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Marine ostracods from the Upper Eocene – Lower Oligocene sections of Slovenia and their paleoecological importance

Miklós MONOSTORI[1], Helena RIFELJ[2] & Bogomir JELEN[2]

(with 3 figures and 4 plates)

The Upper Eocene/Lower Oligocene (Priabonian to Kiscellian) sections of N. Slovenia contains a rich ostracod fauna (51 species). The transgressive sequence is very similar to that of investigable in the Budapest area and more than 90% of species are also common in these localities. It is evident, that these distant series formed in a connected marine Palaeogene basin tectonically disrupted later. Figured ostracod species: *Cytherella (Cytherella)* ex gr. *compressa* (VON MÜNSTER, 1830); *Cytherella (Cytherella)* aff. *mehesi* BRESTENSKÁ, 1975; *Cytherella (Cytherella) transversa* SPEYER, 1863; *Bairdia* cf. *brevis* LIENENKLAUS, 1900; *Bairdia* aff. *complanata* DUCASSE, 1967; *Bairdia rupelica* MonOstori, 1982; *Triebelina* aff. *punctata* DELTEL, 1964; *Paijenborchella* ex gr. *eocaenica* TRIEBEL, 1949; *Clithrocytheridea kosdensis* MONOSTORI, 1996; *Hemicyprideis helvetica* (LIENENKLAUS, 1895); *Cuneocythere* cf. *marginata* (BOSQUET, 1852); *Krithe bartonensis* (JONES, 1857) s. l.; *Krithe pernoides* (BORNEMANN, 1855); *Costa hermi* WITT, 1967 s. l.; *Hazelina indigena* MOOS, 1966; *Pterygocythereis* ex gr. *fimbriata* (VON MÜNSTER, 1830); *Echinocythereis* cf. *scabra* (VON MÜNSTER, 1830); *Ducassella dadayana* (MÉHES, 1941); *Occultocythereis* ex gr. *mutabilis* TRIEBEL, 1961; *Occultocythereis* n. sp. 1 MONOSTORI, 1998; *Pokornyella inaequapunctata* DUCASSE, 1963; *Hornibrookella* ex gr. *macropora* (BOSQUET, 1852); *Reticuloquadracythere apostolescui* (DUCASSE, 1963); *Bosquetina zalanyii* BRESTENSKÁ, 1975; *Cytheretta* aff. *posticalis* TRIEBEL, 1952; *Eucytherura dentata* LIENENKLAUS, 1905; *Semicytherura* ex gr. *gracilis* (LIENENKLAUS, 1895); *Uroleberis budaensis* MONOSTORI, 2000; *Uroleberis striatopunctata* DUCASSE, 1967; *Protoargilloecia angulata* DELTEL, 1963; *Paracypris contracta* (JONES, 1857); *Paracypris* ex gr. *propinqua* TRIEBEL, 1963; *Phlyctenophora oligocaenica* ZALÁNYI, 1929.

Geological introduction

There are some interesting Paleogene sections in Northern Part of Slovenia (Fig. 1) having a rich ostracod material. The marine part of the Vračjek-II section belongs to the chronozones Np 19-20 - ? lowermost 21 (BÁLDI-BEKE in JELEN et al., 2001b). Lithology: marls with a limestone intercalation. (Fig. 2: stratigraphic column with samples)

The Luče section contains the Eocene/Oligocene boundary and its lower part belongs to the chronozone NP 21 (the boundary is between samples 11-13 according to nannoplankton and planktonic foraminifera) (Fig. 3).

Samples 27-31 belong to chronozone NP 22-23, according to M. Báldi-Beke. Lithology: limestone, marl, clay.

These sections are very similar to the Eocene/Oligocene boundary sections of North Hungary (BÁLDI, T. 1986, MONOSTORI, 1986, 1987a) both in lithology and in palaeontology (JELEN et al., 1998).

[1] Department of Palaeontology, Eötvös University, P. O. Box 120, H-1518 Budapest, Hungary. E-mail: monost@ludens.elte.hu
[2] Geological Survey of Slovenia, Dimičeva 14, Ljubljana, Slovenia.

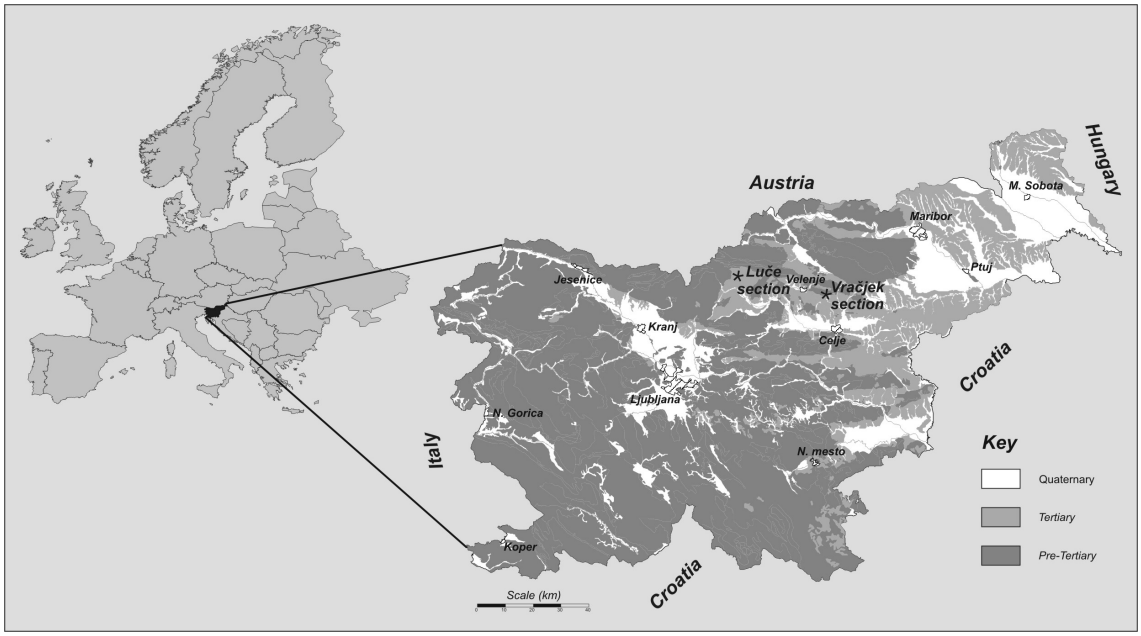

Fig. 1. Location of Luče and Vračjek sections in Slovenia (adapted from BUDKOVIČ et al., 2003). .

Systematical part

Order Podocopida G. W. MÜLLER, 1884
Suborder Platycopa SARS, 1866
Genus *Cytherella* JONES, 1849
Cytherella (Cytherella) ex gr. *compressa* (VON MÜNSTER, 1830)
Plate 1, figs 1-2.

Remarks: one of the frequent forms in the deep sublittoral/bathyal marine environments of Tertiary seas. This collecting species needs revision, our restricted material is unsuited for this.
Dimensions: L = 0.78 – 0.83 mm
H = 0.48 – 0.51 mm
L/H = 1.63 – 1.66
Occurrence: Luče section, samples 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 24, 26, 27. Vračjek-II section, samples 4, 5, 9, 10, 11, 12.
Material. 111 carapaces from the Luče section and 18 carapaces from the Vračjek-II section.

Cytherella (Cytherella) aff. *mehesi* BRESTENSKÁ, 1975
Plate 1, figs 3-5.

1982. *Cytherella* aff. *mehesi* BRESTENSKÁ, 1975 – MONOSTORI, pp. 50-51, Pl. IV, f. 4-7.
1985. *Cytherella* (*Cytherella*) aff. *mehesi* BRESTENSKÁ,1975 – MONOSTORI, pp. 166-167, Pl. 1, f. 3-4.

Remarks: this is a frequent form in deep sublittoral/bathyal sediments of Slovakia and Hungary.

Dimensions: L = 0.72 – 0.86 mm
H = 0.45 – 0.53 mm
L/H = 1.56 – 1.75
Occurrence: Luče section, samples 2, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 24, 26, 27. Vračjek-II section, samples 4, 5, 9, 10, 11, 12, 14.
Material: 105 carapaces from the Luče section and 35 carapaces from the Vračjek-II section.

