

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
ABSTRACT IN THAI	iv
ABSTRACT IN ENGLISH	vi
TABLE OF CONTENTS	viii
LIST OF TABLES	xi
LIST OF ILLUSTRATIONS	xii
CHAPTER 1 INTRODUCTION	1
1.1 Hypothesis	1
1.2 Research objective	2
1.3 Research area	2
1.4 Methodology	4
1.5 Usefulness	4
1.6 Geological setting	6
1.7 Literature review	8
1.7.1 Groups of Permian limestone in Thailand	8
1.7.2 Paleontology	12
1.7.3 Tectonic setting	15
1.7.4 Geophysical data	18
CHAPTER 2 STRATIGRAPHY	21
2.1 The Khao Tham Pong quarry section	22
2.2 The CD 92 outcrop section	22
2.3 The CD 4 outcrop section	23
2.4 The CD 93 outcrop section	24
2.5 The CD 93.1 outcrop section	25
2.6 The CD 1 outcrop section	26
2.7 The CD 3 outcrop section	27

CHAPTER 3 PETROGRAPHY	29
3.1 Oosparite microfacies	29
3.2 Pelsparite microfacies	31
3.3 Cortoidsparite microfacies	33
3.4 Oncoidsparite microfacies	35
3.5 Biomicrite microfacies	37
3.6 Biosparite microfacies	38
3.7 Intrasparite microfacies	40
3.8 Other microfacies	42
3.8.1 Dolomite microfacies	42
3.8.2 Microspar microfacies	44
CHAPTER 4 PALEONTOLOGY	46
4.1 Introduction	46
4.2 Previous work	48
4.2.1 The Khao Tham Pong quarry	48
4.2.2 The kilometer 93.1 outcrop	48
4.2.3 The kilometer 99.5 outcrop	48
4.3 Recent study	48
4.3.1 The Khao Tham Pong quarry section	49
4.3.2 The CD 92 outcrop section	52
4.3.3 The CD 4 outcrop section	53
4.3.4 The CD 93 outcrop section	53
4.3.5 The CD 93.1 outcrop section	54
4.3.6 The CD 1 outcrop section	54
4.3.7 The CD 2 outcrop section	56
4.3.8 The CD 3 outcrop section	56
4.4 Discussion	57

CHAPTER 5 CONCLUSION	58
5.1 Conclusion	58
5.1.1 The Khao Tham Pong quarry section	58
5.1.2 The CD 92 outcrop section	62
5.1.3 The CD 4 outcrop section	63
5.1.4 The CD 93 outcrop section	64
5.1.5 The CD 93.1 outcrop section	65
5.1.6 The CD 1 outcrop section	66
5.1.7 The CD 3 outcrop section	67
5.1.8 The depositional model	68
5.2 Discussion	69
5.2.1 Age	69
5.2.2 Ooid grains	69
5.2.3 Depositional environments	69
5.2.4 Tectonic evolution	70
5.2.5 Fauna evidence	70
REFERENCES	71
APPENDIX	74

LIST OF TABLES

Table		
1.1	The explanation of Figure 1.3	7
4.1	Fusulinids and other foraminifera from the study area.	47
5.1	The Khao Tham Pong quarry section showing its thickness, types of microfacies, depositional environments, and faunas.	59-60
5.2	The CD 92 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	62
5.3	The CD 4 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	63
5.4	The CD 93 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	64
5.5	The CD 93.1 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	65
5.6	The CD 1 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	66
5.7	The CD 3 outcrop section showing thickness, microfacies types, depositional environment, and faunas.	67

