

CHAPTER V

BIOSTRATIGRAPHY OF THE STUDY AREA

The study area is situated at Khao Nong Hoi, Amphoe Pak Chong, Changwat Nakhon Ratchasima. The rocks in the study area are mainly composed of very thickly bedded limestone. They contain various kinds of fossils such as corals, gastropods, crinoideas, algae, sponges, smaller forams, nautiloids, etc. The ammonoids and fusulinids in the investigated area are the largest assemblages discovered in Thailand.

After systematic study of ammonoids and fusulinids, the age of them are inclusively in the Permian. At the present time, the stages of Permian series are compiled and proposed by the Permian subcommission, ICS by Yugan et al., 1996. (Table 5.1) The ages of ammonoids and fusulinids in this research are referred to the stages of Permian Series proposed by them. At the present study, ammonoids and fusulinids in the study area are identified in 10 genera and 17 species of ammonoids and 7 genera of fusulinids. The ranges of ammonoids and fusulinids in the study area are summarized and illustrated in Table 5.2.

The ammonoids and fusulinids in the study area of present study can be divided into 3 biozones in ascending order: *Robustoschwagerina* Biozone, *Misellina* Biozone, and *Perrinites* Biozone. Biostratigraphic Zonation of the study area with references to the data of ammonoids and fusulinids is illustrated in Table 5.3.

***Robustoschwagerina* Biozone**

The *Robustoschwagerina* Zone is at the lower part of lithostratigraphic block 1 and the lowest part of lithostratigraphic block 2. This zone is defined as the local range zone of *Robustoschwagerina* sp. The lower boundary of this zone is indicated by the first appearance of *Robustoschwagerina* sp., and the upper boundary is the last appearance of *Robustoschwagerina* sp.

According to the data on Table 5.2, *Robustoschwagerina* sp. is a short ranging genera between Asselian and Sakmarian.

SERIES	STAGES	SELECTED FOSSIL ZONES			Polarity	Ma	
		Ammonoids	Conodonts	Fusulinids			
Triassic	Griesbachian	<i>Ophiceras</i> <i>Otoceras</i>	<i>Hindeodus parvus</i>			251.1	
PERMIAN	Lopingian	Changhsingian	<i>Pseudotiralites</i> <i>Parotiralites</i> - <i>Shevyrevites</i> <i>Iranites-Phisonites</i>	<i>Clarkina changxingensis</i> <i>C. subcarinata</i>	<i>Palaeofusulina sinensis</i>		± 3.6
		Wuchapingian	<i>Araxoceras-Konglingites</i> <i>Anderssonoceras</i> <i>Roadoceras</i> - <i>Daulingoceras</i>	<i>C. orientalis</i> <i>C. leveni</i> <i>C. dukouensis</i> <i>C. postbitteri</i>	<i>Nanlingella simplex</i> - <i>Codonofusiella kwangsiensis</i>		253.0 ± 0.3
		Cepitanian	<i>Timorites</i>	<i>Jinogondolella altudaensis</i> <i>J. postserrata</i>	<i>Lepidolina yabeiensis</i> <i>Polydiexodina shumardi</i>		
	Guadalupian	Wordian	<i>Waagenoceras</i>	<i>J. asserata</i>	<i>Neoschwagerina craticulifera</i>		264.1 ± 2.2
		Roadian	<i>Demareziites</i> <i>Stacheoceras discoidale</i>	<i>J. nankingensis</i>	<i>Praesumatrina neoschwagerinoides</i> <i>Cancellina cutalensis</i> <i>Armenina</i>	Illawarra Reversal	
		Kungurian	<i>Pseudoviridoceras dunbari</i> <i>Propinoceras busterense</i>	<i>Mesogondolella idahoensis</i> <i>Necstreptognathodus pnevi</i> - <i>N. exculptus</i>	<i>Misellina claudiae</i> <i>Brevaxina dyhrenfurthi</i>		
	Cisuralian	Artinskian	<i>Uraloceras fedorowi</i> <i>Aktubinskia notabilis</i> - <i>Artinskia artiensis</i>	<i>N. pequopansis</i> <i>Sweetognathus whitei</i> - <i>M. blisselli</i>	<i>Pamirina Chalaroschwagerina vulgaris</i>		280.3 ± 2.6
		Sakmarian	<i>Sokmarites inflatus</i> <i>Svetlanoceras strigosum</i>	<i>S. primus</i> <i>Streptognathodus postfusius</i>	<i>Robustoschwagerina schellwieni</i> <i>Sphaeroschwagerina sphaerica</i>		
		Asselian	<i>S. serpentinum</i>	<i>S. constrictus</i>	<i>S. moelieri</i> , <i>R. fecunda</i>		290.6 ± 3.0
			<i>S. primore</i>	<i>S. isolatus</i>	<i>S. vulgaris</i>		
	Carboniferous	Gzhelian	<i>Shumardites confessus</i> - <i>Emilites plummeri</i>	<i>S. wabaunsensis</i> <i>S. elongatus</i>	<i>Daixina robusta</i> <i>D. bosbytaensis</i> <i>T. stuckenbergi</i>		300.3 ± 3.2

