieftainships are still divided into tribes that are called not tribes, but *Banners*, and to a land which is largely desert; and, when these "Braves" turn to Islam, they will soon demonstrate that, even if Asia cannot be wholly reserved to Asiatics, every inch of it that can be called Mongolia means to be Mongol. **Pan-Mongol.**

REFERENCES—KINNOSUKI, *Manchuria, a Survey* (1922); LATTIMORE, *Manchuria, Cradle of Conflict* (1932); and *North Manchuria and the Chinese Eastern Railway* (1924).

INDEX

INTRODUCTORY NOTE

WHERE a name occurs in the text several times, some slight "inconsistencies" may be found in the spelling. They are limited practically to the use of hyphens and capitals, and are intentional; and I hope that a practice which was very convenient to myself, may not be found by others inconvenient and even confusing.

For instance, in a little note-book devoted to the Gobi, it was a real convenience to have the pages referring to the sandy parts of the area headed *Shamo*, and for any pages dealing specially with the relation of the sand to transport by camel ("the ship of the desert") even headed *Sha-mo*. A particular couple of pages about the relation of the stable to the unstable sands might be headed *Sha-Mo* v. *Sha-Ho*; but, when the double sand-belt was treated as a unit, both the middle hyphens and the middle capitals were dropped, and the title was written *Shamo-Shaho*.

The "inconsistencies", then, represent the particular aspects to which I was attending at the particular time or in the particular place; and, if I was selecting essentials rightly, other people's minds may run on the same lines. In that case the 'inconsistencies" might even be useful and welcome; certainly the multiplication of hyphens is ugly, especially when they are not all performing the same function.

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