

องค์ประกอบทางเคมีที่มีฤทธิ์ทางชีวภาพจากหมามุ่ยช้างและกิ้งก่า

นางสาว จรินทร์ ผ่องเมฆินทร์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต

สาขาวิชาเภสัชเคมีและผลิตภัณฑ์ธรรมชาติ

คณะเภสัชศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2549

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

BIOACTIVE CHEMICAL CONSTITUENTS FROM
CHISOCHETON PENDULIFLORUS AND *CF. AGLAIA ERYTHROSPERMA*

Miss Jarinporn Phongmaykin

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Pharmaceutical Chemistry and Natural Products

Faculty of Pharmaceutical Sciences

Chulalongkorn University

Academic Year 2006

Copyright of Chulalongkorn University

490863

Thesis Title BIOACTIVE CHEMICAL CONSTITUENTS FROM
 CHISOCHETON PENDULIFLORUS AND CF.
 AGLAIA ERYTHROSPERMA
By Miss Jarinporn Phongmaykin
Field of Study Pharmaceutical Chemistry and Natural Products
Thesis Advisor Associate Professor Ekarin Saifah, Ph.D.
Thesis Co-Advisor Associate Professor Rutt Suttisri, Ph.D.

Accepted by the Faculty of Pharmaceutical Sciences, Chulalongkorn
University in Partial Fulfillment of the Requirements for the Doctoral Degree

.....*Pornpen Pramyothin*.....Dean of the Faculty of Pharmaceutical Sciences
(Associate Professor Pornpen Pramyothin, Ph.D.)

THESIS COMMITTEE

.....*Witchuda Thanakijcharoenpath*.....Chairman
(Witchuda Thanakijcharoenpath, Ph.D.)

.....*Ekarin Saifah*.....Thesis Advisor
(Associate Professor Ekarin Saifah, Ph.D.)

.....*Rutt Suttisri*.....Thesis Co-Advisor
(Associate Professor Rutt Suttisri, Ph.D.)

.....*Weena Jiratchariyakul*.....Member
(Associate Professor Weena Jiratchariyakul, Dr. rer. nat.)

.....*Nijsiri Ruangrunsi*.....Member
(Associate Professor Nijsiri Ruangrunsi, Ph.D.)

.....*Uthai Sotanaphun*.....Member
(Associate Professor Uthai Sotanaphun, Ph.D.)

จรินทร์ ผ่องเมฆินทร์: องค์ประกอบทางเคมีที่มีฤทธิ์ทางชีวภาพจากหมามุ่ยช้างและกล็อง
(BIOACTIVE CHEMICAL CONSTITUENTS FROM *CHISOCHETON*
PENDULIFLORUS AND *CF. AGLAIA ERYTHROSPERMA*)

อ. ที่ปรึกษา: รศ. ดร. เอกรินทร์ สายฟ้า, อ. ที่ปรึกษาร่วม: รศ. ดร. รุทธ์ สุทธิศรี 335 หน้า.

การศึกษาองค์ประกอบทางเคมีจากใบ เนื้อไม้และเปลือกต้นของหมามุ่ยช้าง (วงศ์ Meliaceae) สามารถแยกสารในกลุ่ม aromadendrane sesquiterpene จำนวน 3 ชนิด คือ 14-hydroxyviridiflorol, (-)-10 β ,13,14-trihydroxy-*allo*-aromadendrane และ 14-hydroxyepiviridiflorol ซึ่งเป็นสารชนิดใหม่ พร้อมกับ สารในกลุ่ม dammarane triterpene จำนวน 5 ชนิด คือ dammaradienone, cabraleadiol, eichlerialactone, cabralealactone และ cabraleahydroxylactone พบสารในกลุ่ม hexanortriterpene 1 ชนิด คือ hollongdione สารในกลุ่ม coumarin 2 ชนิด คือ scoparone และ scopoletin สารในกลุ่ม chromone 1 ชนิด คือ 5-hydroxy-7-methoxy-2-pentylchromone นอกจากนี้ยังพบสาร vanillic acid, ethyl orsellinate และ β -sitosterol glucoside สำหรับการศึกษารายงานองค์ประกอบทางเคมีจากใบ เนื้อผล และเมล็ดของต้นกล็องซึ่งเป็นพืชอีกชนิดหนึ่งในวงศ์ Meliaceae สามารถแยกสารในกลุ่ม dammarane triterpene จำนวน 2 ชนิด คือ ethyl eichlerianoate และ aglinin A สารในกลุ่ม coumarin 2 ชนิด คือ scoparone และ scopoletin พบสารในกลุ่ม aglallactone 1 ชนิด คือ 5,6-desmethylenedioxy-5-methoxy-aglallactone นอกจากนี้ยังพบสารในกลุ่ม flavagline 1 ชนิด คือ 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate การพิสูจน์โครงสร้างทางเคมีของสารทั้งหมดที่สกัดแยกได้โดยอาศัยการวิเคราะห์เชิงสเปกตรัมของ UV, IR, MS และ NMR ร่วมกับการเปรียบเทียบข้อมูลของสารที่เคยมีการรายงานมาแล้ว พบว่าสาร cabraleadiol, cabraleahydroxylactone, cabralealactone, eichlerialactone, 14-hydroxyviridiflorol, (-)-10 β ,13,14-trihydroxy-*allo*-aromadendrane, สารผสมระหว่าง 14-hydroxyviridiflorol และ 14-hydroxyepiviridiflorol ในอัตราส่วน 2:3, 5,6-desmethylenedioxy-5-methoxy-aglallactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate และ ethyl eichlerianoate แสดงฤทธิ์ต้านเชื้อวัณโรค cabraleadiol, cabraleahydroxylactone, cabralealactone, eichlerialactone, 5,6-desmethylenedioxy-5-methoxy-aglallactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate, ethyl eichlerianoate และ aglinin A แสดงฤทธิ์ความเป็นพิษต่อเซลล์มะเร็ง ขณะที่สาร cabraleahydroxylactone, 5,6-desmethylenedioxy-5-methoxy-aglallactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate และ aglinin A แสดงฤทธิ์ต้านเชื้อไวรัสเริม และยังพบว่า 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate สามารถแสดงฤทธิ์ต้านเชื้อมาลาเรียได้

สาขาวิชา เกษษเคมีและผลิตภัณฑ์ธรรมชาติ
ปีการศึกษา 2549

ลายมือชื่อนิติกร.....จรินทร์ ผ่องเมฆินทร์
ลายมือชื่ออาจารย์ที่ปรึกษา.....
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

4476979533: MAJOR PHARMACEUTICAL CHEMISTRY AND NATURAL PRODUCTS

KEY WORDS: *CHISOCHETON PENDULIFLORUS*/CF. *AGLAIA ERYTHROSPERMA*/
AROMADENDRANE-TYPE SESQUITERPENES/ DAMMARANE TRITERPENES/
HEXANORTRITERPENES/ AGLALACTONES/ FLAVAGLINES

JARINPORN PHONGMAYKIN: BIOACTIVE CHEMICAL CONSTITUENTS FROM
CHISOCHETON PENDULIFLORUS AND CF. *AGLAIA ERYTHROSPERMA* THESIS
ADVISOR: ASSOC. PROF. EKARIN SAIFAH, Ph.D., THESIS CO-ADVISOR: ASSOC.
PROF. RUTT SUTTISRI, Ph.D., 335 pp.

