CONTENTS

		Page
A]	BSTRACT (in Thai)	(3)
Al	BSTRACT (in English)	(7)
A	CKNOWNLEDGEMENT	(11)
C	ONTENTS	(12)
LI	ISTS OF TABLES	(15)
LI	STS OF ILLUSTRATIONS	(19)
Al	BBRIVIATIONS AND SYMBOLS	(25)
CI	HAPTER	
1	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Review of Literatures	3
2	EXPERIMENTAL	32
	2.1 Instruments and chemicals	32
	2.2 Plant material	33
	2.3 Extraction	33
	2.4 Isolation and chemical investigation	34
	2.4.1 Investigation of the crude methylene chloride	
	extract from the seeds of C. odollam	34
	2.4.2 Investigation of the crude ethyl acetate	
	extract from latex of C. odollam	43
	2.4.3 Investigation of the crude methylene	
	chloride extract from the barks of C. odollam	55

CONTENTS (continued)

		Page
3	RESULTS AND DISCUSSION	59
	3.1 Structural elucidation of compounds from the seeds	
	of C. odollam	59
	3.1.1 Compound SCO1	60
	3.1.2 Compound SCO2	70
	3.1.3 Compound SCO3	81
	3.1.4 Compound SCO4	93
	3.1.5 Compound SCO5	105
	3.2 Structural elucidation of compounds isolated from	
	latex of C. odollam	115
	3.2.1 Compound LCO1	115
	3.2.2 Compound LCO2	123
	3.2.3 Compound LCO3	131
	3.2.4 Compound LCO4	139
	3.2.5 Compound LCO5	145
	3.2.6 Compound LCO6	151
	3.2.7 Compound LCO7	158
	3.3 Structural elucidation of compounds isolated from	
	the barks of C. odollam	165
	3.3.1 Compound BCO1	165
	3.3.2 Compound BCO2	168
	3.3.3 Compound BCO3	168
	3.3.4 Compound BCO4	169

CONTENTS (continued)

	Page
3.4 Biological activities of the crude extract and the pure compound	nds
from C. odollam	170
APPENDIX	172
BIBLIOGRAPHY	290
VITAE	295

LISTS OF TABLES

Tabl	e	Page
1	Compounds isolated from cerbera species	2
2	¹³ C and DEPT spectral data of compound SCO1	62
3	500 MHz COSY correlation of some protons of compound SCO1	63
4	Major HMBC correlation of compound SCO1	64
5	¹ H and ¹³ C spectral data of compound SCO1	65
6	Comparison of 1 H NMR spectral data between 17β -neriifolin and	68
	compound SCO1	
7	Comparison of 13 C NMR spectral data between 17 β -neriifolin and	69
	compound SCO1	
8	¹³ C and DEPT spectral data of compound SCO2	72
9	500 MHz COSY correlation of some protons of compound SCO2	74
10	Major HMBC correlation of compound SCO2	74
11	¹ H and ¹³ C spectral data of compound SCO2	76
12	Comparison of ¹ H NMR spectral data between compound SCO2 and	
	compound SCO1	78
13	Comparison of ¹³ C NMR spectral data between compound SCO2	
	and compound SCO1	79
14	¹³ C and DEPT spectral data of compound SCO3	83
15	500 MHz COSY correlation of some protons of compound SCO3	84
16	Major HMBC correlation of compound SCO3	84
17	¹ H and ¹³ C spectral data of compound SCO3	86
18	Comparison of ¹ H NMR spectral data between compound SCO3 and	
	compound SCO1	88

LISTS OF TABLES (continued)

Table		Page
19	Comparison of ¹³ C NMR spectral data between compound SCO3 and	
	compound SCO1	89
20	Comparison of ¹ H NMR spectral data between compound SCO3 and	
	17α -neriifolin	90
21	Comparison of ¹³ C NMR spectral data between compound SCO3 and	
	17α -neriifolin	91
22	¹³ C and DEPT spectral data of compound SCO4	95
23	500 MHz COSY correlation of some protons of compound SCO4	96
24	Major HMBC correlation of compound SCO4	97
25	¹ H and ¹³ C spectral data of compound SCO4	98
26	Comparison of ¹ H NMR spectral data between compound SCO4 and	
	compound SCO1	100
27	Comparison of ¹³ C NMR spectral data between compound SCO4 and	
	compound SCO1	101
28	Comparison of ¹ H NMR spectral data between compound SCO4 and	
	cerleaside A	102
29	Comparison of ¹³ C NMR spectral data between compound SCO4 and	
(cerleaside A	103
30	¹³ C and DEPT spectral data of compound SCO5	106
31	500 MHz COSY correlation of some protons of compound SCO5	108
32	Major HMBC correlation of compound SCO5	108
33	¹ H and ¹³ C spectral data of compound SCO5	110

LISTS OF TABLES (continued)

