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Ostracods from the Upper Permian and Lower Triassic of the Zhenfeng Section, South China

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(With 1 Figure and 2 Plates)

Abstract

In the Zhenfeng Section, Guizhou Province, South China, the Permian-Triassic boundary beds are well developed yielding prolific and well-preserved ostracod fossils. The upper Upper Permian yields the *Petasobaridia-Ceratobairdia-Mirabairdia* ostracod assemblage, and the lowermost Triassic yields the *Hollinella-Carinaknightina-Langdaia* assemblage. These two assemblages have a wide distribution in South China, and might have the potential for discerning the upper Upper Permian and Lower Triassic strata.

Key Words: Permian, Triassic, Ostracods, South China.

Introduction

Records of the Permian and Triassic strata and invertebrate fauna in South China date back to more than a century. Much work has been done, but the researches on ostracods, especially at the Permian-Triassic boundary, are relatively scarce. Upper Permian ostracods were described by CHEN and SHI (1982), SHI and CHEN (1987), and WANG (1978); a few species from the Lower Triassic were described by WANG (1978).

The ostracod fossils studied in this paper were collected from the Zhenfeng Section in 1987, 1990 and 1991. The purpose of this paper is to summarize the characteristics of the ostracod fauna, to give a brief description of their paleogeographic distribution, and to discuss their potentiality for defining the Permian-Triassic boundary. Detailed systematic description of ostracod fossils of the Changxing Formation and the lowermost Feixianguan Formation of the Zhenfeng Section have been published by HAO (1992a; 1992b).

Biostratigraphy

The Zhenfeng Section is located 5 km northeast of Longchang township, Zhenfeng County, Guizhou Province, South China (Fig. 1). Here, the Permian-Triassic boundary beds are well developed yielding prolific and well-preserved ostracod fossils, predominantly bairdian ostracods. The upper Upper Permian Changxing Formation consists mainly of limestone and lydite, and can be subdivided into two parts, based on lithological characters and ostracod fauna (HAO, 1992). The lower Lower Triassic, called the

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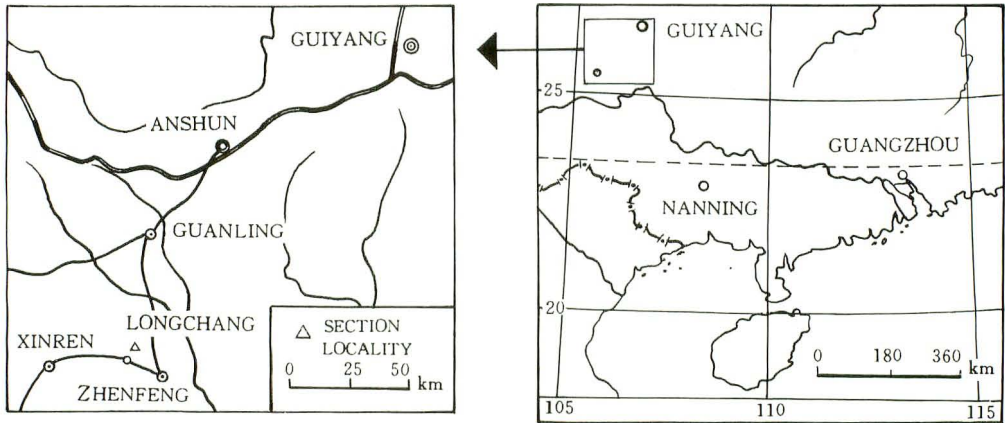


Fig. 1 Map showing the location of the Zhenfeng area.

Feixianguan Formation, consists mainly of light grey, medium-bedded marly limestone.

The lower part of the Changxing Formation consists of grey, dark grey, medium-bedded limestone, 14.4 m thick. It yields the ostracods: *Hollinella tingi*, *Coronakirkbya binodosa*, *Kellettina binodosa*, *Amphissites biambonaria*, *A. centronotus*, *Roundyella papilliformis*, *Knoxiella xinhuaensis*, *K. cf. oblonga*, *Bairdia chasae*, *B. spinosa*, *Petasobairdia unispinata*, *P. nantongensis*, *P. bicornuta*, *P. atopa*, *P. sp.*, *Ceratobairdia sinensis*, *C. zhenfengensis*, *Mirabairdia comisa*, *Rectobairdia firmata*, *Bairdiacypris ventralis*, *Acratia olivifera*, *A. pulchra*, *Acanthoscapha longicostata*, *A. camura*, and *Basslerella obesa*. These ostracods are associated with the conodonts *Neogondolella changxingensis*, *N. orientalis*, *Hibbardelloides sp.*, and the fusulinids *Paleofusulina sinensis*, *P. laxa*, *P. nana*, *P. minima*, *P. simplex*, *Nankinella compacta*.