LIST OF ILLUSTRATIONS

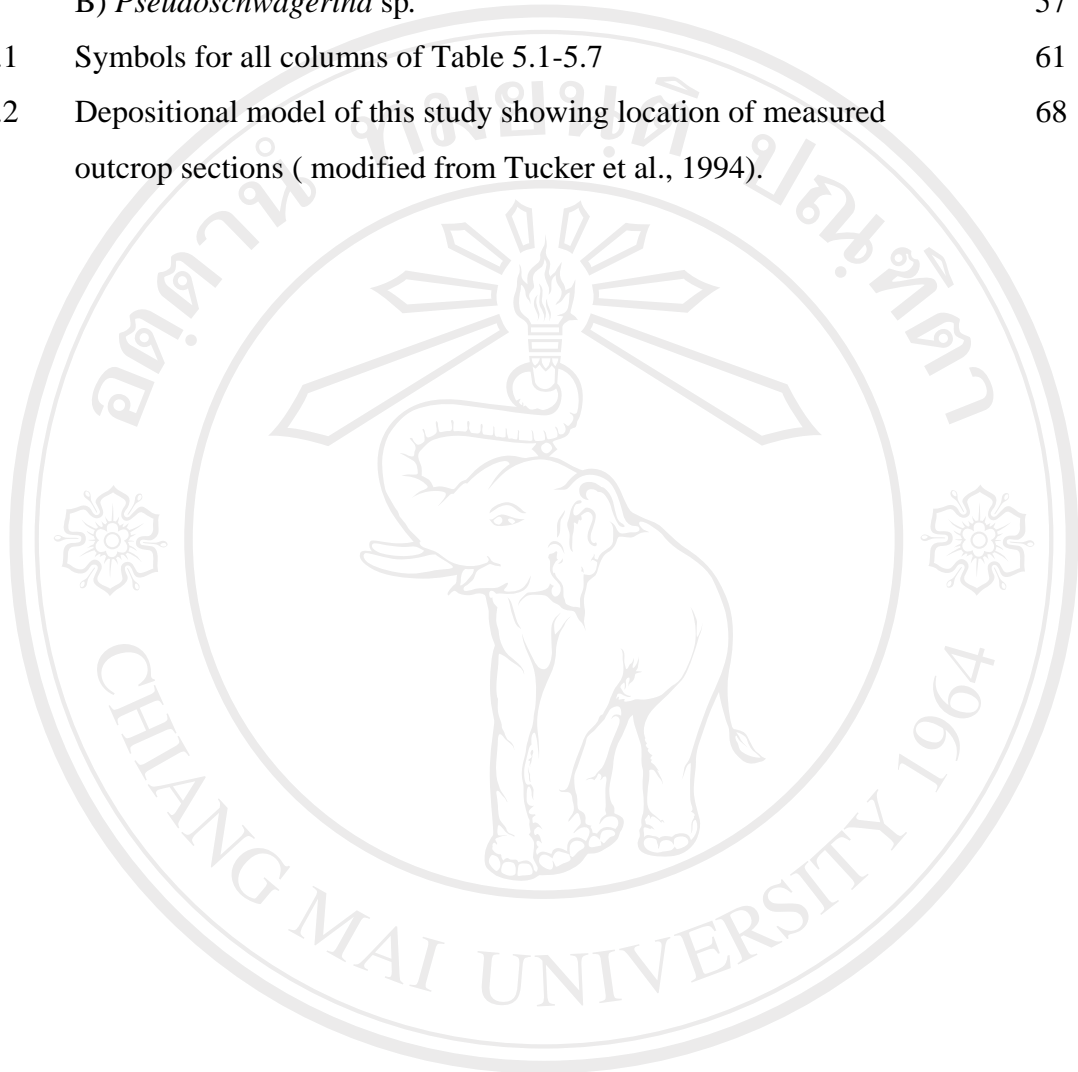
Figure

1.1	Location map showing the study area located at Chiang Dao, about 100 kilometers north of Chiang Mai along route 107.	3
1.2	This map has been sketched from topographic map 1: 50,000 sheet 4848-III , Amphoe Chai Prakan showing the seven outcrop sections: KTP (Khao Tham Pong quarry), CD 92, CD 4, CD 93, CD 93.1, CD 3, and CD 1.	5
1.3	Geological map of the study area, map sheet 4848-III, Amphoe Chai Prakan (Modified from Department of Mineral Resource, 1987)	6
1.4	Aeromagnetic intensity contours overlain on a geological map of the study area (sheet 4848-III, Amphoe Chai Prakan).	19
1.5	Aeromagnetic intensity contours of the study area overlain on total count images (sheet 4848-III, Amphoe Chai Prakan).	20
2.1	Outcrop sections from the Khao Tham Pong quarry to CD 3.	21
2.2	The Khao Tham Pong outcrop section showing the position of some of the 99 rock samples.	22
2.3	The CD 92 outcrop section showing the position of rock samples.	23
2.4	The CD 4 outcrop section showing the position of some of the 22 rock samples.	24
2.5	The CD 93 outcrop section showing the position of the four rock samples.	25
2.6	The CD 93.1 outcrop section showing the position of the first and seventh rock samples.	26
2.7	The CD 1 outcrop section showing the position of the first and third rock samples.	27
2.8	The CD 3 outcrop section showing the position of rock samples.	28
3.1 A)	Thin section of sample N 4/2 of the Khao Tham Pong section showing an oospirite microfacies. The ooid nuclei are carbonate mud. The cortex is a radial structure. The cement is sparite. The calcite veins have two generations.	31

