
TABLE OF CONTENTS

	Page No
Certificate	i
Acknowledgements	ii
Abstract	vi
Table of Contents	viii
List of Tables	xii
List of Figures	xiv
List of Abbreviations	xviii
Chapter 1: Design and Syntheses of Palladium Complexes of NNN/CNN Pincer Ligands: Catalyst for Cross-Dehydrogenative Coupling Reaction of Heteroarenes	
1.1 Introduction	1
1.1.1 Transition Metal-Catalyzed Reaction	1
1.1.2 Transition Metal-Catalyzed C–H Bond Activation	2
1.1.3 Transition Metal-Catalyzed Cross-Dehydrogenative Coupling Reactions	3
1.1.4 Organopalladium Chemistry	9
1.1.5 Classification of Palladacycles	10
1.2 Results and Discussion	17
1.2.1 Crystal Structures	23
1.2.2 Cross-Dehydrogenative Coupling Reaction of Heteroarenes	23
1.3 Conclusion	30
1.4 Experimental Section	31
1.4.1 General Materials and Methods	31
1.4.2 Synthesis of Complex XI	32
1.4.3 Synthesis of Complex XII	32
1.4.4 Synthesis of complex XIII	32
1.4.5 Synthesis of complex XIV	33
1.4.6 Synthesis of complex XV	33
1.4.7 General Procedure for Hetero Cross Dehydrogenative Coupling	34
1.4.8 General Procedure for Homo Cross Dehydrogenative Coupling	40

1.4.9	Procedure for Reusability of Catalyst	41
1.4.10	X-ray Crystallographic Analysis of Complexes XI-XIII	41
1.5	References	43

Chapter 2: One-Pot Sequential Knoevenagel Condensation and Palladium-Catalyzed Intramolecular Cross-Dehydrogenative Coupling: Access to Imidazopyridine-fused Indoles

2.1	Introduction	49
2.1.1	Tandem Reaction	49
2.1.2	Cross-Dehydrogenative Coupling Reactions	50
2.1.3	Intramolecular Cross-Dehydrogenative Coupling	50
2.2	Results and Discussion	59
2.3	Conclusion	70
2.4	Experimental Section	70
2.4.1	General Materials and Methods	70
2.4.2	General Procedure for the Synthesis of Imidazopyridine Fused Indoles	71
2.4.3	X-ray Crystallographic Data of Compound 35ha and 36aa	84
2.5	References	85

Chapter 3A: Rh(III)-Catalyzed Annulation of 2-Arylimidazo[1,2-*a*]pyridines with Maleimides: Synthesis of 1*H*-Benzo[*e*]pyrido[1',2':1,2]imidazo[4,5-*g*]isoindole-1,3(2*H*)-diones and their Photophysical Studies

3.3A.1	Introduction	88
3.3A.2	Results and Discussion	94
3.3A.3	Conclusions	106
3.3A.4	Experimental Section	107
3.3A.4.1	Experimental Procedure for the synthesis of Annulated Products (13)	107
3.3A.4.2	Experimental Procedure for Preparation of 1a- <i>d</i> ₃	107
3.3A.4.3	The KIE Studies on 2-Phenylimidazo[1,2- <i>a</i>]pyridine	108
3.3A.4.4	X-ray crystallographic analysis of 13ac	117
3.3A.5	References	118

Chapter 3B: Rhodium(III)-Catalyzed Dehydrogenative Annulation and Spirocyclization of 2-Arylindoles and 2-(1*H*-Pyrazol-1-yl)-1*H*-indoles with Maleimides: A Facile Access to Isogranulatimide Alkaloid Analogues

3.3B.1	Introduction	123
3.3B.2	Results and Discussion	133
3.3B.3	Conclusions	148
3.3B.4	Experimental Section	148
3.3B.4.1	General Materials and Methods	148
3.3B.4.2	General Procedure for Synthesis of 42, 44 and 46	148
3.3B.4.3	X-ray Crystallographic Analysis of 42ab	161
3.3B.5	References	163

Chapter 4: Palladium-Catalyzed Weakly Coordinating Lactone-Directed C–H Bond Functionalization of 3-Arylcoumarins: Synthesis of Bioactive Coumestan Derivatives

4.1	Introduction	167
4.2	Results and Discussion	177
4.3	Conclusions	189
4.4	Experimental Section	189
4.4.1	General Materials and Methods	189
4.4.2	Experimental Procedure	190
4.4.2.1	General Procedure A: <i>Ortho</i> -Alkenylation	190
4.4.2.2	General procedure B: <i>Ortho</i> -Halogenation	190
4.4.2.3	General procedure C: <i>Ortho</i> -Trifluoroethoxylation	191
4.4.2.4	General procedure D: <i>Ortho</i> -Hydroxylation	191
4.4.2.5	General procedure E: Coumestan Synthesis	191
4.4.3	Synthesis of 2-(2-Oxo-2 <i>H</i> -chromen-3-yl)phenyl trifluoromethanesulfonate (53)	212
4.4.4	Synthesis of 3-(2-((4-Propylphenyl)ethynyl)phenyl)-2 <i>H</i> -chromen-2-one (55)	213
4.4.5	Synthesis of (<i>E</i>)-3-(2-(2-Oxo-2 <i>H</i> -chromen-3-yl)phenyl)acrylic Acid (56)	213
4.4.6	Synthesis of Ethyl 2,3-Dibromo-3-(2-(2-oxo-2 <i>H</i> -chromen-3-yl)phenyl)propanoate (57)	213
4.4.7	Synthesis of 2-(2-Oxo-2 <i>H</i> -chromen-3-yl)benzonitrile (58)	214
4.4.8	Synthesis of 3-(2-(Pyridin-4-yl)phenyl)-2 <i>H</i> -chromen-2-one (60)	214

4.4.9	X-ray Crystallographic Analysis	215
4.4.9.1	X-ray Crystallographic Analysis of 46aa	215
4.4.9.2	X-ray Crystallographic Analysis of 48ab	217
4.4.9.3	X-ray Crystallographic Analysis of 51a	218
4.5	References	220

Chapter 5: Conclusions

5.1	General Conclusions	225
5.2	Future Scope of the Research Work	230

Appendices

List of Publications	A-1
Publication's Abstract	A-2
List of Conferences	A-3
Brief Biography of the Candidate	A-4
Brief Biography of the Supervisor	A-5
Brief Biography of the Co-Supervisor	A-6