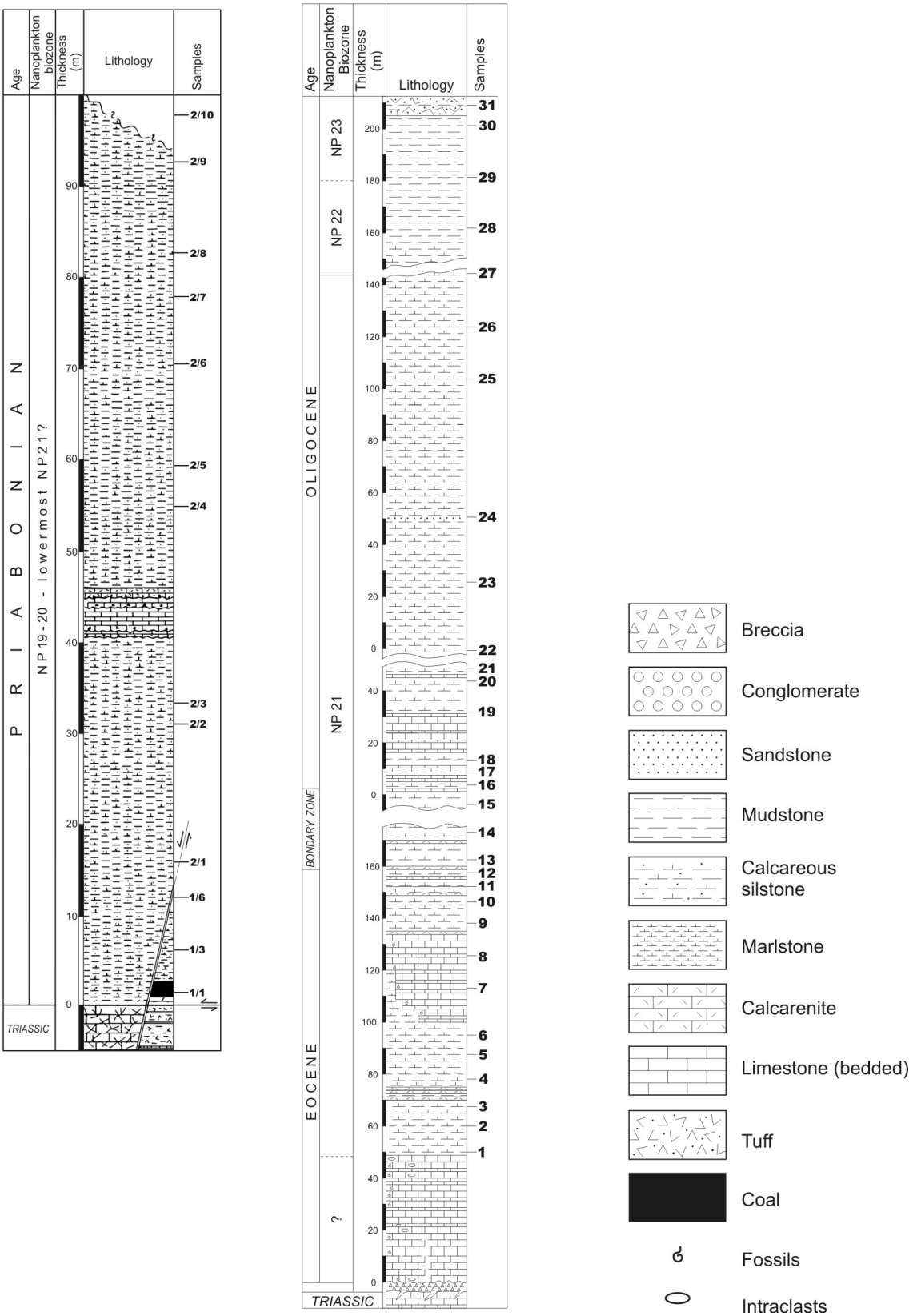

Fig. 2. Lithological profiles of Vračjek II (left, after ŠKABERNE, 2000) and Luče (right, ŠKABERNE, in prep.) sections with sample numbers.

Cytherella transversa Speyer, 1863 s. l.
Plate 3, figs 1-4.

1863. *Cytherella transversa* n. sp. – SPEYER, p. 56, Pl. I, fig. 2.
1941. *Cytherelloidea pestiensis* n. sp. – MÉHES, pp. 81-82, Pl. VII, figs 21-22; text figs 18, 95, 105.
1957. *Cytherella transversa* SPEYER, 1863 – KEIJ, p. 47, Pl. I, fig. 2.
1961. *Cytherella transversa* SPEYER, 1863 – DELTEL, p. 17, Pl. II, figs 22-23.
1963. *Cytherella transversa* SPEYER, 1863 – STCHÉPINSKY, p. , Pl. I, figs 1-3.
1969. *Cytherella transversa* SPEYER, 1863 – PIETRZENIUK, p. 13, Pl. I, figs 11-12.
1969. *Cytherella transversa* SPEYER, 1863 – SCHEREMETA, 1969, p. 45, Pl. I, figs 8-9.
1969. *Cytherella transversa* SPEYER, 1863 – DUCASSE, p. 12, Pl. I, fig. 11.
1975. *Cytherella pestiensis* (MÉHES) – BRESTENSKÁ, pp. 382-383, Pl. 1, figs 1-9.
1975. *Cytherella transversa* SPEYER, 1863 – FAUPEL, p. 64, Pl. 10, figs 5-6.
1981. *Cytherella transversa* SPEYER, 1863 – DUCASSE, p. 175-176, Pl. II, figs 4-9 (forme „ovoide"), figs 10-11 (forme „pentagonale"), figs 12-14 (forme „infléchie"), figs 15 (forme „hastée").
1981. *Cytherella* (*Cytherella*) *transversa* SPEYER, 1863 – UFFENORDE, p. 131, Pl. 1, fig. 3.
1982. *Cytherella pestiensis* (MÉHES, 1941) – MONOSTORI, pp. 48-49, Pl. III, figs 5-8.
1985. *Cytherella* (*Cytherella*)*pestiensis* (MÉHES, 1941) – MONOSTORI, pp. 166-167, Pl. 1, figs 5-
1985. *Cytherella transversa* SPEYER, 1863 – DUCASSE et al., Pl. 71, fig. 16.
1988. *Cytherella* gr. *transversa* SPEYER, 1863 – BARBIN et GUERNET, pp. 215 – 216, Pl. 1, figs 4-5.
1989. *Cytherella transversa* SPEYER, 1863 – KEEN, Pl. 2, fig. 7.

Remarks: this species has a large variability in shape, in the fine ornamentation and in the development of the posterior „ear" of the left valve (see Monostori, 1982, 1985). The investigated material is so close to Cytherella transversa Speyer, 1863 (including the variable forms figured in the literature as transversa that the the species pestiensis is obviously a variation of the C. transversa Speyer, 1863 s. l.
It is one of the most characteristic species of the marine bathyal Paleogene sediments in Hungary.
Dimensions: L = 0.75 – 0.80 mm
H = 0.40 – 0.53 mm
L/H = 1.68 – 1.86.
Occurrence: Luče section, samples 7, 8, 9, 10, 11, 12, 13, 14.
Material: 71 carapaces.

Cytherella cf. *gantensis* MONOSTORI, 1977

Remarks: a single, poorly preserved carapace from Vračjek-II section, sample 3.

Cytherella sp.

Remarks: poorly preserved carapaces with oval outline, undeterminable on species level.
Occurrence: Luče section, samples 2, 7, 8, 9, 10, 11, 12, 13, 17, 19, 20, 27. Vračjek-II section, sample 10.
Material: 100 carapaces from the Luče section and 1 carapace from the Vračjek-II section.

Suborder Metacopa SYLVESTER-BRADLEY, 1967
Familia Saipanettidae MCKENZIE, 1968
Genus *Cardobairdia* VAN DEN BOLD, 1960
Cardobairdia cf. *hungarica* MONOSTORI, 1982

Remarks: poorly preserved carapaces. The visible characters are similar to those of the hungarica from Budapest-area.
Dimensions: L = 0.44 mm
H = 0.24 mm
L/H = 1.83.
Occurrence: Luče section, samples 2, 24, 26.
Materaial: 4 carapaces.

Suborder Podocopa SARS, 1866
Familia Bairdiidae SARS, 1888
Genus *Bairdia* MCCOY, 1844
Bairdia cf. *brevis* LIENENKLAUS, 1900
Plate 1, fig. 8.

Remarks: the only examinable outer characters are similar to this species.
Dimensions: L = 0.94 – 1.08 mm
H = 0.66 – 0.8 mm
L/H = 1.43 – 1.58.
Occurrence: Luče section, sample 6, 7, 8, 10, 12, 13, 14, 15, 16, 19, 20, 21, 22.
Material: 90 carapaces.

Bairdia aff. *complanata* Ducasse, 1967
Plate 1, fig. 9.

Description: the anterior outline is very asymmetrical, its dorsal part is straight or slightly concave, the ventral part is convex, the angular break is at 0.6 of the height. The dorsal outline is slightly and nearly symmetrically rounded. the posterior outline is pointed at 0.2 – 0.3 of the height. Its upper part more of less concave, lower part nearly straight. The ventral outline is straight on the left valve and straight or hardly concave on right valve.

The left valve slightly overlap the right one, at wich the dorsal outline is straight.
Remarks: the form is nearly indentical with figures of DUCASSE from the Eocene of SW-France.
Dimensions: L = 0.73 – 0.81 mm
H = 0.34 – 0.43 mm
L/H = 1.87 – 2.03
Occurrence: Luče section, samples 6, 7, 9, 10, 12, 13, 22, 26.
Material: 13 carapaces.

Bairdia rupelica MONOSTORI, 1982
Plate 1, fig. 10.

1982. *Bairdia rupelica* n. sp. – MONOSTORI, pp. 52-53, Pl. V, f. 1-2.
1985. *Bairdia rupelica* MONOSTORI, 1982 – MONOSTORI, p. 170, Pl. 2, f. 6.

Remarks: characteristic form of Upper Eocene and Lower Oligocene bathyal marine beds in Hungary, the Luče material is very similar.
Dimensions: L = 1.0 mm
H = 0.8 mm
L/H = 1.5
Occurrence: Luče section, samples 6., 7, 10, 12, 14, 15, 16, 19, 20, 22, 28.
Material: 31 carapaces.

Bairdia sp.

Remarks: damaged carapaces belonging to this genus.
Occurrence: Vračjek-II section, samples 5, 9.
Material: 5 carapaces.

Bairdia ? sp.