The upper part of the Changxing Formation consists mainly of dark-grey lydite, with micritic limestone interbeds, 40.7 m thick. It yields the ostracods: *Rectobairdia applanata*, *Petasobairdia atopa*, *P. bicornuta*, *Bairdiacypris ventralis*, *Basslerella obesa*, *Microcheilinella sp.*, *Bairdia sp.* These ostracods are associated with the conodonts *Neogondolella changxingensis*, and the ammonoids *Pseudogastrioceras sp.*, *Pseudotirolites sp.*

The lower part of the Feixianguan Formation consists of mudstone, with thin limestone interbeds, 3.3 m thick. The lowermost part consists of dark-brown clay, 0.6 m thick. This dark-brown clay yields the abundant ostracods: *Hollinella cf. plana*, *H. tingi*, *H. unispinata*, *Carinaknightina carinata*, *C. zhenfengensis*, *Langdaia suboblonga*, *Acratia symmetrica*. These ostracods are associated with the bivalve *Claraia wangi*.

Characteristics of ostracod fauna

In the Zhenfeng Section, 18 genera, including 33 species, of ostracods of the Upper Permian to Lower Triassic have been found. Among them, 16 genera, including 26 species, are from the Changxing Formation and 4 genera, including 7 species, are from

the base of the Feixianguan Formation.

1. Upper Upper Permian (Changxing Formation) *Petalobairdia-Ceratobairdia-Mirabairdia* assemblage

The Changxing Formation is characterized by the *Petalobairdia-Ceratobairdia-Mirabairdia* ostracod assemblage. The faunal features change stratigraphically as follows:

(1) Lower Part: The amount of specimens, and the number of genera and species, increase rapidly. These amount to 90 per cent of all the ostracods of the Changxing Formation. The valve ornaments become very diversified. *Petasobairdia unispinata*, *P. nantongensis*, *P. bicornuta*, *Ceratobairdia sinensis*, *C. zhenfengensis*, *Coronakirkbya binodosa* and *Kelletia binodosa* are the representatives of this part.

(2) Upper Part: It contains fewer ostracods, and fewer genera and species; these amount to only 10 per cent of all the ostracods of the Changxing Formation. The ostracod valves become thin. *Petasobairdia atopa*, *P. bicornuta*, *Hollinella tingi* are the representatives of this assemblage.

The ostracods of Changxing Formation are well preserved; the valves are large, mostly 1 to 1.5 mm in length; the valve ornaments are distinct. Specimens with dorsal ornaments, for example *Petasobairdia* and *Ceratobairdia*, are very abundant. Specimens of *Petasobairdia* may amount to several hundreds in a one-kilogram sample.

The ostracod assemblage and features of the Zhenfeng Section are similar to those of Changxing County, Zhejiang Province (SHI and CHEN, 1987); of Miyang County, Hubei Province; and of Nantong County, Jiangsu Province (CHEN and SHI, 1982). The above-mentioned ostracod fauna is also distributed in Qinglong County, Guizhou Province (WANG, 1978).

The known species of *Ceratobairdia* have their stratigraphic distribution restricted to the Permian (SOHN, 1954; WANG 1978). The known species of *Petasobairdia* also appear mainly in the Permian (CHEN and SHI, 1982; SHI and CHEN, 1987). *Mirabairdia* genus has been found not only in the Triassic (?) of the Alps area (KOLLMANN, 1963), but also in the Upper Permian of Jiangsu Province (CHEN and SHI, 1982).

Some species of the Upper Permian of the Zhenfeng Section, for example *Ceratobairdia sinensis*, *C. zhenfengensis*, *Coronakirkbya binodosa*, *Kelletina binodosa*, *Roundylla papilliformis*, are similar to the Permian species of Texas and Illinois; and *Amphissites centronotus*, *Bairdia chasae*, *B. spinosa*, *Basslerella obesa* have been found both from the Upper Permian of North America (SOHN, 1954; 1960) and the Zhenfeng Section.