Table 5.1 An Integrated Chronostratigraphic Scheme for the Permian System (Yugan et al., 1996)

SERIES		STAGES		<i>Agathiceras</i> sp.	<i>Agathiceras mediterraneum</i>	<i>Adrianites marathonsis</i>	<i>Adrianites cancellatum</i>	<i>Prostacheoceras pamiricus</i>	<i>Stacheoceras brunsonorum</i>	<i>Stacheoceras rothi</i>	<i>Stacheoceras mediterraneum</i>	<i>Perrinites</i> sp.	<i>Perrinites tardus</i>	<i>Perrinites cf. hilli</i>	<i>Popanoceras</i> sp.	<i>Thalassoceras welleri</i>	<i>Darcelites</i> sp.	<i>Parapronorites</i> sp.	<i>Propinacoceras beyrichi</i>	<i>Propinacoceras americanum</i>	<i>Robustoschwagerina</i> sp.	<i>Parafusulina</i> sp.	<i>Pseudofusulina</i> sp.	<i>Misellina</i> sp.	<i>Pamirina</i> sp.	<i>Thailandina</i> sp.	<i>Quasifusulina</i> sp.		
TRIASSIC		Griesbachian																											
PERMIAN	Lopingian	Changhsingian																											
		Wuchapingian																											
	Guadalupian	Capitanian																											
		Wordian																											
		Roadian																											
	Cisuralian	Kungurian																											
		Artinskian																											
		Sakmarian																											
		Asselian																											
	CARBONIFEROUS		Gzhelian																										

Table 5.2 Published Range Chart of Ammonoid and Fusulinids (Loeblich and Tappan, 1998; Yugan et al., 1997; Zhou et al., 1997)