Table		Page
34	Comparison of ¹ H NMR spectral data between compound SCO5 and	
	compound SCO4	111
35	Comparison of ¹³ C NMR spectral data between SCO5 and SCO4	113
36	¹³ C and DEPT spectral data of compound LCO1	117
37	Major HMBC correlation of compound LCO1	118
38	¹ H and ¹³ C spectral data of compound LCO1	120
39	Comparison ¹ H NMR spectral data between compound LCO1 and	
	lpha-amyrin	122
40	¹³ C and DEPT spectral data of compound LCO2	125
41	Major HMBC correlation of compound LCO2	127
42	¹ H and ¹³ C spectral data of compound LCO2	128
43	Comparison of ¹ H NMR spectral data between compound LCO2 and	
	$oldsymbol{eta}$ -amyrin	131
44	¹³ C and DEPT spectral data of compound LCO3	134
45	Major HMBC correlation of compound LCO3	135
46	¹ H and ¹³ C spectral data of compound LCO3	137
47	Comparison ¹ H NMR spectral data between compound LCO3 and	
	$oldsymbol{eta}$ -amyrin	139
48	¹³ C and DEPT spectral data of compound LCO4	142
49	Major HMBC correlation of compound LCO4	143
50	¹ H and ¹³ C spectral data of compound LCO4	145
51	¹³ C and DEPT spectral data of compound LCO5	148
52	Major HMBC correlation of compound LCO5	149

LISTS OF TABLES (continued)

Table		Page
53	¹ H and ¹³ C spectral data of compound LCO5	151
54	¹³ C and DEPT spectral data of compound LCO6	154
55	Major HMBC correlation of compound LCO6	156
56	¹ H and ¹³ C spectral data of compound LCO6	158
57	¹³ C and DEPT spectral data of compound LCO7	161
58	Major HMBC orrelation of compound LCO7	162
59	¹ H and ¹³ C spectral data of compound LCO7	164
60	¹ H, ¹³ C NMR and HMBC of compound BCO1	168
61	Biological activities of the crude extract and the pure compounds from	171
	C odollam	

(18)

LISTS OF ILLUSTRATIONS

Figure		Page
1	Cerbera odollam	2
2	X-ray ORTEP diagram of compound SCO1	72
3	X-ray ORTEP diagram of compound SCO2	83
4	X-ray ORTEP diagram of compound LCO1	132
5	X-ray ORTEP diagram of compound LCO2	141
6	X-ray ORTEP diagram of compound BCO1	203
7	UV (CHCl ₃) spectrum of compound SCO1	173
8	IR (KBr) spectrum of compound SCO1	174
9	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound SCO1	175
10	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound SCO1	176
11	DEPT (CDCl ₃) spectrum of compound SCO1	177
12	2D COSY spectrum of compound SCO1	178
13	2D HMQC spectrum of compound SCO1	179
14	2D HMBC spectrum of compound SCO1	180
15	NOE spectrum of compound SCO1	181
16	UV (CHCl ₃) spectrum of compound SCO2	182
17	IR (KBr) spectrum of compound SCO2	183
18	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound SCO2	184
19	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound SCO2	185
20	DEPT (CDCl ₃) spectrum of compound SCO2	186
21	2D COSY spectrum of compound SCO2	187
22	2D HMQC spectrum of compound SCO2	188
23	2D HMBC spectrum of compound SCO2	189

Central Library Prince of Songkla University

Figu	Figure	
24	UV (CHCl ₃) spectrum of compound SCO3	190
25	IR (KBr) spectrum of compound SCO3	191
26	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound SCO3	192
27	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound SCO3	193
28	DEPT (CDCl ₃) spectrum of compound SCO3	194
29	2D COSY spectrum of compound SCO3	195
30	2D HMQC spectrum of compound SCO3	196
31	2D HMBC spectrum of compound SCO3	197
32	NOE spectrum of compound SCO3 (1)	198
33	NOE spectrum of compound SCO3 (2)	199
34	UV (CHCl ₃) spectrum of compound SCO4	200
35	IR (KBr) spectrum of compound SCO4	201
36	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound SCO4	202
37	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound SCO4	203
38	DEPT (CDCl ₃) spectrum of compound SCO4	204
39	2D COSY spectrum of compound SCO4	205
40	2D HMQC spectrum of compound SCO4	206
41	2D HMBC spectrum of compound SCO4	207
42	UV (CHCl ₃) spectrum of compound SCO5	208
43	IR (KBr) spectrum of compound SCO5	209
44	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound SCO5	210
45	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound SCO5	211
46	DEPT (CDCl ₃) spectrum of compound SCO5	212