In South China, the *Petasobairdia-Ceratobairdia-Mirabairdia* assemblage of the Changxing Formation is associated with the ammonoids *Rotodiscoceras*, *Pleuronododera*, *Pseudotirolites*, the fusulinids *Palaeofusulina*, *Nankinella*, and the conodonts *Neogondolella* (YANG *et al.*, 1987; YAO *et al.*, 1980; LI *et al.*, 1989). Therefore, this assemblage may be assigned to the Upper Permian.

2. Lower Triassic (Feixianguan Formation) *Hollinella-Carinaknightina-Langdaia* assemblage

The lowermost Feixianguan Formation is characterized by the *Hollinella-Carinaknightina-Langdaia* ostracod assemblage. The first occurrence of the *Hollinella-Carinaknightina-Langdaia* ostracod fauna marks the base of the Feixianguan Formation (early Triassic). *Hollinella tingi* and *Langdaia suboblonga* have a wide distribution in South China, especially in the western and southern parts of South China. The assemblage began to appear in the Triassic, and was restricted to the lower part of Lower Triassic (WANG, 1978). Many specimens of *Carinaknightina* genus were also found in the Zhenfeng Section. The distinctive feature of these specimens is that every specimen possesses a dorsal ridge on its upper part. This genus, including three species, has been described by SOHN (1970) from the lower part of the Lower Triassic in the Salt Range, Pakistan. It has been also found from the base of the Lower Triassic in Zunyi and Qinglong County, Guizhou Province (HAO, 1992b; 1994), but has not been reported from other areas. *Hollinella* cf. *plana* was found from the Lower Triassic in the Yunnan and Sichuan Provinces. The *Hollinella-Carinaknightina-Langdaia* ostracod assemblage is associated with the ammonoids *Otoceras*, *Ophiceras*, *Lytophiceras*, the bivalves *Claraia* and *Pteria*, and the conodont *Anchignathodus* (YANG *et al.*, 1987; YAO *et al.*, 1980; LI *et al.*, 1989). Therefore, this assemblage should be assigned to the lowermost Triassic.

Conclusion

The Permian-Triassic boundary beds are well developed in the Zhenfeng Section, Guizhou Province, South China. Ostracod fossils found there are prolific and well preserved. The stratigraphic succession of the ostracod fauna is significant. The upper Upper Permian yields the *Petasobaridia-Ceratobairdia-Mirabairdia* ostracod assemblage, and the lowermost Triassic yields the *Hollinella-Carinaknightina-Langdaia* assemblage. In the Zhenfeng Section, the *Hollinella-Carinaknightina-Langdaia* assemblage occurs at a level 5 m above the *Petasobaridia-Ceratobairdia-Mirabairdia* ostracod assemblage. This 5 m interval consists of shale, barren of fossils. These two ostracod assemblages have a wide distribution in South China, and might have the potential for discerning the upper Upper Permian and Lowermost Triassic strata.

