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CONCHOSTRACAN ASSEMBLAGE FROM BOTTOM OF ERMAYIN FORMATION, SHAANXI

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Key words: conchostracan assemblage, Ermayin Formation, Shaanxi

Summary

This paper deals with characteristics of the conchostracan assemblage and describes some new species of fossil conchostracan collected from the bottom of the Ermayin Formation near Changjiayan of Wupu County, Shaanxi in 1983.

After studying and comparing this conchostracan assemblage, the writer here suggests that (1) this assemblage is characterized by leading members of *Protomonocarina* and *Euestheria,* rare but very important members of *Xiangxiella* and many members of *Palaeolimnadiopsis* and *Diaplexa;* (2) this fossil fauna has a close relation to that of the Heshanggou Formation, but it is more different from that of the Tongchuan Formation.

It is of great significance to compare the regional stratigraphical sequence, because the strata containing this conchostracan fauna are more stable in North China.

This fossil fauna may be called the *Protomonocarina-Euesteria* fauna, representing the conchostracan fauna of early Middle Triassic in North China and resembling the *Xiangxiella* fauna in South China.

Description of new species

Family Palaeolimnadiidae Tasch, 1956

Genus *Palaeolimnadia* Raymond, 1946

Palaeolimnadia wupuensis sp. nov.

(Pl. I, figs. 1—3)

Carapace valve convex, small in size, oval in outline, 3.2mm in length and 2.4mm in height. Dorsal margin short and slightly arched upward. Umbo large and oval, half as high as the carapace. Anterior margin relatively straight; posterior margin narrowing, slightly sharp in behind. Anterior part higher than posterior part. Ventral margin rounded. Growth bands numbering 11—13; sculpture absent, but with ornaments of irregular wrinkles in a few interspaces of the carapace near both anterior and ventral margins.

Comparison This species is closely similar to *Palaeolimnadia jueleui* (Novojilov) in outline, but in the former, the dorsal margin is arched upward, sharply dipping toward the posterior margin and the posterior margin is more sharply rounded.

Palaeolimnadia megaformis sp. nov.

(Pl. I, fig. 4)

Carapace valve small in size, oval in outline, 2.4mm in length and 1.6mm in height. Dorsal margin long and arched upward. Umbo large and oval, occupying 4/5 length or 3/4 height of the carapace. Anterior margin rounded; posterior margin slightly sharp-rounded; ventral margin straight-rounded. Both anterior and posterior parts nearly equal in height. Growth bands numbering 4—6; growth lines convex.

Comparison This species is closely similar to *Palaeolimnadia machaolingensis* Shen and *Palaeolimnadia magnapicalis* Liu, but in the latter, the carapace valves are oval-circular and elongated-oval in outline, while in the former, the umbo occupies 3/4 height of the carapace. This species differs from *Palaeolimnadia pygmaca* (Novojilov); the latter has a long carapace valve, longer umbo and less growth bands.

Palaeolimnadia concentrica sp. nov.

(Pl. I, fig. 5)

Carapace valve convex, small in size, oval in outline, 3.0mm in length and 2.2mm in height. Umbo large, convex and oval, occupying 2/3 length or 2/3 height of the carapace, with irregular concentric stripes. Both anterior and posterior margins rounded. Anterior and posterior parts nearly equal in height. Growth bands numbering 7—9, flattened and slightly convex; growth lines convex, with irregular processes arranged along the growth lines; sculpture absent.

Comparison This new species differs from other species of this genus in its irregular concentric stripes on umbo and irregular processes arranged along the growth lines.

Palaeolimnadia(?) *glenoformis* sp. nov.

(Pl. I, figs. 6, 7)

Carapace valve small in size, elongated-circular in outline, 2.5mm in length and 1.6mm in height. Dorsal margin slightly arched upward. Umbo large, of "eye-ball" type, projecting above the

middle of the carapace, and occupying 1/2 length or 3/4 height of the carapace. Anterior margin broadly rounded; posterior margin slightly sharp-rounded; ventral margin straight-roundel. Growth bands about 6 in number, more closely spaced in the ventral region but sparsely spaced toward both anterior and posterior margins; growth lines convex; sculpture absent.

Comparison This new species differs from other species of this genus in the large and "eye-ball" type umbo projecting above the middle of the carapace.