Remarks: somewhat elongated form with rounded anterior and nearly rounded posterior end. Poorly preserved specimens.
Occurrence: Luče section, samples 2, 6.
Material: 4 carapaces.

Genus *Triebelina* BOLD, 1946
Triebelina aff. *punctata* DELTEL, 1964
Plate 2, fig. 1.

Remarks: the specimens from the Oligocene type territory of SW-French generally are more high and have more short dorsal outline, but among the specimens there is also similar to Luče material (Deltel, 1961, fig. 57.). In material from Lower Oligocene of Turkey similar kind of specimens are figured (Sönmez-Gökçen, 1973) therefore it is very probable our rare specimens belongs to this species.
Dimensions: L = 0.63 – 0.68 mm
H = 0.33 – 0.35 mm
L/H = 1.92 – 1.94
Occurrence: Luče section, samples 7, 15.
Material: 2 carapaces.

Familia Cytheridae BAIRD, 1850
Subfamilia Cytherinae BAIRD, 1850
Tribus Schizocytherini MANDELSTAM
Genus *Schizocythere* TRIEBEL, 1950
Schizocythere ? sp.

Remarks: after the shape and ornamentation the rather poorly preserved carapaces belong to *Schizocythere* or *Cnestocythere* (or they are different species of these genera). Both genera were inhabitant of the medium and deep sublittoral marine waters in the Paleogene of the Central Paratethys area.
Dimensions: L = 0.42 – 0.47 mm
H = 0.26 – 0.30 mm
L/H = 1.57 – 1.7
Occurrence: Luče section, samples 12, 27. Vračjek section, sample 3.
Material: 2 damaged carapaces from the Luče section and 1 carapace from the Vračjek-II section.

Tribus Paijenborchellini DEROO, 1960
Genus *Paijenborchella* KINGMA, 1948
Paijenborchella ex gr. *eocaenica* TRIEBEL, 1949
Plate 2, fig. 2.

Remarks: the visible characters of the specimens are those of the species mentioned above. On some specimens the strengthening of the median costa is visible as on Hungarian Priabonian form *P.* aff. *eocaenica* TRIEBEL, 1949. The sensu lato species is a common form in Bartonian-Priabonian sublittoral beds of Hungary.
Dimensions: L = 0.46 – 0.55 mm
H = 0.26 – 0.28 mm
L/H = 1.81 – 1.98
Occurrence: Vračjek-II section, sample 3.
Material: 13 carapaces.

Paijenborchella sp. 1
Plate 2, fig. 3.

Remarks: there is some similarity to *P. sturovensis* BRESTENSKÁ, 1975 from Oligocen of Slovakia and Hungary but the preservation is incomplete for the unambiguous verification.
Occurrence: Vračjek-II section, sample 5.
Material: 1 carapace.

Familia Leptocytheridae HANAI, 1957
Genus *Callistocythere* RUGGIERI, 1953
Callistocythere sp.
Plate 2, fig. 4.

Remarks: there are a network rare, strong and thick wrinkles on the surface of the valves. There is a distinct, slightly convex keel at the ventral outline from ¼ to ¾ of the length. Near the angular posterior outline runs an another keel.
Dimensions: L = 0.42 – 0.45 mm
H = 0.22 – 0.23 mm.
L/H = 1.90 – 1.96
Occurrence: Luče section, samples 16, 27.
Material: 2 carapaces.

Familia Cytherideidae SARS, 1925
Subfamilia Cytherideinae SARS, 1925
Genus *Clithrocytheridea* STEPHENSEN, 1936
Clithrocytheridea kosdensis MONOSTORI, 1996
Plate 2, fig. 5.

1996. *Clithrocytheridea kosdensis* n. sp. – MONOSTORI, p. 32., Pl. 5., f. 1-4.

Remarks: the shape and ornamentation is similar to the type material, the variability of the strength of ornamentation as large as at the type material. Common form in Priabonian shallow sublittoral materials of Hungary.
Dimensions: L = 0.51 – 0.53 mm
H = 0.26 – 0.27 mm
L/H = 1.96
Occurrence: Vračjek-II section, samples 3, 5.
Material: 79 carapaces.

Genus *Hemicyprideis* MALZ et TRIEBEL, 1970
Hemicyprideis helvetica (LIENENKLAUS, 1895)
Plate 2, fig. 6.

1982. *Hemicyprideis helvetica* (LIENENKLAUS, 1895) – MONOSTORI, pp. 34-35., Pl. I., f. 3-5. (cum syn.)
1985. *Hemicyprideis helvetica* (LIENENKLAUS, 1895) – MONOSTORI, pp. 181 – 182, Pl. 3., f. 7-8.

Remarks: one of the most common species in Kiscellian and Egerian brackish shallow water environments of the Central Paratethys. The Gornji Grad material shows the typical characters of this well known species.
Dimensions: L = 0.64 mm
H = 0.37 mm
L/H = 1.73
Occurrence: Luče section, sample 16.
Material: 1 carapace.

Subfamilia Cuneocytherinae MANDELSTAM, 1959
Genus *Cuneocythere* LIENENKLAUS, 1894
Cuneocythere cf. *marginata* (BOSQUET, 1852)
Plate 2, fig. 7.

Remarks: rare, poorly preserved forms. The investigable characters relate to this species.
Dimensions: L = 0.58 – 0.61 mm
H = 0.33 – 0.38 mm
L/H = 1.6 – 1.76
Occurrence: Luče section, sampoes 19, 20.
Material: 3 carapaces.

Familia Krithidae MANDELSTAM, 1960
Genus *Krithe* BRADY, CROSSKEY et ROBERTSON, 1874
Krithe bartonensis (JONES, 1857) s. l.
Plate 2, fig. 8.

1857. *Cytherideis bartonensis* n. sp. – JONES, p. 50, Pl. V, f. 2a-b, 3a-b.
1996. *Krithe bartonensis* (JONES, 1857) s. l. – MONOSTORI, pp. 39-41, Pl. 11, f. 4-8, Pl. 12, f. 1-8. (cum syn.)

Remarks: in the Eocene sediments of the Central Paratethys area this is one of the most characteristic species of the deep sublittoral environments.
Dimensions: L = 0.66 – 0.73 mm
H = 0.32 – 0.36 mm
L/H = 1.75 – 2.10
Occurrence: Vračjek-II section, samples 3, 4, 5, 9.
Material: 69 carapaces.

Krithe pernoides (BORNEMANN, 1855)
Plate 2, figs 9-11.

1855. *Bairdia pernoides* n. sp. – BORNEMANN, p. 358, Pl. XX., f. 7-8.
1982. *Krithe pernoides* (BORNEMANN, 1855) – MONOSTORI, pp. 55-56, Pl. V, f. 4-10. (cum syn.)
1996. *Krithe pernoides* (BORNEMANN, 1855) s. l. – MONOSTORI, pp. 42-43, Pl. 14, f. 5-8., Pl. 15., f. 1-3. (cum syn.).

Remarks: the characters are those of the Hungarian materials accepted the large diversity. The species in one of the most common forms in the Central Paratethys area from the Eocene to the Egerian in bathyal environments.
Dimensions: L = 0.44 – 0.76 mm
H = 0.22 – 0.34 mm
L/H = 1.8 – 2.42 (generally above 2).

Occurrence: Luče section, samples 2, 7, 9, 10, 11, 14, 15, 16, 20, 28. Vračjek-II section, samples 4, 5, 10, 11, 12, 14.
Material: 28 carapaces from the Luče section and 18 carapaces from the Vračjek-II section.

Familia Trachyleberididae SYLVESTER-BRADLEY, 1948
Subfamilia Trachyleberidinae SYLVESTER-BRADLEY, 1948
Tribus Brachyleberidini SYLVESTER-BRADLEY, 1948
Genus *Trachyleberis* BRADY, 1898
Trachyleberis sp.
Plate 3, fig. 1.

Remarks: very badly preserved form, only with traces of spines characterizing this genus. *Trachyleberis spinosa* LIENENKLAUS, 1900 was a common form in Hungary from Lutetian to Kiscellian in deep sublittoral-bathyal environments.
Dimensions: L = 0.37 mm
H = 0.11 mm
L/H = 1.95
Juvenile form?
Occurrence: Luče section, sample 1.
Material: 1 carapace.

Genus *Costa* NEVIANI, 1928
Costa hermi WITT, 1967 s. l.
Plate 3, figs 2-3.

1967. *Costa hermi* n. sp. – WITT, p. 30, pl. 1, f. 21-26.
1975. *Costa hermi* WITT, 1967 – BRESTENSKÁ, pp. 392 – 393, Pl. 7, f. 7-11.
1982. *Costa hermi* WITT, 1967 – MONOSTORI, pp. 56-58, Pl. V, f. 11-12, Pl. VI., f. 1.

1985. *Costa* cf. *hermi* WITT, 1967 – MONOSTORI, p. 192.

Remarks: this is a common deep sublittoral/bathyal form in the Kiscellian and Egerian sediments of the Central Paratethys. A distinct variation in the strength of ornamental elements were observable at the materials, similarly to the previous description of the specimens from Hungary (MONOSTORI, 1982). The well-preserved material isn't large enough to decide existence of subspecies.
Dimensions: L = 0.72 – 0.93 mm (0.48 juv.?)
H = 0.35 – 0.48 mm (0.24 juv.?)
L/H = 1.87 – 2.04
Occurrence: Luče section, samples 7, 9, 10, 11, 12, 13, 14, 15, 24. Vračjek-II section, samples 4, 5, 12.
Material: 18 carapaces from the Luče section and 3 carapaces from the Vračjek-II section.