Chemical investigation of the leaves, wood and stem bark of *Chisocheton penduliflorus* Planch. ex Hiern (family Meliaceae) led to the isolation of three aromadendrane sesquiterpenes, namely 14-hydroxyviridiflorol, (-)-10 β ,13,14-trihydroxy-*allo*-aromadendrane and a new derivative, five dammarane triterpenes: dammaradienone, cabraleadiol, eichlerialactone, cabralealactone and cabraleahydroxylactone, a hexanortriterpene, hollongdione, two coumarins, scoparone and scopoletin, a chromone, 5-hydroxy-7-methoxy-2-pentylchromone, along with vanillic acid, ethyl orsellinate and β -sitosterol glucoside. Investigation of the leaves, fruits and seeds of another meliaceous plant, cf. *Aglaia erythrosperma* C.M. Pannell yielded two dammarane triterpenes, ethyl eichlerianoate and aglinin A, and two coumarins, scoparone and scopoletin. Furthermore, an aglalactone, 5,6-desmethylenedioxy-5-methoxy-aglalactone, and a flavagline, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate, were also isolated. The structure determination of these compounds was accomplished by spectroscopic methods, including UV, IR, MS and NMR, and comparison with previously reported data. Cabraleadiol, cabraleahydroxylactone, cabralealactone, eichlerialactone, 14-hydroxyviridiflorol, (-)-10 β ,13,14-trihydroxy-*allo*-aromadendrane, a 3:2 mixture of 14-hydroxyviridiflorol and 14-hydroxyepiviridiflorol, 5,6-desmethylenedioxy-5-methoxy-aglalactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate and ethyl eichlerianoate exhibited antituberculosis activity. Cabraleadiol, cabraleahydroxylactone, cabralealactone, eichlerialactone, 5,6-desmethylenedioxy-5-methoxy-aglalactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate, ethyl eichlerianoate and aglinin A displayed cytotoxic activity, whereas cabraleahydroxylactone, 5,6-desmethylenedioxy-5-methoxy-aglalactone, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate and aglinin A also showed anti HSV-1 activity. Furthermore, 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate exhibited antimalarial activity.

Field of study Pharmaceutical Chemistry
and Natural Products

Academic year 2006

Student's signature... Jarinporn Phongmaykin
Advisor's signature... Ekarin Saifah
Co-advisor's signature... Rutt Suttisri

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my thesis advisor, Associate Professor Dr. Ekarin Saifah of the Department of Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University. I greatly appreciate his valuable advice, kindness, patience, and constant encouragement throughout my research study.

I am very thankful to my thesis co-advisor, Associate Professor Dr. Rutt Suttisri of the Department of Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University for his help and valuable suggestions in several matters, especially on the interpretation of NMR spectra.

My appreciations are extended to Professor Dr. Tsutomu Ishikawa of the Graduate School of Pharmaceutical Sciences, Chiba University, for his kindness, hospitality and guidance during my research at Chiba University, Chiba, Japan and to Dr. Takuya Kumamoto for his advice and useful assistance on the operation of NMR apparatus.

I would like to thank all members of my thesis committee for their constructive suggestions and critical review of this thesis.

I am particularly indebted to the Thailand Research Fund (TRF) for financial support (grant no. PHD/0161/2544) through the 2001 Royal Golden Jubilee Ph.D. program.

I would also like to acknowledge a partial financial support by a grant from the Biodiversity Research and Training Program (BRT) and BIOTEC laboratories, NSTD, Thailand for the evaluation of antituberculosis, antimalarial, antiviral and anticancer activities of plant extracts and pure compounds.

On the personal side, I would like to thank previous/present graduate students and all staff members of the Department of Pharmaceutical Botany, Chulalongkorn University for their friendship, kind support and encouragement throughout the period of my study.

Finally, I would like to express my special and deepest appreciation to my family for their love, understanding and encouragement.

CONTENTS

	Page
ABSTRACT (Thai)	iv
ABSTRACT (English)	v
ACKNOWLEDGEMENTS	vi
CONTENTS	vii
LIST OF TABLES	xiii
LIST OF FIGURES	xvi
LIST OF SCHEMES	xxx
LIST OF ABBREVIATIONS AND SYMBOLS	xxxii
CHAPTER	
I INTRODUCTION	1
II HISTORICAL	9
III EXPERIMENTAL	72
1. Sources of Plant Materials	72
2. General Techniques	72
2.1 Solvents	72
2.2 Analytical Thin-Layer Chromatography (TLC)	72
2.3 Column Chromatography	72
2.3.1 Vacuum Liquid Column Chromatography	72
2.3.2 Column Chromatography (CC)	73
2.3.3 Gel Filtration Chromatography	73
2.4 Spectroscopy	73
2.4.1 Ultraviolet (UV) Spectra	73
2.4.2 Infrared (IR) Spectra	74
2.4.3 Mass Spectra.....	74
2.4.4 Proton and Carbon-13 Nuclear Magnetic Resonance (¹ H and ¹³ C NMR) Spectra	74
2.5 Physical Properties	74
2.5.1 Melting Points	75
2.5.2 Optical Rotations.....	75
3. Extraction and Isolation	75
3.1 Extraction and Isolation of compounds from the leaves of	

CHAPTER	Page
<i>Chisocheton penduliflorus</i>	75
3.1.1 Extraction	75
3.1.2 Isolation of Compounds from the Hexane Extract of <i>C. penduliflorus</i> Leaves	75
3.1.2.1 Isolation of Compound CP-1 (Hollongdione)	76
3.1.2.2 Isolation of Compound CP-2 (Dammadienone)	76
3.1.3 Isolation of Compounds CP-3 from the CHCl ₃ Extract of <i>C. penduliflorus</i> Leaves	76
3.2 Extraction and Isolation of compounds from the wood of <i>Chisocheton penduliflorus</i>	77
3.2.1 Extraction	77
3.2.2 Isolation of Compounds from the Hexane Extract of <i>C. penduliflorus</i> Woods	77
3.2.2.1 Isolation of Compound CP-3 (Cabraleadiol)	78
3.2.2.2 Isolation of Compound CP-4 (14-Hydroxyviridiflorol)	78
3.2.3 Isolation of Compounds from the CHCl ₃ Extract of <i>C. penduliflorus</i> Woods	78
3.2.3.1 Isolation of Compound CP-4 (14-Hydroxyviridiflorol)	79
3.2.3.2 Isolation of Compound CP-5 (14-Hydroxyepiviridiflorol).....	79
3.2.3.3 Isolation of Compound CP-3 (Cabraleadiol)	79
3.2.3.4 Isolation of Compound CP-6 (Eichlerialactone)	79
3.2.3.5 Isolation of Compound CP-7 (Cabrealactone) and CP-8 (Cabrealhydroxylactone)	80
3.2.3.6 Isolation of Compound CP-9 (Scoparone), CP-10 (Scopoletin), CP-11 (Vanillic acid), CP-12 (β -Sitosterol glucoside) and CP-13 ((-)-10 β ,13,14-Trihydroxy- <i>allo</i> - aromadendrane)	80
3.3 Extraction and Isolation of compounds from the stem bark of <i>Chisocheton penduliflorus</i>	81
3.3.1 Extraction	81

