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SOME LOWER ORDOVICIAN OSTRACODS FROM WESTERN HUPEH

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With 1 Plate

Introduction

The specimens of Ostracoda dealt herewith were collected by Messrs. K. C. Yang and A. T. Mu from the Ichang formation of Lower Ordovician during their field trip in western Hupei in the Spring of 1951. Six new species in three different genera of which one is new, are described in the present paper. All of them are found in association with graptolites and trilobites. The Ichang formation has been divided into three fossil zones by Hsu and Ma (1948, p. 6). In ascending order the three divisions are named: (1) the *Dactylocephalus dactyloides* zone, (2) the *Asaphopsis immanis* zone and (3) the *Acanthograptus sinensis* zone. The fossils of ostracods have been found in great abundance in the second and third zones. No fossils of the ostracods have yet been found in the first zone.

The age of Ichang formation of western Hupei is corresponding to the Yehli formation of NE China. It is noteworthy that the morphological characters of ostracods of the Ichang formation described in the present paper are quite different from those found from Yehli formation (Hou 1952). The characteristic species of the former formation namely *Primitia tumiduformis, P. ichangensis, P.? subfurcata, Sinoprimitia sinensis* (gen. et sp. nov), *S. hupeiensis* (gen. et sp. nov.), and *Bythocypris subcircularis* bear a comparatively smaller size and a simpler sulcus. The greatest length of their shell is no more than 0.7 mm. On the other hand the length of the specimens of the species *Primitia? nanmanensis* Hou, *Ctenobolbina nanmanensis* Hou, *C. sinensis* Hou, *C. sinensis* var. *wangi* Hou, *C. taitzchoensis* Hou collected from the Yehli formation ranges from 0.75 to 1.39 mm. It appears clear that the ostracods are probably of different origin and that the seas between N. China and S. China were not connected during a certain period of the Lower Ordovician time. In this connection, it should be pointed out that the graptolites found from the Yehli formation, as studied by Mr. Mu, are also quite different from those of the Ichang formation (Mu, 1951 p. 4).

The specimens described in the present paper were derived from five different localities: 1. Kan-Tze-Ping, 2. Kao-Chia-Ling, 3. Wang-Shan-Tu-Ti, 4. Jang-Shui-Ping, 5. Pa-Tze-Lao, Shui-Mu-Wan, the first four localites being situated in the Changyang district and the last one in the Itu district.

The writer is much indebted to Mr. Yang and Mr. Mu for giving her the privilege to study their interesting collection and for furnishing her the field information and to Dr. H. C. Sze and Mr. Y. H. Lu for their valuable suggestion and careful reading of the manuscript.

Family primitiidae Ulrich and Bassler

Genus *Primitia* Jones and Holl

Primitia tumiduformis sp. nov.

Pl. 1, Figs. 1a-b.

Carapace elliptical or ovate in outline, with a straight back and rounded dorsal angles. Fringe or false border indistinct. Valve measured about 0.48 mm in length and 0.29 mm in height (Cat. No. 7023). Ventral margin convex, anterior margin nearly equal to posterior. Surface moderately convex, with a strongly impressed median sulcus situated slightly off the middle portion towards the front, median sulcus about one half of the height of valve. Near the dorsal margin of the valve there is a small node at the anterior side of the sulcus. Only separated valves present, the hingement unknown.

This new species differs from *Euprimitia sanctipauli* Ulrich in having a smooth surface and a small node at the anterior side of sulcus. It is comparable to *Primitia tumidula* Ulrich, but there are many important differences between the two species; (1) the submarginal ridge is absent in the present species; (2) the thickest part of the valve of the present species is at the posterior half, while that of the latter species is at the middle; (3) the swollen part at the posterior half characteristic of the latter species is not developed in the present species.

Horizon and Localities:—Collected from the upper part of Ichang formation at Kan-Tze-Ping and Kao-Chia-Ling, Changyang district, Hupeh Province. (Cat. No. 7023-7024).

Primitia ichangensis sp. nov.

Pl. 1, Figs. 2a-c.

Valves small in size, equivalve, subelliptical or truncated-ovate, with straight dorsal and convex ventral outline. Both ends rounded, nearly equal. Surface smooth, moderately convex, each valve marked by a shallow and short indistinct median impression at the dorsal margin; the maximum thickness is at the middle of valve.

The present species resembles *Sinoprimitia sinensis* in shape and outline of the valve but is distinguished from the latter in having two small nodes at both sides of the sulcus.

Horizon and Localities:—The species occurs abundantly in the greenish-yellow shales of the lower part of Ichang formation, but it is rarely found in the reddish-yellow shale of the upper part of Ichang formation at Kan-Tze-Ping, Wang-Shan-Tu-Ti, Changyang district, and at Pa-Tze-Lao, Shui-Mu-Wan, Itu district, Hupeh Province. (Cat. No. 7025-7026).

Primitia subfurcata sp. nov.

Pl. 1, Figs. 3a-b.

Valves small, similar. Carapace ovate in outline. Length 0.54 mm, height 0.34 mm, and thickness 0.26 mm; the ratio ca. 16: 10:7.5. Hinge line and dorsal margin straight, with a round posterior cardinal angle. The convex ventral margin is curving

abruptly at the posterior side of the valve and bending gradually toward the anterior side. Surface smooth and strongly convex in the posterior half, but slightly compressed in front; an ill-defined depression is observable at the middle of the back. A banded rim border is preserved distinctly between valve margins, the border is widest at the ventral and gradually narrowing toward the ends. Hingement seems to be simple.