Family Vertexiidae Kobayashi, 1954
Subfamily Xiangxiellinae Shen, 1976
Genus *Xiangxiella* Shen, 1976
Xiangxiella beifangensis sp. nov.

(Pl. II, fig. 1)

Carapace valve flattened, small in size, oval in outline, 2.3mm in length and 1.7mm in height. Dorsal margin straight. Umbo large, located at the anterior end of the carapace, with two robust ridges, which are equal in length, bifurcated from the dorsal margin to anterior and posterior margins, and forming an included angle of about 90°. Anterior margin rounded; posterior margin slightly sharply rounded; ventral margin broadly rounded and arched downward. Anterior part slightly higher than posterior part, with a maximum height located at 1/3 the length from the anterior end of the carapace. Growth bands flattened and broader, about 8 in number, with small reticulate ornaments seen in the growth bands.

Comparison This new species differs from other species of this genus in the two robust and long ridges forming an included angle of about 90°.

Genus *Protomonocarina* Tasch, 1962
Protomonocarina reticulata sp. nov.

(Pl. II, figs. 2, 3)

Carapace valve strongly convex, small in size; oval in outline, 4.8mm in length and 3.4mm in height. Dorsal margin long and straight, occupying 2/3 length of the carapace. Umbo mediate, located at the anterior end of the dorsal margin, with a short ridge located in the middle of umbo, about 0.67mm in length, consisting of three "beadlike nodes", extending from dorsal margin to ventral margin, but not cutting the growth line, and forming an angle of 55° with the dorsal margin. Both anterior ventral margins broadly rounded; posterior margin sharply rounded. Maximum height located at 1/2 length of the carapace. Growth bands 26 in number, with small reticulated ornamentation seen in the growth bands.

Comparison This species differs from *Protomonocarina guchengchuanensis* (Wang); the latter has small carapace valve, more convex antero-ventral margin and different ridge structure.

Protomonocarina zhangjiayanensis sp. nov.

(Pl. II, figs. 4—8, 15)

Carapace valve small in size, oval in outline, 4.0mm in length and 2.2mm in height. Upper part of carapace strongly convex, with growth lines robust and convex; lower part of carapace flattened, with growth lines shallower and flattened. Dorsal margin long and straight, occupying

3/4 length of the carapace. Umbo small, located at anterior end of dorsal margin. A short ridge robust and convex, 0.36—0.40mm in length, consisting of four beadlike nodes, extending from dorsal margin of umbo to ventral margin, but not reaching out of the umbo region, forming an angle of about 55° with dorsal margin. Both anterior and ventral margins rounded; posterior margin sharply rounded. Anterior part higher than posterior part. Growth bands numbering 18—25, ornamented with small reticulate sculptures.

Comparison This new species is closely similar to *Protomonocarina reticulata* and *Protomonocarina guchengchuanensis* (Wang) in outline, but the former has various convexities in the same carapace valve so that it may be clearly divided into two regions, and the umbonal position in the latter two species is very anterior.

Protomonocarina shaanxiensis sp. nov.

(Pl. II, figs. 9, 10)

Carapace valve convex, small in size, elliptical in outline, 4.4mm in length and 3.0 mm in height. Dorsal margin straight, occupying 1/2 length of the carapace. Umbo small, located at the anterior end of the dorsal margin; a very short ridge consisting of two beadlike nodes extending from the dorsal margin of the umbo to the ventral margin, but not reaching out of the umbo region, forming an angle of about 70 with the dorsal margin of the carapace. Both anterior and posterior margins rounded; ventral margin slightly curved downward and parallel to dorsal margin. Anterior part higher than posterior part. Growth bands numbering about 30, closely spaced and flattened, with small reticulate ornaments seen in the growth bands.

Family Euestheriidae Defretin, 1965

Genus *Euestheria* Deperet et Mazeran, 1912

Euestheria elliptica sp. nov.

(Pl. III, fig. 1)

Carapace valve small in size, elliptical in outline; 5.2mm in length and 3.2mm in height. Dorsal margin long and straight, occupying 3/4 length of the carapace. Small umbo located a little anterior to the middle. Both anterior and posterior margins well rounded and almost with the same curvature; ventral margin widely curved downward and parallel to dorsal margin. Both anterior and posterior parts nearly equal in height; posterior-dorsal angle of about 160°. Growth bands about 32 in number, with small reticulate ornaments seen in the growth bands.

