OSTRACOD FAUNA AND PALAEOECOLOGY OF THE LUTETIAN (EOCENE) MOLLUSC SAND AT DUDAR, HUNGARY

by

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Abstract

The ostracod fauna of the Lutetian (Middle Eocene) "Mollusc Sand" of Dudar consists of the following species with detailed descriptions: Cytherella (Cytherelloidea) gantensis Monostori; Platella gyrosa (Roemer); Bairdia (Bairdoppilata) gliberti Keij; Cnestocythere hungarica Monostori; Schizocythere hungarica n.sp.; Schizocythere depressa Méhes; Schizocythere ex gr. tessellata (Bosquet); Clithrocytheridea faboides gantensis Monostori; Neocyprideis williamsoniana (Bosquet); Monsmirabilia triebeli Keij; Krithe bartonensis (Jones); Phalcocythere horrescens (Bosquet); Pterygocythere jonesi (Méhes); "Echinocythereis" dadayana (Méhes); Leguminocythereis dudarensis n.sp.; Leguminocythereis aff. erasa Ducasse; Pokornyella ex gr. limbata (Bosquet): Pokornyella aff. ventricosa (Bosquet); Grinioneis haidingeri paijenborchiana Keij; "Hermanites" acuticosta gantensis Monostori; "Bradleya?" validornata hungarica Monostori; Quadracythere angusticostata (Bosquet); Quadracythere vahrenkampi Moos; Caudites monsmirabiliensis Apostolescu; Cytheretta cf. bambruggensis Keij; Paracytheridea cf. gradata (Bosquet); Semicytherura aff. alata (Lienenklaus); Eucytherura cf. keiji Pietrzeniuk; Xestoleberis gantensis Monostori; Uroleberis parnensis (Apostolescu); Paracypris contracta (Jones); Novocypris gantensis Monostori: The ostracod associations washed from several genera of gastropods indicate a depositiona environment in the nearshore region of a shallow sea, characterized by weak, probably seaso nal oscillation of salinity. The region might have been occupied by a lagoon, its parts dominated by different kinds of gastropods. The ostracod associations enclosed in the shells provide evidences on the environmental factors of each part. We could distinguish parts with strong open marine connections, and parts with the characters of a nearshore, inner lagoon, with weak salinity changes.

Introduction

An extremely rich mollusc fauna occurs in the Eocene coal measures of Dudar. The systematic description of the gastropods has been published by STRAUSZ (1966). The rock is mostly coarse sand with more or less clay and calcareous matrix. It rarely contains well preserved microfauna. However, the infill of the gastropod shells yielded plenty of microfossils, including ostracods. Their preservation is similar to that of Recent forms. Similar differences in preservation have been observed between the microfauna of the Mollusc Marl at Gánt and the infill of its gastropod fauna. (MONOSTORI, 1972a, 1972b, 1973, 1977). While publishing the results of the investigation of the Gánt fauna, I reported on the Dudar one in a preliminary form only. Due to priority problems, the Dudar fauna can be published only now, after the the extremely delayed publication of the monograph on the Eocene ostracods of the Dorog basin (it was in press for 7 years).

Material

The Dudar beds have yielded ostracods from the infills of several gastropod genera. We have attempted to draw conclusions on the ecological needs of some ostracod species, based on their occurrences in certain gastropods, as we have made on the Gánt material (MONOSTORI, 1972a, 1977). Capital letters under "Material" in the systematic part indicate the type of gastropods.

A: *Cerithium subcorvinum* OPPH. specimens from museum material;
B: *Cerithium subcorvinum* specimens and different Naticidae specimens from the same block;
C: specimens of *Velates schmidelianus* CHEMNITZ;
D: Naticidae specimens found together with *Velates*;
E: *Cerithium (Campanile) parisiense urkutense* MUNIER CHALMAS specimens from museum material;
F: gastropods of a sand with coal fragments, containing abundant Naticidae.

Systematic part

Subclass Ostracoda LATREILLE, 1806
Order Podocopida G. W. MÜLLER, 1894
Suborder Platycopa SARS, 1866
Family Cytherellidae SARS, 1866
Genus *Cytherella* JONES, 1849

Cytherella (Cytherelloidea) gantensis MONOSTORI, 1977
Pl. I, fig. 1–3.

1977. *Cytherella (Cytherelloidea) gantensis* n. sp. – MONOSTORI, pp. 76–77, pl. I, fig. 1.

1985. *Cytherella (Cytherelloidea) gantensis* MONOSTORI, forma A – MONOSTORI, pp. 27–29, pl. I, fig. 1–3, 13.

Remarks: Maximal carapace width of juvenile specimens lies much farther from the posterior end, than that of adult ones.

Dimensions

Adult left valve L = 0.68 – 0.72 mm
H = 0.35 – 0.38 mm L/H = 1.91 – 1.93
Adult right valve: L = 0.71 – 0.73 mm
H = 0.34 – 0.38 mm L/H = 1.94 – 2.07

Material

A: 13 isolated valves, 9 juvenile isolated valves, 14 fragments
B: 2 isolated valves, 6 juvenile isolated valves, 4 fragments
C: 1 isolated valve
D: 1 isolated valve
E: 1 fragment
F: 1 isolated valve, 1 juvenile isolated valve, 6 fragments

Cytherella (Cytherelloidea) sp.

Remarks

Fragmented specimen, indeterminable to the species level.

Material

D: 1 fragment

Genus *Platella* CORYELL et FIELDS, 1937

Platella gyrosa (ROEMER, 1938)
Pl. I. fig. 4.

1838. *Cytherina gyrosa* n. sp. – ROEMER, p. 517, T. VI, fig. 22.
1955. *Platella gyrosa* (ROEMER) – APOSTOLESCU, p. 244, t. I, fig. 6.
1957. *Platella gyrosa* (ROEMER) – KEIJ, p. 49, pl. I. fig. 1.
1961. *Cytherella gyrosa* (ROEMER) – DELTEL, p. 15, pl. I, fig. 17.
1962. *Platella ? gyrosa* (ROEMER) – HINTE, p. 168, T. II, fig. 2.
1965. *Platella gyrosa* (ROEMER) – EAGAR, p. 28,
1968. *Platella gyrosa* (ROEMER) – HASKINS, pp. 255–256, pl. 2, fig. 27–30,
1969. *Cytherella gyrosa* (ROEMER) – DUCASSE, pp. 8–9, pl. I. fig. 6.
1969. *Platella gyrosa* (ROEMER) – SCHEREMETA, p. 52, Pl. II, fig. 1–3.

Remarks

The fine, more or less concentric ribbing and the Cytherellidae muscle scar characterizing this species together, can be easily recognized even on the fragmentary specimens.

Geographical and stratigraphical distribution

England: Lutetian–Ledian; The Netherlands: Bartonian; Belgium: Ypresian–Bartonian; France: Lutetian–Ledian; Austria: Ypresian; Soviet Union: Bartonian.

Material

C: 1 fragment
D: 1 fragment

Suborder Podocopa SARS, 1866
Superfamily Bairdiacea SARS, 1866
Family Bairdiidae SARS, 1888
Genus *Bairdia* McCOY, 1844

Bairdia (Bairdoppilata) gliberti KEIJ, 1957
Pl. I, fig. 5–7.

1957. *Bairdoppilata gliberti* n. sp. – KEIJ, p. 53, pl. I, fig. 18–21.
1958. *Bairdoppilata gliberti* KEIJ – MARLIERE, p. 18, pl. II, fig. 5–6.
1959. *Bairdoppilata gliberti* KEIJ – DUCASSE, pp. 13–14, pl. I, fig. 4, pl. X, fig. 2a–b.
1968. *Bairdoppilata gliberti* KEIJ – HASKINS, p. 3, pl. 2, fig. 29–30.
1969. *Bairdoppilata gliberti* KEIJ – DUCASSE, p. 24, pl. II, fig. 29.
1969. *Bairdia gliberti* (KEIJ) – PIETRZENIUK, p. 15, T, 2, fig. 9–10, T. XVI, fig. 1–2.
1969. *Bairdoppilata gliberti* KEIJ – SCHEREMETA, pp. 57–58, pl. II, fig. 15–16.
1971. *Bairdoppilata gliberti* KEIJ – BLONDEAU, p. 25, pl. II, fig. 3–4.
1973. *Bairdoppilata gliberti* KEIJ – OLTEANU, POPESCU, p. III, fig. 28.
1973. *Bairdoppilata gliberti* KEIJ – SÖNMEZ-GÖKÇEN, pp. 38–39, pl. IV, fig. 12–14.
1975. *Bairdoppilata gliberti* KEIJ – CARBONNEL, p. 47, pl. 1, fig. 3–4.
1977. *Bairdoppilata gliberti* KEIJ – SZCZECHURA, pp. 63–64, pl. 17, fig. 1–4.
1978. *Bairdoppilata gliberti* KEIJ – KEEN, pl. 1, fig. 11, 14.
1985. *Bairdia (Bairdoppilata) gliberti* KEIJ – DUCASSE et al., pl. 72, fig. 7–8.
1985. *Bairdoppilata* cf. *gliberti* KEIJ – MONOSTORI, pp. 33–35, pl. II, fig. 1–9.

Remarks

The outer morphology is the same as of the forms described from the Dorog basin (MONOSTORI, 1985). In the Dudar material the inner features can be examined also, making possible the exact identification of the species. In the hinge of the Dudar specimens there is no similar strong furrow as can be observed on the type figure, i.e. the valve surface bends more inward around the largest height.

Dimensions

Adult left vale L = 0.91–0.98 mm
H = 0.53–0.57 mm L/H = 1.71–1.73
Adult right valve L = 0.93–1.18 mm
H = 0.47–0.70 mm L/H = 1.69–1.98

Stratigraphical and geographical distribution:

England: Lutetian–Bartonian; Belgium; Palaeocene–Eocene; France: Upper Palaeocene–Upper Oligocene; Germany: Upper Eocene–Lower Oligocene; Poland: Upper Eocene; Rumania: Eocene; Soviet Union: Palaeocene–Eocene; Turkey: Eocene–Oligocene.

Material

A: 7 isolated valves, 2 juvenile isolated valves, 7 fragments;
B: 3 fragments;
C: 3 juvenile isolated valves, 9 fragments;
D: 3 isolated valves, 12 fragments;
E: 1 isolated valve, 2 fragments;
F: 2 juvenile isolated valves, 4 fragments.

Bairdia (Bairdoppilata) aff. *gliberti* Keij
Pl. 2, fig. 1–2.

Remarks

There are some Bairdia at Dudar, which show an almost total resemblance to the type figure of Keij (1957), but do not show the terminal denticulation of the dorsal margin. The inner lamella of these – like a juvenile character – is less well developed than that of the usual adult specimens. However, the dimensions (H = 0.93 – 1.04 mm) are those of the adult specimens.

Material

A: 10 isolated valves, 4 fragments;
D: 3 isolated valves.

Bairdia sp. 1.
Pl. 1, fig. 8 – 9.

Description

The anterior outline of the left valve shows small radius and is asymmetric. The dorsal outline shows large radius, and is almost symmetrical (the radius of its posterior half decreases). The posterior end is tapering below the one-third of maximal height. The upper branch of the posterior outline is concave, the lower branch is convex with large radius. The ventral outline is more or less straight or slightly concave. The lower branches of the anterior and the posterior outlines are slightly denticulated.

The anterior outline of the right valve is strongly asymmetrical. The dorsal outline shows a trapezoidal form, the breaks of the outline lie at one-third and three-quarter of the length. The posterior outline is more tapering, while the ventral outline shows a strong, asymmetrical sinuosity. The ventral halves of the anterior and posterior outlines are strongly denticulated.

The fine dotting of the surface can be observed especially on the right valve.

The internal characters are those of the genus *Bairdia*.

Dimensions

Adult left valve L = 0.61 – 0.64 mm
H = 0.33 – 0.34 mm L/H = 1.86
Adult right valve L = 0.59 – 0.63 mm
H = 0.30 – 0.31 mm L/H = 1.92 – 2.12

Remarks

This form is related to the species "*Bairdia*" complanata of DUCASSE (1967), described from the Middle Eocene of France. The specimens from Dudar shows more arcuate dorsal outline. The adult specimens are characteristically small compared to the usual dimensions of the genus.

Material

A: 7 isolated valves;
F: 1 isolated valve.

Superfamily Cytheracea BAIRD, 1850
Family Cytheridae BAIRD, 1850
Subfamily Cytherinae BAIRD, 1850
Genus *Cnestocythere* TRIEBEL, 1950

Cnestocythere hungarica MONOSTORI, 1985
Pl. 2, fig. 3 – 8.

1985. *Cnestocythere hungarica* n. sp. – MONOSTORI, pp. 40 – 43, pl. III, fig. 9 – 22, pl. IV. fig. 1 – 2 (partim).

