ANNALES

UNIVERSITATIS SCIENTIARUM BUDAPESTINENSIS DE ROLANDO EÖTVÖS NOMINATAE

SECTIO GEOLOGICA

TOMUS XXXIII.

REDIGIT

T. BÁLDI
B. GÉCZY
E. VÉGH – NEUBRANDT
M. MONOSTORI

BUDAPEST
2000

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incepit anno MCMLXX
SECTIO PHILOSOPHICA ET SOCIOLOGICA
incepit anno MCMLXII

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Contents

MONOSTORI, M.
Ostracoda fauna of the Pénzeskút Marl Formation (Albian-Cenomanian) of the Bakony Mountains (Hungary) 5–61

MONOSTORI, M.
Eocene ostracods of Hungary. Systematical part 3. (Cytheracea 3) 63–103

MONOSTORI, M.
Lectotypes of some Paleogene ostracod species from Hungary 105–106

MÉSZÁROS, L. GY.
Palaeogeography and environment of the Late Miocene Soricidae (Mammalia) faunae of the Pannonian Basin. . . . 107–120

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Ostracoda fauna of the Pénzeskút Marl Formation (Albian-Cenomanian) of Bakony Mountains (Hungary)

M. MONOSTORI[1]

(with 33 figures and 9 plates)

Abstract

From the Pénzeskút Marl Formation (Upper Albian-Middle Cenomanian, Transdanubian Central Range, Hungary) 15 species of ostracods are described (*Cytherella ovata* (ROEMER, 1841) s.l., *Cytherella parallela* (REUSS, 1845) s.l., *Cytherelloidea* ex gr. *stricta* (JONES et HINDE, 1890), *Cardobairdia* cf. *minuta* (VAN VEEN, 1936), *Bairdia pseudoseptentrionalis* (MERTENS, 1956) s.l., *Schuleridea jonesiana* (BOSQUET, 1852) s.l., *Neocythere vanveeni* MERTENS, 1956 s.l., *Cythereis* cf. *lerata* GRÜNDEL, 1966, *Rehacythereis glabrella* (TRIEBEL, 1940) s.l., *Rehacythereis reticulata* (JONES et HINDE, 1890), *Cornicythereis* cf. *bonnemai* (TRIEBEL, 1940), *Cornicythereis* ex gr. *gatyensis* (DAMOTTE et GROSDIDIER, 1963), *Veeniacythereis* n. sp. aff. *V. begudensis* (BABINOT, 1971), *Pontocyprella* n. sp. aff. *P. harrisiana* (JONES, 1849), *Paracypris* ex gr. *wrothamensis* KAYE, 1965. Stratigraphically characteristical form is the *Veeniacythereis* n. sp. for the Middle Cenomanian. The paleoecological evaluation of the fauna shows a typical "*platycopa*-signal" with high dominance of *Cytherella,* marking the hypoxic environment of a deep sublittoral-bathyal bottom. Some changes in communities remark the increase of the depth from deep sublittoral to bathyal and there are rather uncertain marks of the decrease of depth in upper part of the Formation.

Geology

The Pénzeskút Marl Formation is the topmost member of the Middle Cretaceous series of formations in the Transdanubian Central Range. Most of the profiles are composed of marl, sometimes with many limestone in the lower

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and sandy marl or sandstone in the upper part (fig. 1) (CSÁSZÁR, 1985, 1985a). All sections and boreholes investigated by us are in the Bakony Mountains.

There is an extremely rich macro- and microfossil content in the sections. The ammonites and foraminifers allow to verify the correct biostratigraphical levels, the ostracods and benthonic foraminifers show the environmental conditions.

This study was supported by the Hungarian National Science Foundation (OTKA Project T 022804).

Systematical part

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

Cytherella ovata (ROEMER, 1841) s.l.
Pl. 1. f. 1-6.

1841. *Cytherina ovata* n. sp. - ROEMER, p. 104., T. 16., f. 21.
1874. *Cytherella ovata* RÖMER - REUSS, p. 151., T. 28., f. 4-5.
1890. *Cytherella ovata* (ROEMER, 1841) - JONES et HINDE, pp. 44-45., Pl. III., f. 48-54., Pl. IV., f. 39.
1940. *Cytherella ovata* ROEMER, 1840 - BONNEMA, p. 93., Pl. I., f. 1-16.
1956. *Cytherella ovata* (ROEMER, 1841) - DEROO, p. 1508, Pl. I., f. 4-6.
1958. *Cytherella ovata* (ROEMER, 1841) - OERTLI, p. 1502, Pl. I., f. 10-29.
1959. *Cytherella ovata* (ROEMER, 1841) - ZALANYI, pp. 522-524., T. IV., f. 4., Abb. 63.
1965. *Cytherella ovata* (ROEMER, 1840) - KAYE et BARKER, pp. 385-386., Pl. 50., f. 10.
1966. *Cytherella ovata* (ROEMER, 1841) - HERRIG, pp. 718-728., T. II., f. 1-7., T. XLIV., f. 6-8; Abb. 11-19.
?1966. *Cytherella ovata* (ROEMER, 1841) - GRÜNDEL, p. 12., T. I., f. 2.
1971. *Cytherella ovata* (ROEMER, 1841) - DAMOTTE, pp. 55-56., Pl. I., f. 2-7.
1974. *Cytherella ovata* (ROEMER, 1840) - DAMOTTE et FREYTET, pp. 202-203., Pl. 1., f. 1.
1976. *Cytherella ovata* (ROEMER, 1841) - JAIN, pp. 202-203. fig. 3 C-D.
1978. *Cytherella ovata* (ROEMER, 1841) - NEALE, Pl. 1., f. 1-2.
1978. *Cytherella ovata* (ROEMER, 1841) - SWAIN, pp. 251-252, Pl. 1., f. 2-5.
1979. *Cytherella ovata* (ROEMER, 1840) - DAMOTTE, p. 276., Pl. 6/1., f. 1.
1982. *Cytherella* ex gr. *ovata* (ROEMER, 1840) - WEAVER, pp. 12-14., Pl. 1., f. 1-5., Pl. 2., f. 20.
1985. *Cytherella ovata* (ROEMER, 1841) - BABINOT et al., Pl. 48., f. 1., Pl. 55., f. 1-2.
1985. *Cytherella* gr. *ovata* (ROEMER, 1841) - VIVIERRE, p. 135., Pl. 1., f. 1.
1988. *Cytherella ovata* (ROEMER, 1841) - JARVIS et al., fig. 15/a.
1992. *Cytherella ovata* (ROEMER, 1841) - WITTE et al., pp. 46-47., Pl. 1., f. 8-10.
1993. *Cytherella ovata* (ROEMER, 1841) - BABINOT et GROSHENY, p. 101., Pl. 1., f. 1-4.

Remarks: a rather variable species of the genus. ROEMER's original came from Upper Cretaceous (Campanian) beds of Germany (MALZ, 1987). Most of our specimens are similar to typical Aptian-Albian form of DEROO (1956) (Pl. I., figs. 4-6.), OERTLI (1958),)Pl.I., figs 14,15,17,20), DAMOTTE (1979) (Pl. 6/1., fig. 1.), BABINOT et al. (1985) (Pl. 48., fig. 1.), WITTE et al. (1992) (Pl. 1., f. 8-10.). Another part of the specimens have straight or even slightly asymmetrically concave ventral outline and their posterodorsal outline is nearly parallel with the ventral, the posterior outline is narrowly rounded. Similar forms are figured as *C. ovata* in OERTLI (1958), BONNEMA (1940). In the investigated Albian-Cenomanian section we have these forms with transitions but not in a temporal row so I think they are variations of a single species.

Dimensions (carapaces): L = 0.55-0.84 mm, H = 0.36 - 0.59 mm, L/H = 1.42 - 1.65.

Occurence: Jásd 42 borehole 6.9 - 477.0 m; Olaszfalu 84 borehole 5.0 - 16.5 m; Bakonynána No 1 outcrop, beds No 3-21.

Material: 2446 exemplar, mainly carapaces.

Cytherella parallela (REUSS, 1845) s.l.
Pl. 1., f. 7-8., Pl. 2., f. 1-2.

1845. *Cytherina parallela* n. sp. - REUSS, p. 16., T. V., f. 33.
1940. *Cytherella parallela* (REUSS, 1845) - BONNEMA, pp. 93-95., Pl. I., f. 17-36.
1958. *Cytherella* cf. *parallela* (REUSS, 1846) - OERTLI, pp. 1501 - 1502, Pl.
1963. *Cytherella* cf. *parallela* (REUSS, 1846) - KAYE, p. 111., Pl. 18., f. 1-6.
?1966. *Cytherella parallela* (REUSS, 1845) - HERRIG, pp. 728-736., Abb. 20-24., T. III., f. 1, 2, 4.
1966. *Cytherella parallela* (REUSS, 1846) - GRÜNDEL, p. 12., T. I., f. 4.
1969. *Cytherella* gr. *parallela* (REUSS, 1846) - BASSOULET et DAMOTTE, Pl. 2., f. 11
1971. *Cytherella* cf. *parallela* (REUSS, 1846) - DAMOTTE, p. 56., Pl. I., f. 8.
1974. *Cytherella parallela* (REUSS), 1845) - SELESNJOVA, p. 278., Pl. 88., f. 3-4.
1976. *Cytherella* cf. *parallela* (REUSS, 1845) - JAIN, p. 203., fig. 3 E-F.
1976. *Cytherella* cf. *parallela* (REUSS, 1845) - BREMAN, pp. 84-85., Pl. II., f. 2a.
1978. *Cytherella parallela* (REUSS, 1845) - SWAIN, p. 251 , Pl. 1., f. 1.
1979. *Cytherella* cf. *parallela* (REUSS, 1845) - DAMOTTE, pp. 276-277., Pl. 6/1., f. 2.
1985. *Cytherella parallela* (REUSS, 1845) - BABINOT et al., Pl. 48., f. 2., Pl. 55., f. 10.

Remarks: the form is rather variable. The typical character is the parallel running of the dorsal and ventral outlines. The length of the valves are different. The ventral and occasionally the dorsal outlines sometimes are slightly and symmetrically concave. The anterior and posterior outlines are broadly and equally rounded except of some specimens having somewhat asymmetrical posterior outline. The variations form a continous but not temporal series and in my opinion they represent a single species.

Dimensions (carapaces): L = 0.55 - 0.78 mm, H = 0.33 - 0.41 mm, L/H = 1.67 - 1.90.

Occurrence: Jásd 41 borehole 263.0 - 449.8 m; Olaszfalu 84 borehole 9.5 - 11.0 m; Jásd No 1 outcrop, beds No 1-21.

Material: 208 exemplares (mainly carapaces).

Genus *Cytherelloidea* ALEXANDER, 1929

Cytherelloidea ex gr. *stricta* (JONES et HINDE, 1890)
Pl. 2., f. 3.

Remarks: some specimens of poor preservation. On the right valve the parallel posterior and ventral outlines are slightly concave, the posterior outline is more or less asymmetrically angular, the anterior outline broadly and symmetrically rounded. There is a more or less distinct posterior costa; its posterior part runs straight, nearly parallel with the posterior outline, after breaks it runs nearly parallel with the dorsal and ventral outline and fades into the surface before the half-length. The investigeted specimens seem to belong to the species-group of *scripta.* The ornamentation is reduced in comparison with the typical form. Also similar is the *C. glabra* HONIGSTEIN et ROSENFELD, 1985.

Dimensions (carapaces): L = 0.57 - 0.62 mm, H = 0.31 - 0.34 mm, L/H = 1.76 - 1.84.

Occurrence: Jásd 42 borehole 192.0 - 425.2 m

Material: 4 carapaces.

Suborder Metacopa SYLVESTER-BRADLEY, 1976
Family Saipanettidae MCKENZIE, 1968
Genus *Cardobairdia* VAN DEN BOLD, 1960

Cardobairdia cf. *minuta* (VAN VEEN, 1936)
Pl. 2., f. 4-5.

Description: carapaces with shape characteristic for this species (elongate form without distinct anterodorsal break, the ventral outline of the left valve is gently convex).

Dimensions (carapaces): L = 0.42 - 0.45 mm, H = 0.22 - 0.25 mm, L/H = 1.83 - 2.05.

Occurrence: Jásd 42 borehole 259.0 - 293.0

Material: 10 carapaces.

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

Bairdia pseudoseptentrionalis (MERTENS, 1956) s. l.
Pl. 2., f. 6-8., Pl. 3., f. 1.

1956. *Bairdoppilata pseudoseptentrionalis* n. sp. - MERTENS, pp. 182-184., T. 8., f. 7-10., T. 13., f. 89-90.
1956. *Bairdoppilata roemeri* n. sp. - DEROO, p. 1509., Pl. I., f. 9-12.
1965. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - KAYE, pp. 223-224., Pl. 2., f. 1., 3-6.
1966. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - GRÜNDEL, p. 15., T. I., f. 18.
1971. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - DAMOTTE, pp. 58-59., Pl. I., f. 15.
1971 *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - KEEN et Siddiqui, p. 63., Pl. 1., f. 2.
1978. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - WIEL, Pl. I., f. 6.
1979. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - DAMOTTE, p. 279., Pl. 6/1., f. 6.
1982. *Bairdoppilata pseudoseptentrionalis* MERTENS, 1956 - WEAVER, pp. 24-25., Pl. 4., f. 1-3.
1984. *Bairdoppilata pondera* JENNINGS, 1936 - HONIGSTEIN, pp. 9-10., Pl. 4., f. 1-2.
1985. *Bairdoppilata pseudoseptentrionalis* MERTENS, 1956 - Ainsworth, p. 30., f. 10/8.
1985. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) - BABINOT et al., Pl. 51., f. 1.
1988. *Bairdoppilata pseudoseptentrionalis* MERTENS, 1956 - JARVIS et al., fig. 15/j.
1992. *Bairdoppilata pseudoseptentrionalis* MERTENS, 1956 - WITTE et al., p. 48., Pl. 2., f. 1.

Remarks: the shape is rather variable in the material. Most common are the highe triangular forms with upward curved posterior end near the ventral level. The median part of the ventral outline is nearly straight or slightly convex. The asymmetrical anterior outline is rather narrowly rounded. There are some elongated specimens with more acute posterior end similar to *Bairdoppilata* ? *elegans* BAYNOVA et TALEV, 1964 and *Bairdia* aff. *major* DONZE, 1964 in BENEST et al. (1977) and RASPHS et al. (1987) (this named forms are much more older). The Albian specimens of Hungary are closest to the specimens figured by KAYE (1965).

Dimensions (carapaces): L = 0.90 - 1.03 mm, H = 0.53 - 0.69 mm, L/H = 1.48 - 1.75.

Occurrence: Jásd 42 borehole 281.0 - 437.3 m; Olaszfalu 84 borehole 5.0 - 16.5 m.

Material: 58 exemplares, mainly carapaces.

Superfamily Cytheracea BAIRD, 1850
Family Cytherideidae SARS, 1925
Subfamily Schulerideinae MANDELSTAM, 1959
Genus *Schuleridea* SWARTZ et SWAIN, 1946

Schulerídea jonesiana (BOSQUET, 1952) s. l.
Pl. 3., f. 2-8., Pl. 4., f. 1.

1849. *Cythere hilseana* ROEMER - JONES, 1849, pp. 10-11., Pl. I. f. 1.
1852. *Cytheridea jonesiana* BOSQUET n. sp. - BOSQUET, p. 38.
1938. *Cytheridea (Haplocytheridea) jonesiana* (BOSQUET) - TRIEBEL, pp. 480 - 482., Pl. 2., f. 21-25.
1956. *Schuleridea jonesiana* (BOSQUET) - DEROO, p. 1512., Pl. II., f. 26-31.
1956. *Schuleridea jonesiana* (BOSQUET, 1852) - MERTENS, pp. 193-195., Pl. 10., f. 38-40.
1958. *Schuleridea jonesiana* (BOSQUET, 1852) - OERTLI, 1958, pp. 1507-1508., Pl. V., f. 105-113.
1962. *Schuleridea jonesiana* (BOSQUET, 1852) - ELLERMANN, pp. 401-402., Abb. 13.
1963. *Schuleridea jonesiana* (BOSQUET, 1852) - KAYE, p. 31., Pl. 2., f. 9-13.
1964. *Schuleridea jonesiana* (BOSQUET, 1852) - KAYE, pp. 45-46., Pl. 1., f. 1-5.
1965 (pan). *Schuleridea jonesiana* (BOSQUET, 1852) - LÜBIMOVA, pp. 38-40., Pl. IV., f. 4-5., 7-8.
1966. *Schuleridea jonesiana jonesiana* (BOSQUET, 1852) - GRÜNDEL, p. 22., Pl. III., f. 12-13.
1970. *Schuleridea jonesiana* (BOSQUET, 1852) - ANDREEV et OERTLI, pp. 103-104., Pl. XXVI., f. 1-4.
1971. *Schuleridea jonesiana* (BOSQUET, 1852) - DAMOTTE, pp. 112-113., Pl. VIII., f. 5.
1971. *Schuleridea jonesiana* (BOSQUET, 1852) - RISCH, pp. 61-62., Pl. 7., f. 15-16.
1971. *Schuleridea jonesiana* (BOSQUET) - KEEN et SIDDIQUI, p. 63., Pl. 1., f. 3-6.
1977. *Schuleridea jonesiana* (BOSQUET, 1852) - CHAROLAIS et al., Pl. 1., f. 9-10.
1978. *Schuleridea jonesiana* (BOSQUET, 1852) - NEALE, 1978., Pl. 8., f. 14., Pl. 9., f. 1-3.
1978. *Schuleridea jonesiana* (BOSQUET) - WIEL, Pl. II., f. 15.
1979. *Schuleridea jonesiana* (BOSQUET, 1852) - DAMOTTE, p. 292., Pl. 6/4., f. 37.
1982. *Schuleridea jonesiana* (BOSQUET, 1852) - WEAVER, pp. 34-35., Pl. 5., f. 18-19.
1985. *Schuleridea jonesiana* (BOSQUET, 1852) - BABINOT et al., Pl. 48., f. 5-6., Pl. 51., f. 6-7.
1992. *Schuleridea jonesiana* (BOSQUET, 1852) - WITTE et al., pp. 54-56., Pl. 3., f. 4-6.

Remarks: the left valve of the form has a characteristical trapezoidal dorsal outline. The ventral outline is broadly arcuate, maximal heigth is only slightly displaced to the posterior direction. The posterior part of the ventral outline nearly straight. The form has a rather acute posterior end. A moderate and elongated swelling on anterodorsal angle of the right valve with also moderate depression below is characteristical for the species. The small and scattered normal pores are comparable to those of the material of KAYE (1964) (containing the lectotype). All the Hungarian specimens differ from Kaye's material due to their narrower posterior part and more convex ventral outline. There are too many variations among the specimens described and figured in the listed literature to make a distinct subspecies without the complete review of the material.

Dimensions (carapaces): L = 0.70 - 1.00 mm, H = 0.44 - 0.66 mm, L/H = 1.43 - 1.62.

Occurrence: Jásd-42 borehole 6.9 - 466.9 m; Olalszfalu 84 borehole 9.5 m; Jásd No 1 outcrop, beds No 8-23.; Bakonynána No 1 outcrop, beds No 1-12.

Material: 475 exemplares, mainly carapaces.

Subfamily Progonocytherinae SYLVESTER-BRADLEY, 1948
Genus *Neocythere* MERTENS, 1956

Neocythere vanveeni MERTENS, 1956 s. l.
Pl. 4., f. 2-8., Pl. 5., f. 1.

1956. *Neocythere vanveeni* n. sp. - MERTENS, 1956, pp. 205-207., Pl. 12., f. 72-78., Pl. 14., f. 100-102.
1958. *Neocythere vanveeni* MERTENS, 1956 - OERTLI, pl. V., f. 123-124.
1962. *Neocythere vanveeni* MERTENS, 1956 - ELLERMANN, pp. 400-401, Abb. 11-12.
1963. *Neocythere (Neocythere) vanveeni* MERTENS, 1956 - KAYE, pp. 276-277., Pl. 41., f. 23., 25.
1964. *Neocythere (N.) vanveeni* MERTENS - KAYE, Pl. 1., f. 10.
1964. *Neocythere (N.) vanveeni* MERTENS, 1956 - KAYE, p. 324., Pl. 54., f. 12-13., Pl. 55., f. 13.
1966. *Neocythere vanveeni vanveeni* MERTENS, 1956 - GRÜNDEL, pp. 32-33., Pl. V. f. 23.
1966. *Neocythere pseudovanveeni* n. sp. - GRÜNDEL, p. 33., T. VI., f. 3-4.
1971. *Neocythere vanveeni* MERTENS - KEEN et SIDDIQUI, pp. 63-64., Pl. 1., f. 10.
1971. *Neocythere vanveeni* MERTENS - BERTRAM et KEMPER, Pl. 2., f. 11.
1971. *Neocythere (Neocythere) vanveeni* MERTENS, 1956 - DAMOTTE, pp. 101-102., Pl. VII., f. 1.
1971. *Neocythere vanveeni* MERTENS - KEMPER, Pl. 2., f. 11.
1977. *Neocythere vanveeni* MERTENS, 1956 - CHAROLAIS et al., pl. 1., f. 11-12.
1978. *Neocythere (Neocythere) vanveeni* MERTENS - WIEL, Pl. II., f. 12-13.
1978. *Neocythere (Neocythere) vanveeni* MERTENS, 1956 - NEALE, Pl. 10., f. 8.
1979. *Neocythere (Neocythere) vaveeni* MERTENS, 1956 - DAMOTTE, p. 289., Pl. 6/3., f. 31.
1982. *Neocythere (Neocythere) vanveeni* MERTENS, 1956 - WEAVER, pp. 46-47.,Pl. 7., f. 17-19.
1982. *Neocythere (Neocythere) kayei* n. sp. - WEAVER, pp. 47-48., Pl. 7., f. 20-23.
1982. *Neocythere* gr. *vanveeni* MERTENS, 1956 - COLIN et al., p. 211., Pl. VI., f. 3-5.
1985. *Neocythere (Neocythere) vanveeni,* 1956 - BABINOT et al., Pl. 51., f. 10-11.
1989. *Neocythere* aff. *vanveeni* MERTENS - FRIEG et KEMPER, Pl. 19., f. 3.
1992. *Neocythere vanveeni* MERTENS, 1956 - WITTE et al., p. 60., Pl. 4., f. 7-8.

Remarks: We have mostly carapaces with incomplete preservation. Most of the material consists of specimens with highly arcuate dorsal outline. There is a conspicuous the arcuate ventral ridge combined from three parallel costa which sometime are fused in a long blunt swelling. The reticulation is usually weak but the mean elements are observable and correspond to those of the vanveeni. There are specimens having characteristic form and ornament of *N. kayei* WEAVER. Considering the variability of species they are probably only morphological variations of the vanveeni occouring in a sample together.

Dimensions (carapaces): L = 0.58 - 0.67 mm, H = 0.35 - 0.41 mm, L/H = 1.54 - 1.66.

Occurrence: Jásd 42 borehole 15.0 - 461.4 m; Olaszfalu 84 borehole 9.5 m; Bakonynána No 1 outcrop, bed No 12.

Material: 156 exemplares, mainly carapaces.

Family Trachyleberididae SYSVESTER-BRADLEY, 1948
Subfamily Trachyleberidinae SYLVESTER-BRADLEY, 1948
Triebe Veeniini PURI, 1973
Genus *Cythereis* JONES, 1849

Cythereis cf. *lerata* GRÜNDEL, 1966
Pl. 5., f. 2-7.

cf. 1966. *Cythereis lerata* n. sp. - GRÜNDEL, p. 35., T. VI., f. 19.

Remarks: most of the material is poorly preserved, but there are some specimens showing the depressed and smooth or nearly smooth posterior and anterior part. The reticulation of the median part is characteristical with the knots and spines on its intersections. The median ridge and the group of knots on the subcentral tubercle are missing. The anterior and ventral spine-rows also are visible. The shape corresponds to the original description.

Dimensions (carapaces): L = 0.60 - 0.73 mm, H = 0.34 - 0.42 mm, L/H = 1.62 - 1.87.

Occurrence: Jásd 42 borehole 127.0 - 444.8 m; Jásd No 1 outcrop, beds 8-9.

Material: 57 carapaces.

"Cythereis" div. sp.

There are many, mainly encrusted specimens belonging to the Cythereis group, but undeterminable even on genus-level. Most of them seem belong to *C.* cf. *lerata* GRÜNDEL, 1966.

Occurrence: Jásd 42 borehole 13.0 - 461.4 m; Olaszfalu 84 borehole 9.5 - 11.o m; Jásd No 1 outcrop, beds 8-17.

Material: 157 carapaces.

Genus *Rehacythereis* GRÜNDEL, 1973

Rehacythereis glabrella (TRIEBEL, 1940) s. l.
Pl. 6., f. 1-5.

1940. *Cythereis glabrella* n. sp. - TRIEBEL, pp. 196-198., t. 6., f. 60-62.
1941. *Cythereis glabrella* TRIEBEL, 1940 - TRIEBEL, T. 4., f. 41.
1964. *Cythereis glabrella minuera* n. ssp., GRÜNDEL, p. 746., T. 1., f. 1-2.
1965. *Cythereis glabrella* TRIEBEL, 1940 - POKORNY, Pl. II., f. 2.
1965. *Cythereis glabrella* TRIEBEL, 1940 - KAYE, p. 248., Pl. 10., f. 5-8.

1966. *Cythereis glabrella glabrella* TRIEBEL, 1940 - GRÜNDEL, 1966, p. 34., T. VI., f. 12-13., T. X., f. 2.
1966. *Cythereis glabrella minuera* GRÜNDEL, 1964 - GRÜNDEL, p. 34., T. VI., f. 14-15.
1971. *Cythereis glabrella* Triebel, 1940 - DAMOTTE, p. 68., Pl. III., f. 2.ú
1971. *Cythereis glabrella glabrella* TRIEBEL, 1940 - KEMPER, Pl. 1., f. 10-11.
1970. *Cythereis glabrella minuera* GRÜNDEL, 1964 - KEMPER, Pl. 1., f. 9.
1971. *Cythereis glabrella glabrella* TRIEBEL, 1940 - BERTRAM et KEMPER, Pl. 1., f. 10-11.
1971. *Cythereis glabrella minuera* GRÜNDEL, 1964 - BERTRAM et KEMPER, Pl. 1. f. 9.
1971. *Cythereis (Rehacythereis?) glabrella* TRIEBEL, 1940 - DAMOTTE, Pl. 1., f. 5.
1978. *Rehacythereis glabrella* (TRIEBEL, 1940) - NEALE, Pl. 12., f. 3-4.
1989. *Cythereis glabrella glabrella* TRIEBEL, 1940 - FRIEG et KEMPER, T. 21., f. 7-10.
1989. *Cythereis glabrella minuera* GRÜNDEL, 1964 - FRIEG et KEMPER, T. 21., f. 5.

Remarks: The investigated specimens are transitional forms between *glabrella glabrella* and *glabrella minuera.* The subcentral tubercle is always distinct or even strong, the posterior remain of the median ridge is different. The outline of the carapace in dorsal view is similar to *glabrella glabrella* and different from *glabrella minuera.*

This species is rather variable and there is a decrease of ornamentation during the Vraconian-Cenomanian. Our Cenomanian forms has a large, distinct subcentral knot with hardly visible remain of the median costa.

Dimensions (carapaces): L = 0.73 - 0.82 mm, H = 0.39 - 0.48 mm, L/H = 1.70 - 1.94.

Occurrence: Jásd 42 borehole 161.0 - 401.0 m; Olaszfalu 84 borehole 6.0 - 16.5 m.

Material: 42 exemplares (mainly carapaces).

Rehacythereis reticulata (JONES et HINDE, 1890)
Pl. 6., f. 6-7., Pl. 7., f. 1-3.

1890. *Cythereis ornatissima* var. *reticulata* n. var. - JONES et HINDE, p. 24., Pl. I., f. 67-68., 77., Pl. IV., f. 9-12.
1940. *Cythereis reticulata* JONES et HINDE, 1890 - TRIEBEL, 1940, pp. 192-195., T. 5., f. 51-56.
1956. *Cythereis reticulata* JONES et HINDE, 1890 - DEROO, p. 1518., Pl. V., f. 68-82.
1963. *Cythereis reticulata* JONES et HINDE, 1890 - DAMOTTE et GROSDIDIER, Pl. 2., f. 6.
1964. *Cythereis reticulata* JONES et HINDE, 1890 - KAYE, pp. 67-68., Pl. 8., f. 16-19.
1966. *Cythereis reticulata reticulata* JONES et HINDE, 1890 - GRÜNDEL, pp. 36-37., Pl. VII., f. 1-2.
1971. *Cythereis reticulata* JONES et HINDE, 1890 - DAMOTTE, pp. 64-65., Pl. II., f. 10.
1971. *Cythereis reticulata* JONES et HINDE, 1890 - RISCH, pp. 60-61., Pl. 7., f. 13-14.
? 1972. *Cythereis reticulata* JONES et HINDE, 1890 - DONZE et PORTHAULT, pp. 367-368., Pl. III., f. 11-14.
1974. *Cythereis reticulata* JONES et HINDE, 1890 - DAMOTTE, Pl. 24., f. 23-25.
1977. *Rehacythereis reticulat* (JONES et HINDE, 1890) - CHAROLAIS et al., Pl. 2., f. 10.
1977. *Cythereis (Rehacythereis?) reticulata* JONES et HINDE, 1890 - DAMOTTE, Pl. 1., f. 3.
1978. *Rehacythereis reticulata* (JONES et HINDE, 1890) - NEALE, Pl. 12., f. 1-2.
1978. *Cythereis (Cythereis) reticulata* JONES et HINDE, 1890 - WIEL, Pl. III., f. 1-4., Pl. IV. f. 1-13.

1979. *Cythereis reticulata* JONES et HINDE, 1890 - DAMOTTE, 1979, p. 282., Pl. 6/2., f. 13.
1982. *Cythereis* aff. *reticulata* JONES et HINDE, 1890 - WEAVER, pp. 67-68., Pl. 13., f. 2-4.
1985. *Cythereis (Rehacythereis) reticulata* JONES et HINDE, 1890 - BABINOT et al., Pl. 52., f. 4-6.
1989. *Rehacythereis reticulata* (JONES ET HINDE, 1890) - GRÜNDEL, Abb. 7.
1992. *Cythereis reticulata* JONES et HINDE, 1890 - WITTE et al., pp. 70-71., Pl. 6. f. 7.

Remarks: Most of the investigated specimens are very similar to those of NEALE (1978) with lacking or obscure ornamentation on the posterior and anterior depressed areas.

Dimensions (carapaces): L = 0.68 - 0.80 mm, H = 0.37 - 0.45 mm, L/H = 1.69 - 1.95.

Occurrence: Jásd 42 borehole 6.9 - 455.0 m; Olaszfalu 84 borehole 5.0 - 16,5 m; Jásd No 1 outcrop beds 9-23; Bakonynána No 1 outcrop, beds No 1-11.

Material: 96 exemplares, mainly carapaces.

Genus *Cornicythereis* GRUENDEL, 1973

Cornicythereis cf. *bonnemai* (TRIEBEL, 1940)
Pl. 7. f. 4.

Remarks: the single specimen is damaged. Its shape and the connection and running of the three longitudinal ribs on the smooth valve are corresponding to those of the *bonnemai*.

Dimensions: L = 0.52 mm.

Occurrence: Jásd 42 borehole 147.0 m.

Material: 1 right valve.

Cornicythereis ex gr. *gatyensis* (DAMOTTE et GROSDIDIER, 1963)
Pl. 7., f. 5-6.

Remarks: the ornamentation is similar to that of the specimens figured in DAMOTTE (1977), DAMOTTE (1979), BABINOT et al. (1985). There is a short median ridge expanded in central muscle scar area. The anterior ridge is sharp and continue in the strong ventral ridge to 0.7 - 0.8 of length. The dorsal ridge is wrinkled. The anterior, posterior and midcostal parts are depressed and smooth. Most of the figured original specimens and some other figured specimens show interrupted median ridge and distinct row of tubercles on peripherial (dorsal, anterior, ventral) ridges. Our specimens have shorter median ridges compared with the forms cited as typical *gatyensis*. They are perhaps the Cenomanian descendants of the typical Albian forms. Beacause of the poor preservation we can not describe a new subspecies or species.

Dimensions: L = 0.44 - 0.48 mm, H = 0.26 - 0.30 mm, L/H = 1.57 - 1.69.

Occurrence: Jásd 42 borehole 113.0 - 203.0 m.

Material: 3 carapaces.

Genus *Veeniacythereis* GRUENDEL, 1973

Veeniacythereis n. sp. aff. V. *begudensis* (BABINOT, 1971)
Pl. 8., f. 1-6.

Description: "*Veenia*-like" shape with pointed triangular posterior end. The dorsal ridge form the arcuate dorsal outline, the ventral ridge run near the ventral outline. The median ridge cross the hardly distinguishable muscle scar tubercle. The posterior and anterior part of valves are smooth and depressived. There is an irregular reticulation between the sharp main ridges; it is strong only on and near the ridges.

The posterior and anterior margins are armed with distinct spines, the anteromarginal edge wear three rows of spines. Also a row of knots is found on the main ridges.

Remarks: the details of the ornamentation are different from the begudensis, this is obviously a new species, but unfortunately we could not found so far a specimen completely preserved and also could not investigate the inner features.

Dimensions: L = 0.62 - 0.93 mm, H = 0.35 - 0.48 mm, L/H = 1.64 - 1.94.

Occurrence: Jásd-42 borehole 6.9 - 53.0 m.

Material: 37 specimens, mainly carapaces.

Superfamily Cypridacea BAIRD, 1845
Family Pontocyprididae G. W. Müller, 1894
Genus *Pontocyprella* LIUBIMOVA, 1955

Pontocyprella n. sp. aff. *P. harrisiana* (JONES, 1849)
Pl. 8., f. 7., Pl. 9., f. 1-3.

Description: The left valve has elongate form with asymmetrical anterior outline, its ventral part is more broadly rounded. The dorsal outline is also asymmetrically rounded, its posterior part is more bent. The posterior end has a blunt point near the ventral level. The ventral outline is slightly sinuous. The left valve overlap the right one except of its anterior part.

The right valve has a distinctly sinuous ventral outline and nearly trapezoidal dorsal outline with slightly concave posterior part, straight median part and nearly straight, slightly convex posterior part.

The investigated forms are similar to *P. harrisiana* in GRÜNDEL (1966), WEAVER (1982) and WITTE et al. (1992) from Albian-Cenomanian, but other figured forms from Lower and Upper Cretaceous (NEALE, 1962; BAYNOVA et TALEV, 1964; BAYNOVA, 1965; HERRIG, 1966) are different from those. There are too few well preserved specimens to describe a new species.

Dimensions: L = 0.54 - 0.64 mm, H = 0.23 - 0.31 mm, L/H = 2.14 - 2.40.

Occurrence: Jásd 42 borehole 151.0 - 449.8 m.

Material: 40 exemplares, mainly carapaces.

Family Candonidae KAUFMANN, 1900
Subfamily Paracypridinae SARS, 1923
Genus *Paracypris* SARS, 1866

Paracypris ex gr. *wrothamensis* KAYE, 1965
Pl. 9., f. 4-8.

Description: acute form mostly with very low valves. The anterior end is symmetrically rounded, the posterior end is acute or slightly truncated. Maximal height at 0.4 of length. The dorsal arc has two hardly observable breaks. The ventral outline has a very shallow embayment. On the right valve the dorsal breaking of the outline are more distinct, just as the ventral embayment and the anterodorsal part of the outline is slightly concave.

Remarks: our specimens are similar to *P. acuta* in STCHÉPINSKY, 1955 (Hauterivian), *P. acuta* in DAMOTTE et GROSDIDIER, 1963 (Aptian), *P. acuta* in GRÜNDEL, 1966 (Hauterivian), *P. wrothamensis* KAYE, 1965 in WITTE et al., 1992 (Albian-Cenomanian), *Paracypris* sp. 1 in COLIN, 1974 (Cenomanian).

The *P. wrothamensis* in WITTE et al. (1992) perhaps is not conspecific with KAYE's type. The figures of *P. acuta* in literature are very different, our specimens are not similar to Cornuel's drowing. The preservation of specimens is not good enough to estabilish a new species.

Dimensions: L = 0.66 - 0.76 mm, H = 0.23 - 0.30 mm, L/H = 2.50 - 2.87.

Occurrence: Jásd 42 borehole 23.0 - 449.8 m.

Material: 41 specimens, mainly carapaces.

Biostratigraphy

Ammonite zonation

The Bakonynána and the Jásd outcrop on the basis of the ammonite zonation belong to the Blanchetti Subzone of the Dispar Zone (Lower Vraconian). the lowermost part of the Pénzeskút Marl in the Jásd 42 borehole belongs also to the Blanchetti Subzone (474.5 - 422.5 m). The following unit is the Bergeri Subzone of the Dispar Zone (Upper Vraconian, 422.5 - 340.3 m). The main part of the section is age of Cenomanian. The part from 340 to 125.0 m belongs to the Mantelli Zone (Lower Cenomanian), the upper part of the borehole has a probable Middle Cenomanian age without zonal markers (125.0 - 6.9 m). (HORVÁTH, A. 1985).

Plankton foraminifer zonation.

On the basis of the plankton foraminifera fauna the Bakonynána and Jásd outcrops represent the Rotalipora ticinensis - Planomalina buxtorfi subzone of the Appenninica-Zone (Lower Vraconian).