Comparison This species differs from *Euestheria kawasakii* (Ozawa et Watanabe) and *Euestheria shimamurai* (Kobayashi) in the length-height ratio of 1.7:1.0 (the latter abou 2:1), the smaller carapace valve and the rare growth bands. This new species is close to *Euestheria hubeiensis* Shen, but the latter has a small postero-dorsal angle, and a length to height ratio of 1.6:1.0.

Euestheria nitida sp. nov.

(Pl. III, figs. 2—4)

Carapace valve slightly convex, small in size, oval in outline, 5.2mm in length and 3.4mm in height. Dorsal margin straight, occupying 2/3 length of the carapace. Umbo located in front of dorsal margin. Anterior margin rounded; posterior margin narrowing backward and sharply rounded; ventral margin rounded. Anterior part higher than posterior part; growth bands sparsely spaced in

the upper part of the carapace, but closely spaced in the lower part, numbering 33, with small reticulate ornaments seen in the growth bands.

Comparison This species differs from *Euestheria lepida* Shen in which the dorsal margin is shorter, and both the anterior and posterior parts are equal in height.

Euestheria brevielliptica sp. nov.

(Pl. III, figs. 12, 17)

Carapace valve moderately convex, small in size, brevielliptical in outline, 3.8mm in length and 2.6mm in height. Dorsal margin straight, occupying 1/2 length of the carapace. Umbo located at anterior end of dorsal margin. Anteroventral margin rounded and convex; both posterior and ventral margins flattened-rounded. Anterior part higher than posterior part. Growth lines convex, but growth bands sinuate, about 22 in number, with small reticulate sculpures seen in the growth bands.

Comparison This species is close to *Euestheria minuta* (Zieten), but the latter has a more convex umbo and a shorter dorsal margin, while the former has a large carapace and many growth bands.

Genus *Brachystheria* Novojilov, 1954

Brachystheria deflecta sp. nov.

(Pl. I, figs. 8, 9)

Carapace valve flattened, small in size, slightly obliquely disciform in outline, 4.0mm in length and 3.2mm in height. Umbo short and straight, located near the middle of the dorsal margin. Growth bands sparsely spaced, numbering about 22, but closely spaced on the ventral margin, with small reticulate ornaments seen in the growth bands.

Comparison This species is close to *Brachystheria subdisca* Wang, but the former has an obliquely disciform carapace with a more rounded and convex ventral margin.

Brachystheria ovata sp. nov.

(Pl. I, fig. 10)

Carapace valve small in size, oval in outline, 4.2mm in length and 2.6mm in height. Dorsal margin short and straight. Umbo located near the middle of the dorsal margin. Anterior part slightly lower than posterior part. Both anterior and ventral margins relatively flattened-rounded; posterior margin relatively convex-rounded. Growth bands sparsely spaced, about 12—14 in number, with small reticulate ornaments seen in the growth bands.

Comparison This species differs from *Brachystheria subdisca* Wang in which the carapace is disciform in outline.

Family Loxomegaglyptidae Novojilov, 1958

Genus *Diaplexa* Novojilov, 1946

Diaplexa(?) *qingshuiheensis* sp. nov.

(Pl. I, figs. 11, 12, 14)

Carapace valve slightly convex, small in size, elongately oval in outline, 3.6mm in length, 2.2 mm in height. Dorsal margin long and straight; anterior margin broadly rounded; posterior mar-

gin slightly narrowing; ventral margin flattened-rounded. Umbo located at the anterior end of the dorsal margin. Growth bands about 9 in number; irregularly reticulate ornaments with robust mesh wall and shallow mesh showing no minutely punctate sculptures seen in the growth bands, but becoming transversely elongated along both sides of the carapace in some growth bands near the ventral margin.

Comparison This species is close to *Diaplexa*(?) *veridicta* Wang in outline, but the former has a small umbo and more irregularly reticulate ornaments with robust wall in growth bands near the lower part of the carapace.

Diaplexa(?) *doliformis* sp. nov.