Remarks

We could examine the hinge of a few specimens only from the Dorog area; these had a hinge of *Cnestocythere*-type. The excellently preserved material from Dudar revealed, that part of the specimens has *Cnestocythere* hinge, another part has *Schizocythere* hinge. All their other characters (shape, ornamentation) are uniform.

The two homoeomorphic species occurs together in the same samples, i.e. in the same environments. Their only distinctive features are the hinges only. Consequently, the *Cnestocythere hungarica* n. sp. described in the Dorog volume (MONOSTORI, 1985) includes the specimens of the *Schizocythere* species as well.

The following data on dimensions and material are of the *Cnestocythere*, which could be exactly separated.

Dimensions

Adult left valve L = 0.50 – 0.52 mm
H = 0.31 – 0.33 mm L/H = 1.56 – 1.65
Adult right valve L = 0.48 – 0.53 mm
H = 0.38 – 0.34 mm L/H = 1.55 – 1.71

Material

B: 1 isolated valve;
C: 11 isolated valves;
D: 3 isolated valves;
E: 7 isolated valves;
F: 20 isolated valves.

Genus *Schizocythere* TRIEBEL, 1950

Schizocythere hungarica n. sp.
Pl. 2, fig. 9–14, pl. 3, fig. 1–2.

1985. *Cnestocythere hungarica* n. sp. – MONOSTORI, pp. 40–43, pl. III, fig. 9–22; pl. IV, fig. 1–2 (partim).

Derivatio nominis:

After its occurrence in Hungary.
Holotype: left valve.
Stratum typicum: Lutetian marl with Cerithium subcorvinum.

Diagnosis

Form and ornamentation are the same as of the species *Cnestocythere hungarica* MONOSTORI, 1985, but the hinge is a characteristic *Schizocythere* one.

Remarks

Individual variation of shape and ornamentation of *Cnestocythere hungarica* MONOSTORI, 1985 and *Schizocythere hungarica* n. sp. is much larger within each species than the differences between the two species. The two species can be distinguished on the basis of the hinge only. Adult specimens of the two species range into the same size magnitude, so it is not probable that we have the adult specimens and specimens of the last larval stage of the same species. The inner lamella is equally developed on the specimens of equal size. Average strength of ornamentation on the *Schizocythere* species is somewhat greater.

Possibly the *Cnestocythere* genus was separated from the *Schizocythere* genus by neotenic evolution during the Eocene; the Hungarian fauna shows this separation.

Dimensions

Adult left valve L = 0.51 mm
H = 0.32 mm L/H = 1.59
Adult right valve L = 0.48–0.52 mm
H = 0.31–0.33 mm L/H = 1.50–1.69

Material

A: 38 isolated valves;
B: 16 isolated valves;
C: 11 isolated valves;
D: 4 isolated valves;
E: 1 isolated valve;
F: 4 isolated valves.

Schizocythere depressa (MÉHES, 1936)
Pl. 3. fig. 3 – 4.

1936. *Eucytherura depressa* n. sp. – MÉHES, pp. 25 – 26, pl. III. fig. 5 – 8.
1977. *Schizocythere depressa* (MÉHES) – MONOSTORI, pp. 98 – 100, pl. III, fig. 1 – 4.
1985. *Schizocythere depressa* (MÉHES) – MONOSTORI, pp. 44 – 46, pl. IV, fig. 3 – 16.

Remark

Our adult specimens of poor preservation represent the smallest size range observed at Dorog.

Dimensions

Adult left valve L = 0.39 – 0.40 mm
H = 0.26 – 0.27 mm L/H = 1.43 – 1.55

Material

B: 2 isolated valves, 1 carapace;
D: 1 isolated valve.

Schizocythere ex gr. *tessellata* (BOSQUET, 1852)
Pl. 3, fig. 5 – 6.

Remarks

Similar to the most stubby forms described in the literature.

Dimensions

Adult left valve L = 0.38 mm
H = 0.27 mm L/H = 1.39

Material

F: 2 isolated valves

Schizocytherini juv.

Due to the homoeomorphy described above the larval shells of *Cnestocythere* and *Schizocythere* species are evaluated together.

Material

A: 6 juvenile isolated valves;
B: 3 juvenile isolated valves;
C: 17 juvenile isolated valves;
D: 9 juvenile isolated valves;
E: 13 juvenile isolated valves;
F: 33 juvenile isolated valves.

Family Cythereideidae SARS, 1925
Subfamily Cythereideinae SARS, 1925
Genus *Clithrocytheridea* STEPHENSON, 1936

Clithrocytheridea faboides gantensis, MONOSTORI, 1977
Pl. 3. fig. 7–8.

1977. *Clithrocytheridea faboides gantensis* n. ssp. MONOSTORI, pp. 83–85, pl. II, fig. 2–4.
1985. *Clithrocytheridea faboides gantensis*, MONOSTORI, – MONOSTORI, pp. 49–52, pl. IV, fig. 19–26; pl. V, fig. 1–5.

Remarks

All Hungarian materials show individual variation in outline and ornamentation. The meeting point of the anterior and dorsal outlines can be shifted backwards, thus making the straight dorsal outline much shorter. The ornamentation may be reduced to a nearly smooth surface; in this case only the anterior wrinkles appear very slightly. The Dudar material show a much greater variability than to that of other Hungarian localities, despite the small number of fossils.

Dimensions

Adult right valve L = 0.38–0.45 mm
H = 0.20–0.21 mm L/H = 1.78–2.23
Adult left valve L = 0.40–0.44 mm
H = 0.21–0.24 mm L/H = 1.75–1.89

Material

D: 1 isolated valve;
F: 14 isolated valves, 4 isolated juvenile valves.

Genus *Neocyprideis* APOSTOLESCU, 1956

Neocyprideis williamsoniana (BOSQUET, 1852)
Pl. 3. fig. 9.

1852. *Cytheridea williamsoniana* n. sp. – BOSQUET, pp. 43–44, pl. II, fig. 6.
1985. *Neocyprideis williamsoniana* (BOSQUET) – MONOSTORI, pp. 52–53, pl. V, fig. 6–7. (cum syn.).

Remarks

The Dudar specimens are unornamented, like a part of the Gánt ones (MONOSTORI, 1977). The species *Neocyprideis apostolescui* (KEIJ, 1957) may be ranged into this species as an ecological variety.

Dimensions

Adult right valve L = 0.71 – 0.72 mm
H = 0.40 – 0.44 mm L/H = 1.65 – 1.76

Material

A: 3 isolated valves, 1 juvenile isolated valve.

Subfamily Cuneocytherinae MANDELSTAM, 1959
Genus *Monsmirabilia* APOSTOLESCU, 1955

Monsmirabilia triebeli KEIJ, 1957
Pl. 3, fig. 10 – 11.

1957. *Cuneocythere (Monsmirabilia) triebeli* n. sp. – KEIJ, p. 79, t. IX, fig. 1 – 4.
1985. *Monsmirabilia triebeli* KEIJ – MONOSTORI, pp. 60 – 64, t. VI, fig. 15 – 27; t. VII, fig. 1 – 8, (cum syn.).

Remarks

Variation of the outline is significant like of the specimens from Gánt and Dorog basin. The description of the ornamentation must be completed: a short posteromarginal margin can be observed besides the anteromarginal margin in the whole material from Hungary. This – like the anteromarginal margin – is strong on the right valve and barely perceptible on the left one. This character was described from the type material, too (KEIJ, 1957).

Dimensions

Adult right valve = 0.47 – 0,52 mm
H = 0.25 – 0.27 mm L/H = 1.82 – 2.00
Adult left valve L = 0.50 – 0.61 mm
H = 0.32 – 0.40 mm L/H = 1.53 – 1.59

Material

A: 7 isolated valves;
B: 8 isolated valves;
C: 1 isolated valve;
F: 20 isolated valves.

Genus *Krithe* BRADY, CROSSKEY et ROBERTSON, 1874

Krithe bartonensis (JONES, 1857)
Pl. 3, fig. 12–13.

1857. *Cytherideis bartonensis* n. sp. – JONES, p. 50, t. V, fig. 2a, b, 3a, b.
1985. *Krithe bartonensis* (JONES) = MONOSTORI, pp. 64–66, t. VII, fig. 9–21. (cum syn.).

Remarks

KHOSLA and HASKINS (1980) ranged this species to the genus *Dentokrithe*, based on the posterior tooth in the left valve and its socket in the right valve. Posterior part of the cylinder bordering the furrow from below in the left valve may be thickened at several *Krithe* species; these make their counterpart depression on the edge of the right valve. This hinge occurs on many forms of *Krithe bartonensis* at Gánt, Dorog and Dudar. (The break of the edge of the right valve lies at 0.4 length, instead of 0.6 length, as the descriptions indicate it! (MONOSTORI, 1977, 1985). (All hungarian localities yield some specimens, which bear a tooth-like thickening on the left valve and a socket-like depression on the right one. These specimens are generally more stubby; these can be found together with those ones, which bear this character very indistinctively. It is questionable, if it is correct to establish a new genus based on this character. Examining the Hungarian material, we can conclude, that this case is only the morphological variation of the same species.

Dimensions

Adult left valve L = 0.66–0.68 mm
H = 0.32–0.34 mm L/H = 2.00–2.07
Adult right valve L = 0.61–0.68 mm
H = 0.27–0.30 mm L/H = 2.24–2.32

Material

A: 11 isolated valves, 3 juvenile isolated valves;
B: 6 isolated valves;
C: 1 fragment;
D: 3 fragments;
F: 13 isolated valves, 2 juvenile isolated valves.

Family Trachyleberididae SYLVESTER–BRADLEY, 1948
Subfamily Trachyleberidinae SYLVESTER–BRADLEY, 1948

Genus *Phalcocythere* SIDDIQUI, 1971
Phalcocythere horrescens (BOSQUET, 1852)
Pl. 3, fig. 14–16.

1852. *Cythere horrescens* n. sp. – BOSQUET, pp. 119, pl. VI, fig. 5.
1955. *Trachyleberis horrescens* (BOSQUET) – APOSTOLESCU, p. 272, pl. VIII, fig. 125–126.

1957. *Hirsutocythere horrescens* (BOSQUET) – KEIJ, p. 101, pl. XV, fig. 4; t. XVII, fig. 6 – 7.
1959. *Hirsutocythere horrescens* (BOSQUET) – DUCASSE, pp. 61 – 64, pl. IV, fig. 3; pl. XXIII, fig. 2.
1961. *Hirsutocythere horrescens* (BOSQUET) – DELTEL, pp. 169 – 170, pl. 16, fig. 281.
1966. *Hirsutocythere horrescens* (BOSQUET) – MOUSSOU, pp. 100 – 102, pl. 30, fig. 127a – b, 128.
1969. *Trachyleberis horrescens* (BOSQUET) – DUCASSE, pp. 148 – 149, pl. X, fig. 208.
1969. *Hirsutocythere horrescens* (BOSQUET) – SCHEREMETA, p. 202, pl. XIV, fig. 11 – 12.
1971. *Trachyberis horrescens* (BOSQUET) – BLONDEAU, pp. 54 – 55, pl. VI, fig. 1 – 5.
1971. *Phalcocythere horrescens* (BOSQUET) – SIDDIQUI, pp. 57 – 58, pl. 29, fig. 5; pl. 30, fig. 1 – 6; pl. 33, fig. 12 – 13.
1973. *Hirsutocythere horrescens* (BOSQUET) – SÖNMEZ – GÖKÇEN, pp. 85 – 86, pl. XI. fig. 16 – 17.
1985. *Phalcocythere horrescens* (BOSQUET) – DUCASSE etal., pl. 78, fig. 15 – 17.

Description

1. In outer lateral view the anterior outline of the left valve is asymmetrically rounded; radius of the upper half is much larger than that of the lower half. The anterior outline makes a 120° angle with the dorsal outline. The cardinal angle strongly protrudes, forming a flat spine bending towards posterior direction. The dorsal outline is straight, but some spines of the lateral surface reach beyond it. The dorsal outline turns into the posterior outline by a 120° angle at 0.8 length. Upper part of the posterior outline is slightly concave, the lower part is convex in a small radius arc. The ventral outline diverges from the dorsal outline in anterior direction. Its posterior part beyound 0.7 length is concave. Between 0.3 and 0.7 length the ventral outline is barely convex (an ornamentation feature, the ventral keel forms this slightly convex section). At 0.3 length – where the ventral and anterior outlines meet – the outline is slightly depressed.

The anterior outline of the right valve is less asymmetric and the cardinal angle does not protrude. The caudal termination is more tapering, due to the stronger concavity of the upper part of the posterior outline. Anterior parts of both valves is densely denticulated; on the posterior part 6 – 7 larger spines protrude from the outline.

