



## CHAPTER V

### DISCUSSIONS AND CONCLUSIONS

#### 5.1 Discussions

1. The Permian carbonate rocks in the study areas, east of Changwat Nakhon Sawan contain 25 genera 37 species fusulinoidea indicating Yakhtashian? (Artinskian) age to Midian (Capitanian) age. These fusulinoidean assemblages in Changwat Nakhon Sawan are similar to the ones in some horizons of Lop Buri area such as Khao Somphot and Saraburi areas. The paleontological result in this research supports the idea of Toriyama (1975) and Titirananda (1976) who suggested that the Khao Khad Formation in Saraburi area can be correlated with the Tak Fa formation in Lop Buri-Nakhon Sawan area. They used more than 100 species of fusulinoideas to correlate the Khao Khad Formation and the Tak Fa formation in Lop Buri – Nakhon Sawan areas. The age of this formation is Yakhtashian (Artinskian) - Bolorian (Kungurian).

2. Depositional environment of carbonate rocks in the study area can be interpreted from the results of petrographic and paleontologic analyses. Almost carbonate rocks in study area show bioclastic wackestone to packstone with abundant fusulinoideas. Others faunas are common algae, smaller forams, shell fragments, crinoid stems, ostracods, gastropods, bivalves, brachiopods, rare corals and locally pellets. The carbonate textures and fossils from the study area indicate that the carbonate rocks were deposited in shelf lagoon environment within carbonate platform (Wilson, 1975) (Figure 5.1).

3. Fusulinoidean assemblages and age in study areas are similar to the ones of the Saraburi and Lop Buri areas. It can be assumed that carbonate platform in study area have originated in the same time as the carbonate platforms in the Saraburi and Lop Buri areas.