Genus *Hazelina* MOOS, 1966
Hazelina indigena MOOS, 1966
Plate 3, fig. 4.

1966. *Hazelina indigena* n. sp. – MOOS, pp. 286 – 288., Pl. 24., f. 1-12.
1985. *Hazelina indigena* MOOS, 1966 – MONOSTORI, pp. 193-194., Pl. 5., f. 3. (cum syn.)
1993. *Hazelina indigena* MOOS, 1966 – RUSU et al., Pl. III., f. 8.
1996. *Hazelina indigena* MOOS, 1966 – MONOSTORI, p. 50., Pl. 18., f. 4.

Remarks: rare sublittoral forms of the Hungarian Uppermost Eocene materials are very similar.
Dimensions: L = 0.74 – 0.77 mm.
H = 0.38 – 0.44 mm
L/H = 1.77 – 1.95
Occurrence: Luče section, samples 10, 14.
Material: 2 carapaces.

Tribus Pterygocythereidini PURI, 1957
Genus Pterygocythereis BLAKE, 1933
Pterygocythereis ex gr. *fimbriata* (VON MÜNSTER, 1830)
Plate 3, fig. 5.

Remarks: the ornamentation clearly point to this group. Part of the long spines usually are broken down. On figured forms the ornamentation is very variable, the species require a revision.
Dimensions: L = 0.83 – 0.86 mm
H = 0.45 – 0.48 mm
L/H = 1.74 – 2.13
Occurrence: Luče section, samples 2, 6, 7, 8, 9, 12, 13, 15, 16, 17, 19.
Material: 19 carapaces.

Tribus Echinocythereidini HAZEL, 1967
Genus *Echinocythereis* PURI, 1954
Echinocythereis cf. *scabra* (VON MÜNSTER, 1830)
Plate 3, fig. 6.

Remarks: the ornamentation of the single specimen is nearly identical those of *the E. scabra* in Moos (1973). The species was described and figured from the Eocene to the Miocene with large ornamental variation.
Dimensions: L = 0.98 mm
H = 0.53 mm
L/H = 1.85
Occurrence: Luče section, sample 10.
Material: 1 carapace.

Genus *Ducassella* COLIN, BABINOT et TAMBAREAU, 1999
Ducassella dadayana (MÉHES, 1941)
Plate 3, figs 7-8.

1936. *Cythereis dadayi* n. sp. – MÉHES, pp. 40-42., Pl. IV., f. 12-13.
1941a. *Cythereis dadayana* nom. nov. – MÉHES, p. 43.
1996. *Echinocythereis dadayana* (MÉHES, 1941) – MONOSTORI, pp. 53-54., Pl. 20., f. 1-8., Pl. 21., f. 1-7. (cum syn.).

Remarks: this is the most common shallow sublittoral species of the Eocene ostracode fauna of Hungary tolerating brackish and normal saline environments.This specimens from Slovenia are similar in details to the Hungarian Upper Eocene materials.
Dimensions: L = 0.72 – 0.78 mm
H = 0.40 – 0.45 mm
L/H = 1.76 – 1.80
Occurrence: Vračjek-II section, samples 3, 5.
Material: 55 carapaces.

Genus *Grinioneis* LIEBAU, 1975
Grinioneis? sp.

Some poorly preserved specimens resembling to several species of this genus. The genus is very frequent in Hungary from the Eocene to the Miocene in normal saline shallow sublittoral sediments.
Dimensions: L = 0.73 – 0.77 mm
H = 0.42 – 0.44 mm
L/H = 1.71 – 1.81
Occurrence: Luče section samples 1, 6, 7, 9, 10, 11, 12, 14, 15, 16 20. Vračjek-II section, samples 4, 5.
Material: 39 carapaces from the Gornji Grad section and 3 carapaces from the Vračjek-II section.

Genus *Occultocythereis* HOWE, 1951
Occultocythereis ex gr. *mutabilis* TRIEBEL, 1961
Plate 3, fig. 9.

Remarks: the ornamentation of the better preserved specimens are similar to those of the *Occultocythereis mutabilis abducta* TRIEBEL, 1961 which is a frequent form in the Bartonian of Hungary. There are some similar forms, but with developed median costa.
Dimensions: L = 0.45 – 0.60 mm
H = 0.25 – 0.32 mm
L/H = 1.76 – 2.00
Occurrence: Luče section, samples 1, 2, 7, 9, 12, 16, 19.
Material: 19 carapaces.

Occultocythereis ex gr. *insolita medioventralis* MONOSTORI, 1985

Remarks: the main elements of ornamentation are close to those of the species.
Occurrence: Vračjek-II section, samples, 5, 9.
Material: 2 carapaces.

Occultocythereis? n. sp. 1 MONOSTORI, 1998
Plate 3, fig. 10.

Remarks: the ornamentation and shape is similar to those of the mentioned species from Bartonian-Priabonian beds of Hungary.
Dimensions: L = 0.66 – 0.79 mm
H = 0.34 – 0.37 mm
L/H = 1.92 – 2.12
Occurrence: Luče section, samples, 6, 8, 13, 15, 20.
Material: 6 carapaces.

Subfamilia Hemicytherinae PURI, 1953
Genus *Pokornyella* OERTLI, 1956
Pokornyella inaequapunctata DUCASSE, 1963
Plate 3, fig. 11.

1961. *Pokornyella* aff. *galeata* (REUSS) – DELTEL, p. 144., Pl. 13., f. 226-229.
1963. *Pokornyella inaequapunctata* n. sp. – DUCASSE, p. 229., Pl. 1., f. 7-8.
1998. *Pokornyella inaequapunctata* DUCASSE, 1963 – MONOSTORI, 1998., pp. 53-54., Pl. 7., f. 3-10., Pl. 8., f. 1-4.

Remarks: the well preserved specimens have the same shape and ornamentation as the materials from the Eocene beds of Hungary. In Hungary this is a frequent shallow sublittoral species also in slightly brackish environments.
Dimensions: L = 0.73 – 0.67 mm
H = 0,40 – 0.45 mm
L/H = 1.56 – 1.82
Occurrence: Luče section, samples 7, 8, 9, 11, 12, 13, 14, 15, 16, 27. Vračjek-II section, sample 5.
Materials: 14 carapaces from the Luče section and 1 carapace from the Vračjek-II section.

Subfamilia Thaerocytherinae HAZEL, 1967
Genus *Hornibrookella* MOOS, 1965
Hornibrookella ex gr. *macropora* (BOSQUET, 1852)
Plate 4, figs 1-3.

Remarks: the form and ornamentation is rather variable in the material. Most specimens have a very rough reticulation atributed to this species, but ornamentation of some specimens is close to *H. odettae* LIEBAU, 1991. I think, the Oligocene *macropora* may be originated from the Eocene *odettae* (in Hungary we can detect this lineage.) The species needs revision because significant part of the described and figured materials belong to different species. Unfortunately the Gornji Grad material isn't good enough for a correct revision.
Dimensions: L = 0.74 – 0.90 mm
H = 0.45 – 0.56 mm
L/H = 1.61 – 1.81
Occurrence: Luče section, samples 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 27.
Material: 90 carapaces from the Luče section.

Genus *Reticuloquadracythere* MONOSTORI, 1998
Reticuloquadracythere apostolescui (DUCASSE, 1963)
Plate 4, fig. 4.

1963. *Quadracythere apostolescui* n. sp. – DUCASSE, pp. 240-241, Pl. III, f. 32-33.
1985. *Quadracythere apostolescui* DUCASSE 1963 –DUCASSE et al., p. 298, Pl. 84, figs 4-5.
1998. *Reticuloquadracythere apostolescui* DUCASSE, 1963 – MONOSTORI, p. 58, Pl. 11, f. 6-10, Pl. 12, f 1. (cum syn.)

Remarks: the ornamentation identify with those of the Eocene (Bartonian – Priabonian) specimens of Hungary, where this is a frequent species shallow sublittoral by normal salinity.
Dimensions: L = 1.08 mm
H = 0.66 mm
L/H = 1.64
Occurrence: Luče section, sample 9.
Material: 1 carapace.

Subfamilia Orioninae PURI, 1973
Genus *Bosquetina* KEIJ, 1957
Bosquetina zalanyii BRESTENSKÁ, 1975
Plate 4, fig. 5.

1975. *Bosquetina zalanyii* n. sp. – BRESTENSKÁ, pp. 390-392, t. 8, f. 1-3.
1985. *Bosquetina zalanyii* BRESTENSKÁ, 1975 – MONOSTORI, p. 201, Pl. 6, f. 9-10.

Remarks: rather common form in the Kiscellian –Egerian stages of Hungary and Slovakia. The investigable features and the preservation are similar to the materials citated above.
Dimensions: L = 1.10 – 0.87 mm
H = 0.53 – 0.60 mm
L/H = 1.66 – 1.82
Occurrence: Luče section, samples 15, 24, 27.
Material: 4 carapaces.

Familia Cytherettidae TRIEBEL, 1952
Genus *Cytheretta* TRIEBEL, 1952
Cytheretta aff. *posticalis* TRIEBEL, 1952
Plate 4, fig. 6.

Remarks: the unornamented carapaces with nearly parallel ventral and dorsal outlines are close to the mentioned above species.
Dimensions: L = 0.95 – 0.97 mm
H = 0.52 – 0.54 mm
L/H = 1.75 – 1.86
Occurrence: Luče section, samples 7, 8, 10, 11, 13.
Material: 6 carapaces.

