

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT (English)	iv
ABSTRACT (Thai)	vii
LIST OF TABLES	xiv
LIST OF FIGURES	xv
LIST OF SCHEMES	xvii
ABBREVIATIONS AND SYMBOLS	xviii
 CHAPTER I: INTRODUCTION	 1
 CHAPTER II : SURVEY OF LITERATURE	 5
2.1 Taxo and Classification of <i>Diospyros ehretioides</i>	5
2.2 Chemistry of compounds from <i>Diospyros</i> species	5
2.2.1 <i>Diospyros ehretioides</i> Wall. Ex G. Don	5
2.2.2 <i>Diospyros rhodocalyx</i>	6
2.2.3 Other species of <i>Diospyros</i>	7
 CHAPTER III: EXPERIMENT	 16
3.1 Source and authentication of the plant materials	16
3.2 Extraction and Isolation	16
3.2.1 Fruits of <i>Diospyros ehretioides</i>	16
3.2.2 Woods of <i>Diospyros rhodocalyx</i>	22
3.2.3 Woods of <i>Diospyros glandulosa</i>	23

	Page
3.3 Bioactivity determination	25
3.3.1 Cytotoxic activity	25
3.3.2 Antimalarial activity	26
3.3.3 Antifungal activity	27
3.3.4 Antitubercular activity	28
CHAPTER IV: RESULTS AND DISCUSSION	30
4.1 Isolated compounds from <i>Diospyros</i> spp.	30
4.1.1 Structure elucidation of the isolated compounds from <i>Diospyros ehretioides</i> fruits	30
4.1.2 Structure elucidation of the isolated compounds from <i>Diospyros rhodocalyx</i> woods	43
4.1.3 Structure elucidation of the isolated compounds from <i>Diospyros glandulosa</i> woods	46
4.2 Biological activity of the isolated compounds	50
4.2.1 Fruits of <i>Diospyros ehretioides</i>	50
4.2.2 Woods of <i>Diospyros rhodocalyx</i> and <i>Diospyros glandulosa</i>	52
CHAPTER V: APPROVAL OF FUNGI	54
5.1 Plant material	57
5.2 Detection of palmarumycins JC1 [70] and JC2 [71] in Sephadex LH-20 fractions by ¹ H-NMR analysis	57
5.3 Isolation of endophytic fungi	58
5.4 Isolation of epiphytic fungi	58
5.5 Detection of palmarumycins JC1 [70] and JC2 [71] in fungal crude extract by ¹ H-NMR analysis	58

	Page
5.6 Results and discussion	60
CHAPTER VI: CONCLUSION	64
REFERENCES	67
APPENDICES	73
A General experimental procedures	74
B Spectral data of isolated compounds	76
C Spectrum of isolated compounds	89
CURRICULUM VITAE	107

LIST OF TABLES

Table		Page
1	^1H (500 MHz) and ^{13}C (125 MHz) NMR spectral data (DMSO- d_6) of Palmarumycin JC1 and ^1H (500 MHz) and ^{13}C (125 MHz) NMR spectral data (CDCl ₃) of Palmarumycin JC2	37
2	^1H (500MHz) and ^{13}C NMR (125MHz) spectral data (CDCl ₃) of Isodiospyrol A and Isodiospyrin	42
3	Biological activities of compounds 23, 70-72 ; IC ₅₀ and MIC values are expressed in $\mu\text{g/mL}$ (mean \pm standard deviation)	52
4	Biological activities of compounds 5, 11-12, 21 and 67 ; IC ₅₀ and MIC values are expressed in $\mu\text{g/mL}$	53
5	Detection of compounds 23, 70-72 in Sephadex LH-20 fractions by ^1H -NMR analysis	60