The Pénzeskút Marl Formation of Olaszfalu 84 borehole belongs mainly to the Rotalipora appenninica-Guembelitria cenomana Subzone of Appenninica zona (Upper Vraconian) except of basal beds belonging to Lower Vraconian. Most complete is the section in the Jásd 42 borehole:

483.1 - 427.0 m: Lower Vraconian (R. ticinensis - P. buxtorfi Subzona)

427.0 - 363.3 m: Upper Vraconian (R. appenninica - G. cenomana Subzona)

363.0 - 141.0 m: Lower Cenomanian, (Rotalipora brotzeni zona)

141.0 - 6.9 m: no index fossils. (BODROGI, I., 1989).

Stratigraphical distribution of ostracods
(Fig. 1)

Six species of ostracods occur in the whole section of the formation:

Cytherella ovata (ROEMER, 1841) s. l.
Schuleridea jonesiana (BOSQUET, 1852) s. l.
Neocythere vanveeni MERTENS, 1956 s. l.
Cythereis cf. *lerata* GRÜNDEL, 1966
Rehacythereis reticulata (JONES et HINDE, 1890)
Paracypris ex gr. *wrothamensis* KAYE, 1965

C. ovata is a wide-spread species from Aptian to Cenomanian and "sensu lato" in the whole Upper Cretaceous.

Sch. jonesiana is common from Aptian to Cenomanian and N. vanveeni also common from Albian to Cenomanian in Europa.

C. lerata is found in Albian of Germany, our material has rather poor preservation, the identification is uncertain.

Rehacythereis reticulata is one of the most frequent species of the Cythereis-group in Albian-Cenomanian of Europa *P. wrothamensis* is typical in Albian-Cenomanian of England, France and Cenomanian of The Netherland.

There is no spcies in the sections of the formation restricted to Albian beds. Four species are found in Lower-Vrakonian - Lower Cenomanian part of sections

Cytherella parallela (REUSS, 1845) s. l.
Cytherelloidea ex gr. *stricta* (JONES et HINDE, 1890)
Bairdia pseudoseptentrionalis (MERTENS, 1956) s. l.
Pontocyprella n. sp. aff. *harrisiana* (JONES, 1849)

C. parallela is a frequently mentioned form from the Cretaceous of Europa. *C. stricta* is well known from Albian - Cenomanian of Western Europe.

B. pseudoseptentrionalis is frequent in Germany, France and England from Albian to Cenomanian.

One species is characteristic for the Upper Vraconian - Lower Cenomanian part of the formation:

Rehacythereis glabrella (TRIEBEL, 1940) s. l.

This is a typical Albian form of Europa. Specimens detected in the Pénzeskút Marl Formation show a temporal change of ornamentation. The forms from Upper Vraconian are similar to type ornamented, while the forms of Lower Cenomanian beds are characterized by disappearence of the short median ridge, but the strong subcentral tubercle remain constant. There is a similar line in the Albian of Western Europe (*R. glabrella glabrella* - *R. g. minuera* with the reduction both of the subcentral tubercle and median ridge.

Two species are restricted to Lower Cenomanian part of the formation:

Cardobairdia cf. *minuta* (VAN VEEN, 1936)
Cornicythereis cf. *bonnemai* TRIEBEL, 1940)

C. minuta is known from Lower and Upper Cretaceous sediments of Europa, *C. bonnemai* is common in Albian - Cenomanian beds of Europa.

The *Cornicythereis* ex gr. *gatyensis* (DAMOTTE et GROSDIDIER, 1963) s. l. is found only in the Cenomanian beds of the formation. The typical form of species characteristic for Albian of Western Europe.

Veeniacythereis n. sp. aff. *V. begudensis* BABINOT, 1971 is the characteristical form of the upper part of formation (probably age of Middle Cenomanian).The most similar V. *begudensis* is a typical Cenomanian form of France.

Summing up the species distribution: there is no species restricted to Albian (Vraconian) beds and also only some occasionally occured rare forms are found only in Lower Cenomanian beds. The ornamentation change of *Rehacythereis glabrella* is suitable to distinguish the Upper Vraconian and Lower Cenomanian parts of the formation. The *Veniacythereis* n. sp. aff. *V. begudensis* is a good marker of the uppermost (probable Middle Cenomanian) part of the formation.

Paleoecology

Lithology

The most complete section of formation is found in the well Jásd-42 (Fig. 1). The lower (Albian) part of the section is composed of dolomitic marl with limestone nodules, the upper (Cenomanian) part consist of marl, siltstone and sandy marl. In the lowermost 5 m of the well there is a high content of glauconite. There is a large amount of bacterial pyrit in the section. (CSÁSZÁR et al., 1987; BODROGI, 1989)

Distribution of ostracods

The Pénzeskút Marl Formation contains poor in species ostracod communities:
The maximal species number in a sample is eight. The distribution of all specimens from all investigated samples is as follows (Fig. 2):

Cytherella ovata (ROEMER, 1941) s. l.	63.8 %
Cytherella parallela (REUSS, 1845) s. l.	5.4 %
Cytherelloidea ex gr. *stricta* (JONES eet HINDE, 1890)	0.1 %
Cardobairdia cf. *minuta* (VAN VEEN, 1936)	0.3 %
Bairdia pseudoseptentrionalis (MERTENS, 1956) s. l.	1.5 %
Schuleridea jonesiana (BOSQUET, 1852) s. l.	12.4 %
Neocythere vanveeni MERTENS, 1956 s. l.	4.1 %
Cythereis cf. *lerata* GRÜNDEL, 1966	1.5 %
"Cythereis" div. sp.	4.1 %

Rehacythereis glabrella (TRIEBEL, 1940) s. l.	1.1 %
Rehacythereis reticulata (JONES et HINDE, 1890)	2.5 %
Cornicythereis cf. *bonnemai* (TRIEBEL, 1940)	< 0.1 %
Cornicythereis gatyensis (DAMOTTE et GROSDIDIER, 1963) s. l.	< 0.1 %
Veeniacythereis n. sp. aff. *V. begudensis* (BABINOT, 1971)	1 %
Pontocyprella n. sp. aff. *P. harrisiana* (JONES, 1849)	1 %
Paracypris ex gr. *wrothamensis* KAYE, 1965	1 %

Only two species dominate the ostracod fauna: *Cytherella ovata* and *Schuleridea jonesiana.*

Another species amount less then 10 % of the specimen number, so they are accessorical elements in the ostracoda fauna of the formation.

Cytherids without *Schuleridea* mount up to 15 % of the total specimen number. This value is much more high in the sublittoral ostracod communities known from Europa.

The most conspicuous element of the taxonomic composition is the dominance of *Cytherella.* 69.2 % from the total specimen number of the investigated materials belongs to this genus. This proportion varies from 40 to 100 % in the distinct samples. The *Cytherella* - dominated ostracoda communities are well known markers of hypoxic environments (WHATLEY, 1991, 1995; RODRIGUEZ - LÁZARO et al., 1998).

The species *C. ovata* s. l. is the most common form in the whole section of the formation, while the *C. parallela* s. l. is found mainly in lower part of it. It may be a form prefer to live in deep sublitoral environments while *C. ovata* occupy wider range of deep environments (Figs 3-33).

The *Cytherelloidea* ex gr. *stricta* occour in form of sporadic single valves, they are derived near-shore fossils.

The *Cardobairdia* specimens are accidental deep-water (bathyal) forms in the middle of the section (Figs 16-17).

The *Bairdia pseudoseptentrionalis* has on occurrence similar to *Cytherella parallela* s. l. (Figs 18., 20-26). This species shows some morphological variations: in the lower part of the sections the specimens are more high, then the *"Urobairdia"* – type (low forms with acute caudal parts more frequent in the upper part. This may be a sign of change of deep sublittoral and bathyal environments in the cours of transgression. There is a conspicious dominance of species in Jásd-41 433.0 m (Fig. 5), detecting its affinity to sublittoral and perhaps, as known from other localities of different age, its affinity to carbonate-rich environments (see the lithological profil on Fig. 1).

Schuleridea has the second part in order of dominance among the ostracods with 12.4 % of the total specimen number (0 – 55 % in the distinct samples). The *Schuleridea* is one of the most adaptive genus among the mesozoic forms and *S. jonesiana* perhaps was accomodated to hypoxic environments, too. It is most abundant in the lower and upper thirds of the section (Figs 3-33).

Neocythere vanveeni is a permanent additional form with some peaks (8-15%) of relative abundance scattered in the section (Figs 11., 17-18., 28., 30.).

Cythereis cf. *lerata* and *"Cythereis"* sp. div. have a similar distribution in the section, the latter contains mainly undeterminable encrusted specimens of *C.* cf. *lerata.* Relative abundances (10 - 27 %) are observable in different part of the section; the maximum is near the middle (Figs 12., 16-19., 24., 33.). They are the most frequent additional forms in the fauna.

Rehacythereis glabrella has a scattered appearence in the section: in the lower part of the section some ornamented specimens and in the middle of the section more, accidentally relative abundant (14 - 19 %) fairly ornamented carapaces are found (Figs 14-15., 25-26.). As I have written in the systematical part, the change of ornamentation is similar that of written in GRÜNDEL (1964). I am not sure of evolutional character of this temporal succession, it is possible an ecological effect during the sublittoral/bathyal change of environment.

Rehacythereis reticulata has a similarly scattered distribution, but its dominance characteristic in lower and occasionally in upper part of the section (Figs 4., 8., 25., 28-30., 32-33.). It seems to be connected to deep sublittoral environments. This species is also one of the resistant forms of Cretaceous Cytherids.

Veniacythereis n. sp. is typical form in the uppermost part of the investigated section, with relative abundance (8 - 32 %) (Figs 3-6.). Its late occurrence has evolutionary reasons (new Cenomanian species).

The percentage of *Pontocyprella* n. sp. is very low considering the probable deep-water environments, and its low oxygen level resistance (RODRIGUEZ-LÁZARO et al., 1998). Its appereance restricted on the lower two thirds of the section (Figs 11., 14-15., 17-23.).

Paracypris ex gr. *wrothamensis* has a scattered distribution in the section, it is usually an additional form of communities (Figs 7-8., 10., 18-21., 23., 25., 29., 31.).

Other fossils

On basis of the rich foraminifer assemblages (plancton, benthos ratio, bentonic communites) the lower part of the section developed under shallow shelf condition (483.1 - 427.0 m), the middle part has a deep-sublittoral/shallow bathyal character (427.0 - 141.0 m) up to water depth 200 m. (BODROGI, 1989)

Among the Ammonites there is a characteristical change of the less mobile/mobile form ratio from Lower Vraconian to Lower Cenomanian (HORVÁTH, A. in CSÁSZÁR et al., 1987).

Palaeoecological summary
(Figs 3-33)

Setting out from the ostracods there is no evidence of shallow sublittoral environment during the formation of the examined section. The underlayed Zirc Limestone Formation is a true representative of the shallow - and mid-sublittoral sedimentation. In the Vraconian the water depth increase suddenly. Under outer shelf environments (~ 100 m water depth) evolved oxygen minimum on the bottom. The main components of the ostracod association are the platycopids *(Cytherella),* the sediments are rich in oraganic matter and pyrite. Derived near-shore forms are very sporadic also in the lowermost part. During the transgression the water depth reached the bathyal zone (Lower Cenomanian part of the section). The poor succession shows the persistence of the hypoxic environment (strong "*platycopa*-signal"). Some change in the succession (decrease of the *Schuleridea,* decrease of *Rehacythereis reticulata* versus increase of *Cythereis* cf. *lerata,* weakened ornamentation by *Rehacythereis glabrella)* also are remarks of a bathyal "stress-environment" where water depth reached several hundred metres. The upper (Middle Cenomanian) part of the section is interpreted as sediment of regression. The ostracods are found abundantly enough to establish the continuation of the hypoxic environment up to the top of the section, terminated with high "*platicopa*-signal". The occasionally relatively high content of Cytheridae *(Schuleridea, Rehacythereis reticulata, Veeniacythereis* n. sp.) may indicate some decrease of the water deepth, but there is no typical shallow or mid-sublittoral communities.

Conclusions

The Upper Albian (Vraconian) - Middle Cenomanian Pénzeskút Marl Formation of the Transdanubian Central Range (Hungary) contains ostracods (15 species). The main character of the fauna is the "*platycopa* signal", the distinct dominance of the genus *Cytherella. Rehacythereis glabrella* disappear in the Lower Cenomanian (this is the latest occurrence of the species till now). *Veniacythereis* n. sp. seems to be a species appearing from the Middle Cenomanian. Detailed investigations of communities proved a suddenly transgression with deep sublittoral than bathyal environments rich in organic matter and poor in oxygen (hypoxia). These communities have few and generally resistant species. There is some change of form during the deep sublittoral-bathyal transition. The upper part of the formation shows uncertain marks of decreasing water depth (regression?).

References

AINSWORTH, N. R. (1985): Upper Jurassic and Lower Cretaceous ostracoda from the Fastenet Basin, Offshore Southwest Ireland - Irish Journal of the Earth Sciences, 7., pp. 15-33.

ANDREEV, Ju. N. et OERTLI, H. J. (1970): Some Cretaceous ostracods of Middle Asia and their related forms of Europe - Voprosy mikropaleontologii, 13., pp. 95- 121., Pl. I-IV., Nauka, Moscow.

BABINOT, J. F. (1971): Nouvelles espèces d'Ostracodes du Cénomanian supérieur de l'auréole septentrionale du Bassin du Beausset (Bouhes du Rhône-Var) - Revue de Micropaléontologie, 13., 4., pp. 237-248., Pl. 1-3.

BABINOT, J. F. et al. (1985): Crétacé supérieur. Crétacé inférieur - *In* OERTLI, H. J. (ed.): Atlas des Ostracodes France, Bull. Centres Rech. Explor.-Prod. Elf-Aquitaine, Mémoir 9., pp. 163-255., Pl. 41-70.

BABINOT, J. F. et GROSHENY, D. (1993): La limite Cenomanien-Turonien en domaine subalpin meriodional: etude des ostracodes de la coupe de Vergons (Sudest France) - Revue de Micropaleontologie, 36., 2., pp. 99-108.

BASSOULET, J. P. et DAMOTTE, R. (1969): Quelques Ostracodes nouveaux du Cénomano-Turonien de l'Atlas saharien occidental (Algérie) - Revue de Micropaléontologie, 12., 3., pp. 130-144., Pl. 1-2.

BAYNOVA, E. (1965): Ostracodes d'Albien de la partie d'ouest et centrale de Bulgarie du Nord - Review Bulg. Geol. Soc. 26., 3., pp. 287-315., Pl. 1-5.

BAYNOVA, E. et TALEV, B. (1964): Ostracoden aus dem Hauterive des zentralen und östlichen Teils Nordbulgariens - Acad. Bulg. Sci., Paléontol. 6., pp. 17-53., Pl. 1-5.

BENEST, M. et al. (1977): Nouves données paléontologiques, paléoecologiques et sédimentologiques sur le Berriasien de la région de Lamoricière (Ouled Mimoun et El Rhoraf, Monts de Tlemcen, Algerie) - Géobios, 10., 2., pp. 195-249., Pl. 1-12.

BERTRAM, H. et Kemper, E. (1971): Das Alb von Hannover -Beih. Ber. Naturhist. Ges. Hannover, pp. 27-41., Pl. 1-3.

BODROGI, I. (1989): Planktonic foraminifera stratigraphy of the Pénzeskút Marl Formation - Annales Inst. Geol. Publ. Hung. LXIII., 5., pp. 1-109., Pl. I -VIII.

BONNEMA, (1940-41): Ostracoden aus der Kreide des Untergrundes der nordöstlichen Niederlande - Natuurhist. Mbl., 29., pp. 91-95., 104-108., 115-118., 129-132., T. 1-4., 30., pp. 8-10., 21-24., 26-29., 40-43., 56-60., 70-72. T. 1-3., Limbourg.

BOSQUET, J. (1852): Description des Entomostraces fossiles des Terrains Tertiaires de la France et de la Belgique - Mem. Acad. Roy. Sci. Belgique, 24., pp. 1-142., Pl. 1-36.

BREMAN, E. (1976): Paleoecology and systematics of Cenomanian adn Turonian ostracoda from Guadalajara and Soria (Central Spain) - Rev. españ. Micropaleont., 8., 1., pp. 71-122., Pl. 1-14.

CHAROLAIS, J. et al. (1977): Découverte de microfacies de l'Albien moyen et supérieur dans la Vallée de Joux (Jura vaudois, Suisse) - Géobios, 10., 5., pp. 683-695., Pl. 1-2.

COLIN, J. P. (1974): Contribution à l'étude des ostracodes du Crétacé supérieur Dordogne - Géobios, 7., 1., pp. 19-42., Pl. 8-10.

COLIN, et al. (1982): Los ostracodos del Cenomaniense superior y Turoniense de la Cuenca Vasco-Cantabrica - Revista Esp. Micropal., XIV., pp. 187-220., Pl. I-VI.

CSÁSZÁR, G. (1985): Übersicht der Basis und Referenzprofile der Mittelkreide Ungarns - Österr. Akad. Wiss., Schriftenr. Erdwiss. Komm., 7., pp. 67.92.

CSÁSZÁR, G. (1985a): Paläogeographischer und entwicklungsgeschichtlicher Abriss der Mittelkreide des Transdanubischen Mittelgebirges an Hand von Basis- und Referenzprofilen - Österr. Akad. Wiss., Schriftenr. Erdwiss. Komm., 7., pp. 173-192.

CSÁSZÁR G., et al. (1987): Facies and ecology of the Albian-Cenomanian Pénzeskút Marl Formation in the light of the fossil record - M. Áll. Földt. Int. Évkönyve 1985-rõl, pp. 381-403.

DAMOTTE, R. (1971): Contribution à l'étude des ostracodes marins dans le Crétacé du Bassin de Paris - Mém. Soc. géol. France, n. s. 50. (Mém. 113.), pp. 1-150., Pl. 1-8.

DAMOTTE, R. (1974): Un nouveau genre d'ostracode d'Albien du Bassin de Paris. Matronella n. g. - Palaeontographica, A., 146., pp. 181-189., Pl. 23-24.

DAMOTTE, R. (1977): Sur les genres Crétacés: *Rechacythereis, Veeniacythereis, Cornicythereis, Parvacythereis* et *Chapmanicythereis* (Trachyleberididae, Ostracoda) crées par J.Gruendel en 1973 - Revue de Micropaléontologie, 19., 4., pp. 200-210., Pl. 1-2.

DAMOTTE, R. (1979): Les ostracodes du stratotype de l'Albien: biozonation, systematique - Albien Aube, Paris, pp. 267-297., Pl. 6/1-6/4.

DAMOTTE, R. et FREYTET, P. (1974): Contribution à la connaissance du Cénomanien du Massif de Fontfroide (Aude-France): étude des ostracodes - Revista Españ. Micropaleont., 6., 2., pp. 201-207., Pl. 1., 1974.

DAMOTTE, R. et GROSDIDIER, E. (1963): Quelques ostracodes du Crétacé de la Champagne humide. 1. Albien-Cénomanian - Revue de micropaléontologie, 6., pp. 51-66., Pl. 1-3.

DEROO, G. (1956): Études critiques au sujet des ostracodes marins du Crétacé inférieur et moyen de la Champagne humide et du Bas Boullonnais - Revue Inst. Franç. Pétrole, 11., pp. 1499-1535., Pl. 1-5.

DONZE, P. (1964): Ostracodes Berriasiens des massifs subalpins septentrionaux (Bauges et Chartreuse) - Travaux Lab. Géol. Fac. Sci. Lyon, N. S. 11., pp. 103-158., 1964.

DONZE, P. et PORTHAULT, B. (1972): Les ostracodes de la sous-famille des Trachyleberidinae dans quelques coupes de référence du Cénomanien du Sud-Est de a France - Revista Españ. Micropal., 4., 3., pp. 355-376., Pl. 1-3.

ELLERMANN, Cl. (1962): Neue Alb-Vorkommen in der Münsterschen Kreidebucht und ihre Mikrofauna - Neues Jahrb. Geol. Paläont. Mh., pp. 385-408.

FRIEG, Cl. et KEMPER, E. (1989): Mikropaläontologische Gliederung und Abgrenzung von Ober-Alb und Unter-Cenoman in Nordwestdeutschland - Geologisches Jahrbuch, A 113., pp. 73-193., Pl. 1-24.

GRÜNDEL, (1964): Neue Ostracoden aus der deutschen Unterkreide - Monatsberichte d. Deutsch. Akad. Wiss., 6., pp. 743-749., T. 1; pp. 849-858., T. 1-2.

GRÜNDEL, J. (1966): Taxonomissche, biostratigraphische und variations-statistische Untersuchungen an den Ostracoden der Unterkreide in Deutschland - Freiberger Forschungshefte, C. 200., pp. 1-105., T. 1-10.

GRÜNDEL, J. (1989): Trends der Grobskulpturentwicklung und der Ausbildung des Seitenumrisses bei nachjurassischen Trachyleberididae (Cytherocopina, Ostracoda) - Zeitschrift geol. Wiss., 17., pp. 603-617.

HERRIG, E. (1966): Ostracoden aus der Weissen Schreibkreide (Unter-Maastricht) der Insel Rügen - Paläontologische Abhandlungen, A2, pp. 693-1024., t. 1-45.

HONIGSTEIN, A. (1984): Senonian ostracodes from Israel - Bulletin Geol. Surv. Israel, 78., pp. 1-48., Pl. 1-15.

HONIGSTEIN, et ROSENFELD, (1985): Late Turonian-Early Coniacian ostracodes from the Zihor Formation, Southern Israel - Revista Españ. Micropal., 17., 3., pp. 447-466.

HORVÁTH, A. (1985): Ammoniten-Stratigraphie der Pénzeskút Mergel Formation - Österr. Akad. Wiss., Schriftenr. Erdwiss. Kom., 7., pp. 149-172.

JAIN, S. P. (1976): Ostracoda from the Kallakkudi Limestone (Albian), Tiruchirapalli District, Tamil Nadu: Families Cytherellidae, Bairdiidae, Macrocyprididae and Paracyprididae - Indian J. Earth Sci., 3., 2., pp. 199-207., Pl. 1.

JARVIS, I. et al. (1988): Microfaunal assemblages and the Cenomanian-Turonian (Late Cretaceous) oceanic anoxic event - Cretaceous Research, 9., 1., pp. 3-103.

JONES, T. R. (1849): A monograph of the Entomostraca of the Cretaceous formation of England - Palaeontographical Soc. London, Monogr., pp. 1-40., Pl. 1-7.

JONES, T. R. et HINDE, G. J. (1890): A supplementary monograph of the Cretaceous Entomostraca of England and Ireland - Palaeontographical Soc., Monogr. pp. 1-70., Pl. 1-4.

KAYE, P. (1963): Species of the ostracod family Cytherellidae from the British Lower Cretaceous - Senckenbergiana Lethaea, 44., pp. 109-125., Pl. 18-20.

KAYE, P. (1963): The interpretation of the Mesozoic ostracod genera of the family Cytherideidae Sars, 1925 - Revue de Micropaléontologie, 6., pp. 23-40., Pl. 1-3.

KAYE, P. (1963b): The ostracod genus *Neocythere* in the Speeton Clay - Palaeontology, 6., pp. 274-281., Pl. 41.

KAYE, P. (1964): Revision of British marine Cretaceous ostracoda with notes on additional forms - Bulletin British Mus. Nat. Hist. (Geol.), 10., pp. 39-77., Pl. 1-9.

KAYE, P. (1964a): Revision of the ostracoda from the Bargate Beds in Surrey - Palaeontology, 7., pp. 317-330., Pl. 54-55.

KAYE, P. (1965): Some new British Albian ostracoda - Bulletin British Mus. Nat. Hist. (Geol.), 11., pp. 217-259., Pl. 1-11.

KAYE, P. et BARKER, D. (1965): Ostracoda from the Sutterby Marl (U.Aptian) of south Lincolnshire - Palaeontology, 8., pp. 375-390., Pl. 48-50.

KEEN, M. C. et SIDDIQUI, Q. A. (1971): Cenomanian ostracoda from the Carr's Glen Shell bed of Belfast, Northern Ireland - Revue de Micropaleontologie, 14., pp. 62-68., Pl. 1-2.

LJUBIMOVA, P. S. (1965): Ostrakody nizhnemelovyh otlozhenij Prikaspijskoj Vpadiny - Trudy VNIGRI, Nov. ser. 244., pp. 1-200., Pl. I-XVI.

MALZ, H. (1987): Klassische Ostracoden-Präparate im Roemer-Pelizaeus-Museum in Hildesheim - Senckenbergiana Lethaea, 68., pp. 163-196.

MERTENS, E. (1956): Grenzziehung Alb/Cenoman in Nordwestdeutschland mit Hilfe von Ostracoden - Geologisches Jahrbuch, 72., pp. 173-230., T. 8-14.

NEALE, J. W. (1978): The Cretaceous - *In* BATE, R., ROBINSON, E. (eds.): A stratigraphical index of British Ostracoda, pp. 325-384., Pl. 1-17., Seel House Press, Liverpool.

OERTLI, H. J. (1958): Les ostracodes de l'Aptien-Albien d'Apt - Revue Inst. Franc. du Petrole, 13., pp. 1499-1537., Pl. 1-9.

POKORNY, Vl. (1965): New Trachyleberidinae (Ostracoda, Crustacea) from the Coniacian of Bohemia - Časopis miner. geol. 10., 1., pp. 51-55., Pl. 1-2.

RASPLUS, L. et al. (1987): Stratigraphie integrée du sillon citra-bétique (Sierra de Fontcalent, Province d'Alicante, Espagne) - Geobios, 20., 3., pp. 337-387.

REUSS, A. E. (1845): Die Versteinerungen der Böhmischen Kreideformation.I. - pp. 1-58., T. 1-13., Stuttgart.

REUSS, A. E. (1974): Die Foraminiferen, Bryozoen und Ostracoden des Pläners. 3. - Palaeontographica, 20., pp. 73-157., t. 20-28.

RISCH, H. (1971): Stratigraphie der höheren Unterkreide der Bayerischen Kalkalpen mit Hilfe von Mikrofossilien - Palaeontographica, A 138., pp. 1-80., t. 1-8.

RODRIGUEZ-LÁZARO, J. et al. (1998): Cenomanian events in teh deep western Basque Basin: the Leioa section - Cretaceous Research, 19., pp. 673-700.

ROEMER, F. A. (1841): Die Versteinerungen des norddeutschen Kreidegebirges - pp. 1-145., T. 1-16., Hannover.

SELESNJOVA, (1974): Crustacea. Ostaracoda - in Blank, M. Ya. et al. (eds): Atlas fauny verkhnij mel, pp. 275-291., Pl. 88-92.

STCHÉPINSKY, A. (1955): Études des ostracodes du Crétacé inférieur de la Haute Marne - Bulletin Soc. Géol. France, (6), 4., pp. 485-500., Pl. 1.

SWAIN, F. M. (1978): Some Middle Cretaceous ostracoda from northern Spain and their interregional relationships - Revista Españ. Micropaleont., 10., 2., pp. 245-265., Pl. 1-3.

TRIEBEL, E. (1938): Die Ostracoden der deutschen Kreide 2. Die Cytheridea-Arten der Unteren Kreide - Senckenbergiana, 20., pp. 471-501., T. 1-6.

TRIEBEL, E. (1940): Die Ostracoden der deutschen Kreide. 3. Cytherideinae und Cytherinae aus der Unteren Kreide. Senckenbergiana, 22., pp. 160-227., T. 1-10.

TRIEBEL, E. (1941): Zur Morphologie und Ökologie der fossilen Ostracoden, mit Beschreibung einiger neuer Gattungen und Arten - Senckenbergiana, 23., pp. 294-400., T. 1-15.

VIVIERRE, J.-L. (1985): Les ostracodes du Crétacé supérieur (Vraconien à Campanien basal) de region de Tébessa (Algérie du Nord-Est): stratigraphie, paléoécologie, systématique - These l'Univ. Pierre et Marie Curie, 1985., pp. 1-161., Pl. 1-27.

WEAVER, P. P. E. (1981): Ostracoda from the british Lower Chalk and Plenus Marls - Palaeontographical Soc., Monogr., No 562., pp. 1-127., Pl. 1-20.

WHATLEY, R. (1991): The platycopid signal: a means of detecting kenoxic events using Ostracoda - Journal of Micropaleontology, 10., pp. 181-185.

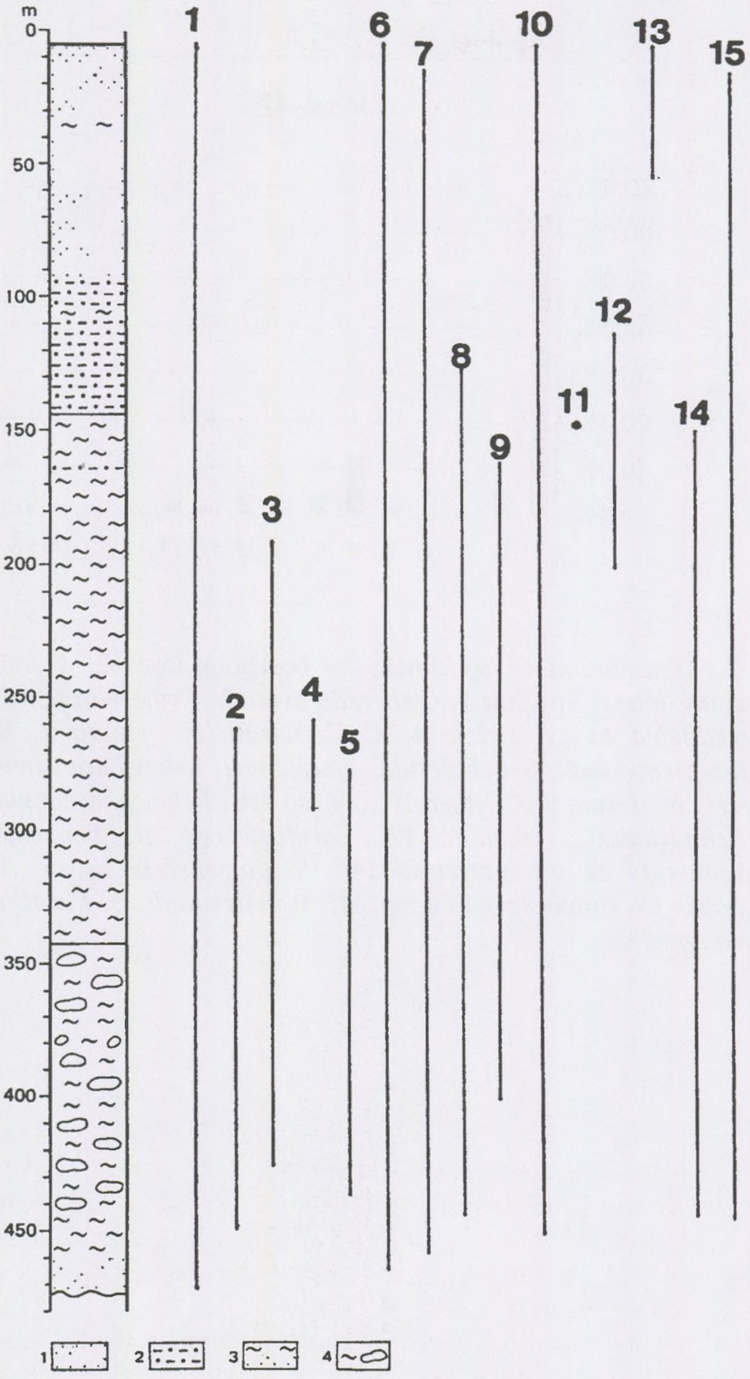
WHATLEY, R. (1995): Ostracoda and oceanic palaeoxygen levels - Mitteilungen Hamb. Zool. Mus Inst., 92., pp. 337-353.

WIEL, A. M. (1978): Ostracodes from the Albian of Petit Blanc-Nez (NW France) with emphasis on evolution in Cythereis reticulata - hirsuta - folkstonensis group - Proceedings Kon. Nederl. Akad. Wetensch., B 81., pp. 248-262., Pl. 1-4.

WITTE, L. et al. (1992): Ostracods from the Albian/Cenomanian boundary in the Acherhoek area (eastern part of The Netherlands) - Scripta Geologica, 102., pp. 33-84., Pl. 1-7.

ZALÁNYI, B. (1959): Ostracoden-Faunen aus der Aptstufe des Nördlichen Bakony-Gebirges - Annales Inst. Geol. Publ. Hung., XLVII., 2., pp. 355-566., T. 1-6.

Fig. 1. Stratigraphical distribution of ostracods in borehole Jásd-42. Legend. Rocks: 1. sandstone 2. siltstone 3. sandy marl 4. marl with limestone nodules. Species: 1. *Cytherella ovata* 2. *Cytherella* parallela 3. *Cytherella* ex gr. *striata* 4. *Cardobairdia* cf. *minima* 5. *Bairdia pseudoseptentrionalis* 6. *Schuleridea jonesiana* 7. *Neocythere vanveeni* 8. *Cythereis* cf. *lerata* 9. *Rehacythereis* glabrella 10. *Rehacythereis reticulata* 11. *Cornicythereis* ex gr. *bonnemai* 12. *Cornicythereis* ex gr. *gatyensis* 13. *Veeniacythereis* n. sp. aff. *V. begudensis* 14. *Pontocyprella* n. sp. aff. *P. harrisiana* 15. *Paracypris* ex gr. *wrothamensis*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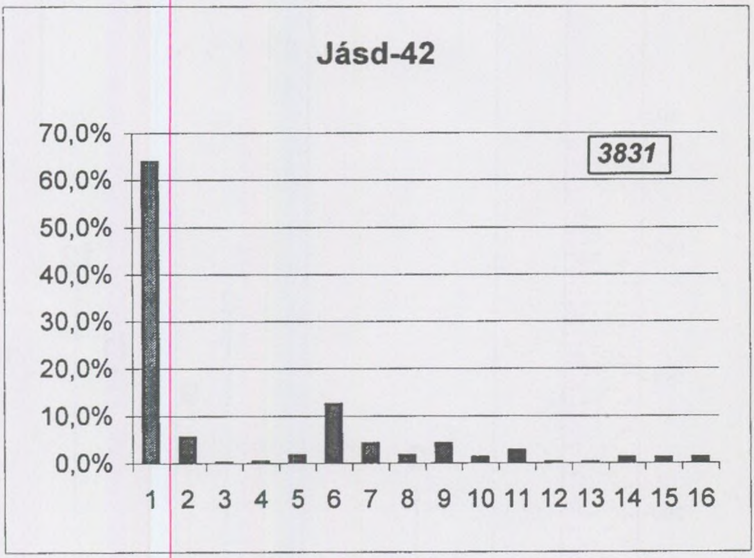


Fig. 2. Distribution of specimens in borehole Jásd-42. Number of specimens in box. Species: 1. *Cytherella ovata* 2. *Cytherella parallela* 3. *Cytherelloidea* ex gr. *stricta* 4. *Cardobairdia* cf. *minuta* 5. *Bairdia pseudoseptentrionalis* 6. *Schulerideajonesiana* 7. *Neocythere vanveeni* 8. *Cythereis* cf. *lerata* 9. *"Cythereis"* div. sp. 10. *Rehacythereis glabrella* 11. *Rehacythereis reticulata* 12. *Cornicythereis* cf. *bonnemai* 13. *Cornicythereis* ex gr. *gatyensis* 14. *Veeniacythereis* n. sp. aff. *V. begudensis* 15. *Pontocyprella* n. sp. aff. P. *harrisiana* 16. *Paracypris* ex gr. *wrothamensis*.

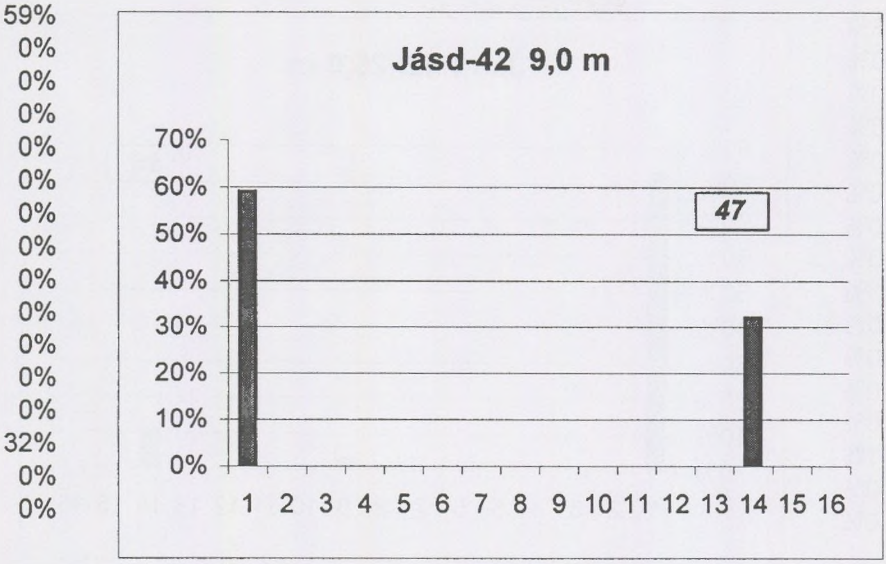
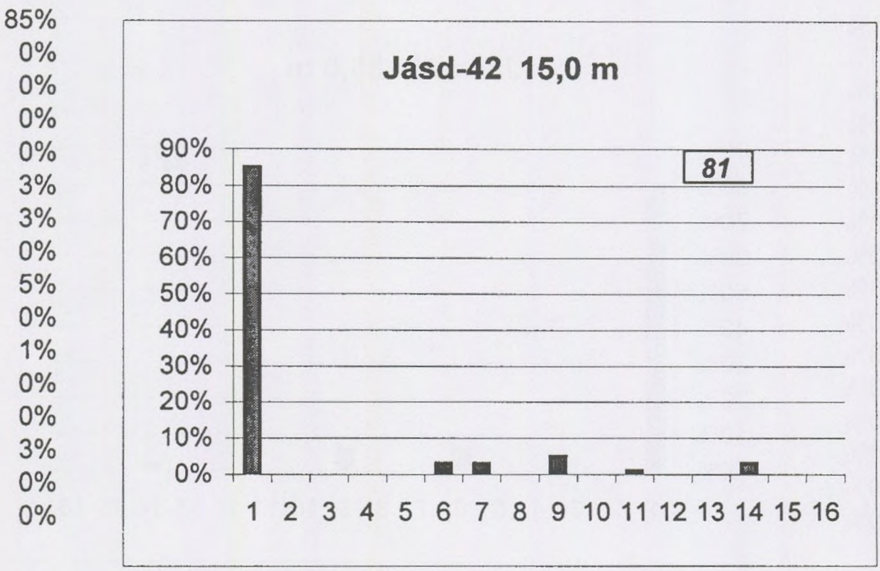


Fig. 3. For legend see Fig. 2.



