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

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(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.

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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

Schuleridea 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.
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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?).

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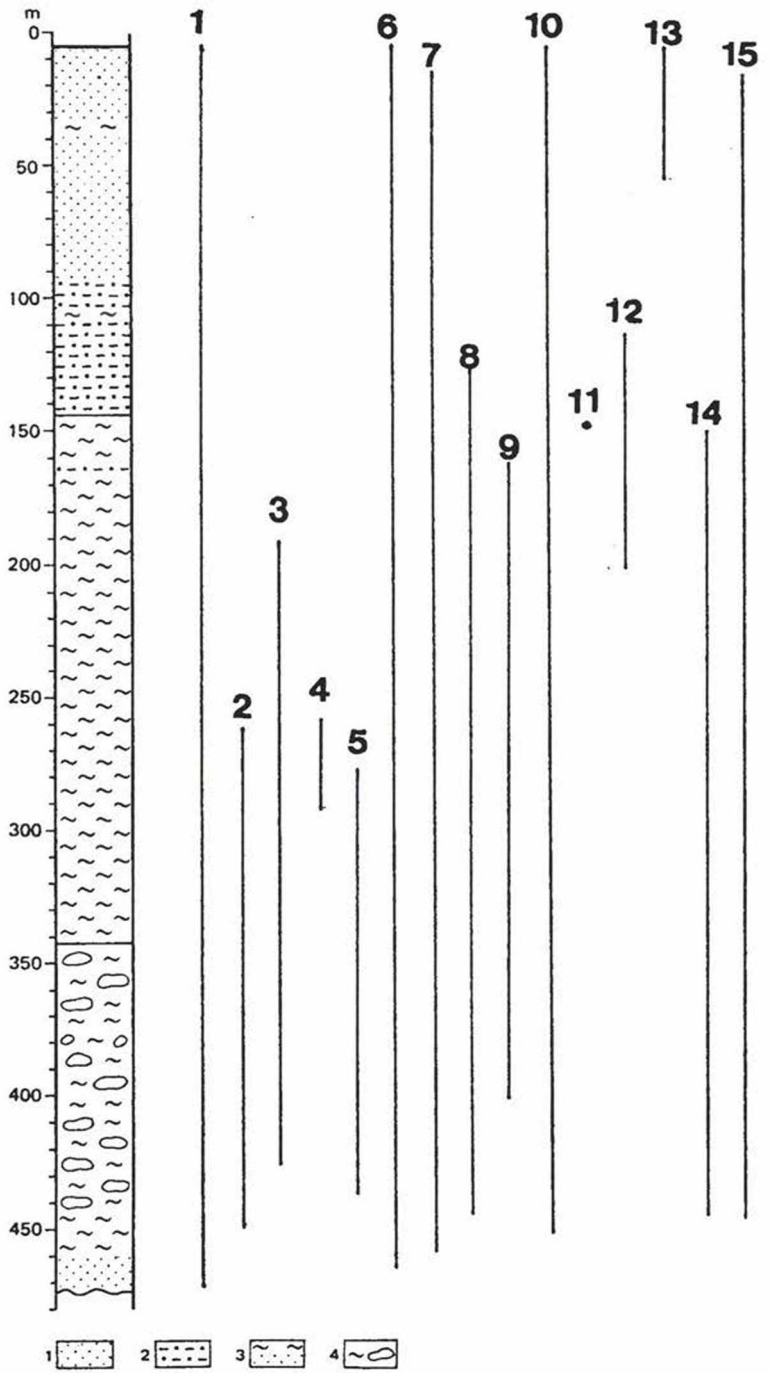
Fig. 1. Stratigraphical distribution of ostracods in borehole Jásd-42. Legend. Rocks: 1. sandstone 2. siltstone 3. sandy marl 4. marl with limestone nodules. Species: 1. *Cytherella ovata* 2. *Cytherella* parallela 3. *Cytherella* ex gr. *striata* 4. *Cardobairdia* cf. *minima* 5. *Bairdia pseudoseptentrionalis* 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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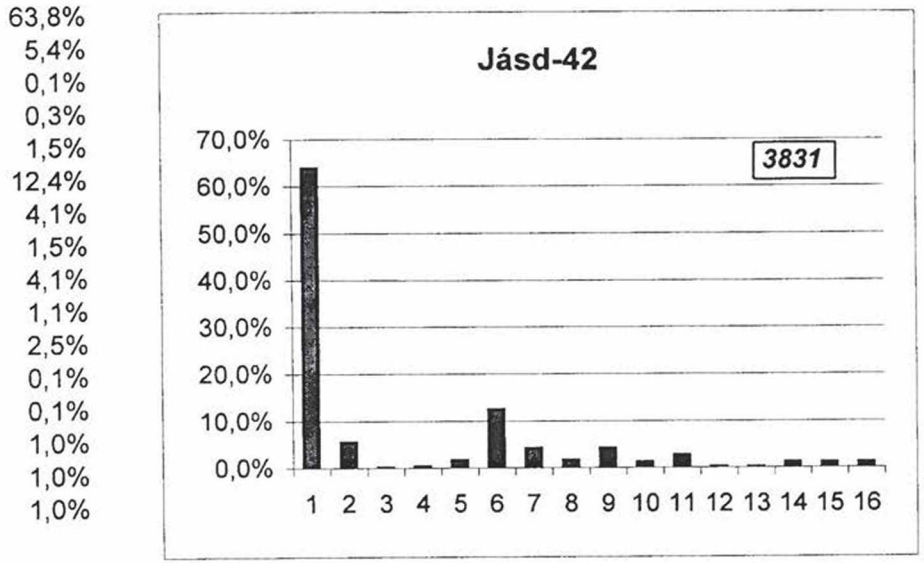

Fig. 2. Distribution of specimens in borehole Jásd-42. Number of specimens in box. Species: 1. *Cytherella ovata* 2. *Cytherella parallela* 3. *Cytherelloidea* ex gr. *stricta* 4. *Cardobairdia* cf. *minuta* 5. *Bairdia pseudoseptentrionalis* 6. *Schuleridea jonesiana* 7. *Neocythere vanveeni* 8. *Cythereis* 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*.

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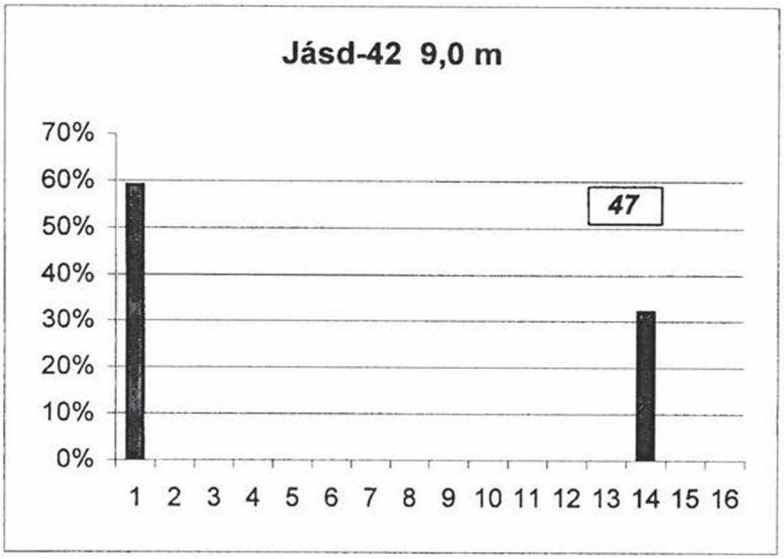

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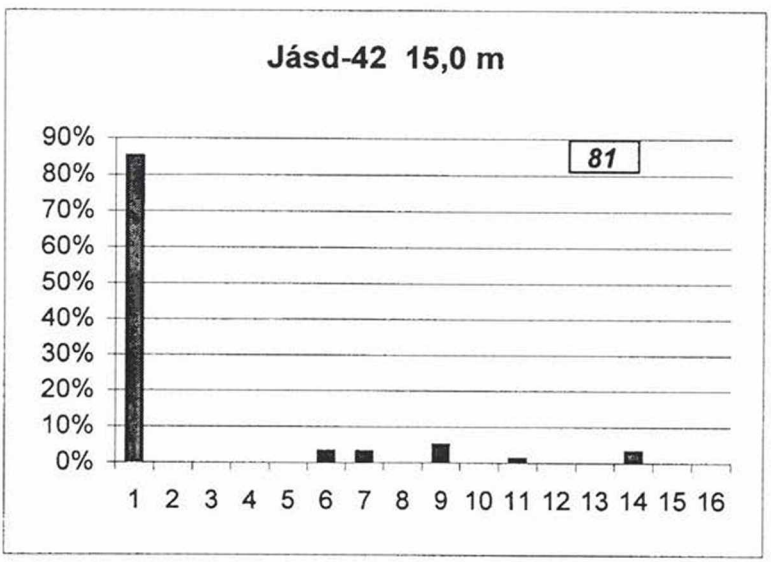

