

Cretaceous Gastropod Assemblages from Xizang (Tibet) with reference to their paleozoogeographical significance

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ABSTRACT — *The Cretaceous marine gastropods are mainly distributed to the north and south of the Yalung Zangbu River, characterized by having Nerineids as their principal element. Based on gastropods and their associated fossils, the assemblages of Xizang bear a similarity to those of Europe, Middle East, Baluchistan as well as Kashmir, all belonging to the Indo-Mediterranean Region of Tethyan Realm.*

RIASSUNTO — [Associazioni di gasteropodi cretacei di Xizang (Tibet) e loro significato paleozoogeografico] — *I gasteropodi marini del Cretaceo si trovano sia a Nord che a Sud del fiume Yalung Zangbu ed hanno come forme caratterizzanti i Nerineidi. Le associazioni fossili della regione del Xizang mostrano somiglianza con quelle contemporanee d'Europa, Medio Oriente, Baluchistan e Kashmir, tutte appartenenti alla Regione Indo-Mediterranea del dominio della Tetide. La fauna studiata riflette un ambiente di acque basse e calde con sedimentazione carbonatica, tipiche di un mare epicontinentale.*

INTRODUCTION

It is well known that in China the continental clastic sediments were dominated over vast areas and contained rich non-marine fossils during the Cretaceous, while the marine deposits of the Cretaceous are known up to date to be exposed only in Xizang, the western part of Tarim Basin, Xinjiang and other coastal regions. Although limited in distribution in China, the marine Cretaceous deposits are of vital importance from the viewpoints of biology and biostratigraphy.

Xizang is one of the regions where the Cretaceous marine strata are best developed and rich in fossils to the north and south of the Yalung Zangbu River. The discovery of these faunas may serve as the best substantial evidence for the study of the paleozoogeographic provinces and distribution of shallow water Tethyan faunas and for a detailed correlation of the sequence in China with those in the other areas of the world.

Although there was a recorded report in Xizang first in 1877 (Feistmantal), the study of Cretaceous fossil gastropods didn't appear until in the sixties when a comprehensive scientific investigation was carried out in the Qinghai-Xizang Plateau under the

sponsorship of the Chinese Academy of Sciences and a large amount of new materials were accumulated. The main Cretaceous gastropod localities are given in Text-fig. 1, most of these fossil being found in northern Xizang, the Xigaze district and the Kamba district.

THE LANGSHAN FAUNA FROM NORTHERN XIZANG

According to the faunal and lithological characters, the Cretaceous strata of northern Xizang may be divided, in ascending order, into two Formations: the Langshan Formation in the upper and the Doba Formation in the lower (Ma Xiao-da, 1981; Zhang Bin-gao, *et alii*, 1981).

The Langshan Formation, one of the richly fossiliferous beds, is mainly composed of dark grey limestone intercalated with marls, yielding at least 25 species of gastropods. In the lower part there are: *Pseudomesalia* sp., *Microschiza baingoinensis* Yü, *Paraglauconia trotteri* (Feistmantal), (Pl. 1, fig. 16), *Glauconia oviliformis* Yü, *Glauconia* sp., *Tylostoma* sp., *Nerinea pauli* Coquand, *N. multilamellosa* Delpy (Pl. 1, figs. 8-9), *N. zumoffeni* Delpy, *Adiozoptyxis coquandiana* (d'Orbigny) (Pl. 1, figs. 17-18), *Plesio-plocus* sp. (Pl. 1, figs. 1-2), *Neoptyxis astrachanica*

(Rebinder) (Pl. 1, fig. 7) and *Diptyxis tibetica* Yü, etc. (Yü Wen, 1975, 1982; Yü Wen & Xia Jin-bao 'in press'). This assemblage is widely distributed in the Baingoin, Xainza and Gzere districts. The species *Adiozoptyx coquandiana* (d'Orbigny) is a common form in Europe, Middle East and Kashmir of Barremian to Aptian Stages. *Nerinea pauli* Coquand, *N. multilamellosa* Delpy and *N. zumoffeni* Delpy were found from the Aptian Stage in Libanon and *Neoptyx astrachanica* (Rebinder) is also a leading form from the Aptian Stage in Astrachan district of U.S.S.R.. It is obvious that the important discovery of this assemblage in northern Xizang not only accounts for the geographical distribution of these species, but also affords us the fossil evidence of geological age of Aptian Stage of Europe.

In the Doba Formation which is conformably overlain by the Langshan Formation and composed of clastic sediments, no fossil has so far been known.

