สารที่มีฤทธิ์ทางชีวภาพจากเปลือกต้นตูมกาแดง

นายอุทัย โสธนะพันธุ์

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BIOACTIVE COMPOUNDS FROM *Glyptopetalum sclerocarpum* STEM BARK

Mr. Uthai Sotanaphun

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By	Mr. Uthai Sotanaphun
Program	Pharmaceutical Chemistry and Natural Products
Thesis Advisor	Associate Professor Rapepol Bavovada, Ph.D.
Thesis Co-advisor	Associate Professor Vimolmas Lipipun, Ph.D.
	Rutt Suttisri, Ph.D.

Accepted by the Graduate School, Chulalongkorn University in Partial Fulfillment of the Requirements for the Doctoral Degree.

..... Dean of Graduate School
(Professor Supawat Chutivongse, M.D.)

Thesis Committee

..... Chairman
(Khanit Suwanborirux, Ph.D.)

..... Thesis Advisor
(Associate Professor Rapepol Bavovada, Ph.D.)

..... Thesis Co-advisor
(Associate Professor Vimolmas Lipipun, Ph.D.)

..... Thesis Co-advisor
(Rutt Suttisri, Ph.D.)

..... Member
(Associate Professor Somchai Pengprecha, Ph.D.)

พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสีเขียวนี้เพียงแผ่นเดียว

อุทัย โสธนะพันธุ์ : สารที่มีฤทธิ์ทางชีวภาพจากเปลือกต้นตูมกาแดง (BIOACTIVE COMPOUNDS FROM *Glyptopetalum sclerocarpum* STEM BARK) อ. ที่ปรึกษา : รศ. ดร. รพีพล ภโววาท, อ. ที่ปรึกษาร่วม : รศ. ดร. วิมลมาศ ลิปิพันธ์, อ. ดร. รุทธ์ สุทธิศรี, 291 หน้า. ISBN 974-636-768-4.

จากการสกัดแยกสารจากเปลือกต้นตูมกาแดง (*Glyptopetalum sclerocarpum* Laws.) ได้พบสารจำพวก quinone-methide triterpenes ชนิดใหม่ 9 ชนิด คือ 20-hydroxy-tingenone, 20,22β-dihydroxy-tingenone, 20,22β-dihydroxy-20-epi-tingenone, 20-hydroxy-22-oxo-tingenone, 20-hydroxy-22-oxo-20-epi-tingenone, 20,21α-dihydroxy-22-oxo-21-desoxotingenone, 21α-hydroxy-20,22-dioxo-30(20→21)*abeo*-21-desoxo-tingenone, 20-oxo-20,21-*seco*-tingen-21-oic acid และ 20-oxo-21-nor-20,21-*seco*-tingen-22-al นอกจากนั้นพบสารที่เคยมีรายงานแล้ว 3 ชนิด คือ tingenone, 22β-hydroxy-tingenone และ 20-hydroxy-20-epi-tingenone การพิสูจน์โครงสร้างทางเคมีของสารเหล่านี้ใช้การวิเคราะห์ข้อมูลทางสเปกโตรสโคปีอย่างละเอียด สารทั้งหมดแสดงความเป็นพิษต่อ brine shrimp และแสดงฤทธิ์ต้านเชื้อแบคทีเรียแกรมบวก และเชื้อรา หมู่ฟังชั่นบนโครงสร้างในส่วนของ ring E และความชอบในการละลายในไขมันของสาร มีอิทธิพลต่อฤทธิ์เหล่านี้ โครงสร้างของ tingenone, 22β-hydroxy-tingenone และ 20-hydroxy-20-epi-tingenone จะเปลี่ยนแปลงอย่างรวดเร็วในสภาวะที่เป็นกรด กลายเป็น isotingenone III, 20β-hydroxy-isotingenone III และ 20-hydroxy-20-epi-isotingenone III ตามลำดับ ซึ่งทำให้ความเป็นพิษต่อ brine shrimp ลดลง และสูญเสียฤทธิ์ต้านเชื้อจุลชีพ

ภาควิชา .....

สาขาวิชา เภสัชเคมีและผลิตภัณฑ์ธรรมชาติ.....

ปีการศึกษา ...2539.....

