

องค์ประกอบทางเคมีของส่วนสกัดจากลำต้นชั้นทองพยาบาท
(*Gelonium multiflorum* A.Juss.) และฤทธิ์ทางชีวภาพ



นางสาววีชรารัตน์ ทองไทย

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CHEMICAL CONSTITUENTS OF STEM EXTRACTS FROM
Gelonium multiflorum A.Juss.
AND THEIR BIOLOGICAL ACTIVITIES

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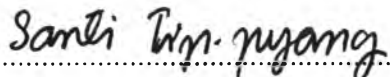
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การค้นพบสารเคมีจากพืชในธรรมชาติที่มีฤทธิ์ทางชีวภาพ

วิทยานิพนธ์ ไทย: องค์ประกอบทางเคมีของส่วนสกัดจากลำต้นชั้นทองพยับบาท (*Gelonium multiflorum* A.Juss.) และฤทธิ์ทางชีวภาพ (CHEMICAL CONSTITUENTS OF STEM EXTRACTS FROM *Gelonium multiflorum* A.Juss. AND THEIR BIOLOGICAL ACTIVITIES) อ. ที่ปรึกษา : อ. ดร. สันติ ทิพยางค์ , 107 หน้า. ISBN 974-332-962-5.

การศึกษาองค์ประกอบทางเคมีของส่วนสกัดที่มีฤทธิ์ทางชีวภาพ (ไดคลอโรมีเทน และเอทิลอะซิเตด) จากลำต้นชั้นทองพยับบาท (*Gelonium multiflorum* A.Juss.) สามารถแยกได้สารผสม 4 ชนิด และสารบริสุทธิ์ 8 ชนิด โดยข้อมูลทางสเปกโตรสโคปี และการทำปฏิกิริยาเคมี ทำให้พิสูจน์สูตรโครงสร้างของสารทั้งหมด ได้แก่ สารผสมแอลกอฮอล์โดยตรงอิมตัว, สารผสมกรดคาร์บอกซิลิกโดยตรง, สารผสมไตรเทอร์ปีนอยด์ 3 ชนิด (α -amyrin, bauerenol และ multiflorenol) สารผสมเอสเตอร์โดยตรง, stigmasterol, ไตรเทอร์ปีนอยด์ 1, 3-methoxy-4-propylbenzaldehyde, 5-hydroxymethyl furfuraldehyde, scopoletin, helioscopinolide A, helioscopinolide E และ helioscopinolide M ซึ่งสารที่พบส่วนใหญ่ยังไม่เคยมีรายงานว่าพบจากลำต้นชั้นทองพยับบาท โดยเฉพาะสารชนิดสุดท้าย helioscopinolide M เป็นสารใหม่

ผลการทดสอบฤทธิ์ทางชีวภาพ ของลำต้นชั้นทองพยับบาท พบว่า ไตรเทอร์ปีนอยด์ 1, 5-hydroxymethyl furfuraldehyde และ scopoletin แสดงความเป็นพิษต่อไบรน์ซิมพ์ (*Artemia salina* Linn.) ด้วยค่า LC_{50} 38.33, 39.28 และ 13.31 ไมโครกรัมต่อมิลลิลิตรตามลำดับ สำหรับ scopoletin ยังมีฤทธิ์เป็น antioxidant ด้วย

ภาควิชา เคมี
สาขาวิชา เคมี
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ลายมือชื่อนิติ วิทยานิพนธ์ ไทย
ลายมือชื่ออาจารย์ที่ปรึกษา สันติ ทิพยางค์
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VATCHARAPORN THONGTHAI : CHEMICAL CONSTITUENTS OF STEM EXTRACTS FROM *Gelonium multiflorum* A.Juss. AND THEIR BIOLOGICAL ACTIVITIES. THESIS ADVISOR: SANTI TIP-PYANG, Ph.D., 107 pp. ISBN. 974-332-962-5.

The chemical investigation of the stems of *Gelonium multiflorum* A.Juss. for biologically active constituent had led to the isolation of four mixtures and eight compounds. Their structures have been elucidated from spectroscopic data and chemical reactions. They were a mixture of saturated long chain alcohols, a mixture of long chain carboxylic acids, a mixture of three triterpenoids (α -amyrin, bauerenol and multiflorenol), a mixture of long chain esters, stigmasterol, triterpenoid I, 3-methoxy-4-propylbenzaldehyde, 5-hydroxymethyl furfuraldehyde, scopoletin, helioscopinolide A, helioscopinolide E and helioscopinolide M. The last compound was a new compound.

The biological activities tests indicated that triterpenoid I, 5-hydroxymethyl furfuraldehyde and scopoletin showed the moderate cytotoxicity against brine shrimp (*Artemia salina* Linn.) with LC_{50} 38.33, 39.28 and 13.31 $\mu\text{g/ml}$, respectively. In addition, scopoletin also showed significant antioxidant activity.

ภาควิชา.....

สาขาวิชา.....

ปีการศึกษา.....

