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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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 coma*, *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 wangii*.

**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
Ostracods from the Upper Permian and Lower Triassic

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. zhenjengensis, Coronakirkbya binodosa and Kellettia binoda 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, Kellettina binodosa, Roundyella papilliformis, are similar to the Permian species of Texas and Illinois; and Amphisites centronotus, Bairdia chasae, B. spinosa, Bassslerella 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, Pleuronododeras, 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 *Caraia* 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


Explanation of Plate I

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. *Coronankirkbya 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. *Langdaia suboblonga* Wang  
x55. Lowermost Feixianguan Formation

Fig. 16. *Basslerella obesa* Kellet  
x78. Changxing Formation

Fig. 17. *Knockiella* sp. cf. *K. oblonga* Wang  
x70. Changxing Formation

Fig. 18. *Knockiella xinhuensis* Wang  
x42. Changxing Formation
Explanation of Plate 2

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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