In dorsal view of the left valve the the rise of the outline is insignificant until 0.2 length, then it rises to neat half-length by 30°, then it rises in a somewhat smaller angle until 0.8 length. Behind the outline slopes towards the plane separating the valves along ca. one-third of the local width perpendicularly; then it slopes by 45° almost until the end of the valve. At the end of the valve the outline is almost parallel with the plane separating the valves along a small section.

In dorsal view of the right valve the outline shows similar characters.

2. Ornamentation. There is a strong ventral keel on the left valve from 0.2 to 0.8 length. This keel starts slightly above the ventral outline then extends below the ventral outline on its posterior part. The keel is plate-like and bears a spine-like tapering on its posterior part. The lateral surface is covered by dense spines. There is an especially strong spine near the dorsal outline before the posterior hinge element. The subcentral nodule bears conspicuously stronger spines. There is a strong row of spines along the anterior outline. The protruding cardinal part of the left valve is formed by a plate-like valve-extension, bending like a spine in posterior direction. The posterodorsal spine on the right valve is somewhat weaker.

3. Dimensions

Adult left valve L = 0.54 – 0.57 mm
H = 0.32 – 0.38 mm L/H = 1.47 – 1.70
Adult right valve L = 0.54 – 0.58 mm
H = 0.28 – 0.31 mm L/H = 1.85 – 1.92

4 – 8. The inner characters cannot be studied.

9. There is a strong eye-nodule at the cardinal angle.

Remarks

Even the details of the ornamentation can be easily compared to the type material of BOSQUET (1852) revised by KEIJ (1957). Protruding character of the caudal angle of the left valve can be observed on the figures of DUCASSE et al. (1985) like on the Dudar specimens. Individual variation is low, displaying itself in the variability of spinosity.

Geographical and stratigraphical distribution:

France: Ypresian – Ledian; Belgium: Lutetian – Ledian; Soviet Union: Lutetian – Bartonian; Turkey: Bartonian.

Material

A: 17 isolated valves, 2 juvenile isolated valves, 7 fragments.

Genus *Pterygocythere* HILL, 1954

Pterygocythere jonesi (MÉHES, 1936)
Pl. 4, fig. 1 – 2.

1936. *Cytheropteron jonesi* n. sp. – MÉHES, pp. 22 – 25, t. III, fig. 1 – 4.
1977. *Pterygocythere jonesi* (MÉHES) – MONOSTORI, pp. 81 – 83, Pl. I, fig. 10 – 12.
1985. *Pterygocythere jonesi* (MÉHES) – MONOSTORI, pp. 73 – 75, Pl. VIII, fig. 7 – 9.

Remarks

The two intact left valves are elongated; the local height less decreases towards posterior direction than on the majority of the Gánt and Dorog specimens (MONOSTORI, 1977, 1985). The dorsal outline is nearly straight. The discrepance may be due to sexual dimorphism (male specimens). Teeth of the anterior and posterior margins are long. The wing-like widening terminates in a long spine, observable due to the extremely good preservation.

Dimensions

Adult left valve L = 0.89 – 0.92 mm
H = 0.45 – 0.53 mm L/H = 1.73 – 1.97

Material

A: 3 fragments;
F: 2 isolated valves, 3 fragments.

Genus *Echinocythereis* PURI, 1954

"*Echinocythereis*" *dadayana* (MÉHES, 1941)
Pl. 4, fig. 3 – 6.

1936. *Cythereis dadayi* n. sp. – MÉHES, pp. 40 – 42, t. IV, fig. 12 – 13.
1985. *Echinocythereis dadayana* (MÉHES) – MONOSTORI, pp. 75 – 79, Pl. VIII, fig. 10 – 15, Pl. IX. fig. 1 – 11. (cum syn.).

Remarks

The Dudar specimens are less ornamented, like those of the original description (MÉHES 1936). The Gánt fauna also contains similar forms (MONOSTORI, 1977). The posterodorsal keel mostly can be easily recognized on the Dudar specimens; it lies between 0.6 – 0.8 length like an upward bending plate. Many juvenile specimens occur in some samples. Their surface is almost smooth. The ventral keel is indicated by a strong break in the lateral surface and a tiny spine of the termination of the keel. There is a short, barely perceptible rib or ribs on the ventral part near the outer margin. The posterior teeth can be easily recognized; there are no anterior teeth. The marginal zone is extremely narrow, the hinge is weak. The dorsal and ventral outlines show more convergence in posterior direction than on the adult specimens.

Dimensions

Adult right valve L = 0.74 – 0.80 mm
H = 0.41 – 0.45 mm L/H = 1.78 – 1.83
Adult left valve L = 0.73 – 0.76 mm
H = 0.44 – 0.45 mm L/H = 1.63 – 1.70
Juvenile right valve L = 0.31 – 0.60 mm
H = 0.18 – 0.35 mm L/H = 1.70 – 1.73
Juvenile left valve L = 0.47 – 0.55 mm
H = 0.30 – 0.35 mm L/H = 1.57 – 1.60

Material

A: 239 isolated valves, 1 carapax, 66 juvenile isolated valves;
B: 38 isolated valves, 3 carapaces, 8 juvenile isolated valves;
C: 3 isolated valves;
D: 1 isolated valve;
F: 12 isolated valves.

Subfamily Campilocytherinae PURI, 1960
Genus *Leguminocythereis* HOWE et LAW, 1936

Leguminocythereis dudarensis n. sp.
Pl. 4, fig. 7–8.

Derivatio nominis: named after the type locality.
Holotype: left valve.
Locus typicus: Dudar, Hungary.
Stratum typicum: Lutetian molluscan marl.
Diagnosis

The dominant longitudinal ornamentation elements on the valve weaken from the muscle scar area towards anterior direction; these are anterodorsally fading. The ventral outline is barely convex. There is a definite spine posteroventrally.

Description

1. In outer lateral view the anterior outline of the left valve is strongly asymmetrically rounded; radius of the upper two-thirds is much larger than that of the lower part. The anterior outline bends into the nearly straight dorsal outline at 0.4 length. The latter turns into the posterior outline before 0.9 length in ca. 140° angle. The upper part of the posterior outline is barely concave; the lower branch is rounded by a small radius arc after a 120° break. The ventral outline is nearly straight, being slightly convex between 0.4 and 0.7 length. Height lies at 0.4 length. In outer lateral view of the right valve the height is moved towards the valve surface. The ventral outline is less convex. In inner lateral view there is an asymmetric sinus on the outer margin of the left valve between 0.3 and 0.6 length.

2. Ornamentation. There are two strong, parallel ribs along the anterior outline of the left valve, beginning from the anterior hinge element; the inner one is thinning and fades into the surface at three-quarters of the length. The outer rib slightly moves away from the posterior outline and runs towards the posterior hinge element. The lateral surface bears 10 to 12 uneven, more or less parallel ribs, which partly wedge out towards posterior direction. This longitudinal ribbing is weak on the anterodorsal and ventral parts of the valves from the muscle scar area backwards; the surface is almost smooth here. There is a strong posteroventral spine on the outer concentric rib. There are 3 tiny spines near the lower branch of the posteroventral outline. The ornamentation of the right valve is similar.

3. Dimensions
Adult left valve L = 0.83 mm
H = 0.46 mm L/H = 1.79
Adult right valve L = 0.94 mm
H = 0.50 mm L/H = 1.88
Embryonic right valve L = 0.50 mm
H = 0.27 mm L/H = 1.85

4. The inner lamella is wide anteriorly and posteroventrally. There is no vestibulum. The selvage runs near the outer margin.

5. The marginal pore canals are relatively dense, straight and simple at the anterior and posteroventral parts.

6. The hinge contains a strong anterior socket in the left valve, a strong anteromedian tooth bending downwards and in anterior direction, a reticulated posteromedian cylinder and an elongated posterior socket.

7. The normal pores are disseminated and arranged in the spaces between the longitudinal ribs.

8. The muscle scar area cannot be studied.

9. There is no eye nodule.

10. The left valve slightly overlaps the right valve dorsally and ventrally.

12. The juvenile forms bear a longer straight part of the dorsal outline.

Comparisons

The species is most near to the group of *L. oertlii* KEIJ, but differs by the shape of the outline and by the mostly longitudinal ornamentation. Consequently, it is a separate species.

Material

F: 2 isolated valves, 5 juvenile isolated valves, 14 fragments.

Leguminocythereis aff. *erasa* DUCASSE, 1967
Pl. 4, fig. 9.

Remarks

A single right valve, bearing a nearly symmetrically, in a small radius arc rounded anterior outline, and a nearly symmetrically, in a large radius arc rounded dorsal outline. The meeting point of the dorsal and the anterior outlines is slightly depressive, while the meeting point of the dorsal and posterior outlines is strongly depressed. The posterior outline is rounded in a very small radius arc. The ventral outline is strongly convex; it is formed by a strongly bulging lateral surface between 0.2 and 0.8 length. Ornamentation is that of described by DUCASSE (1967); weak traces of ribbing can be observed on the upper, mostly smooth part of the valve. The strongly bulged ventral part is shifted forward, compared to the type specimen, together with the locations of greatest height and width. In dorsal view the posterior slope of the outline is steeper than on the type, the section of the outline which is parallel with the plane separating the valves is longer.

This single specimen cannot give possibility to determine if these differences are individual variations only, or van be evaluated taxonomically.

Material

C: 1 isolated valve.

Leguminocythereis sp.

Remarks

Fragments indeterminable to the species level.

Material

E: 2 fragments.

Family Hemicytheridae PURI, 1953

Subfamily Hemicytherinae PURI, 1953

Genus *Pokornyella* OERTLI, 1956

Pokornyella ex gr. *limbata* (BOSQUET, 1852)
Pl. 5, fig. 1, 3.

Description

1. In outer lateral view of the left valve the anterior outline is very asymmetrically rounded, bending into the slightly concave dorsal outline at 0.5 length by a 130 – 140° break. At the transition towards the posterior outline there is a 90° break at 0.9 length. The upper part of the posterior outline is strongly concave, while the lower part forms a strong caudal process. The transition of the posterior and ventral outlines is concave around 0.8 length. The ventral outline is asymmetrically convex until 0.8 length. Meeting of the ventral and anterior outlines is concave again around 0.3 length. Height lies at 0.5 length.

Anterior outline of the right valve turns into the dorsal outline at 0.4 length by ca. 150° angle. The latter is straight until 0.6 length, then convexly bends towards the ventral outline until 0.9 length. The upper branch of the posterior outline is strongly concave, while the lower branch is strongly convex, forming a tapering caudal process at the lower third of the height. The posterior outline gradually turns into the weakly and slightly asymmetrically convex ventral outline. Height lies in the middle.

In inner lateral view the outer margin of the left valve definitely deviates from the outline dorsally and ventrally as well. In dorsal view the outline rises in 45° angle until 0.4 length. Then the rise decreases, becoming zero behind 0.5 length. Then the outline slopes in posterior direction. The slope increases from 0° to 60° until a little before 0.9 length. Then the outline is parallel with the plane separating the valves until the termination of the valve at one-fourth level of maximal width.

2. Ornamentation. Valve surface is pitted, being frequently fading, especially on the most convex part of the valve. The large, angular spaces

bordering the anterior outline can be well observed on some specimens. There is a definite ventral keel in the immediate neighbourhood of the ventral outline. There is a protruding ornamentation terminated by a pointless spine on the upper part of the lateral surface before the meeting of the dorsal and posterior outlines. There are longitudinal wrinkles on the caudal process.

3. Dimensions
Adult left valve L = 0.61 – 0.72 mm
H = 0.41 mm L/H = 1.54 – 1.74
Adult right valve L = 0.66 – 0.67 mm
H = 0.38 – 0.40 mm L/H = 1.68 – 1.75

4. The inner lamella is moderately wide. There is no vestibulum. The selvage runs near the outer margin.

5. There is a moderate number of marginal pore canals; these are simple and straight.

6. The anterior hinge element of the left valve is a large socket. The anteromedian element is a strong, button-like tooth, located towards the inner part of the valve compared to the anteromedian element. The posteromedian element is a strong, lath-like cylinder, bordered by a dorsal, strong furrow. The posterior element is a strong socket.

7. There are many large normal pores.

8. The central muscle scars cannot be studied.

9. There is a small, but definite eye-nodule at the cardinal angle.

10. The left valve definitely overlaps the right valve dorsally and ventrally.

11. Part of the forms are more elongated: these might be the male specimens.

Remarks

Compared to the type of BOSQUET revised by KEIJ (1957) the left valves bears somewhat weaker ornamentation, the anterior asymmetry is more definite and the dorsal outline is more straight. The pertinent literature contains more significant differences than these in the large numbers of occurrences ranged into this species. It is questionable if these are subspecies or – rather – the species shows very high individual variation.