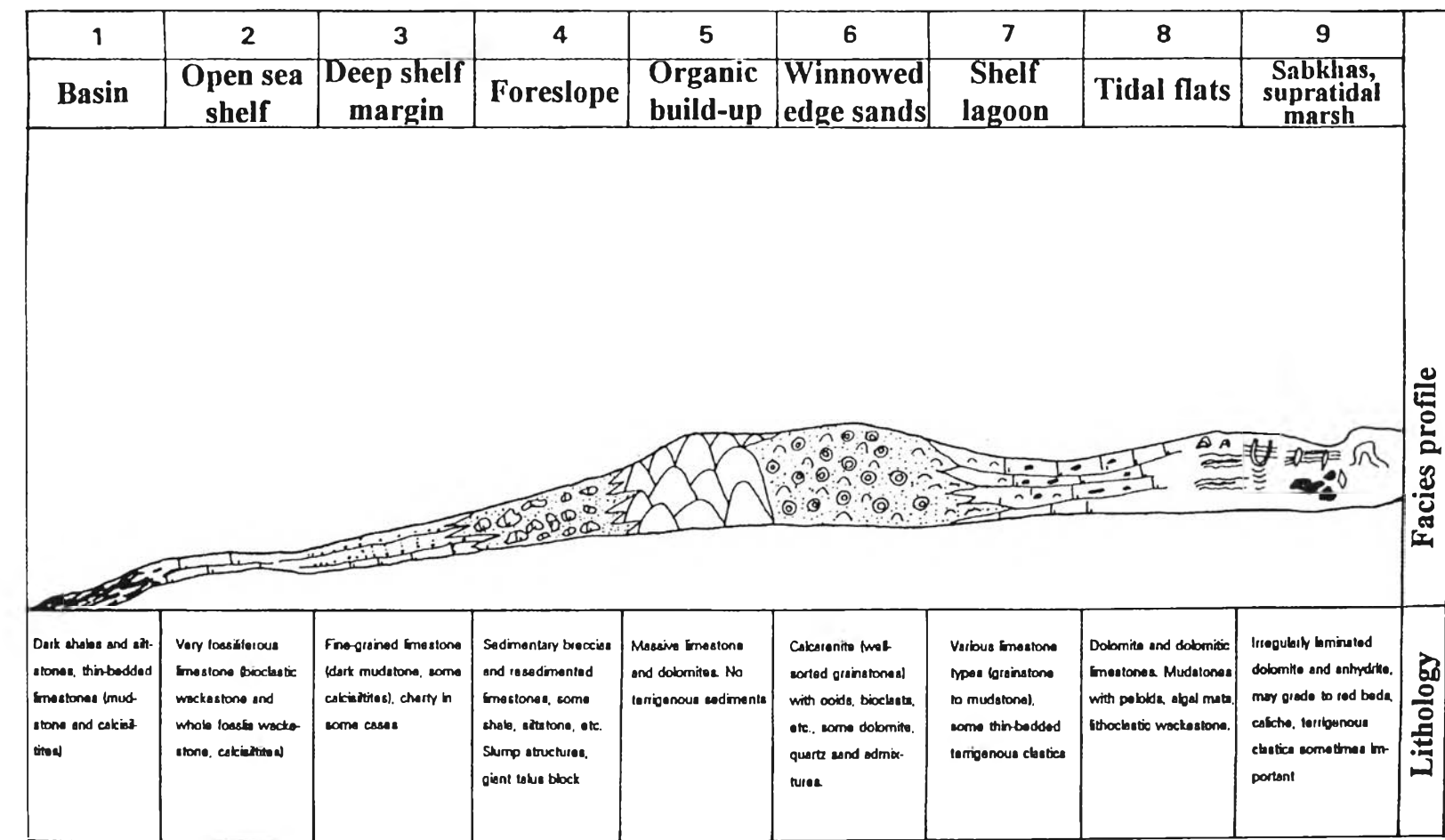


Figure 5.1 The major environment deposition for carbonate sediments (Wilson, 1975).

## 5.2 Conclusions

Permian limestones in the study areas of Amphoe Tak Fa, Amphoe Ta Khli and Amphoe Phrayuha Khiri, eastern part of Changwat Nakhon Sawan were defined as a part of the Tak Fa formation of the Saraburi Group (Nakornsri, 1977, 1981). These rocks are composed of medium to dark grey, thin to thick bedded limestone. 77 samples collected from twelve localities were used for fusulinoidea paleontologic study, their geological age determination and petrographic analyses of carbonate rocks in order to indicate their depositional environment. The texture of limestone, the geological ages and depositional environments of the rock samples are concluded as followed:

1. 77 samples collected from twelve localities of the study area show that the limestone texture of Tak Fa formation are classified to be bioclastic wackestone to packstone, with abundant fossils such as fusulinoideas, algae, smaller forams, shell fragments, crinoid stems, ostracods, gastropods, bivalves, brachiopods, rare corals and locally pellets.

2. Two sections belong to Khao Look Klone and Khao Noi, and eleven isolated samples from ten localities belong to Ban Hua Khao (TK1), Khao Mun Nak (TK2), Khao Kui (TK3), Khao Thong (TK4), Khao Sung (TK5), Khao Chong Lom (TK6), Khao Nam Ving (TF1), Khao Ploi (TF2), Khao Kra Jeow (TF3) and Khao Noom Nang (PK). A total of 6 Families, 10 Subfamilies, 24 genera and 37 species of fusulinoidea were identified and possibly divided into 5 fusulinoidean zones: *Misellina* biozone, *Maklaya* biozone, *Neoschwagerina* biozone, *Colania* biozone, *Lepidolina* biozone, in ascending order. The age and fusulinoidean assemblages of rocks unit in the investigated area are illustrated in Table 5.1 and 5.2.

The geological age of Khao Look Klone and Khao Noi in Amphoe Ta Khli is Yakhtashian? (Artinskian) and Bolorian age, respectively. 3 isolated samples in Amphoe Tak Fa have geological age ranges from Kubergandian (Roadian) to Midian (Capitanian)

Table 5.1 The age and fusulinoidean assemblages of rocks unit in Khao Look Klone and Khao Noi.