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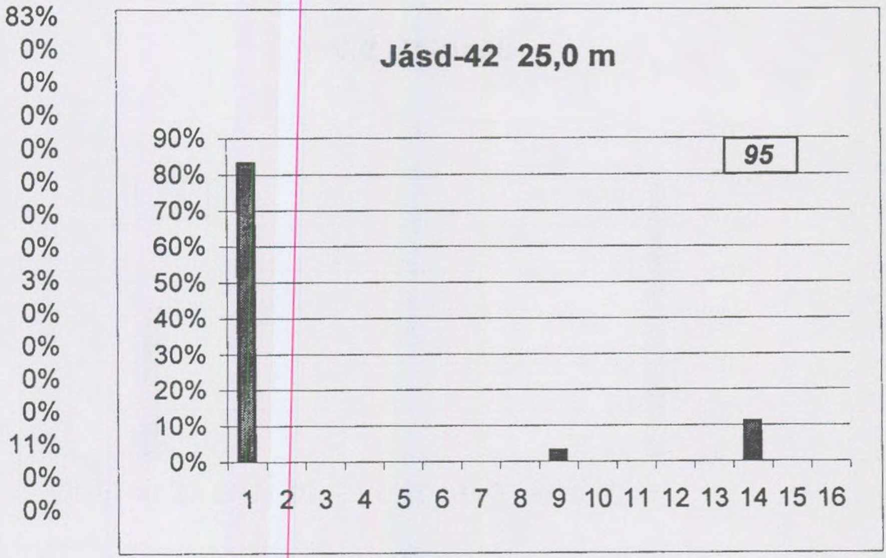

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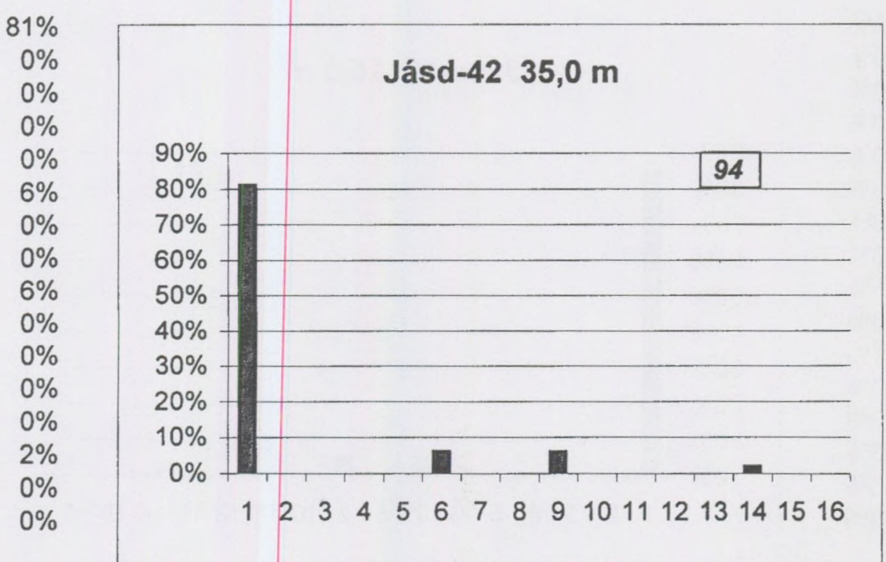

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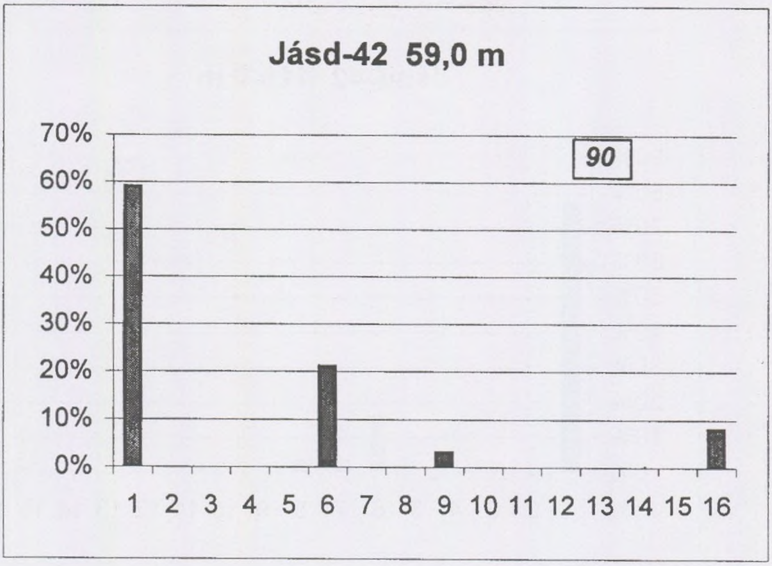

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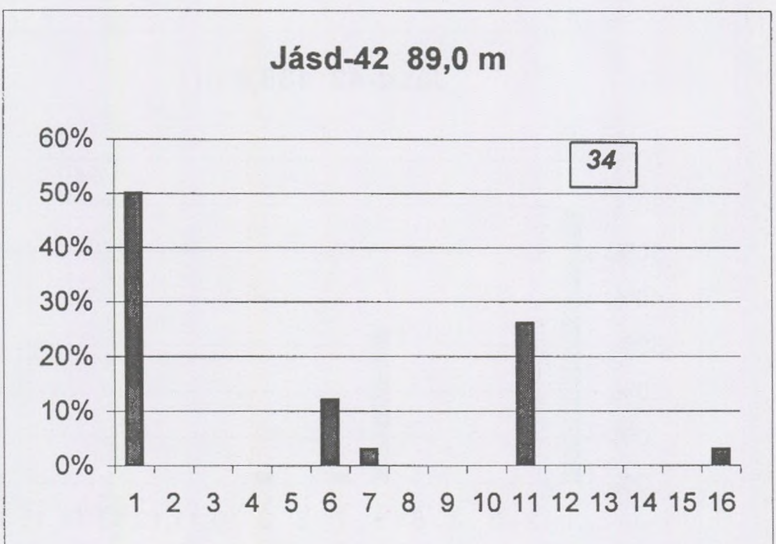

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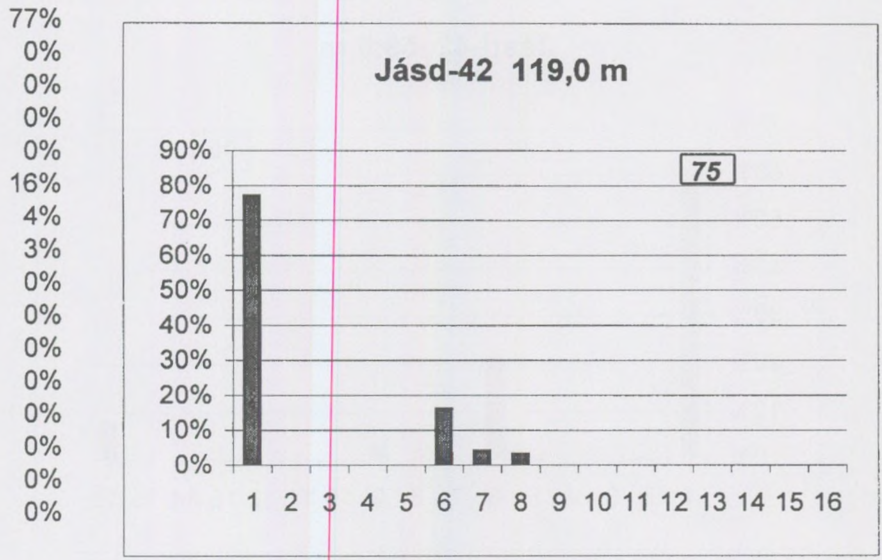

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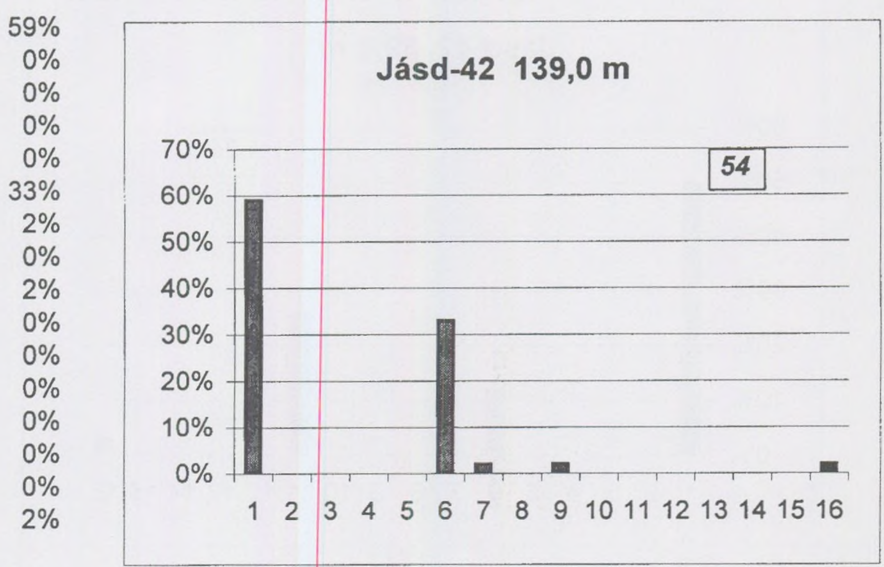

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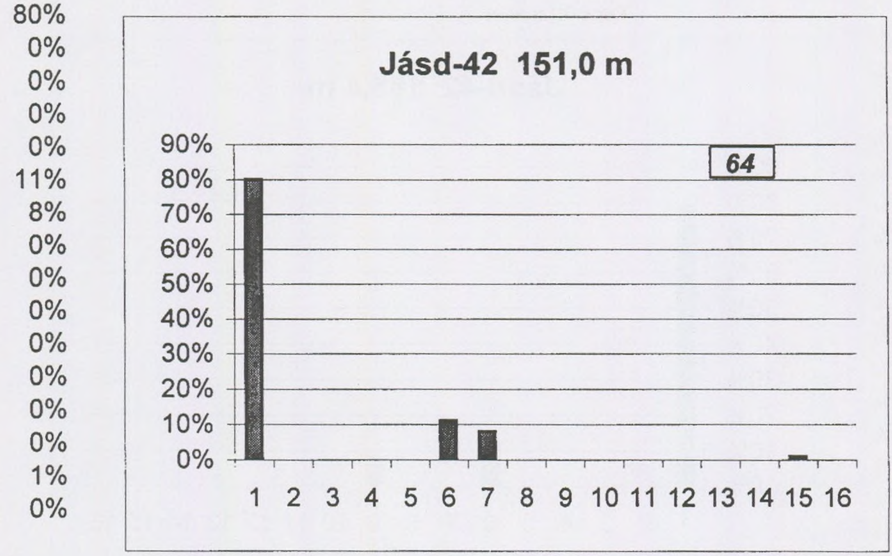

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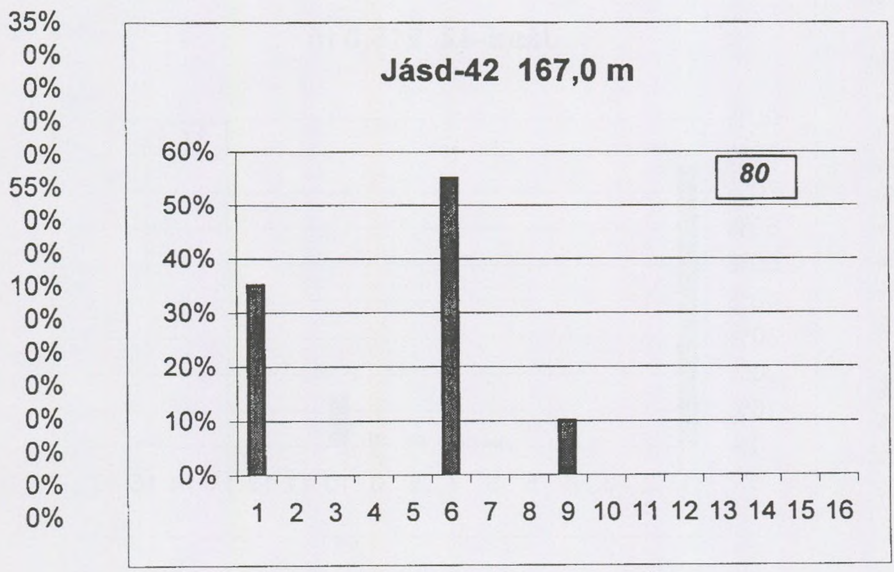

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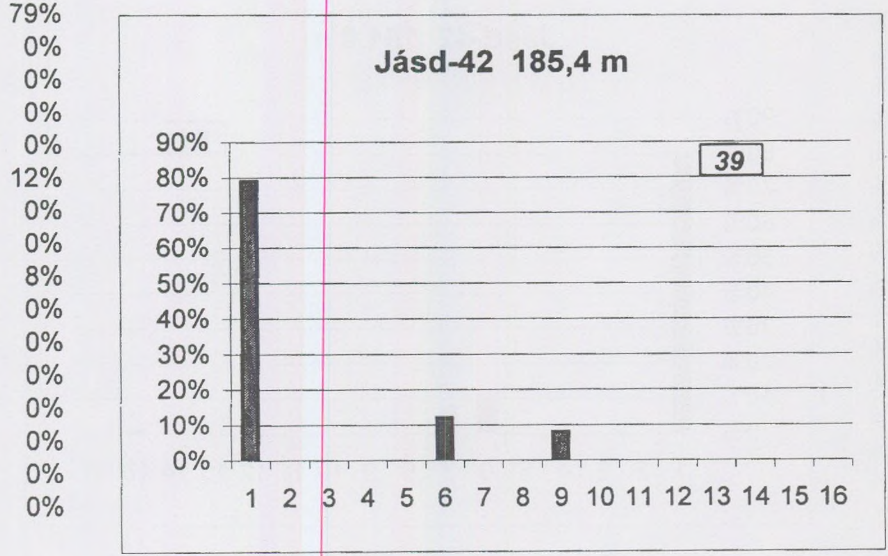

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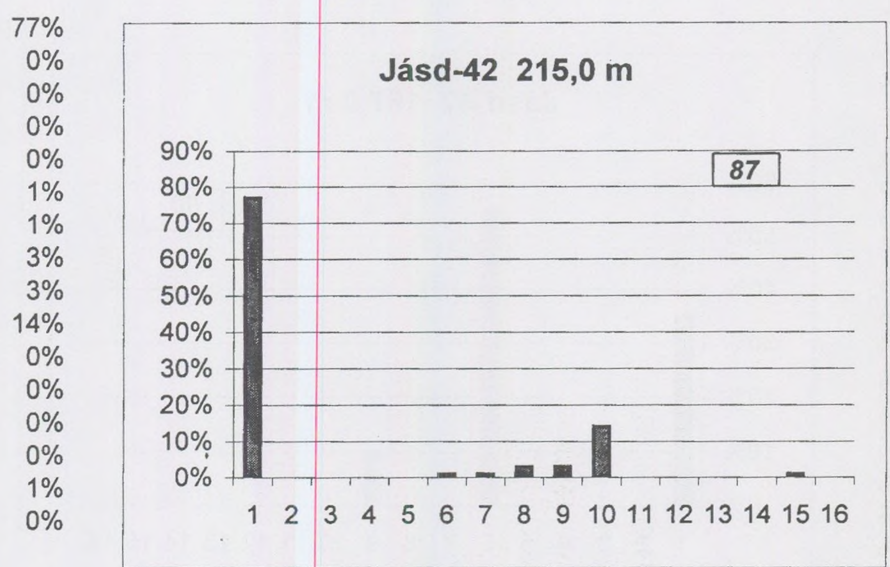

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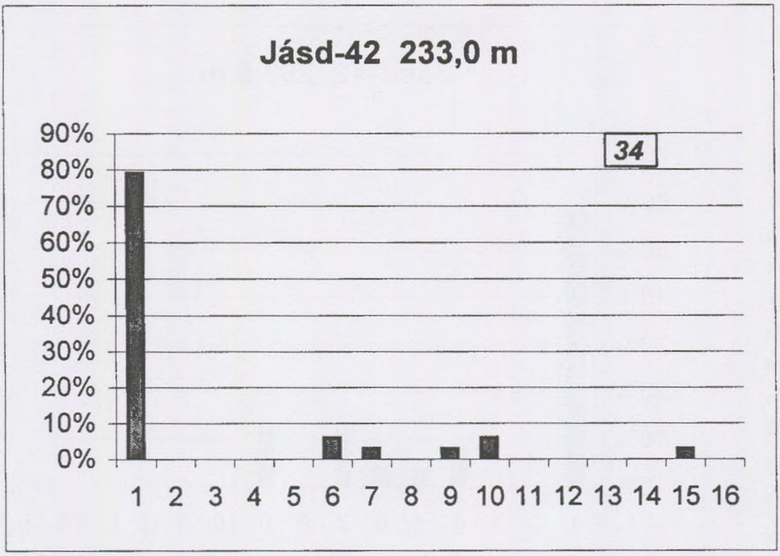

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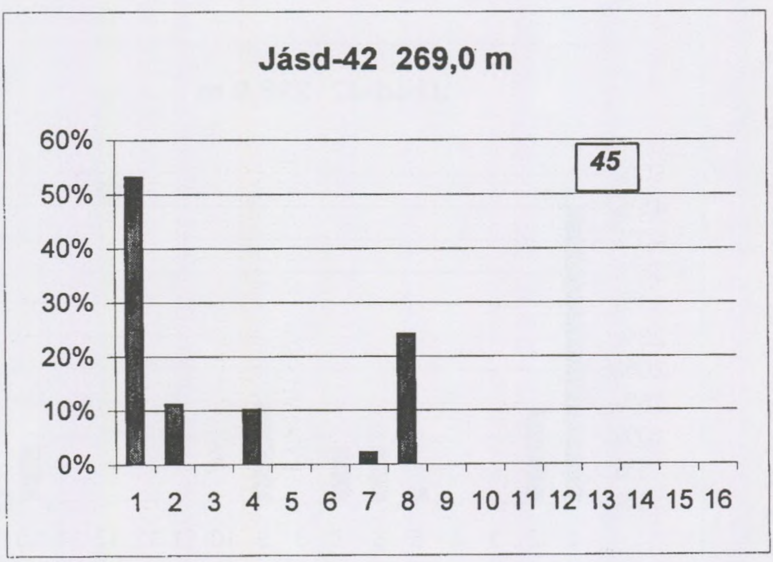

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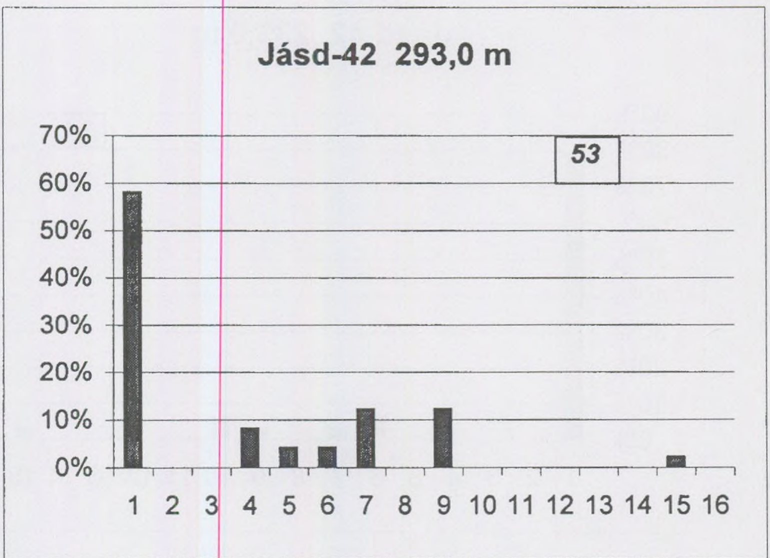

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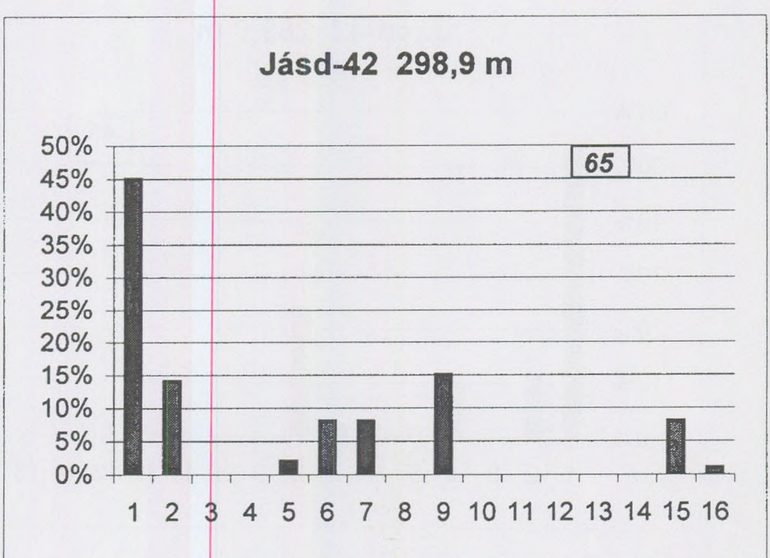

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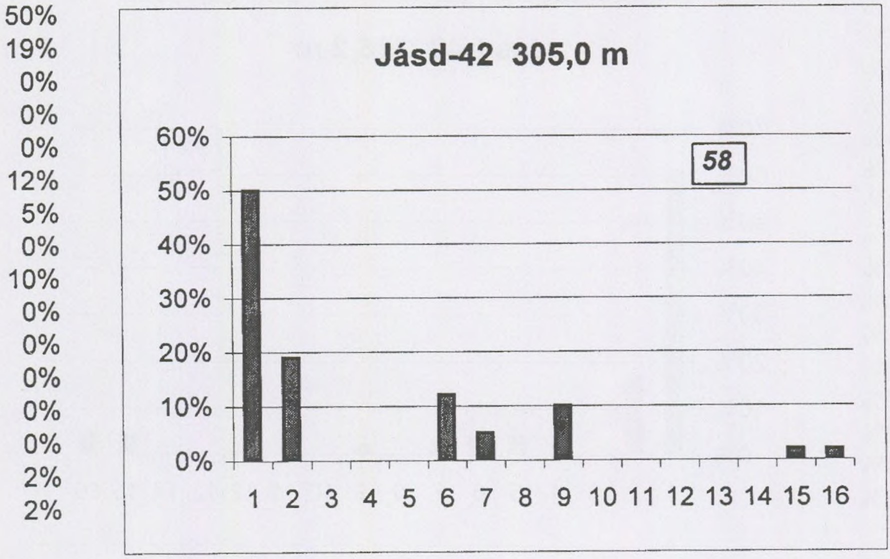

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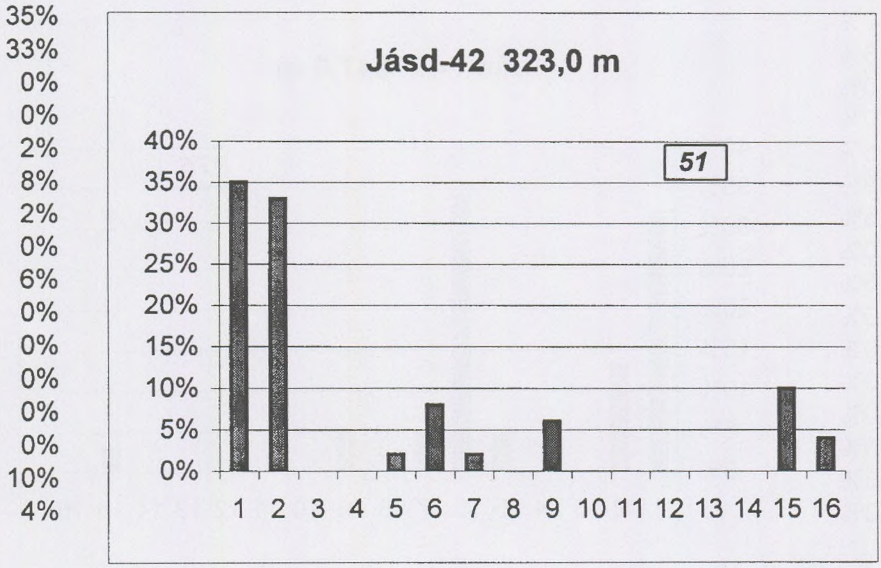

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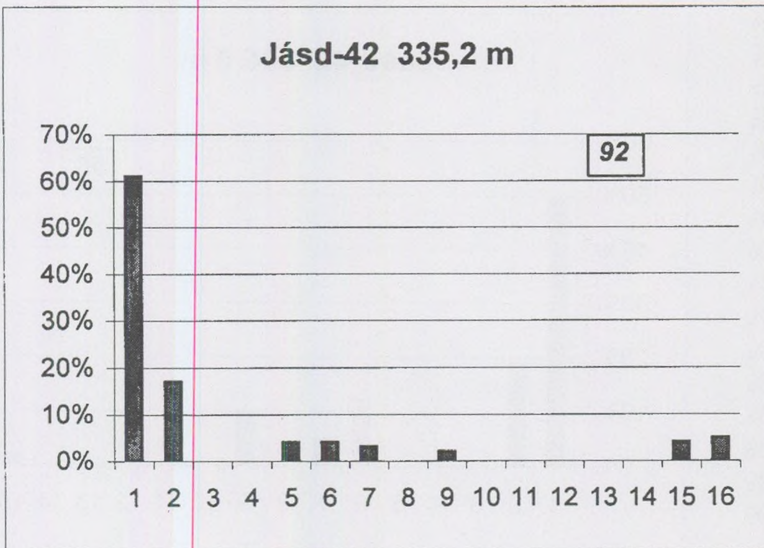

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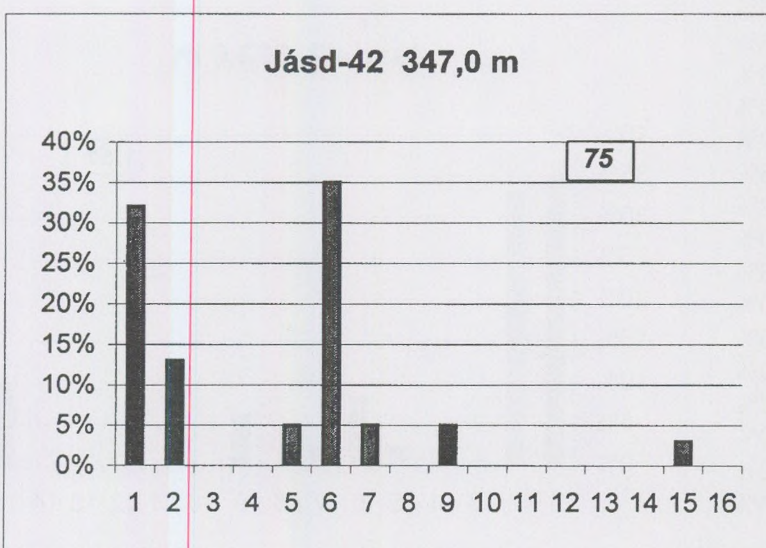

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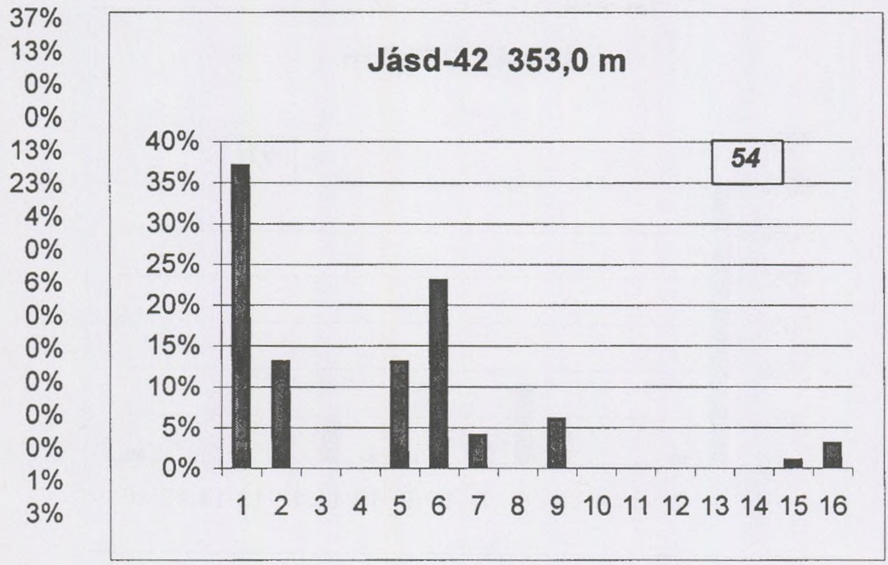

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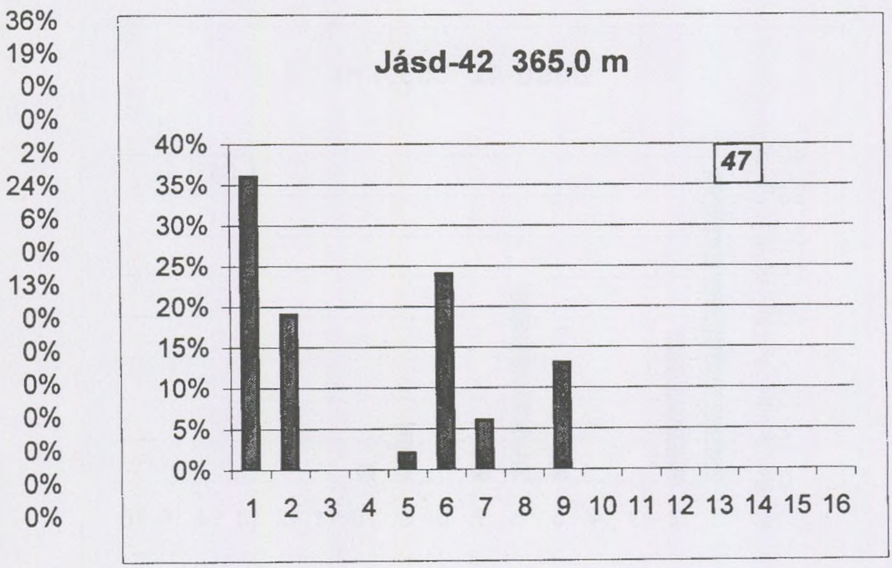

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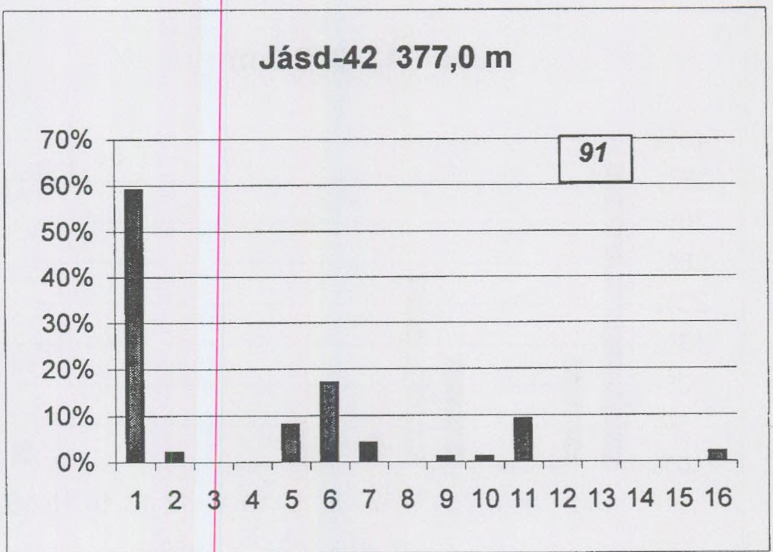

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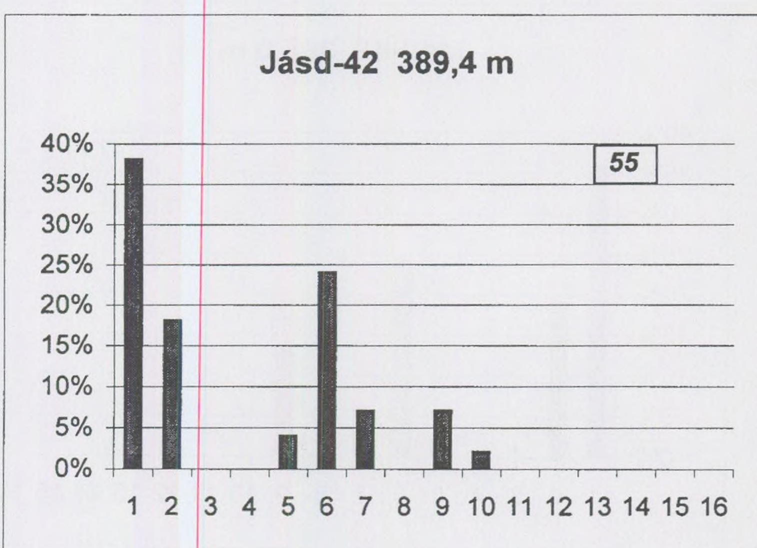

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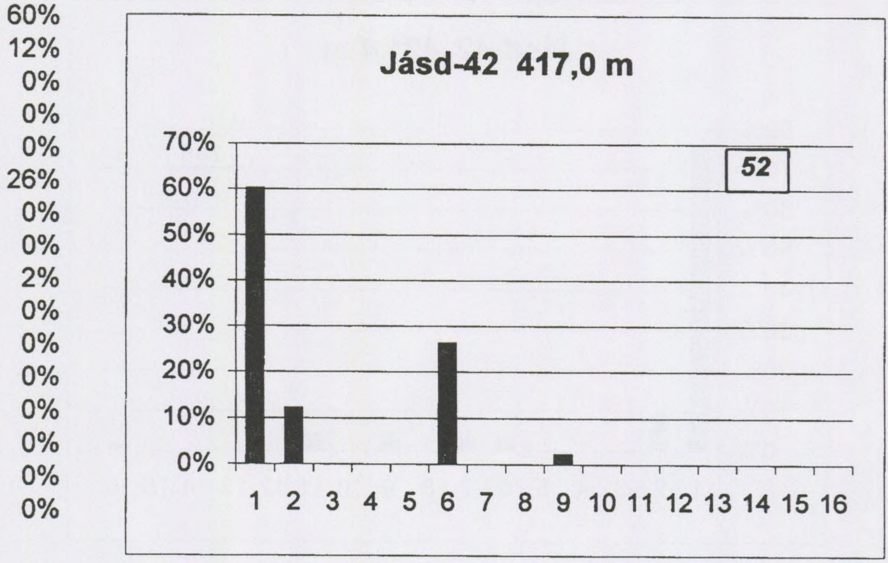

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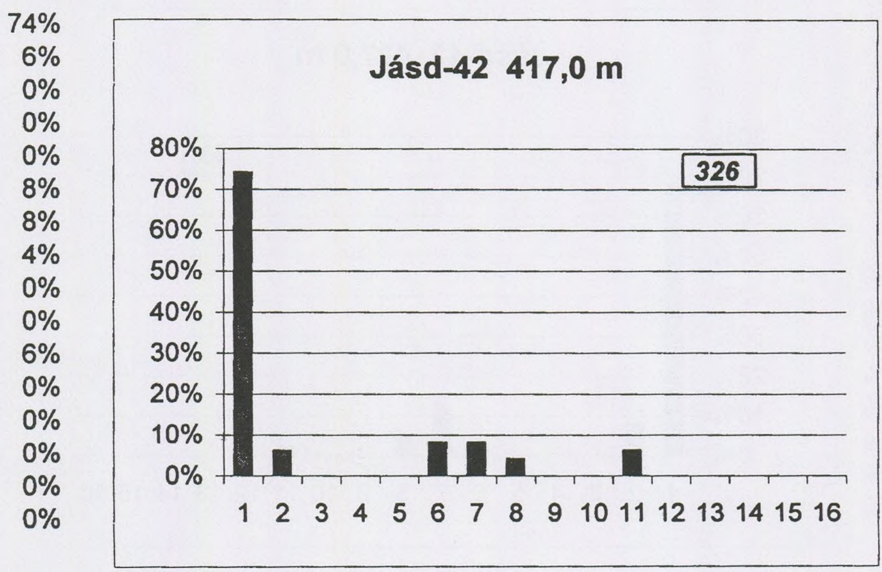

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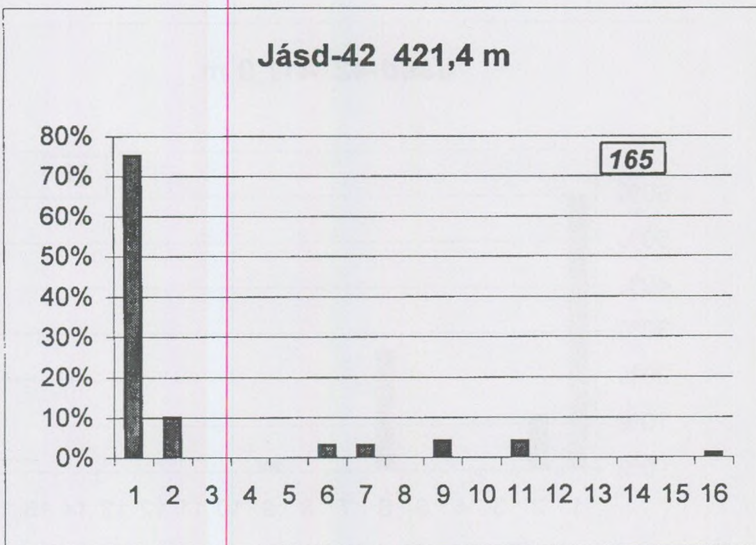

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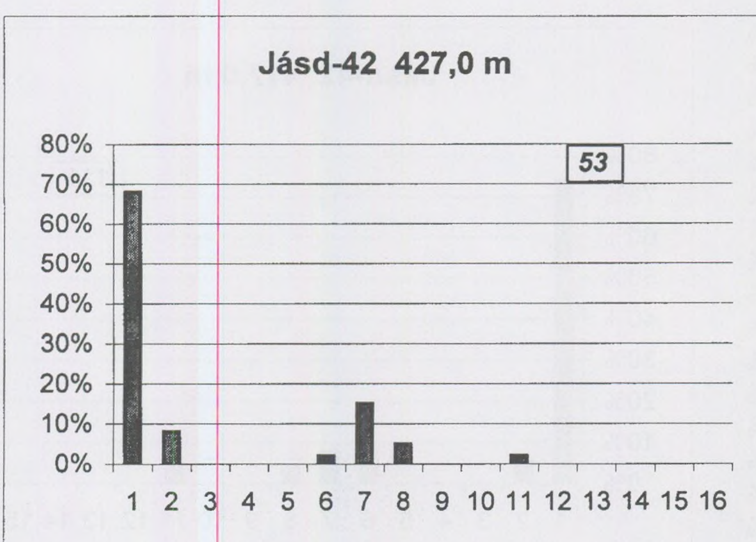

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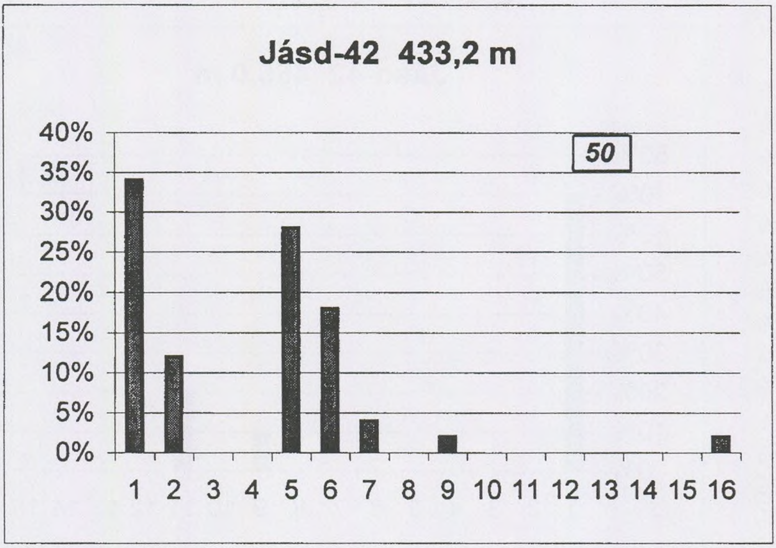

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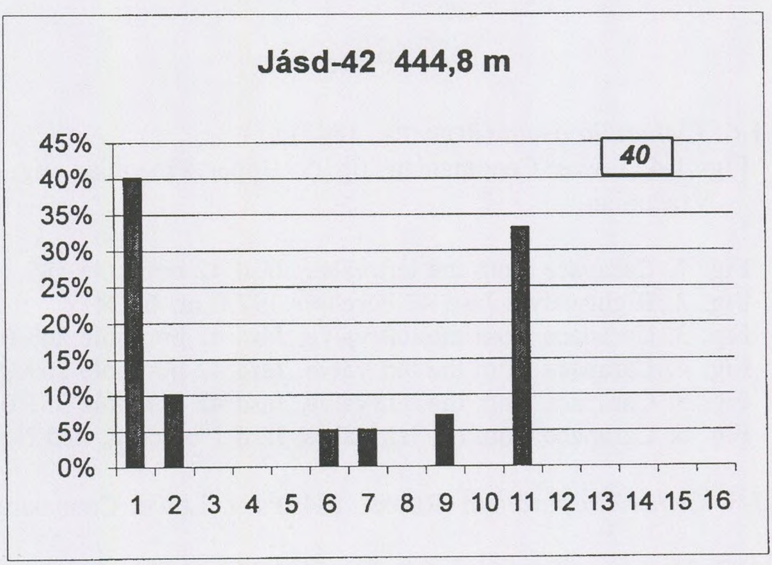


Fig. 32. For caption see Fig. 2.