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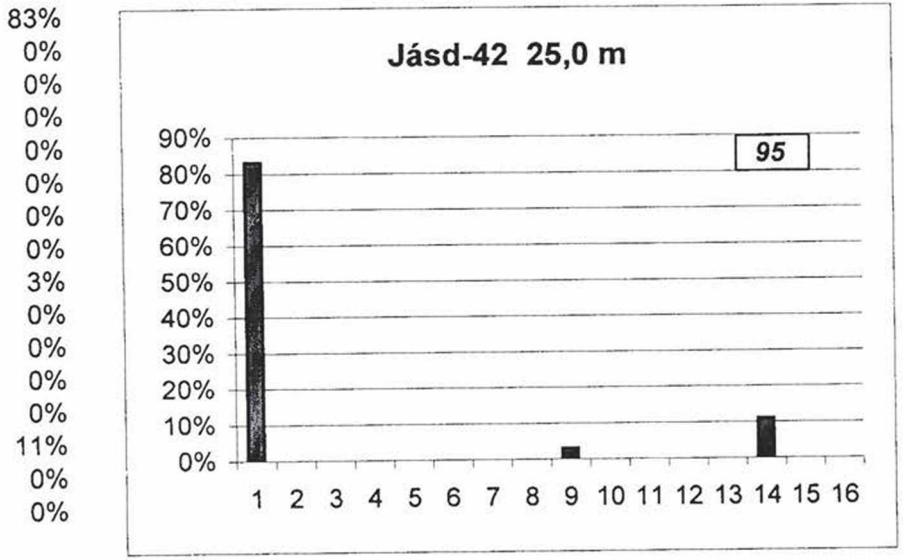

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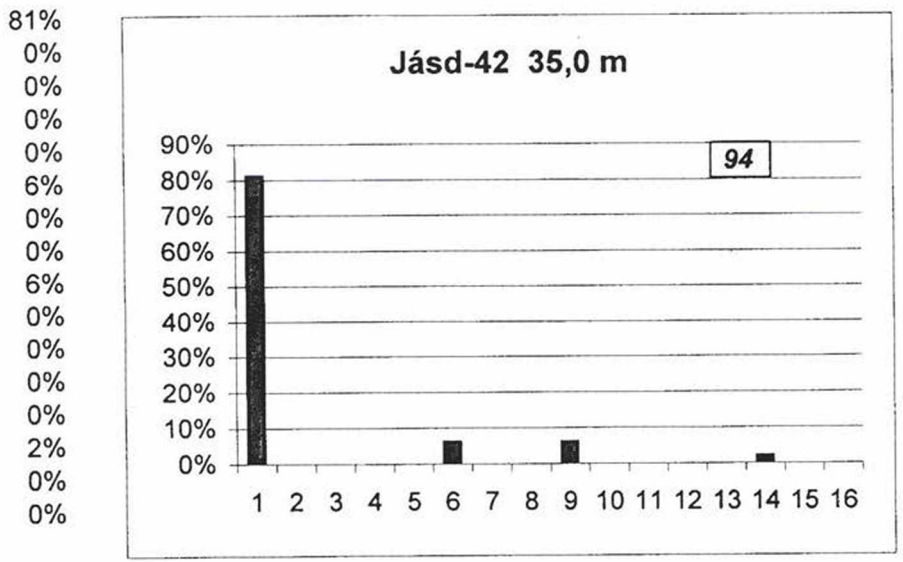

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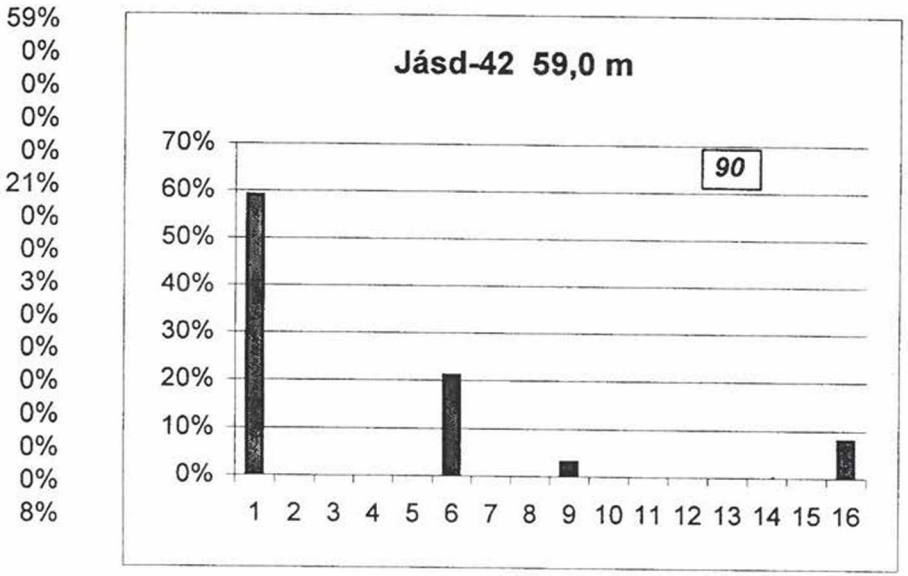

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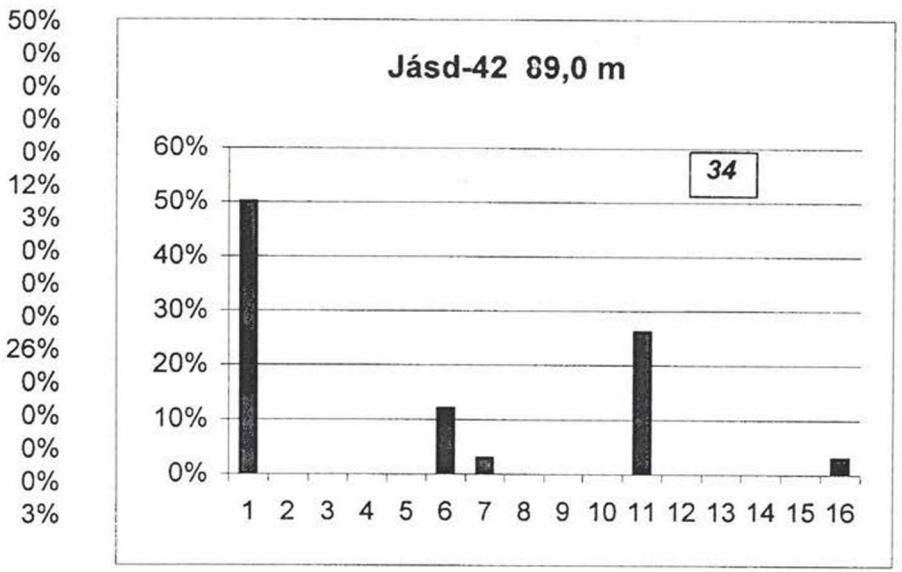

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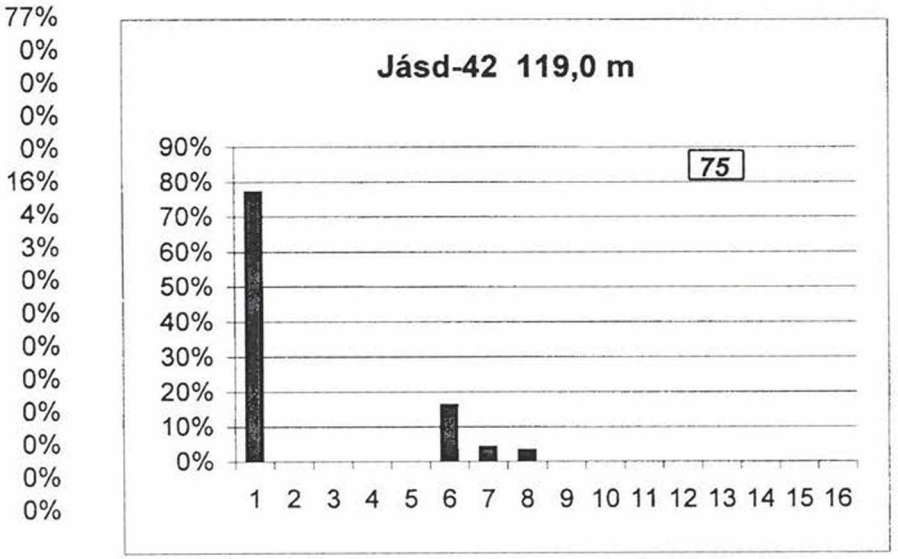

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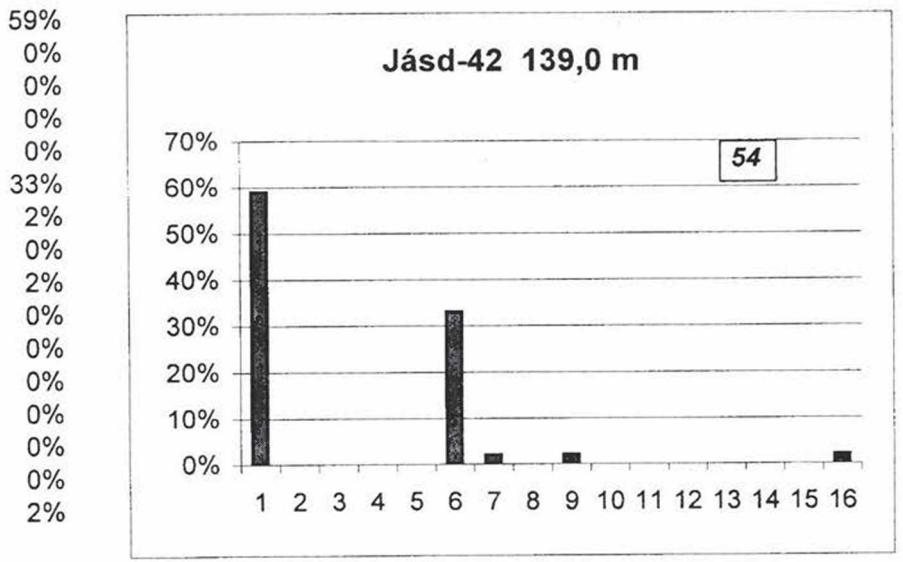