(Pl. I, fig. 13)

Carapace valve slightly convex, small in size, oval in outline, 2.8mm in length and 2.0mm in height. Dorsal margin slightly arched upward. Umbo located anterior to the middle. Both anterior and ventral margins broadly rounded; posterior margin slightly narrowing. Anterior part higher than posterior part. Growth bands rare and equally spaced, about 9 in number; irregularly reticulate and transversely elongated ornaments with robust mesh wall seen in the growth bands.

Comparison This species differs from *Diaplexa*(?) *xuanhanensis* Chen in which the carapace is elongately quadrate or elliptical in outline.

图　版　说　明

所有标本均保存在天津市地震局。野外采集号全部为 8306。

图　版　I

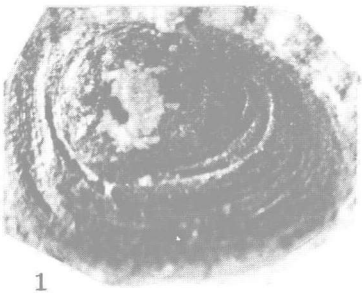
1—3. *Palaeolimnadia wupuensis* sp. nov.
1.右瓣外模，×14，Holotype，登记号：SL069。
2.同一标本内模，×14，登记号：SL129。
3.双瓣，幼年壳，×13，登记号：SL095。
4. *Palaeolimnadia megaformis* sp. nov.
左瓣内模，×19，Holotype，登记号：SL053。
5. *Palaeolimnadia concentrica* sp. nov.
右瓣外模，×12，Holotype，登记号：SL103。
6,7. *Palaeolimnadia* (?) *glenoformis* sp. nov.
6.左瓣外模，×25，Holotype，登记号：SL037。
7.同一标本的扫描照片，×30。
8,9. *Brachystheria deflecta* sp. nov.
8.右瓣外模，×8.5，Holotype，登记号：SL086。
9.右瓣，×8，paratype，登记号：SL158。
10. *Brachystheria ovata* sp. nov.
左瓣外模，×8，Holotype，登记号：SL107。
11,12,14. *Diaplexa* (?) *qingshuiheensis* sp. nov.
11.右瓣，×9，Holotype，登记号：SL071。
12.右瓣，×13，Paratype，登记号：SL060。
14.右瓣，×8，Paratype，登记号：SL083。
13. *Diaplexa*(?) *doliformis* sp. nov.
右瓣，×6.5，Holotype，登记号：SL102。

图 版 II

1. *Xiangxiella beifangensis* sp. nov.
右瓣，×21，Holotype，登记号：SL005。
2,3. *Protomonocarina reticulata* sp. nov.
2.右瓣外模，×9，Holotype，登记号：SL029。
3.同一标本局部放大，×20。
4—8,15. *Protomonocarina zhangjiayanensis* sp. nov.
4.左瓣外模，×13，Holotype，登记号：SL001。
5.右瓣外模，×14，Paratype，登记号：SL011。
6.双瓣，×15，Paratype，由明显的珠形节组成的胎壳脊，登记号：SL010。
7.双瓣一部分，×8，Paratype，登记号：SL015。
8.双瓣背视，×12，登记号：SL017。
15.左瓣外模，×16，Paratype，登记号：SL025。
9,10. *Protomonocarina shaanxiensis* sp. nov.
9.左瓣，×14，Holotype，登记号：SL089。
10.左瓣，×14，Paratype，登记号：SL014。
11—14. *Protomonocarina sinensis* Shen
11.左瓣外模，×6，登记号：SL151。
12.左瓣，×13，登记号：SL013。
13.右瓣，×8，登记号：SL016。
14.右瓣外模，×13，登记号：SL018。