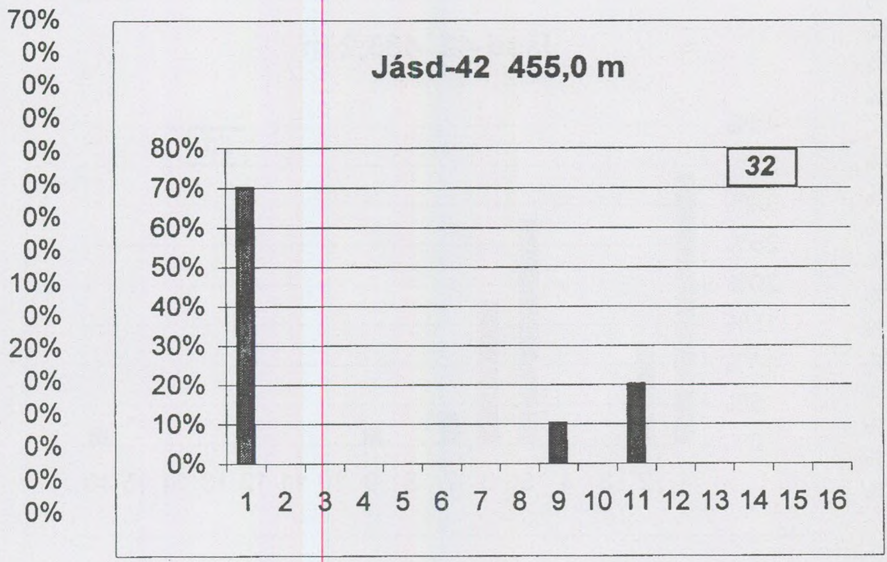


Fig. 33. For caption see Fig. 2.

Plate 1

Figs 1-6. *Cytherella ovata* (ROEMER, 1841) s. l.

Figs 1-4. Lower Cenomanian; fig. 5. Upper Vraconian, fig. 6. Lower Vraconian

Fig. 1. Carapace from the left valve. Jásd 42 borehole 185.4 m. 82 ×
Fig. 2. Right valve. Jásd 42 borehole 197.0 m. 63 ×
Fig. 3. Carapace from the left valve. Jásd 42 borehole 267.0 m. 76 ×
Fig. 4. Carapace from the left valve. Jásd 42 borehole 269.0 m. 68 ×
Fig. 5. Carapace from the left valve. Jásd 42 borehole 351.0 m. 87 ×
Fig. 6. Carapace from the left valve. Jásd 1 outcrop, bed No 13. 66 ×

Figs 7-8. *Cytherella parallela* (REUSS, 1845) s. l. Lower Cenomanian.

Fig. 7. Carapace from the left valve. Jásd 42 borehole 263.0 m. 68 ×
Fig. 8. Carapace from the left valve. Jásd 42 borehole 293.0 m. 87 ×

Plate 1

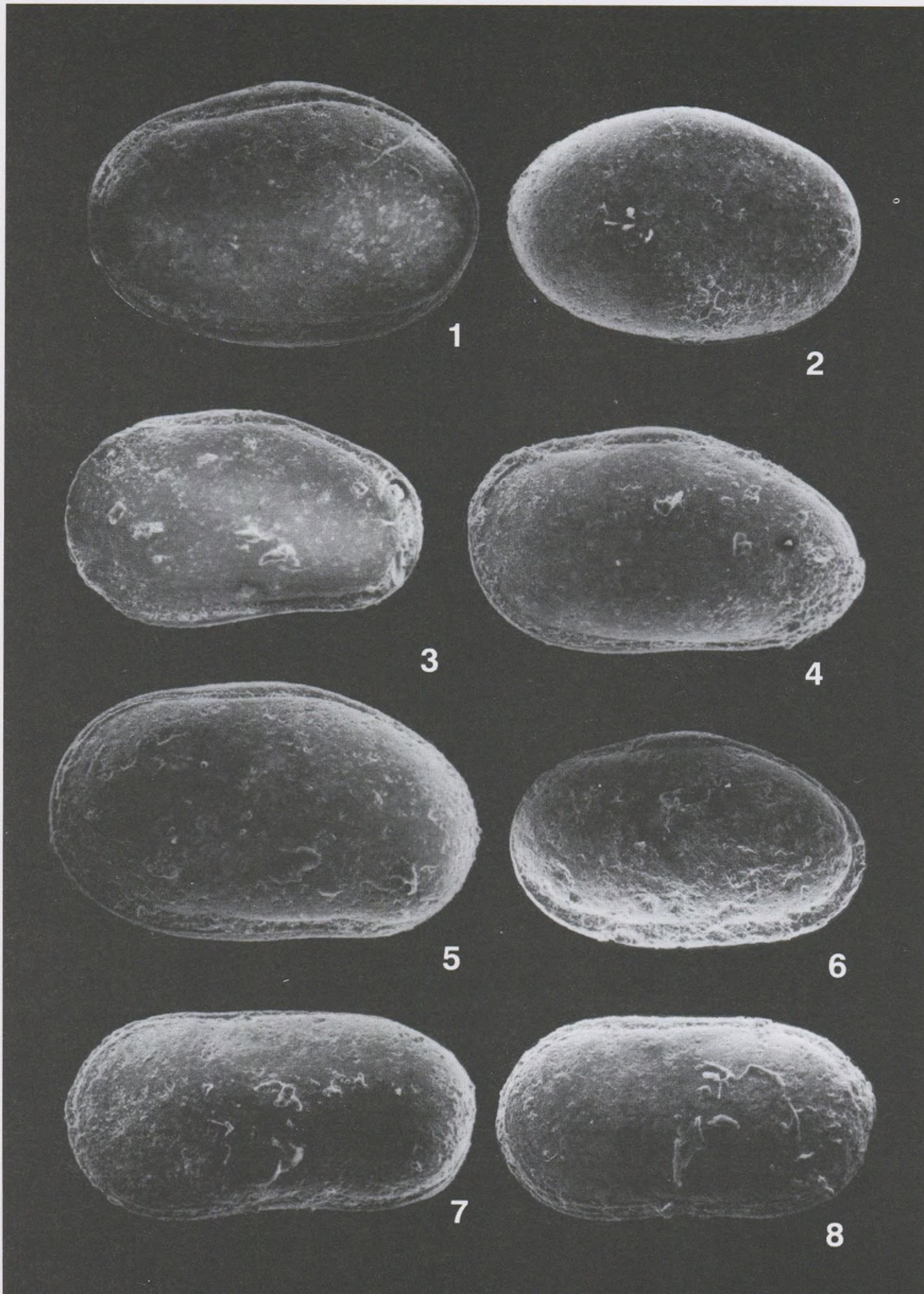


Plate 2

Figs 1-2. *Cytherella parallela* (REUSS, 1845) s. l.

Fig. 1. Upper Vraconian, Fig. 2. Lower Vraconian
Fig. 1. Carapace from the left valve. Jásd 42 borehole 421.4 m. 79 ×
Fig. 2. Right valve. Jásd-1 outcrop, bed No 13. 68 ×

Fig. 3. *Cytherelloidea* ex gr. *stricta* (JONES et HINDE, 1890). Lower Cenomanian. Right valve. Jásd 42 borehole 197.0 m. 93 ×

Figs 4-5. *Cardobairdia* cf. *minuta* (VAN VEEN, 1936) Lower Cenomanian

Fig. 4. Carapace from the right valve. Jásd 42 borehole 259.0 m. 117 ×
Fig. 5. Carapace from the right valve. Jásd 42 borehole 279.0 m. 109 ×

Figs 6-8. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) s. l. Upper Vraconian.

Fig. 6. Left valve. Jásd 42 borehole 345.0 m. 65 ×
Fig. 7. Carapace from the right valve. Jásd 42 borehole 347.0 m. 65 ×
Fig. 8. Carapace from the right valve. Jásd 42 borehole 401.0 m.

Plate 2

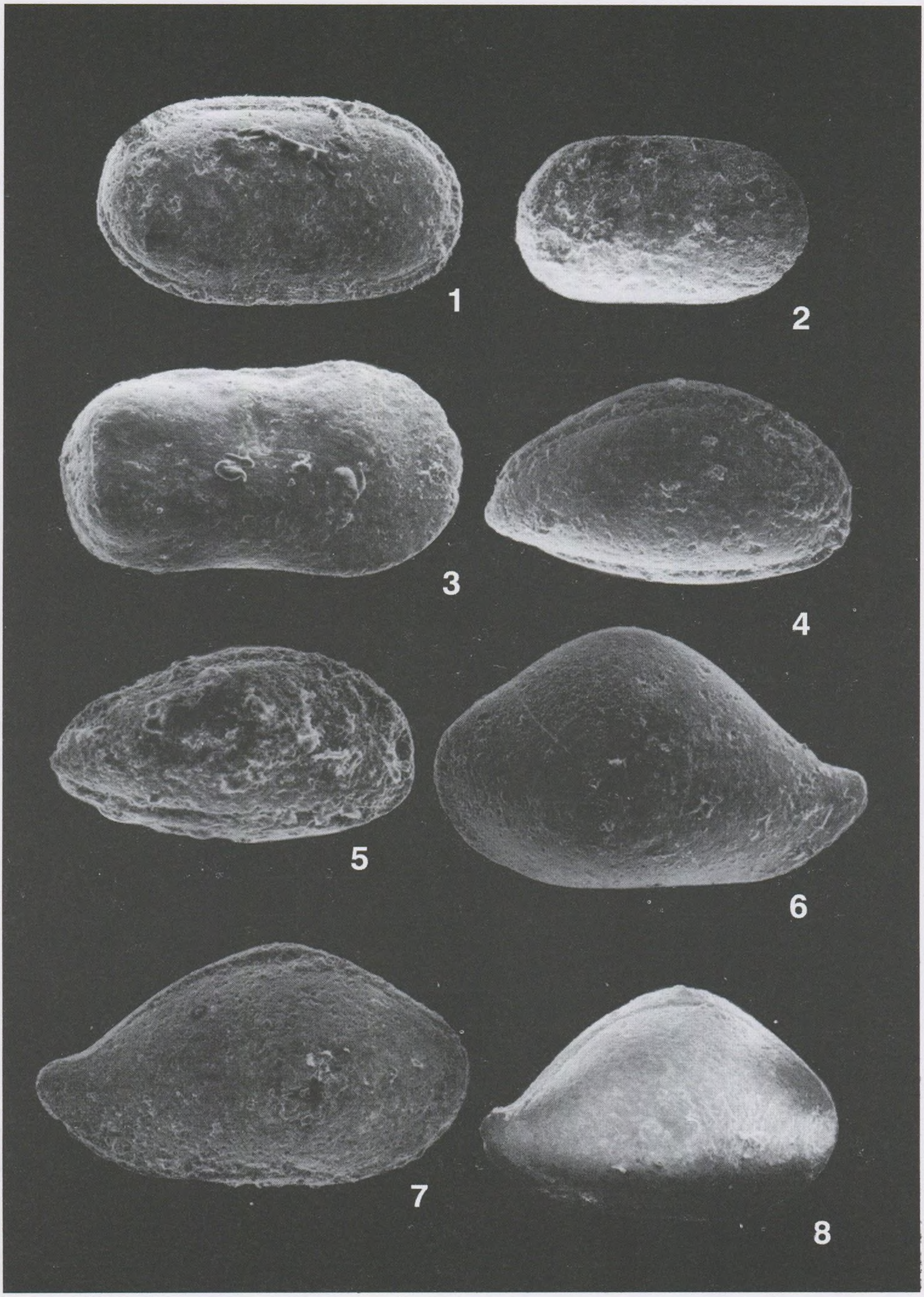


Plate 3

Fig. 1. *Bairdia pseudoseptentrionalis* (MERTENS, 1956) s. l. Lower Vraconian. Left valve. Jásd 42 borehole 433.2 m. 52 ×

Figs 2-8. *Schulerideea jonesiana* (BOSQUET, 1852) s. l. Fig. 2. Middle Cenomanian, Figs 3-6. Lower Cenomanian, Fig. 7. Upper Vraconian, Fig. 8. Lower Vraconian.

Fig. 2. Inner side of the right valve. Jásd 42 borehole 57.0 m. 98 ×
Fig. 3. Carapace from the right valve. Jásd 42 borehole 203.0 m. 68 ×
Fig. 4. Left valve. Jásd 42 borehole 203.0 m. 69 ×
Fig. 5. Carapace from the right valve. Jásd 42 borehole 203.0 m. 60 ×
Fig. 6. Carapace from the right valve. Jásd 42 borehole 293.0 m. 60 ×
Fig. 7. Left valve. Jásd 42 borehole 369.4 m. 60 ×
Fig. 8. Carapace from the right valve. Jásd 1 outcrop, bed No 21. 65 ×

Plate 3

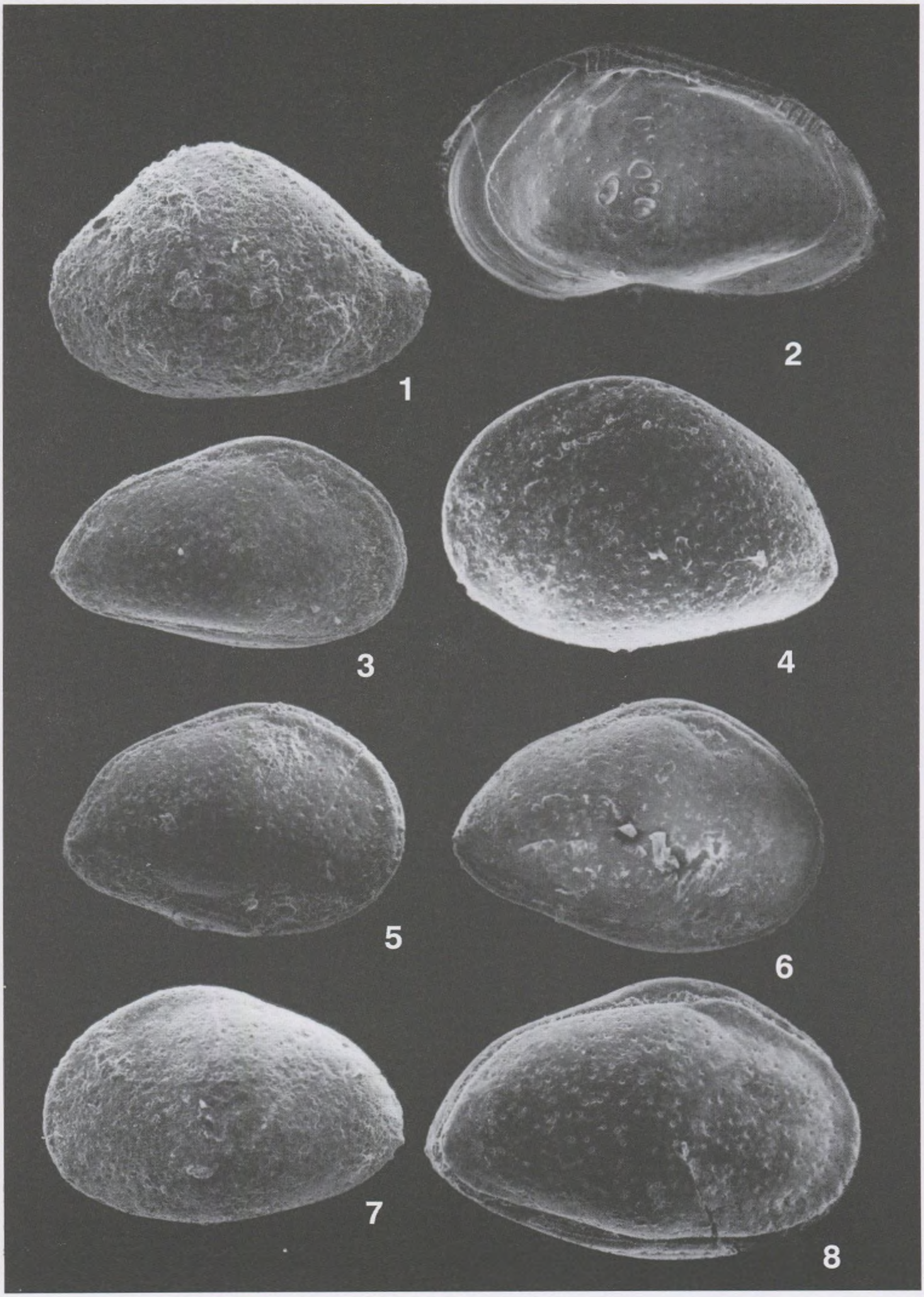


Plate 4

Fig. 1. *Schuleridea jonesiana* (BOSQUET, 1852) s. l. Lower Vraconian. Carapace from the right valve. Jásd 1 outcrop, bed No 21. 50 ×

Figs. 2-8. *Neocythere vanveeni* Mertens, 1956 s. l.

Figs 2-6. Lower Cenomanian, FIGS 7-8 Upper Vraconian.
Figs 2-3. Left valves. Jásd 42 borehole 259.0 m. 79 × and 88 ×
Fig. 4. Right valve. Jásd 42 borehole 287.0 m 77 ×
Fig. 5. Left valve. Jásd 42 borehole 293.0 m. 77 ×
Fig. 6. Left valve. Jásd 42 borehole 335.2 m. 8 ×
Fig. 7. Carapace from the right valve.Jásd 42 borehole 359.0 m. 82 ×
Fig. 8. Left valve.Jásd 42 borehole 365.0 m. 77 ×

Plate 4

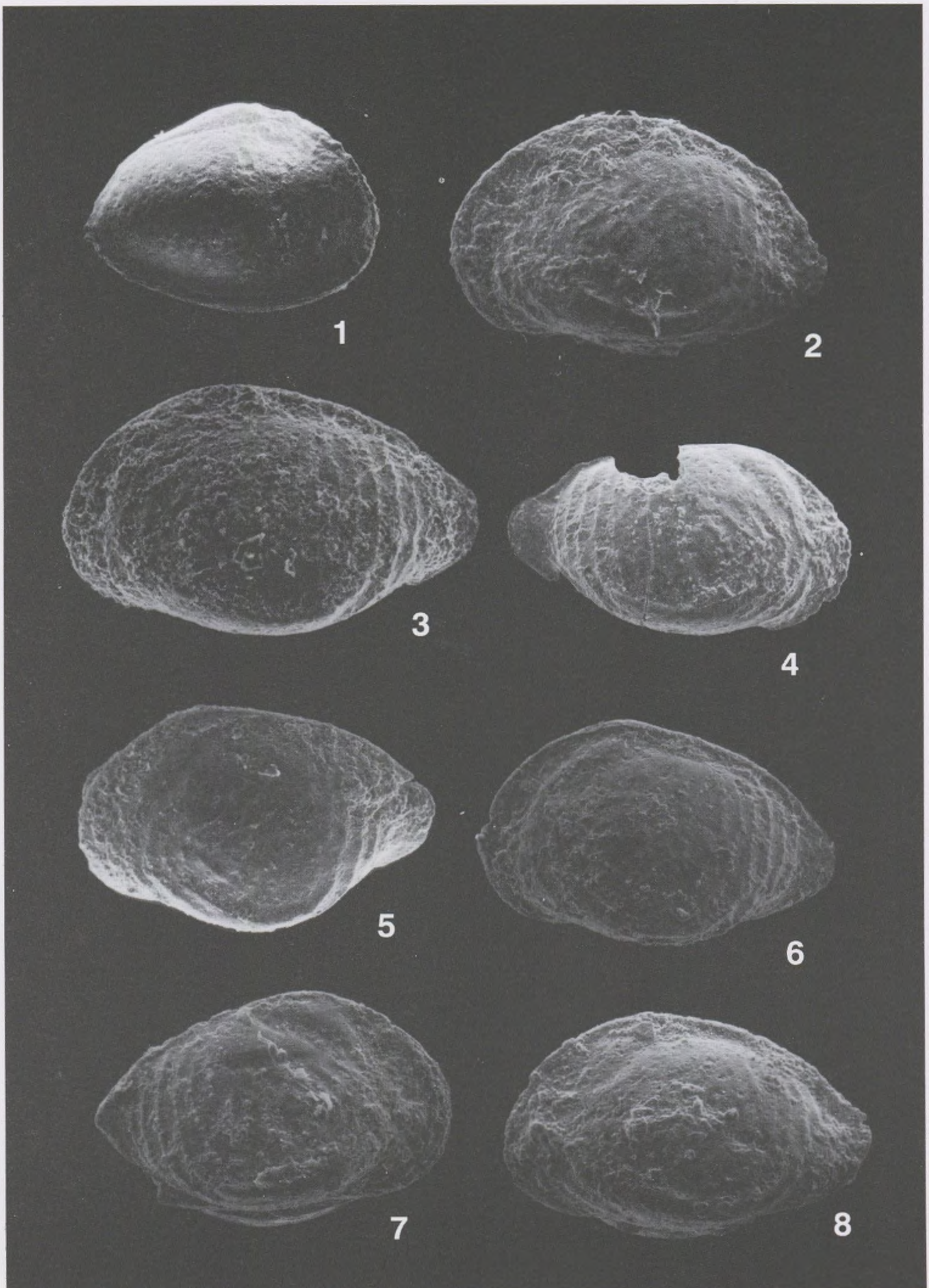


Plate 5

Fig. 1. *Neocythere vanveeni* MERTENS,1956 s. l. Upper Vraconian. Carapace from the right valve. Jásd 42 borehole 389.0 m. 77 ×

Figs. 2-7. *Cythereis* cf. *lerata* GRÜNDEL, 1966. Figs 2-5. Lower Cenomanian, Figs 6-7. Lower Vraconian.

Fig. 2. Carapace from the left valve. Jásd 42 borehole 127.0 m. 77 ×
Fig. 3. Carapace from the left valve. Jásd 42 borehole 203.0 m. 79 ×
Fig. 4. Carapace from the left valve. Jásd 42 borehole 215.0 m. 88 ×
Fig. 5. Carapace from the right valve. Jásd 42 borehole 269.0 m. 82 ×
Fig. 6. Carapace from the right valve. Jásd 42 borehole 444.8 m. 88 ×
Fig. 7. Carapace from the right valve. Jásd 1 outcrop, bed No 9. 97 ×

Plate 5

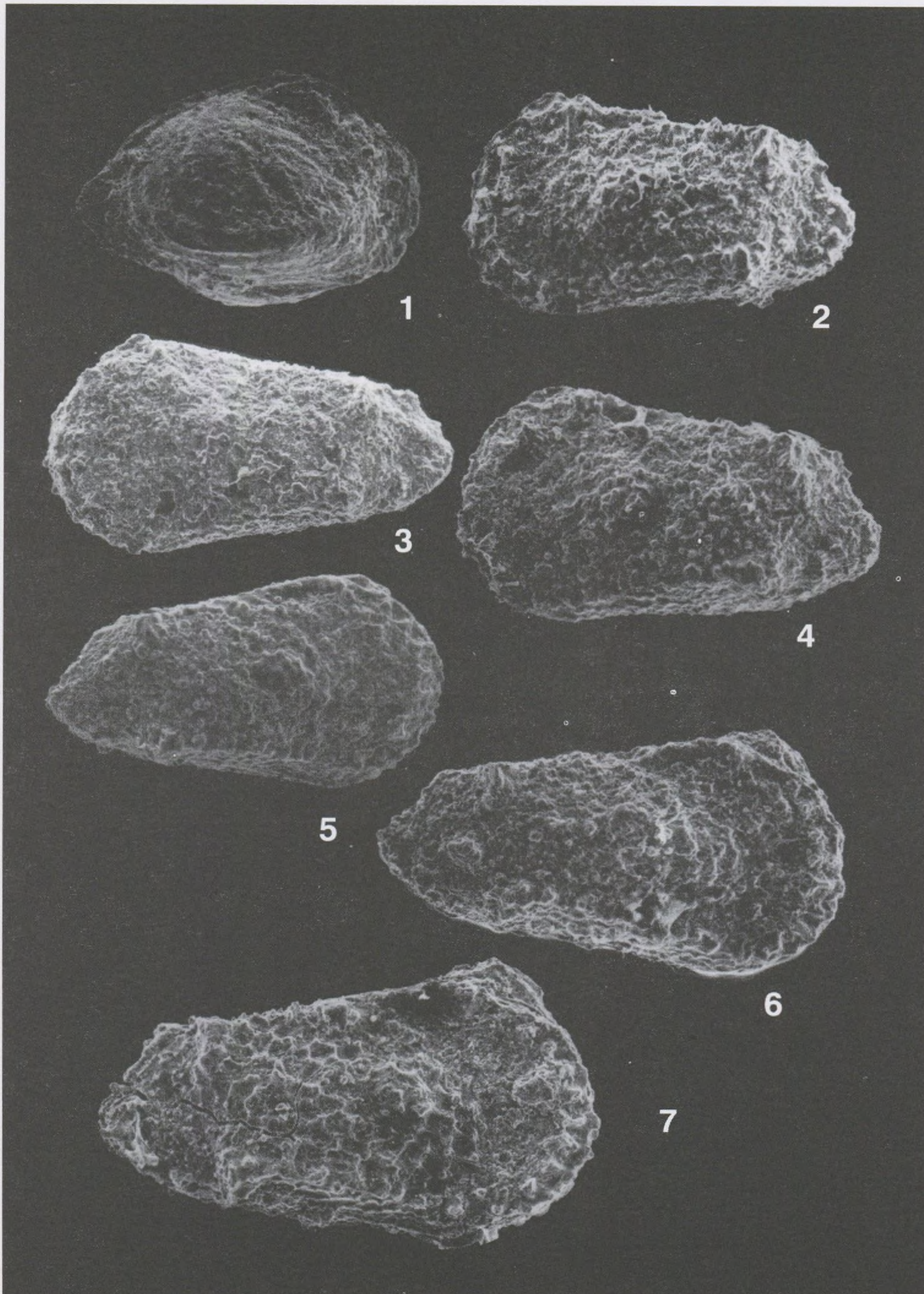


Plate 6

Figs 1-5. *Rehacythereis glabrella* (TRIEBEL, 1940) s. l. Figs 1-3. Lower Cenomanian, Figs 4-5. Upper Vraconian.

Fig. 1. Carapace from the left valve. Jásd 42 borehole 161.0 m. 75 ×
Fig. 2. Carapace from the left valve. Jásd 42 borehole 197.0 m. 72 ×
Fig. 3. Carapace from the left valve. Jásd 42 borehole 287.0 m. 66 ×
Fig. 4. Carapace from the right valve. Jásd 42 borehole 377.0 m. 66 ×
Fig. 5. Carapace from the left valve. Jásd 42 borehole 389.4 m. 64 ×

Figs 6-7. *Rehacythereis reticulata* (JONES et HINDE, 1890) Fig. 6. Upper Vraconian, Fig. 7. Lower Vraconian.

Fig. 6. Carapace from the right valve. Jásd 42 borehole 421.4 m. 83 ×
Fig. 7. Carapace from the left valve. Jásd 42 borehole 444.8 m. 88 ×

Plate 6

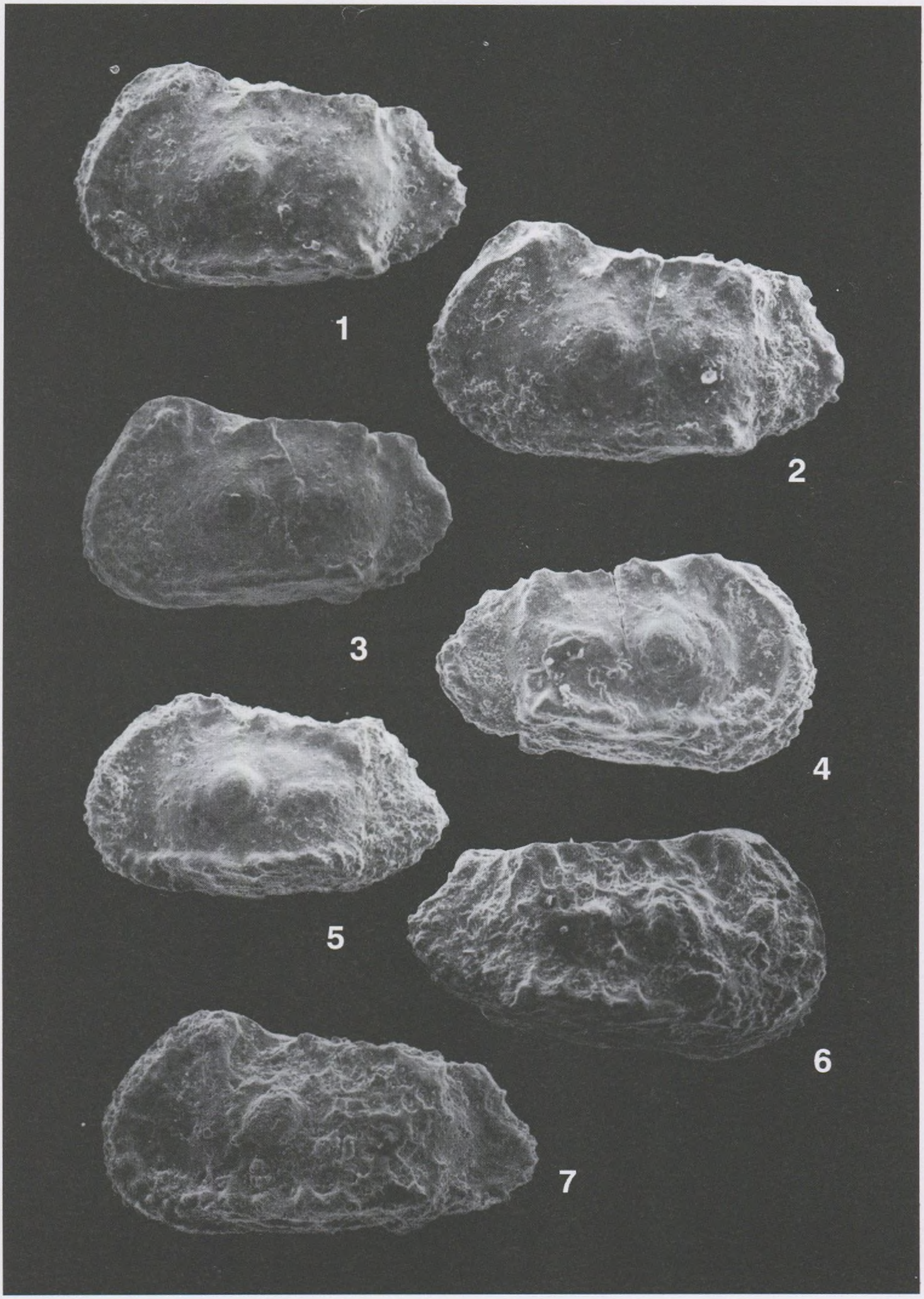


Plate 7

Figs 1-3. *Rehacythereis reticulata* (JONES et HINDE, 1890) Lower Vraconian.
Fig. 1. Carapace from the left valve. Jásd 1 outcrop, bed No 9. 88 ×
Fig. 2. Carapace from the right valve. Jásd 1 outcrop, bed No 17. 88 ×
Fig. 3. Carapace from the right valve. Jásd 1 outcrop, bed No 21. 88 ×

Fig. 4. *Cornicythereis* cf. *bonnemai* (TRIEBEL, 1940) Lower Cenomanian.
Right valve. Jásd 42 borehole 147.0 m. 95 ×

Figs 5-6. *Cornicythereis* ex gr. *gatyensis* (DAMOTTE et GROSDIDIER, 1963).
Middle Cenomanian. Jásd 42 borehole 113.0 m.
Fig. 5. Carapace from the left valve. 123 ×
Fig. 6. Carapace from the right valve. 110 ×

Plate 7

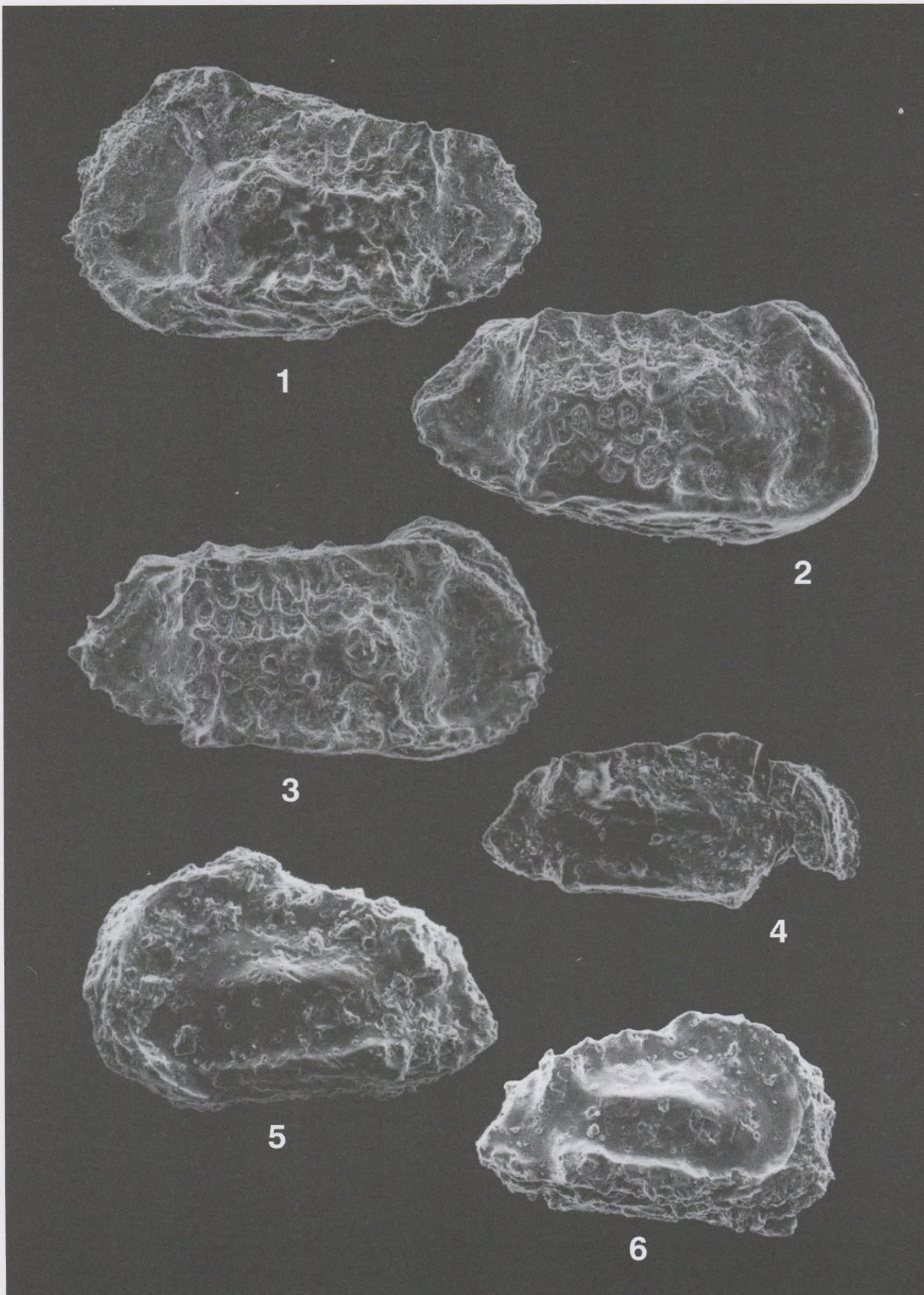


Plate 8

Figs 1-6. *Veeniacythereis* n. sp. aff *V. begudensis* (BABINOT, 1971). Middle Cenomanian.