Material

B: 2 isolated valves;
E: 2 isolated valves, 1 fragment;
F: 1 fragment.

Pokornyella aff. *ventricosa* (BOSQUET) juv.
Pl. 4, fig. 10.

Remarks

This juvenile form can be identified by its outline and ornamentation with the forms of the Paris basin ranged to this species.

Material

F: 1 juvenile isolated valve.

Subfamily Thaerocytherinae HAZEL, 1967
Genus *Grinioneis* LIEBAU, 1975

Grinioneis haidingeri paijenborchiana KEIJ, 1957
Pl. 5, fig. 2.

1957. *Hermanites paijenborchiana* n. sp. – KEIJ, p. 110, t. XVII, fig. 11 – 14, t. XXI, fig. 10 – 11.
1985. *Hermanites haidingeri paijenborchiana* KEIJ – MONOSTORI, pp. 83 – 87, Pl. X, fig. 7 – 16, Pl. XI, fig. 1 – 7 (cum syn.).

Remarks

Part of the specimens bear a less well developed dorsal keel. On these specimens the lateral surface steeply slopes from the strongly protruding ventral keel towards the dorsal keel. Here the subcentral nodule is less protruding.

Dimensions

Adult right valve L = 0.67 mm
H = 0.37 mm L/H = 1.84
Adult left valve L = 0.68 mm
H = 0.37 mm L/H = 1.87
Adult carapace L = 0.68 mm
H = 0.37 mm W = 0.30 mm L/H = 1.87
Adult carapace (variation mentioned in Remarks)
L = 0.76 mm H = 0.41 mm
L/H = 1.83 W = 0.42 mm

Material

B: 1 carapace;
C: 1 isolated valve, 3 carapaces;
D: 2 isolated valves, 1 carapax, 2 isolated juvenile valves;
F: 2 isolated valves.

Genus *Hermanites* PURI, 1955

"*Hermanites*" *acuticosta gantensis* MONOSTORI, 1977
Pl. 5, fig. 6.

1977. *Hermanites acuticosta gantensis* n. ssp. - MONOSTORI, pp. 104 – 107. Pl. IV, fig. 3 – 6.

Remarks

The plate of the dorsal keel is not divided into two parts on the Dudar specimens. Generally the ornamentation is less well developed.

Dimensions

Adult left valve L = 0.57 – 0.61 mm
H = 0.33 – 0.35 mm L/H = 1.69 – 1.79
Adult right valve L = 0.58 – 0.60 mm
H = 0.31 – 0.32 mm L/H = 1,85 – 1.89

Material

A: 28 isolated valves;
B: 2 isolated valves.

Genus *Bradleya* HORNIBROOK, 1952

Bradleya? validornata hungarica MONOSTORI, 1977
Pl. 5, fig, 4 – 5, 7.

1977. *Bradleya validornata hungarica* n. ssp. – MONOSTORI, pp. 100 – 102, t. III, fig. 5 – 8.
1985. *Bradleya validornata hungarica* MONOSTORI – MONOSTORI, pp. 90 – 94, Pl. XI, fig. 21 – 22, Pl. XII, fig. 1 – 6.

Dimensions

Adult left valve L = 0.85 – 0.87 mm
H = 0.53 mm L/H = 1,60 – 1,64
Adult right valve L = 0,86 mm
H = 0.50 mm L/H = 1.74

Material

C: 2 isolated valves;
D: 4 isolated valves.

Genus *Quadracythere* HORNIBROOK, 1952

Quadracythere angusticostata (BOSQUET, 1852)
Pl. 5, fig. 8.

1852. *Cythere angusticostata* n. sp. – BOSQUET, pp. 91 – 92, Pl. IV, fig. 12.
1985. *Quadracythere angusticostata* (BOSQUET, 1852) – MONOSTORI, pp. 94 – 97, Pl. XII, fig. 7 – 15, Pl. XIII, fig. 1 – 3. (cum syn.).

Dimensions

Adult left valve L = 0.77 – 0.79 mm
H = 0.44 – 0.45 mm L/H = 1.76

Material

C: 1 isolated valve;
D: 2 isolated valves.

Quadracythere vahrenkampi Moos, 1965
Pl. 6, fig. 2 – 10.

1965. *Quadracythere (Hornibrookella) vahrenkampi* n. sp. – Moos, pp. 599 – 602, t. 34, fig. 6 – 8.
1985. *Quadracythere vahrenkampi* Moos, 1965 – Monostori, pp. 98 – 100, Pl. XIII, fig. 4 – 12 (cum syn.).

Remarks

On part of the specimens the ornamentation elements merge into each other of fade; these show an unreticulated subcentral node. Ornamentation displays high individual variation. We have found the possibly juvenile forms described from the Dorog basin (Monostori, 1985). Shape and ornamentation of adult specimens is similar to the *Quadracythere vermiculata* (Bosquet) specimens figured by Ducasse et al. (1985), but significantly differs from the description and figures of Keij's (1957) revision of the *vermiculata* type material.

Dimensions

Adult left valve L = 0.73 – 0.83 mm
H = 0.41 – 0.47 mm L/H = 1.75 – 1-84
Adult right valve L = 0.77 – 0.83 mm
H = 0.38 – 0.40 mm L/H = 1,97 – 2.09

Material

A: 96 isolted valves, 7 carapaces;

C: 1 juvenile? isolated valve, 1 juvenile? carapax;
D: 2 juvenile? isolated valves; 2 fragments;
E: 1 juvenile? isolated valve;
F: 5 isolated valves, 2 carapaces, 2 juvenile? isolated valves, 3 fragments.

Subfamily Orioninae Puri, 1973
Genus *Caudites* Coryell et Fields, 1937

Caudites monsmirabiliensis Apostolescu, 1955
Pl. 7, fig. 1 – 3.

1955. *Caudites monsmirabiliensis* n. sp. – Apostolescu, p. 251, t. II, fig. 33 – 34.
1985. *Caudites monsmirabiliensis* Apostolescu – Monostori, pp. 101 – 103, Pl. XIII, fig. 13 – 17 (cum syn.).

Remarks

The Dudar specimens are characterized by the morphological characters of the Dorog material (Monostori, 1985), differing slightly from the type.

Dimensions

Adult left valve L = 0.52 mm
H = 0.27 mm L/H = 1.91
Adult carapax L = 0,50 mm
H = 0,25 mm L/H = 2.00 W = 0.18 mm

Material

A: 1 carapax;
C: 1 isolated valve;
F: 1 isolated valve.

Subfamily Cytherettidae TRIEBEL, 1972
Genus *Cytheretta* G. W. MÜLLER, 1894

Cytheretta cf. *bambruggensis* KEIJ, 1955
Pl. 7. fig. 5–6.

Description

1. In outer lateral view the anterior outline of the left valve is asymmetrically rounded; radius of the lower part is much larger than that of the upper part. The anterior outline turns into the nearly straight dorsal outline by a ca. 150° angle. Between 0.6 and 0.8 length the dorsal outline is formed by a slightly arched section of the strong dorsal rib. The dorsal outline is strongly depressed between 0.8 and 0.9 length, consequently the transition to the posterior outline is protruding. The upper branch of the posterior outline has smaller radius than that of the lower branch. The lower branch continuously bends into the nearly straight ventral outline. The lower part of the anterior outline is denticulated.

In inner lateral view the dorsal margin of the left valve is straight, while the ventral margin is slightly sinuous somewhat before half length.

2. Ornamentation. Surface of the left valve displays strong ribbing. Number of ribs is 9. The arched dorsal rib, which is somewhat stronger than the others starts at 0.4 length somewhat below the dorsal outline; it forms the dorsal outline in a straight line between 0.6 and 0.8 length. Behind it bends downwards in a more and more steep arc and terminates at 0.9 length and at one-third of the local height. The second rib is slightly arched in dorsal direction, starting from the neighbourhood of the anterior outline. Immediately near to it starts the less arched third rib. The 4. and 5. ribs are slightly sinuous. The 5. rib is barely perceptible around 0.5 length along a short section. The 6. rib is especially strong; at the ends it slightly bends upwards. There is a strong intermediate rib between ribs 5. and 6. between 0.4 and 0.8 length. The 7. rib is parallel with the 6. one. The 8. and 9. ribs are parallel with the venteal outline. There is a bifurcating intermediate rib between 7. and 8. ribs on the posteroventral part. All ribs strongly converge at their posterior terminations. The longitudinal ribs are connected by transverse riblets. The valve is smooth above the anterior and

posterior hinge elements. Near the anterior and posterior margins the surface is poorly observable, as well as the spaces formed by the transverse riblets. There are weak anteromarginal and posteromarginal rims.

3. Dimensions
Adult left valve L = 0.77 mm
H = 0.42 mm L/H = 1.83
4 – 8. The inner characters cannot be studied.
9. There is no eye-node or eye-spot.

Remarks

The longitudinal ornamentation elements can be well compared by the photograph of KEIJ (1972) onthe topotype material. The denticulation of the anterior margin also indicates this species. Certain details of the ornamentation (rise of the dorsal rib above the dorsal margin, characters of the transverse riblets) are similar to the species *Cytheretta haimeana* (BOSQUET, 1852).

Material

B: 2 isolated valves.

Cytheretta sp. 1.

Remarks

This form can be ranged into the group of *C. crassivenia Apostolescu*, 1955.

Material

C: 2 isolated valves.

Cytheretta sp.

Remarks

Fragment indeterminable to the species level.

Material

E: 1 fragment.

Family Paracytheridae PURI, 1957
Genus *Paracytheridea* G. W. MÜLLER, 1894
Paracytheride cf. *gradata* (BOSQUET, 1852)

Remarks

Observable characters of the injured valves indicate this species.

Material

C: 2 isolated valves.

Family Cytheruridae G. W. MÜLLER, 1894
Subfamily Cytherurinae G. W. MÜLLER, 1894
Genus *Semicytherura* WAGNER, 1957
Semicytherura aff. *alata* (LIENENKLAUS, 1894)

Remarks

Outline and ornamentation can be easily identified with published figures. The anterior outline is more asymmetrical, the ventral keel protrudes along a longer section and the dorsal outline is more arcuate than those of the type. It is questionable, if the forms described from various ages under this name indicate wide variability or the authors amalgamated different species. The Dudar material is too poor to answer this question.

Material

A: 1 isolated valve;
F: 2 isolated valves.

Genus *Eucytherura* G. W. MÜLLER, 1894
Eucytherura cf. *keiji* PIETRZENIUK, 1969

Remarks

All observable characters of the single specimen of poor preservation (outline, reticulation, shape of the ventral keel, a short anterior roblet running towards the centre, character of the posterodorsal bulge) indicate this species.

Material

F: 1 isolated valve.

Subfamily Cytheropterinae HANAI, 1957
Genus *Cytheropteron* SARS, 1966
Cytheropteron sp. div.

Remarks

Poorly preserved, scattered specimens belonging to several species.

Material

A: 1 isolated valve;
B: 1 isolated valve;
C: 1 isolated valve;
D: 1 isolated valve;
E: 1 isolated valve;
F: 1 isolated valve.

Family Xestoleberididae SARS, 1928
Genus *Xestoleberis* SARS, 1866
Xestoleberis gantensis MONOSTORI, 1977
Pl. 7, fig. 4, 8–11.

1977. *Xestoleberis gantensis* n. sp. – MONOSTORI, pp. 113–115, t. IV, fig. 14–17.
1985. *Xestoleberis gantensis* MONOSTORI – MONOSTORI, pp. 121–124, Pl. 121–124, Pl. XVI, fig. 1–3.

Remarks

Most specimens are tiny, morphologically variable, thin shelled, probably juvenile forms, like in Gánt and in the Dorog basin. Part of them are extremely elongated; these can be ranged here conditionally only.

Dimensions

Adult right valve L = 0.60–0.66 mm
H = 0.41–0.45 mm L/H = 1.47–1.51
Adult left valve L = 0.61–0.68 mm
H = 0.45–0.48 mm L/H = 1.37–1.41

Material

A: 46 isolated valves, 34 juvenile isolated valves, 34 juvenile isolated valves (elongated forms);
B: 2 isolated valves, 18 juvenile isolated valves;
C: 2 isolated valves, 4 juvenile isolated valves;
D: 3 isolated valves, 9 juvenile isolated valves;
E: 1 isolated valve, 5 juvenile isolated valves;
F: 6 isolated valves, 32 juvenile isolated valves.

Xestoleberis sp. 1.
Pl. 7, fig. 7, 12.

Remarks

Valves with nearly symmetrical dorsal outline, with nearly the same anterior and posterior rounding and with slightly concave symmetrical ventral outline.

Dimensions

Adult left valve L = 0.41–0.50 mm
H = 0.24–0.28 mm L/H = 1.75–1.82

Material

F: 18 isolated valves.