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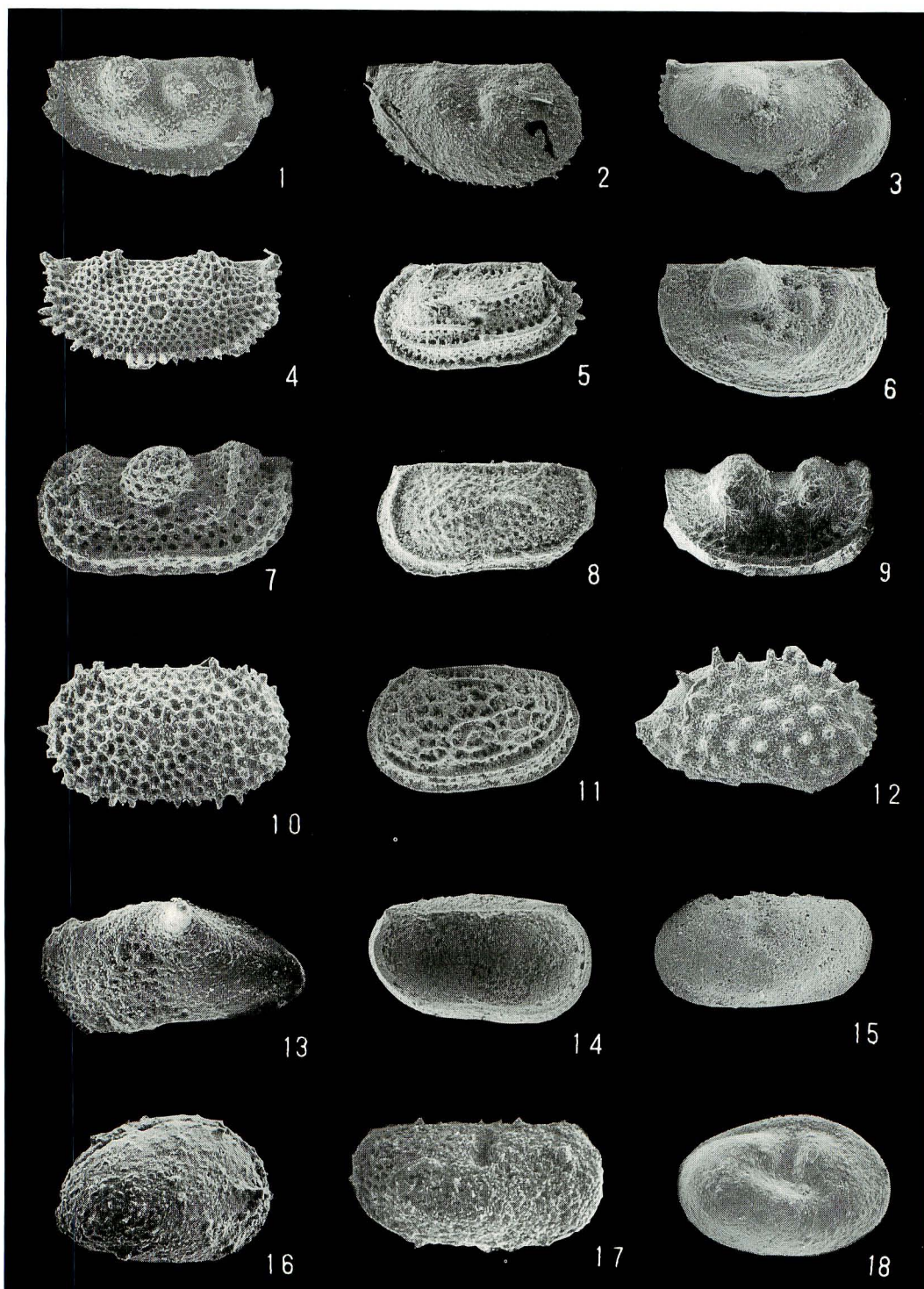
References

- CHEN, D. and SHI, C. (1982): Latest Permian Ostracoda from Nantong, Jiangsu and from Mianyang, Hubei. *Bull. Nanjing Inst. Geol. & Palaeont., Acad. Sinica*, **4**, 105–152.
- HAO, W. (1992a): Latest Permian Ostracods from Zhenfeng, Guizhou. *Acta Sci. Nat. Univ. Pekinensis*, **28**(2), 236–249.
- HAO, W. (1992b): Early Triassic Marine Ostracods from Guizhou. *Acta Micropalaeontologica Sinica*, (9)1, 37–45.
- HAO, W. (1994): The Development of the Late Permian-Early Triassic Ostracod Fauna in Guizhou Province. *Geological Review*, (40)1, 87–93.
- KOLLMANN, K. (1963): Ostrakoden aus der alpinen Trias II. Weitere Bairdiidae. *Jb. Geol.*, **B**, **106**, 121–203.
- LI, Z., ZHAN, L., DAI, J., JIN, R., ZHU, X., ZHANG, J., HUANG, H., XU, D., YAN, Z., and LI, H. (1989): Study of the Permian-Triassic Biostratigraphy and Event Stratigraphy of Northern Sichuan and Southern Shaanxi. 435 ps. Geol. Publ. House, Beijing.
- SHI, C. and CHEN, D. (1987): Ostracods from the Changxing Formation of Meishan, Changxing, Zhejiang Province. *In: Stratigraphy and paleontology of the stratigraphic boundaries in China, Permian-Triassic boundary* (1), 23–80. Nanjing University Press.
- SOHN, I.G. (1954): Ostracoda from the Permian of the Glass Mountains, Texas. *U.S. Geol. Surv.*, Z64-A, 1–24.
- SOHN, I.G. (1960): Palaeozoic Species of Bairdia and Related Genera. *U.S. Geol. Surv.*, 330-A, 1–105.
- SOHN, I.G. (1968): Triassic Ostracodes from Makhtesh Ramon, Israel. *Israel Geol. Survey Bull.*, **44**, 1–71.
- SOHN, I.G. (1970): Early Triassic marine Ostracodes from the Salt Range and Surghar Range, West Pakistan. *Univ. Kansas Dept. Geol. Spec. Publ.*, **4**, 193–206.
- WANG, S. (1978): Late Permian and Early Triassic Ostracods of Western Guizhou and Noretheastern Yunnan. *Acta Palaeontologica Sinica*, (17)3, 277–312.
- YANG, Z., YIN, H., WU, S., YANG, F., DING, M. and XU, G. (1987): Permian-Triassic Boundary stratigraphy and Fauna of South China. 379 ps. Geol. Publ. House, Beijing.
- YAO, Z., XU, J., ZHANG, Z. and MO, Z. (1980): Biostratigraphy of the Late Permian and problems on the Permian-Triassic boundary in Western Guizhou and Eastern Yunnan, 1–69. *In: The coal-bearing strata and palaeontology of the Late Permian in Western Guizhou and Eastern Yunnan*. Science Press, Beijing.