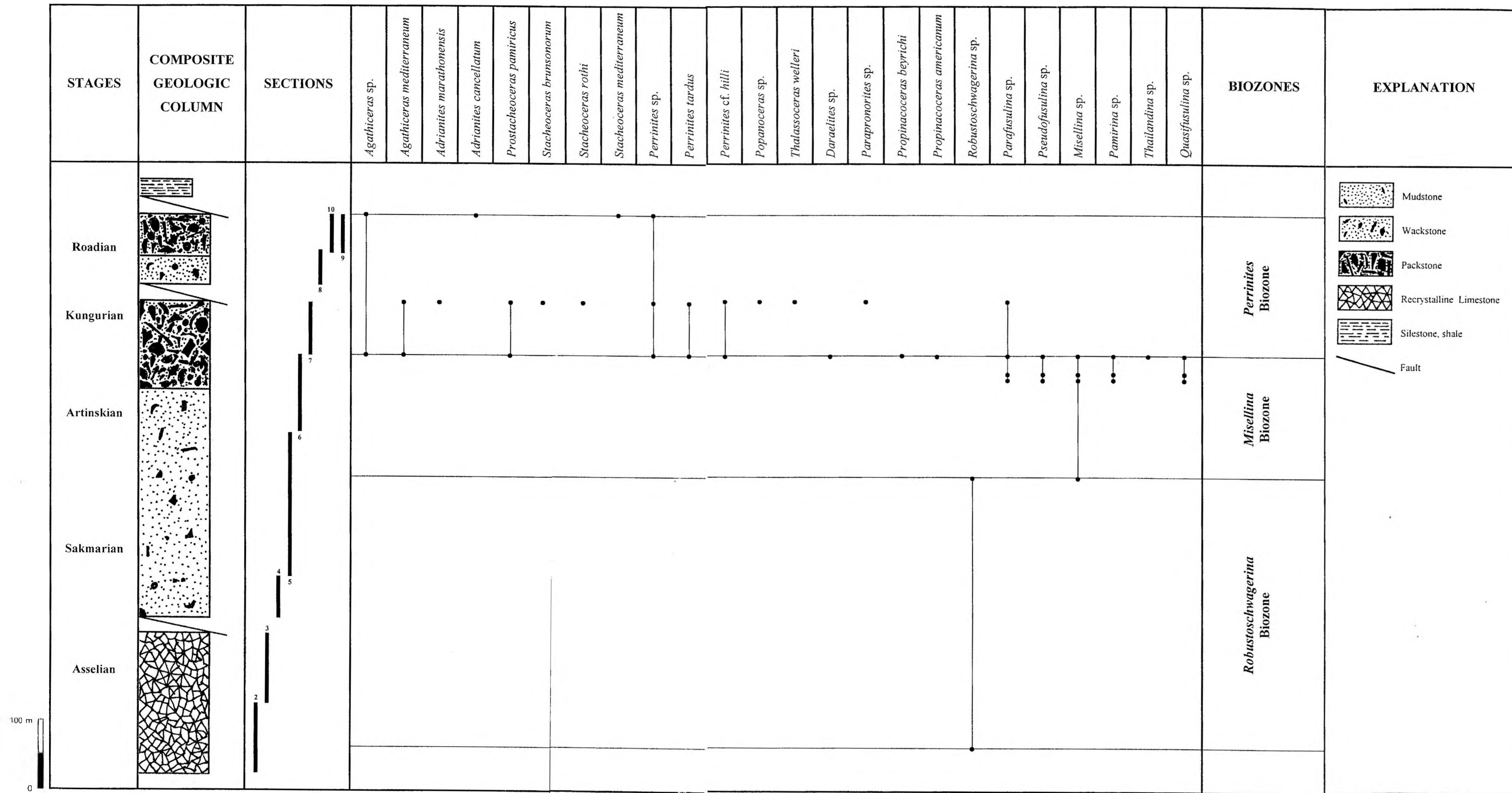


Table 5.3 Biostratigraphy of Khao Nong Hoi with References to Ammonoids and Fusulinids

The geological age of this zone is considered as Asselian to Sakmarian by the range of *Robustoschwagerina* sp. Furthermore, the age of tabulata coral discovered in this zone (identified by Mr. Nitipon Noiphao, the senior geologist student of Chulalongkorn University) is *Nephelephyllum* sp. which indicates the Late Carboniferous to Early Permian (Sakmarian age) conformably with *Robustoschwagerina* sp.

***Misellina* Biozone**

The *Misellina* Biozone is located at the central part of stratigraphic block 2 of the study area. The *Misellina* Biozone is defined by the assemblage of various kind of fusulinids. The lower boundary of this zone is defined by the first appearance of *Misellina* sp., and the upper boundary is the last appearance of *Misellina* sp. Moreover, The upper boundary of this zone is the existing of ammonoids group. The fusulinids assemblages in this zone are composed of *Parafusulina* sp., *Pseudofusulina* sp., *Pamirina* sp., and *Thailandina* sp.

The geological age of this zone is considered as Artinskian by the range of *Misellina* sp., *Parafusulina* sp., *Pseudofusulina* sp., *Pamirina* sp., and *Thailandina* sp., This zone is conformably overlies *Robustoschwagerina* Biozone and underlies *Perrinites* Biozone.

***Perrinites* Biozone**

The *Perrinites* Biozone is overlies *Misellina-Propinacoceras* Zone. This zone is the highest part of the stratigraphic block 2 and bottom part of stratigraphic block 3 of the study area. The *Perrinites* Biozone is defined by local range zone of *Perrinites* group and a large ammonoids assemblage together with abundant *Parafusulina* sp. This zone is distinguished from the others zones by the first appearance of *Perrinites* sp.; *Perrinites tardus* Miller and Furnish, 1940; *Perrinites* cf. *hilli* (Smith, 1903), Miller and Furnish, 1940 as the lower boundary. The upper boundary is also limited by the last appearances of ammonoids assemblage.

The *Perrinites* Biozone of the study area also contains a large assemblage of ammonoids such as: *Agathiceras* sp.; *Agathiceras mediteraneum* Toumanskaya, 1949; *Adrianites marathonensis* Bose, 1917; *Prostacheoceras* cf. *pamiricus* Bogoslovskaya, 1978; *Stacheoceras brunsonorum* Miller and Cline, 1934; *Stacheoceras rothi* Miller and Furnish, 1940; *Thalassoceras welleri* (Bose, 1917); Miller and Furnish, 1940; *Daraelites* sp.;

Propinacoceras beyrichi Gemmellaro, 1888; *Propinacoceras americanum* Miller and Warren, 1933. *Popanoceras* sp. and *Parapronorites* sp. Fusulinids discovered in this zone is a large number of *Parafusulina* sp.

The geological age of the *Perrinites* Biozone is considered as Kungurian to Roadian by the range of *Perrinites* sp.; *Perrinites tardus* Miller and Furnish, 1940; *Perrinites* cf. *hilli* (Smith, 1903), Miller and Furnish, 1940 existed in the study area.

Furthermore, in the lithostratigraphic block 3 situated at the topmost part in the stratigraphic of the study area still contain some of ammonoids assemblage such as *Agathiceras* sp.; *Adrianites cancellatum* Smith, 1927; *Stacheoceras mediterraneum* Gemmellaro, 1887; and *Perrinites* sp. This part is in contact with the stratigraphic block 2 by a fault. According to the data of lithology and fossil record, this block probably to be a part of stratigraphic block 2. But it was cut by fault and situated above stratigraphic block 2. The *Adrianites cancellatum* Smith, 1927 indicates a Wordian age. Thus the age of this block probably ranges from the Roadian and may reach the Earliest Wordian.