

การเปลี่ยนแปลงโครงสร้างโดยกระบวนการทางชีวภาพ  
ของไดเทอริฟินอยด์ด้วยเชื้อรา *Absidia* sp.



นางสาวสมจินตนา ทวีพานิชย์

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BIOTRANSFORMATION OF DITERPENOIDs BY *Absidia sp.*

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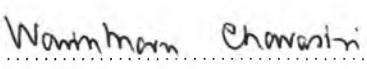
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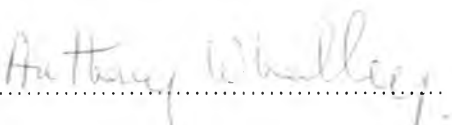
  
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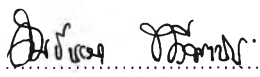

  
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สมจินตนา ทวีพานิชย์ : การเปลี่ยนแปลงโครงสร้างของสารไดเทอร์พีนอยด์โดยกระบวนการทางชีวภาพด้วยเชื้อรา *Absidia* sp. (BIOTRANSFORMATION OF DITERPENOIDS BY *Absidia* sp.) อ.ที่ปรึกษา: รศ. ดร. อมร เพชรสม : 200 หน้า. ISBN: 974-14-2354-3.

การเปลี่ยนโครงสร้างทางเคมีของสารคูเรโนไดเทอร์พีน (*ent*-kaur-16-en-19-oic acid, **1**) โดยอาศัย *Absidia blakesleeana* และ *Rhizopus oligosporus* พบว่า *A. blakesleeana* ให้ผลิตภัณฑ์สี่ชนิด คือ *ent*-(7 $\alpha$ ,9 $\alpha$ )-dihydroxy-kaur-16-en-19-oic acid (**1a**), *ent*-(7 $\alpha$ ,11 $\beta$ )-dihydroxy-kaur-16-en-19-oic acid (**1b**), *ent*-(1 $\beta$ ,7 $\alpha$ )-dihydroxy-kaur-16-en-19-oic acid (**1c**) และ *ent*-(7 $\alpha$ ,13)-dihydroxy-kaur-16-en-19-oic acid (**1d**) ซึ่งเป็นผลจากการเกิดปฏิกิริยาการเติมหมู่ไฮดรอกซิลสองกลุ่มในโครงสร้างหลักโดยผลิตภัณฑ์ 7 $\alpha$ ,9 $\alpha$ -diOH และ 1 $\beta$ ,7 $\alpha$ -diOH เป็นสารประกอบไดเทอร์พีนอยด์ชนิดใหม่ ส่วนการเปลี่ยนแปลงโครงสร้างด้วยเชื้อ *R. oligosporus* ได้ผลิตภัณฑ์ *ent*-7 $\alpha$ -hydroxy-kaur-16-en-19-oic acid (**1e**) และ **1a** อีกทั้งผลิตภัณฑ์ใหม่ *ent*-(9 $\alpha$ ,16 $\beta$ ,17)-trihydroxy-kaur-16-en-19-oic acid (**1f**) การเปลี่ยนโครงสร้างทางเคมีของสารแลบเดนไดเทอร์พีน (*ent*-1,2-dehydro-3-oxomanoyl oxide, **2**) โดยอาศัย *R. oligosporus*, *R. stolonifer* และ *Mucor plumbeus* พบว่า *R. oligosporus* และ *M. plumbeus* ให้ผลิตภัณฑ์ชนิดใหม่สองชนิด คือ, *ent*-11 $\alpha$ -hydroxy-1,2-dehydro-3-oxomanoyl oxide (**2a**) และ *ent*-(11 $\alpha$ ,14 $\xi$ ,15)-trihydroxy-1,2-dehydro-3-oxomanoyl oxide (**2b**) ขณะที่ *R. stolonifer* ได้ผลิตภัณฑ์ **2a** และผลิตภัณฑ์ใหม่คือ *ent*-11 $\alpha$ -hydroxy-3-oxomanoyl oxide (**2c**) โครงสร้างของสารประกอบเหล่านี้พิสูจน์เอกลักษณ์ได้โดยอาศัยเทคนิคทางสเปกโทรสโกปี และการวิเคราะห์โครงสร้างผลึกโมเลกุลสามมิติ

