

A Middle Triassic radiolarian assemblage from Quxia, Lhaze County, southern Tibet

Qun YANG*, Atsushi MATSUOKA,** Yu-jing WANG*,
Kenta KOBAYASHI***, Tohru NAGAHASHI*** and Qing-gao ZENG****

Abstract

A radiolarian assemblage was extracted from a siliceous mudstone sample of Triassic shallow marine sequences exposed south of Quxia in the Zhongbei area, Lhaze County, southern Tibet. The radiolarian assemblage discovered in this study is characterized by having abundant spumellarians and few nassellarians. It includes *Cryptostephanidium cornigeum* Dumitrica, *Hindeosphaera spinulosa* (Nakaseko and Nishimura), *Muelleritortis cochleata* (Nakaseko and Nishimura), *Pseudostylosphaera goestlingensis* (Kozur and Mostler), *Pseudostylosphaera hellenica* (De Wever), *Pseudostylosphaera japonica* (Nakaseko and Nishimura), *Pseudostylosphaera nazarovi* (Kozur and Mostler), *Triassocampe* sp. cf. *T. deweveri* (Nakaseko and Nishimura) and *Tritortis*(?) sp. The faunal association is comparable to that of the TR 4A zone in the Mino Terrane, central Japan, proposed by Sugiyama (1997). The age of the assemblage is assignable to Ladinian (Middle Triassic). Comparison with radiolarian biostratigraphic works in other areas is also concordant with this age assignment.

Key words: Ladinian, Middle Triassic, Quxia, Radiolaria, southern Tibet, Zhongbei area.

Introduction

The Zhongbei area in southern Tibet is situated in the Himalaya Tectonic Unit (Shackleton, 1981), south of the Yarlung Zangbo Suture Zone (Fig. 1). The unit in the study area is composed of the Tethys-Himalayan zone and the Melange zone. The former consists mainly of Triassic shallow marine sediments of Gondwana origin. The latter is made up of clastic sediments with huge blocks (up to 2 km long) of Permian limestone. The Melange zone

* Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing 210008, China.

** Department of Geology, Faculty of Science, Niigata University, Niigata 950-2181, Japan.

*** Graduate School of Science and Technology, Niigata University, Niigata 950-2181, Japan.

**** Institute of Geological Science of Tibet, Lhasa 851400, China.

(Manuscript received 7 January, 2000; accepted 18 January, 2000)

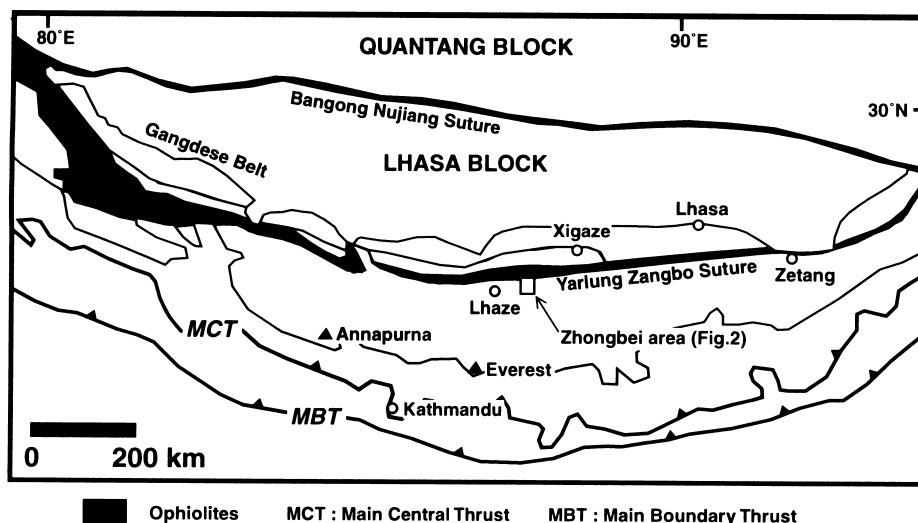


Fig. 1. Index map of the study area.

tectonically overlays the Tethys-Himalayan zone. The boundary thrust between these two zones is nearly horizontal. Paleogene molasse sediments called the Liuqu Formation occupies between the Himalaya Tectonic Unit and the Yarlung Zangbo Ophiolite Belt with fault contacts (Yin and Sun, 1988).

Triassic strata of the study area include the Zhongbei Formation (Lower Triassic mudstone intercalated with thin-bedded limestone with bivalves and ammonites), Xiukang Formation (Middle Triassic mudstone and limestone interbeds with bivalves) and Jilong Formation (Upper Triassic sandstone and mudstone with bivalves) (Yin and Sun, 1988). These formations are in fault contact with each other. Radiolarians were previously reported from the limestones of the Xiukang Formation collected west of our sample locality near the village of Xiukang (Yin and Sun, 1988). The reported radiolarians, however, were calcified and were observed in rock thin sections. Previous researchers were unable to extract those radiolarians and to conduct a micropaleontological study.