CHAPTER	Page
3.3.2 Isolation of Compounds from the Hexane Extract of <i>C. penduliflorus</i> Stem bark	81
3.3.2.1 Isolation of Compound CP-14 (5-Hydroxy-7-methoxy-2-pentylchromone)	82
3.3.2.2 Isolation of Compound CP-4 (14-Hydroxyviridiflorol)	82
3.3.3 Isolation of Compounds from the CHCl ₃ Extract of <i>C. penduliflorus</i> Stem bark	82
3.3.3.1 Isolation of Compound CP-15 (Ethyl orsellinate), CP-3 (Cabraleadiol) and CP-8 (Cabraleahydroxylactone)	83
3.3.3.2 Isolation of Compound CP-9 (Scoparone)	84
3.3.3.3 Isolation of Compound CP-12 (β -sitosterol glucoside)..	84
3.4 Extraction and Isolation of compounds from the leaves of <i>cf. Aglaia erythrosperma</i>	84
3.4.1 Extraction	84
3.4.2 Isolation of Compounds from the Hexane Extract of <i>cf. Aglaia erythrosperma</i> Leaves	85
3.4.2.1 Isolation of Compound AE-1(Cabraleadiol)	85
3.4.2.2 Isolation of Compound AE-2 (Cabraleahydroxylactone)	86
3.4.3 Isolation of Compounds from the CHCl ₃ Extract of <i>cf. Aglaia erythrosperma</i> Leaves	86
3.4.3.1 Isolation of Compound AE-3 (Scoparone)	86
3.4.3.2 Isolation of Compound AE-4 (Aglaialactone).....	87
3.5 Extraction and Isolation of compounds from the pericarp of <i>cf. Aglaia erythrosperma</i>	87
3.5.1 Extraction	87
3.5.2 Isolation of Compounds from the Hexane Extract of <i>cf. Aglaia erythrosperma</i> Pericarp.....	87
3.5.2.1 Isolation of Compound AE-1 (Cabraleadiol)	88
3.5.2.2 Isolation of Compound AE-2 (Cabraleahydroxylactone)	88
3.5.2.3 Isolation of Compound AE-5 (Ethyl eichlerianoate)	88

CHAPTER	Page
3.5.2.4 Isolation of Compound AE-6 (Eichlerialactone)	89
3.5.3 Isolation of Compounds from the CHCl ₃ Extract of <i>cf. Aglaia erythrosperma</i> pericarp.....	89
3.5.3.1 Isolation of Compound AE-7 (Aglinin A)	90
3.5.3.2 Isolation of Compound AE-1 (Cabraleadiol) and compound AE-2 (Cabraleahydroxylactone).	90
3.5.3.3 Isolation of compound AE-8 (scopoletin)	90
3.6 Extraction and Isolation of compounds from the seeds of <i>cf. Aglaia erythrosperma</i>	91
3.6.1 Extraction	91
3.6.2 Isolation of Compounds from the Hexane Extract of <i>cf. Aglaia erythrosperma</i> Seeds	91
3.6.2.1 Isolation of Compound AE-9 (Cabralealactone).....	92
3.6.2.2 Isolation of Compound AE-1 (Cabraleadiol)	92
3.6.2.3 Isolation of Compound AE-2 (Cabraleahydroxylactone)	92
3.6.2.4 Isolation of Compound AE-6 (Eichlerialactone).....	92
3.6.3 Isolation of Compounds AE-10 from the CHCl ₃ and MeOH Extracts of <i>cf. Aglaia erythrosperma</i> Seeds	92
4. Physical and Spectral Data of Isolated Compounds	108
4.1 Compound CP-1 (Hollongdione)	108
4.2 Compound CP-2 (Dammaradienone)	108
4.3 Compound CP-3 (AE-1) (Cabraleadiol)	108
4.4 Compound CP-4 (14-Hydroxyviridiflorol)	108
4.5 Compound CP-5 (14-Hydroxyepiviridiflorol)	109
4.6 Compound CP-6 (AE-6) (Eichlerialactone)	109
4.7 Compound CP-7 (AE-9) (Cabralealactone)	109
4.8 Compound CP-8 (AE-2) (Cabraleahydroxylactone)	109
4.9 Compound CP-9 (AE-3) (Scoparone)	110
4.10 Compound CP-10 (AE-8) (Scopoletin)	110
4.11 Compound CP-11 (Vanillic acid)	110

CHAPTER	Page
4.12 Compound CP-12 (β -Sitosterol glucoside)	111
4.13 Compound CP-13	
((-)-10 β ,13,14-Trihydroxy- <i>allo</i> -aromadendrane).....	111
4.14 Compound CP-14 (5-Hydroxy-7-methoxy-2-pentylchromone)	111
4.15 Compound CP-15 (Ethyl orsellinate)	111
4.16 Compound AE-4 (Aglaiolactone or	
5,6-desmethylenedioxy-5-methoxy-aglalactone)	112
4.17 Compound AE-5 (20S,24R-Epoxy-25-hydroxy-3,4-seco-	
5 α -dammar-4(28)-en-3-ethylester) or (Ethyl eichlerianoate)	112
4.18 Compound AE-7 (Aglinin A)	112
4.19 Compound AE-10 (4'-Demethoxy-3',4'-methylenedioxy	
-methyl rocaglate)	113
5. Evaluation of Biological Activities	114
5.1 Determination of antimycobacterial activity	114
5.2 Determination of antimalarial activity	114
5.3 Determination of cytotoxic activity	115
5.3.1 Human small cell lung carcinoma (NCI-H187)	115
5.3.2 Human epidermoid carcinoma (KB) and breast cancer (BC)	115
5.3.3 Vero cell	116
5.4 Determination of anti-herpes simplex activity	116
IV RESULTS AND DISCUSSION.....	118
1. Structure Determination of compounds Isolated from <i>Chisocheton</i>	
<i>penduliflorus</i>	118
1.1 Identification of compound CP-1	118
1.2 Identification of compound CP-2	121
1.3 Identification of compound CP-3	124
1.4 Identification of compound CP-4	128
1.5 Identification of compound CP-5	131
1.6 Identification of compound CP-6	133
1.7 Identification of compound CP-7	136
1.8 Identification of compound CP-8	139
1.9 Identification of compound CP-9	142
1.10 Identification of compound CP-10.....	145

CHAPTER	Page
1.11 Identification of compound CP-11	148
1.12 Identification of compound CP-12	150
1.13 Identification of compound CP-13	153
1.14 Identification of compound CP-14	156
1.15 Identification of compound CP-15	158
2. Structure Determination of Compound Isolated from <i>cf. Aglaia erythrosperma</i>	160
2.1 Identification of compound AE-4.....	160
2.2 Identification of compound AE-5.....	163
2.3 Identification of compound AE-7.....	166
2.4 Identification of compound AE-10	169
3. Bioactivity evaluation of compounds isolated from <i>Chisocheiton penduliflorus</i> and <i>cf. Aglaia erythrosperma</i>	173
3.1 Bioactive compounds from <i>Chisocheiton penduliflorus</i>	173
3.1.1 Cytotoxicity activity	175
3.1.2 Antituberculosis activity	175
3.1.3 Anti HSV-1 activity	175
3.2 Bioactive compounds from <i>cf. Aglaia erythrosperma</i>	176
3.2.1 Cytotoxicity activity	176
3.2.2 Antituberculosis activity	178
3.2.3 Anti HSV-1 activity	179
3.2.4 Antimalarial activity	179
V CONCLUSION	180
REFERENCES	182
APPENDICES	198
VITA	335

LIST OF TABLES

Table	Page
1 Subfamilies of Meliaceae	1
2 The distribution of triterpenoids in <i>Chisocheton</i> spp.	9
3 Distribution of dammarane-type triterpenoids in the Meliaceae	16
4 Distribution of aromadendrane – type sesquiterpenes in plants	31
5 Distribution of flavagline compounds in the family Meliaceae	48
6 Combined fractions from hexane extract of <i>C. penduliflorus</i> leaves	76
7 Combined fractions from hexane extract of <i>C. penduliflorus</i> woods	78
8 Combined fractions from CHCl ₃ extract of <i>C. penduliflorus</i> woods	79
9 Combined fractions from hexane extract of <i>C. penduliflorus</i> stem bark....	81
10 Combined fractions from CHCl ₃ extract of <i>C. penduliflorus</i> stem bark....	83
11 Combined fractions from hexane extract of cf. <i>Aglaia erythrosperma</i> leaves	85
12 Combined fractions from CHCl ₃ extract of cf. <i>Aglaia erythrosperma</i> leaves	86
13 Combined fractions from hexane extract of cf. <i>Aglaia erythrosperma</i> pericarp	88
14 Combined fractions from CHCl ₃ extract of cf. <i>Aglaia erythrosperma</i> pericarp	89
15 Combined fractions from hexane extract of cf. <i>Aglaia erythrosperma</i> seeds	91
16 NMR spectral data of hollongdione (compound CP-1) (CDCl ₃ , 500 MHz)	120
17 NMR spectral data of dammarandienone (compound CP-2) (CDCl ₃ , 500 MHz)	122
18 Comparison of ¹ H and ¹³ C NMR spectral data of cabraleadiol and compound CP-3 (CDCl ₃ , 500 MHz)	126
19 Comparison of ¹ H and ¹³ C NMR spectral data (in CDCl ₃ , 500 MHz) of 14-hydroxyviridiflorol and compound CP-4	130

