

**High-Resolution International Correlation of the Lower
Triassic in Southern Thailand Based on Integrated
Stratigraphy of Ammonoids, Conodonts and Carbon
Isotope**

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Kittichai TONGTHERM

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Triassic in Southern Thailand Based on Integrated
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Kittichai TONGTHERM

CONTENTS

	Pages
ABSTRACT.....	iii
LIST OF FIGURES.....	v
LIST OF TABLES	xi
1. Introduction	1
2. Research methods	6
3. Paleogeographical and geological setting	9
4. Results	
4.1. Stratigraphy	11
4.2. Biostratigraphy	
4.2.1. Ammonoid succession	18
4.2.2. Conodont succession	19
4.3. Carbon isotope chemostratigraphy	26
5. Discussion	
5.1. International correlation of the Lower Triassic in southern Thailand	28
5.2. Age of the ichthyopterygian <i>Thaisaurus</i>	34
5.3. Aspect of Spathian ammonoid fauna	39
5.4. Aspect of Spathian conodont fauna	41
5.5. Stratigraphy relationships of the Chaiburi Formation between the isolated mountains	44

	Pages
6. Systematic paleontology	
6.1. Ammonoids	46
6.2. Conodonts	83
7. Conclusions	107
8. Acknowledgement	109
9. References	110

ABSTRACT

High-resolution international correlation of the marine Triassic Phukhaothong Dolomite Member of the Chaiburi Formation, which belongs to the Shan Thai Terrane or Sibumasu Block, in the Phatthalung area in southern Thailand is reported based on integrated stratigraphy of ammonoids, conodonts and carbon isotope. The 104 m+ thick Phukhaothong Dolomite Member exposed on the north side of an isolated mountain at Khao Thong consists of bedded to massive, light grey dolomite.

Ammonoids occur only in the middle to upper parts of the member, whereas conodonts are abundant throughout the sequence. Seven distinct early Spathian ammonoid assemblages, the *Columbites* sp. indet. beds, *Arctomeekoceras?* sp. indet. beds, *Tirolites* sp. indet. B beds, *Tirolites* sp. indet. C beds and *Tirolites* sp. indet. D bed in the *Tirolites-Columbites* Zone, and the *Idahocolumbites cheneyi* beds and *Idahocolumbites* sp. nov. beds in the *Idahocolumbites* Zone, as well as a late Smithian conodont zone, the *Hadrodontina aequabilis-Staeschegnathus perrii* Zone, and three early Spathian conodont zones, *Icriospathodus crassatus* Zone, *Triassospathodus symmetricus-Novispathodus anhuiensis* Zone and *Novispathodus* sp. indet. I-*Novispathodus* sp. indet. J Zone are recognized in ascending order.

A total of 104 dolomite samples were measured for carbon isotope ratio ($\delta^{13}\text{C}_{\text{carb}}$). Low $\delta^{13}\text{C}_{\text{carb}}$ value (-0.97‰) measured at the base of the section are followed by a gradual increase until highest value (+3.86‰) within the lower part of the member including the *Hadrodontina aequabilis-Staeschegnathus perrii* Zone. The values gradually decrease from +3.86 to -0.59‰ within the middle part of the member, and then gradually increase from -0.60‰ to +1.89‰ within the upper part of the member. The carbon cycle curve recorded in the Phukhaothong Dolomite Member corresponds to the late Smithian to early Spathian global carbon isotope positive and following negative excursions recorded from the Tethyan, Panthalassa and Boreal regions. The Smithian-Spathian boundary is probably located between the *Hadrodontina aequabilis-Staeschegnathus perrii* and *Icriospathodus crassatus* zones.

The age of the primitive ichthyopterygian *Thaisaurus chonglakmanii* collected from the *Idahocolumbites cheneyi* beds is constrained to the early Spathian, thus suggesting it is the oldest known ichthyopterygian, because the range of *Marcouxia* and *Idahocolumbites* is limited to the *Columbites parisiensis* Subzone of the lower Spathian in the western USA.

The Spathian ammonoid faunas exhibit a very strong relationship with other Tethyan as well as eastern Panthalassa faunas in the low equatorial zone, but show no relationship with faunas in the middle and higher latitudinal areas, suggesting that the faunas were differentiated in the latitude direction during the Spathian. The late Smithian to early Spathian conodont faunas also show a strong relationship with faunas in the low equatorial zone.

Most of the Chaiburi Formation is distributed as isolated mountains protruding from the Quaternary plain and consequently, it had been difficult to make detailed correlations between these isolated mountain outcrops because of the absence of key age datable horizon such as tuff beds. Discovery of ammonoid *Marcouxia chaiburiensis* at Khao Chingcho permits to correlate this section with the Khao Thong section. Because *M. chaiburiensis* is easily recognizable in the field and its occurrence is limited to a narrow stratigraphic range, this ammonoid may provide an important key for understanding the stratigraphic relationships of the Chaiburi Formation distributed throughout the isolated mountain outcrops as well as the geological structure in the Phatthalung area.