图 版 III

1. *Euestheria elliptica* sp. nov.
左瓣外模，×9，Holotype，登记号：SL075。
2—4. *Euestheria nitida* sp. nov.
2.右瓣外模，×9，Holotype，登记号：SL047。
3.图 2 标本的局部放大，×28。
4.右瓣，×8，Paratype，登记号：SL108。
5—7. *Euestheria subgibba* (Wang)
5. 左瓣，×9，登记号：SL049。
6. 左瓣，×13，登记号：SL122。
7. 左瓣外模局部放大，×50，登记号：SL034。
8,9. *Euestheria shensiensis* (Wang)
8. 右瓣，×8.5，登记号：SL080。
9. 同一标本外模局部放大，×25。
10,11. *Euestheria subgibba* (Wang)
10.右瓣，×13，登记号：SL093。
11.左瓣外模，×13，登记号：SL051。
12,17. *Euestheria brevielliptica* sp. nov.
12.右瓣外模，×8，Holotype，登记号：SL148。
17.右瓣外模，×15，Paratype，登记号：SL201。
13. *Euestheria shensiensis* (Wang)
左瓣外模，×8，登记号：SL096。
14. *Euestheria subgibba* (Wang)
左瓣，×8，登记号：SL104
15,16. *Euestheria shensiensis* (Wang)
15.右瓣外模，×8.5，登记号：SL025。
16.同一标本局部放大，×75。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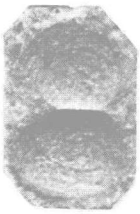
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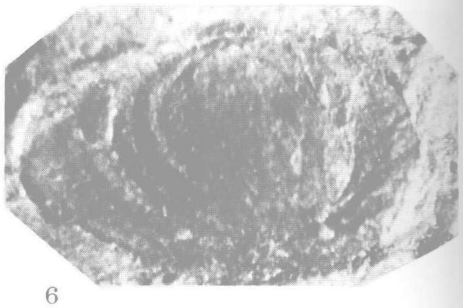
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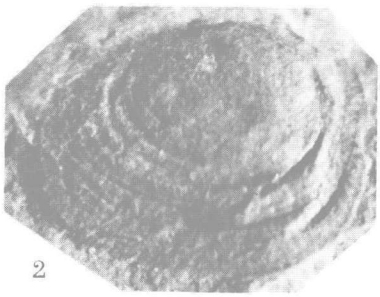
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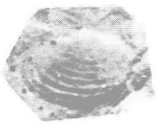
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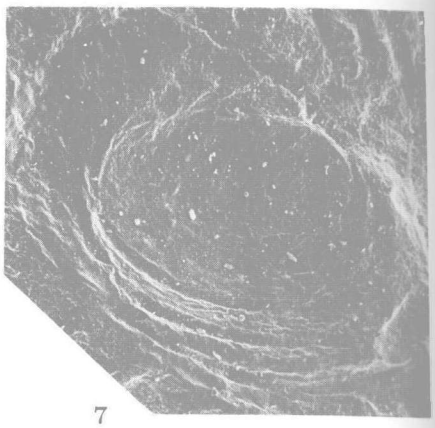
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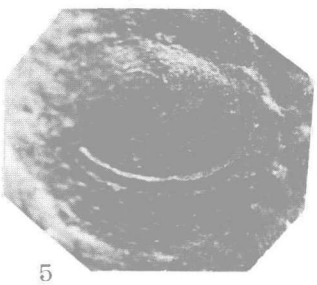
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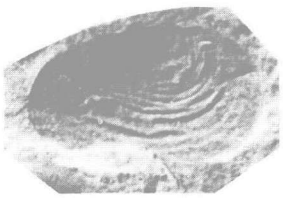