Genus *Flexus* NEVIANI, 1928
Flexus sp. 1.
Plate 4, fig. 7.

Remarks: the ornamentation is similar to those of the *Pl. schoelleri* (KEIJ, 1955) in KEEN (1972) from the Lower Miocene of SW-France.
Dimensions: L = 0.81 mm
H = 0.41 mm
L/H = 1.97
Occurrence: Vračjek-II section, sample 4.
Material: 1 carapace.

Familia Loxoconchidae SARS, 1925
Genus *Loxoconcha* SARS, 1866
Loxoconcha sp.
Plate 4, fig. 8.

Remarks: damaged specimen with network ornamentation composed from large particles in the middle of the surface and ventrally and small ones dorsally and posterior.
Occurrence: Luče section, samples 21, 26, 27.
Material: 4 carapaces.

Familia Cytheruridae G. W. MÜLLER,, 1894
Subfamilia Cytherurinae G. W. MÜLLER, 1894
Genus *Eucytherura* G. W. MÜLLER, 1894
Eucytherura dentata LIENENKLAUS, 1905
Plate 4, fig. 9.

1905. *Eucytherura dentata* n. sp. – LIENENKLAUS, p. 57, T. IV, f. 31.
1985 *Eucytherura dentata* LIENENKLAUS 1905 – MONOSTORI, pp. 208-209, Pl. 7, f. 7. (cum syn.)

Remarks: all investigable details of the shape and ornamentation point at this species.
Dimensions: L = 0.42 – 0.51 mm
H = 0.22 – 0.26 mm
L/H = 1.81 – 1.93
Occurrence: Luče section, samples 1, 2, 26.
Material: 4 carapaces.

Eucytherura sp. 1.
Plate 4, fig. 10.

Remarks: the ornamentation is a similar but more dense reticulation as those of the *E. dentata*. The posterior end has a longer caudal part directed upward.
Occurrence: Luče section, sample 21.
Material: 1 carapace.

Genus *Semicytherura* WAGNER, 1959
Semicytherura ex gr. *gracilis* (LIENENKLAUS, 1895)
Plate 4, fig. 11.

Remarks: the ornamentation resemble to those of this species, the specimen is badly preserved. Similar forms are known from the Upper Priabonian bathyal marine beds of Hungary.
Dimensions: L = 0.31 mm
H = 0.16 mm
L/H = 1.94
Occurrence: Luče section, sample 2.
Material: 1 carapace.

Subfamilia Cytheropterinae HANAI, 1957
Genus *Cytheropteron* SARS, 1866
Cytheropteron? sp.

Remarks: there is a moderate ventrolateral swelling posteriorly with a blunt projecting part at its end.
Dimensions: L = 0.60 mm
H = 0.40 mm
L/H = 1.50
Occurrence: Vračjek-II section, sample 5.
Material: 1 carapace.

Familia Xestoleberididae SARS, 1928
Genus *Xestoleberis* SARS, 1866
Xestoleberis sp.

Remarks: poorly preserved specimens of this genus, resembling to X. gantensis Monostori, 1975.
Occurrence: Vračjek-II section samples 4, ?14.
Material: 3 carapaces.

Genus *Uroleberis* TRIEBEL, 1958
Uroleberis budaensis MONOSTORI, 2000
Plate 4, fig. 12.

1985. *Uroleberis odessensis* SCHEREMETA, 1969 – MONOSTORI, pp. 212-213, Pl. 7, f. 10-13.
2000. *Uroleberis budaensis* n. sp. – MONOSTORI, p. 70, Pl. 11, f. 5-8, Pl. 12, f. 1-3.

Remarks: frequent form in the bathyal marine environments of Upper Eocene in Hungary
Dimensions: L = 0.55 – 0.64 mm
H = 0.28 – 0.34 mm
L/H = 1.89 – 1.95
Occurrence: Luče section, samples 23, 24, 25, 26, 27. Vračjek-II section, samples 9, 14.
Material: 7 carapaces from the Luče section and 2 carapaces from the Vračjek-II section.

Uroleberis striatopunctata DUCASSE, 1967
Plate 5, fig. 1.

1959. *Eocytheropteron striatopunctatum* n. sp. – DUCASSE, pp. 44-45, Pl. XIX, f. 2a-b.
1967. *Uroleberis striatopunctata* n. sp. – DUCASSE, pp. 61-62, Pl. III, f. 67.

1985. *Uroleberis striatopunctata* DUCASSE – DUCASSE et al., p. 308, Pl. 88, fig 3.
2000. *Uroleberis striatopunctata* DUCASSE, 1967 – MONOSTORI, p. 71, Pl. 12, f. 5. (cum syn.)

Remarks: well preserved form with shape and punctation characteristic for this species.
Dimensions: L = 0.59 mm
H = 0.41 mm
L/H = 1.44
Occurrence: Luče section, sample 15.
Material: 1 carapace.

Familia Macrocypridae G. W. MÜLLER, 1912
Genus *Protoargilloecia* LIUBIMOVA, 1955
Protoargilloecia angulata DELTEL, 1963
Plate 5, figs 2-4.

1961. *Protoargilloecia angulata* n. sp. – DELTEL, pp. 42-44., Pl. 5., f. 66-69.
1964. *Protoargilloecia angulata* n. sp. – DELTEL, pp. 146-148., Pl. II., f. 32-34.
1969. *Protoargilloecia angulata* DELTEL – DUCASSE, p. 28., Pl. II., f. 34.
1983. *Protoargilloecia angulata* DELTEL, 1961 – DUCASSE, pp. 276 – 279., Pl. I.
1985. *Protoargilloecia angulata* DELTEL, 1964 – DUCASSE et al., Pl. 88., f. 14.
1985. *Argilloecia quasiramphasta* n. sp. – MONOSTORI, pp. 216-218., Pl. 8., f. 1-3.

Remarks: characteristical species of the bathyal marine environments in the Paleogene. Frequent form in Paleogene of Hungary.
Dimensions: L = 0.45 – 0.54 mm (juv, 0.32)
H = 0.20 – 0.24 mm (juv. 0.20)
L/H = 2.20 – 2.54 (mainly 2.20-2.30)(juv. 2.23)
Occurrence: Luče section, samples 2, 6, 9, 14, 15, 16, 20, 24, 26, 27. Vračjek-II section, samples 4, 5, 9, 12, 14.
Material: 28 carapaces from the Luče section and 55 carapaces from the Vračjek-II section.

Familia Candonidae KAUFMANN, 1900
Subfamilia Paracypridinae SARS, 1923
Genus *Paracypris* SARS, 1866

Paracypris contracta (JONES, 1857)
Plate 5, fig. 5.

1857. *Bairdia contracta* n. sp. – JONES, pp. 53-54, Pl. V, figs 1a-c.
1987. *Paracypris contracta* (JONES, 1857) – MONOSTORI, p. 161, Pl. 7, f. 18-19. (cum syn.)

Remarks: specimens of Slovenia are very similar to materials from Bartonian – Priabonian of Hungary.
Occurrence: Vračjek-II section, sample 3.
Material: 3 carapaces.

Paracypris ex gr. *propinqua* TRIEBEL, 1963
Plate 5, fig. 6.

1985. Cypridacea fam., gen. et sp. indet. 2. – MONOSTORI, p. 223, Pl. 8, f. 7-8.

Remarks: the anterior part is more wide and the ventral sinus is more deep as on the type of propinqua. Rather frequent form of the Hungarian bathyal Priabonian beds.
Dimensions: L = 0.50 – 0.74 mm
H = 0.20 – 0.30 mm
L/H = 2.32 – 2.50
Occurrence: Luče section, samples 21, 24, 25, 27. ? Vračjek-II section sample 4.
Material: 9 carapaces from the Gornji Grad section and (?) 1 carapace from the Vračjek-II section.

Paracypris? sp. 1.
Plate 5, figs 7-8.

Remarks: triangular form with asymmetrically rounded anterior outline. The dorsal outline has two branches with slight rounded break between them. The posterior end acute near the level of the ventral outline, which is straight on the left valve and slightly and asymmetrically holowed on the right one.

This form was described from the Uppermost Eocene – Lowermost Oligocene of Hungary as Cypridacea fam., gen. et sp., indet. 1 (MONOSTORI, 1985). In Hungary the form is rather frequent in beds formed in bathyal marine environment.

Dimensions: L = 0.41 – 0.62 mm
H = 0.21 – 0.33 mm
L/H = 1.89 – 1.95
Occurrence: Luče section, samples 2, 7, 9, 23, 24, 25.
Vračjek-II section, sample 9.
Material: 13 carapaces from the Luče section and 1 carapace from the Vračjek-II section.

Paracypris? sp. 2.
Plate 5, fig. 9.

Remarks: elongated form wich has asymmetrical hollowing on the ventral outline on both valves. The anterior outline is nearly symmetrically rounded, the posterior one is rather pointless. The breaks of the asymmetrical dorsal outline are hardly visible on the generally damaged specimens.

Dimensions: L = 0.61 – 0.69
H = 0.28 – 0.32 mm
L/H = 2.16 – 2.17
Occurrence: Luče section, samples 20, 21, 24.
Material: 10 carapaces.

Genus *Phlyctenophora* BRADY, 1880
Phlyctenophora oligocaenica ZALÁNYI, 1929
Plate 5, fig. 10.