THE FOSSIL GASTROPODS FROM XIGAZE GROUP

The Xigaze Group in such districts as Xigaze, Sagya and Gyirong contains the following species: *Pleurotomaria* cf. *falcata* d'Orbigny, *Pterodonta* cf. *nobilis* Stolizka, *Pseudamaura* cf. *bulbiformis* (Sowerby), *Plesioplocus* sp., *Nerinea* sp., *Plesiptygmatis zhi-longensis* Yü (Pl. 1, fig. 6), *Neotrochactaeon ventricosa* Hacobjan and *Actaeonella* cf. *crassa* (Dujardin), etc.. The genus *Plesiptygmatis* is known to occur from the Upper Cretaceous in Mexico, Europe and Central Asia. This Group was previously referred tentatively to Late Cretaceous. However, it should be pointed out that owing to the complex tectonics, more faults and less fossils, more and more work has to be done in the days ahead with respect to the Cretaceous sequences, fossil assemblages, biogeography, etc. in this region.

THE GASTROPOD ASSEMBLAGES FROM KAMBA DISTRICT

The Cretaceous system of Kamba district has made known for a long time (Hayden, 1907). In 1916, H. Douvillé made a description on the Cretaceous gastropods. Over the last fifteen years, quite a number of fossil gastropods in this region have been collected by the Teams of Scientific Expedition to Mt. Qomolangma Region. The gastropod assemblage of the upper part of Zongshan Formation is characterized by having *Desmiera pontica* (d'Archiac) (Pl. 1, figs. 13-15), *D. d'archiaci* Noetling, *Ampullospira* sp., *Glauconia* sp., and *Actaeonella* sp. (Pl. 1, fig. 5), etc. in association with *Bournonia haydeni* Douvillé, *Inoceramus* (*Endocostea*) *haydeni* Douvillé (Wen shi-xuan, 1974); *Orbitoides media* (d'Archiac), *O. apiculata* Schlumberger, *Omphalocyclus macroporus* (Lamarck) etc. (Ho Yen, *et alii*, 1976). *Desmiera pontica* (d'Archiac) was originally described in the Maastrichtian of Baluchistan, Pakistan. *Orbitoides media* d'Archiac and *Omphalocyclus macroporus* (Lamarck) are also extensively distributed in the Maastrichtian Stage of Europe, Pakistan and India. Therefore, the gastropod-bearing bed may be referable to the Maastrichtian Stage.

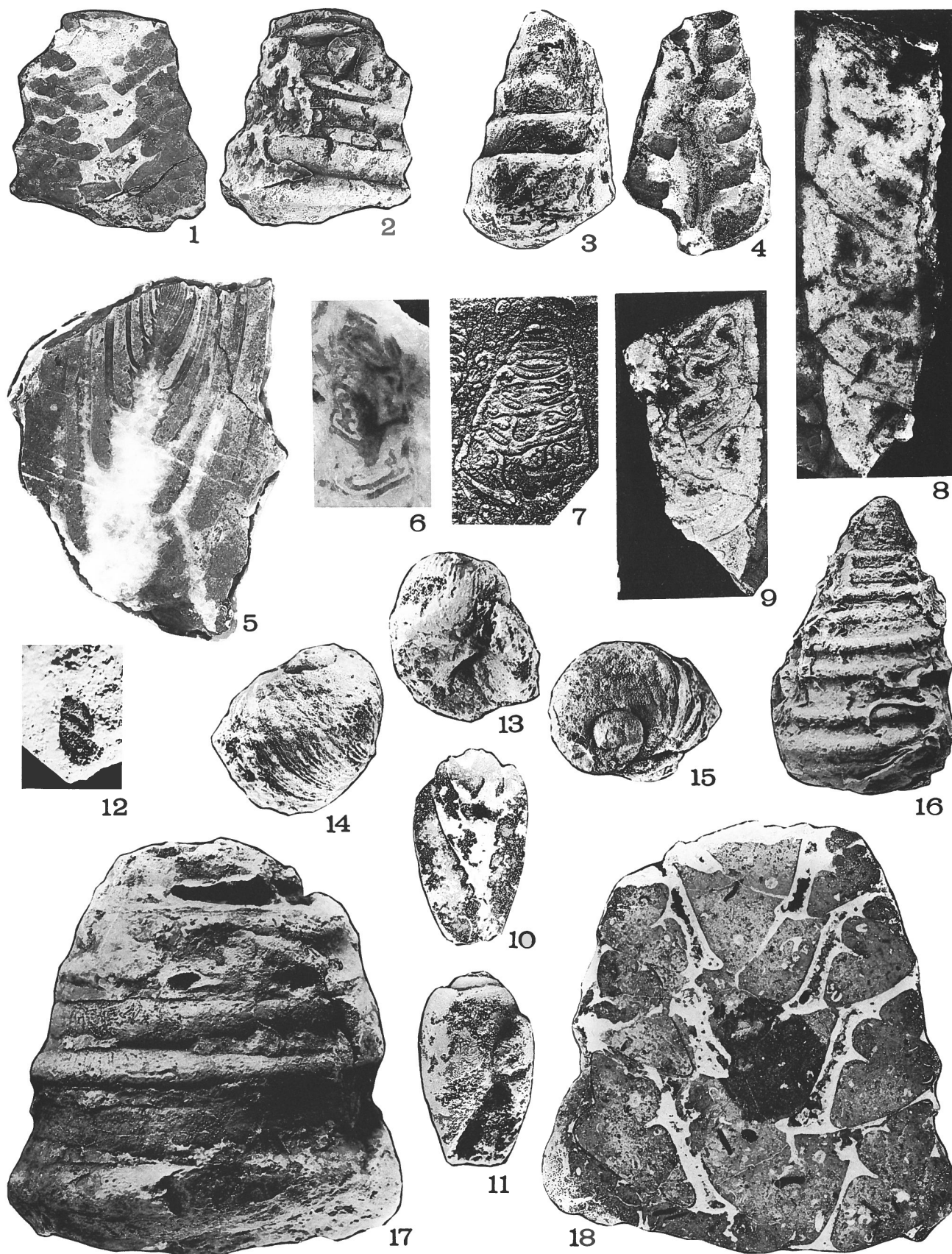
Up to date, the highest Cretaceous marine strata in Xizang are known to belong to the Jidula Formation, in which a few fossils have been reported such as *Trochactaeon? tuilaensis* Yü (Pl. 1, figs. 10-12); *Cymopolia tibetica* Morellet and *Acidularia antiqua* Pia (Wang Yü-jing, 1976; Yü Wen, 1975). Judging from the fossil aspects, this formation corresponds most likely to that of the Maastrichtian Stage of Middle East.

