

CHAPTER V

FUSULINACEAN BIOSTRATIGRAPHY



The investigated limestones in the eastern part of Changwat Loei are ranging from Late Carboniferous to Middle Permian ages. They contain rich shallow marine organic remains such as fusulinids, smaller foraminifers, corals and giant pelecypods. The fusulinids in the areas of present study can be subdivided into 6 fusulinacean zones (Figure 100) in ascending order : *Triticites*, *Daixina*, *Pseudoschwagerina*, *Pseudofusulina-Chalaroschwagerina*, *Pamirina* and *Yangchienia* Zones.

1. *Triticites* zone

The *Triticites* zone, about 60 m thick, conformably underlies the *Daixina* zone but the contact can not be observed. This zone is defined as the stratigraphic interval between the first occurrence of *Triticites* sp. and that of *Daixina* sp. The *Triticites* zone of this study may be corresponding to *Triticites* zone that was established by Rauser-Chernousova and others (1979) and Invanova and others (1979) in the Moscow Syncline, Russia.

Triticites sp. is a rather long-ranging species which indicates the Late Kassimovian to Early Gzhelian age. (Rauser-Chernousova and others, 1979 and Invanova and others, 1979). Only *Triticites* sp. was found in Pha Mo (Location TCM 94-1), Pha Mo Noi (Location TCM 94-2) and Location TCM 94-5.

2. *Daixina* zone

The *Daixina* zone, about 8.3 m thick, conformably overlies *Triticites* zone and underlies *Pseudoschwagerina* zone. This zone is defined as the stratigraphic interval between the first appearance of *Daixina* sp. and that of *Pseudoschwagerina* sp. This *Daixina* zone may be corresponding to *Daixina* zone that was established by Davydov (1988).

The geologic age of this zone is considered as Gzhelian by Davydov (1988). *Daixina* sp. was found in Phu Khao (Location TCM 94-3), together with *Triticites* sp. but without *Pseudoschwagerina* sp.

3. *Pseudoschwagerina* zone

The *Pseudoschwagerina* zone, about 11 m thick, is defined as the stratigraphic interval from the first to last appearance of *Pseudoschwagerina* sp. The stratigraphic relationship between the present zone and the subjacent *Daixina* zone are conformable. This *Pseudoschwagerina* zone may be corresponding to *Pseudoschwagerina* zone in fusulinid zonation of the Tethyan realm that is summarized by Ingavat and others (1980).

The geologic age of this zone is considered as Asselian by Ingavat and others (1980), Ingavat (1984) and Dawson and Racey (1993). *Pseudoschwagerina* sp. was found in the upper part of Location TCM 94-3. It is abundant in Location TCM 94-4 and associated with *Daixina* sp., *Schubertella* sp., *Triticites* sp. and *Jigulites* sp.

4. *Pseudofusulina-Chalaroschwagerina* zone

The *Pseudofusulina-Chalaroschwagerina* zone, about 38 m thick, is defined as the stratigraphic interval from the first appearance of *Pseudofusulina* sp. to the last appearance of *Chalaroschwagerina* sp. This zone is characterized by the occurrence of *Pseudofusulina* sp. and *Chalaroschwagerina* sp. and it overlies the *Pseudoschwagerina* zone. The stratigraphic relationship between the present zone and the subjacent *Pseudoschwagerina* zone are unconformable. In this study, the author can not observe the faunas that indicate Sakmarian age which is between the *Pseudoschwagerina* zone and *Pseudofusulina-Chalaroschwagerina* zone. The present zone may be corresponding to *Pseudofusulina vulgaris-Chalaroschwagerina* zone which was established by Dawson and Racey (1993).

Although the fusulinids (*Pseudofusulina* sp. and *Parafusulina* sp.) in the lower part of this zone are long-ranging and can not indicate the certain age, but they are associated with coral (*Protomichelinia* sp.) which indicates Yahtashian to Bolorian ages (Jirawanwasana, 1995). The upper part of this zone contains *Chalaroschwagerina* sp. which is referred to Dawson and Racey (1993) and Ueno (1991), as Yahtashian age. So, the age of this zone is considered as Yahtashian which is based on *Protomichelinia* sp. in the lower part and *Chalaroschwagerina* sp. in the upper part. *Chalaroschwagerina* sp. together with *Parafusulina* sp., *Pseudofusulina* sp. and coral (*Protomichelinia* sp.) were found in Location TCM 94-10.

5. *Pamirina* zone

The *Pamirina* zone, about 17.7 m thick, is defined as the stratigraphic interval from the first to last appearance of *Pamirina* sp. The *Pamirina* zone overlies

Pseudofusulina-Chalaroschwagerina zone based on structural ground but the contact can not be observed. It may be in the upper part of *Pseudofusulina-Chalaroschwagerina* zone because Ueno (1991) summarized that the genus *Pamirina* is most characteristic in the upper part of *Pseudofusulina-Chalaroschwagerina* zone of Late Yahtashian age. *Pamirina* sp. was found in Location TCM 94-11 and associated with *Sphaerulina* sp., and *Schubertella* sp.

6. *Yangchienia* zone

The *Yangchienia* zone in this study is defined as the stratigraphic interval from the first to last appearance of *Yangchienia* sp. The occurrence of *Yangchienia* sp. based on the previous researchs can be summarized as follow :

Yangchienia iniqua Lee was studied from the upper part of the Chihhsia Limestone in South China. It is in *Cancellina* zone (Sheng, 1963) which corresponds to Kubergandian age.