Genus *Uroleberis* TRIEBEL, 1958

Uroleberis parnensis (APOSTOLESCU, 1955)
Pl. 7, fig. 13–15.

1955. *Eocytheropteron parnensis* n. sp. – APOSTOLESCU, p. 259, Pl. IV, fig: 66–67.

1957. *Microxestoleberis parnensis* (APOSTOLESCU) – KEIJ, p. 167, Pl. XV, fig. 9.
1958. *Uroleberis parnensis* (APOSTOLESCU, 1955) – TRIEBEL, pp. 110–112, T. 2, fig. 5–12, T. 3, fig. 13.
1959. *Eocytheropteron parnensis* APOSTOLESCU – DUCASSE, pp. 43–44, Pl. XVIII, fig. 3a, b.
1961. *Uroleberis parnensis* (APOSTOLECU) – DELTEL, p. 35, Pl. 12, fig. 207–208.
1969. *Uroleberis parnensis* (APOSTOLESCU) – SCHEREMETA, pp. 217–218, Pl. XXI, fig. 1–3.
1969. *Uroleberis parnensis* (APOSTOLESCU) – DUCASSE, p. 102, Pl. VII, fig. 146.
1971. *Uroleberis parnensis* (APOSTOLESCU, 1955) – BLONDEAU, p. 97, pl. X, fig. 15.

Description

1. In outer lateral view of the left valve the anterior outline is rounded with a small radius arc. The transition to the dorsal outline is concave at 0.2 length. The dorsal outline is rounded nearly symmetrically in a relatively small radius arc. The upper branch of the posterior outline is concave from 0.9 length, while the lower branch is almost straight. The posterior outline forms a protruding caudal process, having its axis somewhat below one-third height. The ventral outline is formed of the ventral bulge between 0.3 and 0.8 length; it is almost straight. Height lies at 0.5 length.

In outer lateral view of the right valve the dorsal outline forms a slight trapezoidal break; the caudal process is more tapering.

2. Valve surface is smooth with a strong ventral bulge between 0.2 and 0.8 length. The latter steeply terminates posteriorly, while anteriorly slowly rises from the lateral surface.

3. Dimensions.

Left valve L = 0.57 mm, H = 0,37 mm, L/H = 1.54. Right valve L = 0.53 mm, H = 0.31 mm, L/H = 1.73

4. The inner lamella is relatively narrow; there is a definite anterior vestibulum.

5. There are many short, simple, straight marginal pore canals anteriorly.

6. The strong adaptation furrow in the left valve and the elongated, crenulate anterior and posterior teeth in the right valve can be well studied.

7–8. The normal pores and the muscle scars cannot be well studied.

9. There is no eye-spot or eye-node; the characteristic „xestoleberis spot" can be easily recognized.

Remarks

The Dudar form is very similar to the topotype material figured by TRIEBEL (1958).

Geographical and stratigraphical distribution: France: Middle to Upper Eocene; Soviet Union, southern parts: Middle to Upper Eocene.

Material

A: 6 isolated valves, 2 isolated embryonic valves, 2 fragments;
F: 1 isolated valve.

Family Bythocytheridae SARS, 1866
Genus *Monoceratina* ROTH, 1928

Monoceratina sp.

Remarks

Single, fragmented specimen of poor preservation.

Material

E: 1 isolated, fragmented valve.

Superfamily Cypridacea BAIRD, 1845
Family Candonidae KAUFMANN, 1900
Subfamily Paracypridinae SARS, 1923
Genus *Paracypris* SARS, 1866

Paracypris contracta (JONES, 1857)
Pl. 7, fig. 18–19.

1857. *Bairdia contracta* n. sp. – JONES, pp. 53–54, t. V, fig. 1a–c.
1985. *Paracypris contracta* (JONES, 1857) – MONOSTORI, pp. 127–130, Pl. XVI, fig. 8–15, Pl. XVII, fig. 1–6 (cum syn.).

Remarks

Strong individual variation of the outline described by MONOSTORI (1985) from the Dorog basin can be well observed on this material as well.

Dimensions

Adult left valve L = 0.85 – 0.94 mm
H = 0.38 – 0.42 mm L/H = 2.11 – 2.25
Adult right valve L = 0.83 – 0.94 mm
H = 0.33 – 0.41 mm L/H = 2.24 – 2.50

Material

A: 5 isolated valves;
D: 1 isolated valve;
F: 12 isolated valves.

Cypridacea Incertae Familiae
Genus *Novocypris* DUCASSE, 1967

Novocypris gantensis MONOSTORI. 1977
Pl. 7, fig. 16–17.

1977. *Novocypris? gantensis* n. sp. – MONOSTORI, pp. 80–81, t. I, fig. 5–9.
1985. *Novocypris? gantensis* MONOSTORI, 1977 – MONOSTORI, pp. 130–131, Pl. XVII, fig. 7–21.

Dimensions

Adult left valve L = 0.64–0.67 mm
H = 0.32–0.34 mm L/H = 1.97–2.04
Adult right valve L = 0.60–0.65 mm
H = 0.27–0.30 mm L/H = 2.20–2.26

Material

A: 6 isolated valves;
B: 20 isolated valves;
F: 2 isolated valves.

Palaeoecological interpretation

Fundamental principles of the palaeoecological interpretation of ostracod faunas are given by MONOSTORI (1985) on the example of the Eocene ostracods of the Dorog basin. Either the ostracod fauna or the other faunal elements clearly indicate a shallow sublittoral marine environment of deposition.

The following markers have been applied for qualifying the associations on Fig. 1.

I. Forms dominating in the deeper part of the shallow sublittoral region, connected to the open sea. Salinity: normal, Forms:
Krithe bartonensis – Schizocytherini div. sp.

II. Forms dominating in the normal saline shallower part of the shallow sublittoral region:
Quadracythere div. sp. – "*Hermanites*" – Grinioneis – *Phalcocythere horrescens* – *Leguminocythereis* div. sp. – *Bradleya? validornata hungarica*.

III. Forms dominating in the nearshore part of the shallow sublittoral region with slightly oscillating salinity:
"*Echinocythereis*" *dadayana* – *Monsmirabilia triebeli* – *Clithrocytheridea faboides gantensis* – *Pokornyella* div. sp.

IV. Forms dominating in the nearshore part of the shallow sublittoral region with strongly oscillating salinity:
Novocypris gantensis.

V. Forms dominating in different environments:

Cytherella gantensis – *Bairdia (Bairdoppilata) gliberti* – *Xestoleberis gantensis* – *Paracypris contracta.*

Fig. 1. indicates that most of the total fauna (T) is formed by the specimens of group I. This indicates that the formation was deposited in a shallow sublittoral open lagoon with oscillating salinity, at least during some periods of the year.

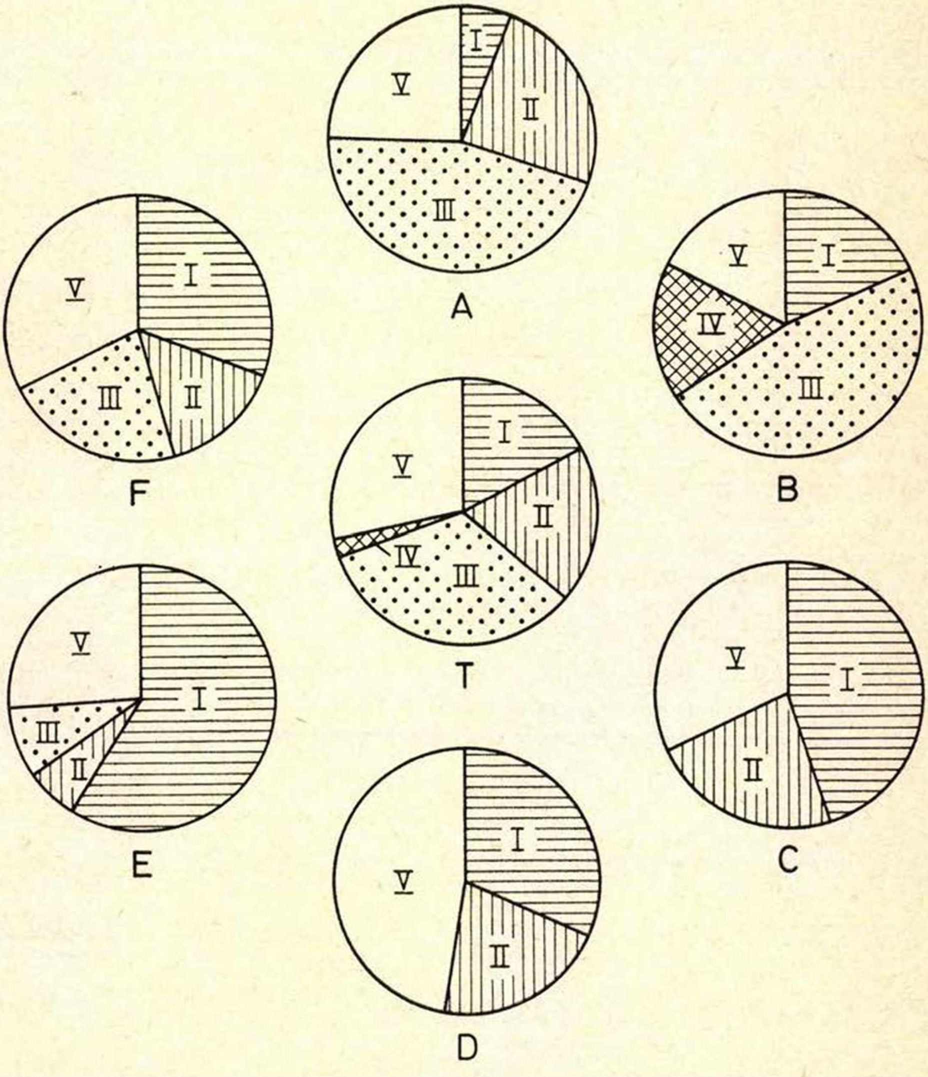

Fig. 1. Quantitative ecological composition of ostracod faunas washed from gastropods For the explanation of letters A – F see under "Material". T = ecological composition of the whole fauna. For the description of associations I – V. see under "Palaeoecological interpretation".

The subordinate significance of group IV. indicates that this effect was not too strong.

The 20% percentage of group I. definitely suggests direct connections with the open sea, at least during some periods of the year.

Washing residues yielded from different gastropod shells show the following differences:

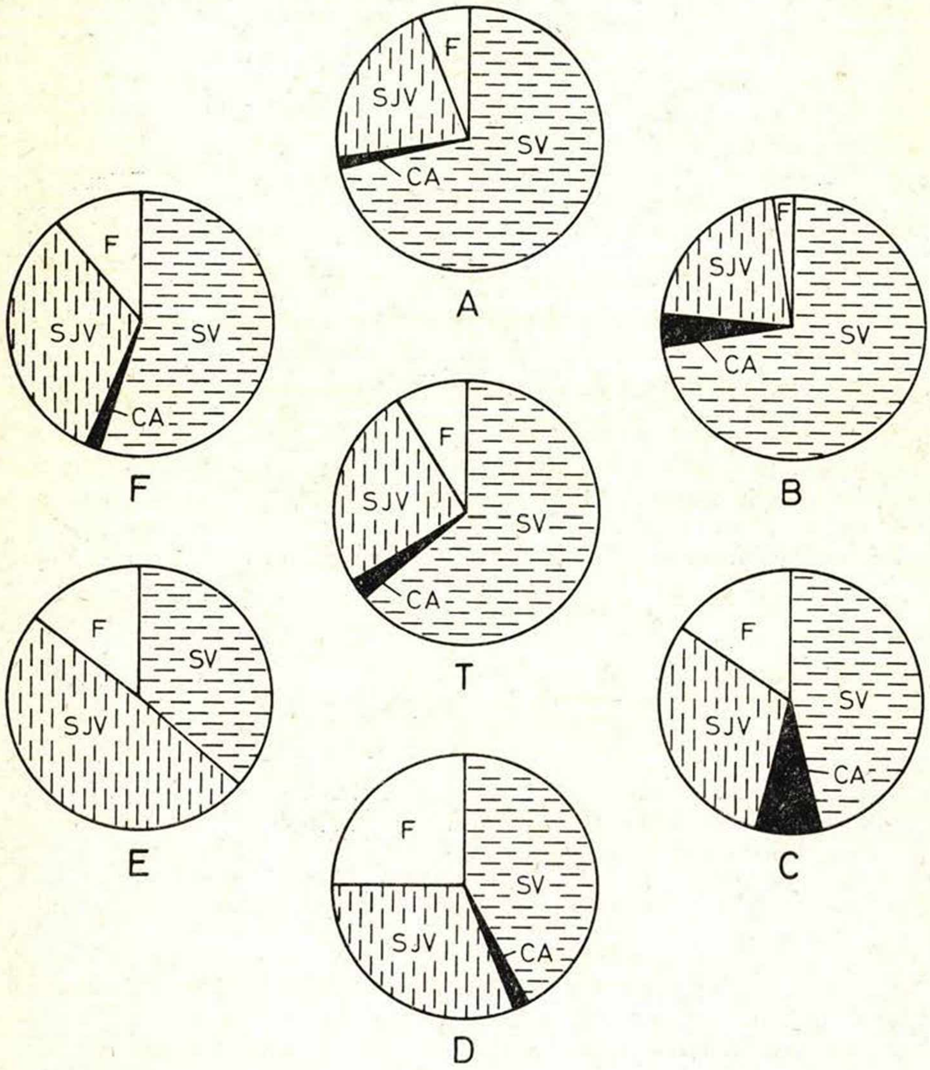

Fig. 2. Quantitative evaluation of preservation of ostracod faunas washed from different gastropods. SV = single valves, CA = carapaces, SJV = single juvenile valves, F = fragments.