LIST OF FIGURES

Figure	Page
1 The fruits of <i>Diospyros ehretioides</i>	2
2 Color changing of MTT tetrazolium reagent	28
3 X-ray crystal structure of CPD1 isolated from fraction B6	33
4 500 MHz ^1H NMR (CDCl_3) spectrum of compound 5	90
5 ^{13}C NMR (CDCl_3) spectra of compound 5	90
6 500 MHz ^1H NMR (CDCl_3) spectrum of compound 11	91
7 500 MHz ^1H NMR (CDCl_3) spectrum of compound 12	91
8 500 MHz ^1H NMR (CDCl_3) spectrum of compound 21	92
9 ^{13}C NMR (CDCl_3) spectra of compound 21	92
10 500 MHz ^1H NMR (CDCl_3) spectrum of compound 23	93
11 ^{13}C NMR (CDCl_3) and DEPT 135 spectra of compound 23	93
12 HMQC of compound 23	94
13 ^1H - ^1H COSY spectrum of compound 23	94
14 Long range ^1H - ^{13}C correlations (HMBC) of compound 23	95
15 IR spectrum of compound 23	95
16 500 MHz ^1H NMR (CDCl_3) spectrum of compound 67	96
17 ^{13}C NMR (CDCl_3) spectra of compound 67	96
18 500 MHz ^1H NMR ($\text{DMSO}-d_6$) spectrum of compound 70	97
19 ^{13}C NMR ($\text{DMSO}-d_6$) and DEPT 135 spectra of compound 70	97
20 HMQC of compound 70	98
21 ^1H - ^1H COSY spectrum of compound 70	98
22 Long range ^1H - ^{13}C correlations (HMBC) of compound 70	99
23 NOESY spectrum of compound 70	99
24 IR spectrum of compound 70	100
25 500 MHz ^1H NMR (CDCl_3) spectrum of compound 71	100
26 ^{13}C NMR(CDCl_3) and DEPT 135 spectra of compound 71	101

Figure	Page
27 HMQC of compound 71	101
28 ^1H - ^1H COSY spectrum of compound 71	102
29 Long range ^1H - ^{13}C correlations (HMBC) of compound 71	102
30 IR spectrum of compound 71	103
31 500 MHz ^1H NMR (CDCl_3) spectrum of compound 72	103
32 ^{13}C NMR (CDCl_3) and DEPT 135 spectra of compound 72	104
33 HMQC of compound 72	104
34 ^1H - ^1H COSY spectrum of compound 72	105
35 Long range ^1H - ^{13}C correlations (HMBC) of compound 72	105
36 IR spectrum of compound 72	106

LIST OF SCHEMES

Scheme	Page
1 The extraction and isolation of CH ₂ Cl ₂ crude extract	18
2 The extraction and isolation of crude extract from the fresh fruits	20
3 The extraction and isolation of crude extract from the dried fruits	21
4 The extraction and isolation of CH ₂ Cl ₂ crude extract of <i>Diospyros rhodocalyx</i>	23
5 The extraction and isolation of CH ₂ Cl ₂ crude extract of <i>Diospyros glandulosa</i>	24
6 Cultivation of endophytic and epiphytic fungi in three different culture media and detection of palmarumycins JC1 [70] and JC2 [71] in fungal crude extracts by ¹ H-NMR analysis	59

ABBREVIATIONS AND SYMBOLS

BC	breast cancer
br	broad
°C	degree Celsius
cm ⁻¹	wave number
CDCl ₃	chloroform- <i>d</i> ₁
CH ₂ Cl ₂	dichloromethane
CHCl ₃	chloroform
COSY	correlation spectroscopy
d	doublet
dd	doublet of doublet
ddd	doublet of doublet of doublet
DEPT	distortionless enhancement by polarization transfer
EtOAc	ethyl acetate
EtOH	ethanol
ESI-TOF MS	electrospray ionization-time of flight mass spectrometry
g	gram
h	hour
HMBC	Heteronuclear Multiple Bond Correlation spectroscopy
HMQC	Heteronuclear Multiple Quantum Correlation spectroscopy
HPLC	High performance liquid chromatography
HSV-1	herpes simplex virus type 1
Hz	herz
IC ₅₀	50% inhibitory concentration
IR	infrared spectroscopy
<i>J</i>	coupling constant (Hz)
KB	oral human epidermal carcinoma
Kg	kilogram
L	liter

ABBREVIATIONS AND SYMBOLS (cont.)

m	multiplet
MeCN	acetonitrile
MeOH	methanol
Mg	milligram
MHz	megahertz
MIC	minimum inhibitory concentration
Min.	minute
mp	melting point
$\mu\text{g/mL}$	microgram per milliliter
m/z	a value of mass divided by charge
NaHCO_3	sodium hydrogen carbonate
NCI-H187	human, small cell lung cancer
nm	nanometer
NMR	nuclear magnetic resonance spectroscopy
NOESY	nuclear overhauser effect spectroscopy
ppm	part per million
<i>q</i>	quartet
<i>qq</i>	quartet of quartet
<i>s</i>	singlet
<i>t</i>	triplet
<i>td</i>	triplet of doublet
UV	ultraviolet
ν_{max}	maximum absorption frequency
λ_{max}	maximum absorption wavelength
δ	chemical shift (ppm)
$[\alpha]_{\text{D}}$	specific rotation