3.1 B) Stained thin section of sample N 4/1 of the Khao Tham Pong section showing the red color of non-ferroan calcite.	32
3.2 A) Thin section of sample E 4/15 of the Khao Tham Pong section showing pelsparite microfacies. Other grains are sub-rounded intraclasts. Ooid grains are rare. Cement is sparite.	33
B) Stained thin section of sample E 4/15 showing the red color of non-ferroan calcite. The burrow tube in the slide is a significant part of this microfacies; its diameter is 2.22 millimeters.	33
3.3 A) Thin section of sample E 3/12 of the Khao Tham Pong section showing a cortoidsparite microfacies. The diameters of cortoid grains are 0.10 to 2.00 millimeter. The cement is sparite.	35
B) Stained thin section of sample E 3/12 showing the red color of non-ferroan calcite.	35
3.4 A) Thin section of sample CD 93.1/1 of the CD 93.1 section showing oncoidsparite microfacies. The diameters of oncooid grains are 1.25 to 3.37 millimeter. Cement is fibrous-rim sparry cement. Some euhedral to subhedral dolomite crystals are present.	37
B) Stained thin section of sample CD 93.1/1 showing the red color of non-ferroan calcite. Dolomite crystals are unstained, indicating they are non-ferroan dolomite.	37
3.5 A) Biomicrite microfacies thin section of sample CD 4/13 of the CD 4 section. Bioclasts are debris of various organisms and the matrix is micrite.	38
B) Stained thin section of sample CD 4/13 showing the red color of non-ferroan calcite.	39
3.6 A) Thin section of sample CD 92/1 of section CD 92 showing biosparite microfacies.	40
B) Stained thin section of sample CD 92/1 showing the red color of non-ferroan calcite.	40
3.7 A) Thin section of sample N 4/10 of the Khao Tham Pong section showing intrasparite microfacies. The intraclasts are bioclast fragments in micrite. The bioclasts are small gastropods, small forams, and	42

	echinoderm plates.	
B)	Stained thin section of sample N 4/8 of the Khao Tham Pong section showing the red color of non-ferroan calcite.	42
3.8.1A)	Thin section of sample E 3/7 of the Khao Tham Pong section showing dolomite microfacies. The coarsely crystalline dolomite has a fair proportion of straight boundaries. The fabric is planar subhedral.	44
B)	Stained thin section of sample E 3/6 of the Khao Tham Pong section showing the red color of non-ferroan calcite. Dolomite crystals are colorless, which indicates they are non-ferroan dolomite. The intercrystal pore space has been filled with post-dolomitization calcite cement.	45
3.8.2A)	Thin section of sample E 3/8 of the Khao Tham Pong section showing microsparite microfacies. The carbonate grains were destroyed by deformation. The slide shows microspar, pseudospar, secondary micrite, and subhedral to euhedral dolomite crystals, the result of neomorphism.	46
B)	Stained thin section of sample E 3/8 showing the red color of non-ferroan calcite. Dolomite crystals are colorless, indicating non-ferroan dolomite.	46
4.1	Khao Tham Pong quarry foraminifera.	49-51
	A) <i>Climacammina</i> sp.	49
	B) <i>Tetrataxis</i> sp.	50
	C) <i>Spiroplectammina</i> sp.	50
	D) <i>Beedeina elegans</i>	51
	E) <i>Fusulinella pseudobocki</i>	51
4.2	CD 92 outcrop section fauna.	52-53
	A) Dasycladaceans	52
	B) Ostracod	53
4.3	CD 93 outcrop section fauna.	54
	A) <i>Biseriella parva</i>	54
4.4	CD 1 outcrop section fauna.	55
	A) <i>Eoschubertella</i> sp.	55

	B) <i>Biseriella parva</i>	55
4.5	CD 3 outcrop section fauna.	56-57
	A) <i>Triticites</i> sp.	56
	B) <i>Pseudoschwagerina</i> sp.	57
5.1	Symbols for all columns of Table 5.1-5.7	61
5.2	Depositional model of this study showing location of measured outcrop sections (modified from Tucker et al., 1994).	68



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
 Copyright© by Chiang Mai University
 All rights reserved