Fig. 1. Carapace from the right valve. Jásd 42 borehole 6.9 m. 88 ×
Figs 2-4. Jásd 42 borehole 9.0 m.
Fig. 2. Carapace from the left valve. 68 ×
Fig. 3. Carapace from the right valve. 79 ×
Fig. 4. Fragmental right valve. 66 ×
Fig. 5. Fragmental right valve. Jásd 42 borehole 25.0 m. 66 ×
Fig. 6. Carapace from the right valve. Jásd 42 borehole 53.0 m. 66 ×

Fig. 7. *Pontocyprella* n. sp. aff. *P. harrisiana* (JONES, 1849). Lower Cenomanian. Carapace from the right valve. Jásd 42 borehole 215.0 m. 104 ×

Plate 8

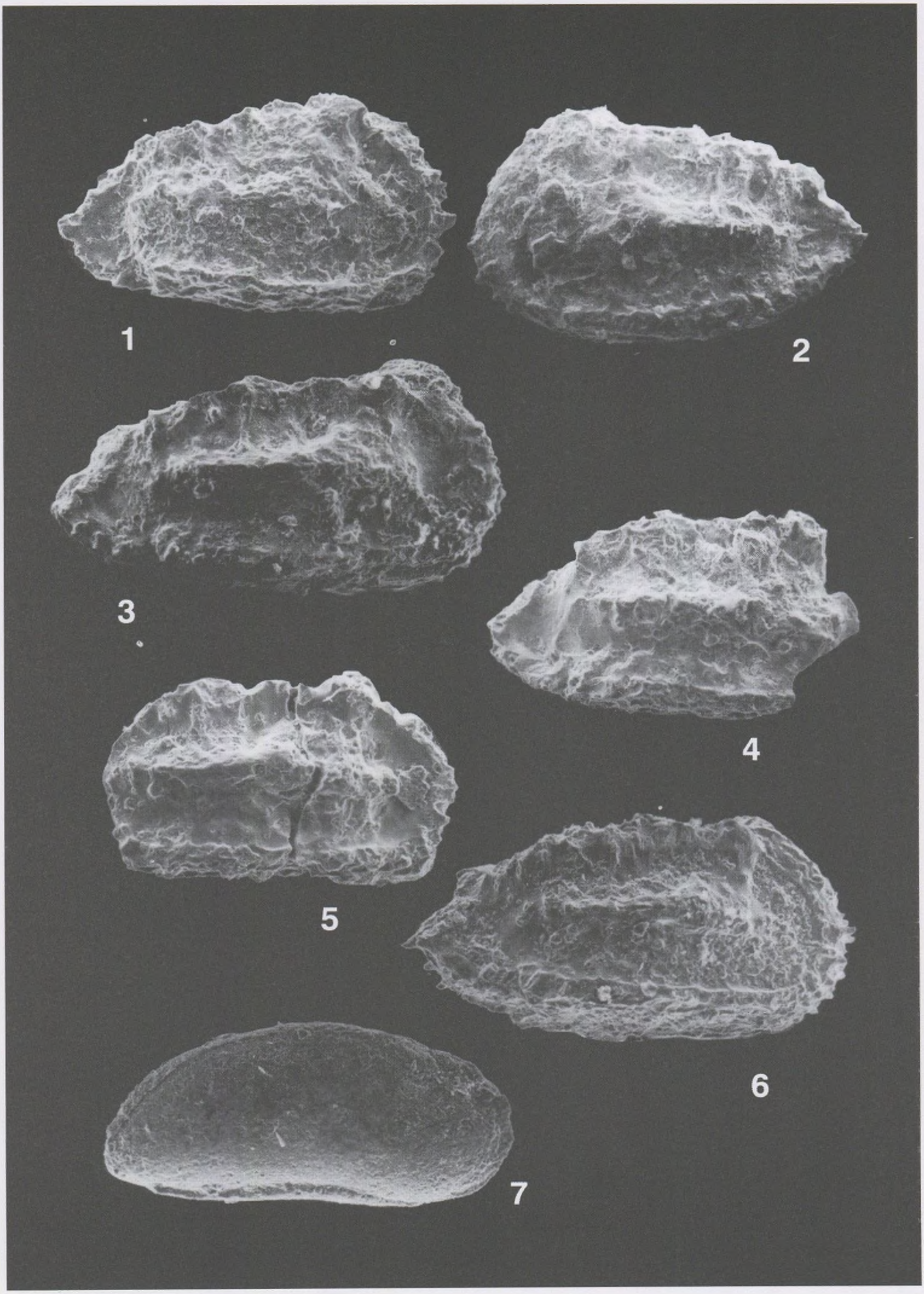


Plate 9

Figs 1-3. *Pontocyprella* n. sp. aff. *P. harrisiana* (Jones, 1849). Lower Cenomanian. Carapaces from the right valve.

Fig. 1. Jásd 42 borehole 293.0 m. 88 ×
Fig. 2. Jásd 42 borehole 311.0 m. 105 ×
Fig. 3. Jásd 42 borehole 335.2 m. 79 ×

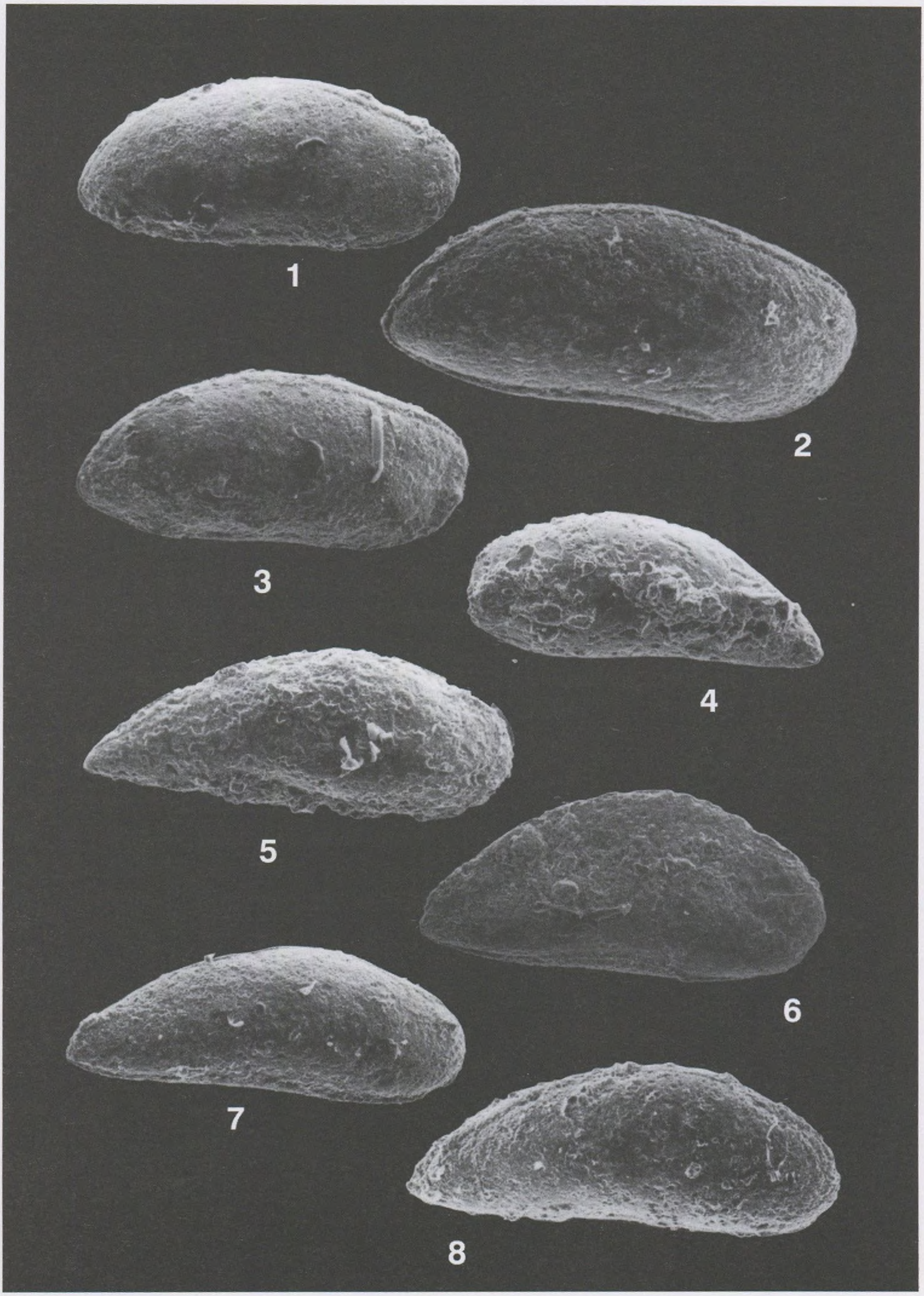
Figs 4-8. *Paracypris* ex gr. *wrothamensis* KAYE, 1965. Figs 4-5. Middle Cenomanian, Figs 6-7. Lower Cenomanian, Fig. 8. Upper Vraconian.

Fig. 4. Carapace from the left valve. Jásd 42 borehole 59.0 m. 72 ×

Figs 5-8. Carapaces from the right valve.

Fig. 5. Jásd 42 borehole 93.0 m. 82 ×
Fig. 6. Jásd 42 borehole 287.0 m. 72 ×
Fig. 7. Jásd 42 borehole 335.2 m. 72 ×
Fig. 8. Jásd 42 borehole 353.0 m. 82 ×

Plate 9



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33, 63-103 (2000) Budapest

Eocene ostracods of Hungary
Systematical part 3
(Cytheracea 3)

M. MONOSTORI[1]

(with 13 plates)

Abstract

This work is the third part of a monograph describing the ostracod fauna of the Eocene sediments of Hungary. It contains the descriptions of the following Cytheracea species: *Schizocythere depressa* (MÉHES, 1936), *Schizocythere* ex gr. *tessellata* (BOSQUET, 1852), *Schizocythere hungarica* MONOSTORI, 1985, *Schizocythere* aff. *hungarica* MONOSTORI, 1985, *Cnestocythere transdanubica* n. sp., *Abyssocythere* ? sp. 1, *Xestoleberis gantensis* MONOSTORI, 1977, *Uroleberis budaensis* n. sp., *Uroleberis parnensis* (APOSTOLESCU, 1955), *Uroleberis striatopunctata* DUCASSE, 1967, *Uroleberis subtrapezida* DUCASSE, 1967, *Uroleberis* sp. 1 and some additions to genera referred in parts 1. and 2. (new occurences or rare forms): *Asperissimocythere perlucida* (MÉHES, 1936), *Cletocythereis* ? *angusticostata* (BOSQUET, 1852), *Grinioneis haidingeri paijenborchiana* (KEIJ, 1957), *Occultocythereis insolita medioventralis* (MONOSTORI, 1985), *Occultocythereis mutabilis abducta* TRIEBEL, 1961, *Occultocythereis* ? cf. n. sp. 1 MONOSTORI, 1998, *Pokornyella* sp. 1, *Pokornyella* sp. 2, *Pokornyella* sp. 3, *Loxoconcha* sp. 1, *Paracytheridea* cf. *grignonensis* (KEIJ, 1957), *Eucytherura* ex gr. *dentata* LIENENKLAUS, 1905, *Eucytherura* sp. 1, *Semicytherura oedelemensis* (KEIJ, 1957), *Semicytherura* aff. *unispinosa* PIETRZENIUK, 1969, *Monoceratina striata* DELTEL, 1964, *Monoceratina* sp. 2. This study was supported by MKM Project 0143/1997.

[1]Department of Palaeontology, Eötvös University, H-1083 Budapest, Ludovika tér 2, Hungary

Systematical part

Cytheracea BAIRD, 1850 superfamilia
Cytheridae BAIRD, 1850 familia
Cytherinae BAIRD, 1850 subfamilia
Schizocytherini MANDELSTAM, 1960 tribus
Schizocythere TRIEBEL, 1950 genus

Schizocythere depressa (MÉHES, 1936)
Pl. 1. f. 1-6, Pl. 2. f. 1-7, Pl. 3. f. 1-2.

1936. *Eucytherura depressa* n. sp. - MÉHES, pp. 25-26., Pl. III., f. 5-8.
1977. *Schizocythere depressa* (MÉHES, 1930) - MONOSTORI, pp. 98-100., Pl. III., f. 1-4.
1985. *Schizocythere depressa* (MÉHES, 1936) - MONOSTORI, pp. 44-46., P. IV , f. 3-16.
1987. *Schizocythere depressa* (MÉHES, 1936) - MONOSTORI, p. 142., Pl. 3., f. 3-4.

Remarks: The revision of species and discussion of intraspecific variation are in MONOSTORI, (1977, 1985).

Dimensions: L = 0.39 - 0.53, H = 0.24 - 0.32, L/H = 1.42 - 1.73

Occurrence: Budapest area: Budakeszi 6 borehole 108.3 - 129.4 m. Cserhát area: Kósd 20 borehole 123.9 - 124.4 m. Dorog area: Bajót, Búzáshegy ravine, beds N° 3, 4, 6, Csolnok 699/b borehole 520.0 - 532.0 m, Csolnok borehole 314.4 - 327.1 m, Esztergom 81 borehole 248.5 - 290.4 m, Nyergesújfalu 31 borehole 193.7 - 300.0 m, Ótokod open pit mine, samples A5 - B9, Tokod 527 borehole 198.4 - 290.0 m. Mány area: Csabdi 74 borehole 260.0 - 297.3 m, Csordakút 113 borehole 297.0 - 364.0 m, Csordakút 115 borehole 292.0 - 408.0 m, Mány 55 borehole 424.0 - 516.0 m, Mesterberek 46 borehole 94.2 - 94.6 m, Mesterberek 68 borehole 186.5 - 206.0 m, Mesterberek 75 borehole 272.5 - 360.0 m, Mesterberek 76 borehole 305.0 - 419.5 m, Mesterberek 78 borehole 375.0 - 385.0 m, Mesterberek 81 borehole 145.0 - 211.0 m, Mesterberek 88 borehole 269.0 - 298.5 m, Mesterberek 118 borehole 308.0 - 396.0 m, Mesterberek 180 borehole 79.5 - 138.5 m, Tabajd 7 borehole 147.0 - 150.8 m. Mór-Tatabánya area: Gánt, Bagoly Hill pit, Mór 16 borehole 82.6 - 86.8 m, Oroszlány 2200 borehole 583.6 - 586.8 m, Oroszlány 2210 borehole 558.0 - 560.2 m, Oroszlány 2274 borehole 525.2 - 530.5 m, Oroszlány 2291 borehole 471.4 m, Oroszlány 2341 borehole 328.8 - 406.7 m, Tarján 8 borehole 235,2 - 256.3 m, Tatabánya 1474 borehole 309.9 - 313.5 m, Tatabánya 1481 borehole 121.7 - 158.8 m, Várgesztes 1 borehole 95.5 - 97.0 m, VS 22 borehole 96.4 - 118.6 m. Bakony area: Dudar, Coal mine.

Material: 5228 carapaces, 189 left valves, 165 right valves.

Stratigraphical range in Hungary: Middle and Upper Eocene (Upper Lutetian - Lower Priabonian).

Schizocythere ex gr. *tessellata* (BOSQUET, 1852)
Pl. 3. f. 3-8., Pl. 4. f. 1-2.

Remarks: Characteristic is the lack of the strenghtening of the antero- and posterodorsal corners and absence of the posteroventral spine compared with *Sch. depressa.* In some beds there are transitional forms to *Sch. depressa,* so this form may be an ecological variation.

Dimensions: L = 0.45 - 0.55, H = 0.31 - 0.37, L/H = 1.52 - 1.70.

Occurrence: Budapest area: Budakeszi 6 borehole 108.3 - 152.7 m. Mór-Tatabánya area: Mór 16 borehole 9.6 – 52.2 m, Oroszlány 2361 borehole 278.6 - 313.0 m, Tatabánya 1481 borehole 285.8 - 286.8 m. Bakony area: Csabrendek 850 borehole 87.2 - 87.8 m, Sümeg, Darvastó pit.

Material: 229 carapaces, 2 left valves, 1 right valve.

Stratigraphical range in Hungary: Middle and Upper Eocene (Lower Lutetian-Lower Priabonian).

Schizocythere hungarica (MONOSTORI, 1985)
Pl. 4., f. 3-6., Pl. 5. f. 1-7., Pl. 6., f. 1-8.

1985. *Cnestocythere hungarica* n. sp. – MONOSTORI, pp. 40-43., Pl. III., f. 9-13., 21-22. Non Pl. III. f. 14-20., Pl. IV. f. 1-2.
1987. *Schizocythere hungarica* n. sp. – MONOSTORI, pp. 141-142., Pl. 2., f. 9-14., Pl. 3., f. 1-2.

Remarks: The species described in MONOSTORI (1985) as Cnestocythere hungarica contains two somewhat homoeomorph species of genera *Cnestocythere* and *Schizocythere* (MONOSTORI, 1987).

The type specimen of *Cnestocythere hungarica* (MONOSTORI, 1985, Pl. III., f. 9.) with his extremely developed ornamentation certainly belongs to the *Schizocythere* genus. Therefore the valid original description for the *Sch. hungarica* is the description of the *Cn. hungarica* in MONOSTORI, 1985. It is necessary to describe the hinge of *Sch. hungarica* in detail and to define the differences its ornamentation from similar *Cnestocythere* species.

The "schizodont" character of the projecting half of the anterior tooth in the right valve and that of the anteromedian tooth in the left valve is weak or absent contrast with other species of the genus. All other hinge elements are comparable in detail with the typical *Schizocythere* hinge.

The ornamentation of the species is very close to the *Kangarina tridens* DELTEL, 1964 in DUCASSE et al., 1985., but the genus *Kangarina* has a very special, different hinge structure.

The difference of the ornamentation of *Sch. hungarica* from the similar *Cnestocythere* are the strong and wide posterodorsal and posteroventral spines going beyond the ventral and dorsal outlines, the sharp ridges bordering them and protruding ornamentation on the subcentral tubercle.

The degree of difference betwen *Cn. hungarica* and *Sch. hungarica* varies in the material, so without the investigation of the hinge we often can not distinguish the forms exactly (most of the specimens are moderately preserved carapaces). *Sch. hungarica* is a very frequent form, while *Cn. hungarica* is a rather rare one.

Dimensions: L = 0.48 - 0.62 mm, H = 0.31 - 0.39 mm, L/H = 1.50 - 1.69.

Occurrence: Dorog area: Bajót-Búzáshegy ravine, bed N° 1, Csolnok borehole 305.9 - 329.4 m, Csolnok 699/b borehole 517.2 - 518.2 m, Esztergom 81 borehole 271.1 - 279.6 m, Nyergesújfalu 31 borehole 4.5 - 271.1 m, Ótokod pit A8 - B6 beds, Tokod 527 borehole 223.2 - 255.8 m. Mány area: Csordakút 113 borehole 304.0 - 346.0 m, Mány 55 borehole 433.0 - 474.6 m, Mesterberek 75 borehole 279.0 m, Mesterberek 76 borehole 323.0 - 387.0 m, Mesterberek 118 borehole 316.4 - 392.0 m, Mesterberek 180 borehole 80.6 m, Tabajd 6 borehole 76.8 - 148.0 m. Mór-Tatabánya area: Mór 16 borehole 90.8 - 92.2 m, Oroszlány 2210 borehole 564.4 m, Oroszlány 2260 borehole 212.0 - 229.4 m, Oroszlány 2274 borehole 533.2 - 533.7 m, Oroszlány 2370 borehole 610.8 m, Tatabánya 1480 borehole 139.6 - 273.4 m, VS 22 borehole 91.8 - 94.6 m. Bakony area: Dudar coal mine, Somlóvásárhely 1 borehole 546.7 - 551.0 m, Csetény 61 borehole 477.5 m.

Material: about 800 carapaces, 100 right and 100 left valves.

Stratigraphical range in Hungary: Middle and Upper Eocene (Upper Lutetian-Lower Priabonian).

Schizocythere aff. *hungarica* (MONOSTORI, 1985)
Pl. 7., f. 1-3.

Remarks: A few, poorly preserved carapaces. In dorsal view there is no central protuberation of the ornamentation as on the type, but there is a longer, keel like strengthening of the ornamentation to form a two-humped elevation. There are some differences also in the posterior spines and in the reticulation elements. It is perhaps a new species or subspecies derived from *Sch. hungarica*.

Dimensions: L = 0.60 - 0.67 mm, H = 0.36 - 0.44 m, L/H = 1.51 - 1.67.

Occurrence: Budapest area: Budakeszi 6 borehole 129.4 - 152.7 m, Cserhát area: Kósd 20 borehole 115.3 - 117.9 m.

Material: 10 carapaces.

Stratigraphical range in Hungary: Upper Eocene (Lower Priabonian).

Cnestocythere TRIEBEL, 1950 genus

Cnestocythere transdanubica n. sp.
Pl. 7., f. 4-6., Pl. 8., f. 1-7.

1985. *Cnestocythere hungarica* n. sp. - MONOSTORI, pp. 40-43., Pl. III., f. 14-16., 17-20., Pl. IV., f. 1-2. Non Pl. III. f. 9-13., 21-22.
1987. *Cnestocythere hungarica* MONOSTORI, 1985 - MONOSTORI, pp. 140-141., Pl. 2., f. 3-8.

Derivatio nominis: after its occurrence in Transdanubia (Hungaray).

Holotypus: left valve.

Locus typicus: Dudar, coal mine.

Strataum typicum: Upper Lutetian - Bartonian mollusc sand.

Diagnosis: coarsely reticulated form with moderately developed posterodorsal and posteroventral spines and merodont/entomodont hinge.

Description: The description of *Cnestocythere hungarica* prepared from a mixed material of two, nearly homoeomorphic species of genera *Schizocythere* and *Cnestocythere*. The holotype obviously belongs to the genus *Schizocythere*, so it is necessary to describe a new species for the specimens belonging to *Cnestocythere*.

The anterior outline of the left valve is asymmetrically rounded, its dorsal 2/3 is only slightly convex. The dorsal outline is more or less concave, its posterior half composed by the dorsal ridge slightly elevated above the dorsal margine. The posterior outline is acute nearly in the midline, its upper part concave, the lower is straight or hardly concave. The ventral outline is more or less asymmetrically convex. The outline of the right valve is similar.

There is a rough reticulation network on the whole lateral surface with a weak dorsal ridge starting from the distinct eye knob, making a little elevation above the dorsal margin. There is a straight anteromarginal costa near the anterior margin and a ventral keel, composed by three asymmetrically arched ventral costae.

The riblets of the reticulation are more wide (less sharp) on the subcentral area.

The hinge is typical for the genus: elongate crenulate terminal teeth and crenulate median groove in right valve, crenulate terminal sockets and crenulate median bar in the left valve.

Comparison:
The *Cn. transdanubica* has a typical hinge of its genus, while the ornamentation pattern is very similar to that of *Schizocythere hungarica*. There are some differences on the posterior and subcentral part. The typical posterodorsal and posteroventral spines are weak and the projecting part of ornamentation on the subcentral area is practically missing.

Remarks: an interesting problem, treated in Monostori (1987), is the coexistence of two homoeomorphic species of genera *Cnestocythere* and *Schizocythere* in the Eocene beds of Hungary.

This early appearence of the genera as a homoeomorphic species may indicate a neotenic orogin from *Schizocythere*.

Dimensions: L = 0.48 - 0.58 mm, H = 0.31 - 0.38 mm, L/H = 1.55 - 1.71.

Occurrence: Dorog area: Csolnok borehole 305.9 - 329.4 m, Nyergesújfalu 31 borehole 4.5 - 271.1 m, Ótokod pit A8-B6 beds, Tokod 527 borehole 223.2 - 255.8 m. Mány area: Csabdi 74 borehole 294.7 - 295.6 m. Tatabánya area: Tatabánya 1481 borehole 140.3 - 141.2 m. Bakony area: Dudar coal mine, Somlóvásárhely 1 borehole 546.7 - 551.0 m and 835.0 - 837.7 m.

Material: about 300 carapaces and 100 left and right valves.

Stratigraphical range in Hungary: Middle and Upper Eocene (Upper Lutetian - Lower Priabonian).

Trachyleberididae SYLVESTER-BRADLEY, 1948 familia
Trachyleberidinae SYLVESTER-BRADLEY, 1948 subfamilia
Veeniini PURI, 1973 tribus
Abyssocythere BENSON, 1971 genus

Abyssocythere ? sp. 1.
Pl. 9. f. 1.

Remarks: characteristic is the strong dorsal spine row like *A. carpathica* POKORNÝ, 1974. Also similar is the strong keel running parallel with the anterior margin. There is a row of little knobs between this keel and the marginal keel. Irregular dorsal and ventral ridges and reticulation are visible. The posterior end is sometimes more acute than on A. carpatica. The preservation is not good enough to determine the species.

Occurrence. Bakony area: Somlóvásárhely-1 borehole 600.0 - 641.2 m.

Material: 2 carapaces.

Stratigraphical range in Hungary: Middle Eocene (Upper Bartonian).

Xestoleberididae SARS, 1928 familia
Xestoleberis SARS, 1866 genus

Xestoleberis gantensis MONOSTORI, 1977
Pl. 9., f. 2-7., Pl. 10. f. 1-7., Pl. 11., f. 1-4.

1977. *Xestoleberis gantensis* n. sp. - MONOSTORI, pp. 113-115., Pl. IV., f. 14-17.

1985. *Xestoleberis gantensis* MONOSTORI, 1977 - MONOSTORI, pp. 121-124., Pl. XVI., f. 13.
1987. *Xestoleberis gantensis* MONOSTORI, 1977 - MONOSTORI, pp. 158-159., Pl. 7., f. 4., 8-11.

Remarks: Most similar form is *X. convexa* DELTEL, 1961 (from Stampien de Gass). The *X. gantensis* is a more angular form, the posterodorsal part of the dorsal outline is usually nearly parallel with the ventral outline. There are some problems with "instar" forms (see MONOSTORI, 1977, p. 115., 1985., p. 124,., 1987., p. 159). These variable and mostly elongated small, thin shelled specimens usually are found together with the typical "large" specimens of the species, but we have some samples with "instars" only. Unusual is the great amount of the "instars": ~ 75 % of the total number of specimens. The accidental of appearance separated instars may be explained by mechanical separation of sediment on the sea floor. Between the small forms there are also short specimens similar to typical "big" (adult) forms. These circumstances point rather to a single species, but the small elongated form may be also a separate species and not a late "instar" of the *gantensis*.

Dimensions:

Adults: L = 0.50 - 0.67 mm, H = 0.32 - 0.48 mm, L/H = 1.34 - 1.67.

Instars: L = 0.25 - 0.50 mm, H = 0.15 - 0.27 mm, L/H = 1.50 - 1.68.

Occurrence: Budapest area: Pusztaszeri út, outcrop, samples N° 1, 2, 3, 5, 10, 20, 21, 22, 24, 26, 27, Kiscell-1 borehole 91.5 m, Budapest, SzOT-1 borehole 7.0 m, SzOT-4 borehole 54.0, SzOT-6 borehole 6.0 m, 10.8 m. Budakeszi-6 borehole 114.5 - 152.2 m. Cserhát area: Kósd 20 borehole 123.9 - 124.4 m. Dorog area: Ótokod pit, samples A1, A9 - 10, Tokod 527 borehole 210.2 - 254.7 m, Csolnok borehole 301.0 - 329.4 m, Esztergom 81 borehole 254.4 - 279.6 m, Nyergesújfalu 31 borehole 199.5 - 290.6 m. Mány area: Csabdi 74 borehole 260.0 - 297.6 m, Csordakút 113 borehole 293.0 - 369.0 m, Csordakút 115 borehole 296.0 - 427.0 m, Mány 55 borehole 424.0 - 509.0 m, Mesterberek 68 borehole 184.0 m, Mesterberek 75 borehole 272.5 - 368.0 m, Mesterberek 76 borehole 288.2 - 411.7 m, Mesterberek 78 borehole 371.0 - 385.0 m, Mesterberek 81 borehole 108.0 - 210.0 m, Mesterberek 88 borehole 284.4 m, Mesterberek 118 borehole 368.0 - 392.0 m, Mesterberek 180 borehole 68.0 - 149.2 m, Tabajd 6 borehole 76.8 - 148.0 m, Tabajd-7 borehole 144.8 - 150.8 m. Mór-Tatabánya area: Mór 16 borehole 82.6 - 92.2 m, Oroszlány 2210 borehole 564.4 m, Oroszlány 2361 borehole 287.3 - 327.0 m, Tatabánya 1474 borehole 322,9 - 323.4 m, Tatabánya 1481 borehole 111.3 - 286.8 m, Várgesztes 1 borehole 95.5 - 100.7 m, Tarján 8 borehole 247.6 - 256.5 m, Gánt, bauxite pit. Bakony area: Somlóvásárhely 1 borehole 835.0 m, Dudar coal mine.

Material: 3945 carapaces, 96 right valves, 95 left valves, ~ 75 % "instar" (see remarks).

Stratigraphical range in Hungary: Middle and Upper Eocene (Upper Lutetian - Upper Priabonian).

Uroleberis TRIEBEL, 1958 genus

Uroleberis budaensis n. sp.
Pl. 11., f. 5-8., Pl. 12., f. 1-3.

1985a. *Uroleberis odessensis* SCHEREMETA, 1969 - MONOSTORI, pp. 212-213, Pl. 7., f. 10-13.

Derivatio nominis: after occurrence of the type (Buda-part of Budapest).

Locus typicus: Budapest

Stratum typicum: Pusztaszeri u. sample N° 81/5, Upper Priabonian.

Diagnosis: The ventral outline is mostly straight, sometimes slightly convex or concave. The valves are elongated. The ventral area is always depressed and bordered by a distinct break, often by a keel or even a bar with posterior strengthening. In the depressed area - visible only in ventral view - there are distinct longitudinal wrinkles.

Comparison: *U. odessensis* SCHEREMETA, 1969 believed conspecific with this material by MONOSTORI (1985) is a much more high form.

Remarks: There is a distinct variation of shape even in the same sample from somewhat more triangular to more trapezoidal: dimorphism?

Dimensions: adult carapaces: L = 0.45 - 0.48 mm, H = 0.24 - 0.27 mm, L/H = 1.78 - 1.79.

Occurrence: Bükk area: Noszvaj, Síkfõkút, quarry, sample N° 18. Budapest area: Kiscell-1 borehole, 89.5 m, 100.2 m, 103.5 m, 108.3 m, Pusztaszeri út, outcrop, samples N° 2, 3, 5, 10, 13, 20, 21, 22, 24, 26, 27, Ibolya utca, quarry, 1.2 m, 4.4 m, 7.0 m, SzOT-1 borehole 5.5 m, Várhegy, outcrop. Dorog area: Lábatlan-Nyergesújfalu river wall, sample II/2. Mór-Tatabánya area: Alcsútdoboz-3 borehole 737.0 m, 742.5 m.

Material: 2 right valves, 65 carapaces.

Stratigraphical range in Hungary: Upper Eocene, Priabonian (there are some allochthonous occurrences: Ibolya u. quarry (Lower Oligocene).

There are two specimens belonging to the group of this species without ventral longitudinal winkles in samples borehole Somlóvásárhely-1 (Bakony area), samples 293.4 and 599.2 m (Uppermost Bartonian, near the Bartonian/Priabonian boundary (Pl. 12., f. 3.).

Uroleberis parnensis (APOSTOLESCU, 1955)
Pl. 12., f. 4.

1955. *Eocytheropteron parnensis* n. sp. - APOSTOLESCU, p. 259., Pl. IV., f. 66-67.

1987. *Uroleberis parnensis* (APOSTOLESCU, 1955) - MONOSTORI, pp. 159-161., Pl. 7., f. 13-15., (cum syn.).

Remarks: The form is less triangular than the type or any of figured specimens in the literature cited. Specimens of SCHEREMETA have a rather different outline, except of the inner-side drawing borrowed from KEIJ (1957) so it may be a different species.

Dimensions: adult left valve: L = 0.57 mm, H = 0.37 mm, L/H = 1.54. Adult right valve: L = 0.53 mm, H = 0.31 mm, L/H = 1.73.

Occurrence: Bakony Area: Dudar, coal mine.

Material: 3 left valves, 4 right valves, 2 instars, 2 fragments.

Stratigraphical distribution without Hungary: France: Middle and Upper Eocene, ? Ukraine: Middle and Upper Eocene.

Stratigraphical range in Hungary: Middle Eocene (Upper Lutetian - Lower Bartonian).

Uroleberis striatopunctata DUCASSE, 1967
Pl. 12., f. 5.

1959. *Eocytheropteron striatopunctatum* n. sp. - DUCASSE, pp. 44-45., Pl. XIX., f. 2a-b.
1961. *Uroleberis striatopunctata* (DUCASSE, 1959) - DELTEL, 1961, p. 137., Pl. 12., f. 209.
1966. *Uroleberis striatopunctata* (DUCASSE, 1959) - MOUSSOU, p. 75., Pl. 21., f. 85a-b.
1967. *Uroleberis striatopunctata* n. sp. - DUCASSE, pp. 61-62., Pl. III. f. 67.
1969. *Uroleberis striatopunctata* DUCASSE - DUCASSE, p. 103., Pl. VII., f. 148.
1971. *Uroleberis striatopunctata* DUCASSE, 1959 - BLONDEAU, p. 97., Pl. X., f. 16.
1973. *Uroleberis striatopunctatum* DUCASSE,1959 - SÖNMEZ-GÖKÇEN, p. 95., Pl. XII., f. 36-37.
1985. *Uroleberis striatopunctata* DUCASSE, 1967 - DUCASSE et al., Pl. 88., f. 3.
1985. *Uroleberis striatopunctata* DUCASSE, 1967 - MONOSTORI, 1985, pp. 124-125., Pl. XVI., f. 4-5.
1985a. *Uroleberis striatopunctata* DUCASSE, 1967 - MONOSTORI, pp. 213-214.
1993. *Uroleberis striatopunctata* DUCASSE - OLLIVIER-PIERRE et al., P.. IV., f. 8.

Remarks: DUCASSE gives a description in her thesis (1959), but the valid "naming" is found in her later article (1967) acording to her opinion (DUCASSE et al., 1985). The figured specimen from the Dorog basin is very close to the type figure (1967). The specimen from Síkfõkút figured in this work has somewhat less narrow anterior part and more straight ventral outline.

