

157

สารคดีจากเปลือกต้น ชะเอมป่า

นาย ศิริโชค พ. จันพิญล

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเอกศาสตรมหาบัณฑิต

ภาควิชาเกษตรเวท

บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

ปีการศึกษา 2539

ISBN 974-636-738-2

ลิขสิทธิ์ของบัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

CHEMICAL CONSTITUENTS FROM THE BARK
OF *ALBIZIA MYRIOPHYLLA* BENTH.

Mr. Sirichok P. Janupiboon

The Thesis Submitted in Partial Fulfillment of Requirements
for the Degree of Master of Science in Pharmacy

Department of Pharmacognosy

Graduate School

Chulalongkorn University

Academic Year 1996

ISBN 974-636-738-2

Thesis Title CHEMICAL CONSTITUENTS FROM THE BARK OF
ALBIZIA MYRIOPHYLLA BENTH.
By Mr. Sirichok Pjanupiboon
Department Pharmacognosy
Thesis Advisor Mr. Chaiyo Chaichantipyuth, M.Sc. in Pharm.

Accepted by Graduate School, Chulalongkorn University, in partial
fulfillment of the requirement for the Master's degree.

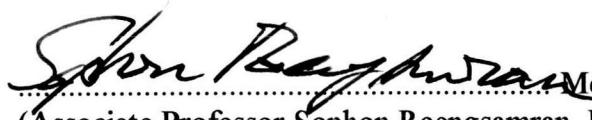

.....
(Professor Supawat Chutivongse, M.D.)

Dean of graduate School

Thesis Committee :


.....
(Associate Professor Kalaya Pharadai, M.Eng.)


.....
(Associate Professor Chaiyo Chaichantipyuth, M.Sc.)


.....
(Associate Professor Sophon Roengsamran, Ph.D.)


.....
(Associate Professor Surattana Amnuopol, M.Sc. in Pharm.)

พิมพ์ด้นฉบับบันทึกด้วยอวัยวะนินพเน็ตภายในกรอบสีเขียวที่พิมพ์บนเดียว

ศรีโชค พ. จันพิญล : สารเคมีจากเปลือกต้นชะเอมป่า (CHEMICAL CONSTITUENTS FROM THE BARK OF *ALBIZIA MYRIOPHYLLA* BENTH.). อ. ที่ปรึกษา : รศ. ชัยโย ชัยชาญพิพุทธ, 104 หน้า. ISBN 974-636-738-2

โดยการใช้วิธีทาง Column Chromatography สามารถแยก spermidine alkaloid ได้ 2 ชนิด และ triterpenoid อีก 1 ชนิด จากเปลือกต้นชะเอมป่า ได้ทำการศึกษาคุณสมบัติทางกายและเคมีของ alkaloid พบว่า เป็น palustrine และ albizzine A และ triterpenoid ที่ได้มีชื่อว่า triptotripterpenoidallactone A

ภาควิชา เภสัชเวท
สาขาวิชา เภสัชเวท
ปีการศึกษา 2539

ลายมือชื่อนิสิต *AI LI*
ลายมือชื่ออาจารย์ที่ปรึกษา *ดร. ชัยชาญพิพุทธ*
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม

ผู้มีสิทธิ์อ่านได้ทั้งหมดที่เขียนไว้ในนี้เป็นสิ่งเดียวที่สามารถอ่านได้

C675448 : MAJOR PHARMACOGNOSY

KEY WORD: CHEMICAL CONSTITUENT/ *ALBIZIA MYRIOPHYLLA* BENTH./ BARK.

SIRICHOK P. JANUPIBOON : CHEMICAL CONSTITUENTS FROM THE BARK OF *ALBIZIA MYRIOPHYLLA* BENTH. THESIS ADVISOR : ASSOC. PROF. CHAIYO CHAICHANTIPYUTH, M.Sc. in PHARM., 104 pp. ISBN 974-636-738-2

By means of column chromatography, two spermidine alkaloid and triterpenoid were isolated from the barks of *Albizia myriophylla* Benth. (Mimosaceae). The physical and chemical properties have shown that the alkaloid are Palustrine and albizzine A, triterpenoid is triptotripterpenoidallactone A.

ภาควิชา..... เภสัชเวท

ลายมือชื่อนักศึกษา..... *AA L7*

สาขาวิชา..... เภสัชเวท

ลายมือชื่ออาจารย์ที่ปรึกษา..... *ดร.พญ. ชัยโยธิน พุฒิ*

ปีการศึกษา..... 2539

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

ACKNOWLEDGMENTS

The author is deeply indebted and grateful to his advisor, Associate Professor Chaiyo Chaichantipyuth of the Department of Pharmacognosy, Faculty of Pharmaceutical Sciences, Chulalongkorn University, for his guidance, useful suggestion, continual interest and encouragements throughout the course of this study.

The author would like to acknowledge his sincere gratefulness to Assistant Professor Dr. Amorn Petsom, Department of Chemistry, Faculty of Sciences, Chulalongkorn University , for his kindness in recording the mass spectrum, and Associate Professor Dr. Sophon Roengsumran, Department of Chemistry, Faculty of Sciences, Chulalongkorn University, for his suggestion to the interpretation of spectrum.

The author would like to express his appreciation and thanks to all the staff members of the Departments of Pharmacognosy and Department of Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University, for their kindness and helps.