Table	Page
20 ^1H and ^{13}C NMR spectral data of compound CP-5 (14-hydroxyepiviridiflorol) (in CDCl_3 , 500 MHz)	132
21 Comparison of NMR spectral data of eichlerialactone and compound CP-6 (CDCl_3 , 500 MHz)	134
22 Comparison of NMR spectral data of cabralealactone and compound CP-7 (CDCl_3 , 500 MHz)	137
23 Comparison of NMR spectral data of cabraleahydroxylactone and compound CP-8 (CDCl_3 , 500 MHz)	140
24 Comparison of NMR spectral data of scoparone and compound CP-9 (CDCl_3 , 500 MHz)	144
25 Comparison of NMR spectral data of scopoletin and compound CP-10 ($\text{DMSO}-d_6$, 500 MHz)	147
26 Comparison of NMR spectral data of vanillic acid and compound CP-11 ($\text{DMSO}-d_6$, 500 MHz)	149
27 Comparison of ^{13}C NMR spectral data of β -Sitosterol glucoside and compound CP-12 ($\text{DMSO}-d_6$, 500 MHz)	152
28 Comparison of ^1H and ^{13}C NMR spectral data of (-)-10 β ,13,14-trihydroxy- <i>allo</i> -aromadendrane and compound CP-13 (CDCl_3 , 500 MHz)	155
29 Comparison of ^1H and ^{13}C NMR spectral data of 5-hydroxy-7- methoxy-2-pentylchromone and compound CP-14 (CDCl_3 , 500 MHz) ..	157
30 Comparison of NMR spectral data of ethyl orsellinate and compound CP-15 (CDCl_3 , 500 MHz)	159
31 Comparison of NMR spectral data of aglaialactone and compound AE-4 (CDCl_3 , 500 MHz)	162
32 NMR spectral data of ethyl eichlerianoate (compound AE-5) (CDCl_3 , 500 MHz)	165
33 Comparison of NMR spectral data of aglinin A methylester and compound AE-7 (CDCl_3 , 500 MHz)	167

Table	Page
34 Comparison of NMR spectral data of 4'-demethoxy-3',4'-methylenedioxy-methyl rocaglate and compound AE-10 (CDCl ₃ , 500 MHz)	171
35 Bioactivities of compounds isolated from <i>Chisocheton penduliflorus</i>	174
36 Bioactivities of compounds isolated from cf. <i>Aglaia erythrosperma</i>	177

LIST OF FIGURES

Figure	Page
1 <i>Chisocheton penduliflorus</i> Planch. ex Hiern	
A) Fruits	7
2 cf. <i>Aglaia erythrosperma</i> C.M. Pannell A) Stem and bark, B) Leaves, C) Fruits with milky latex.....	8
3 Chemical structures of triterpenoids found in <i>Chisocheton</i> spp.	12
4 Chemical structures of dammarane – type triterpenoids in the Meliaceae	24
5 Chemical structures of aromadendrane – type sesquiterpenes in plants ..	37
6 Chemical structures of flavagline compounds in the family Meliaceae ...	57
7 Structure of compounds isolated from leaves, wood and stem bark of <i>C. penduliflorus</i>	106
8 Structure of compounds isolated from leaves, pericarp and seeds of cf. <i>Aglaia erythrosperma</i>	107
9 IR Spectrum of compound CP-1 (KBr disc)	199
10 ESI Mass spectrum of compound CP-1	199
11a ¹ H NMR (500 MHz) Spectrum of compound CP-1 (in CDCl ₃).....	200
11b ¹ H NMR (500 MHz) Spectrum of compound CP-1 (in CDCl ₃) (expansion δ 0.78-1.23 ppm).....	200
11c ¹ H NMR (500 MHz) Spectrum of compound CP-1 (CDCl ₃) (expansion δ 1.24-1.86 ppm).....	201
12 ¹³ C NMR (125 MHz) Spectrum of compound CP-1 (in CDCl ₃).....	201
13a DEPT 135 Spectrum of compound CP-1.....	202
13b DEPT 135 Spectrum of compound CP-1 (expansion δ 49.0-55.5 ppm)..	202
14 ¹ H- ¹ H COSY Spectrum of compound CP-1.....	203
15a HMQC Spectrum of compound CP-1 (expansion δ _H 0.7-1.1 ppm, δ _C 14-20 ppm).....	203
15b HMQC Spectrum of compound CP-1 (expansion δ _H 0.8-1.8 ppm, δ _C 18-37 ppm).....	204
15c HMQC Spectrum of compound CP-1 (expansion δ _H 0.8-2.7 ppm, δ _C 30-60 ppm).....	204

Figure	Page
16a HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.85-2.7 ppm, δ_{C} 13-29 ppm).....	205
16b HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.85-2.7 ppm, δ_{C} 30-60 ppm)	205
16c HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.85-2.7 ppm, δ_{C} 200-220 ppm)	206
16d HMBC Spectrum of compound CP-1 (expansion δ_{H} 0.80-1.10 ppm, δ_{C} 13-29 ppm).....	206
16e HMBC Spectrum of compound CP-1 (expansion δ_{H} 0.80-1.10 ppm, δ_{C} 30-60 ppm)	207
16f HMBC Spectrum of compound CP-1 (expansion δ_{H} 0.80-1.10 ppm, δ_{C} 207-220 ppm)	207
16g HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.10-1.75 ppm, δ_{C} 207-220 ppm)	208
16h HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.10-1.75 ppm, δ_{C} 30-60 ppm)	208
16i HMBC Spectrum of compound CP-1 (expansion δ_{H} 1.10-1.75 ppm, δ_{C} 13-30 ppm)	209
17 NOESY Spectrum of compound CP-1.....	209
18 IR Spectrum of compound CP-2 (KBr disc).....	210
19 ESI Mass spectrum of compound CP-2.....	210
20a ^1H NMR (500 MHz) Spectrum of compound CP-2 (in CDCl_3).....	211
20b ^1H NMR (500 MHz) Spectrum of compound CP-2 (in CDCl_3) (expansion δ 0.84-1.69 ppm).....	211
20c ^1H NMR (500 MHz) Spectrum of compound CP-2 (in CDCl_3) (expansion δ 1.80-5.15 ppm).....	212
21 ^{13}C NMR (125 MHz) Spectrum of compound CP-2 (in CDCl_3).....	212
22a DEPT 135 Spectrum of compound CP-2.....	213
22b DEPT 135 Spectrum of compound CP-2 (expansion δ 100-135 ppm).....	213
23 ^1H - ^1H COSY Spectrum of compound CP-2.....	214