A – B: The region characterized by *Cerithium subcorvinum* shows mostly oscillation of salinity: this might have been the innermost and hydrodynamically the most quiet part of the lagoon. Stronger oscillation of salinity (higher frequence of association IV) was characteristic for smaller parts only, and occured rarely.

C – D: The region characterized by *Velates schmidelianus* shows the highest influence of open marine seawater; the continental influence is subordinate. This might have been the outer part of the lagoon and had direct connections with the open sea, with strong hydrodynamic movements.

E: The Campaniles lived in the same region.

F: The coaly sand with Naticidae was deposited under the balanced influence of the lagoon and the open sea.

Fig. 2. presents the distribution of the preservation of fossils. Most of the forms are isolated valves, carapaces are subordinate; there are very many juvenile isolated valves; fragments are relatively rare.

High proportion of isolated valves is generally characteristic for sandy deposits sedimented in highly agitated water. The finer grained sediments are characterized by the dominance of carapaces, except those regions where the deposition was slow. These features provide ready explanation for the dominance of isolated valves in the Dudar fauna.

There are important differences in the percentage of adult and juvenile valves in the washing residues of the different gastropods. This is mostly due to sedimentological causes. For example, the largest proportion of juvenile valves was found in the Campaniles containing much more fine grained infills than other gastropods.

Frequency of embryonic valves is different species by species. The local changes in their abundance might be caused by sedimentological separation as well as different fossilisation potentials and ecological conditions (e.g. unfavorable conditions for certain adult forms).

The multiple causes make the evaluation of juvenile forms percentage difficult. Their frequency indicate good conditions for fossilisation.

Dominance of the species is shown on *Fig. 3.*

The inner part of the ancient lagoon was dominated by "*Echinocythereis*" *dadayana* and highest frequency was reached by *Phalcocythere horrescens*, "*Hermanites*" *acuticosta gantensis*, *Quadracythere vahrenkampi*, *Novocypris gantensis*. Dominance relationships indicate low oscillation of salinity compared to normal conditions; it was normal during most of the year.

The outer part of the lagoon, connected to the open sea was characterized by relatively higher percentage of *Cytherella gantensis*, *Bairdia gliberti*, *Schizocytherini* spp., *Grinioneis haidingeri paijenborchiana*, *Bradleya? validornata hungarica*, *Quadracythere* ex gr. *vermiculata*. The species composition clearly indicates shallow submarine environment.

The index of diversity (calculated by the method of *Williams*, 1964) is much smaller in the inner part with oscillating salinity, than in the outer part connected with the open sea *(Fig. 4.)*. The coaly sand with Naticidae

<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>T</th></tr>
<tr><td>Cytherella (Cytherelloidea) gantensis</td><td>|5</td><td></td><td>/10</td><td></td><td></td><td>3</td><td>4</td></tr>
<tr><td>Bairdia (Bairdoppilata) gliberti</td><td>4</td><td></td><td>|11|</td><td>[25]</td><td>|8</td><td></td><td>|5</td></tr>
<tr><td>Cnestocythere hungarica</td><td></td><td></td><td>|10</td><td>4</td><td>|18|</td><td>|8</td><td>3</td></tr>
<tr><td>Schizocythere hungarica</td><td>|5</td><td>|12|</td><td>|10</td><td>|6</td><td></td><td></td><td>|5</td></tr>
<tr><td>Schizocytherini juv.</td><td></td><td></td><td>|16|</td><td>|13|</td><td>[33]</td><td>|13|</td><td>6</td></tr>
<tr><td>Clithrocytheridea faboides gantensis</td><td></td><td></td><td></td><td></td><td></td><td>|7</td><td>–</td></tr>
<tr><td>Monsmirabilia triebeli</td><td></td><td>|6</td><td></td><td></td><td></td><td>|8</td><td>3</td></tr>
<tr><td>Krithe bartonensis</td><td></td><td>4</td><td></td><td>4</td><td></td><td>|6</td><td>3</td></tr>
<tr><td>Phalcocythere horrescens</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td>–</td></tr>
<tr><td>Echinocythereis dadayana</td><td>[41]</td><td>[35]</td><td></td><td></td><td></td><td>|5</td><td>[27]</td></tr>
<tr><td>Leguminocythereis dudarensis</td><td></td><td></td><td></td><td></td><td></td><td>|8</td><td>–</td></tr>
<tr><td>Leguminocythereis sp.</td><td></td><td></td><td></td><td></td><td>|5</td><td></td><td>–</td></tr>
<tr><td>Pokornyella ex gr. limbata</td><td></td><td></td><td></td><td></td><td>|8</td><td></td><td>–</td></tr>
<tr><td>Hermanites haidingeri paijenborchiana</td><td></td><td></td><td>4</td><td>|7</td><td></td><td></td><td>–</td></tr>
<tr><td>Hermanites acuticosta gantensis</td><td>4</td><td></td><td></td><td></td><td></td><td></td><td>–</td></tr>
<tr><td>Bradeya? validornata hungarica</td><td></td><td></td><td></td><td>|6</td><td></td><td></td><td></td></tr>
<tr><td>Quadracythere vahrenkampi</td><td>|14|</td><td></td><td></td><td>|6</td><td></td><td>|5</td><td>|9</td></tr>
<tr><td>Quadracythere ex gr. vermiculata</td><td></td><td></td><td>|15|</td><td></td><td></td><td></td><td>–</td></tr>
<tr><td>Xestoleberis gantensis</td><td>|15|</td><td>|14|</td><td>|6</td><td>|17|</td><td>|15|</td><td>4</td><td>|15|</td></tr>
<tr><td>Xestoleberis sp.</td><td></td><td></td><td></td><td></td><td></td><td>|7</td><td>–</td></tr>
<tr><td>Paracypris contracta</td><td></td><td></td><td></td><td></td><td></td><td>|5</td><td>–</td></tr>
<tr><td>Novocypris gantensis</td><td></td><td>|14|</td><td></td><td></td><td></td><td></td><td>–</td></tr>
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Symbols:
- $<5\%$: 3
- $5-10\%$: |6
- $11-20\%$: |14|
- $21-30\%$: [26]
- $30<\%$: [33]

Fig. 3. Dominance relationships of species in the washing residues from different gastropod species. The different framing of percentage values serves to accentuate certain percentage intervals.

occupied an intermediate position and had a diversity similar to the outer regions. The sample washed from the Campaniles from the outer region showed lesser diversity. It is due to the small amount of the investigated material and due to the fine grained infill of these gastropods compared to the matrix.

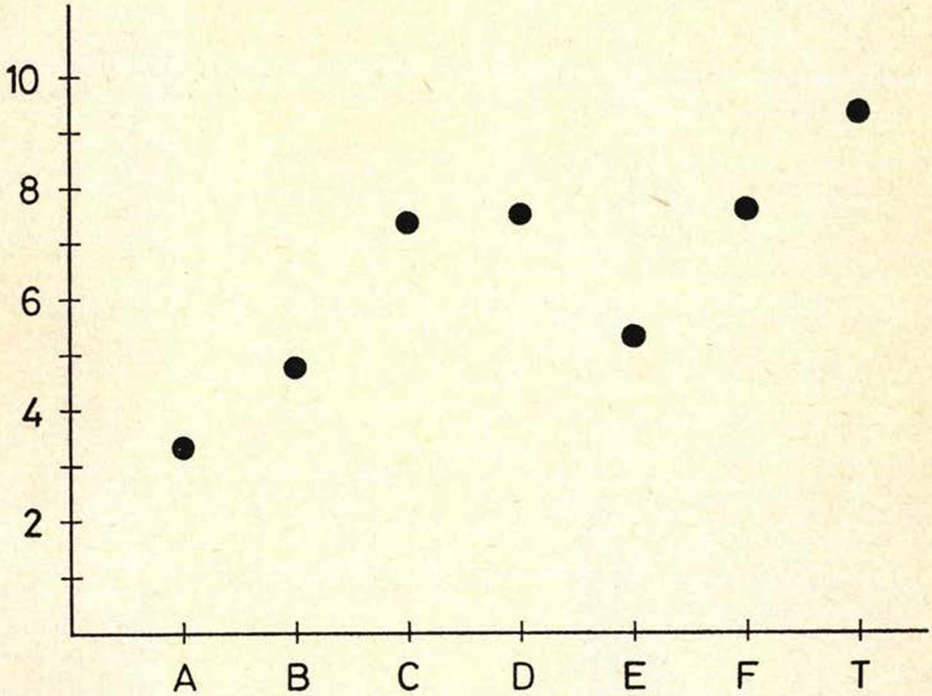

Fig. 4. Diversity indices (after Williams, 1964) of ostracod faunas washed from different gastropod species.

The diversity of the whole fauna is much higher than that any of the faunas washed from the gastropods: it indicates the diversity of the whole lagoon. The diversity of the faunas in the gastropods indicates that of the immediate environment. The diversity of the washing residue of the rock matrix itself might be neareer to the diversity of a larger environmental unit. Our material did not allow us to prove this, since we could not evaluate the ostracod fauna of the coarse-grained matrix.

Summary

The fauna from the washing residue, the rock matrix and the accompanying fauna indicate that the Dudar mollusc sand was deposited in a more or less restricted lagoon. Fossilisation probability was poor for the ostra-

cods living on sandy substratum, but those embedded within gastropods have been preserved in extremely good condition. (MONOSTORI, 1973). Examination of ostracod associations yielded from different gastropod species made possible the differentiation of the lagoon into regions connected to the open sea and into nearshore zones.

The associations clearly indicate that the mollusc sand was deposited in the shallow sublittoral zone, mostly in normal saline sea, where the salinity periodically (probably seasonally) oscillated. Similar conclusions have been drawn by STRAUSZ (1966) based on the examination of the gastropod fauna. The oscillation of the salinity decreased from the inner regions toward the open sea.

Comparing the Dudar locality with the Gánt region (MONOSTORI, 1977) the instability of the environmental conditions was much less; it is indicated by differences in the composition of the ostracod faunas, of the mollusc faunas and by the local massive occurrence of *Nummulites*.

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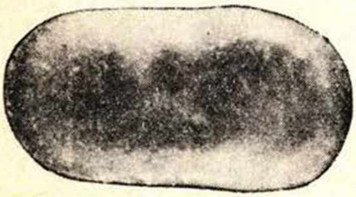

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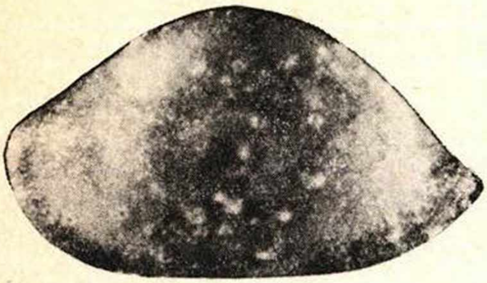

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PLATE 1.

Figs. 1 – 3. *Cytherella (Cytherelloidea) gantensis* MONOSTORI, 1977. Outer view of left valves

Fig. 4. *Platella gyrosa* (ROEMER, 1983), Outer view of a damaged left valve.

Fig. 5 – 7. *Bairdia (Bairdoppilata) gliberti* KEIJ, 1957. Figs. 5, 7: outer view of left valves; fig. 6: outer view of right valve.

Figs. 8 – 9. *Bairdia* sp. 1. Fig. 8: outer view of left valve; Fig. 9.: outer view of right valve.