Toriyama and others (1974) studied fusulinid faunas from Khao Phlong Phrab, Saraburi. *Yangchienia* cfr. *compressa* (Ozawa) was found in B4 *Maklaya pamirina* zone, corresponding to Kubergandian age. *Yangchienia haydeni* Thompson, *Yangchienia tobleri* Thompson and *Yangchienia thompsoni* Skinner and Wilde were observed in B7 *Presumatrina schellwieni* zone, indicating Murghabian.

According to Toriyama and others (1974), *Yangchienia* sp. is ranging from Kubergandian to Murgabian ages. But the age of this zone is considered to be Kubergandian based on coral (*Crassiparietiphyllum* sp.) found in the upper part of this zone (Jirawanwasana, 1995).

The lower part of Wat Sunantharam section are barren of fossils. The rock types are dolomitic and micritic limestones. Its age is estimated to be Bolorian? based on stratigraphy.

The middle part of Wat Sunantharam section (Location TCM 94-9) contains *Yangchienia* sp. associated with *Verbeekina* sp., *Pseudofusulina* sp. and *Parafusulina* sp. Furthermore, *Pseudofusulina* sp. and *Parafusulina* sp. were also found in the uppermost bed of this location which overlies the *Yangchienia* zone and coral (*Crassiparietiphyllum* sp.) bed. *Pseudofusulina* sp. and *Parafusulina* sp. are long-ranging and the uppermost bed may be younger than the *Yangchienia* zone.



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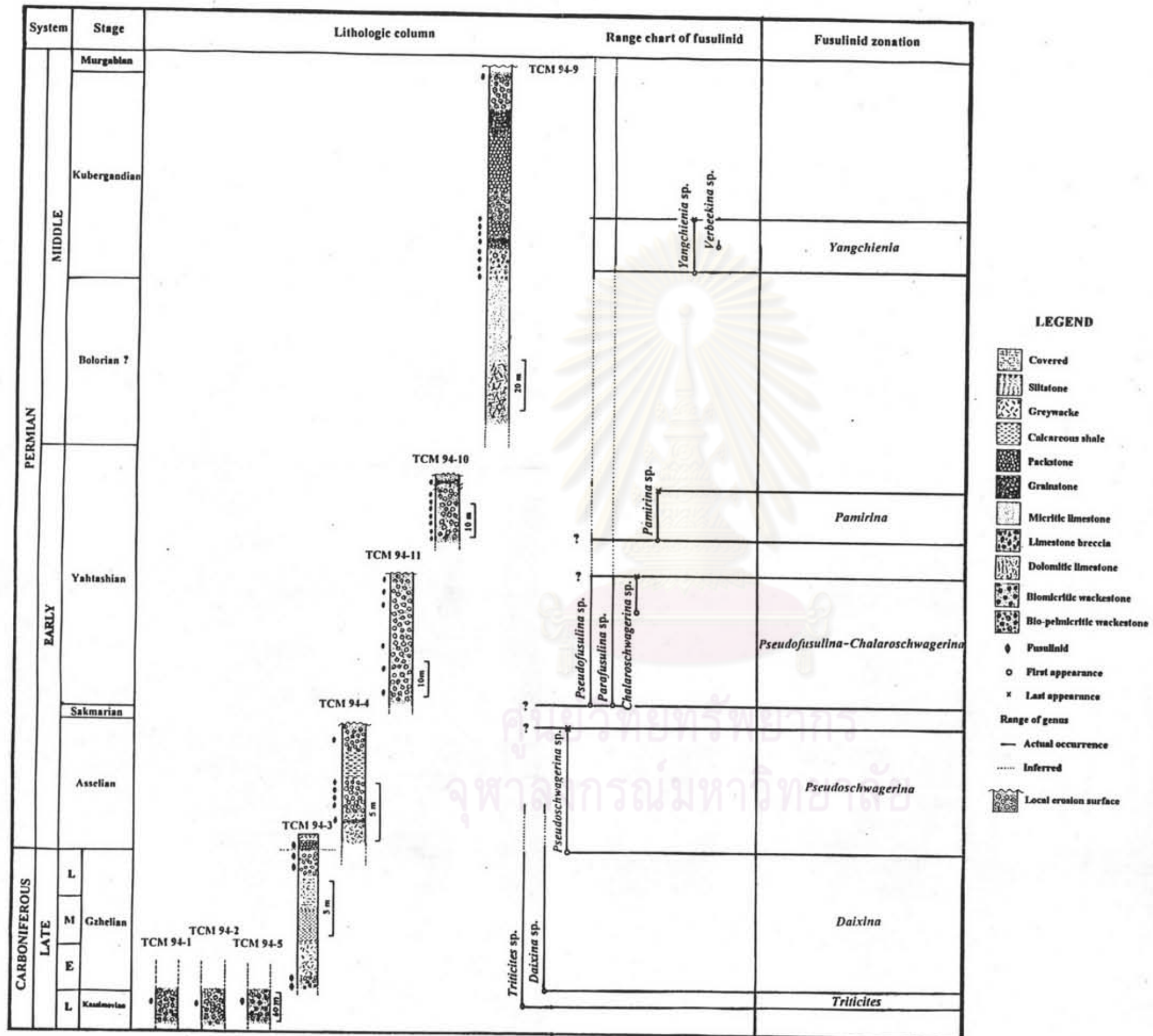


Figure 100 Fusulinid zonation in the study areas.