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Biotransformation of the kaurane diterpene (*ent*-kaur-16-en-19-oic acid, **1**) was carried out with *Absidia blakesleeana* and *Rhizopus oligosporus*. It was found that *A. blakesleeana* produced four metabolites, *ent*-(7 $\alpha$ ,9 $\alpha$ )-dihydroxy-kaur-16-en-19-oic acid (**1a**), *ent*-(7 $\alpha$ ,11 $\beta$ )-dihydroxy-kaur-16-en-19-oic acid (**1b**), *ent*-(1 $\beta$ ,7 $\alpha$ )-dihydroxy-kaur-16-en-19-oic acid (**1c**) and *ent*-(7 $\alpha$ ,13)-dihydroxy-kaur-16-en-19-oic acid (**1d**), which were the results of dihydroxylation, among which 7 $\alpha$ ,9 $\alpha$ -diOH and 1 $\beta$ ,7 $\alpha$ -diOH were characterized as new diterpenoids. The *ent*-7 $\alpha$ -hydroxy-kaur-16-en-19-oic acid (**1e**) and **1a**, including the new *ent*-(9 $\alpha$ ,16 $\beta$ ,17)-trihydroxy-kaur-16-en-19-oic acid (**1f**), were obtained with *R. oligosporus*. Biotransformation of the labdane diterpene (*ent*-1,2-dehydro-3-oxomanoyl oxide, **2**) was carried out using *R. oligosporus*, *R. stolonifer* and *Mucor plumbeus*. It was found that *R. oligosporus* and *M. plumbeus* yielded two new metabolites, *ent*-11 $\alpha$ -hydroxy-1,2-dehydro-3-oxomanoyl oxide (**2a**), *ent*-(11 $\alpha$ ,14 $\xi$ ,15)-trihydroxy-1,2-dehydro-3-oxomanoyl oxide (**2b**) while *R. stolonifer* gave **2a** and the new *ent*-11 $\alpha$ -hydroxy-3-oxomanoyl oxide (**2c**). The structures of these metabolites were established on the basis of spectroscopic techniques and X-ray crystallography.

Department.....Chemistry.... Student's signature.....

Field of study.....Chemistry... Advisor's signature.....

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Somjintana Taveepanich

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## LIST OF ABBREVIATIONS

$[\alpha]_D^{20}$	= specific rotation at 20 <sup>o</sup> and sodium D line (589 nm)
ATCC	= American Type Culture Collection, Maryland, U.S.A
br s	= broad singlet (for NMR spectral data)
°C	= degree Celsius
<sup>13</sup> C-NMR	= carbon-13 nuclear magnetic resonance
CDCl <sub>3</sub>	= deuterated chloroform
CHCl <sub>3</sub>	= chloroform
CD <sub>3</sub> OD	= deuterated methanol
cm	= centimeter
COSY	= <sup>1</sup> H- <sup>1</sup> H correlation spectroscopy
CFU	= Colony forming unit
δ	= chemical shift
d	= doublet (for NMR spectral data)
dd	= doublet of doublet (for NMR spectral data)
dt	= doublet of triplets (for NMR spectral data)
DBE	= Double Bond Equivalent
ε	= molar absorptivity
EIMS	= electron impact mass spectroscopy
ESI MS	= Electrospray Ionization Mass Spectrum
Eq	= equatorial
EtOAc	= ethylacetate
g	= gram
HMBC	= <sup>1</sup> H- <sup>13</sup> C heteronuclear correlation
HMQC	= <sup>1</sup> H- detected heteronuclear multiple quantum coherence
<sup>1</sup> H-NMR	= proton nuclear magnetic resonance
HRESIMS	= High Resolution Electrospray Ionization Mass Spectrum

Hz	= hertz
IR	= infrared spectroscopy
l	= liter
$\mu$ l	= microliter
$[M+H]^+$	= protonated molecular ion
m	= multiplet (for NMR spectral data)
MEA	= Malt extract agar
MHB	= Mueller- Hinton broth
MeOH	= methanol
MIC	= Minimum inhibitory concentration
mg	= miligram
$\mu$ g	= microgram
MHz	= megahertz
ml	= mililitre
mm	= milimeter
$\nu_{max}$	= wave number at maximum absorption
NMR	= nuclear magnetic resonance
No.	= Number
ppm	= part per million
s	= singlet (for NMR spectral data)
SEM	= scanning electron microscope
t	= triplet (for NMR spectral data)
TISTR	= Thailand Institute of Scientific and Technological Research
TLC	= thin layer chromatography
UV	= Ultraviolet