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From the stem bark of *Glyptopetalum sclerocarpum* Laws., nine new quinone-methide triterpenes, 20-hydroxy-tingenone, 20,22β-dihydroxy-tingenone, 20,22β-dihydroxy-20-epi-tingenone, 20-hydroxy-22-oxo-tingenone, 20-hydroxy-22-oxo-20-epi-tingenone, 20,21α-dihydroxy-22-oxo-21-desoxotingenone, 21α-hydroxy-20,22-dioxo-30(20→21)*abeo*-21-desoxo-tingenone, 20-oxo-20,21-*seco*-tingen-21-oic acid and 20-oxo-21-nor-20,21-*seco*-tingen-22-al, were isolated together with three known compounds, tingenone, 22β-hydroxy-tingenone and 20-hydroxy-20-epi-tingenone. Elucidation of their structures was based on detailed spectroscopic examination. All compounds were toxic to brine shrimp and exhibited antimicrobial activities against gram-positive bacteria and fungi. These activities were influenced by functional groups on ring E of their pentacyclic triterpene structure and their lipophilic nature. Tingenone, 22β-hydroxy-tingenone and 20-hydroxy-20-epi-tingenone rapidly rearranged under acid condition to isotingenone III, 20β-hydroxy-isotingenone III and 20-hydroxy-20-epi-isotingenone III, respectively. These acid-rearranged compounds were less toxic to brine shrimp and lost their antimicrobial activities.

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สาขาวิชา เภสัชเคมีและผลิตภัณฑ์ธรรมชาติ ลายมือชื่ออาจารย์ที่ปรึกษา .....

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ABBREVIATIONS

br	= broad (for NMR spectra)
BSL	= brine-shrimp lethality
c	= concentration (g/100 ml)
°C	= degree Celsius
cc	= column chromatography
CCl_4	= carbon tetrachloride
$CDCl_3$	= deuterochloroform
$CHCl_3$	= chloroform
cm	= cetrimeter
^{13}C-NMR	= carbon-13 nuclear magnetic resonance
cosy	= correlation spectroscopy
d	= doublet (for NMR spectra)
dd	= doublet of doublet (for NMR spectra)
ddd	= doublet of doublet of doublet (for NMR spectra)
ddq	= doublet of doublet of quartet (for NMR spectra)
DEPT	= distortionless enhancement by polarization transfer
DMSO	= dimethyl sulfoxide
dt	= doublet of triplet (for NMR spectra)
EIMS	= electron impact mass spectrum
Et_2O	= diethyl ether
EtOAc	= ethyl acetate
EtOH	= ethanol
eV	= electron volt
fc	= flash chromatography
g	= gram
HCl	= hydrochloric acid
HMBC	= proton detected heteronuclear multiple bond connectivity
HMQC	= proton detected heteronuclear multiple quantum coherence
^{1}H-NMR	= proton nuclear magnetic resonance

H_2SO_4 = sulfuric acid
Hz = hertz
IR = infrared
J = coupling constant
KBr = potassium bromide
kg = kilogram
LD_{50} = 50% lethal dose
m = multiplet (for NMR spectra)
$[M]^+$ = molecular ion
MeOH = methanol
MH = Muller Hinton
MHz = mega hertz
mg = miligram
MIC = minimum inhibitory concentration
ml = milliliter
mm = millimeter
MM = molecular machanic
MS = mass spectrum
m/z = mass per charge ratio
nm = nanometer
NMR = nuclear magnetic resonance
No. = number
NOE = nuclear overhauser effect
NOESY = nuclear overhauser effect spectroscopy
ppm = part per million
Rf = retardative factor, relative front
Rm = Martin-ralation
s = singlet (for NMR spectra)
S = Sabouraud dextrose
SAR = structure activity relationship
SiO_2 = silica gel
t = triplet (for NMR spectra)

td	= triplet of doublet (for NMR spectra)
TLC	= thin-layer chromatography
TMS	= tetramethylsilane
UV	= ultraviolet
v/v	= volume by volume
$[\alpha]_D$	= specific rotation at 589 nm
ε	= molr absorptivity
δ	= chemical shift
λ_{max}	= wavelength at maximum absoption
μg	= microgram
μl	= microliter
ν_{max}	= wavenumber at maximum absorption