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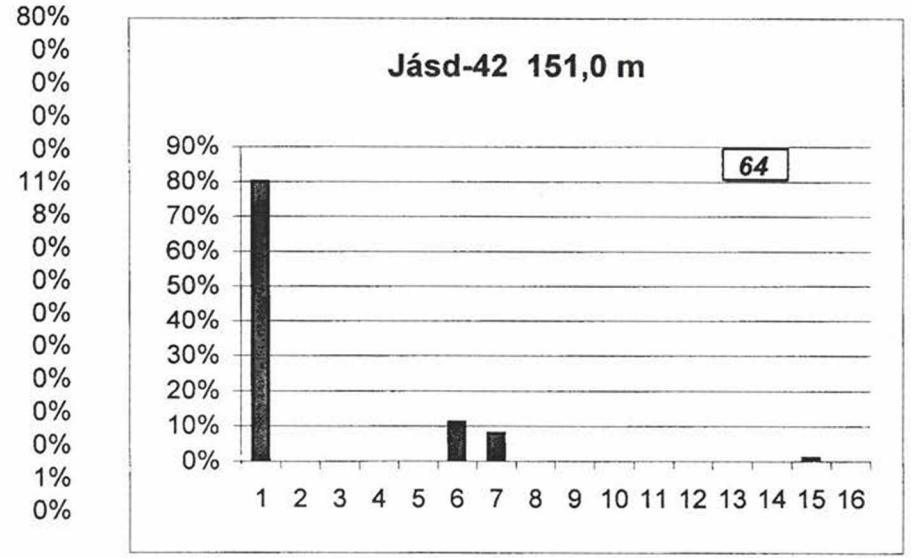

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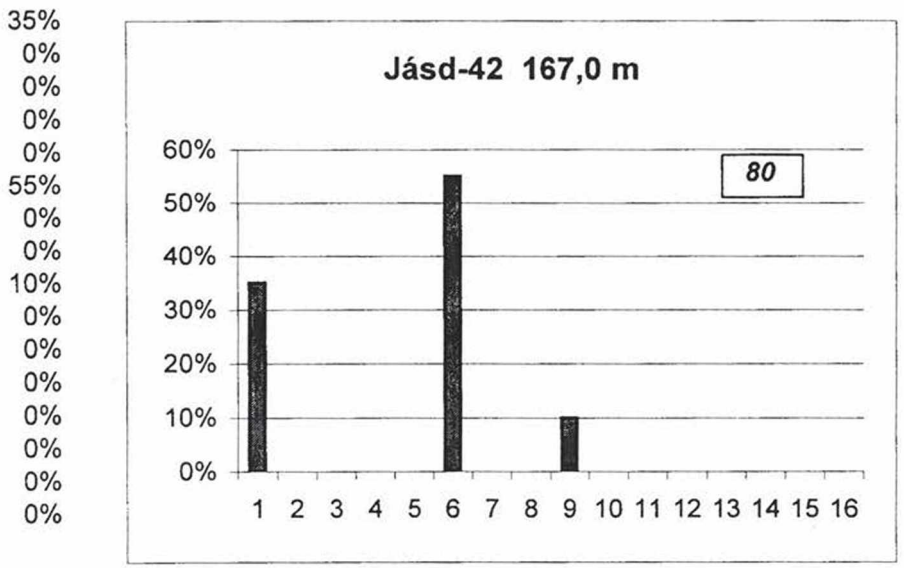

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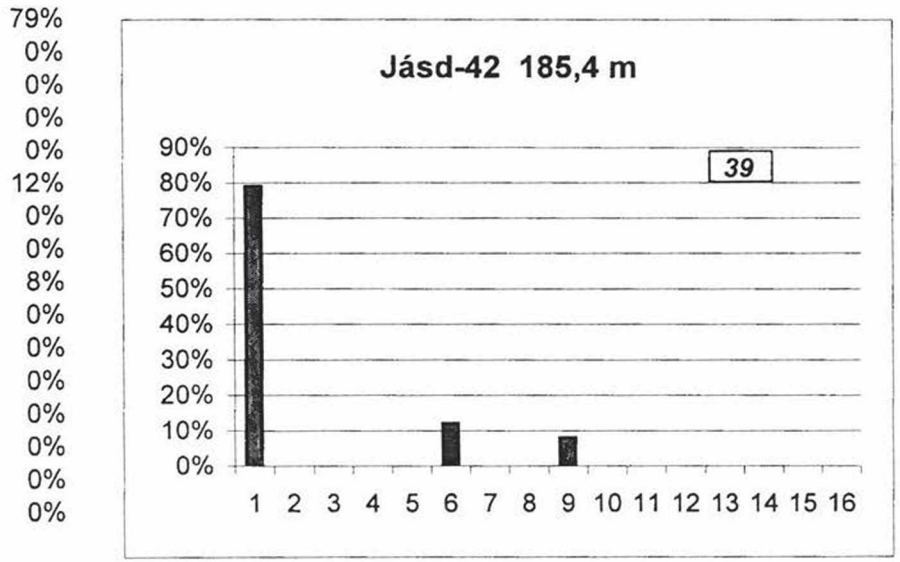

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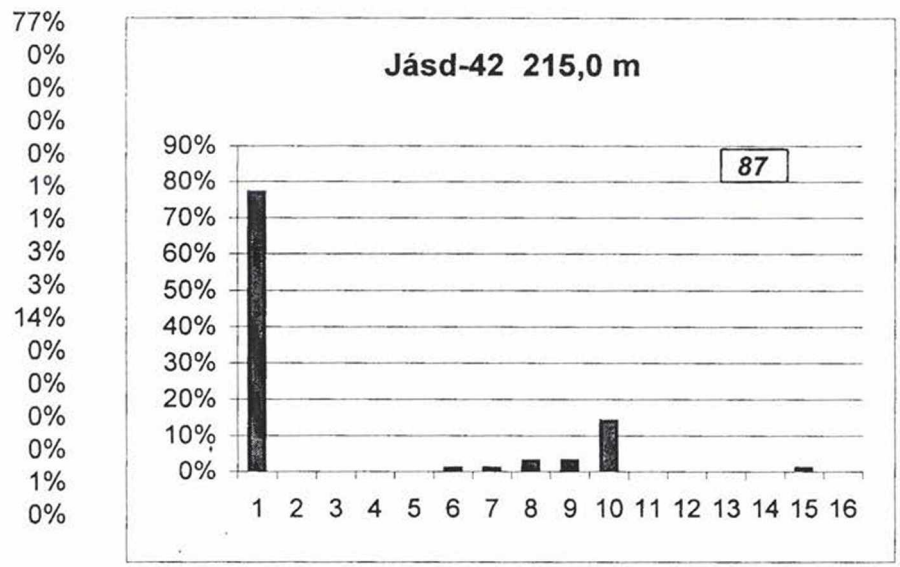

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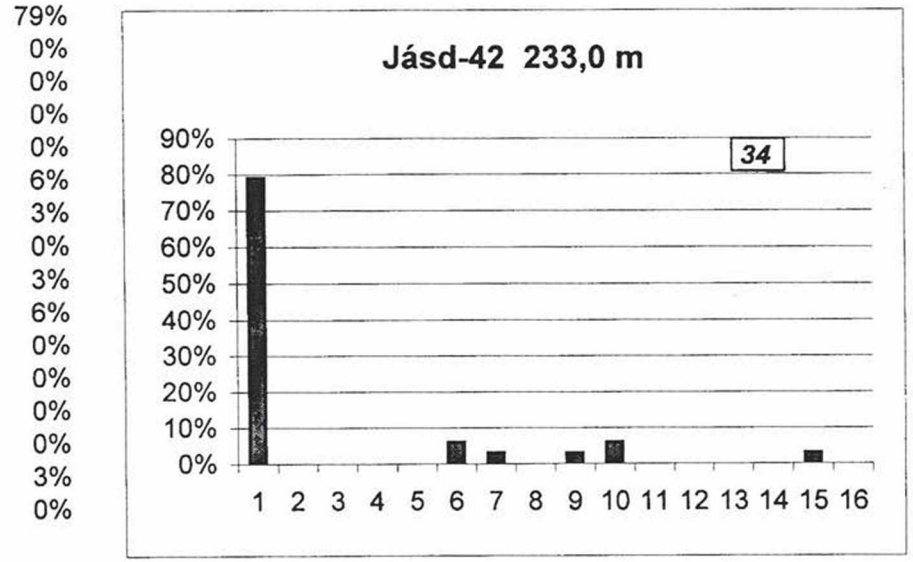

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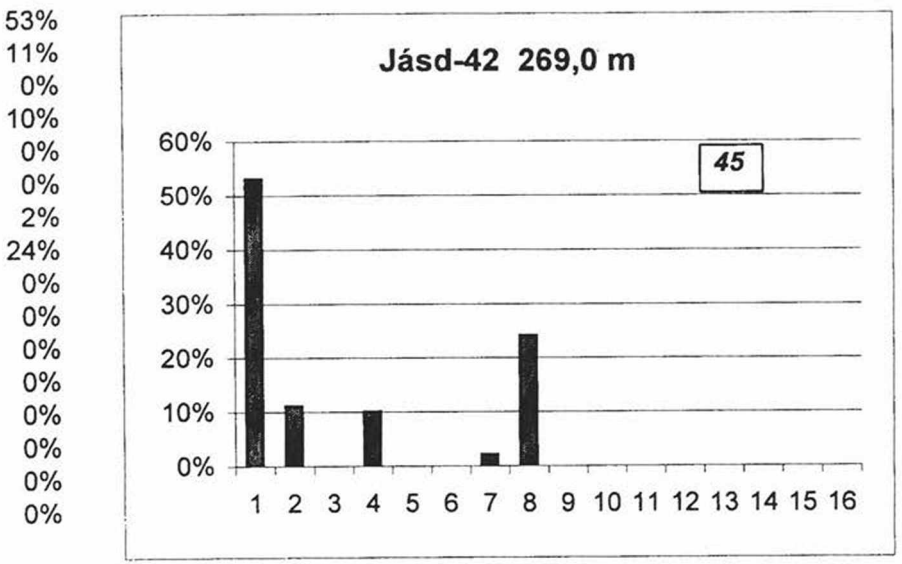