Finally, the author's grateful thanks are also due to Graduate School, Chulalongkorn University, for granting partial financial support (eight thousand Baht) to fulfill this work.

CONTENTS

	Page
ABSTRACT (Thai).....	iv
ABSTRACT (English).....	v
ACKNOWLEDGEMENTS.....	vi
CONTENTS.....	vii
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
ABBREVIATIONS.....	xi
CHAPTER	
I INTRODUCTION.....	1
II HISTORICAL	
Occurrence of Chemical Compounds in Species of Albizia.....	6
Spermidine and Related Alkaloids.....	29
Chemical Nature of Spermidine and Related Alkaloids.....	29
Biosynthesis.....	32
1. Biosynthesis of Spermidine and Spermine in Microorganisms.....	32
2. Biosynthesis of Spermidine and Spermine in Animals.....	32
3. Biosynthesis of Spermidine and Spermine in Plants.....	33
Alkaloid Biosynthesis.....	34
Biological Effects.....	36
Palustrine.....	37
1. Introduction.....	37

	Page
2. The Chemistry of Palustrine.....	38
3. Chemical Synthesis of Palustrine.....	39
Occurrence of the Polyamines in Natural Materials.....	43
1. The Polyamines in Microorganisms.....	43
2. The Polyamines in Animal Tissue.....	43
3. The Polyamines in Plants.....	44
Triterpenoides.....	49
1. Chemistry of triterpenoids.....	49
2. Classification of triterpenoids.....	49
3. Biosynthesis of Pentacyclic triterpenes.....	57
III EXPERIMENTAL.....	60
1. Source and Authentication of Plant materials.....	60
2. General Techniques.....	60
3. Extraction.....	62
4. Isolation.....	63
5. Characterization of the Isolated Compounds.....	64
IV DISCUSSION.....	66
1. Structure Elucidation of AM-1.....	66
2. Structure Elucidation of AM-3.....	68
3. Structure Elucidation of TS-1.....	69
V CONCLUSION.....	72
REFERENCES.....	73
APPENDIX.....	86
VITA.....	104

LIST OF TABLES

Table		Page
1.	^1H -NMR Chemical shift (δ) ppm of AM-1.....	67
2.	^{13}C -NMR Chemical shift (δ) ppm of TS-1.....	70

LIST OF FIGURES

Figure	Page
1. Related alkaloids of spermidine.....	31
2. Biosynthesis pathway of polyamines, spermidine and spermine.....	35
3. Derivative of Palustrine.....	39
4. Chemical synthesis of palustrine.....	42
5. Squalene Biosynthesis.....	58
6. Biosynthesis pathway of the amyrins (α - amyrrin 137, β -amyrrin 135).....	59
7. Fragmentation of Palustrine.....	67
8. <i>Albizia myriophylla</i> Benth. (﴿﴿﴾)	87
9. Thin layer chromatogram of crude extracts.....	88
10. FAB mass spectrum of AM-1.....	89
11. Proton nuclear magnetic resonance spectrum of AM-1 (CDCl ₃).....	90
12 Expansion of proton nuclear magnetic resonance of AM-1.....	91
13. FAB mass spectrum of AM-3.....	92
14. Proton nuclear magnetic resonance spectrum of AM-3 (CDCl ₃).....	93
15. Expansion of proton nuclear magnetic resonance of AM-3.....	94
16. FAB mass spectrum of TS-1.....	95
17. Proton nuclear magnetic resonance spectrum of TS-1	96
18. Expansion of proton nuclear magnetic resonance of TS-1.....	97
19. Expansion of proton nuclear magnetic resonance of TS-1.....	98
20. Carbon-13 nuclear magnetic resonance spectrum of TS-1 in deuterated chloroform and 10% deuterated methanol.....	99
21. Expansion of carbon-13 nuclear magnetic resonance of TS-1.....	100
22. The DEPT spectra of TS-1.....	101
23. Expansion of DEPT spctra of TS-1.....	102
24. Expansion of DEPT spctra of TS-1.....	103

ABBREVIATIONS

br d	=	Broad doublet (for NMR spectra)
br s	=	Broad singlet (for NMR spectra)
br t	=	Broad triplet (for NMR spectra)
° C	=	Degree Celsius
cm	=	Centimeter
¹³ C-NMR	=	Carbon-13 nuclear magnetic resonance
COSY	=	Correlated Spectroscopy
1D	=	One dimensional
2D	=	Two dimensional
DEPT	=	Distortionless Enhancement by Polarization Transfer
d	=	Doublet (for NMR spectra)
dd	=	Doublet of doublets (for NMR spectra)
δ	=	Chemical shift
eV	=	Electron volt
g	=	Gram
¹ H-NMR	=	Proton nuclear magnetic resonance
Hz	=	Hertz
IC50	=	50% Inhibition concentration
J	=	Coupling constant
Kg	=	Kilogram
M+	=	Molecular ion
m	=	multiplet (for NMR spectra)
MeOH	=	Methanol
mg	=	Milligram

MHz	=	Megahertz
ml	=	Milliliter
mm	=	Millimeter
μm	=	Micrometer
<i>m/z</i>	=	Mass to charge ratio
MS	=	Mass spectroscopy
NMR	=	Nuclear magnetic resonance spectrum
No.	=	Number
nm	=	Nanometer
s	=	Singlet (for NMR spectra)
spp.	=	Species
t	=	Triplet (for NMR spectra)
TLC	=	Thin layer chromatography
TMS	=	Tetramethylsilane