In our field survey in 1998, we collected 15 rock samples from the Triassic sediments for a micropaleontological research in the Zhongbei area (Figs. 1 and 2). One sample (Loc. 98061027 in Fig. 2) obtained from an outcrop composed of stratified siliceous mudstone (Fig. 3) yield identifiable radiolarian specimens after HF treatment. The sample point is located south of Quxia and is situated within undivided Triassic strata according to previous stratigraphic investigation (Yin and Sun, 1988). No further detailed stratigraphic and paleontological data at the sample locality are available. Radiolarian analysis conducted in this study reveals the stratified siliceous mudstone is Middle Triassic (Ladinian) in age.

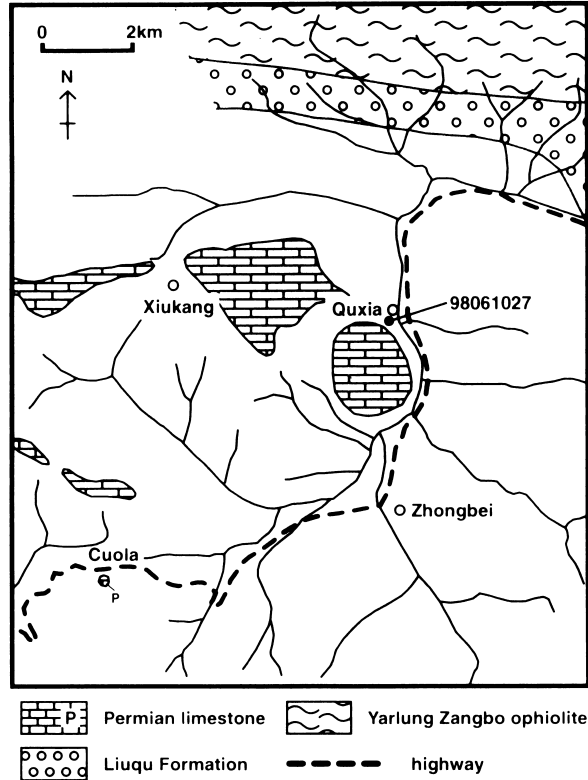


Fig. 2. Schematic geological map showing sample locality (98061027) in the Zhongbei area, southern Tibet, China. Simplified from Yin and Sun (1988).

Description of radiolarian assemblage and age assignment

The present radiolarian assemblage, poor to moderate in preservation, includes the following taxa:

- Cryptostephanidium cornigeum* Dumitrica (Pl. 1, Fig. 9)
- Hindeosphaera spinulosa* (Nakaseko and Nishimura) (Pl. 1, Fig. 7)
- Muelleritortis cochleata* (Nakaseko and Nishimura) (Pl. 1, Figs. 11-14)
- Pseudostylosphaera goestlingensis* (Kozur and Mostler) (Pl. 1, Fig. 5)
- Pseudostylosphaera hellenica* (De Wever) (Pl. 1, Fig. 6)
- Pseudostylosphaera japonica* (Nakaseko and Nishimura) (Pl. 1, Figs. 1-2)
- Pseudostylosphaera nazarovi* (Kozur and Mostler) (Pl. 1, Figs. 3-4)
- Triassocampe* sp. cf. *T. deweveri* (Nakaseko and Nishimura) (Pl. 1, Fig. 8)
- Tritortis*(?) sp. (Pl. 1, Fig. 10)



Fig. 3. Photograph of stratified siliceous mudstone where the sample (98061027) was collected. The hammer is 33 cm in length.

This faunal assemblage is characterized by having relatively abundant spumellarians and by being poor in nassellarian taxa. The most abundant taxa are species belonging to the genera *Pseudostylosphaera* Kozur and Mostler and *Muelleritortis* Kozur. It is noted that the genus *Triassocampe* Dumitrica, Kozur and Mostler, which commonly occurs in corresponding radiolarian-bearing strata in other areas, is rarely observed in this assemblage.

Although the preservation of the current radiolarian assemblage is relatively poor, the presence of some age-diagnostic taxa such as species of *Cryptostephanidium*, *Muelleritortis* and *Pseudostylosphaera* makes it possible to analyze its biostratigraphic and chronostratigraphic position. According to Sugiyama's (1997) range chart established in the Mino Terrane, central Japan, the co-occurrence of *Cryptostephanidium cornigeum* and *Muelleritortis cochleata* is restricted to the TR 4A zone. The stratigraphic ranges of *Pseudostylosphaera goestlingensis*, *Pseudostylosphaera japonica* and *Pseudostylosphaera nazarovi* also include the TR 4A zone. Therefore, the present radiolarian assemblage can be correlated with that of the TR 4A zone by Sugiyama (1997), indicating a Ladinian age. Kozur and Mostler (1994) pointed out that the abundant occurrence of *Muelleritortis cochleata* is