Dimensions: adult carapaces: L = 0.50 - 0.55 m, H = 0.32 - 0.39 mm, L/H = 1.41 - 1.56.

Occurrence: Bükk area: Noszvaj, Síkfõkút, quarry sample N° 21. Dorog area: Nyeresújfalu 31 borehole 246.4 - 248.7 m, Lábatlan-Nyergesújfalu river wall sample III/3.

Material: 6 carapaces.

Stratigraphical distribution without Hungary: France: Lower Eocene - Stampian, Turkey: Bartonian.

Stratigraphical range in Hungary: Middle and Upper Eocene (Upper Bartonian - Priabonian).

Uroleberis subtrapezida DUCASSE, 1967
Pl. 12., f. 6-7.

1967. *Uroleberis subtrapezidus* n. sp. - DUCASSE, pp. Pl. III., f. 65-66.
1969. *Uroleberis subtrapezida* DUCASSE, 1967 - DUCASSE, pp. 103-104., Pl. VII., f. 149.
1985. *Uroleberis subtrapezida* DUCASSE, 1967 - DUCASSE et al., Pl. 88., f. 6.

Description: The dorsal outline is nearly trapezoidal, asymmetrical, the anterior and posterior outlines are asymmetrically rounded, the ventral outline is nearly straight, a little sinuous. There are some longitudinal wrinkles on the bended ventral surface visible only in ventral view. The surface of the carapace is covered by pits being rather large centrally and small around the margin and on posterior and anterior parts.

Remarks: Our forms are most similar to the specimen figured by Ducasse et al. (1985).

Dimensions: L = 0.55, H = 0.32, L/H = 1.72, W = 0.35.

Occurrence: Bakony area: Somlóvásárhely-1 borehole 546.7 - 551.0 m.

Material: 2 carapaces.

Stratigraphical distribution without Hungary: France, Uppper Eocene.

Stratigraphical range in Hungary: Upper Eocene (Lower Priabonian).

Uroleberis sp. 1.
Pl. 13., f. 1.

Remarks: elongated and densely pitted form with distinct ventral swelling. The specimen is incomplete.

Occurrence: Bakony area: Somlóvásárhely 1 borehole 551.0 m.

Material: 1 carapace.

Stratigraphical range in Hungary: Upper Eocene (Lower Priabonian).

Addition to Cytheracea

New occurrences of form described in parts 1, 2 and some rare new forms of discussed genera.

Asperissimocythere perlucida (MÉHES, 1936)

Occurrence: Cserhát area: Kósd 20 borehole 144.5 - 147.3 m. Dorog area: Nyergesújfalu 31 borehole 232.5 - 234.5 m.

Middle and Upper Eocene (Upper Bartonien - Lower Priabonian).

Cletocythereis ? *angusticostata* (BOSQUET, 1852)

Occurrence: Somlóvásárhely 1 borehole 546.7 m. Upper Eocene (Lower Priabonian), 1 carapace.

Grinioneis haidingeri paijenborchiana (KEIJ, 1957)

Remarks: The "spongeous type of reticulation (extended upper surface of reticulation-walls) is very strong.

Occurrence: Bakony area: Bakonyszentkirály 4 borehole, 437.0 m, Middle Eocene (Upper Lutetian – Lower Bartonian).

Occultocythereis insolita mediaventralis (MONOSTORI, 1985)

Occurrence: Budapest area: Kósd 20 borehole 117.9 – 121.2 m (Upper Eocene: Lower Priabonian). 1 carapace.

Occultocythereis mutabilis adducta TRIEBEL, 1961

Occurrence: Dorog area: Bajót-Búzáshegy ravine, sample 5. Middle Eocene (Bartonian). 1 carapace.

Occultocythereis ? cf. n. sp. 1 MONOSTORI, 1998

Occurrence: Budapest area: Ibolya street quarry, 7.9 m. (Lowermost Oligocene with reworked Eocene material). 1 carapace.

Pokornyella sp. 1
Pl. 13., f. 2.

Poorly preserved specimen with rough reticulation without visible details.

Occurrence: Budapest area: Budakeszi 6 borehole 127.9 – 129.4 m. Upper Eocene (Lower Priabonian). 1 carapace.

Pokornyella sp. 2.
Pl. 13., f. 3.

Remarks: Poorly preserved specimen with very truncate posterior end, with rough reticulation (rather pits in the middle of valves). There are sharpe ventral ridges.

Occurrence: Budapest area: Solymár, Várerdőhegy. Upper Eocene (Upper Priabonian). 1 carapace.

Pokornyella sp. 3.
Pl. 13., f. 4.

Remarks: The shape is similar to ? *P. lattorfiana* (LIENENKLAUS, 1900) (MONOSTORI, 1998), but the reticulation is more fine and it is not so much sharp. The preservation is poor.

Occurrence: Bakony area: Somlóvásárhely 1 borehole 836.8 m. Middle Eocene (Lutetian). 1 carapace.

Loxoconcha sp. 1
Pl. 13., f. 5.

Remarks: The dorsal outline is somewhat arcuate and converge even on his anterior part with the ventral outline. The punctuation of surface much more dense and fine as that of the *L. inculta* MONOSTORI, 1985.

Occurrence: Mány area: Csabdi 74 borehole 315.5 - 317.0 m. Middle Eocene (Bartonian). 1 carapace.

Paracytheridea cf. *grignonensis* (KEIJ, 1957)

Poorly preserved specimen.

Occurrence: Mór-Tatabánya area: Mór 16 borehole 55.7 - 57.2 m. Middle Eocene (Bartonian). 1 carapace.

Eucytherura ex gr. *dentata* LIENENKLAUS, 1905

Occurrence: Budapest area: Budapest, Várhegy outcrop. Uppermost Eocene (Upper Priabonian. 1 carapace.

Eucytherura sp. 1
Pl. 13., f. 6.

Remarks: Stronge reticulation with equal large pits and strong arterior transversal ridge. The form is damaged.
Occurrence: Mány area: Mesterberek 180 borehole 126.3 - 127.6 m. Middle Eocene (Bartonian). 1 carapace.

Semicytherura oedelemensis (KEIJ, 1957)

Occurrence: Dorog area: Nyergesújfalu 31 borehole 268.0 - 269.5 m. Middle Eocene (Bartonian). 1 carapace.

Semicytherura aff. *unispinosa* PIETRZENIUK, 1969

Occurrence: Dorog area: Csabdi 74 borehole 276.2 - 279.6 m. Mány area: Mesterberek 76 borehole 369.0 m. Mány 55 borehole 434.0 m. Middle Eocene (Bartonian). 3 carapaces.

Monoceratina striata DELTEL, 1964
Pl. 13., f. 7.

Occurrence: Dorog area: Csolnok 699/b borehole 576.5 - 587.5 m, Nyergesújfalu 31 borehole 252.5 - 253.5 m. Mány area: Csordakút 113 borehole 294.0 m, Csordakút 115 borehole 304.0 m, Mány 55 borehole 476.8 m. Tatabánya area: Tatabánya 1481 borehole 218.4 - 220.4 m. Middle Eocene (Upper Lutetian - Lower Bartonian), 7 carapaces.

Monoceratina sp. 2
Pl. 13., f. 8.

Poorly preserved specimen with characters typical for *Monoceratina*.
Occurrence: Budapest area: Pusztaszeri street outcrop, sample 2. Upper Eocene (Upper Priabonian). 1 carapace.

References

APOSTOLESCU, V. (1955): Description de quelques ostracodes du Lutétien du Bassin de Paris. – Cahiers Géologie, 28-29., pp. 241-279., Pl. 1-8.

BLONDEAU, M. A. (1971): Contribution a l'etude des ostracodes Eocenes des Bassins de Campbon et de Saffre (Loire-Atlantique). – These de l'Univ. Nantes, pp. 1-157., Pl. 1-17.

BOSQUET, J. (1852): Déscription des Entomostracés fossiles des terrains tertiaires de la France et de la Belgique – Memoires Sav. étrang. Academie Roy. Sci. Belgique, 24., pp. 1-142., Pl. 1-6.

DELTEL, B. (1961): Les Ostracodes du Paléogene moyen et supérieur d'Aquitaine méridionale – These Troisieme Cycle, Université de Bordeaux, N° 95., pp. 1-215., Pl. 1-19.

DELTEL, B. (1964): Noveaux Ostracodes de l'Eocene et l'Oligocene de l'Aquitaine méridionale – Actes Soc. Linnéenne Bordeaux, 100., pp. 127-221., Pl. 1-6.

DUCASSE, O. (1959): Les Ostracodes de l'Eocene du sous-sol bordelais: répartition intérét stratigraphique et paléogéographique – Thése Troisieme Cycle, Univ. Bordeaux, N° 40., pp. 1-132., Pl. 1-28.

DUCASSE, O. (1967): Noveaux Ostracodes de l'Eocene Nordaquitain – Proc. Verb. Soc. Sc. Phys. Natur Bordeaux, (7/2/1967), pp. 1-89., Pl. 1-5.

DUCASSE, O. (1969): Etude micropaléontologique (Ostracodes) de l'Eocene Nord-Aquitain – These Univ. Bordeaux, pp. 1-381., Pl. 1-20.

DUCASSE, O., GUERNET, Cl., et TAMBAREAU, Y. (1985): Paléogene – *In* OERTLI, H. J. (ed.) Atlas des Ostracodes de France. - Bulletines Centre Tech, Explor-Prod. Elf-Aquitain, Mem. 9., pp. 257-311., Pl. 71-89.

KEIJ, A. J. (1957): Eocene and Oligocene Ostracoda of Belgium – Institute Roy. Sci. Nat. Belgique, Mém. 136., pp. 1-210., Pl. 1-26.

LIENENKLAUS, E. (1900): Die Tertiär-Ostracoden des mittleren Nord-Deutschland – Zeitschrift Deutsch. Geol. Gesellschaft, 52., pp. 497-550., Pl. 1-4.

LIENENKLAUS, E. (1905): Die Ostrakoden des Mainzer Tertiärbeckens – Abhandlungen Senckenberg. Naturforsch. Ges. für 1905., pp. 1-67., Pl. 1-4.

MÉHES, Gy. (1936): Die eozänen Ostracoden der Umgebung von Budapest – Geologica Hungarica, ser. Palaeontologica, 12., pp. 1-64., Pl. I-IV.

MONOSTORI, M. (1977): Ostracode fauna from the Eocene of Gánt (Transdanubian Central Mountains, Hungary) – Annales Univ. Sci. Budapestinensis, Sect. Geol., XIX., pp. 75-129., Pl. I-IV.

MONOSTORI, M. (1985): Eocene ostracods from the Dorog Basin (Northern Transdanubia, Hungary) – Akadémiai Kiadó, Budapest, pp. 1-213., Pl. I-XVII.

MONOSTORI, M. (1985a): Ostracods of Eocene/Oligocene boundary profiles – Annales Univ. Sci. Budapestinensis, Sect. Geol., XXV., pp. 161-243., Pl. 1-8.

MONOSTORI, M. (1987): Ostracod fauna and palaeoecology of the Lutetian (Eocene) mollusc sand at Dudar, Hungary – Annales Univ. Sci. Budapestinensis, Sect. Geol., XXVII., pp. 135-183., Pl. 1-7.

MONOSTORI, M. (1998): Eocene ostracods of Hungary. Systematical part 2 (Cytheracea 2) – Hantkeniana 2., pp. 49- 101., Pl. 1-17., Budapest.

MOUSSOU, A. (1966): Contribution a l'étude des Ostracodes de l'Oligocene girondin – These Troisieme Cycle, Univ. Bordeaux, N° 374., pp. 1-218., Pl. 1-33.

OLLIVIER-PIERRE, M. F.; MAUPIN, C.; ESTEOULE-CHOUX et SITTLER, c. S. (1993): Transgression et paleoenvironnement a l'Oligocene en Bretagne (France): Sedimentologie, micropaleontologie, palynologie et palynofacies du Rupelien du Bassin de Rennes – Palaeogeography, Palaeoclimatology, Palaeoecology, 103., 3-4., pp. 223-250.

PIETRZENIUK, E. (1969): Taxonomische und biostratigraphische Untersuchungen an Ostracoden des Eozän 5 im Norden der Deutschen Demokratischen Republik - Paläontologische Abhandlungen, A., IV., 1., pp. 1-162., Pl. I-XXVIII.

POKORNÝ, Vl. (1974): Abyssocythere, a deep-sea ostracode in the Paleogene of Czechoslovakia - Acta Univ. Carol., Geol., 1973., 3., pp. 243-252.

SCHEREMETA, V., G. (1969): Ostracody paleogena Ukrainy-Lvovskij Universitet, Lvov, pp. 1-273., Pl. 1-21.

SÖNMEZ-GÖKÇEN, N. (1973): Etude paleontologique (Ostracodes) et stratigraphique de niveaux du Paleogene du Sud-Est de la Thrace - Publ. Inst. Rech. Min. Turquie (MTA), 147., pp. 1-118., Pl. 1-12.

TRIEBEL, E. (1950): Homöomorphe Ostracoden-Gattungen - Senckenbergiana, 31., 5-6., pp. 313-330.

TRIEBEL, E. (1961): Geschlechts-Dimorphismus und Asymmetrie der Klappen bei der Ostracodengattung Occultocythereis - Senckenbergiana lethaea, 42., ¾., pp. 205-225., Pl. 1-5.

Plate 1

Figs 1-6. *Schizocythere depressa* (MÉHES, 1936).

Fig. 1. Carapace from the right valve. 100x. Mesterberek 76 borehole 358.6 m.

Fig. 2. Carapace from the right valve. 116x. Mesterberek 180 borehole 126.3 - 127.7 m.

Fig. 3. Right valve. 131x. Gánt, Bagolyhegy pit.

Fig. 4. Left valve from inner side. 101x. Oroszlány 2200 borehole 585.8 m.

Fig. 5. Carapace from the dorsal side. 117x. Oroszlány 2210 borehole 558.0 m.

Fig. 6. Carapace from the dorsal side. 115x. Mesterberek 180 borehole 104.8 - 107.0 m.

Figs 1-6. Middle Eocene (Bartonian).

Plate 1

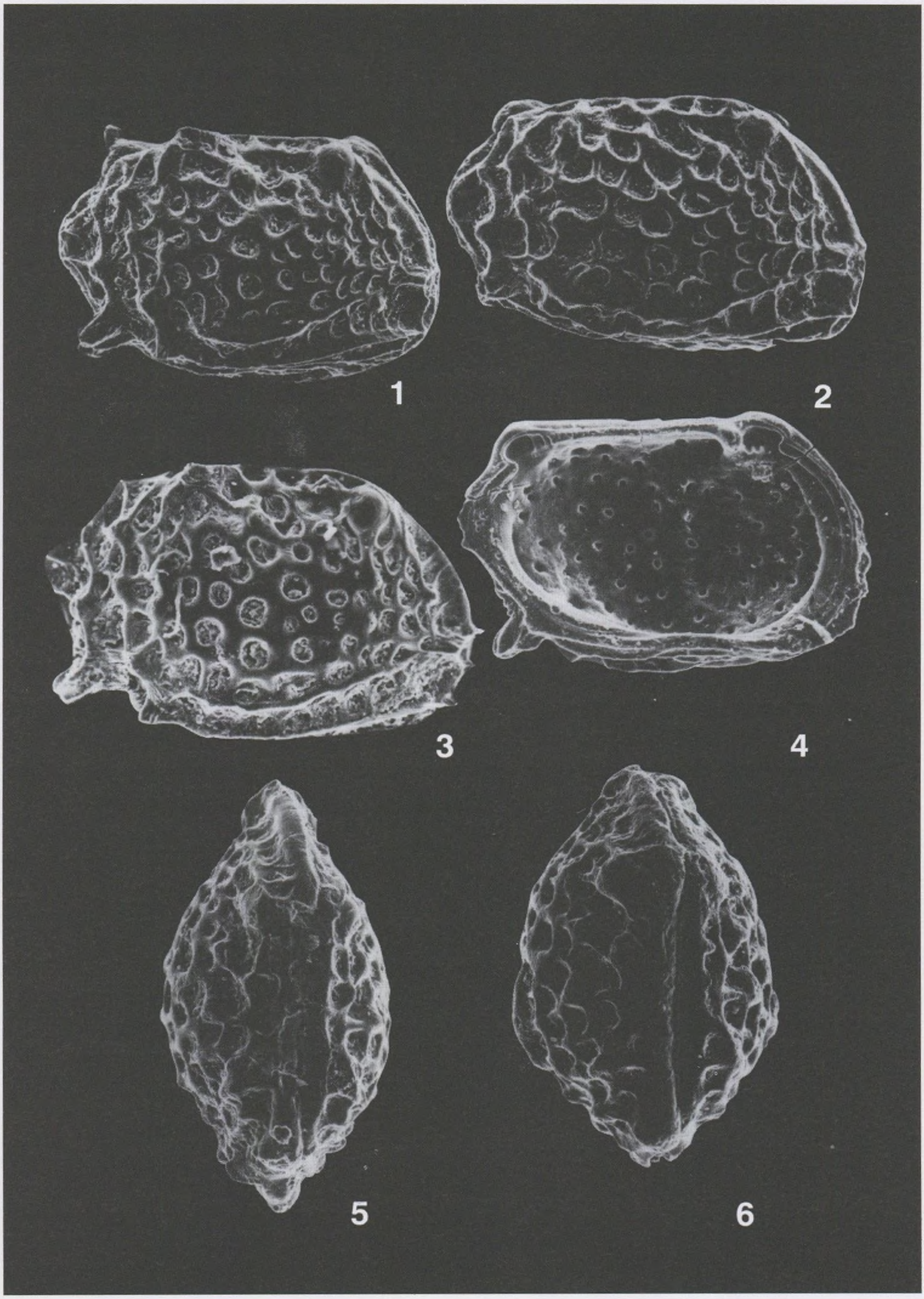


Plate 2

Figs 1-7. *Schizocythere depressa* (Méhes, 1936).

Fig. 1. Carapace from the left valve. 99x. Csordakút 113 borehole 346.0 m.
Fig. 2. Carapace from the left valve. 104x. Mesterberek 118 borehole 358.8 m.
Fig. 3. Carapace from the left valve. 104x. Mór 16 borehole 84.6 – 86.8 m.
Fig. 4. Carapace from the right valve. 92x. Nyergesújfalu 31 borehole 268.0 – 269.5 m.
Fig. 5. Carapace from the left valve. 99x. Budakeszi 6 borehole 114.5 – 116.5 m
Fig. 6. Carapace from the dorsal side. 104x. Nyergesújfalu 31 borehole 261.6 – 264.0 m.
Fig. 7. Carapace from the left valve. 104x. Nyergesújfalu 31 borehole 246.4 – 248.7 m.

Figs 1-4., 6-7. Middle Eocene (Bartonian).
Fig. 5. Upper Eocene (Lower Priabonian).

Plate 2

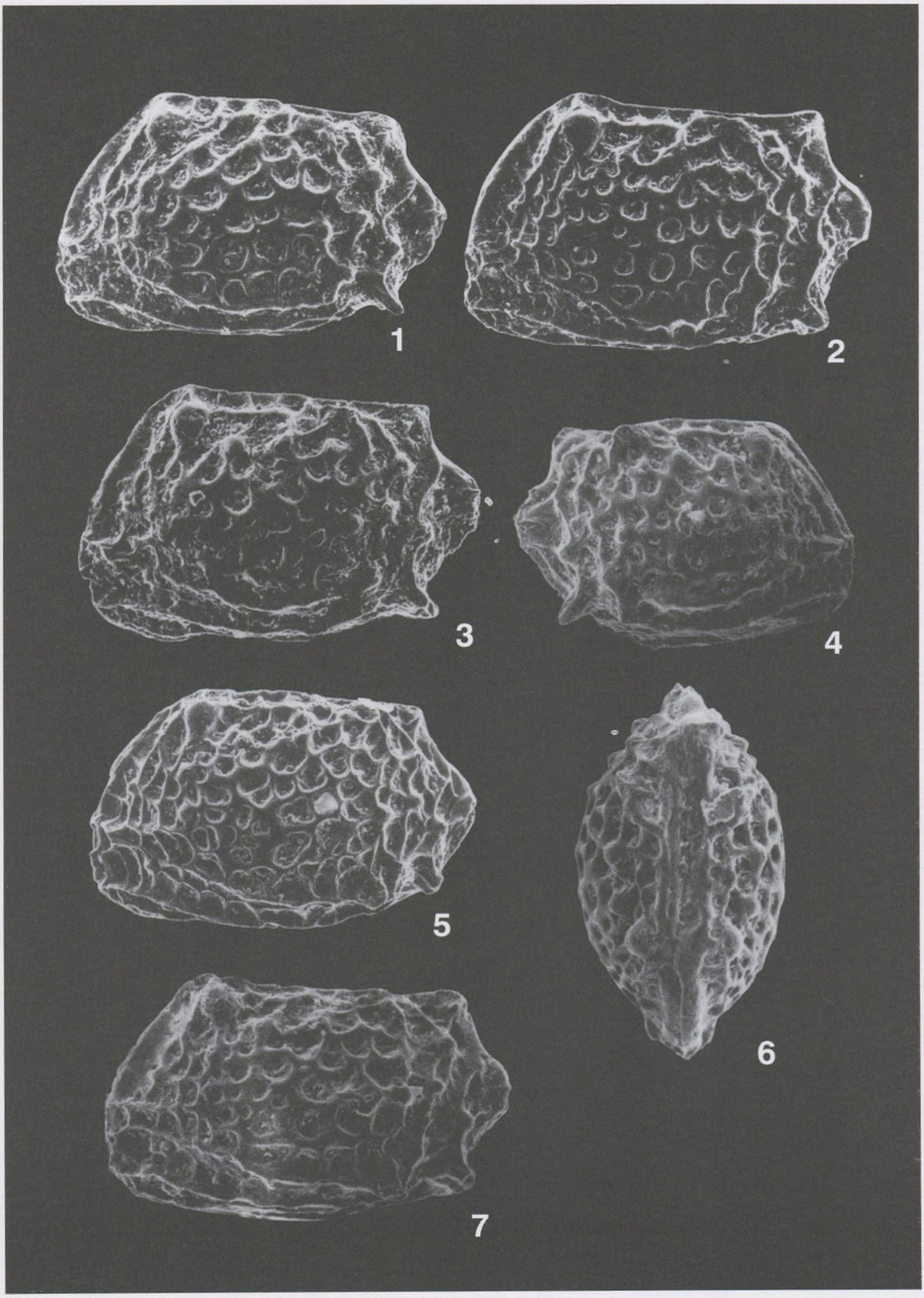


Plate 3

Figs 1-2. *Schizocythere depressa* (Méhes, 1936).

Fig. 1. Left valve from the inner side. 104x. Nyergesújfalu 31 borehole 290.0 - 290.6 m.
Fig. 2. Carapace from the left valve. 74x. Tokod 527 borehole 238.8 - 241.3 m.

Figs 1-2. Middle Eocene (Bartonian).

Figs 3-8. *Schizocythere* ex gr. *tessellata* (BOSQUET, 1852).

Fig. 3. Carapace from the left valve. 99x. Sümeg, Darvastó pit. Middle Eocene (Lower Lutetian).
Fig. 4. Carapace from the left valve. 122x. Dudar, coal mine.
Fig. 5. Carapace from the right valve. 112x. Mór 16 borehole 50.1 - 52.2 m.
Fig. 6. Carapace from the left valve. 104x. Oroszlány 2361 borehole 309.2 m.
Fig. 7. Carapace from the right valve. 104x. Oroszlány 2361 borehole 309.2 m.
Fig. 8. Carapace from the right valve. 108x. Oroszlány 2361 borehole 287.3 m.

Figs 4-8. Middle Eocene (Upper Lutetian-Bartonian).

Plate 3

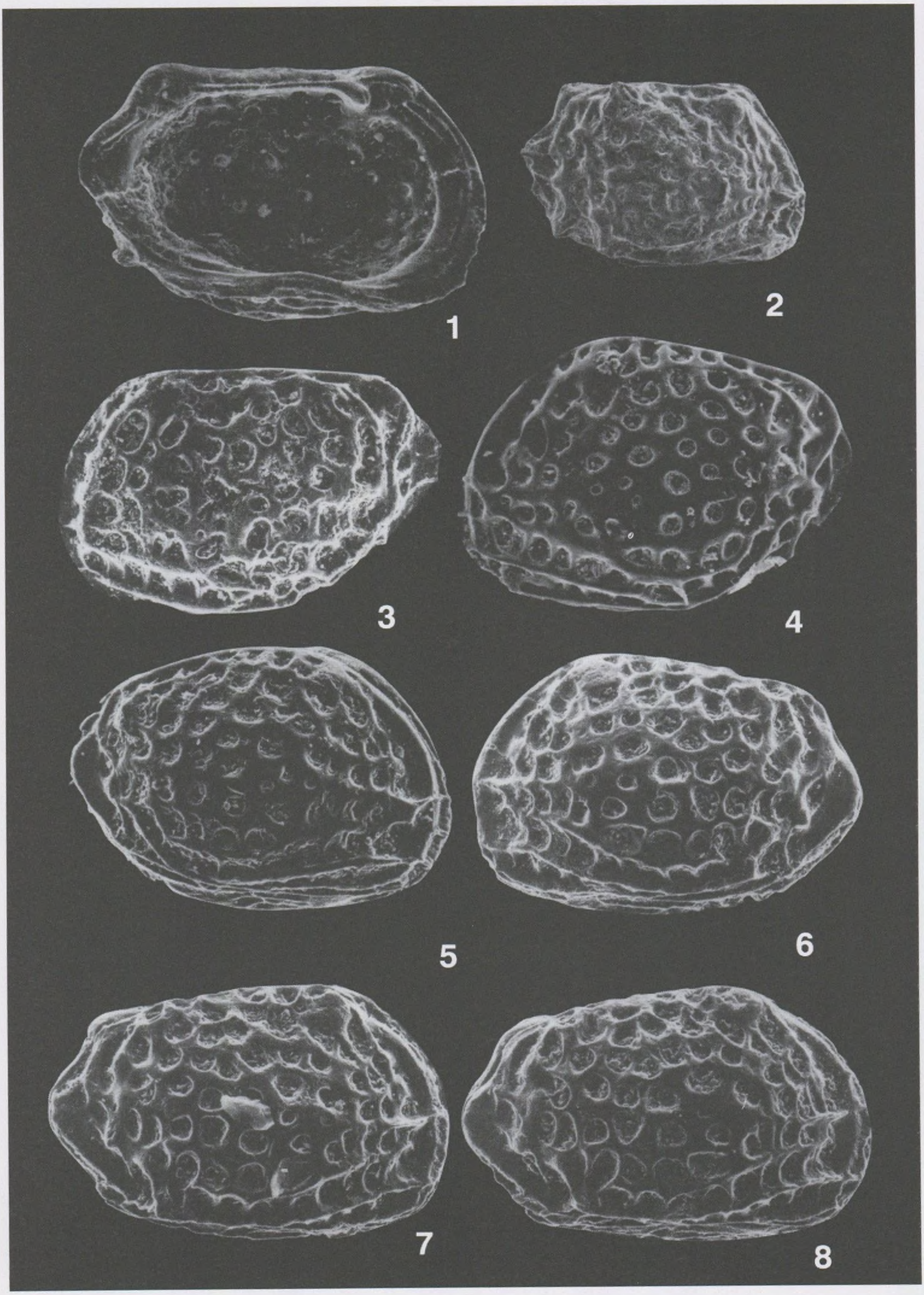


Plate 4

Figs 1-2. *Schizocythere* ex gr. *tessellata* (BOSQUET, 1852).

Fig. 1. Carapace from the dorsal side. 104x. Oroszlány 2361 borehole 301.0 m. Middle Eocene (Bartonian).
Fig. 2. Carapace from the right valve. 108x. Budakeszi 6 borehole 127.9 – 129.4 m. Upper Eocene (Lower Priabonian).

Figs 3-6. *Schizocythere hungarica* MONOSTORI, 1985.

Fig. 3. Left valve. 100x. Dudar, coal mine.
Fig. 4. Carapace from the right valve. 107x. Csetény 61 borehole 477.5 m.
Fig. 5. Right valve 108x. Dudar, coal mine.
Fig. 6. Right valve from the inner side. 99x. Oroszlány 2274 borehole 533.2 m.

Figs 3-6. Middle Eocene (Upper Lutetian-Bartonian).

Plate 4

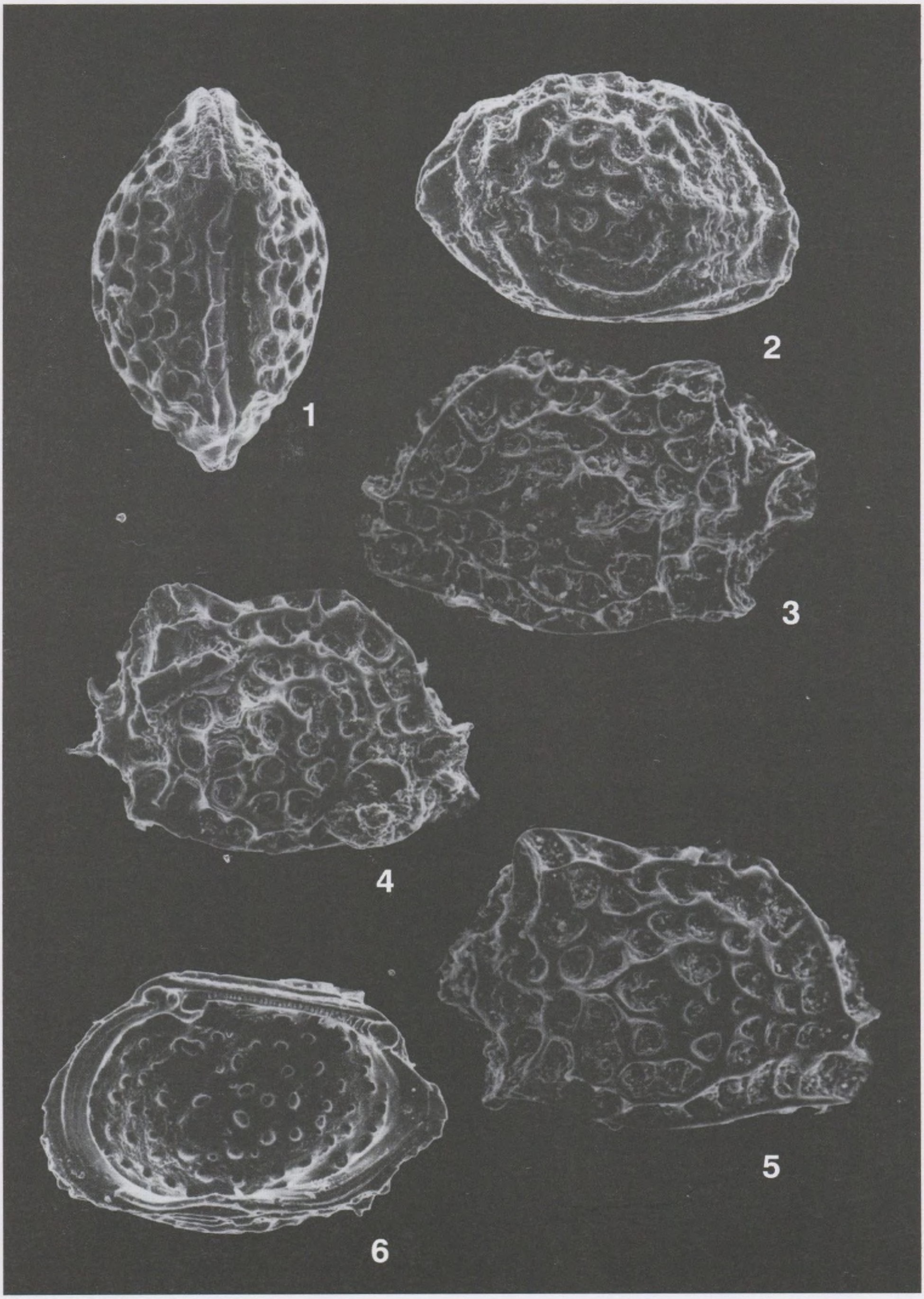


Plate 5

Figs 1-7. *Schizocythere hungarica* MONOSTORI, 1985.

Fig. 1. Anterior part of the hinge in the right valve. 300x. Dudar, coal mine.
Fig. 2. Left valve. 91x. Oroszlány 2274 borehole 533.2 m.
Fig. 3. Right valve from the inner side. 100x. Dudar, coal mine.
Figs 1-3. Middle Eocene (Upper Lutetian - Bartonian).
Fig. 4. Carapace from the left valve. 90x. Somlóvásárhely 1 borehole 551.0 m. Upper Eocene (Lower Priabonian).
Fig. 5. Right valve. 99x. dudar, coal mine.
Fig. 6. Carapace from the left valve. 90x. Oroszlány 2210 borehole 564.4 m.
Fig. 7. Carapace from the right valve. 97x. Csolnok 113 borehole 316.0 m.

Figs 5-7. Middle Eocene (Upper Lutetian - Bartonian).

Plate 5

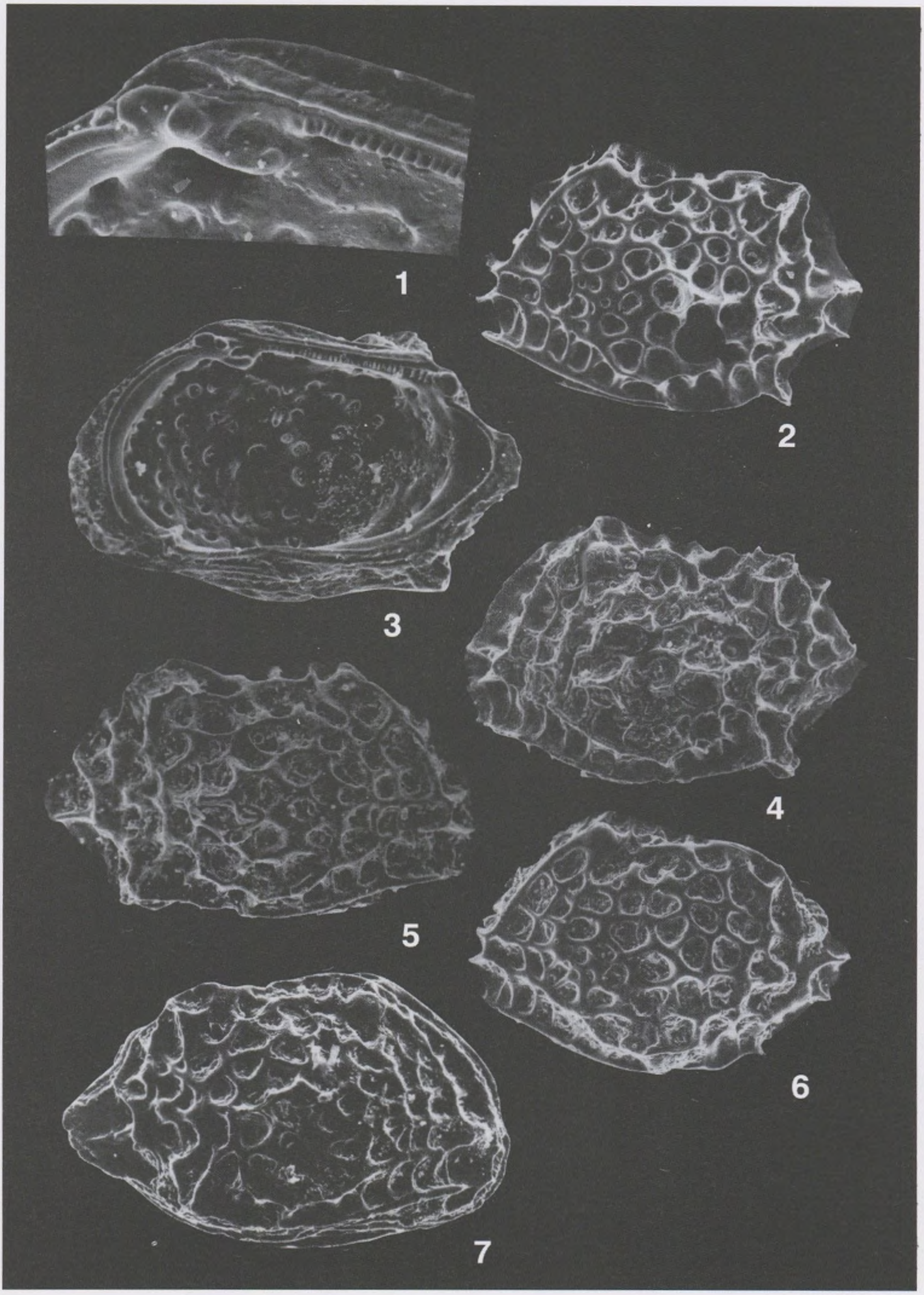


Plate 6

Figs 1-8. *Schizocythere hungarica* MONOSTORI, 1985.

Fig. 1. Carapace from the dorsal side. 119x. Mány 55 borehole 434.0 m.
Fig. 2. Carapace from the right valve. 90x. Mesterberek 118 borehole 392.0 m.
Fig. 3. Carapace from the right valve. 90x. Tokod 527 borehole 223.2 - 226.2 m
Fig. 4. Carapace from the left valve. 90x. Nyergesújfalu 31 borehole 252.5 - 253.5 m.
Fig. 5. Carapace from the left valve. 84x. Ótokod pit, sample A9.
Fig. 6. Carapace from the dorsal side. 81x. Ótokod pit, sample A9.
Fig. 7. Carapace from the left valve. 72x. Nyergesújfalu 31 borehole 261.6 - 264.0 m.
Fig. 8. Carapace from the right valve. 82x. Ótokod pit, sample A8.