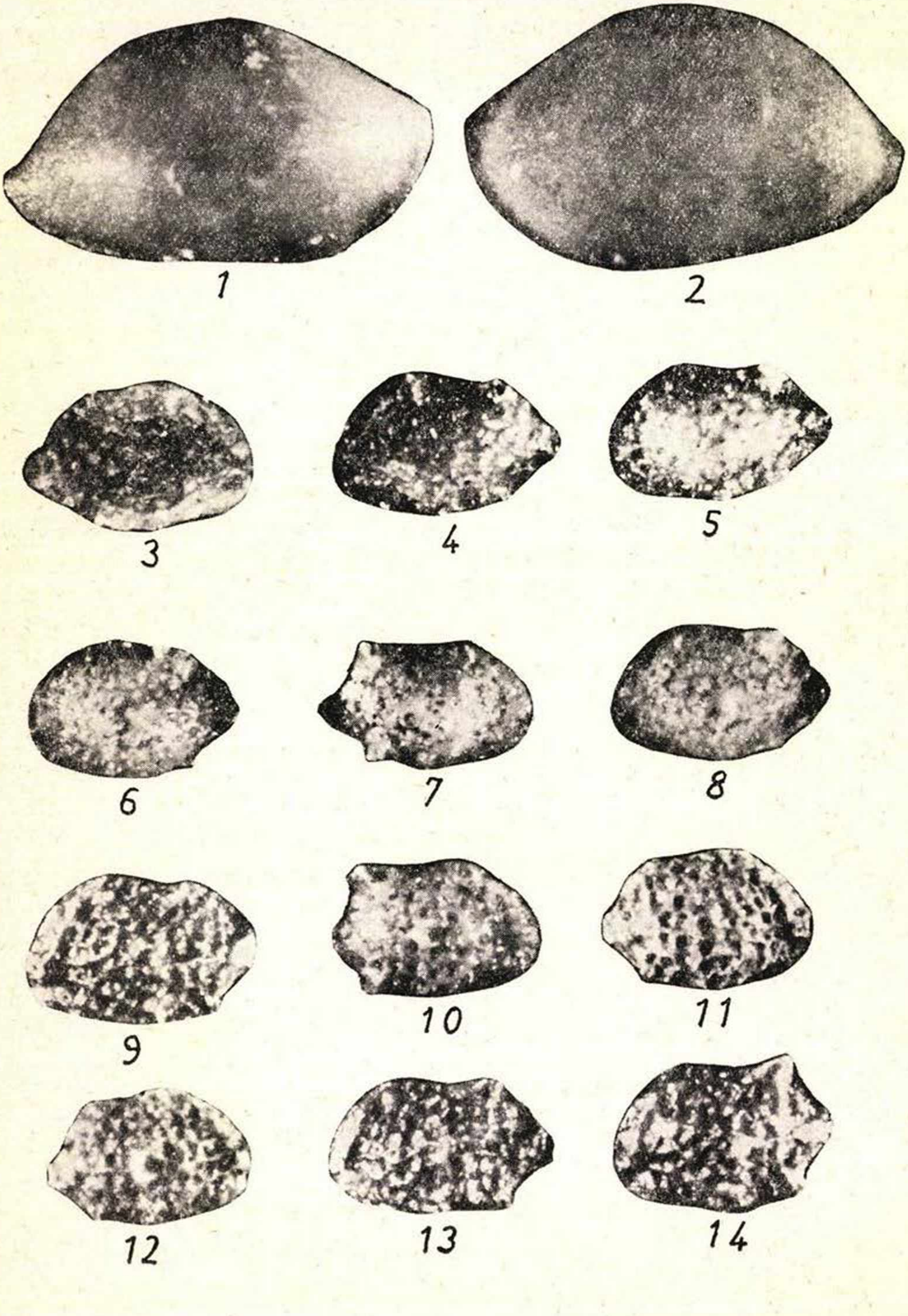
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PLATE 2.

Figs. 1–2. Bairdia (Bairdoppilata) aff. *gliberti* KEIJ, 1957. Fig. 1: outer view of right valve; fig. 2: outer view of left valve.

Figs. 3–8. Cnestocythere hungarica MONOSTORI, 1985. Figs. 3, 7: Outer view of left valves; figs. 4–6, 8: outer view of left valves.

Figs. 9–14. Schizocythere hungarica n. sp. Figs. 9, 13–14: outer view of left valves; figs 10–12: outer view of left valves.

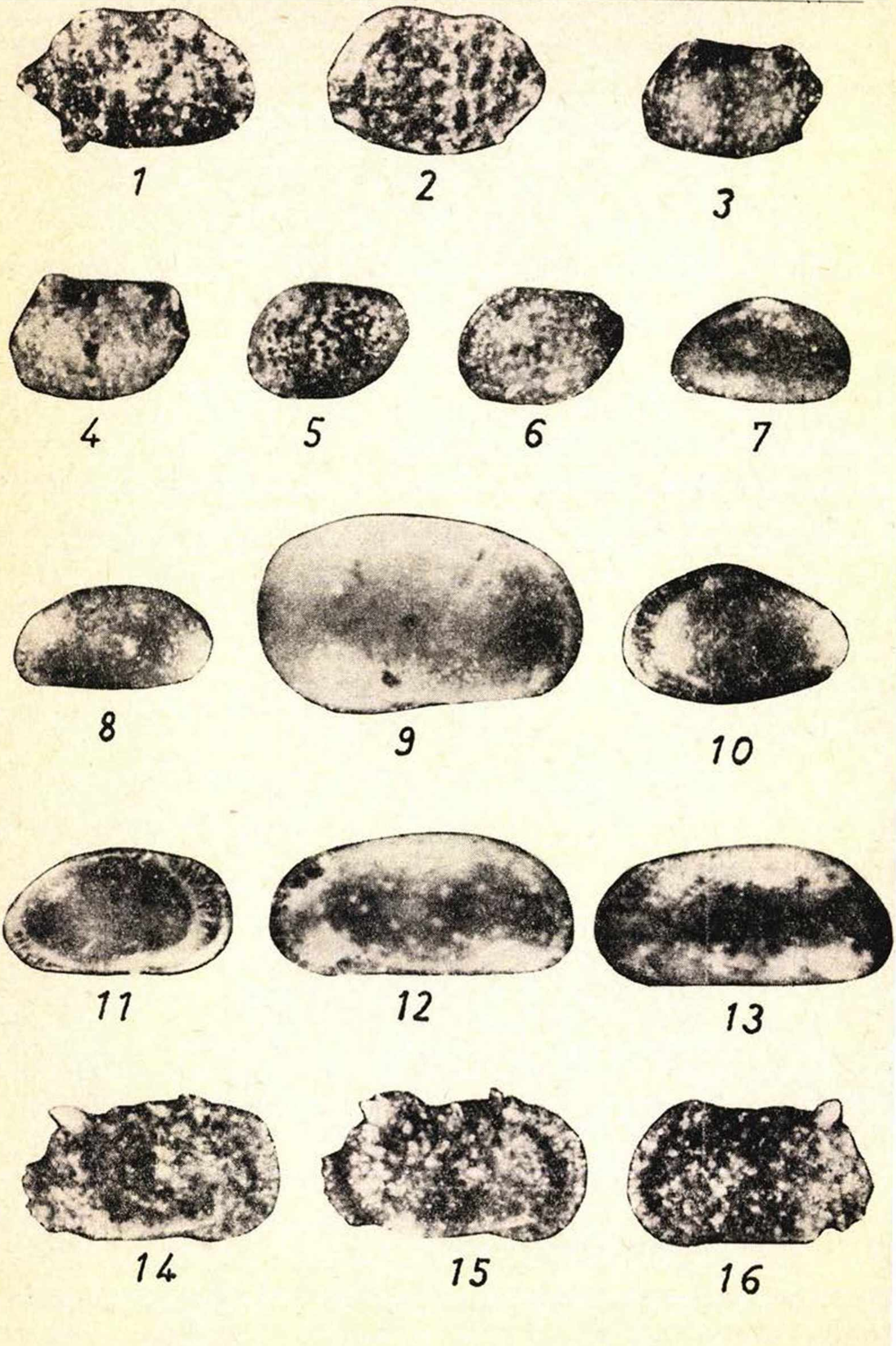
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PLATE 3.

Figs. 1 – 2. Schizocythere hungarica n. sp. Fig. 1: outer view of right valve; fig. 2: outer view of left valve.
Figs. 3 – 4. Schizocythere depressa (MÉHES, 1936). Outer view of left valves.
Figs. 5 – 6. Schizocythere ex gr. *tessellata* (BOSQUET, 1852). Outer view of left valves.
Figs. 7 – 8. Clithrocytheridea faboides gantensis MONOSTORI, 1977. Outer view of left valves.
Fig. 9. Neocyprideis williamsonisna (BOSQUET, 1852). Outer view of right valve.
Figs. 10 – 11. Monsmirabilia triebeli KEIJ, 1957. Fig. 10: outer view of left valve; fig. 11: outer view of right valve.
Figs. 12 – 13. Krithe bartonensis (JONES, 1857). Outer view of left valves.
Figs. 14 – 16. Phalcocythere horrescens (BOSQUET, 1852). Figs. 14 – 15: outer view of right valves; fig. 16: outer view of left valves.

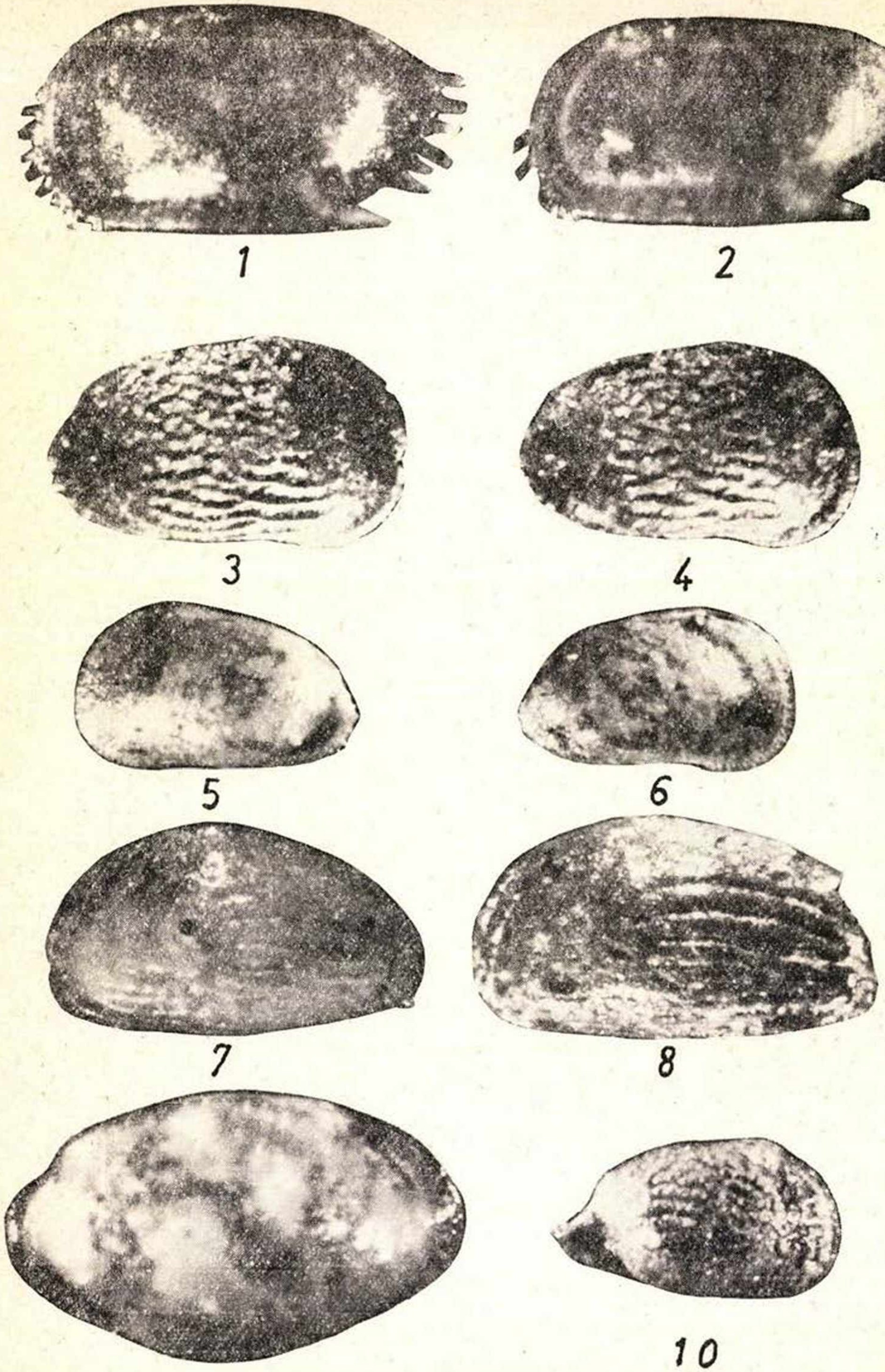
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PLATE 4.