1929. *Pontocypris oligocaenica* n. sp. – ZALÁNYI, pp. 91-93, T. II, F. 1. Textfig. 38.
1985. *Phlyctenophora oligocaenica* (ZALÁNYI, 1929) – MONOSTORI, pp. 220-221, Pl. 8, f. 4, (cum syn.)

Remarks: the species known from the deep sublittoral marine sediments of Hungary, Slovakia and Ukraina.

Dimensions: L = 0.72 – 1.00 mm
H = 0.31 – 0.44 mm
L/H = 2.29 – 2.32
Occurrence: Luče section, samples 10, 14, 16, 27.
Material: 5 carapaces.

Genus *Novocypris* DUCASSE, 1967
? *Novocypris gantensis* MONOSTORI, 1977

Remarks: the form is close to the type material, the inner features essential for determination are undeterminable.
Occurrence: Vračjek-II section, sample 3.
Material: 3 carapaces.

Cypridae gen. et sp. indet 1.
Plate 5, fig. 11.

Remarks: elongated form with nearly symmetrically rounded anterior, broadly rounded dorsal slightly asymmetrically rounded posterior and deeply hollowed ventral outline. Left valve somewhat larger then right.

Dimensions: L = 0.83 – 0.54 mm
H = 0.36 – 0.26 mm
L/H = 2.07 – 2.29
Occurrence: Luče section, samples 2, 21, 27.
Material: 8 carapaces.

Stratigraphical distribution

Great part of the species have the same stratigraphical distribution in this sections as in the Buda sections.

Cytherella gantensis, *Paijenborchella* ex gr. *eocaenica*, *Clithrocytheridea kosdensis, Krithe bartonensis, Ducassella dadayana, Paracypris contracta, Novocypris gantensis* are restricted to the lower part of the Vračjek-II section, they never are known in Hungary after Eocene, even after Lower Priabonian also in the Buda sections.

There are some forms which are of Oligocene age in Hungary and also have been found in Luče material above the Eocene/Oligocene boundary (*Hemicyprideis helvetica, Cuneocythere marginata, Bosquetina zalanyi*).

Some other species restricted in Hungary by Oligocene beds, are known in Luče section also in uppermost Eocene (*Echinocythereis scabra, Cytheretta posticalis, Phlyctenophora oligocenica*). *Uroleberis budaensis* in Hungary is restricted to Priabonian Buda Marl, while in Luče section most of the specimens occur in NP 23 beds. I think, these differences are due to certain environmental differences between the localities.

Paleoecological analysis and palaeogeography

Sample 3 in the lower part of the Vračjek-II section is the single showing clearly sublittoral fauna. Characteristic is the mixing of the elements of different sublittoral niches:

Ducassella dadayana (26 % of the fauna in sample 3), *Novocypris gantensis* (1.4 %), *Clithrocytheridea kosdensis* (37 %) are common forms in shallow sublittoral environments with varying salinity but the high percent of *Krithe bartonensis* (25 %) relate to mid-sublittoral marine environment with normal salinity. This is perhaps consequence of an occasionally strong sediment transportation.

All the other samples in the Vračjek-II section show clearly deep environments as a result of deepening of the investigated area (deep sublittoral than shallow bathyal). Characteristic forms for this deep environment in the Upper Eocene – Lower Oligocene of Hungary living by low energy.

Cytherella ex gr. *compressa*
Cytherella mehesi
Krithe pernoides
Protoargilloecia angulata
Uroleberis budaensis are found in this section.

They summarized percentage in the samples are following:

sample 4: 74 %,
sample 5: 67 %,
sample 9: 66 %,
samples 10, 11, 12, 13: 100 %

The appearence of the obviously sublittoral fauna is decreasing (20 % in sample 4, 19 % in sample 5,13 % in sample 9,0 % in sample 10 and subsequent ones.

The Luče section contains younger sediments. In this section we cannot find any true sublittoral community „in situ".

The following forms of the upper bathyal environment of Late Priabonian – Early Kiscellian of Hungary are detected in this section:

Cytherella compressa
Cytherella mehesi
Cytherella pestiensis
Bairdia brevis
Bairdia rupelica
Krithe pernoides

Costa hermi
Pterygocythereis fimbriata
Uroleberis budaensis
Protoargilloecia angulata
Cardobairdia sp.

This environment is clearly documented by other fossils (see in BÁLDI, 1986). The marly part of the section has in its lower part intercalated turbiditic limestones similarly to Buda Marl Formation of Hungary which probable have turbidity current origin. The ostracoda fauna is sometimes rich in sublittoral elements because of permanent resedimentation. So we can get an insight in to the sublittoral communities of the adjoining areas.

These adjoining areas are characterized by the dominance of normal salinity forms, only one specimen of brackish form is detected (*Hemicyprideis helvetica*). Frequent elements of normal or nearly normal salinity are *Grinioneis*? sp., *Occultocythereis* ex gr. *mutabilis*, *Occultocythereis*? n. sp. 1, *Pokornyella inaequapunctata, Hornibrookella macropora, Cytheretta posticalis*. The shallow-to-mid-sublittoral components take up 0—31 % of the specimen number in the samples. These components generally are more plentiful and variable in samples of the Luče section than in the samples of the Buda Marl sections. Probably there was a rather intense sediment transport from the shallow sublittoral.

The actual Hungarian and Slovenian Paleogene Basins in the Paleogene were parts of a uniform basin, fragmented by tectonical events later (CSONTOS el al, 1992; JELEN et al., 1992; FODOR et al., 1998).

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Plate 1

Figs 1-2. *Cytherella* ex gr. *compressa* (VON MÜNSTER, 1830)
Fig. 1. 75x. Vračjek-II section, sample 4.
Carapace from the left valve.
Fig. 2. 58x. Luče section, sample 20.
Carapace from the left valve.

Figs 3-5. *Cytherella* aff. *mehesi* BRESTENSKÁ, 1975
Fig. 3. 73x. Vračjek-II section, sample 4.
Carapace from the left valve.
Fig. 4. 65x. Luče section, sample 16.
Carapace from the dorsal side.
Fig. 5. 65x. Luče section, sample 21.
Carapace from the left valve.

Figs 6-7. *Cytherella transversa* SPEYER, 1863
Fig. 6. 65x. Luče section, sample 13.
Carapace from the left valve.
Fig. 7. 65x. Luče section, sample 14.
Carapace from the left valve.

Fig. 8. *Bairdia* cf. *brevis* LIENENKLAUS, 1900
40x. Luče section, sample 15.
Carapace from the right valve.

Fig. 9. *Bairdia* aff. *complanata* DUCASSE, 1967
70x. Luče section sample 9.
Carapace from the right valve.

Fig. 10. *Bairdia rupelica* MONOSTORI, 1982
70x. Luče section, sample 20.
Carapace from the right valve.

(All the materials are deposited in the Palaeontological Collection of the Palaeontological Department, Eötvös University, Budapest)