Figs 1-8. Middle Eocene (Bartonian).

Plate 6

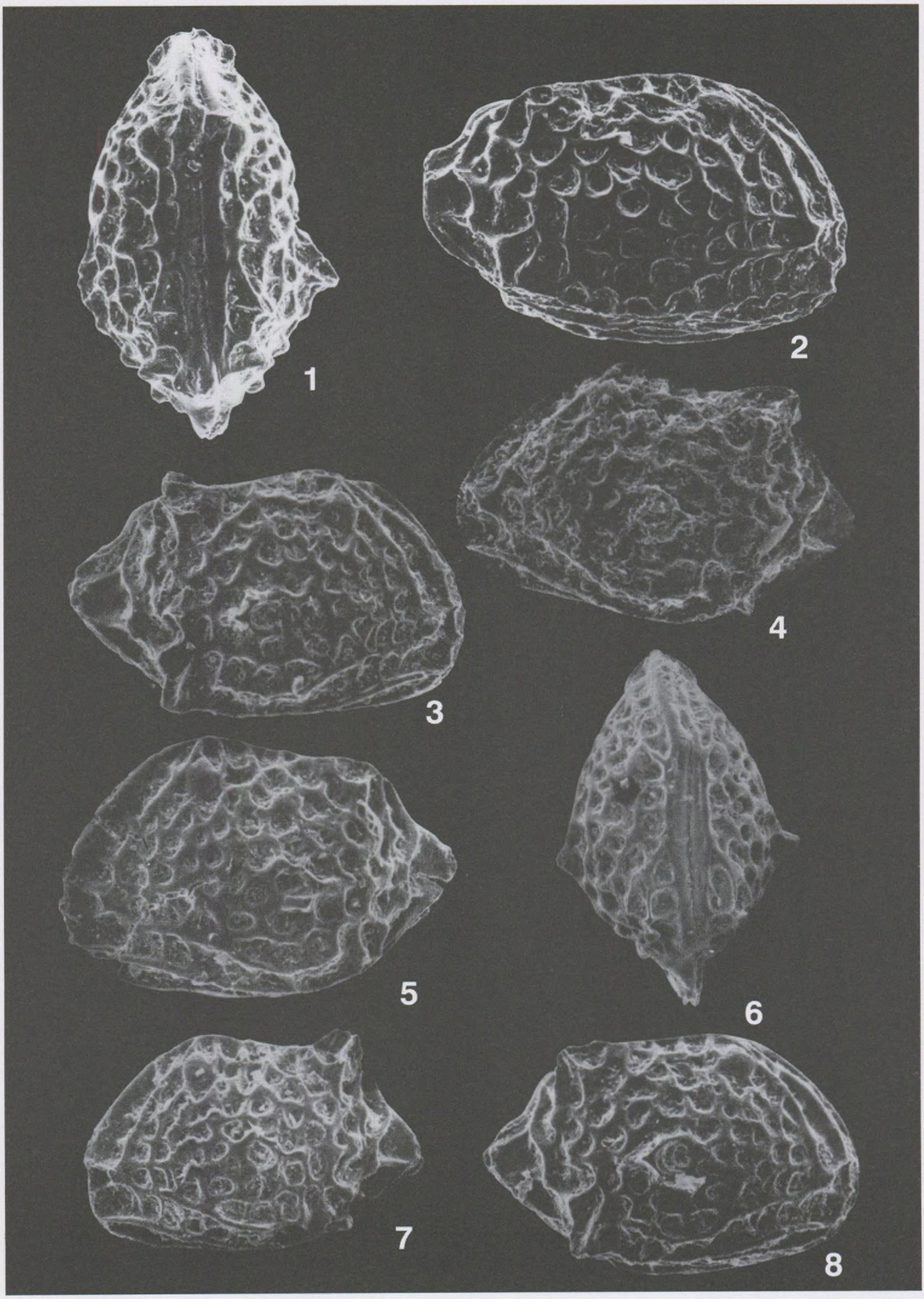


Plate 7

Figs 1-3. *Schizocythere* aff. *hungarica* MONOSTORI, 1985.

Fig. 1. Carapace from the right valve. 90x. Budakeszi 6 borehole 150.2 - 152.7 m.
Fig. 2. Carapace from the dorsal side. 90x. Budakeszi 6 borehole 150.2 – 152.7 m.
Fig. 3. Carapace from the left valve. 90x. Budakeszi 6 borehole 130.2 – 132.6 m.

Figs 1-3. Upper Eocene (Lower Priabonian).

Figs 4-6. *Cnestocythere transdanubica* n. sp.

Fig. 4. Left valve. 107x. Dudar, coal mine. Holotype.
Fig. 5. Right valve from the inner side. 104x. Dudar, coal mine.
Fig. 6. Right valve. 123x. Dudar, coal mine.

Figs 4-6. Middle Eocene (Upper Lutetian-Bartonian).

Plate 7

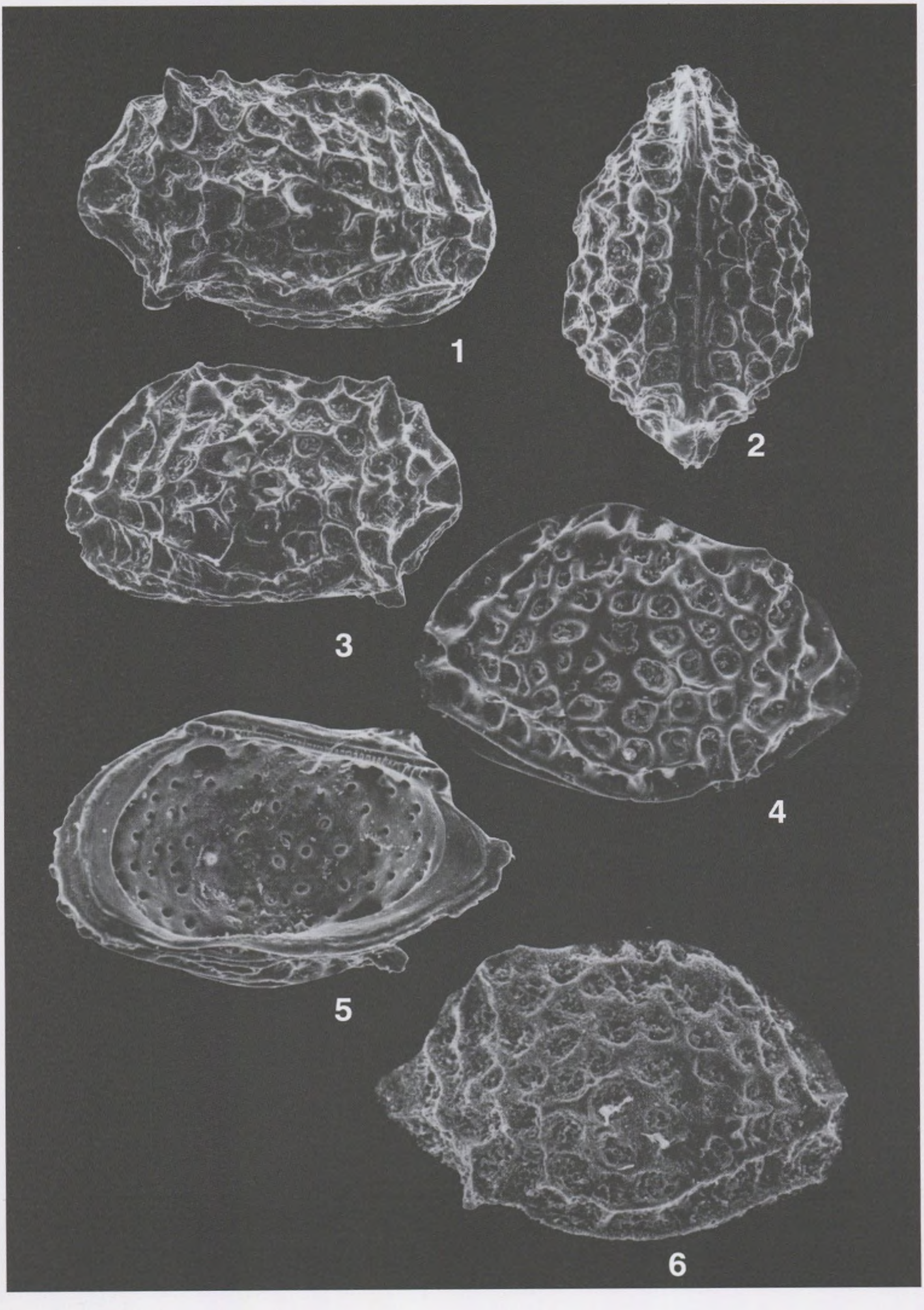


Plate 8

Figs 1-7. *Cnestocythere transdanubica* n. sp.

Fig. 1. Carapace from the left valve. 104x. Dudar, coal mine.
Fig. 2. Carapace from the left valve. 72x. Esztergom 81 borehole 279.4 - 279.6 m.
Fig. 3. Carapace from the right valve. 90x. Somlóvásárhely 1 borehole 835.0 m.
Fig. 4. Carapace from the right valve. 81x. Ótokod pit, sample A8.
Fig. 5. Left valve from the inside. 95x. Nyergesújfalu 31 borehole 261.6 - 264.0 m.
Fig. 6. Carapace from the dorsal side. 90x. Esztergom 81 borehole 279.4 - 279.6 m.
Fig. 7. Carapace from the left valve. 72x. Tokod 527 borehole 223.2 - 226.2 m.

Figs 1-7. Middle Eocene (Upper Lutetian-Bartonian).

Plate 8

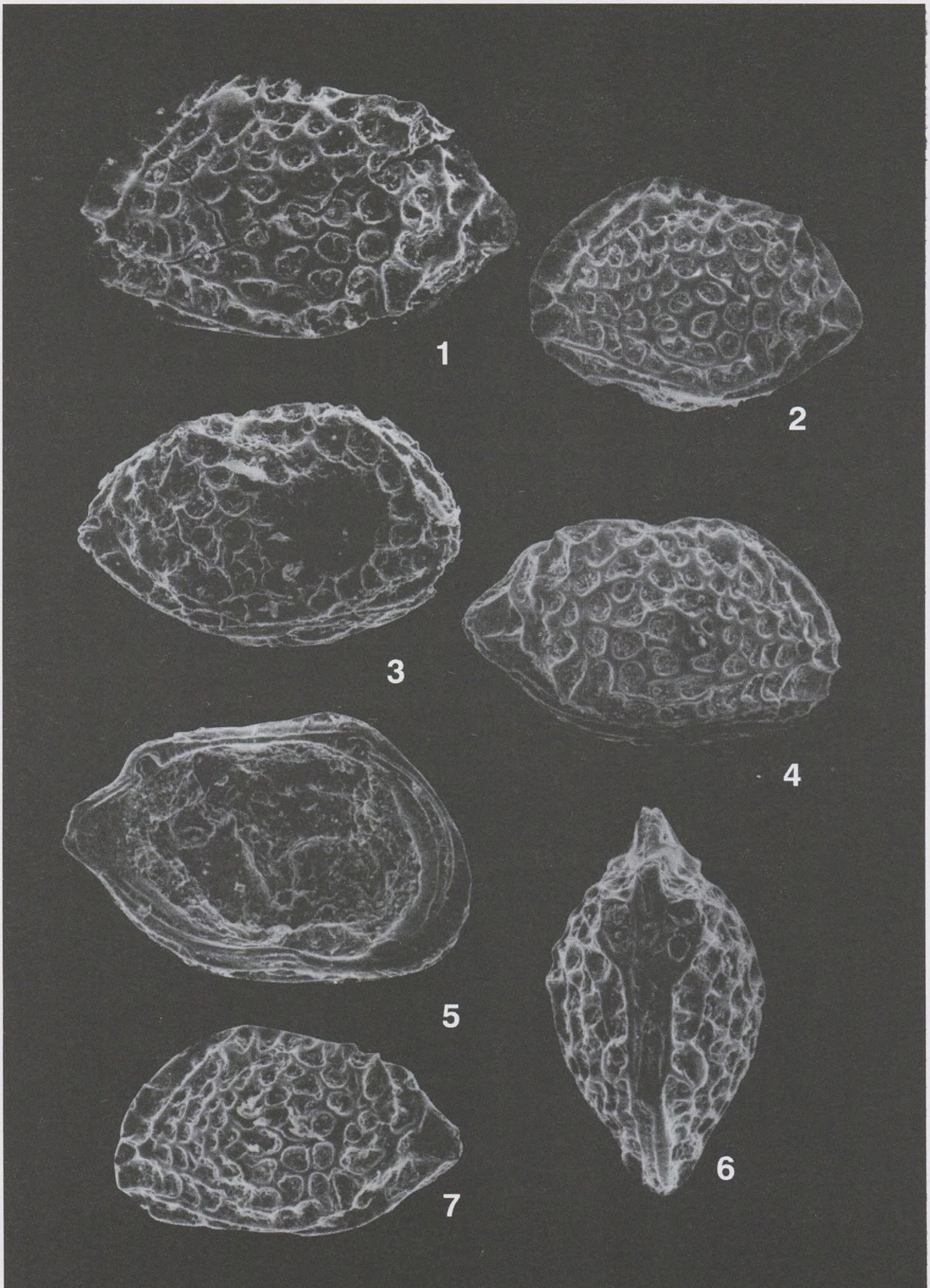


Plate 9

Fig. 1. *Abyssocythere* ? sp. 1. Carapace from the right valve. 81x. Somlóvásárhely 1 borehole 641.2 m. Middle Eocene (Bartonian).

Figs 2-7. *Xestoleberis gantensis* MONOSTORI, 1977.

Fig. 2. Carapace from the right valve. 99x. Mesterberek 76 borehole 336.6 m.

Fig. 3. Left valve. 73x. Gánt, Bagoly-hegy pit.

Fig. 4. Carapace from the right valve. 90x. Mesterberek 76 borehole 316.1 m.

Fig. 5. Left valve from the inside. 77x. Dudar, coal mine.

Fig. 6. Left valve from the inside. 77x. Gánt, Bagolyhegy-pit.

Fig. 7. Carapace from the right valve. 66x. Mesterberek 76 borehole 358.6 m.

Figs 2-7. Middle Eocene (Upper Lutetian-Bartonian).

Plate 9

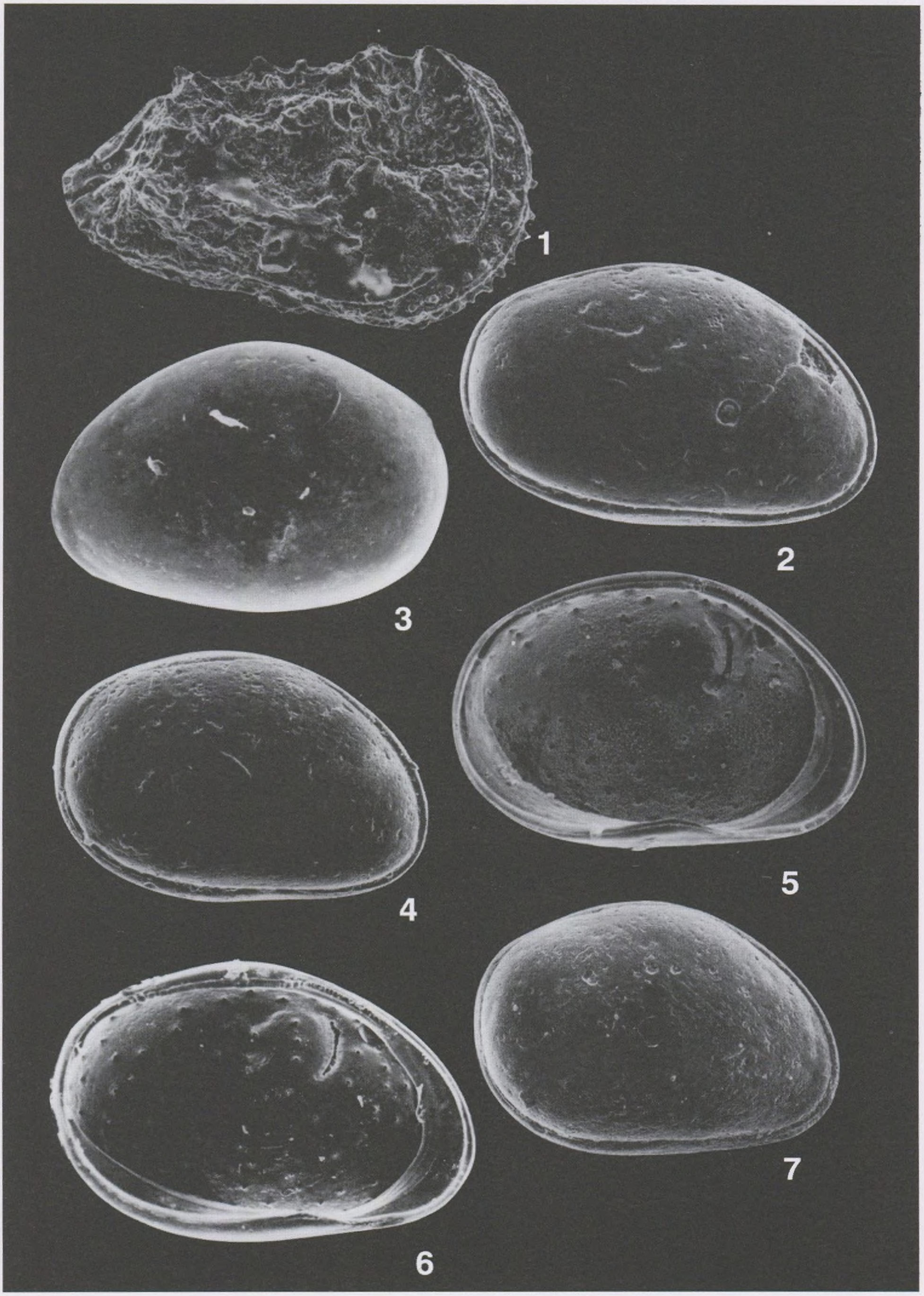


Plate 10

Figs 1-7. *Xestoleberis gantensis* MONOSTORI, 1977.

Fig. 1. Carapace from the right valve. 100x. Csordakút 113 borehole 297.0 m.
Fig. 2. Carapace from the dorsal side. 95x. Mesterberek 76 borehole 384.3 m.
Fig. 3. Carapace from the right valve. 68x. Mesterberek 118 borehole 358.8 m.
Fig. 4. Carapace from the dorsal side. 72x. Mesterberek 180 borehole 106.0 m.
Fig. 5. Carapace from the right valve. 110x. Mesterberek 76 borehole 358.6 m.
Fig. 6. Carapace from the right valve. 69x. Oroszlány 2361 borehole 287.3 m.
Fig. 7. Carapace from the right valve. 81x. Tarján 8 borehole 255.2 - 256.3 m.

Figs 1-7. Middle Eocene (Upper Lutetian-Bartonian).

Plate 10

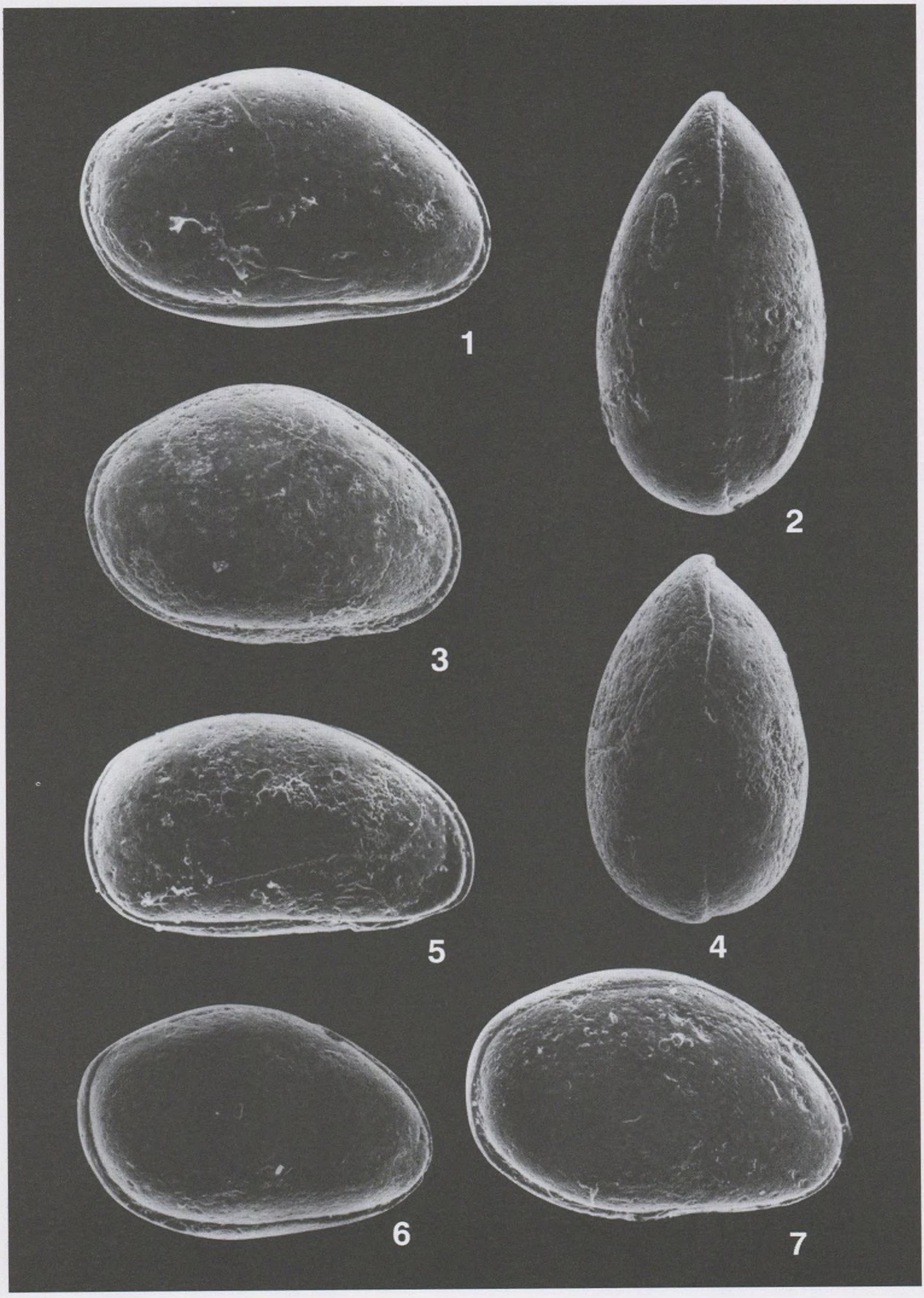


Plate 11

Figs 1-4. *Xestoleberis gantensis* MONOSTORI, 1977.

Fig. 1. Carapace from the right valve. 86x. Mesterberek 118 borehole 358.8 m.
Fig. 2. Carapace from the left valve. 74x. Oroszlány 2210 borehole 564.4 m.
Fig. 3. Left valve. 127x. Budapest Pusztaszeri street, sample 87/1.
Fig. 4. Carapace from the right valve. 81x. Budakeszi 6 borehole 121.3 - 122.8 m.

Figs 1-2. Middle Eocene (Bartonian).
Figs 3-4. Upper Eocene (Priabonian).

Figs 5-8. *Uroleberis budaensis* n. sp.]

Fig. 5. Carapace from the right valve. 83x. Budapest, Pusztaszeri street, sample 81/5. Holotypus.
Fig. 6. Carapace from the right valve. 119x. Nyergesújfalu, sample II/2.
Fig. 7. Carapace from the right valve. 110x. Budapest, Várhegy.
Fig. 8. Carapace from the ventral side. 74x. Budapest, Szépvölgy , sample V/66.

Figs 5-8. Upper Eocene (Priabonian).

Plate 11

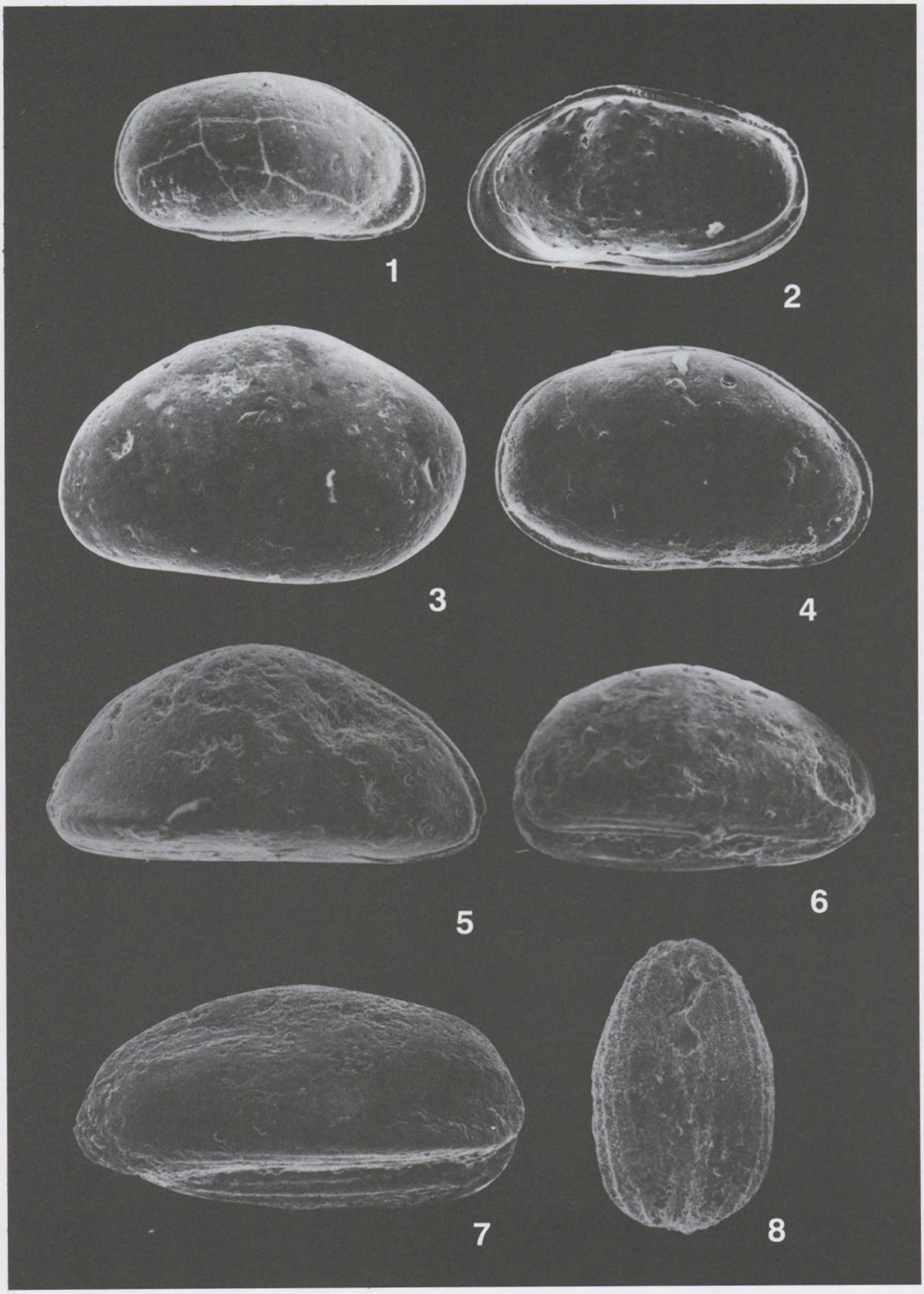


Plate 12

Figs 1-3. *Uroleberis budaensis* n. sp.

Fig. 1. Carapace from the left valve. 108x. Budapest, Pusztaszeri street.
Fig. 2. Carapace from the ventral side. 81x. Budapest, Pusztaszeri street, sample 81/5.
Fig. 3. Carapace from the left valve. 106x. Somlóvásárhely 1 borehole 593.4 m.

Figs 1-3. Upper Eocene (Priabonian).

Fig. 4. *Uroleberis parnensis* (Apostolescu, 1955). Right valve. 104x. Dudar, coal mine. Middle Eocene (Upper Lutetian-Bartonian).

Fig. 5. *Uroleberis striatopunctata* Ducasse, 1967. Carapace from the left valve. 81x. Síkfõkút, sample 82/21. Upper Eocene (Priabonian).

Figs 6-7. *Uroleberis subtrapezida* Ducasse, 1967.

Fig. 6. Carapace from the ventral side. 72x. Somlóvásárhely 1 borehole 546.7 m
Fig. 7. Carapace from the right valve. 90x. Somlóvásárhely 1 borehole 551.0 m.

Figs 6-7. Upper Eocene (Priabonian).

Plate 12

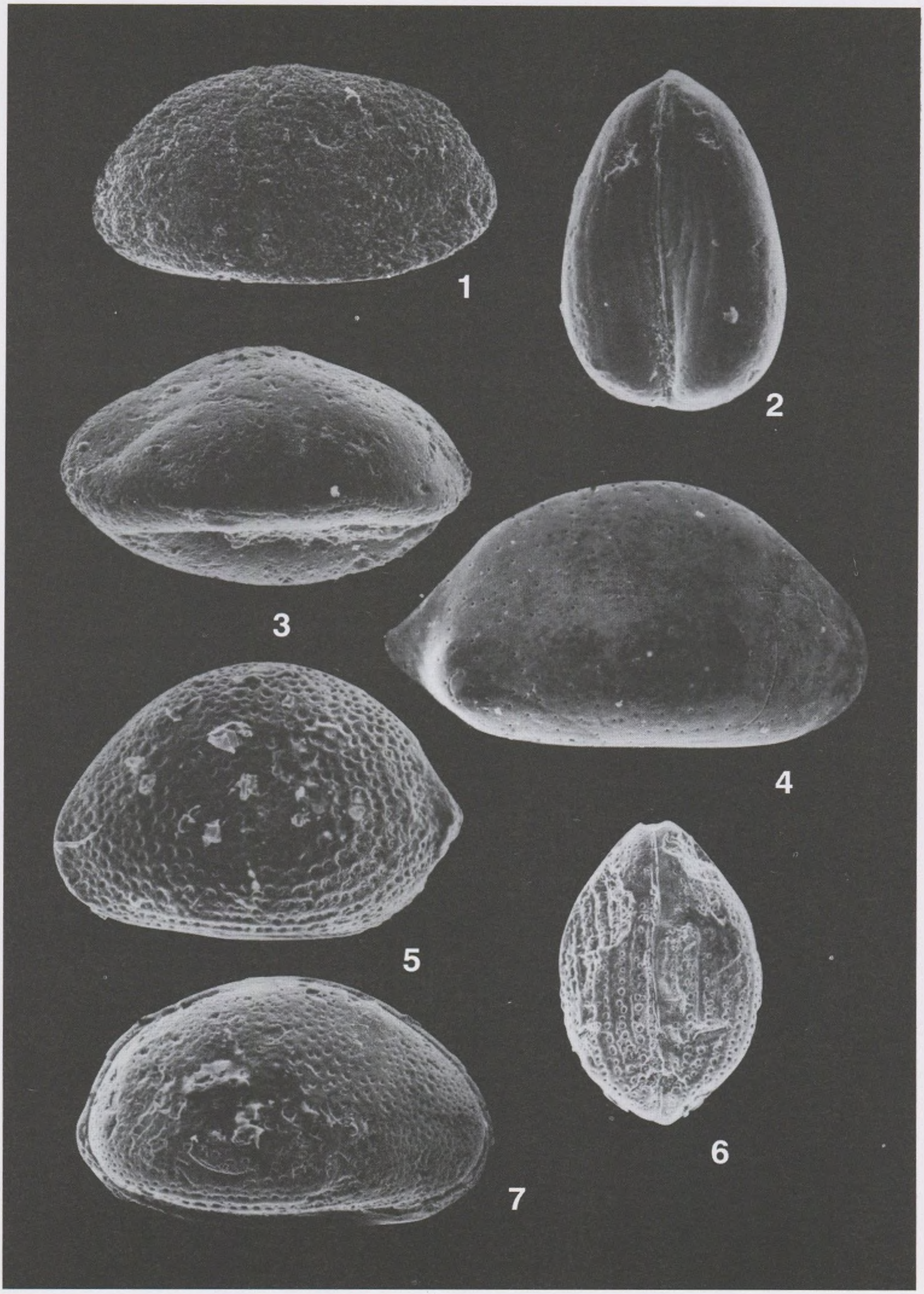


Plate 13

Fig. 1. *Uroleberis* sp. 1. Carapace from the right valve. 90x. Somlóvásárhely 1 borehole 551.0 m. Upper Eocene (Lower Priabonian).

Fig. 2. *Pokornyella* sp. 1. Carapace from the right valve. 75x. Budakeszi 6 borehole 127.9 - 129.4 m. Upper Eocene (Lower Priabonian).

Fig. 3. *Pokornyella* sp. 2. Carapace from the right valve. 63x. Solymár, Várerdőhegy. Upper Eocene (Upper Priabonian).

Fig. 4. *Pokornyella* sp. 3. Carapace from the right valve. 72x. Somlóvásárhely 1 borehole 836.9 m. Middle Eocene (Upper Lutetian).

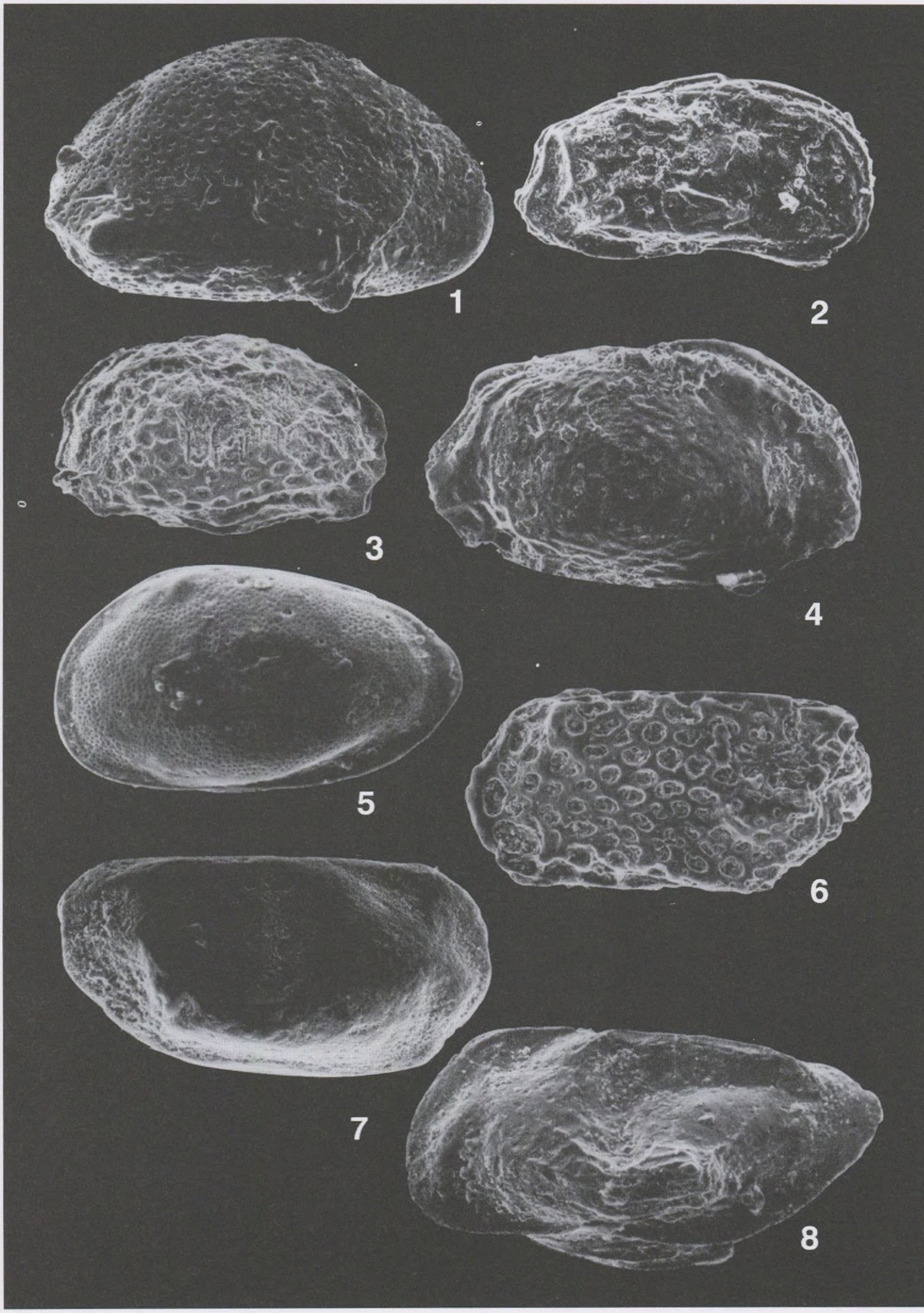
Fig. 5. *Loxoconcha* sp. 1. Carapace from the left valve. Csabdi 74 borehole 315.5 - 317.0 m. Middle Eocene (Bartonian).

Fig. 6. *Eucytherura* sp. 1. Carapace from the left valve. 79x. Mesterberek 180 borehole 126.3 - 127.6 m. Middle Eocene (Bartonian).

Fig. 7. *Monoceratina* sp. 2. Carapace from the left valve. 122x. Budapest, Pusztaszeri street, sample 87/2. Upper Eocene (Upper Priabonian).

Fig. 8. *Monoceratina striata* DELTEL, 1964. Carapace from the right valve. 110x. Csordakút 115 borehole 304.0 m. Middle Eocene (Bartonian).