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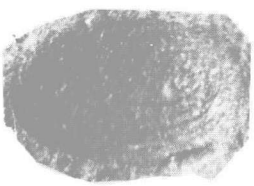
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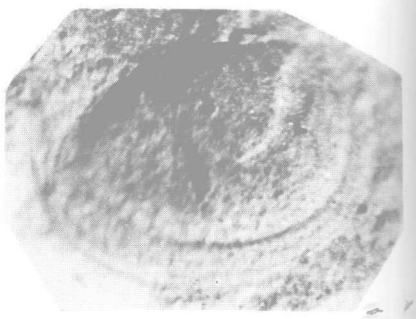
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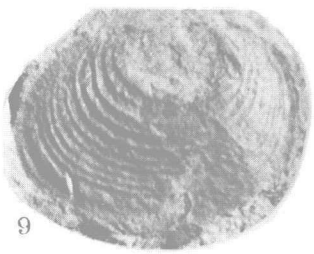
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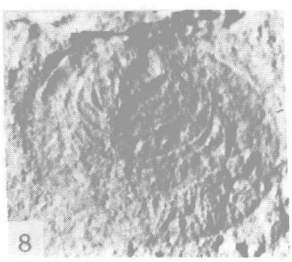
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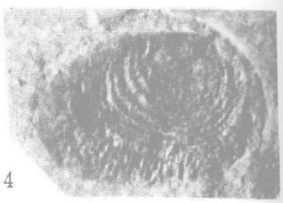
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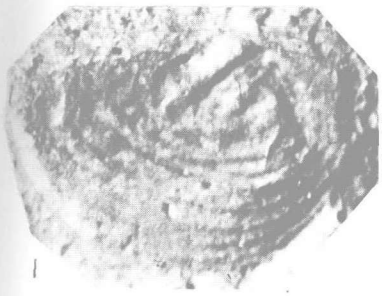
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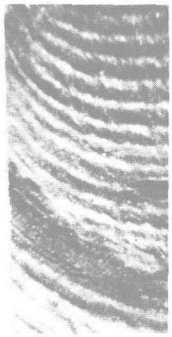
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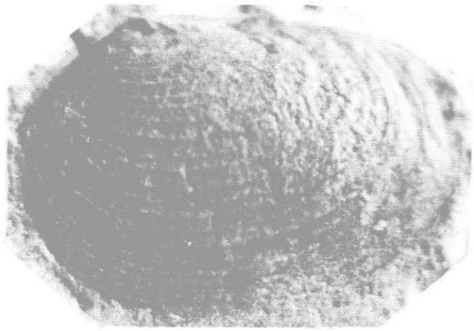
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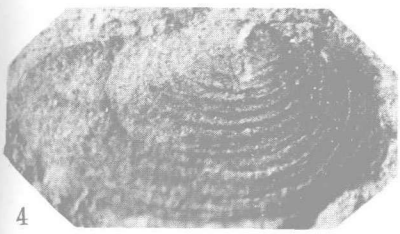
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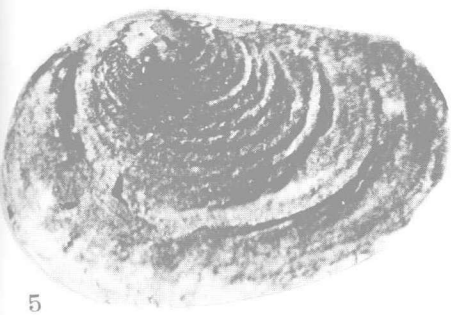
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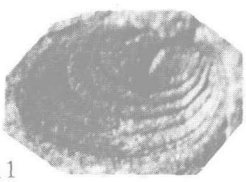
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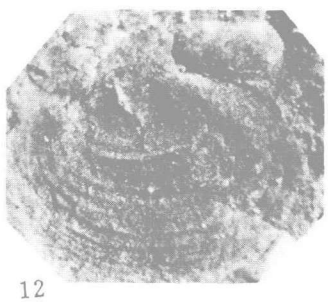
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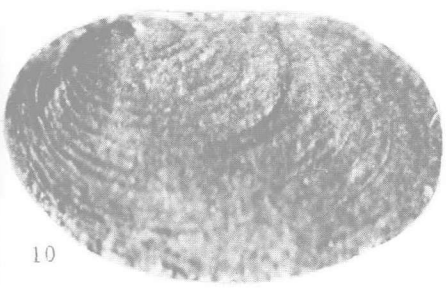
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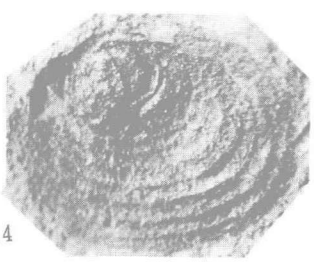
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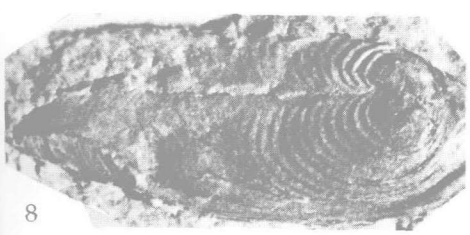