Fifty-eight taxa (ammonoids: 26, conodonts: 32) including two new ammonoid species (*Marcouxia chaiburiensis*, *Idahocolumbites* sp. nov.) are described.

Keywords: Ammonoids, carbon isotope, Chaiburi Formation, conodonts, Lower Triassic, Peninsular Thailand, Phatthalung, Phukhaothong Dolomite Member, Olenekian, Smithian, Spathian, stratigraphy.

LIST OF FIGURES

	Pages
Figure 1. Paleogeographic map for the Early Triassic showing the positions of the key areas of Smithian-Spathian studies	3
Figure 2. Geological map of the Phatthalung area, southern Thailand, and locality of Khao Thong section.	4
Figure 3. Selected photographs from the Khao Thong section in the Phatthalung area and the topographic map.	5
Figure 4. Plan view of Khao Thong section showing structural attitude of beds as well as locality numbers.	7
Figure 5. Plan view of Khao Thong section showing structural attitude of beds as well as carbon isotope locality numbers.	8
Figure 6. Columnar section of the Khao Thong section in the Phatthalung area.	14
Figure 7. Species composition of the ammonoid assemblages in the Phukhaothong Dolomite Member at the Khao Thong section.	15
Figure 8. List of collected ammonoids from the Phukhaothong Dolomite Member at the Khao Thong section and the number of specimens used in this study.	16

	Pages
Figure 9. List of collected conodont elements from the Phukhaothong Dolomite Member at the Khao Thong section and the number of specimens used in this study.	17
Figure 10. Stratigraphic occurrences of ammonoids and gastropod in the Phukhaothong Dolomite Member at the Khao Thong section.	23
Figure 11. Stratigraphic occurrences of conodonts and ichthyopterygia <i>Thaisaurus chonglakmanii</i> in the Phukhaothong Dolomite Member at the Khao Thong section.	24
Figure 12. Ammonoids and conodont biostratigraphic subdivision of the Smithian and Spathian of the Phatthalung area, southern Thailand and correlation with other regions.	25
Figure 13. Carbon isotope data from the Phukhaothong Dolomite Member. The bed numbers of measured dolomite samples are shown in the right side.	27
Figure 14. Detailed correlations of Smithian-Spathian sections based on a combination of ammonoid and conodont biostratigraphy and C isotope chemostratigraphy	32
Figure 15. Spathian (upper Olenekian, Lower Triassic) ammonoid zones and their correlation with the fossil record of Ichthyopterygia.	36

	Pages
Figure 16. Selected photographs from the Khao Thong section in the Phatthalung area.	37
Figure 17. Holotype of <i>Thaisaurus chonglakmanii</i> (No. TF2454).	38
Figure 18. Paleogeographical distribution of selected Spathian ammonoids.	40
Figure 19. Paleogeographical distribution of selected Smithian conodonts.	42
Figure 20. Paleogeographical distribution of selected Spathian conodonts.	43
Figure 21. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Cordillerites angulatus</i> Hyatt and Smith, 1905.	67
Figure 22. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Tirolites</i> sp. indet. B.	68
Figure 23. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Tirolites</i> sp. indet. C.	69
Figure 24. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Columbites</i> sp. indet.	70

	Pages
<p>Figure 25. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Idahocolumbites cheneyi</i> (Kummel, 1969).</p>	71
<p>Figure 26. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Idahocolumbites</i> sp. nov.</p>	72
<p>Figure 27. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Idahocolumbites</i> sp. indet. A</p>	73
<p>Figure 28. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Marcouxia chaiburiensis</i> Tongtherm and Shigeta in Tongtherm et al., 2020a</p>	74
<p>Figure 29. Scatter diagrams of rib number versus shell diameter (D) for <i>Marcouxia chaiburiensis</i> Tongtherm and Shigeta in Tongtherm et al., 2020a</p>	75
<p>Figure 30. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Bajarunia pilata</i> (Hyatt and Smith, 1905)</p>	76

	Pages
Figure 31. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for <i>Arctomeekoceras?</i> sp. indet.	77
Figure 32. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for Gen. et sp. indet. A.	78
Figure 33. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for Gen. et sp. indet. B.	79
Figure 34. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for Gen. et sp. indet. D.	80
Figure 35. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for Gen. et sp. indet. G.	81

Figure 36. Scatter diagrams of whorl high (H), whorl width (W) and umbilicus

82

diameter (U) versus shell diameter (D) and H/D, W/D and U/D versus D for

Gen. et sp. indet. I.

LIST OF APPENDIXS

	Pages
Appendix 1. $\delta^{13}\text{C}/\delta^{12}\text{C}$ isotopic data of dolomite samples from the Phukhaothong Dolomite Member at the Khao Thong section in the Phatthalung area, southern Thailand.	220
Appendix 2. List of ammonoids from the Phukhaothong Dolomite Member at the Khao Thong section in the Phatthalung area, southern Thailand.	224
Appendix 3. List of conodonts from the Phukhaothong Dolomite Member at the Khao Thong section in the Phatthalung area, southern Thailand.	239