Plate 1

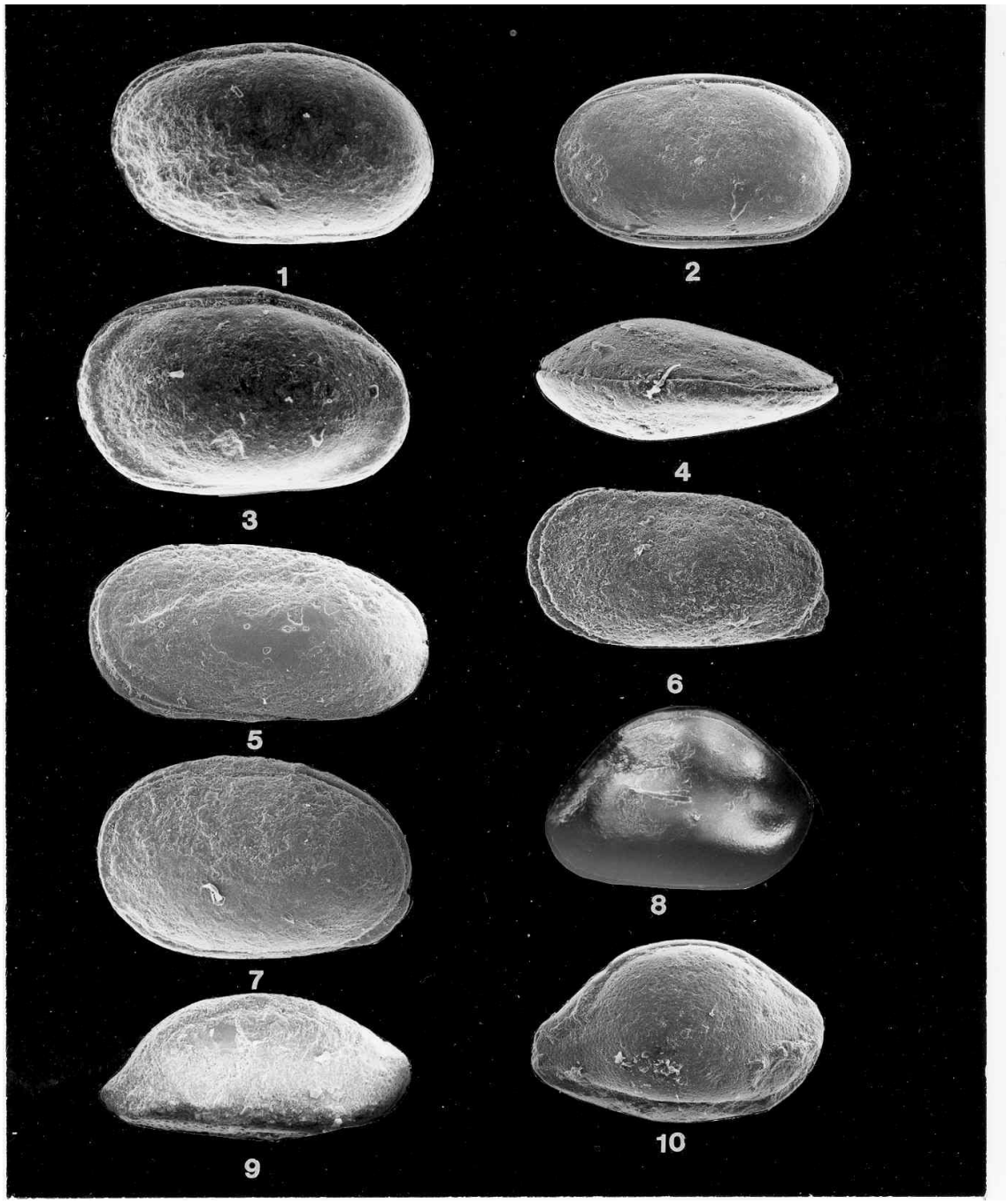

Plate 2

Fig. 1. *Triebelina* aff. *punctata* DELTEL, 1963
80x. Luče section, sample 7.
Carapace from the right valve.

Fig. 2. *Paijenborchella* ex gr. *eocaenica* TRIEBEL, 1949
132x. Vračjek-II section, sample 3.
Carapace from the left valve.

Fig. 3. *Paijenborchella* sp. 1.
110x. Vračjek-II section, sample 5.
Carapace from the left valve.

Fig. 4. *Callistocythere* sp.
107x. Luče , sample 16.
Carapace from the left valve.

Fig. 5. *Clithrocytheridea kosdensis* MONOSTORI, 1996
105x. Vračjek-II section, sample 3.
Carapace from the right valve.

Fig. 6. *Hemicyprideis helvetica* (LIENENKLAUS, 1895)
80x. Luče section, sample 16.
Carapace from the right valve.

Fig. 7. *Cuneocythere* cf. *marginata* (BOSQUET, 1852)
85x. Luče section, sample 19.
Carapace from the left valve.

Fig. 8. *Krithe bartonensis* (JONES, 1857) s. l.
70x. Vračjek-II section, sample 3.
Carapace from the right valve.

Figs 9-11. *Krithe pernoides* (BORNEMANN, 1855)
Fig. 9. 75x. Luče section, sample 28.
Carapace from the dorsal side.
Fig. 10. 110x. Vračjek-II section, sample 4.
Carapace from the right valve.
Fig. 11. 75x. Luče section, sample 7.
Carapace from the left valve.

Plate 2

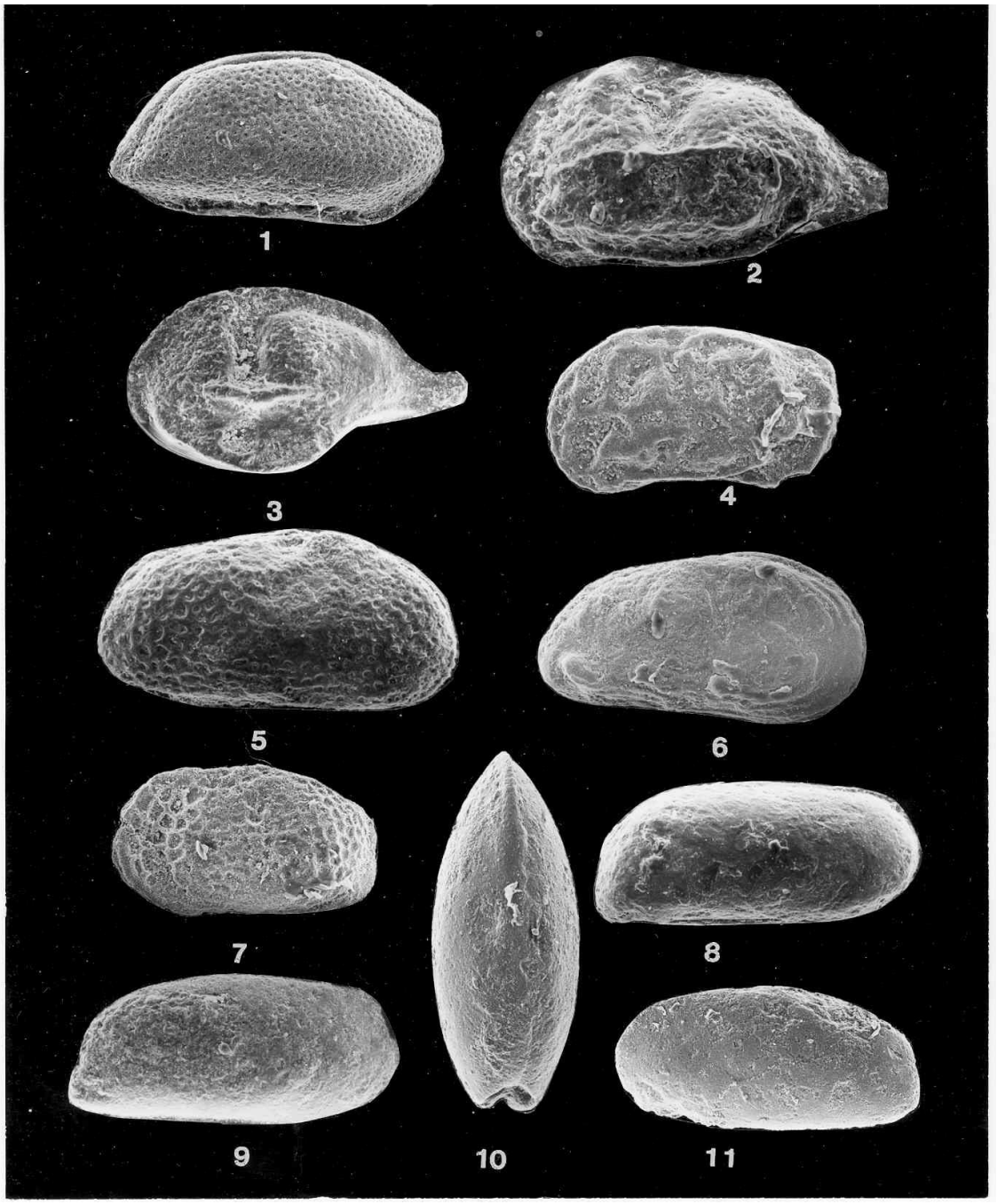

Plate 3

Fig. 1. *Trachyleberis* sp.
135x. Luče section, sample 1.
Carapace from the right valve.

Figs 2-3. *Costa hermi* WITT, 1967
Fig. 2. 70x. Vračjek-II section, sample 12.
Carapace from the left valve.
Fig. 3. 70x. Luče section, sample 15.
Carapace from the right valve.

Fig. 4. *Hazelina indigena* MOOS, 1966
65x. Luče section, sample 10.
Carapace from the right valve.

Fig. 5. *Pterygocythereis* ex gr. *fimbriata* (VON MÜNSTER, 1830)
52x. Luče section, sample 2.
Carapace from the left valve.

Fig. 6. *Echinocythereis* cf. *scabra* (MÜNSTER, 1830)
52x. Luče section, sample 10.
Carapace from the right valve.

Figs 7-8. *Ducassella dadayana* (MÉHES, 1941)
Fig. 7. 72x. Vračjek-II section, sample 3.
Carapace from the right valve.
Fig. 8. 72x. Vračjek-II section, sample 3.
Carapace from the dorsal side.

Fig. 9. *Occultocythereis* ex gr. *mutabilis abducta* TRIEBEL, 1961
85x. Luče section, sample 12.
Carapace from the left valve.

Fig. 10. *Occultocythereis*? n. sp. 1. MONOSTORI, 1998
73x. Luče section, sample 13.
Carapace from the left valve.

Fig. 11. *Pokornyella inaequapunctata* DUCASSE, 1963
65x. Luče section, sample 10.
Carapace from the right valve.