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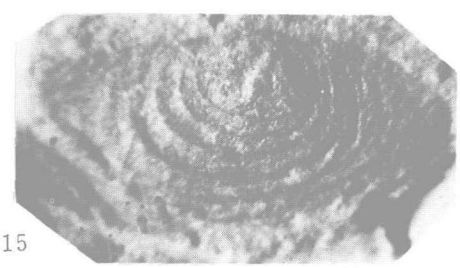
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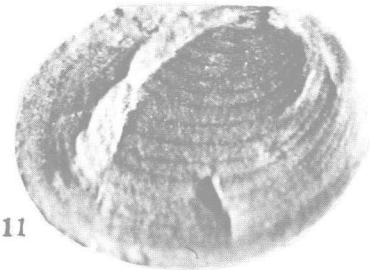
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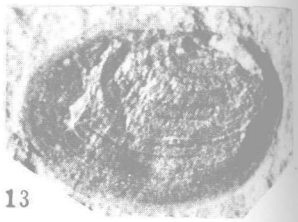
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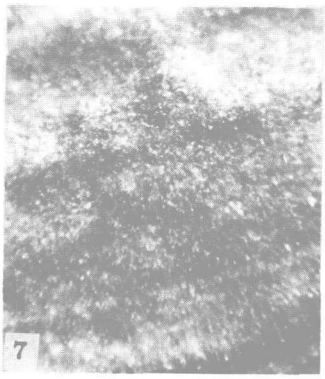
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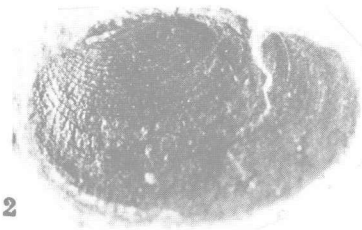
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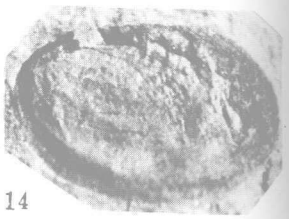
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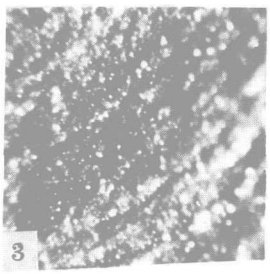
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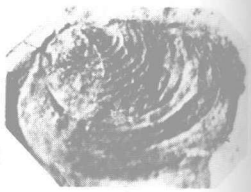
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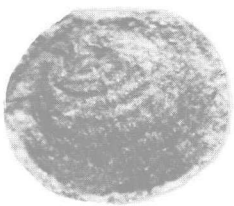
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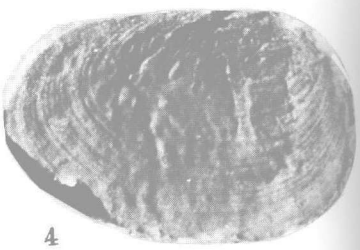
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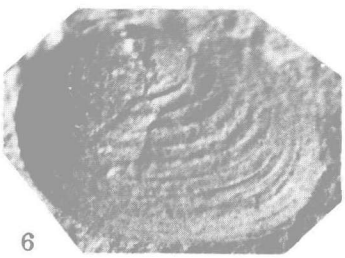
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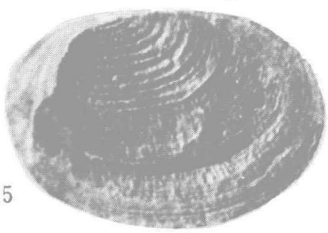
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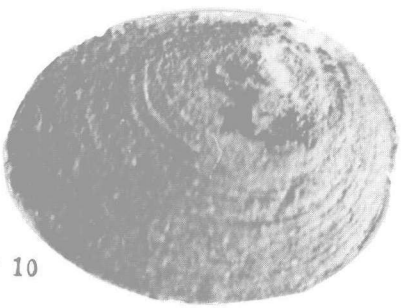
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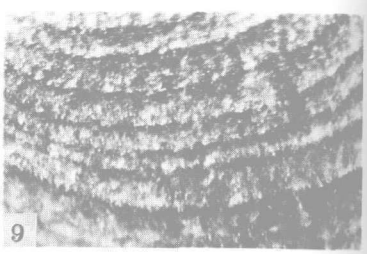
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