Figs. 1 – 2. *Pterygocythere jonesi* (MÉHES, 1936). Outer view of left valves.
Figs. 3 – 6. *Echinocythereis dadayana* (MÉHES, 1941). Figs. 3 – 4: outer view of right valves; fig. 5: outer view of juvenile left valve; fig. 6: outer view of juvenile righ' valve.
Figs. 7 – 8. *Leguminocythereis dudarensis* n. sp. Outer view of left valves.
Fig. 9. *Leguminocythrereis* aff. *erasa* DUCASSE, 1967. Outer view of right valve

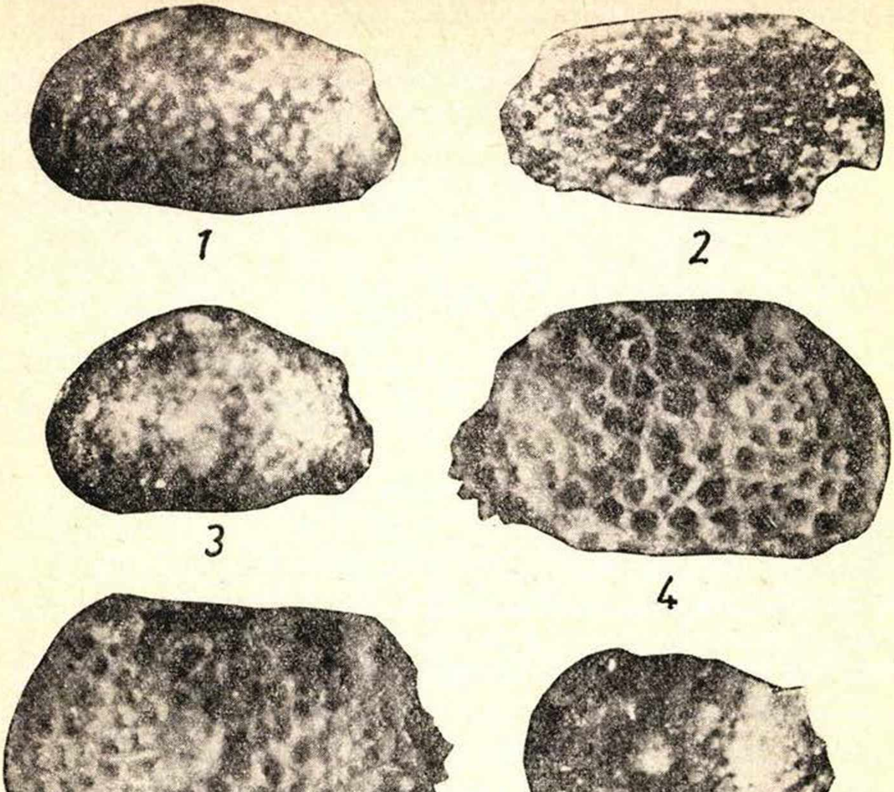
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PLATE 5.

Figs. 1, 3. *Pokornyella* ex gr. *limbata* (Bosquet, 1852). Outer view of left valves.
Fig. 2. *Grinioneis haidingeri paijenborchiana* Keij, 1957. Outer view of right valve.
Figs. 4–5, 7. *Bradleya? validornata hungarica* Monostori, 1977. Figs. 4. 7: outer view of right valves; fig. 5: outer view of left valve.
Fig. 6. *„Hermanites" acuticosta gantensis* Monostori, 1977. Outer view of left valve.
Fig. 8. *Quadracythere angusticostata* (Bosquet, 1852). Outer view of left valve.
Figs. 9–10. *Quadracythere* ex gr. *vermiculata* (Bosquet, 1852). Outer view of left valve.

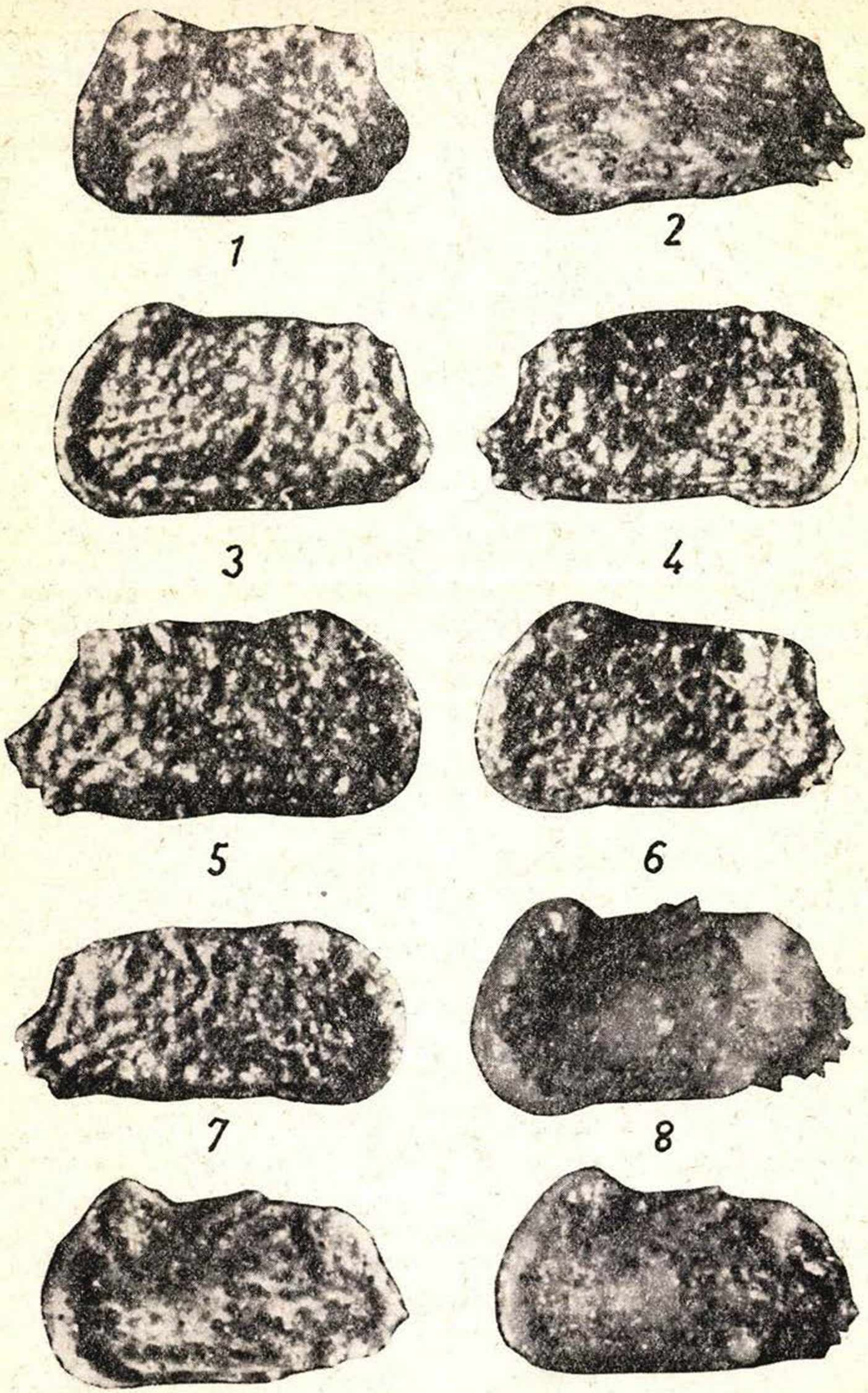
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PLATE 6.

Fig. 1. Quadracythere ex gr. *vermiculata* (BOSQUET, 1852). Outer view of left valve.
Figs. 2 – 10. Quadracythere vahrenkampi MOOS, 1965. Figs. 2 – 3, 6, 8 – 10: outer view of left valves; figs. 4 – 5, 7: outer view of right valves.

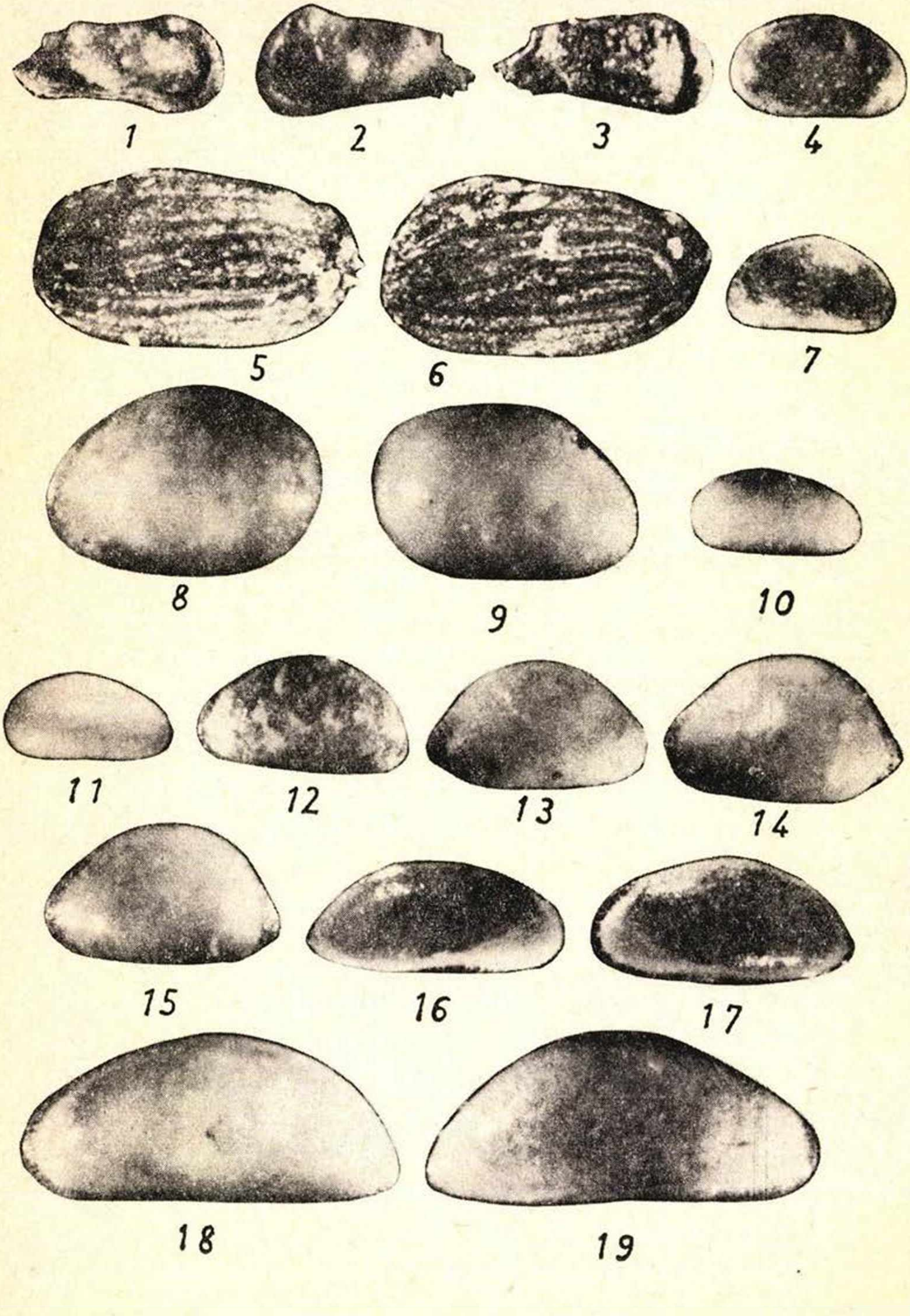
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PLATE 7.

Figs. 1 – 3. Caudites monsmirabiliensis APOSTOLESCU, 1955. Figs. 1, 3: outer view of right valve; fig. 2: outer view of left valve.

Figs. 4, 8 – 11. Xestoleberis gantensis MONOSTORI, 1977. Fig. 4: outer view of juvenile right valve; fig. 8: outer view of left valve; fig. 9: outer view of right valve; figs. 10 – 11: outer view of juvenile right valve (questionably belongs to this species).

Figs. 5 – 6. Cytheretta cf. *bambruggensis* KEIJ, 1957. Outer view of left valves.

Figs. 7, 12. Xestoleberis sp. 1. Fig. 7: outer view of right valve; fig. 12: outer view of left valve.

Figs. 13 – 15. Uroleberis parnensis (APOSTOLESCU, 1955). Fig. 13: outer view of right valve; figs. 14 – 15: outer view of left valves.

Figs. 16 – 17. Novocypris gantensis MONOSTORI, 1977. Fig. 17: outer view of right valve; fig. 17: outer view of left valve.

Figs. 18 – 19. Paracypris contracta (JONES, 1857). Fig. 18: outer view of left valve; fig. 19: outer view of right valve.