characteristic of the upper Ladinian *Muelleritortis cochleata* zone in the Alps. The current assemblage is also correlatable to the *Emiluvia(?) cochleata* assemblage (e.g., Nakaseko and Nishimura, 1979; Kishida and Sugano, 1982; Sato et al., 1986) in southwest Japan, probably to the *Pseudostylosphaera japonica* assemblage of Sashida et al. (1993) of the Kiso Mountains in central Japan and to Yeh's (1992) US91-33G assemblage of Uson Island in the Philippines. All these works suggested these assemblages are generally indicative of a Middle Triassic (most probably Ladinian) age. Therefore, the radiolarian assemblage from the Zhongbei area reported herein is assignable to a Ladinian age.

Acknowledgements

K. Sugiyama (Geological Survey of Japan) gave us constructive comments on identification of radiolarians and age assignment. This research has been supported by Grant-in-Aid for Scientific Research from the Ministry of Education, Science, Sports and Culture of Japan (no. 10041114 to Matsuoka). Japan Society of Promotion for Science and Chinese Academy of Science provided financial support for Yang's academic visit to Japan in 1999.

References

- Kishida, Y. and Sugano, K., 1982, Radiolarian zonation of Triassic and Jurassic in outer side of Southwest Japan. *News of Osaka Micropaleontologists, Spec. Vol.*, no. 5, 271-300. (in Japanese with English abstract)
- Kozur, H. and Mostler, H., 1994, Anisian to Middle Carnian radiolarian zonation and description of some stratigraphically important radiolarians. *Geol. Palaeont. Mitt. Innsbruck, Sonderbd.* **3**, 39-255.
- Nakaseko, K. and Nishimura, A., 1979, Upper Triassic Radiolaria from southwest Japan. *Sci. Rep., Coll. Educ. Osaka Univ.*, **28**, 61-109.
- Sashida, K., Nishimura, H., Igo, H., Kazama, S and Kamata, Y., 1993, Triassic radiolarian faunas from Kiso-fukushima, Kiso Mountains, central Japan. *Sci. Rep. Inst. Geosci., Univ. Tsukuba, Sec. B*, **14**, 77-97.
- Sato, T., Murata, M. and Yoshida, H., 1986, Triassic and Jurassic radiolarian biostratigraphy in the southern part of Chichibu terrain of Kyushu, Japan. *News of Osaka Micropaleontologists, Spec. Vol.*, no. 7, 9-23. (in Japanese with English abstract)
- Shackleton, R.M., 1981, Structure of Southern Tibet: report on a traverse from Lhasa to Khatmandu organized by Academia Sinica. *Jour. Struct. Geol.*, **3**, 97-105.
- Sugiyama, K., 1997, Triassic and Lower Jurassic radiolarian biostratigraphy in the siliceous claystone and bedded chert units of the southeastern Mino Terrane, Central Japan. *Bull. Mizunami Fossil Museum*, no. 24, 79-193.
- Yeh, K., 1992, Triassic Radiolaria from Uson Island, Philippines. *Bull. National Museum, Natural Science*, no. 3, 51-91.
- Yin, J. and Sun, Y., 1988, Triassic System in the Zhongbei area, Lhaze County, southern Tibet. *Bull. Inst. Geol. Acad. Sinica*, **3**, 73-79. (in Chinese)

Explanation of Plate 1

All the figures are scanning electron micrographs of Middle Triassic (Ladinian) radiolarians extracted from a siliceous mudstone sample (98061027) collected from Quxia, Lhaze County, southern Tibet (China). The numbers in parenthesis after magnification are serial numbers of scanning electron micrographs deposited in the Department of Geology, Faculty of Science, Niigata University.

- Figs. 1-2. *Pseudostylosphaera japonica* (Nakaseko and Nishimura), 1, ×100 (25987); 2, ×100 (25968)
- Figs. 3-4. *Pseudostylosphaera nazarovi* (Kozur and Mostler), 3, ×100 (25954); 4, ×100 (25972)
- Fig. 5. *Pseudostylosphaera goestlingensis* (Kozur and Mostler), ×100 (25976)
- Fig. 6. *Pseudostylosphaera hellenica* (De Wever), ×100 (25975)
- Fig. 7. *Hindeosphaera spinulosa* (Nakaseko and Nishimura), ×175 (25970)
- Fig. 8. *Triassocampe* sp. cf. *T. deweveri* (Nakaseko and Nishimura), ×175 (25951)
- Fig. 9. *Cryptosphanidium cornigeum* Dumitrica, ×250 (25960)
- Fig. 10. *Tritortis*(?) sp., ×250 (25991)
- Figs. 11-14. *Muelleritortis cochleata* (Nakaseko and Nishimura), 11, ×100 (25998); 12, ×100 (25992); 13, ×100 (25978); 14, ×100 (25996)

Plate 1