Figure	Page	
24a	HMQC Spectrum of compound CP-2 (δ_{H} 0.8-2.3 ppm, δ_{C} 19-33 ppm).....	214
24b	HMQC Spectrum of compound CP-2 (δ_{H} 0.7-1.7 ppm, δ_{C} 14-28 ppm).....	215
24c	HMQC Spectrum of compound CP-2 (expansion δ_{H} 0.7-1.7 ppm, δ_{C} 28-60 ppm).....	215
24d	HMQC Spectrum of compound CP-2 (expansion δ_{H} 1.8-2.7 ppm, δ_{C} 25-58 ppm).....	216
24e	HMQC Spectrum of compound CP-2 (expansion δ_{H} 4.1-5.9 ppm, δ_{C} 106-126 ppm).....	216
24f	HMQC Spectrum of compound CP-2 (expansion δ_{H} 0.75-1.15 ppm, δ_{C} 14-23 ppm).....	217
25a	HMBC Spectrum of compound CP-2 (expansion δ_{H} 4.55-5.45 ppm, δ_{C} 30-60 ppm).....	217
25b	HMBC Spectrum of compound CP-2 (expansion δ_{H} 4.55-5.45 ppm, δ_{C} 11-33 ppm).....	218
25c	HMBC Spectrum of compound CP-2 (expansion δ_{H} 1.8-2.9 ppm, δ_{C} 150-220 ppm).....	218
25d	HMBC Spectrum of compound CP-2 (expansion δ_{H} 1.75-2.65 ppm, δ_{C} 107-136 ppm).....	219
25e	HMBC Spectrum of compound CP-2 (expansion δ_{H} 1.75-2.65 ppm, δ_{C} 30-60 ppm).....	219
25f	HMBC Spectrum of compound CP-2 (expansion δ_{H} 1.80-2.55 ppm, δ_{C} 11-33 ppm).....	220
25g	HMBC Spectrum of compound CP-2 (expansion δ_{H} 0.6-1.7 ppm, δ_{C} 150-220 ppm).....	220
25h	HMBC Spectrum of compound CP-2 (expansion δ_{H} 0.6-1.7 ppm, δ_{C} 107-136 ppm).....	221
25i	HMBC Spectrum of compound CP-2 (expansion δ_{H} 0.70-1.25 ppm, δ_{C} 34-59 ppm).....	221
25j	HMBC Spectrum of compound CP-2 (expansion δ_{H} 0.80-1.75 ppm, δ_{C} 11-33 ppm).....	222
26a	NOESY Spectrum of compound CP-2.....	222

Figure	Page
27 IR Spectrum of compound CP-3 (KBr disc).....	223
28 EI Mass spectrum of compound CP-3	223
29a ¹ H NMR (500 MHz) Spectrum of compound CP-3 (in CDCl ₃).....	224
29b ¹ H NMR (500 MHz) Spectrum of compound CP-3 (in CDCl ₃) (expansion δ 0.80-1.70 ppm).....	224
29c ¹ H NMR (500 MHz) Spectrum of compound CP-3 (in CDCl ₃) (expansion δ 1.32-3.35 ppm).....	225
30 ¹³ C NMR (125 MHz) Spectrum of compound CP-3 (in CDCl ₃).....	225
31 DEPT 135 Spectrum of compound CP-3.....	226
32 ¹ H- ¹ H COSY Spectrum of compound CP-3.....	226
33a HMQC Spectrum of compound CP-3 (expansion δ _H 0.80-2.00 ppm, δ _C 16-52 ppm).....	227
33b HMQC Spectrum of compound CP-3 (expansion δ _H 3.0-4.0 ppm, δ _C 74-89 ppm).....	227
34a HMBC Spectrum of compound CP-3 (expansion δ _H 1.00-1.30 ppm, δ _C 30-39 ppm).....	228
34b HMBC Spectrum of compound CP-3 (expansion δ _H 1.14-1.34 ppm, δ _C 15-23 ppm).....	228
34c HMBC Spectrum of compound CP-3 (expansion δ _H 1.14-1.34 ppm, δ _C 24-30 ppm).....	229
34d HMBC Spectrum of compound CP-3 (expansion δ _H 1.34-1.68 ppm, δ _C 15-23 ppm).....	229
34e HMBC Spectrum of compound CP-3 (expansion δ _H 1.35-2.00 ppm, δ _C 30-53 ppm).....	230
34f HMBC Spectrum of compound CP-3 (expansion δ _H 1.35-2.00 ppm, δ _C 68-90 ppm).....	230
34g HMBC Spectrum of compound CP-3 (expansion δ _H 1.06-1.18 ppm, δ _C 85-88 ppm).....	231

Figure	Page
34h HMBC Spectrum of compound CP-3 (expansion δ_H 1.58-1.90 ppm, δ_C 84.5-88.5 ppm).....	231
34i HMBC Spectrum of compound CP-3 (expansion δ_H 0.75-1.20 ppm, δ_C 15-29 ppm).....	232
34j HMBC Spectrum of compound CP-3 (expansion δ_H 0.75-1.20 ppm, δ_C 31-52 ppm).....	232
34k HMBC Spectrum of compound CP-3 (expansion δ_H 3.35-3.75 ppm, δ_C 31-52 ppm).....	233
34l HMBC Spectrum of compound CP-3 (expansion δ_H 3.35-3.75 ppm, δ_C 21-30 ppm).....	233
34m. HMBC Spectrum of compound CP-3 (expansion δ_H 3.35-3.75 ppm, δ_C 69-89 ppm).....	234
35 NOESY Spectrum of compound CP-3.....	234
36 IR Spectrum of compound CP-4 (KBr disc).....	235
37 ESI-TOF Mass spectrum of compound CP-4.....	235
38a 1H NMR (500 MHz) Spectrum of compound CP-4 (in $CDCl_3$).....	236
38b 1H NMR (500 MHz) Spectrum of compound CP-4 (in $CDCl_3$) (expansion δ 0.0-1.1 ppm).....	236
38c 1H NMR (500 MHz) Spectrum of compound CP-4 (in $CDCl_3$) (expansion δ 1.0-1.7 ppm).....	237
38d 1H NMR (500 MHz) Spectrum of compound CP-4 (in $CDCl_3$) (expansion δ 1.70-2.04 ppm).....	237
39 ^{13}C NMR (125 MHz) Spectrum of compound CP-4 (in $CDCl_3$).....	238
40a DEPT 135 Spectrum of compound CP-4.....	238
40b DEPT 135 Spectrum of compound CP-4 (expansion δ 16-30 ppm).....	239
41 1H - 1H COSY Spectrum of compound CP-4	239
42 HMQC Spectrum of compound CP-4.....	240
43a HMBC Spectrum of compound CP-4.....	240
43b HMBC Spectrum of compound CP-4 (expansion δ_H 1.4-3.7 ppm, δ_C 40-95 ppm).....	241
43c HMBC Spectrum of compound CP-4 (expansion δ_H 2.7-4.1 ppm, δ_C 14-43 ppm).....	241
43d HMBC Spectrum of compound CP-4	