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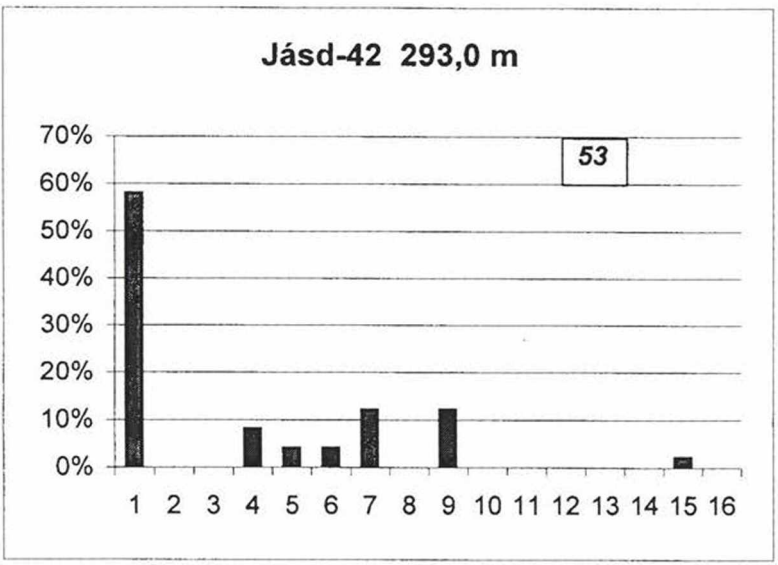

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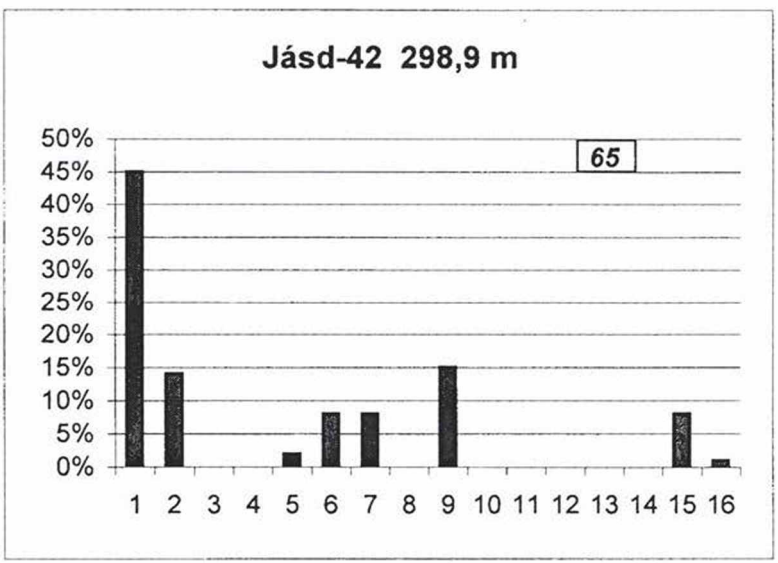

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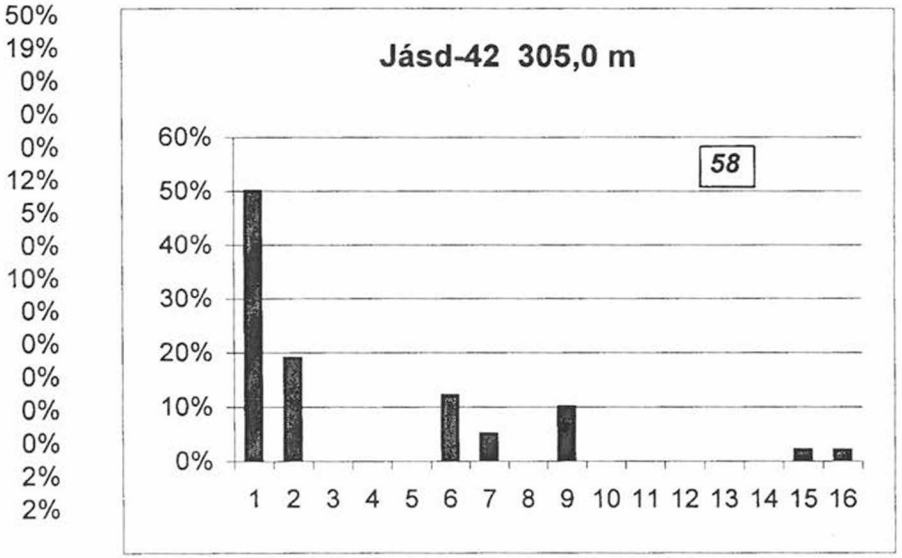

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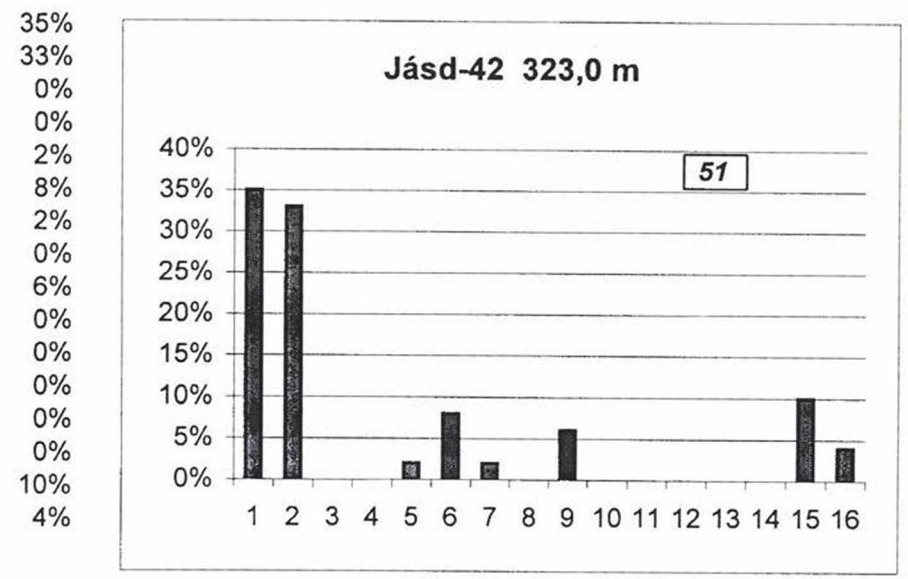

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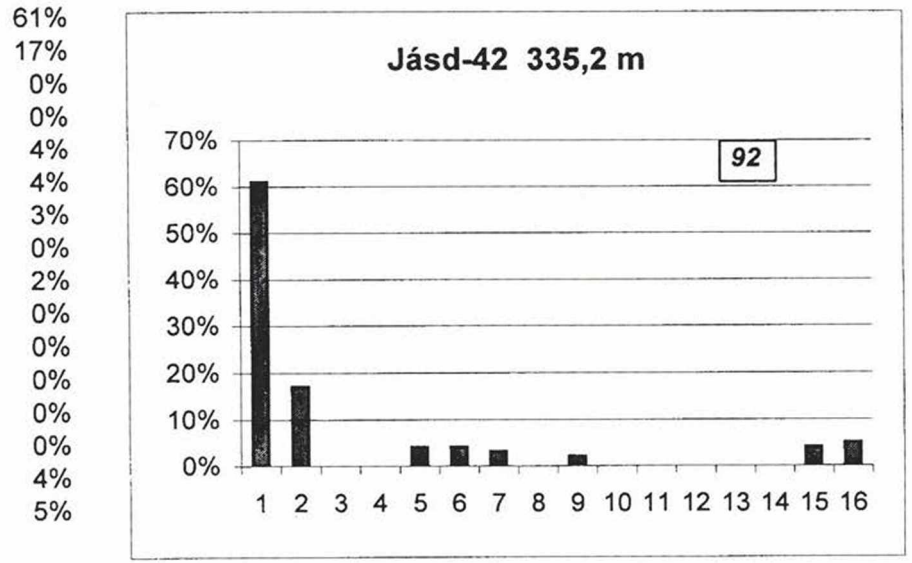

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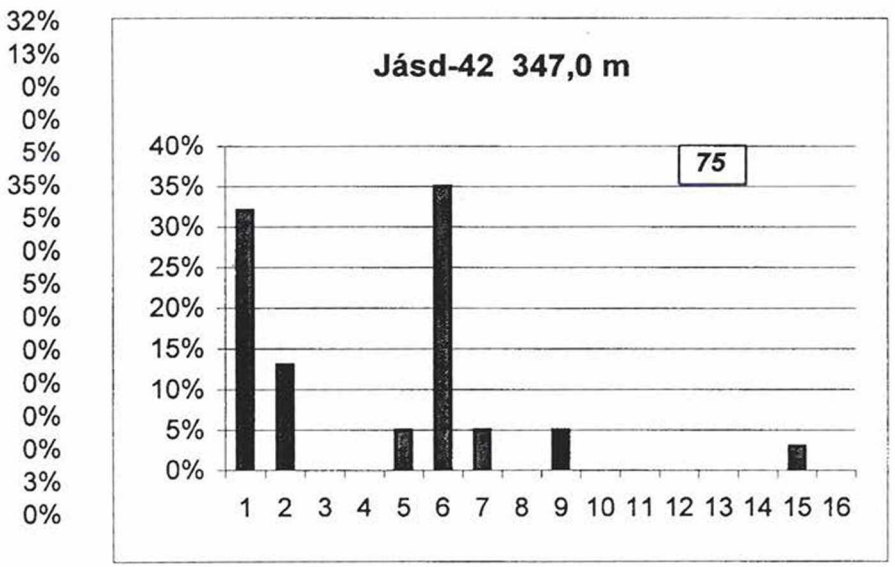