ลายมือชื่อนิติ.....

ลายมือชื่ออาจารย์ที่ปรึกษา.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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CONTENTS

	Pages
Abstract in Thai	iv
Abstract in English	v
Acknowledgment	vi
List of Figures	ix
List of Schemes	xi
List of Tables	xii
List of Abbreviations	xiii
CHAPTER	
1. INTRODUCTION	1
1.1 Pharmacological Activities of <i>G. multiflorum</i>	3
1.2 Chemical Constituents of <i>G. multiflorum</i>	4
1.3 Botanical Aspect and Distribution	5
2. EXPERIMENT	
2.1 Plant material	11
2.2 Equipments	11
2.3 Chemical Reagents	12
2.4 Bioassay Procedures	13
2.4.1 A Microwell Cytotoxicity Assay using Brine shrimp	13
2.4.2 The Inhibitory Effect for Tumor Cell lines	14
2.4.3 Antioxidant Test	14
2.4.3A TLC autographic assay	14
2.4.3B O ₂ Scavenging Test	15
2.5 Extraction	15
2.6 Separation and Purification	16

3. RESULT AND DISCUSSION	
3.1 Primary Bioassay Screening Results of Crude Extracts	19
3.1.1 A Microwell Cytotoxicity Assay using Brine Shrimp	19
3.1.2 Anticell Lines Test Result	19
3.1.3 Antioxidant Test Result	22
3.2 Properties and Structural Elucidation of Isolated Mixtures and Compounds	24
3.2.1 Mixture A	24
3.2.2 Mixture B	26
3.2.3 Mixture C	28
3.2.4 Mixture D	36
3.2.5 Compound 1	38
3.2.6 Compound 2	44
3.2.7 Compound 3	50
3.2.8 Compound 4	62
3.2.9 Compound 5	67
3.2.10 Compound 6	74
3.2.11 Compound 7	80
3.2.12 Compound 8	85
3.3 The Result of Biological Activities of Isolated Compounds	94
3.3.1 Microwell Cytotoxicity Test Result of Isolated Compound	94
3.3.2 Antioxidant Result of Isolated Compounds	95
3.3.3 Biological Activity Studies of Isolated Compound	96
4. CONCLUSION	98
Proposal for the Future work	100
REFERENCES	101
VITA	107

List of Figures

Figures	Pages
1.1 The skeleton of some diterpenoids.....	2
1.2 Flowers, fruits and leaves of <i>Gelonium multiflorum</i> A. Juss.....	6
1.3 Compounds from <i>Gelonium multiflorum</i>	8
3.1 The IR spectrum of Mixture A	25
3.2 The IR spectrum of Mixture B	27
3.3 Structure of three compounds in Mixture C	28
3.4 The IR spectrum of Mixture C	29
3.5 The GC chromatograms of Mixture C	29
3.5a The Mass spectrum of Mixture C-1: α - Amyrin.....	30
3.5b The Mass spectrum of Mixture C-2: Multiflorenol.....	32
3.5c The Mass spectrum of Mixture C-3: Bauerenol.....	34
3.6 The IR spectrum of Mixture D	37
3.7 The IR spectrum of Compound 1	41
3.8 The GC chromatograms of three standard steroids.....	41
3.9 The GC chromatogram of Compound 1.....	42
3.10 The ^1H NMR spectrum of Compound 1.....	42
3.11 The ^{13}C NMR spectrum of Compound 1.....	43
3.12 The DEPT 90 and 135 spectra of Compound 1	43
3.13 The Mass spectrum of Compound 2.....	46
3.14 The ^1H NMR spectrum of Compound 2.....	47
3.15 The ^{13}C NMR spectrum of Compound 2.....	48
3.16 The DEPT 90 and 135 spectra of Compound 2.....	49
3.17 Carbon assignments of Compound 3	52
3.18 Long range ^1H - ^{13}C coupling as detected in HMBC spectra.....	53
3.19 The ^1H NMR spectrum of Compound 3.....	53
3.20 The ^{13}C NMR spectrum of Compound 3.....	54
3.21 The DEPT 90 and 135 spectra of Compound 3	55
3.22 The Mass spectrum of Compound 3	56
3.23 The HMQC spectrum of Compound 3	57