Figure	Page
(expansion δ_H 0.0-1.2 ppm, δ_C 25-33 ppm).....	242
43e HMBC Spectrum of compound CP-4 (expansion δ_H 0.75-1.20 ppm, δ_C 11-43 ppm).....	242
43f HMBC Spectrum of compound CP-4 (expansion δ_H 1.2-2.5 ppm, δ_C 15-45 ppm).....	243
44 NOESY Spectrum of compound CP-4.....	243
45 IR Spectrum of compound CP-5.....	244
46 ESI-TOF Mass spectrum of compound CP-5.....	244
47a 1H NMR (500 MHz) Spectrum of compound CP-5 (in $CDCl_3$).....	245
47b 1H NMR (500 MHz) Spectrum of compound CP-5 (in $CDCl_3$) (expansion δ 0.6-2.2 ppm).....	245
48 ^{13}C NMR (125 MHz) Spectrum of compound CP-5 (in $CDCl_3$).....	246
49a DEPT 135 Spectrum of compound CP-5.....	246
49b DEPT 135 Spectrum of compound CP-5 (expansion δ 15-45 ppm).....	247
50 1H - 1H COSY Spectrum of compound CP-5.....	247
51 HMQC Spectrum of compound CP-5.....	248
52 HMBC Spectrum of compound CP-5.....	248
53a NOESY Spectrum of compound CP-5.....	249
53b NOESY Spectrum of compound CP-5 (expansion δ 0.5-2.4 ppm).....	249
54 IR Spectrum of compound CP-6 (KBr disc).....	250
55 EI Mass spectrum of compound CP-6	250
56a 1H NMR (500 MHz) Spectrum of compound CP-6 (in $CDCl_3$).....	251
56b 1H NMR (500 MHz) Spectrum of compound CP-6 (in $CDCl_3$) (expansion δ 0.8-2.8 ppm).....	251
57a ^{13}C NMR (125 MHz) Spectrum of compound CP-6 (in $CDCl_3$).....	252

Figure	Page
57b ¹³ C NMR (125 MHz) Spectrum of compound CP-6 (in CDCl ₃) (expansion δ 15-51 ppm).....	252
58 DEPT 135 Spectrum of compound CP-6	253
59 ¹ H- ¹ H COSY Spectrum of compound CP-6.....	253
60a HMQC Spectrum of compound CP-6	254
60b HMQC Spectrum of compound CP-6 (expansion δ _H 4.0-6.0 ppm, δ _C 108-120 ppm).....	254
61a HMBC Spectrum of compound CP-6.....	255
61b HMBC Spectrum of compound CP-6 (expansion δ _H 4.0-6.0 ppm, δ _C 15-60 ppm).....	255
61c HMBC Spectrum of compound CP-6 (expansion δ _H 1.2-3.0 ppm, δ _C 80-190 ppm).....	256
62 NOESY Spectrum of compound CP-6	256
63 IR Spectrum of compound CP-7.....	257
64 IR Spectrum of compound CP-7 (KBr disc).....	257
65 ¹ H NMR (500 MHz) Spectrum of compound CP-7 (in CDCl ₃).....	258
66 ¹³ C NMR (125 MHz) Spectrum of compound CP-7 (in CDCl ₃).....	258
67a DEPT 135 Spectrum of compound CP-7	259
67b DEPT 135 Spectrum of compound CP-7 (expansion δ 15-32 ppm).....	259
67c DEPT 135 Spectrum of compound CP-7 (expansion δ 33-56 ppm).....	260
68 IR Spectrum of compound CP-8 (KBr disc).....	260
69 EI Mass spectrum of compound CP-8	261
70a ¹ H NMR (500 MHz) Spectrum of compound CP-8 (in CDCl ₃).....	261
70b ¹ H NMR (500 MHz) Spectrum of compound CP-8 (in CDCl ₃) (expansion δ 0.80-1.52 ppm).....	262
70c ¹ H NMR (500 MHz) Spectrum of compound CP-8 (in CDCl ₃) (expansion δ 1.68-3.40 ppm).....	262

Figure	Page
71 ^{13}C NMR (125 MHz) Spectrum of compound CP-8 (in CDCl_3).....	263
72a DEPT 135 Spectrum of compound CP-8 (expansion δ 14-32 ppm).....	263
72b DEPT 135 Spectrum of compound CP-8 (expansion δ 33-51 ppm).....	264
73 ^1H - ^1H COSY Spectrum of compound CP-8	264
74a HMQC Spectrum of compound CP-8	265
74b HMQC Spectrum of compound CP-8 (expansion δ_{H} 0.75-1.65 ppm, δ_{C} 30-54 ppm).....	265
74c HMQC Spectrum of compound CP-8 (expansion δ_{H} 1.0-2.8 ppm, δ_{C} 13-30 ppm).....	266
74d HMQC Spectrum of compound CP-8 (expansion δ_{H} 1.4-2.8 ppm, δ_{C} 20-30 ppm).....	266
74e HMQC Spectrum of compound CP-8 (expansion δ_{H} 1.0-2.8 ppm, δ_{C} 30- 54 ppm).....	267
74f HMQC Spectrum of compound CP-8 (expansion δ_{H} 2.4-3.5 ppm, δ_{C} 62- 98 ppm).....	267
75a HMBC Spectrum of compound CP-8	268
75b HMBC Spectrum of compound CP-8 (expansion δ_{H} 0.80-1.04 ppm, δ_{C} 13-30 ppm).....	268
75c HMBC Spectrum of compound CP-8 (expansion δ_{H} 1.09-1.65 ppm, δ_{C} 13-30 ppm).....	269
75d HMBC Spectrum of compound CP-8 (expansion δ_{H} 0.80-1.55 ppm, δ_{C} 74-91 ppm).....	269
75e HMBC Spectrum of compound CP-8 (expansion δ_{H} 1.6-3.5 ppm, δ_{C} 30-54 ppm).....	270
75f HMBC Spectrum of compound CP-8 (expansion δ_{H} 1.6-3.5 ppm, δ_{C} 70-180 ppm).....	270
76 NOESY Spectrum of compound CP-8.....	271
77 UV Spectrum of compound CP-9 (MeOH).....	271
78 IR Spectrum of compound CP-9 (KBr disc).....	272

Figure	Page
79 EI- Mass spectrum of compound CP-9	272
80 ¹ H NMR (500 MHz) Spectrum of compound CP-9 (in CDCl ₃).....	273
81 ¹³ C NMR (125 MHz) Spectrum of compound CP-9 (in CDCl ₃).....	273
82 DEPT 135 Spectrum of compound CP-9.....	274
83 ¹ H- ¹ H COSY Spectrum of compound CP-9.....	274
84 HMQC Spectrum of compound CP-9.....	275
85 HMBC Spectrum of compound CP-9.....	275
86 UV Spectrum of compound CP-10 (MeOH).....	276
87 IR Spectrum of compound CP-10 (KBr disc).....	276
88 ESI-TOF Mass spectrum of compound CP-10	277
89 ¹ H NMR (500 MHz) Spectrum of compound CP-10 (in DMSO- <i>d</i> ₆).....	277
90 ¹³ C NMR (125 MHz) Spectrum of compound CP-10 (in DMSO- <i>d</i> ₆).....	278
91 DEPT 135 Spectrum of compound CP-10.....	278
92 ¹ H- ¹ H COSY Spectrum of compound CP-10.....	279
93 HMQC Spectrum of compound CP-10.....	279
94 HMBC Spectrum of compound CP-10.....	280
95 UV Spectrum of compound CP-11 (MeOH).....	280
96 IR Spectrum of compound CP-11 (KBr disc).....	281
97 EI Mass spectrum of compound CP-11.....	281
98a ¹ H NMR (500 MHz) Spectrum of compound CP-11 (in DMSO- <i>d</i> ₆).....	282
98b ¹ H NMR (500 MHz) Spectrum of compound CP-11 (in DMSO- <i>d</i> ₆) (expansion δ 6.5-7.7 ppm).....	282
99 ¹³ C NMR (125 MHz) Spectrum of compound CP-11 (in DMSO- <i>d</i> ₆).....	283
100 DEPT 135 Spectrum of compound CP-11.....	283
101 ¹ H- ¹ H COSY Spectrum of compound CP-11.....	284
102 HMQC Spectrum of compound CP-11.....	284