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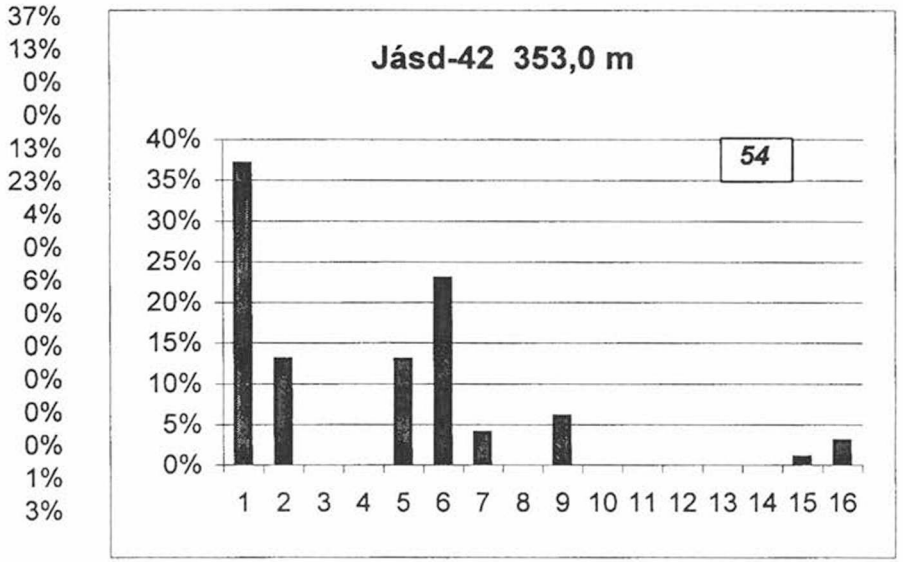

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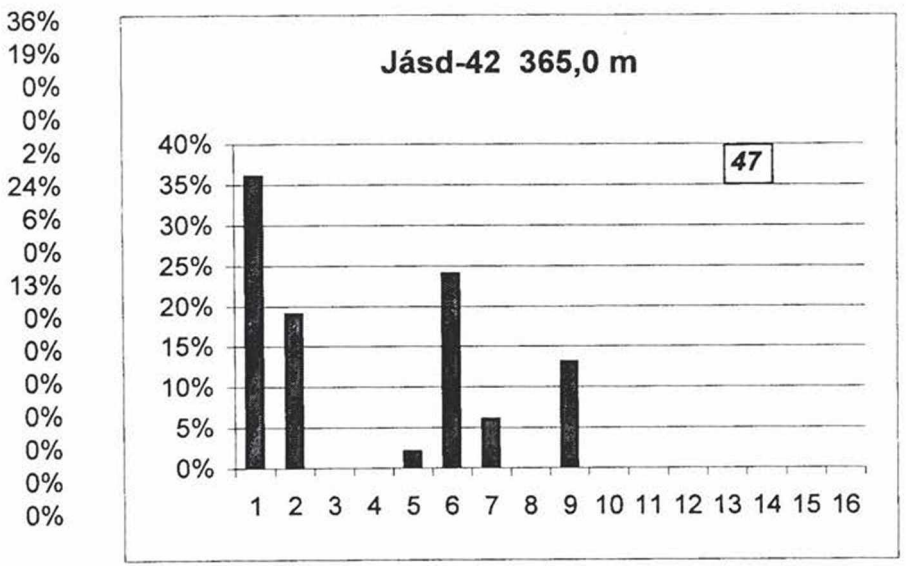

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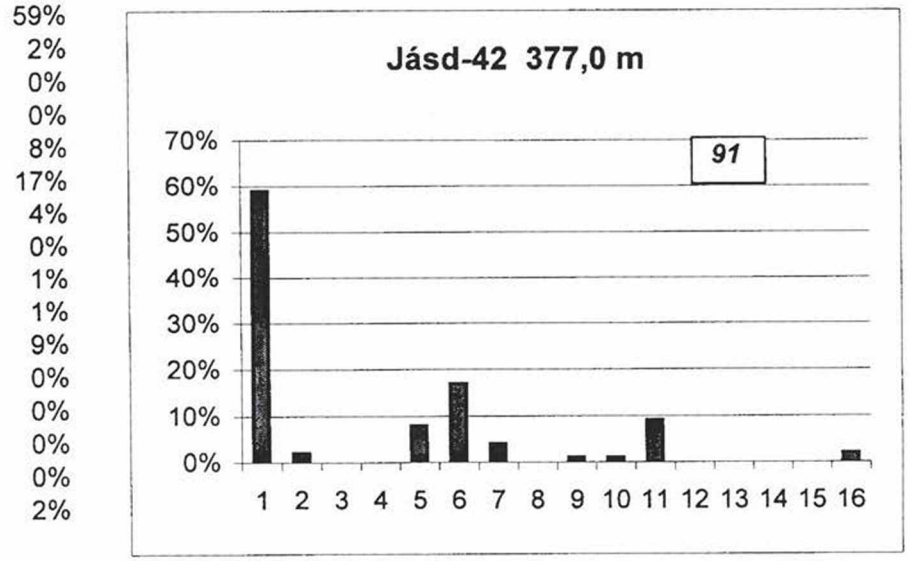

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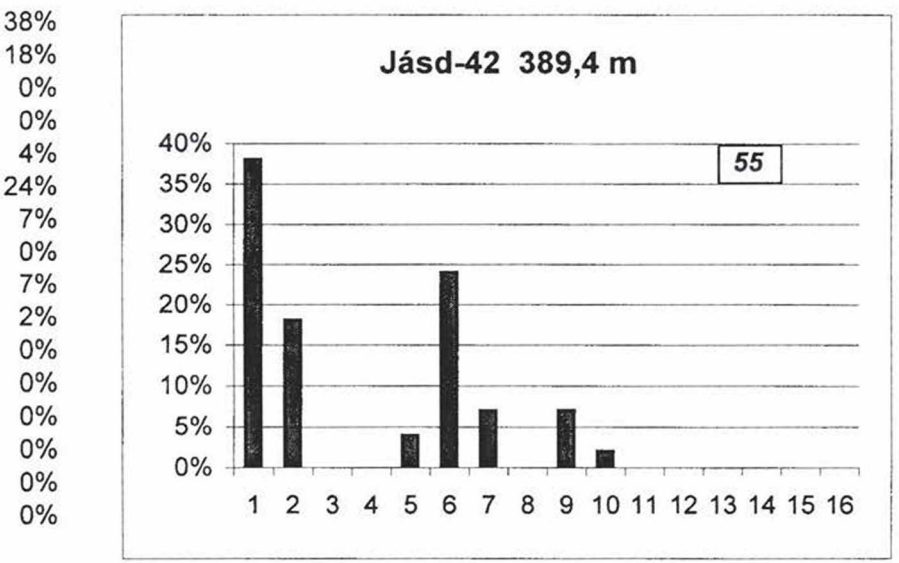

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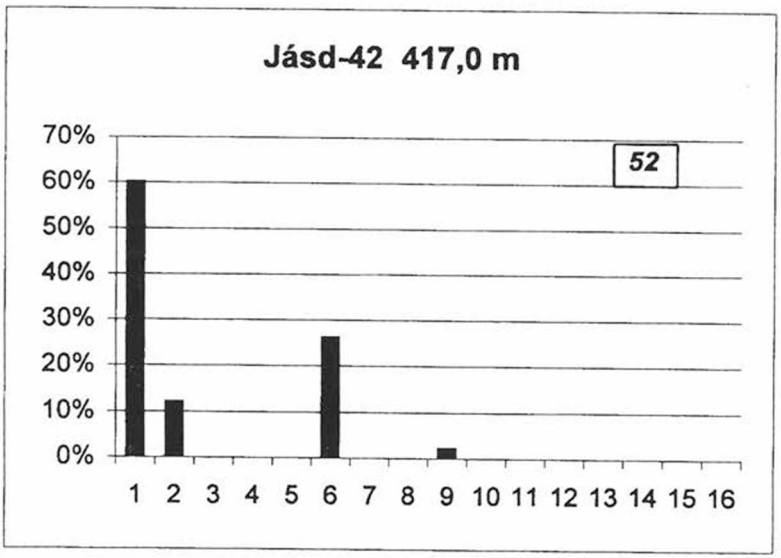

Fig. 27. For caption see Fig. 2.

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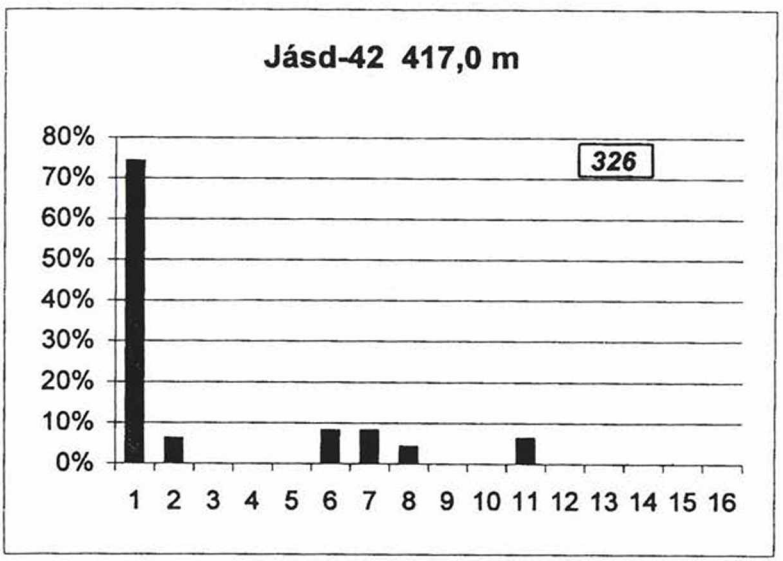


Fig. 28. For caption see Fig. 2.