Plate 3

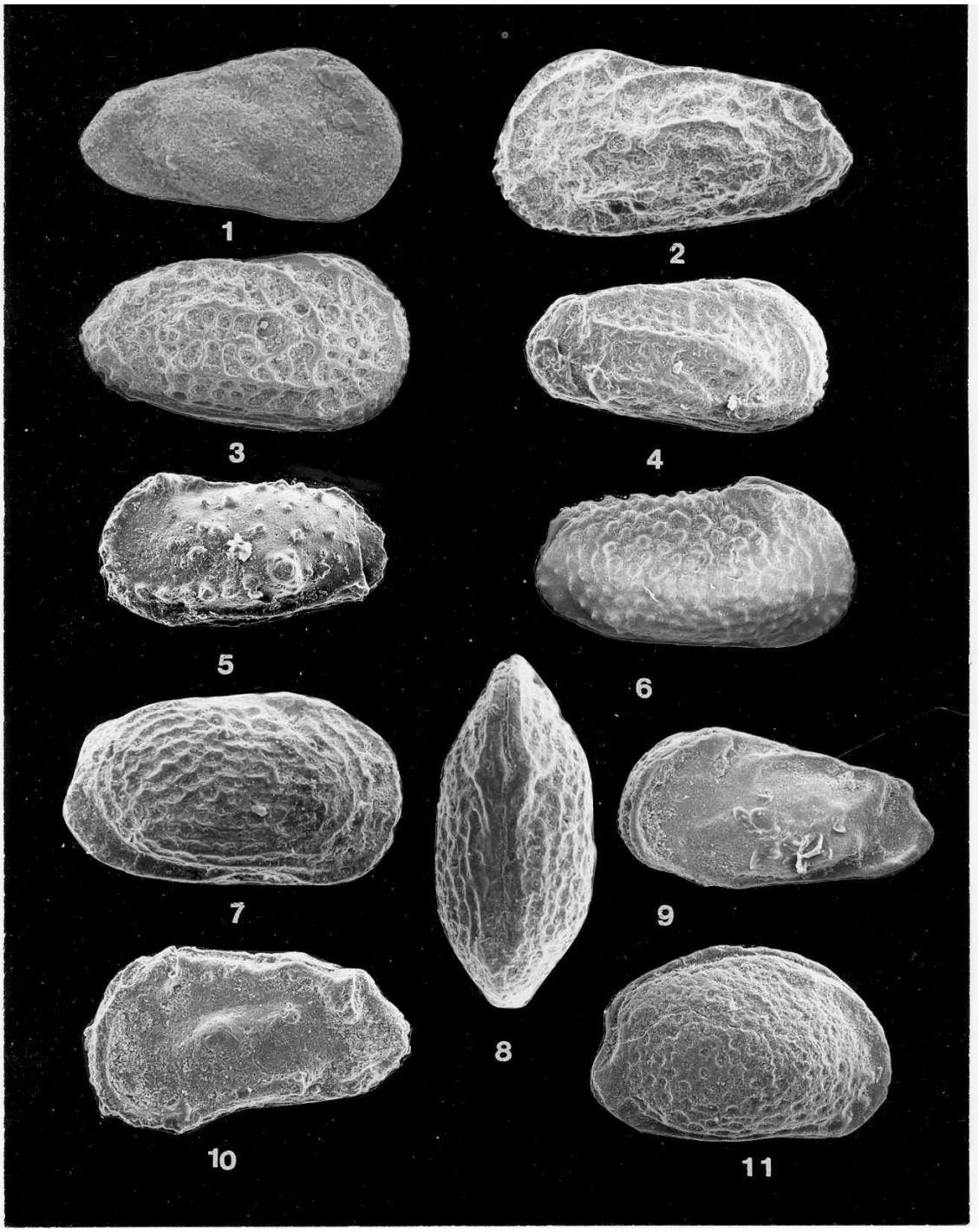

Plate 4

Figs 1-3. *Hornibrookella* ex gr. *macropora* (BOSQUET, 1852)
Fig. 1. 65x. Gornji Grad section, sample 22.
Carapace from the right valve.
Fig. 2. 60x. Luče section, sample 11.
Carapace from the right valve.
Fig. 3. 60x. Luče section, sample 9.
Carapace from the right valve.

Fig. 4. *Reticuloquadracythere apostolescui* (DUCASSE, 1963)
45x. Luče section, sample 9.
Carapace from the left valve.

Fig. 5. *Bosquetina zalanyii* BRESTENSKÁ, 1975
52x. Luče section, sample 24.
Carapace from the left valve.

Fig. 6. *Cytheretta* aff. *posticalis* TRIEBEL, 1952
55x. Luče section, sample 10.
Carapace from the right valve.

Fig. 7. *Flexus* sp. 1.
70x. Vračjek-II section, sample 4.
Carapace from the right valve.

Fig. 8. *Loxoconcha* sp.
110x. Luče section, sample 27.
Carapace from the right valve.

Fig. 9. *Eucytherura dentata* LIENENKLAUS, 1895
85x. Luče section, sample 26.
Carapace from the right valve.

Fig. 10. *Eucytherura* sp. 1
120x. Luče section, sample 21.
Carapace from the right valve.

Fig. 11. *Semicytherura* ex gr. *gracilis* (LIENENKLAUS, 1895)
125x. Luče section, sample 2.
Carapace from the left valve.

Fig. 12. *Uroleberis budaensis* MONOSTORI, 2000
85x. Luče d section, sample
Carapace from the right valve.

Plate 4

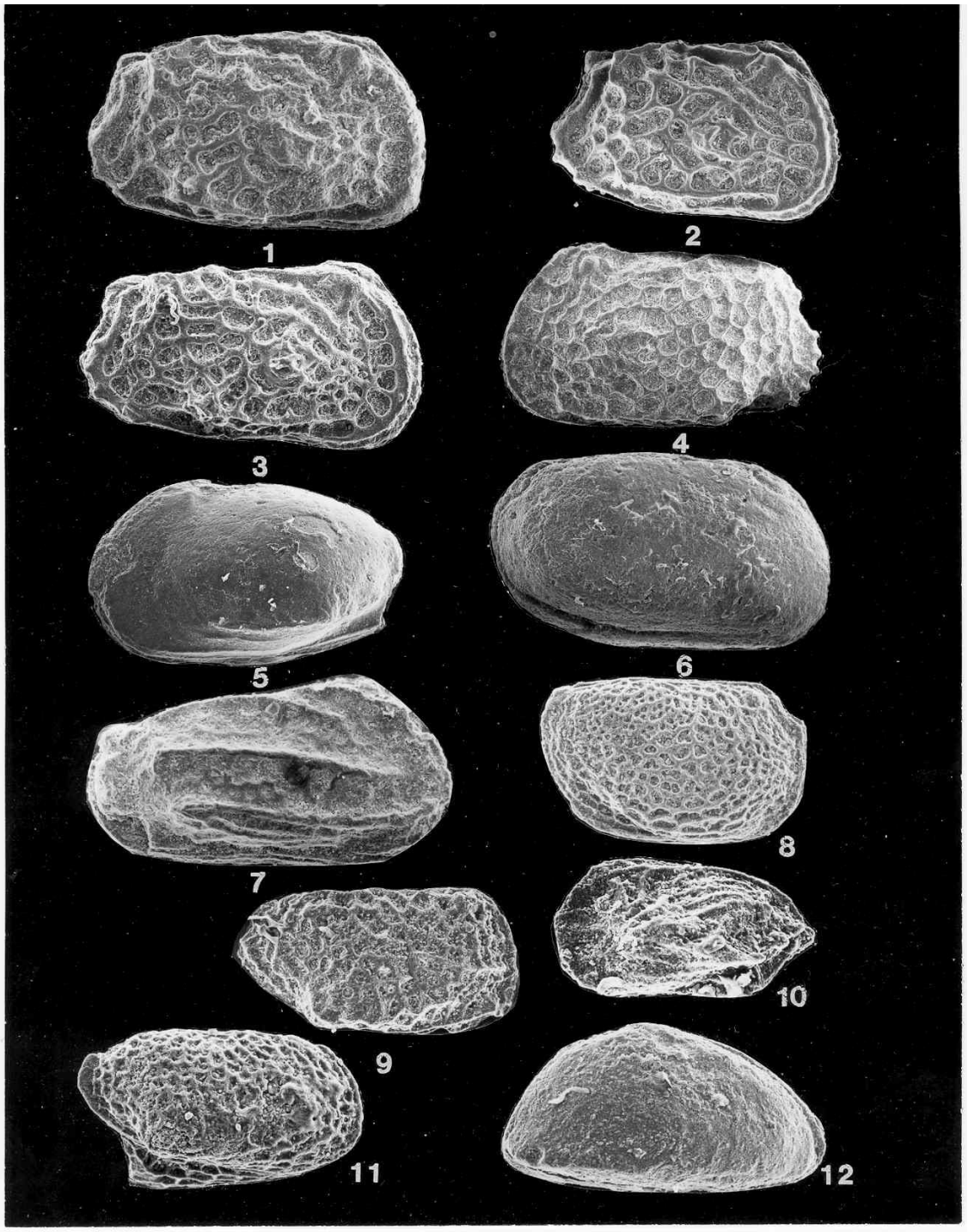

Plate 5

Fig. 1. *Uroleberis striatopuncta* DUCASSE, 1967
80x. Luče section, sample 15.
Carapace from the left valve.

Figs 2-4. *Protoargilloecia angulata* DELTEL, 1963
Fig. 2. 100x. Luče section, sample 9.
Carapace from the left valve.
Fig. 3. 90x. Luče section, sample 14.
Carapace from the left valve.
Fig. 4. 115x. Vračjek-II section, sample 4.
Carapace from the left valve.

Fig. 5. *Paracypris contracta* (JONES, 1857)
50x. Vračjek-II section, sample 3.
Carapace from the right valve.

Fig. 6. *Paracypris* ex gr. *propinqua* TRIEBEL, 1963
105x. Luče section, sample 25.
Carapace from the right valve.

Figs 7-8. *Paracypris*? sp. 1
Fig. 7. 80x. Luče section, sample 2.
Carapace from the right valve.
Fig. 8. 80x. Luče , sample 24.
Carapace from the left valve.

Fig. 9. *Paracypris*? sp. 2.
75x. Luče section, sample 20.
Carapace from the right valve.

Fig. 10. *Phlyctenophora oligocaenica* ZALÁNYI, 1929
70x. Luče section, sample 16.
Carapace from the right valve.

Fig. 11. Cypridae gen. et sp. indet. 1.
60x. Luče section, sample 26.
Carapace from the right valve.

Plate 5