Figure	Page
103 HMBC Spectrum of compound CP-11.....	285
104 ¹ H NMR (500 MHz) Spectrum of compound CP-12 (in DMSO- <i>d</i> ₆).....	285
105a ¹³ C NMR (125 MHz) Spectrum of compound CP-12 (in DMSO- <i>d</i> ₆).....	286
105b ¹³ C NMR (125 MHz) Spectrum of compound CP-12 (in DMSO- <i>d</i> ₆) (expanded δ 10-50 ppm).....	286
105c ¹³ C NMR (125 MHz) Spectrum of compound CP-12 (in DMSO- <i>d</i> ₆) (expansion δ 45-80 ppm).....	287
106 DEPT 135 Spectrum of compound CP-12.....	287
107 IR Spectrum of compound CP-13 (KBr disc).....	288
108 ESI Mass spectrum of compound CP-13.....	288
109 ¹ H NMR (500 MHz) Spectrum of compound CP-13 (in CDCl ₃).....	289
110 ¹³ C NMR (125 MHz) Spectrum of compound CP-13 (in CDCl ₃).....	289
111 DEPT 135 Spectrum of compound CP-13.....	290
112 ¹ H- ¹ H COSY Spectrum of compound CP-13.....	290
113 HMQC Spectrum of compound CP-13.....	291
114a HMBC Spectrum of compound CP-13.....	291
114b HMBC Spectrum of compound CP-13 (expansion δ _H 0.1-2.0 ppm, δ _C 50-85 ppm).....	292
114c HMBC Spectrum of compound CP-13 (expansion δ _H 3.0-3.8 ppm, δ _C 9-34 ppm).....	292
114d HMBC Spectrum of compound CP-13 (expansion δ _H 3.0-3.8 ppm, δ _C 66-82 ppm).....	293
115 NOESY Spectrum of compound CP-13.....	293
116 UV Spectrum of compound CP-14 (MeOH).....	294
117 IR Spectrum of compound CP-14 (KBr disc).....	294
118 ESI-TOF Mass spectrum of compound CP-14.....	295
119 ¹ H NMR (500 MHz) Spectrum of compound CP-14 (in CDCl ₃).....	295

Figure	Page
120 ^{13}C NMR (125 MHz) Spectrum of compound CP-14 (in CDCl_3).....	296
121 DEPT 135 Spectrum of compound CP-14.....	296
122 ^1H - ^1H COSY Spectrum of compound CP-14.....	297
123 HMQC Spectrum of compound CP-14.....	297
124 HMBC Spectrum of compound CP-14.....	298
125 UV Spectrum of compound CP-15 (MeOH).....	298
126 IR Spectrum of compound CP-15 (KBr disc).....	299
127 ESI- Mass spectrum (Negative mode) of compound CP-15.....	299
128a ^1H NMR (500 MHz) Spectrum of compound CP-15 (in CDCl_3).....	300
128b ^1H NMR (500 MHz) Spectrum of compound CP-15 (in CDCl_3) (expansion δ 1.0-4.8 ppm).....	300
128c ^1H NMR (500 MHz) Spectrum of compound CP-15 (in CDCl_3) (expansion δ 6.0-12.0 ppm).....	301
129 ^{13}C NMR (125 MHz) Spectrum of compound CP-15 (in CDCl_3).....	301
130 DEPT 135 Spectrum of compound CP-15.....	302
131 ^1H - ^1H COSY Spectrum of compound CP-15.....	302
132 HMQC Spectrum of compound CP-15.....	303
133 HMBC Spectrum of compound CP-15.....	303
134 UV Spectrum of compound AE-4 (MeOH).....	304
135 IR Spectrum of compound AE-4 (KBr disc).....	304
136 EI Mass spectrum of compound AE-4.....	305
137a ^1H NMR (500 MHz) Spectrum of compound AE-4 (in CDCl_3).....	305
137b ^1H NMR (500 MHz) Spectrum of compound AE-4 (in CDCl_3) (expansion δ 6.0-7.4 ppm).....	306
138 ^{13}C NMR (125 MHz) Spectrum of compound AE-4 (in CDCl_3).....	306
139 DEPT 135 Spectrum of compound AE-4.....	307
140 ^1H - ^1H COSY Spectrum of compound AE-4.....	307

Figure	Page
141	HMQC Spectrum of compound AE-4.....308
142	HMBC Spectrum of compound AE-4..... 308
143	IR Spectrum of compound AE-5 (KBr disc).....309
144	ESI-TOF mass spectrum of compound AE-5..... 309
145a	¹ H NMR (500 MHz) Spectrum of compound AE-5 (in CDCl ₃)..... 310
145b	¹ H NMR (500 MHz) Spectrum of compound AE-5 (in CDCl ₃) (expansion δ 0.8-2.4 ppm).....310
145c	¹ H NMR (500 MHz) Spectrum of compound AE-5 (in CDCl ₃) (expansion δ 3.6-5.0 ppm).....311
146	¹³ C NMR (125 MHz) Spectrum of compound AE-5 (in CDCl ₃)..... 311
147a	DEPT 135 Spectrum of compound AE-5 (expansion δ 14-38 ppm)..... 312
147b	DEPT 135 Spectrum of compound AE-5 (expansion δ 38-90 ppm).....312
147c	DEPT 135 Spectrum of compound AE-5..... 313
148	¹ H- ¹ H COSY Spectrum of compound AE-5..... 313
149a	HMQC Spectrum of compound AE-5.....314
149b	HMQC Spectrum of compound AE-5 expansion δ _H 3.5-5.0 ppm, δ _C 55-115 ppm).....314
150a	HMBC Spectrum of compound AE-5.....315
150b	HMBC Spectrum of compound AE-5 (expansion δ _H 0.6-2.6 ppm, δ _C 10-55 ppm).....315
150c	HMBC Spectrum of compound AE-5 (expansion δ _H 0.8-2.0 ppm, δ _C 59-90 ppm).....316
150d	HMBC Spectrum of compound AE-5 (expansion δ _H 1.4-2.5 ppm, δ _C 110-180 ppm).....316
150e	HMBC Spectrum of compound AE-5 (expansion δ _H 3.6-5.0 ppm, δ _C 10-65 ppm).....317
151a	NOESY Spectrum of compound AE-5..... 317

Figure	Page
151b NOESY Spectrum of compound AE-5 (expansion δ 0.8-2.4 ppm).....	318
152 IR Spectrum of compound AE-7 (KBr disc).....	318
153 ESI Mass spectrum (Negative mode) of compound AE-7.....	319
154a ^1H NMR (500 MHz) Spectrum of compound AE-7 (in CDCl_3).....	319
154b ^1H NMR (500 MHz) Spectrum of compound AE-7 (in CDCl_3) (expansion δ 0.8-2.8 ppm).....	320
155 ^{13}C NMR (125 MHz) Spectrum of compound AE-7 (in CDCl_3).....	320
156a DEPT 135 Spectrum of compound AE-7 (expansion δ 15-37 ppm).....	321
156b DEPT 135 Spectrum of compound AE-7 (expansion δ 39-52 ppm).....	321
156c DEPT 135 Spectrum of compound AE-7 (expansion δ 75-115 ppm).....	322
157 ^1H - ^1H COSY Spectrum of compound AE-7.....	322
158a HMQC Spectrum of compound AE-7.....	323
158b HMQC Spectrum of compound AE-7 (expansion δ_{H} 1.0-2.6 ppm, δ_{C} 20-55 ppm).....	323
158c HMQC Spectrum of compound AE-7 (expansion δ_{H} 4.4-5.1 ppm, δ_{C} 106-120 ppm).....	324
159a HMBC Spectrum of compound AE-7.....	324
159b HMBC Spectrum of compound AE-7 (expansion δ_{H} 0.7-1.9 ppm, δ_{C} 65-100 ppm).....	325
159c HMBC Spectrum of compound AE-7 (expansion δ_{H} 0.7-2.8 ppm, δ_{C} 100-185 ppm).....	325
159d HMBC Spectrum of compound AE-7 (expansion δ_{H} 4.4-5.1 ppm, δ_{C} 10-60 ppm).....	326
160 UV Spectrum of compound AE-10 (MeOH).....	326
161 IR Spectrum of compound AE-10 (KBr disc).....	327
162 ESI-TOF Mass spectrum of compound AE-10.....	327