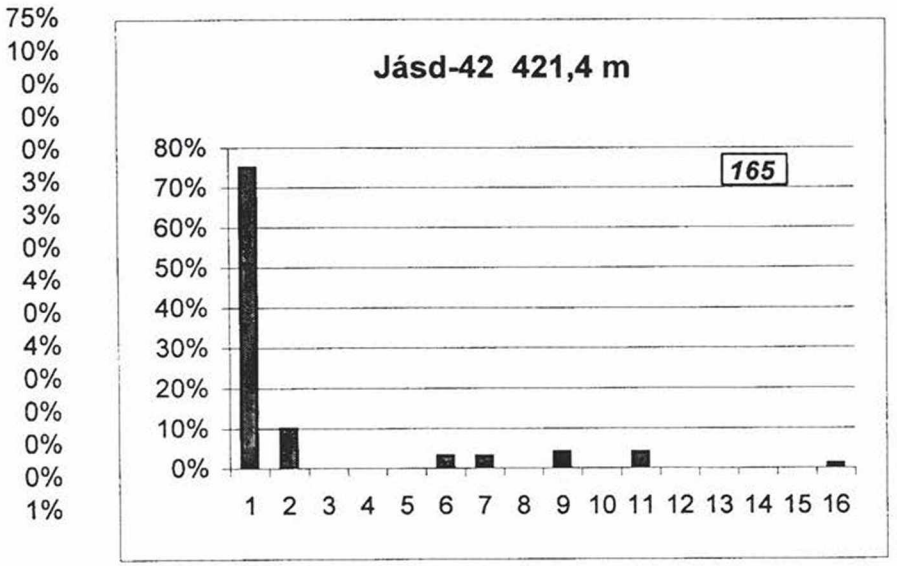
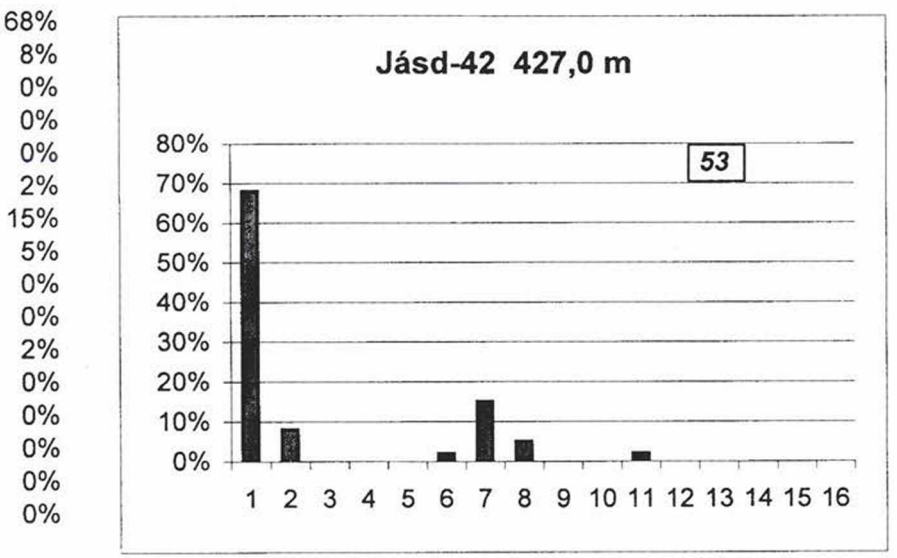


Fig. 29. For caption see Fig. 2.



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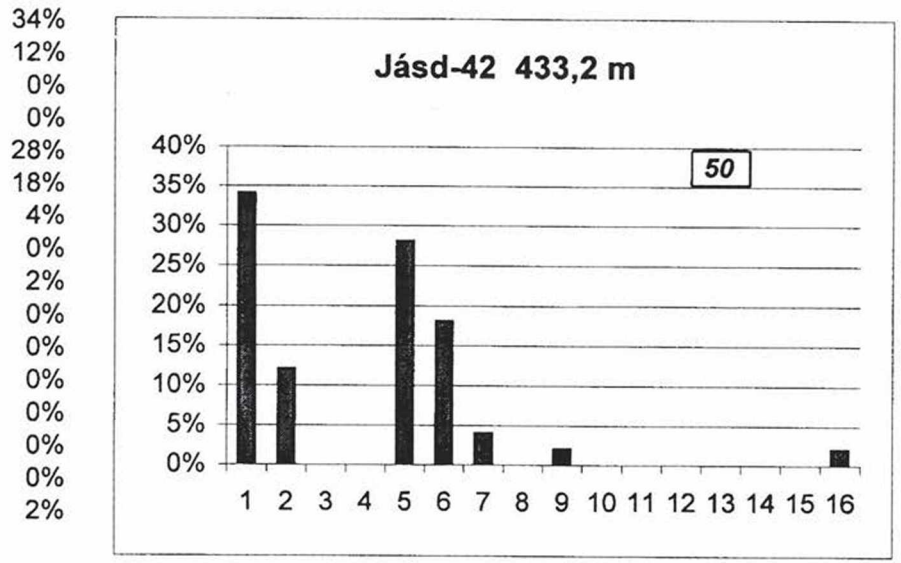

Fig. 31. For caption see Fig. 2.

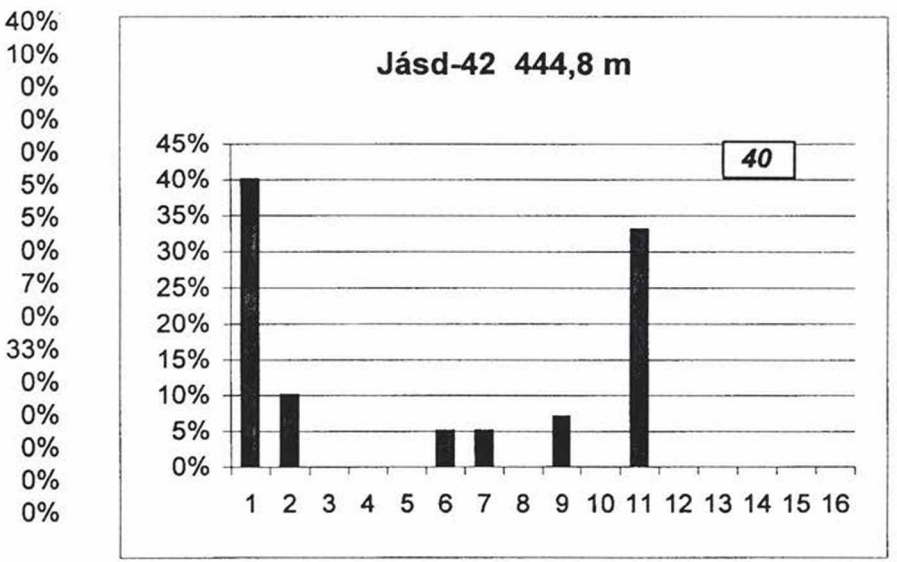

Fig. 32. For caption see Fig. 2.

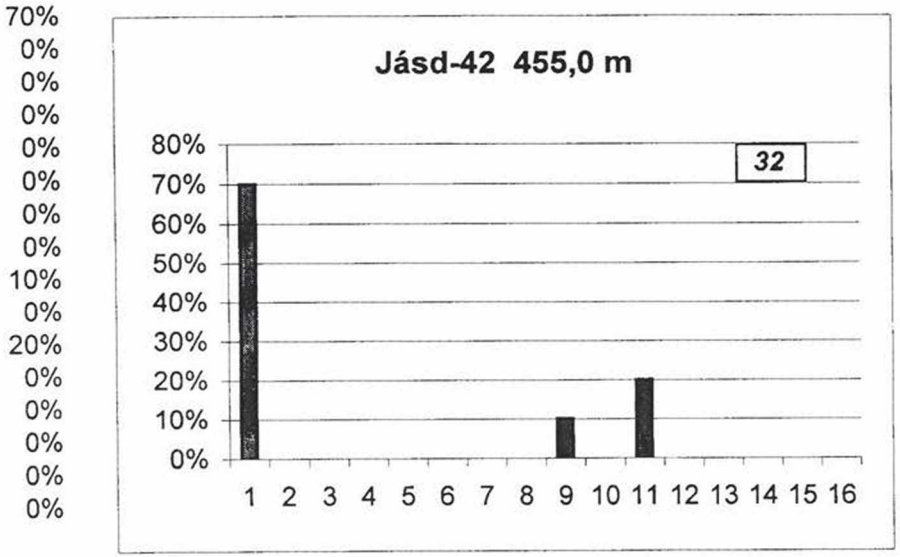

Fig. 33. For caption see Fig. 2.