Location	Fusulinoidea	Age
Khao Look Klone	<p><i>Staffella</i> sp., <i>Pseudostaffella</i> sp.,  <i>Nankinella</i> sp., <i>Pseudoendothyra</i> sp.,  <i>Schubertella</i> sp. and <i>Pseudofusulina</i> sp.</p>	<p>Yakhtashian?            (Artinskian)</p>
Khao Noi	<p><i>Misellina</i> sp., <i>Maklaya</i> sp.,  <i>Neothailandina</i> sp., <i>Pravitroschwagerina</i> sp.,  <i>Pseudofusulina</i> sp., <i>Chusenella</i> sp.,  <i>Neofusulinella</i> sp., <i>Schubertella</i> sp. and  <i>Nankinella</i> sp.</p>	<p>Bolorian            (Kungurian)</p>

Table 5.2 The age and fusulinoidean assemblages of rocks unit in isolate limestone ten localities.

Location	Fusulinoidea	Age
Ban Hua Khao (TK1)	<i>Pseudofusulina</i> sp., <i>Parafusulina</i> sp., <i>Yangcheinia</i> sp., <i>Pseudodoliolina</i> sp., <i>Neothailandina</i> sp., <i>Cancellina</i> sp., <i>Neoschwagerina</i> sp.	Kubergandian (Roadian)
Khao Mun Nak (TK2)	<i>Parafusulina</i> sp., <i>Pseudofusulina</i> sp., <i>Verbeekina verbeeki</i> , <i>Cancellina</i> sp.	Kubergandian (Roadian)
Khao Kui (TK3)	<i>Chusenella</i> sp., <i>Lepidolina</i> sp.	Midian (Capitanian)
Khao Thong (TK4)	<i>Pseudofusulina</i> sp., <i>Chusenella</i> sp., <i>Lepidolina</i> sp.	Midian (Capitanian)
Khao Sung (TK5)	<i>Skinnerella</i> ? sp., <i>Pseudofusulina</i> ? sp.	Kubergandian (Roadian)
Khao Chong Lom(TK6)	<i>Chusenella</i> sp., <i>Verbeekina verbeeki</i> , <i>Lepidolina</i> sp.	Midian (Capitanian)
Khao Nam Ving(TF1)	<i>Laosella</i> sp., <i>Pseudofusulina</i> sp., <i>Verbeekina</i> sp., <i>Yangcheinia</i> sp., <i>Neoschwagerina</i> sp., <i>Cancellina</i> sp.	Kubergandian (Roadian)
	<i>Lepidolina</i> sp., <i>Verbeekina</i> sp.	Midian (Capitanian)
Khao Ploi (TF2)	<i>Chusenella</i> sp., <i>Lepidolina</i> sp.	Midian (Capitanian)
Khao Kra Jeow (TF3)	<i>Neoschwagerina</i> sp., <i>Colania</i> sp., <i>Sumatrina</i> sp.	Midian (Capitanian)
Khao Noom Nang (PK)	<i>Colania</i> sp., <i>Sumatrina</i> sp., <i>Chusenella</i> sp., and <i>Verbeekina verbeeki</i>	Midian (Capitanian)

age. In Amphoe Ta Khli have 6 localities which the geological age ranges from Kubergandian(Roadian) to Midian (Capitanian) age. And the geological age of 1 locality in Amphoe Phrayuha Khiri is Midian (Capitanian) age. The fusulinoideas of study area belong to the types of fusulinoideas which are widely distributed in the Permian of Tethys regions (East and Southeast Asia). The rocks in which fusulinoideas have been found, are ranging from Yakhtashian? (Artinskian) to Midian (Capitanian) age.

3. The carbonate textures and fossils from the study area indicate that the carbonate rocks were deposited in shelf lagoon environment within carbonate platform

4. These fusulinoidean assemblages in Changwat Nakhon Sawan are similar to fusulinoidea in some horizon of Lop Buri area such as Khao Somphot and Saraburi areas. In correlation with the previous studies of Toriyama (1975) and Titirananda (1976), they suggested that the Khao Khad Formation in Saraburi area can be correlated with the Tak Fa formation in Lop Buri-Nakhon Sawan area. Based on the evidences of composition and texture of carbonate rocks, they show that the depositional environment was within carbonate platform. Fusulinoidean assemblages and age in study areas are similar to the ones of the Saraburi and Lop Buri areas. It can be assumed that carbonate platform in study area have originated in the same time as the carbonate platforms in the Saraburi and Lop Buri areas.