Figure	Page
163a ^1H NMR (500 MHz) Spectrum of compound AE-10 (in CDCl_3).....	328
163b ^1H NMR (500 MHz) Spectrum of compound AE-10 (in CDCl_3) (expansion δ 0.8-4.5 ppm).....	328
163c ^1H NMR (500 MHz) Spectrum of compound AE-10 (in CDCl_3) (expansion δ 5.0-7.5 ppm).....	329
164a ^{13}C NMR (125 MHz) Spectrum of compound AE-10 (in CDCl_3).....	329
164b ^{13}C NMR (125 MHz) Spectrum of compound AE-10 (in CDCl_3) (expansion δ 5-80 ppm).....	330
164c ^{13}C NMR (125 MHz) Spectrum of compound AE-10 (in CDCl_3) (expansion δ 90-175 ppm).....	330
165 DEPT 135 Spectrum of compound AE-10.....	331
166a ^1H - ^1H COSY Spectrum of compound AE-10 (expansion δ 3.2-5.4 ppm).....	331
166b ^1H - ^1H COSY Spectrum of compound AE-10 (expansion δ 5.5-8.5 ppm).....	332
167 HMQC Spectrum of compound AE-10.....	332
168a HMBC Spectrum of compound AE-10.....	333
168b HMBC Spectrum of compound AE-10 (expansion δ_{H} 3.2-5.4 ppm, δ_{C} 40-85 ppm).....	333
169 NOESY Spectrum of compound AE-10.....	334

LIST OF SCHEMES

Scheme	Page
1 Isolation of compounds from the hexane extract <i>C. penduliflorus</i> leaves...94	94
2 Isolation of compound CP-3 from the CHCl ₃ extract of <i>C. penduliflorus</i> leaves94	94
3 Isolation of compounds from the hexane extract of <i>C. penduliflorus</i> wood95	95
4 Isolation of compounds from the CHCl ₃ extract of <i>C. penduliflorus</i> wood96	96
5 Isolation of compounds from the Hexane extract of <i>C. penduliflorus</i> stem bark97	97
6 Isolation of compounds from the CHCl ₃ extract of <i>C. penduliflorus</i> stem bark 98	98
7 Isolation of compounds from the hexane extract of cf. <i>Aglaia erythrosperma</i> leaves..... 99	99
8 Isolation of compounds from the CHCl ₃ extract of cf. <i>Aglaia erythrosperma</i> leaves100	100
9 Isolation of compounds from the hexane extract of cf. <i>Aglaia erythrosperma</i> pericarp101	101
10 Isolation of compounds from the CHCl ₃ extract of cf. <i>Aglaia erythrosperma</i> pericarp.....102	102
11 Isolation of compounds from the hexane extract of cf. <i>Aglaia erythrosperma</i> seeds103	103
12 Isolation of compounds from the CHCl ₃ extract of cf. <i>Aglaia erythrosperma</i> seeds104	104
13 Isolation of compounds from the MeOH extract of cf. <i>Aglaia erythrosperma</i> seeds105	105

LIST OF ABBREVIATIONS AND SYMBOLS

$[\alpha]^{25}_D$	=	Specific rotation at 25° and sodium D line (589 nm)
<i>br s</i>	=	Broad singlet (for NMR spectra)
BSA	=	Bovine serum albumin
BuOH	=	Butanol
<i>c</i>	=	Concentration
°C	=	Degree Celsius
calcd	=	Calculated
CDCl ₃	=	Deuterated chloroform
<i>cf.</i>	=	Compare or consult
CFU	=	Colony forming unit
CHCl ₃	=	Chloroform
CH ₂ Cl ₂	=	Dichloromethane
CD ₃ OD	=	Deuterated methanol
cm	=	Centimetre
cm ⁻¹	=	Reciprocal centimeter (unit of wave number)
¹³ C NMR	=	Carbon-13 Nuclear Magnetic Resonance
2D NMR	=	Two dimensional Nuclear Magnetic Resonance
<i>d</i>	=	Doublet (for NMR spectra)
<i>dd</i>	=	Doublet of doublets (for NMR spectra)
<i>ddd</i>	=	Doublet of doublets of doublets (for NMR spectra)
DEPT	=	Distortionless Enhancement by Polarization Transfer
DMSO	=	Dimethyl sulfoxide
DMSO- <i>d</i> ₆	=	Deuterated dimethyl sulfoxide
δ	=	Chemical shift
ED ₅₀	=	Median effective dose
EIMS	=	Electron Impact Mass Spectrometry
ESIMS	=	Electrospray Ionization Mass Spectrometry
ESITOFMS	=	Electrospray Ionization Time of Flight Mass Spectrometry
EtOAc	=	Ethyl acetate
<i>em.</i>	=	emission
<i>ex aff.</i>	=	of affinity
<i>ex.</i>	=	excitation

LIST OF ABBREVIATIONS AND SYMBOLS (continued)

g	=	Gram
hr	=	Hour
^1H NMR	=	Proton Nuclear Magnetic Resonance
^1H - ^1H COSY	=	Homonuclear (Proton-Proton) Correlation Spectroscopy
HMBC	=	^1H -detected Heteronuclear Multiple Bond Coherence
HMQC	=	^1H -detected Heteronuclear Multiple Quantum Coherence
H_2O	=	Water
HREIMS	=	High Resolution Electron Impact Mass Spectrometry
HRESIMS	=	High Resolution Electrospray Ionization Mass Spectrometry
HSQC	=	Heteronuclear Single Quantum Correlation
Hz	=	Hertz
IC_{50}	=	Median Inhibitory Concentration
IR	=	Infrared Spectrum
J	=	Coupling constant
KBr	=	Potassium bromide
Kg	=	Kilogram
L	=	Liter
μg	=	Microgram
μCi	=	MicroCurie
μl	=	Microliter
μM	=	Micromolar
λ_{max}	=	Wavelength at maximal absorption
ϵ	=	Molar absorptivity
$[\text{M}]^+$	=	Molecular ion
m	=	Metre
m	=	Multiplet (for NMR spectra)
$[\text{M}+\text{H}]^+$	=	Protonated molecular ion
MeOH	=	Methanol
mg	=	Milligram
MHz	=	Megahertz
MIC	=	Minimum inhibitory concentration
min	=	Minute

LIST OF ABBREVIATIONS AND SYMBOLS (continued)

ml	=	Milliliter
mM	=	Millimolar
mm	=	Millimeter
mp	=	Melting point
MS	=	Mass Spectrometry
MW	=	Molecular weight
m/z	=	Mass to charge ratio
NaCl	=	Sodium chloride
nm	=	Nanometer
NMR	=	Nuclear Magnetic Resonance
NOESY	=	Nuclear Overhauser Enhancement Spectroscopy
OD	=	Optical Density
PBS	=	Phosphate Buffer Saline
ppm	=	Part-per-million
q	=	Quartet (for NMR spectra)
s	=	Singlet (for NMR spectra)
ν_{\max}	=	Wave number at maximal absorption
rpm	=	round per minute
spp.	=	Species
TFA	=	Trifluoroacetic acid
t	=	Triplet (for NMR spectrum)
tdd	=	Triplet of doublet of doublets (for NMR spectrum)
THF	=	Tetrahydrofuran
TLC	=	Thin Layer Chromatography
UV	=	Ultraviolet