The specimen is well-preserved. According to the external structure of the valves and the form of hingement, the present species is closely related to *Primitia*? *furcata* Jones and Holl, but differs from it in the shallow, simple depression, and the more rounded posterior end.

Horizon and Locality:—Collected from the greenish-yellow shales of lower part of Ichang formation at Wang-Shan-Tu-Ti, Changyang, Hupeh Province. (Cat. No. 7027).

Genus *Sinoprimitia* gen. nov.

Genotype: *Sinoprimitia sinensis* sp. nov.

Outline truncate oval. Valves small in size; similar. Hinge straight, and long, shorter than the greatest length of the valve. Shell strongly and regularly convex, bearing a distinct central sulcus, extending to dorsal margin; surface smooth, having two small nodes at the upper and middle part of both sides of the central sulcus.

This genus differs from *Primitia* Jones & Holl in oblique median sulcus and in having distinct, pointed small nodes; it differs from *Primitiella* Ulrich in the sharp small nodes, in the presence of a distinct sulcus and in the absence of narrow border; it differs from *Haploprimitia* Ulrich and Bassler in the broad and oblique sulcus extending to dorsal margin and in having the sharp and small nodes; it differs from *Laccoprimitia* Ulrich and Bassler in having pointed small node and the oblique sulcus extending to the dorsal margin; it differs from *Euprimitia* Ulrich and Bassler in the smooth surface, shallower and shorter sulcus, and in the absence of the marginal fringe (or border); it differs from *Ulrichia* Jones in the strongly convex valves and in the pointed and small nodes.

The two genera (*Primitia* & *Sinoprimitia*) found in the Ichang formation consist of several different species. All of them are characterized by the presence of a more developed median sulcus of valve. It is of interest to note that the species found from the upper horizon of the Ichang formation namely *Sinoprimitia hupeiensis* (gen. et sp. nov.), *Primitia tumiduformis* (sp. nov.) are characterized by a long and deep sulcus and the species found from the lower horizon of this formation namely *Sinoprimitia sinensis* (sp. nov.), *Primitia ichangensis* (sp. nov.) are characterized by a short and shallow sulcus. It seems to the present writer that the development of the sulcus from short to long and from shallow to deep may be one of the important factors of the evolution of the family Primitiidae.

Sinoprimitia sinensis gen. et sp. nov.

Pl. 1, Figs. 4a-b.

Valves small, similar, its length 0.58 mm, height 0.41 mm (Cat. No. 7028). Outline truncate elliptical; hinge straight, shorter than the greatest length of valve, dorsal margin straight, both anterior and posterior angles obtuse. Free margins regularly

curved. Surface smooth and strongly convex, the median sulcus distinct and oblique extending to dorsal margin. Two small nodes present at both sides of the medial sulcus. Hingement and overlap are unknown.

In external structures this species resembles the young form of *Primitia? nanmanensis* Hou but it differs from the latter by (1) the smaller size, (2) the more convex surface, and (3) the longer hinge line.

Horizon and Locality:—Abundant in reddish-yellow shales of the lower part of Ichang formation at Jang-Shui-Ping, Changyang district, Hupeh Province. (Cat. No. 7028-7029).

Sinoprimitia hupeiensis gen. et sp. nov.

Pl. 1, Figs. 5a-b.

Valve small in size, measured about 0.44 mm in length, and 0.27 mm in height (Cat. No. 7030). Outline truncate elliptical, hinge straight, about three-fourths the length of the valve; dorsal margin straight, curving regularly into anterior and posterior ends; ventral margin rounded, bending abruptly to the anterior side and gentley to the posterior side. Surface smooth and strongly convex provided with a broad and well-defined median sulcus, extending to dorsal margin, the length of the sulcus measured about one half of the valve-height. A pointed small node present at the anterior side of sulcus.

This species differs from the preceding one in having only one small node and in having a broad and well-defined sulcus. In general shape of the valve this species bears a strong resemblance to *Primitia? nanmanensis* Hou but the present species is characterized by the smaller size, the longer hinge line, and the more convex valve with only one distinct small node.

Horizon and Locality:—The species is common in the greenish-yellow shales of the upper part of Ichang formation at the Kan-Tze-Ping, Changyang, Hupeh Province: (Cat. No. 7030-7031).

Family Bairdiidae Sars

Genus *Bythocypris* Brady

Bythocypris subcircularis sp. nov.

Pl. 1, Figs. 6a-b.

Carapace sub-circular in outline, valves small, unequivalved, with straight back and nearly equal ends. Ventral margin convex and regularly curved. Length 0.44 mm, height 0.34 mm, and thickness 0.24 mm, i.e. a proportion of 13:10:7. Surface smooth; valve moderately convex. Hinge line oblique.

There is only one specimen in the material. On this specimen the right valve seems to overlap the left at anterior dorsal and the left valve seems to overlap the right at posterior ventral, but this may probably be a matter of preservation.

This specimen is a complete and well-preserved internal cast. It is associated with *Primitia ichangensis* sp. nov. In regard to the outline and external structure, the species seems to be related closely to *Bythocypris semicircularis* (J. & H.), but differs from it in having oblique hinge line and nearly equal ends.

Horizon and Locality:—Obtained from the greenish-yellow shales of lower part of Ichang formation at Wang-Shan-Tu-Ti, of the district Changyang, Hupeh Province. (Cat. No. 7032).