	Pages
3.24 The HMBC spectrum of Compound 3	57
3.25 The expanded HMQC spectra of Compound 3	58
3.26 The expanded HMBC spectra of Compound 3	60
3.27 The ^1H NMR spectrum of Compound 4	63
3.28 The ^{13}C NMR spectrum of Compound 4	64
3.29 The DEPT 90 and 135 spectra of Compound 4	65
3.30 The Mass spectrum of Compound 4	66
3.31 The IR spectrum of Compound 5	69
3.32 The Mass spectrum of Compound 5	70
3.33 The ^1H NMR spectrum of Compound 5	71
3.34 The ^{13}C NMR spectrum of Compound 5	72
3.35 The DEPT 90 and 135 spectra of Compound 5	73
3.36 The ^1H NMR spectrum of Compound 6	76
3.37 The ^{13}C NMR spectrum of Compound 6	77
3.38 The DEPT 90 and 135 spectra of Compound 6	78
3.39 The Mass spectrum of Compound 6	79
3.40 The IR spectrum of Compound 7	81
3.41 The ^1H NMR spectrum of Compound 7	82
3.42 The Expansion of ^1H NMR spectra of Compound 7	82
3.43 The ^{13}C NMR spectrum of Compound 7	83
3.44 The DEPT 90 and 135 spectra of Compound 7	84
3.45 The IR spectrum of Compound 8	88
3.46 The Mass spectrum of Compound 8	89
3.47 The ^1H NMR spectrum of Compound 8	90
3.48 The ^{13}C NMR spectrum of Compound 8	91
3.49 The DEPT 90 and 135 spectra of Compound 8	92
3.50 NOE Difference spectra of Compound 8	93

List of Schemes

Schemes	Page
2.1 The Extraction procedure of the stems from <i>G.multiflorum</i>	16
2.2 Isolation procedure of the Dichloromethane crude extract.....	17
2.3 Isolation procedure of the Ethyl acetate crude extract.....	18
3.1 The Mass fragmentation pattern of α - Amyrin	31
3.2 The Mass fragmentation pattern of Multiflorenol.....	33
3.3 The Mass fragmentation pattern of Bauerenol	35

List of Tables

Tables	Pages
1.1 Chemical constituents of <i>Gelonium multiflorum</i>	7
3.1 Brine Shrimp Cytotoxicity Lethality Test of various crude extracts.....	19
3.2 The Result of Anticell lines of total (methanolic) crude extract	20
3.3 The Result of Anticell lines of Dichloromethane crude extract.....	20
3.4 The Result of Anticell lines of Ethyl acetate crude extract.....	21
3.5 The Result of Anticell lines of Methanolic crude extract.....	21
3.6 Summary the results of Anticell lines of various crude extracts.....	22
3.7 Antioxidant result from TLC autographic assay of various crude extracts...	22
3.8 Antioxidant result from O ₂ scavenging test of various crude extracts.....	23
3.9 The IR absorption band assignments of Mixture B.....	26
3.10 The IR absorption band assignments of Mixture D.....	36
3.11 The IR absorption band assignments of Compound 1.....	38
3.12 Retention times of Compound 1 and Standard steroids.....	39
3.13 The Carbon chemical shifts of Stigmasterol and Compound 1	40
3.14 The Carbon chemical shifts of Taraxerol and Compound 2	45
3.15 The Carbon chemical shifts of Jolkinolide E and Compound 3	51
3.16 Carbon and attached proton determined by one bond correlation in HMQC spectra of Compound 3	53
3.17 The Carbon chemical shifts of Helioscopinolide E and Compound 5	68
3.18 The Carbon chemical shifts of Helioscopinolide A and Compound 6	75
3.19 The Result of Brine Shrimp Cytotoxicity Lethality Test of Isolated Compounds.....	94
3.20 The Result of Antioxidant Test of Isolated Compounds.....	95

List of Abbreviations

° C	=	degree celsius
cm ⁻¹	=	reciprocal centimeter
¹³ C NMR	=	Carbon 13 Nuclear magnetic resonance
CC, Silica gel	=	column chromatography using silica gel as absorbent
COSY	=	two-dimensional ¹ H correlation spectroscopy
Cont.	=	continuous
Ara	=	α-L- arabinose
Ac	=	acetyl
d	=	doublet
dd	=	double of doublet (NMR)
DEPT	=	distortionless enhancement by polarization transfer
FT	=	Fourier transform
g	=	gram
GC-MS	=	gas chromatography mass spectroscopy
GLC	=	gas liquid chromatography
Glc	=	β-D-glucose
¹ H NMR	=	proton nuclear magnetic resonance
HMBC	=	Heteronuclear multiple bond connectivity by 2D multiple quantum nuclear magnetic resonance
HMQC	=	¹ H-detected heteronuclear multiple-quantum coherence via direct coupling
Hz	=	hertz
IR	=	Infrared
<i>J</i>	=	coupling constant
Kg	=	kilogram
M.W.	=	molecular weight
M ⁺	=	molecular ion
m	=	multiplet
m/z	=	mass per charge

mg	=	milligram
ml	=	milliliter
m.p.	=	melting point
NOE	=	nuclear overhauser effect
nm	=	nanometer
No.	=	number
LC ₅₀	=	concentration caused 50% lethality
ppm	=	part per million
PTLC	=	preparative thin layer chromatography
q	=	quartet
quint	=	quintet
Rha	=	α -L-rhamnose (6-deoxymannose)
R _f	=	retardation factor
R _t	=	retention time
s	=	singlet
TLC	=	thin layer chromatography
UV	=	ultraviolet spectroscopy
wt/wt	=	weight by weight
Xyl	=	β -D-xylose
δ	=	chemical shift
μ g	=	microgram
μ l	=	microliter