PRELIMINARY CONCLUSIONS

From what has been mentioned above, it can be seen that the Cretaceous gastropods of Xizang are

EXPLANATION OF PLATE 1

- Figs. 1, 2 - *Plesioplocus* sp. 1) Axial and 2) dorsal view, X 1. Lower part of Langshan Formation. Lower Cretaceous. Baingoin.
 Figs. 3, 4 - *Diptyxis tibetica* Yü. 3) Dorsal and 4) axial view, X 1. Same as Figs. 1, 2.
 Fig. 5 - *Actaeonella* sp. Axial view, X 1. Upper part of Zongshan Formation, Upper Cretaceous. Jidula, Kamba.
 Fig. 6 - *Plesiptygmatis zhi-longensis* Yü. Axial view, X 4. Xigaze Group, Upper Cretaceous. Xigaze.
 Fig. 7 - *Neoptyx astrachanica* (Rebinder). Axial view, X 1. Lower part of Langshan Formation. Lower Cretaceous. Gerze.
 Figs. 8, 9 - *Nerinea multilamellosa* Delpy. 8) Axial view, X 1; 9) axial view, X 1. Same as Fig. 7.
 Figs. 10 - 12 - *Trochactaeon? tuilaensis* Yü. 10) Axial and 11) apertural view, X 2; 12) front view, showing the columellar folds, X 4. Jidula Formation, Upper Cretaceous. Tuila, Yadong.
 Figs. 13 - 15 - *Desmiera pontica* (d'Archiac). 13) Apertural, 14) dorsal and 15) apical view, X 4. Upper part of Zongshan Formation, Upper Cretaceous. Tuila, Yadong.
 Fig. 16 - *Paraglauconia trotteri* (Feistmantal). Dorsal view, X 1. Lower part of Langshan Formation, Lower Cretaceous, Baingoin.
 Figs. 17, 18 - *Adiozoptyx coquandiana* (d'Orbigny). 17) Dorsal and 18) axial view, X 1. Same as Fig. 16.





Text-fig. 1 - Map showing important localities of Cretaceous gastropods in Xizang.

characterized by having Nerineids as their principal elements, corresponding most likely to those of the Tethys. For instance, *Adiozoptyx coquandiana* (d'Orbigny) was prosperous in northern Xizang, extending from Western Europe, Libanon and Kashmir to northern Xizang during the Barremian to Aptian Stages, whereas *Nerinea pauli* Coquand and *N. multilamellosa* were originally reported from the Aptian of Libanon. The presence of *Neoptyx astrachanica* (Rebin-

der) in Xizang is also of interest. Likewise, *Desmiera pontica* (d'Archiac) is found in Baluchistan of Maastrichtian. Doubtless to say, the Cretaceous gastropods of Xizang bear a similarity to those of Europe or, sometimes, to those of Middle East, Baluchistan as well as Kashmir. On the whole, the gastropods of this region may therefore belong to the Indo-Mediterranean Region of Tethyan Realm.

The genera *Paraglauconia*, *Microschiza*, *Adiozoptyxis*, *Diptyxis* and *Neoptyxis* are always of co-occurrence with either shallow and warm-water Tethyan or marginal Tethyan faunas, such as rudist bivalves, orbitolinid foraminifers and corals. These characters show clearly that the benthonic faunas reflect a shallow-water carbonate facies, lying in an epicontinental sea area of the East Tethys.

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