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

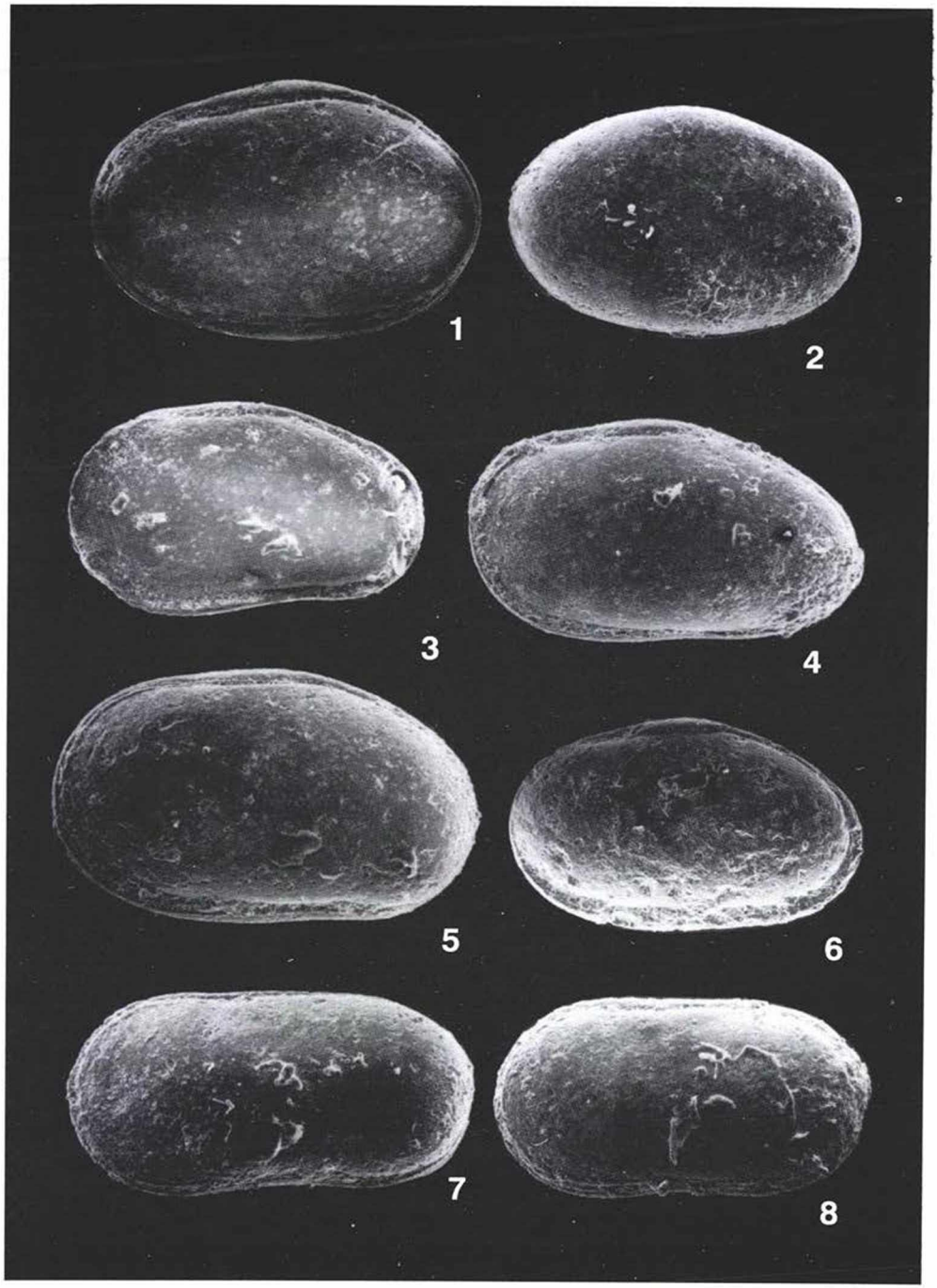

Plate 2

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

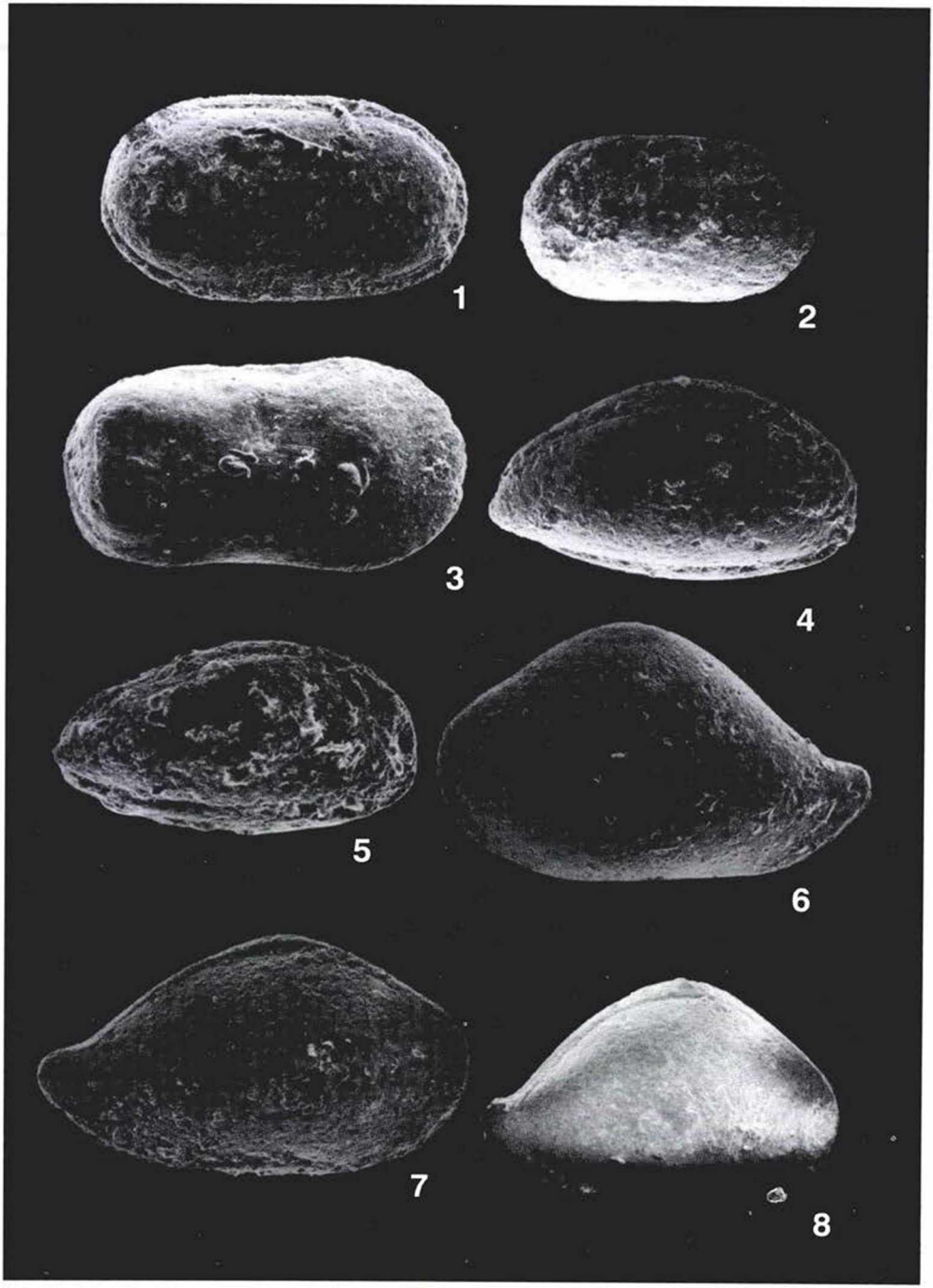

Plate 3

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

Figs 2-8. *Schuleridea 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