Plate 13



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33, 105–106 (2000) Budapest

Lectotypes of some Paleogene ostracod species from Hungary

M. MONOSTORI[1]

Abstract

The lectotypes of the following Paleogene species are assigned in this article: *Hemicyprideis: anterocostata* MONOSTORI, 1982; *Cardobairdia hungarica* MONOSTORI, 1982; *Bairdia rupelica* MONOSTORI, 1982; *Cuneocythere marginata anterodepressa* MONOSTORI, 1982; *Loxoconcha delemontensis hungarica* MONOSTORI, 1982; *Miocyprideis ? rara derupta* MONOSTORI, 1982; *Paracypris ? rupelica* MONOSTORI, 1982; *Cardobairdia ? spinifera* MONOSTORI, 1985; *Cytheromorpha subalpina dorsodepressa* MONOSTORI, 1985; *Loxoconcha carinata tardense* MONOSTORI, 1985; *Argilloecia quasiramphasta* MONOSTORI, 1985; *Leguminocythereis dudarensis* MONOSTORI, 1987; *Cletocythereis ? angusticostata darvastoense* MONOSTORI, 1998; *Pokornyella ? bicostata Monostori,* 1998.

Introduction

There are in my works some new species from Paleogene sediments of Hungary missing the assignment of holotype. I declare the following specimens as lectotypes of these species:

Hemicyprideis ? anterocostata MONOSTORI, 1982
Lectotype: Pl. I., f. 1.

Cardobairdia hungarica MONOSTORI, 1982
Lectotype: Pl. IV., f. 8.

Bairdia rupelica MONOSTORI, 1982
Lectotype: Pl. V., f. 1.

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Paracypris rupelica MONOSTORI, 1982
Lectotype: Pl. VII., f. 3.

Cuneocythere marginata anterodepressa MONOSTORI, 1982
Lectotype: Pl. VII., f. 9.

Loxoconcha delemontensis hungaria MONOSTORI, 1982
Lectotype: Pl. VIII., f. 1.

Miocyprideis ? rara derupta MONOSTORI, 1982
Lectotype: Pl. IX., f. 8.

Cardobairdia ? spinifera MONOSTORI, 1985
Lectotype: Pl. 2., f. 2.

Cytheromorpha subalpina dorsodepressa MONOSTORI, 1985
Lectotype: Pl. 2. f. 7.

Loxoconcha carinata tardense MONOSTORI, 1985
Lectotype: Pl. 7., f. 3.

Argilloecia quasiramphasta MONOSTORI, 1985
Lectotype: Pl. 8., f. 3.

Leguminocythereis dudarensis MONOSTORI, 1987
Lectotype: Pl. 4., f. 7.

Cletocythereis ? angusticostata darvastoense MONOSTORI, 1998
Lectotype: Pl. 4., f. 6.

Pokornyella? bicostata MONOSTORI, 1998
Lectotype: Pl. 7., f. 1.

References

MONOSTORI, M. (1982): Oligocene ostracods from the surroundings of Budapest – Annales Univ. Sci. Budapestinensis, Sect., Geol., XXI., pp. 31-102., Pl. I-IX.

MONOSTORI, M. (1985): Ostracods of Eocene/Oligocene boundary profiles in Hungary – Annales Univ. Sci. Budapestinensis, Sect. Geol., XXV., pp. 161-243., Pl. 1-8.

MONOSTORI, M. (1987): Ostracod fauna and palaeoecology of the Lutetian (Eocene) mollusc sand et Dudar, Hungary – Annales Univ. Sci. Budapestinensis, Sect. Geol., XXVII., pp. 135-183., Pl. 1-7.

MONOSTORI, M. (1998): Eocene ostracods of Hungary. Systematical part 2 (Cytheracea?) – Hantkeniana, 2., pp. 49-101., Pl. 1-17.

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Palaeogeography and environment of the Late Miocene Soricidae (Mammalia) faunae of the Pannonian Basin

L. Gy. MÉSZÁROS[1]

(with 7 figures)

Abstract

The article presents the palaeobiogeographical and palaeoecological results of the examinations of eleven Vallesian and Turolian shrew faunae found in the Pannonian Basin. While in the MN 9-11 Zones of the Late Miocene in the greater part of Europe a subtropical climate was dominant, the Soricidae and other vertebrate fauna elements in the Pannonian Basin's northern and western areas which had become lands reflect much more extreme conditions; forests and grassland plains alternated with each other, and in places desert tracts may have appeared. Probably the wind-sheltering effect of the Alps and Carpathians, which by the MN 9 Zone already had profiles of high mountain ranges, created the drier and, from the point-of-view of temperature, more extreme climate. This is supported by the fact that the migrations and evolutionary connections of the Soricidae faunae show the Pannonian Basin to have been closed to the north and west, and open to the south. In the MN 10-11 Zones the parts of Transdanubia which had become island sometimes became isolated from the eastern mainland of the Pannonian Basin.

Introduction

Shrews, in all probability of Asian origin, appeared in Europe approximately 33 million years ago at the end of the Early Oligocene. From the beginning of the Miocene they became very common, although as an effect of the dry and cold climatic event at the boundary of the Early-Middle Miocene their diversity

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temporarily declined. Compared to the damp subtropical climate of Europe in the Early and Middle Miocene, the Late Miocene brought a significant deterioration in the climate. The Soricinae and Allosoricinae shrews which adapted better to the drier and more extreme climate migrated into the area from Asia, and displaced the hitherto widespread species of the subfamilies Crocidosoricinae and Heterosoricinae (RZEBIK-KOWALSKA, 1995).

At the same time the Late Neogene orogene movements created several smaller basins in Europe. These basins, because of their unusual relief situation and possible isolation, have preserved fossilised faunae from which it can be concluded that the environment differed from the average. The Pannonian Basin was one of these areas in the Late Miocene, the Soricidae faunae of which differed significantly from other European shrew communities.

The author studied eleven shrew fauna of Upper Miocene localities in Hungary between 1994-1998 (Figs 1-2). The taxonomic description of the faunae has since been published (HÍR & MÉSZÁROS, 1995, MÉSZÁROS, 1996, 1997, 1998a, 1998b, 1999a, 1999b, ZIEGLER & MÉSZÁROS, 2000). The changes of shrew faunae and the migratory and autochthonal evolutionary processes which occurred in the Pannonian Basin make it possible to draw numerous palaeobiogeographical and palaeoecological conclusions. These results are presented in the current article.

The biocoenotic preference of the studied genera

Among the shrews which are used to define the environment *Crusafontina*, *Paenelimnoecus* and *Amblycoptus* are the indicators of arboraceous vegetation with a good water supply. Although *Paenelimnoecus*, *Crusafontina* and *Amblycoptus* became extinct, a relative of the latter two, recent *Anourosorex squamipes*, lives in the highland forests of South-East Asia (REPENNING, 1967). *Crusafontina* and *Paenelimnoecus* occur together in Kohfidisch (BACHMAYER & WILSON, 1970) and Dorn-Dürkheim (STORCH, 1978), although the former mainly represents large, extensive grassland plains, with small patches of forest grouped around open water surfaces, and the latter was an area of arboraceous vegetation in the Late Miocene.

According to REUMER (1984) *Episoriculus* (*Asoriculus*) indicates the proximity of an open water surface which is bordered by dense plant cover. The Osztramos and Csarnóta finds (JÁNOSSY & KORDOS, 1977, KRETZOI, 1962) support this supposition.

Kordosia likes open grassland associations. Although REUMER (1984) believes that the genus could have lived in a forest environment, the author does not accept this. Its occurrence at Osztramos does not prove anything in itself, as according to JÁNOSSY (1972) locality 1 has a "mixed ecology" containing both steppe and forest elements. The Mediterranean occurrence (DOUKAS et al., 1995) and presence of *Kordosia* in the Polgárdi 5 fauna of unusual components (see below) can only be explained by the fact that it lived in a climate warmer than the average of the area (e.g. on the exposed southern karstic mountainsides) and was able to tolerate the drier conditions.

Blarinella, although today forced back to the mountain forests of Asia (Repenning, 1967), was a typical "opportunist" genus in the Late Neogene (MÉSZÁROS, 1999a); it occurred both in drier, open grassland and wetter, forest associations.

The biocoenotic relations of the studied faunae

Soricidae communities, considering other fauna elements, usually indicate a local forested ecotope with a good water supply connected with an open mass of water, or a highland environment in a drier climate.

Alsótelekes: Among modern Soricinae only *Crusafontina* is present which makes arboraceous vegetation probable. The more ancient members of the biocoenosis (*Florinia, Miosorex*) suggest that the environment could not have been dry.

Rudabánya. The presence of *Dinosorex* and *Crusafontina*, as at Alsótelekes, suggests wet conditions with lush vegetation. The appearance of *Paenelimnoecus* and perhaps *Blarinella* (KRETZOI et al., 1976) further strengthens this view. The supposition of a wet environment is supported by other insectivores also found in the fauna (ZIEGLER & MÉSZÁROS, 2000). This all agrees with the statement of KRETZOI et al. (1976) according to which remains were collected in marshland in the environment of which there were also grassland plains and patches of forest.

Sümeg: *Dinosorex*, *Crusafontina* and *Paenelimnoecus* suggest a similar environment to the previous locality. Here, however, the presence of an open water surface cannot be proved unambiguously, as although Anura can be found in the fauna, the proportion of amphibians is very low and fish do not occur at all (KRETZOI, 1984).

Tihany: Only three *Crusafontina* were found at the locality, which suggests arboraceous vegetation, but the few remains are not enough to clear exactly the palaeoecological statement.

Csákvár: *Crusafontina* and *Paenelimnoecus* indicate dense, lush vegetation. In the area of the locality there must have been a water environment association. Fish, turtles, beavers, otters and water birds all occur at the locality. Ungulates (types of deer, pygmy antelopes) were also rather forest-dwellers than steppe-dwellers (KRETZOI, 1954).

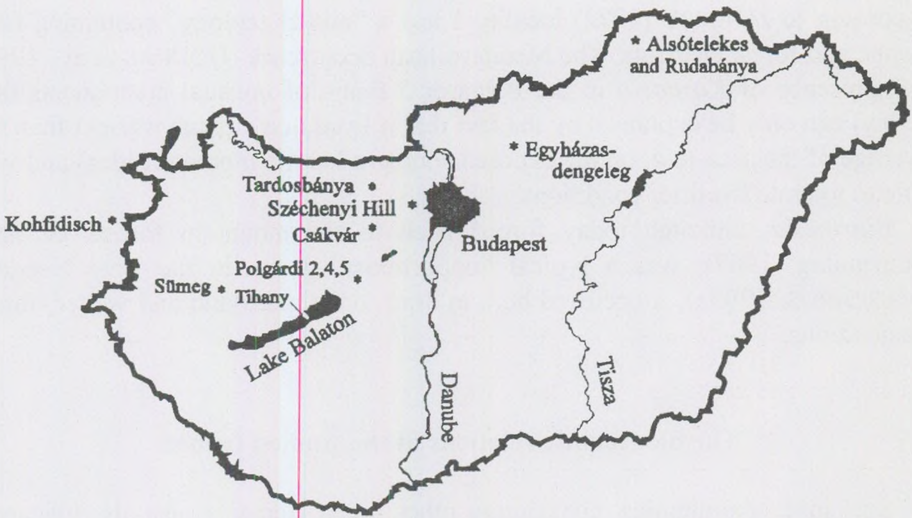

Fig. 1. Upper Miocene Soricidae localities studied in the Pannonian Basin.

Tardosbánya: Apart from *Crusafontina*, *Paenelimnoecus* and *Amblycoptus* which suggest a forest environment, *Asoriculus* is present, the first Late Miocene Soricinae in the Pannonian Basin which definitely lived near open water. The fish, frogs and desmans in JÁNOSSY's manuscript faunal list, made in 1981, suggest the proximity of a larger stretch of water.

Egyházasdengeleg: The obvious dominance of *Amblycoptus* indicates a forest biocoenosis developed in a dry broader surrounding as the result of a local effect. The same can be said of the Gastropods of the locality as well (KROLOPP E., pers. comm.). However, the development of local areas of desert or semi-desert can be deduced from certain rodent finds (HÍR & MÉSZÁROS, 1995). Taking into consideration the full group of remains and the taphonomic characteristics, the Soricidae fauna of the cross-stratified sand at Egyházasdengeleg lived in a gallery forest on the margins of a river situated in a very dry broader area.

Széchenyi-hegy: Only *Amblycoptus* represents the shrews in the examined material. KRETZOI (1980), not taking the Soricidae into account, believes that, with the exception of one tapir tooth, there was nothing to suggest a waterside, forested environment. However, taking into consideration the ecological requirements of *Amblycoptus*, greater significance must be attributed to the tapir find. To this the "Trimylinae ind." remains mentioned by Kretzoi must be added, which on the basis of the description is probably *Paenelimnoecus*, which, like *Amblycoptus*, adapted to a forest environment.

Polgárdi 2, 4, 5: KORDOS (1991) on the basis of the Cricetidae fauna placed all three localities in the MN 13 Zone so that localities 4 and 5 were of about the same age, while locality 2 was somewhat younger than them. In spite of this the shrew community of localities 4 and 2 are largely similar to each other (the presence of *Crusafontina*, *Paenelimnoecus*, *Amblycoptus* and *Asoriculus* indicates arboraceous vegetation); locality 5, however, differs fundamentally from them. 7 species of shrew occur at locality 4; at locality 5 the diversity is drastically reduced. Among the former only *Blarinella dubia* remains, and together with the here first occurring *Kordosia topali* the total number of species is two.

Myr	Age	Central Paratethys Stage	Mammal faunal unit	MN	Soricidae localities in the Pannonian Basin	Selected other Soricidae Localities
6 _	L					Maramena
					Polgárdi 2	
	a	Pontian		13		
					Polgárdi 5	
7 _	t				Polgárdi 4	
					Széchenyi Hill	
	e		Turolian	12	Tardosbánya	
					Egyházas-dengeleg	
8 _	M					
					Csákvár	
	i			11	Tihany	
						Dorn-Dürkheim
9 _	o	Pannonian				
				10	Kohfidisch	
	c				Sümeg	
10 _	e		Vallesian			
					Rudabánya	
	n			9	Alsótelekes	
						Belchatów A
11 _	e					Can Llobateres

Fig. 2. The stratigraphical position of the studied Upper Miocene Soricidae localities.

The divergence of the Polgárdi 5 fauna from that of 4 is probably not caused by macroclimatic changes but microclimatic ones. This could have been, for example, the development of the vegetation of a forested karst area into an open biocoenosis which was accompanied by the large-scale decline in the diversity of the shrew community. In the fauna of Polgárdi 5 the opportunist *Blarinella* remained, but the forest genera disappeared and *Kordosia*, which likes warmer conditions characteristic of the Mediterranean, appeared. In parallel with the forestation that followed lusher vegetation again developed on this mountainside in which the forest genera (*Paenelimnoecus* and *Amblycoptus*) reappeared, but perhaps not with its original diversity. Locality 2 represents this period.

The Carpathian-Alpine biogeographical barrier

On the basis of the change of shrew faunae MÉSZÁROS (2000b) defined four Late Miocene 'Soricidae fauna intervals' in the Pannonian Basin. The boundary between the first two (Alsótelekes and Kohfidisch intervals) lies within the MN 9 Zone. On this boundary three genera disappear, and two new ones appear; the number of surviving genera is three. On the lower boundary of the third and fourth intervals (Tardosbánya, MN 12, Polgárdi, MN 13) two new genera appear in each. In the Soricidae fauna of the Pannonian Basin the change which indicates the drying of the climate and the rise in the mean annual temperature fluctuation had already happened in the MN 9 Zone. The minute Crocidosoricinae shrews which adapted to the subtropical climate became extinct, and their place was taken by Soricinae migrating in from Asia which also tolerated continental conditions well. Somewhat later the Heterosoricinae also disappeared. On the lower boundary of the MN 12 and MN 13 Zones new species of Soricinae migrated into the region which likewise suggests changes in the climate (Figs 3-4).

In spite of this it cannot be stated that the climate of the Pannonian Basin in the MN 9-11 Zones would have been extremely dry. Taking into account that the temperature could have been somewhat warmer than today's (*Sorex* or other shrews which definitely tolerate cold are missing), the quantity of precipitation probably more or less corresponded to current values. Generally, conditions reminiscent of present day savannahs could have been dominant, where gallery forests grew along larger water-courses and on the coasts of the Pannonian Lake (KRETZOI, 1954, 1984, KRETZOI et al., 1976, KÁZMÉR, 1990). Besides the provision of the necessary wetness, the Lake also could have moderated the annual fluctuation of temperature to a slight degree. Although on the basis of the Soricinae dominance a more extreme climate can be clearly shown, the occurrences of shrews are most often connected with the gallery forests already mentioned.

Age	Late Miocene					Soricidae subfamilies
Unit	Vallesian		Turolian			
MN	9	10	11	12	13	
SFI	I.	II.		III	IV	
gen. nr.	2	0	0	0	0	Crocidosoricinae
	1	1	0	0	0	Heterosoricinae
	4	3	3	6	7	Soricinae
	2 FAD, 3 LAD		2 FAD	2 FAD		Simultaneous events in the Soricidae fauna

Fig. 3. The change in the Soricidae faunae of the Pannonian Basin in the Late Miocene. Abbreviations: SFI = Soricidae Fauna Intervals according to Mészáros (in press); I = Alsótelekes SFI; II = Kohfidisch SFI; III = Tardosbánya SFI; IV = Polgárdi SFI; gen. nr. = number of genera; FAD = First Appearance Date; LAD = Last Appearance Date.

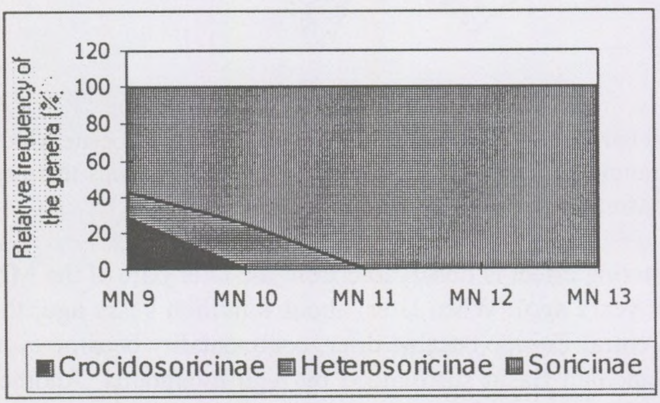

Fig. 4. The change in the relative frequency of the Soricidae subfamilies in the Late Miocene MN 9-13 Zones.

While the climate of the Pannonian Basin became more continental, in other parts of Central Europe in the Vallesian and at the start of the Turolian subtropical forests and faunae still occurred (FORTELIUS et al., 1996, BERNOR et al., 1997) such as those of the Pannonian Basin in the Middle Miocene (MÉSZÁROS, 2000a). The drier climate which developed in the Pannonian Basin can only be explained if we assume that as a consequence of the Late Neogene orogene movements the Alps and the Carpathians had already risen so much by the Early Vallesian MN 9 Zone as to obstruct the passage of the moist air masses arriving from the Atlantic Ocean to the region (Fig. 5).

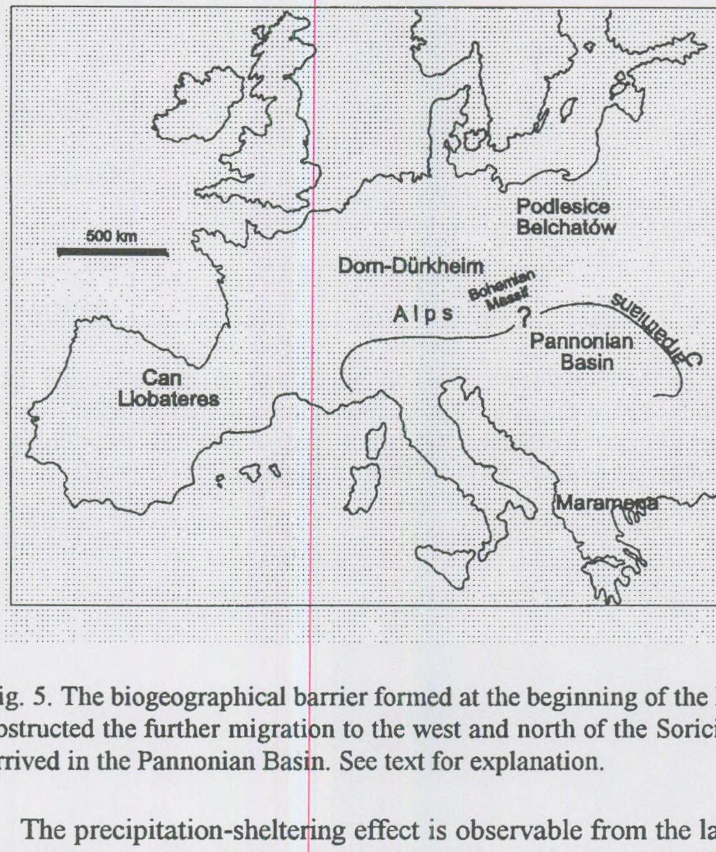

Fig. 5. The biogeographical barrier formed at the beginning of the Late Miocene which obstructed the further migration to the west and north of the Soricidae groups that had arrived in the Pannonian Basin. See text for explanation.

The precipitation-sheltering effect is observable from the later part of the MN 9 Zone (about 11 million years ago). When later, about 8 million years ago, the whole of the climate of Central Europe became drier, continentality became even more apparent in the Pannonian Basin surrounded by high mountains. Another Soricinae migration started into the region and in places small deserts appeared. At this time too gallery forests ran along the margins of the larger rivers from the Carpathians towards the Pannonian Lake (HÍR & MÉSZÁROS, 1995).

The development of the high mountain profile at the same time represented the appearance of a biogeographical barrier, which on the one hand isolated the populations of species already present from those found to the north and west, and on the other hand hindered those coming from Asia in migrating further.

There is a significant difference in the comparison of the sizes of the *Crusafontina* finds from the Pannonian Basin and the Spanish and Polish forms. A monotonous trend in the growth of size is typical of the populations of the

Pannonian Basin into which individuals of more western populations cannot be accommodated (Fig. 6). On the basis of the differing evolution it can be assumed that the stocks living in the Pannonian Basin were isolated from the aspect of morphological evolution from the communities of other areas, thus a biogeographical barrier separated the two areas.

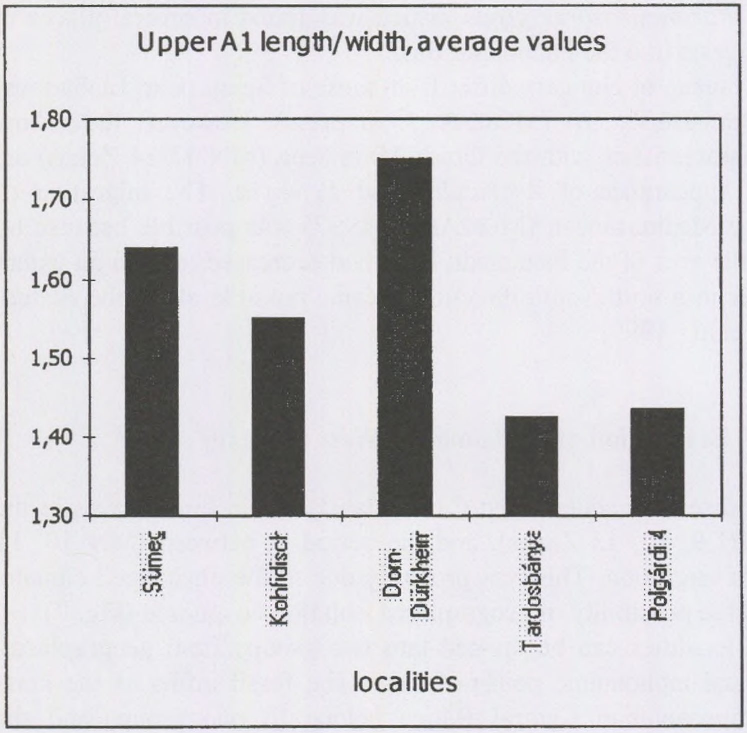

Fig. 6. The divergence in the trend of the growth in size of the *Crusafontina* populations in the Pannonian Basin from the trends of other European regions.

According to MÉSZÁROS (2000b) the shrews of the Pannonian Basin in the Alsótelekes fauna interval show a relationship with the Polish ones, while in the remaining part of the Upper Miocene a great degree of provinciality developed. Unfortunately, there is no known locality for Polish Soricidae in the greater part of the Upper Miocene, thus the exact period of the isolation cannot be established. *Zelceina soriculoides* and *Kordosia topali* appear significantly later in Poland (only after Podlesice, RZEBIK-KOWALSKA, 1994). It is probable that just like today the Eurasian grassland plains due to the effect of the basin stretched the furthest west in the area of Hungary in the Vallesian and Turolian ages; they only appeared in Poland later. Thus the Soricinae shrews which adapted to a more continental climate only reached Polish territory much later and possibly by a different route.

Provinciality could not have been caused by climatic differences only as it continued in the Pliocene as well when, due to the general climatic change, the differences between the climate of Hungary and other Central European areas may have been smaller. *Amblycoptus oligodon* never occurred outside Hungary, while its relation, *Paranourosorex gigas*, which was found in several places in Poland, did not migrate into the Pannonian Basin.

The Soricidae faunae of Hungary differ from those of Spain (Can Llobateres) and Germany (Dorn-Dürkheim) (MÉSZÁROS, in press). However, they show several similar characteristics with the Greek Maramena (MN 13/14 Zones) as, for instance, the appearance of *Asoriculus* and *Petenyia*. The migration of *Kordosia* from the Mediterranean (MÉSZÁROS, 1997) was possible because by the MN 13 Zone the area of the Pannonian Lake had decreased to such an extent that the fauna flux in a north/south direction became possible along the eastern shores (MAGYAR et al., 1999).

The isolation of the faunae of West Hungary

The Soricinae shrews conquered the Carpathian Basin in three waves in the Late Miocene (MN 9, 12, 13 Zones), and the period in between (MN 10, 11 Zones) was free of migration. This was probably due to the unchanged climate, but neither should the possibility of geographical isolation be ignored (Fig. 7).

The examined localities can be divided into two groups from geographical, sedimentological and taphonomic points-of-view. The fossil infills of the karst recess in the Transdanubian Central Range belong to one group, and the sediments containing fossils accumulated under fluvial, lacustrine or marshy conditions of North Hungary to the other. The shrew remains found in the lacustrine sediment at Tihany constitute an exception. The finds of the migration-free period were found without exception in the Transdanubian Central Range.

It can be assumed that the localities of North Hungary were in areas filled up by the deltas of rivers flowing into the Pannonian Lake, while some parts of the Central Range rose above the remaining large water surface as islands or peninsulas. This possible isolation must have already disappeared by the MN 12 Zone as in Tardosbánya and Polgárdi new migrant species had appeared. The island or peninsula theory is supported by the fact that in both Sümeg and Csákvár animals associated with a watery environment can be found. The isolation, however, could not have been continuous towards the west as the faunae of West Hungary and the animal community of Kochfidisch in Burgenland demonstrate a close relationship. The isolation of the two areas created the possibility for the *Crusafontina-Amblycoptus* evolutionary transition (MÉSZÁROS, 1997). The Carpathian/Alpine biogeographical barrier isolated the *Crusafontina* populations of the Pannonian Basin from other European areas, providing the possibility for the separated morphological evolution and the evolution of endemic *Amblycoptus*. It does not explain, however, how *Amblycoptus* could have evolved in a way that *Crusafontina* could still be found in the Pannonian Basin. This fact is only credible if in the MN 10-11 Zones the populations were also isolated from each other within the Pannonian Basin. *Crusafontina* continued to survive in the western area (Sümeg, Csákvár, Tihany). In the east, perhaps due to the competition provoked by the arrival of further species from Asia (e.g. *Petenyia*, Egyházasdengeleg), the *Amblycoptus* evolved. The isolation disappeared in the MN 12 Zone, the *Amblycoptus* migrated into the Transdanubian region and in Tardosbánya they are found together with *Crusafontina*.

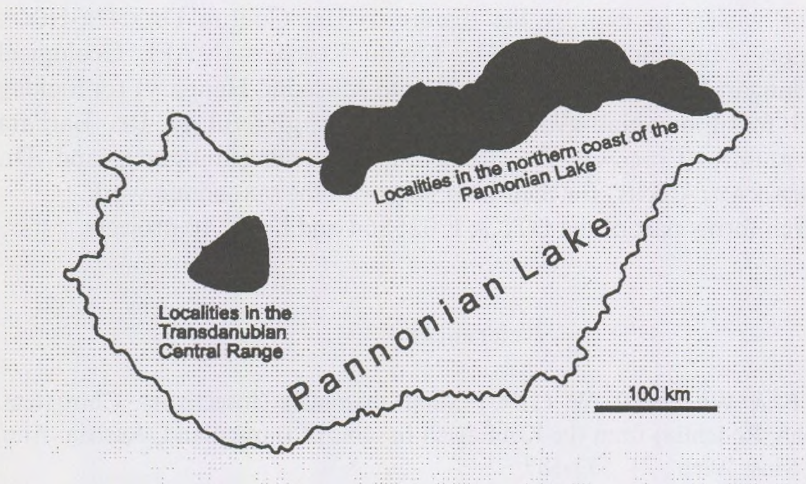

Fig. 7 Isolated Soricidae areas in the MN 10-11 Zones of the Pannonian Basin. See text for explanation.

On the basis of this hypothesis it is possible that MÉSZÁROS's (1998a) stratigraphical statement, according to which the relatively low frequency of the occurrence of *Amblycoptus* at Tardosbánya suggests an older period than Egyházasdengeleg, needs to be revised. The lack of *Crusafontina* at Egyházasdengeleg and the wealth of *Amblycoptus* at the locality may also be the consequence of isolation.

The palaeogeographical picture outlined here agrees with the series of maps prepared on the basis of the palaeontological and geophysical data of MAGYAR et al. (1999) which shows the palaeogeographical evolution of the Pannonian Lake. According to this, 10.8 million years ago (about the start of the MN 9 Zone) the Transdanubian Central Range and north-eastern Hungary were mainland and the two areas were connected. 9.5 million years ago (about the start of the MN 10 Zone) mainland emerged in north-eastern Hungary, but in Transdanubia only a few islands emerged from the Pannonian Lake. 9 million years ago the northern part of Transdanubia and north-eastern Hungary became connected mainland, and the Pannonian Lake receding to the south-east no longer separated the two areas.

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References

BACHMAYER, F. & WILSON, R. W. (1970): Small mammals (Insectivora, Chiroptera, Lagomorpha, Rodentia) from the Kohfidisch fissures of Burgenland, Austria. Ann. Naturhist. Mus. Wien., 74: 533-587.

BERNOR, R. L., TOBIEN, H., HAYEK, L.-A., C., & MITTMANN, H.-W. (1997): *Hippotherium primigenium* (Equidae, Mammalia) from the Late Miocene Höwenegg (Hegau, Germany). Andrias, 10: 1-230.

DOUKAS, C. S., VAN DEN HOEK OSTENDE, L. W. THEOCHAROPOULOS, C. D. & REUMER, J. W. F. (1995): The Vertebrate Locality Maramena (Greece) at the Turolian-Ruscinian boundary (Neogene) 5. Insectivora (Erinaceidae, Talpidae, Soricidae, Mammalia). Münchner Geowiss. Abh., 28: 43-64.

FORTELIUS, M., VERDELIN, L., ANDREWS, P., BERNOR, R. L., GENTRY, A., HUMPHREY, L., MITTMANN, H.-W. & VIRANTA, S. (1996): Provinciality, diversity, turnover and paleoecology in land mammal faunas of the Later Miocene of Western Eurasia. in: BERNOR, R. L., FAHLBUSCH, V. & MITTMANN, H.-W.: The evolution of Western Eurasian Neogene mammal faunas. Columbia Univ. Press, pp. 414-448.

HÍR, J. & MÉSZÁROS, L. GY. (1995): Late Miocene Microvertebrata from Egyházasdengeleg (North Hungary, Nógrád County). Nógrád Megyei Múz. Évk., 20: 167-200.

JÁNOSSY, D. (1972): Middle Pliocene mictovertebrate fauna from the Osztramos Loc. 1 (Northern Hungary). Ann Hist.-Nat. Nus. Nat. Hung., 64: 27-52.

JÁNOSSY, D. & KORDOS, L. (1977): Az Osztramos gerinces lelőhelyeinek faunisztikai és karsztmorfológiai áttekintése (1975-ig) (The faunistical and karst-morphological review of palaeontological localities for vertebrates at Osztramos, Northern Hungary). Fragm. Min. Pal., 8: 39-72.

KÁZMÉR, M. (1990): Birth, life and death of the Pannonian Lake. Palaeogeogr., Palaeoclimatol., Palaeoecol., 79: 171-188.

KORDOS, L. (1991): Late Miocene paleovertebrate localities, Polgárdi, Mezőföld. Magyarország Geológiai Alapszelvényei, pp. 1-6, MÁFI, Budapest.

KRETZOI, M. (1954): Befejező jelentés a Csákvári-barlang őslénytani feltárásáról. (Rapport final des fouilles paléontologiques dans la grotte de Csákvár.) MÁFI Évi Jel. az 1952. évről, pp. 37-55.

KRETZOI, M. (1962): A Csarnótai Fauna és Faunaszint. (Fauna und Faunenhorizont von Csarnóta.) MÁFI Évi jel. az 1959. évről, pp. 297-395.

KRETZOI, M. (1984): A Sümeg-gerinci fauna és faunaszakasz. (The fauna and faunal age of Sümeg-gerinc.) Geol. Hung., Ser. Geol., 20: 214-222.

KRETZOI, M. (1980): Fontosabb szórványleletek a MÁFI gerinces-gyűjteményében (5). A Széchenyi-hegy pliocén édesvízi mészkövének faunája. (Wichtigere Streufunde in der Wirbeltierpaläontologischen Sammlung der Ungarischen Geologischen Anstalt, 5.) MÁFI Évi Jel. az 1978. évről, pp. 347-359.

KRETZOI, M., KROLOPP, E., LŐRINCZ, H. & PÁLFALVY, I. (1976): A rudabányai alsópannoniai prehominidás lelőhely flórája, faunája és rétegtani helyzete. (Flora, Fauna und Stratigraphische Lage der Untenpannonischen Prähominiden-Fundstelle von Rudabánya, NO-Ungarn.) MÁFI Évi Jel. az 1974. évről, pp. 365-394.

MAGYAR, I., GEARY, D., & MÜLLER, P. (1999): The evolution of the Late Micene Pannonian Lake in Central Europe. Palaeogeogr., Palaeoclimatol., Palaeoecol., 147: 151-167.

MÉSZÁROS, L. GY. (1996): Soricidae (Mammalia, Insectivora) remains from three Late Miocene localities in western Hungary. Ann. Univ. Sci. Budapest., Sect. Geol., 31: 5-25 & 119-122.

MÉSZÁROS, L. Gy. (1997): *Kordosia*, a new genus for some Late Miocene Amblycoptini shrews (Mammalia, Insectivora). N. Jb. Geol. Paläont., Mh. 2/1997: 65-78.

MÉSZÁROS, L. Gy. (1998a): Late Miocene Soricidae (Mammalia) fauna from Tardosbánya (Western Hungary). Hantkeniana, 2: 103-125.

MÉSZÁROS, L. Gy. (1998b): *Crusafontina* (Mammalia, Soricidae) remains from Late Miocene localities in Hungary. Senckenbergiana lethaea, 77 (1/2): 145-159.

MÉSZÁROS, L. Gy. (1999a): An exeptionally rich Soricidae (Mammalia) fauna from the Late Miocene localities of Polgárdi (Hungary). Ann. Univ. Sci. Budapest., Sect. Geol., 32: 5-34.

MÉSZÁROS, L. Gy. (1999b): Some insectivore (Mammalia) remains from the Late Miocene locality of Alsótelekes (Hungary). Ann. Univ. Sci. Budapest., Sect. Geol., 32: 35-47.

MÉSZÁROS, L. Gy., (2000a): Magyarország legidõsebb rovarevõ faunái. (The oldest known insectivore faunae of Hungary.) 3. Magyar Õslénytani Vándorgyűlés, pp. 21-22, Tihany.

MÉSZÁROS, L. Gy., (2000b): New results for the Late Miocene Soricidae stratigraphy of the Pannonian Basin. Newsletters on Stratigraphy, in press.

REPENNING, CH. A. (1967): Subfamilies and genera of the Soricidae. Geol. Survey Prof. Paper, 265: 1-74.

REUMER, J. W. F. (1984): Ruscinian and Early Pleistocene Soricidae from Tegelen (The Netherlands) and Hungary. Scr. Geol., 73: 1-173.

RZEBIK-KOWALSKA, B. (1994): Pliocene and quaternary insectivores (Mammalia) from Poland. Acta zool. cracov., 37 (1): 77-136.

RZEBIK-KOWALSKA, B. (1995): Climate and history of European shrews (Family Soricidae) Acta zool. cracov., 38 (1): 95-107.

STORCH, G. (1978): Die turolische Wirbeltierfauna von Dorn-Dürkheim, Rheinhessen (SW-Deutschland). 2. Mammalia: Insectivora. Senckenbergiana lethaea., 58 (6): 421-449.

ZIEGLER, R. & MÉSZÁROS, L. Gy. (2000): The insectivores (Mammalia) of the Late Miocene Hominoid Locality Rudabánya, Hungary. Geol. Hung., Ser. Palaeont, in press.