Explanation of Plate 1

All specimens are from the Zhenfeng Section, Guizhou Province, South China, and are stored in the Department of Geology, Peking University.

- Fig. 1. *Hollinella tingi* (Patte)
x38. Changxing Formation
- Fig. 2. *Hollinella* sp. cf. *H. plana* Jiang
x55. Lowermost Feixianguan Formation
- Fig. 3. *Hollinella unispinata* Hao
x34. Lowermost Feixianguan Formation
- Fig. 4. *Coronakirkbya binodosa* Hao
x50. Changxing Formation
- Fig. 5. *Amphissites biambonaria* Hao
x38. Changxing Formation
- Fig. 6. *Hollinella tingi* (Patte)
x40. Lowermost Feixianguan Formation
- Fig. 7. *Amphissites centronotus* (Ulrich et Bassler)
x53. Changxing Formation
- Fig. 8. *Carinaknightina zhenfengensis* Hao
x67. Lowermost Feixianguan Formation
- Fig. 9. *Kellettina binodosa* Hao
x35. Changxing Formation
- Fig. 10. *Roundyella papilliformis* Wang
x60. Changxing Formation
- Fig. 11. *Carinaknightina carinata* Sohn
x50. Lowermost Feixianguan Formation
- Fig. 12. *Bairdia* sp. aff. *B. spinosa* Cooper
x55. Changxing Formation
- Fig. 13. *Bairdia* sp.
x45. Changxing Formation
- Fig. 14. *Carinaknightina carinata* Sohn
x50. Lowermost Feixianguan Formation
- Fig. 15. *Langaia suboblonga* Wang
x55. Lowermost Feixianguan Formation
- Fig. 16. *Basslerella obesa* Kellet
x78. Changxing Formation
- Fig. 17. *Knoxiaella* sp. cf. *K. oblonga* Wang
x70. Changxing Formation
- Fig. 18. *Knoxiaella xinhuaensis* Wang
x42. Changxing Formation



Explanation of Plate 2

All specimens are from the Zhenfeng Section, Guizhou Province, South China, and are stored in the Department of Geology, Peking University.

- Fig. 1. *Petasobairdia bicornuta* Chen
x45. Changxing Formation
- Fig. 2. *Petasobairdia atopa* Hao
x36. Changxing Formation
- Fig. 3. *Ceratobairdia zhenfengensis* Hao
x30. Changxing Formation
- Fig. 4. *Petasobairdia unispinata* Hao
x27. Changxing Formation
- Fig. 5. *Mirabairdia comisa* Chen
x43. Changxing Formation
- Fig. 6. *Petasobairdia unispinata* Hao
x27. Changxing Formation
- Fig. 7. *Acratia symmetrica* Hao
x48. Lowermost Feixianguan Formation
- Fig. 8. *Mirabairdia comisa* Chen
x42. Changxing Formation
- Fig. 9. *Acratia olivera* Chen
x36. Changxing Formation
- Fig. 10. *Bairdia chasae* Kellet
x40. Changxing Formation
- Fig. 11. *Acanthoscapha camura* Hao
x52. Changxing Formation
- Fig. 12. *Ceratobairdia sinensis* Wang
x25. Changxing Formation
- Fig. 13. *Rectobairdia applanata* Hao.
x44. Changxing Formation
- Fig. 14. *Acanthoscapha longicostata* Hao
x35. Changxing Formation
- Fig. 15. *Rectobairdia firmata* Chen
x35. Changxing Formation
- Fig. 16. *Acratia pulchra* Posner
x53. Changxing Formation
- Fig. 17. *Bairdiacypris ventralis* Chen
x34. Changxing Formation
- Fig. 18. *Petasobairdia ventralis* Chen
x40. Changxing Formation