Figu	Figure	
47	2D COSY spectrum of compound SCO5	213
48	2D HMQC spectrum of compound SCO5	214
49	2D HMBC spectrum of compound SCO5	215
50	IR (KBr) spectrum of compound LCO1	216
51	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound LCO1	217
52	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO1	218
53	DEPT (CDCl ₃) spectrum of compound LCO1	219
54	2D COSY spectrum of compound LCO1	220
55	2D HMQC spectrum of compound LCO1	221
56	2D HMBC spectrum of compound LCO1	222
57	Mass spectrum of compound LCO1	223
58	IR (KBr) spectrum of compound LCO2	224
59	H NMR (500 MHz, CDCl ₃) spectrum of compound LCO2	225
60	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO2	226
61	DEPT (CDCl ₃) spectrum of compound LCO2	227
62	2D COSY spectrum of compound LCO2	228
63	2D HMQC spectrum of compound LCO2	229
64	2D HMBC spectrum of compound LCO2	230
65	Mass spectrum of compound LCO2	231
66	IR (KBr) spectrum of compound LCO3	232
67	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound LCO3	233
68	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO3	234
69	DEPT (CDCl ₃) spectrum of compound LCO3	235

Figu	are	Page
70	2D COSY spectrum of compound LCO3	236
71	2D HMQC spectrum of compound LCO3	237
72	2D HMBC spectrum of compound LCO3	238
73	NOE spectrum of compound LCO3 (1)	239
74	NOE spectrum of compound LCO3 (2)	240
75	IR (Neat) spectrum of compound LCO4	241
76	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound LCO4	242
77	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO4	243
78	DEPT (CDCl ₃) spectrum of compound LCO4	244
79	2D COSY spectrum of compound LCO4	245
80	2D HMQC spectrum of compound LCO4	246
81	2D HMBC spectrum of compound LCO4	247
82	IR (KBr) spectrum of compound LCO5	248
83	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound LCO5	249
84	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO5	250
85	DEPT (CDCl ₃) spectrum of compound LCO5	251
86	2D COSY spectrum of compound LCO5	252
87	2D HMQC spectrum of compound LCO5	253
88	2D HMBC spectrum of compound LCO5	254
89	IR (KBr) spectrum of compound LCO6	255
90	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound LCO6	256
91	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO6	257
92	DEPT (CDCl ₃) spectrum of compound LCC6	258

Figu	Figure	
93	2D COSY spectrum of compound LCO6	259
94	2D HMQC spectrum of compound LCO6	260
95	2D HMBC spectrum of compound LCO6	261
96	NOE spectrum of compound LCO6 (1)	262
97	NOE spectrum of compound LCO6 (2)	263
98	IR (KBr) spectrum of compound LCO7	264
99	H NMR (500 MHz, CDCl ₃) spectrum of compound LCO7	265
100	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound LCO7	266
101	DEPT (CDCl ₃) spectrum of compound LCO7	267
102	2D COSY spectrum of compound LCO7	268
103	2D HMQC spectrum of compound LCO7	269
104	2D HMBC spectrum of compound LCO7	270
105	UV (CHCl ₃) spectrum of compound BCO1	271
106	IR (KBr) spectrum of compound BCO1	272
107	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound BCO1	273
108	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound BCO1	274
109	DEPT (CDCl ₃) spectrum of compound BCO1	275
110	2D HMQC spectrum of compound BCO1	276
111	2D HMBC spectrum of compound BCO1	277
112	Mass spectrum of compound BCO1	278
113	IR (KBr) spectrum of compound BCO2	289
114	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound BCO2	280
115	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound BCO2	281

Figure		Page
116	UV (CHCl ₃) spectrum of compound BCO3	282
117	IR (KBr) spectrum of compound BCO3	283
118	H NMR (500 MHz, CDCl ₃) spectrum of compound BCO3	284
119	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound BCO3	285
120	UV (CHCl ₃) spectrum of compound BCO4	286
121	IR (KBr) spectrum of compound BCO4	287
122	¹ H NMR (500 MHz, CDCl ₃) spectrum of compound BCO4	288
123	¹³ C NMR (125 MHz, CDCl ₃) spectrum of compound BCO4	289

ABBREVIATIONS AND SYMBOLS

singlet S doublet d triplet ŧ quartet qmultiplet m doublet of doublet dddoublet of triplet dtbroad singlet br s broad multiplet br m gram g nanometer nm melting point m.p. cm⁻¹ reciprocol centimeter (wave number) δ chemical shift relative to TMS Jcoupling constant $[\alpha]_{\rm p}$ specific rotation $\lambda_{\scriptscriptstyle{\mathsf{max}}}$ maximum wavelength ν absorption frequencies molar extinction coefficient ε Fig. Figure m/z a value of mass divided by charge °C degree celcius MHz Megahertz part per million ppm

ABBREVIATIONS AND SYMBOLS (continued)

c = concentration

IR = Infrared

UV = Ultraviolet-Visible

MS = Mass Spectroscopy

NMR = Nuclear Magnetic Resonance

2D NMR = Two Dimensional Nuclear Magnetic Resonance

COSY = Correlation Spectroscopy

DEPT = Distortionless Enhancement by Polarization Transfer

HMBC = Heteronuclear Multiple Bond Correlation

HMQC = Heteronuclear Multiple Quantum Coherence

NOE = Nuclear Overhauser Effect Spectroscopy

CC = Column Chromatography

QCC = Quick Column Chromatography

PLC = Preparative Thin Layer Chromatography

TMS = tetramethylsilane

CDCl₃ = deuterochlroform