

องค์ประกอบทางเคมีของเนื้อไม้จันทน์ชะมด *Mansonia gagei*
และฤทธิ์ทางชีวภาพ

นายอภิรักษ์ พันธุมชัย

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CHEMICAL CONSTITUENTS OF THE HEARTWOODS OF *Mansonia gagei* AND
THEIR BIOLOGICAL ACTIVITY

Mr. Apirak Puntumchai

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Science in Chemistry

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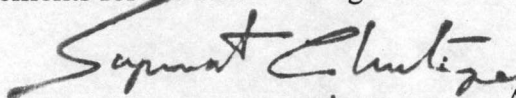
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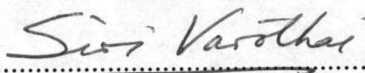
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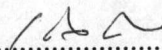


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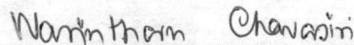
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อภิรักษ์ พันธุมชัย : องค์ประกอบทางเคมีของเนื้อไม้จันทน์ชะมด *Mansonia gagei* และ
 ฤทธิ์ทางชีวภาพ CHEMICAL CONSTITUENTS OF THE HEARTWOODS OF
Mansonia gagei AND THEIR BIOLOGICAL ACTIVITY

อาจารย์ที่ปรึกษา: ผู้ช่วยศาสตราจารย์ ดร. วรินทร์ ชวศิริ

ในการศึกษาครั้งนี้ สกัดเนื้อไม้จันทน์ชะมดที่แห้งและบดละเอียด ด้วยเฮกเซน ไดคลอ-
 โรมีเทน และ เมทานอล ตามลำดับ ผลการทดสอบฤทธิ์ทางชีวภาพเบื้องต้นพบว่า สิ่งสกัดเฮกเซน
 และไดคลอโรมีเทน แสดงฤทธิ์ทางชีวภาพ เมื่อทำการแยกสิ่งสกัดทั้งสองด้วยวิธีทางโครมา-
 โทกราฟี สามารถแยกสารได้ 10 ชนิด โดยอาศัยสมบัติทางกายภาพ ปฏิริยาเคมี และข้อมูลทาง
 สเปกโทรสโกปี สามารถพิสูจน์สูตรโครงสร้างของสารได้ 9 ชนิดคือ ของผสมเอสเทอร์ไฮดรอกซ์,
 3,8-dimethyl-5-isopropyl-6-methoxy coumarin, 2,3-dihydro-3,6,9-trimethyl naphtho[1,8-bc]
 pyran-7-oxa-8-one, 3,8-dimethyl-5-isopropyl-1,2-naphthoquinone (mansonone C), 3,8-dimethyl-
 5-isopropyl-6-hydroxy coumarin, ของผสมคีโตนไฮดรอกซ์, ของผสมของ β -sitosterol และ
 stigmasterol, 3,8-dimethyl-5-isopropyl-6-hydroxy-1,2-naphthalenedione (mansonone G), 2,3-
 dihydro-3,6,9-trimethyl-4-hydroxy-naphtho[1,8-bc]pyran-7,8-dione (mansonone H) สารที่แยกได้
 ทั้งหมดยังไม่เคยมีรายงานว่าเป็นองค์ประกอบในพืชสกุล *Mansonia* ยกเว้น mansonone C, G และ
 H นอกจากนี้ สารคูมารินที่แยกได้ทั้งสามชนิดพบว่าเป็นสารใหม่ที่เกิดขึ้นในธรรมชาติ
 mansonone C และ G แสดงความเป็นพิษต่อ brine shrimp (*Artemia salina* Linnaeus) ด้วยค่า LC_{50}
 8.20 และ 8.29 ภายในเวลา 12 ชั่วโมง ตามลำดับ นอกจากนี้พบว่า 3,8-dimethyl-5-isopropyl-6-
 methoxy coumarin แสดงความเป็นพิษที่น่าสนใจต่อเซลล์ *Hepatocellular carcinoma* (Bel-7402)

ภาควิชาเคมี.....

สาขาวิชาเคมี.....

ปีการศึกษา2540.....

ลายมือชื่อนิสิต อภิรักษ์ พันธุมชัย

ลายมือชื่ออาจารย์ที่ปรึกษา วรินทร์ ชวศิริ

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม -

APIRAK PUNTUMCHAI : CHEMICAL CONSTITUENTS OF THE
HEARTWOODS OF *Mansonia gagei* AND THEIR BIOLOGICAL
ACTIVITY

THESIS ADVISOR : ASST. PROF. WARINTHORN CHAVASIRI, Ph.D.

The dried and ground heartwoods of *Mansonia gagei* Drumm were successively extracted with hexane, dichloromethane and methanol, respectively. The preliminary bioassay tests indicated that the hexane and dichloromethane crude extracts were biologically active. The separation of both extracts by means of chromatography led to the isolation of ten substances. By means of physical properties, chemical reactions and spectroscopic data, the structures of nine substances were elucidated. They were found to be a mixture of long chain aliphatic esters, 3,8-dimethyl-5-isopropyl-6-methoxy coumarin, 2,3-dihydro-3,6,9-trimethyl naphtho[1,8-bc]pyran-7-oxa-8-one, 3,8-dimethyl-5-isopropyl-1,2-naphtho-quinone (mansonone C), 3,8-dimethyl-5-isopropyl-6-hydroxy coumarin, a mixture of long chain aliphatic ketones, a mixture of β -sitosterol and stigmasterol, 3,8-dimethyl-5-isopropyl-6-hydroxy-1,2-naphthalenedione (mansonone G), 2,3-dihydro-3,6,9-trimethyl-4-hydroxy-naphtho[1,8-bc]pyran-7,8-dione (mansonone H). Except for mansonones C, G and H, the other isolated substances have not been reported to be constituents of plants in *Mansonia* genus. Moreover, three isolated coumarins were found to be new naturally occurring compounds. Mansonones C and G exhibited cytotoxicity activity against brine shrimp (*Artemia salina* Linnaeus) with LC_{50} values of 8.20 and 8.29 at 12 hours, respectively. In addition, 3,8-dimethyl-5-isopropyl-6-methoxy coumarin displayed promising activity as a cytotoxic agent against *Hepatocellular carcinoma* (Bel-7402) cell line.

ภาควิชาเคมี.....
สาขาวิชาเคมี.....
ปีการศึกษา2540.....

ลายมือชื่อนิสิต อภิรักษ์ พัทธมชัย
ลายมือชื่ออาจารย์ที่ปรึกษา อ.พร. ๑๖๕๕
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม -
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List of Abbreviations

b	broad	cm ⁻¹	unit of wavelength
m	multiplet (NMR)	IR	infrared
m/e	mass to charge ratio	MS	mass spectrometry
d	doublet (NMR)	J	coupling constant
dd	doublet of doublet (NMR)	ppm	part per million
DMSO	dimethylsulfoxide	m.p.	melting point
MW	molecular weight	wt	weight
GLC	gas liquid chromatography	M ⁺	molecular ion
s	sharp (IR)	R _f	rate of flow in chromatogram
LC ₅₀	concentration that caused 50% lethality	δ	chemical shift
NMR	nuclear magnetic resonance	s	singlet (NMR)
t	triplet (NMR)		