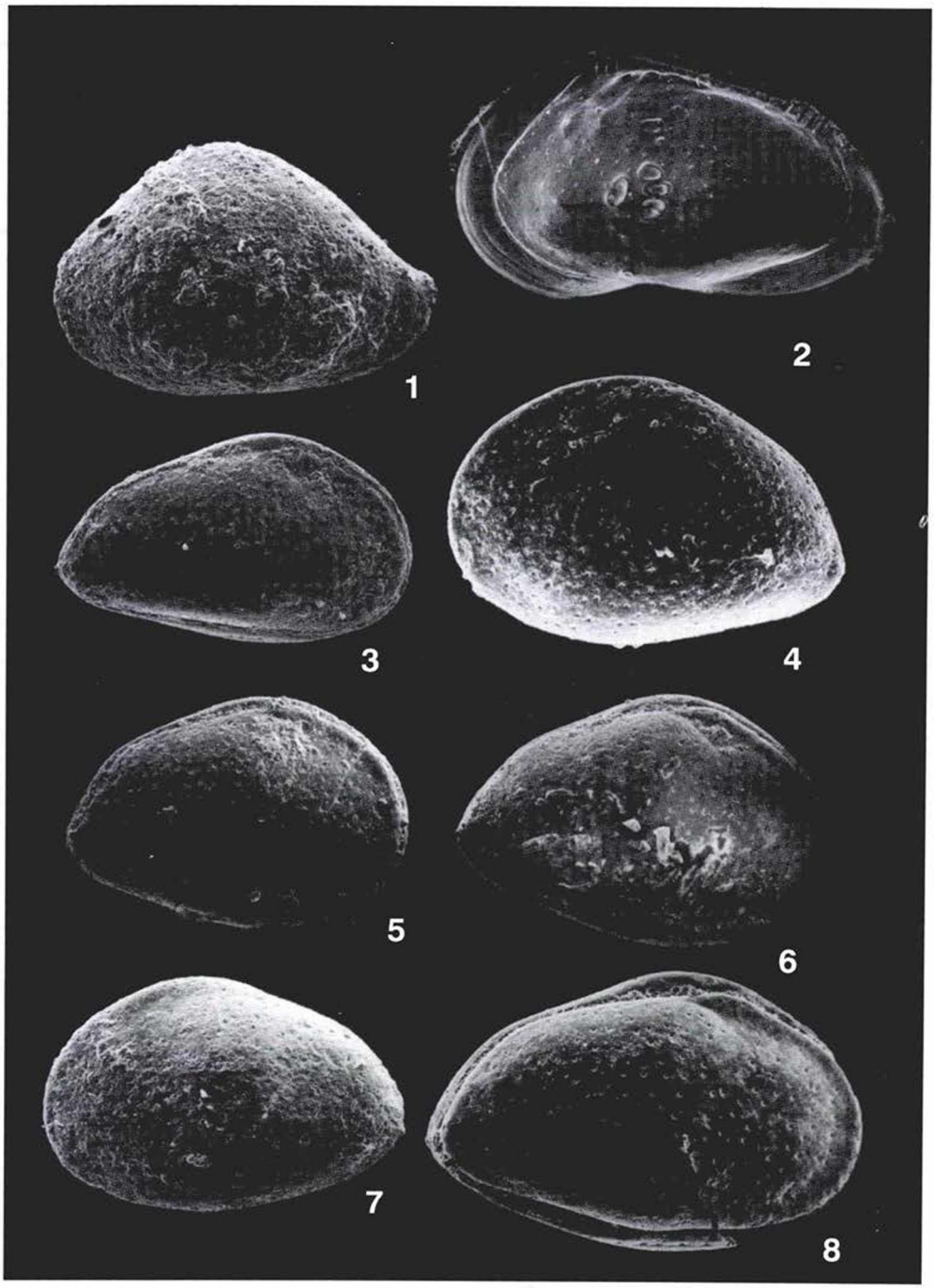

Plate 4

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

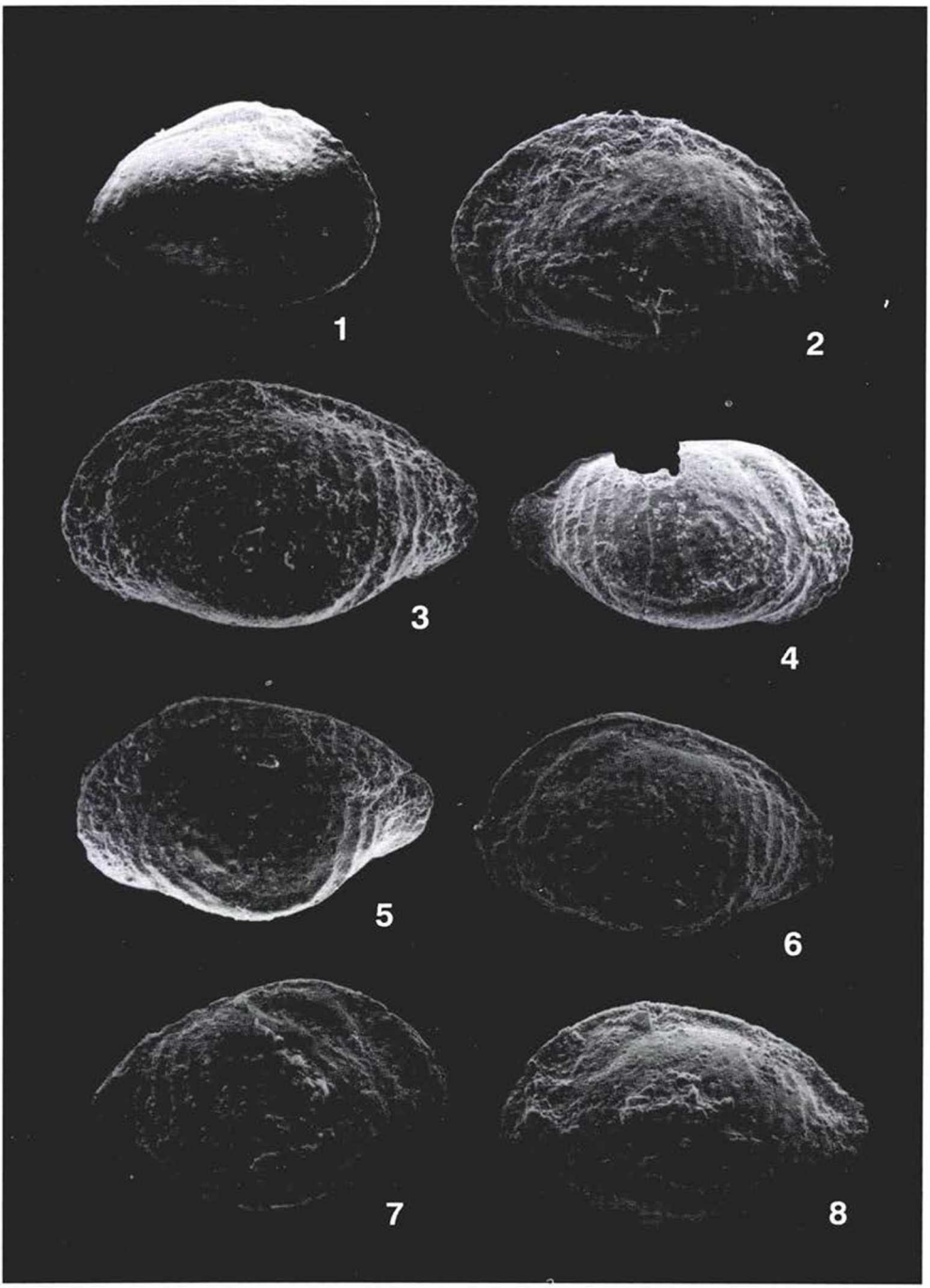

Plate 5

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

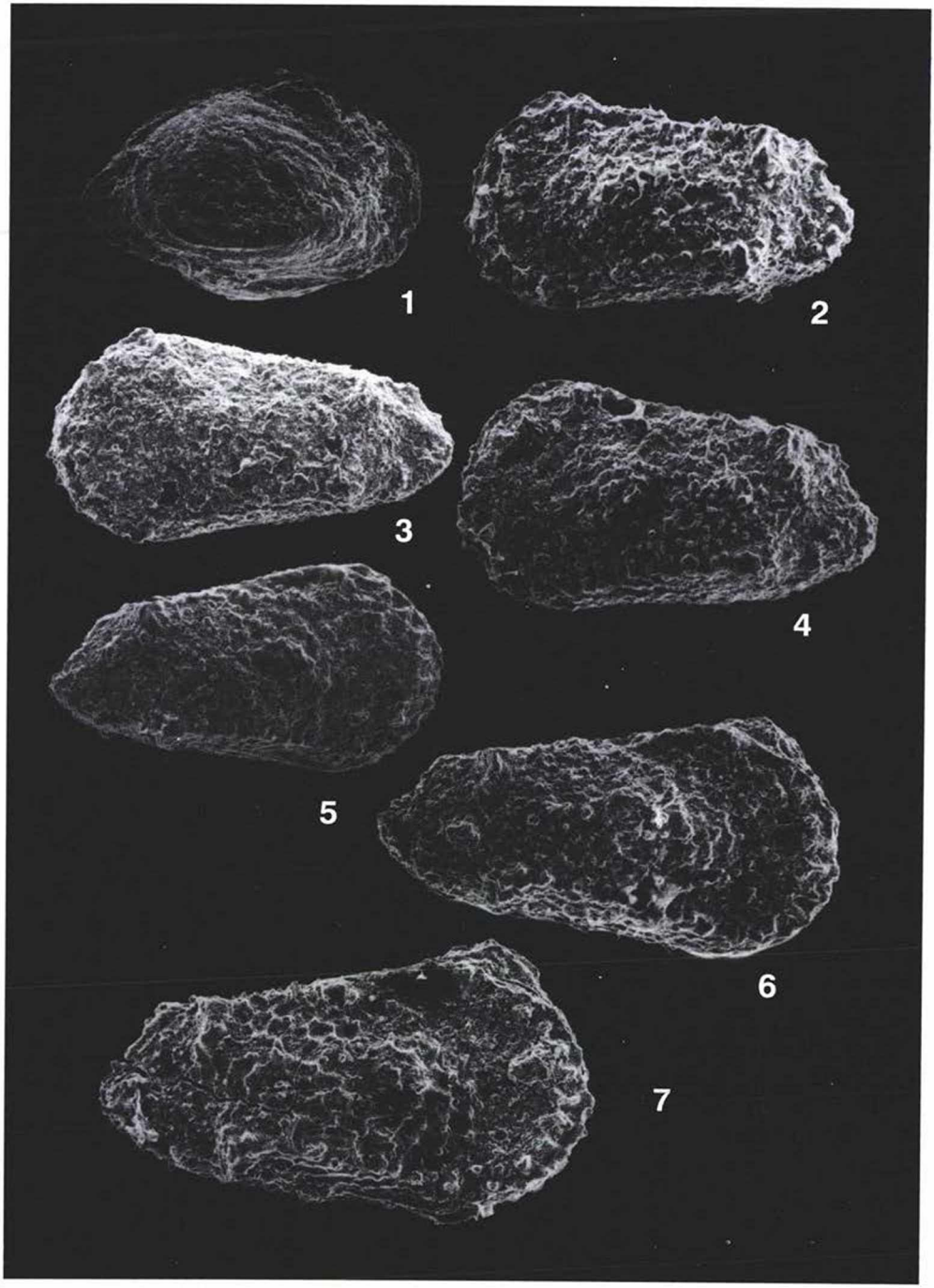

Plate 6

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

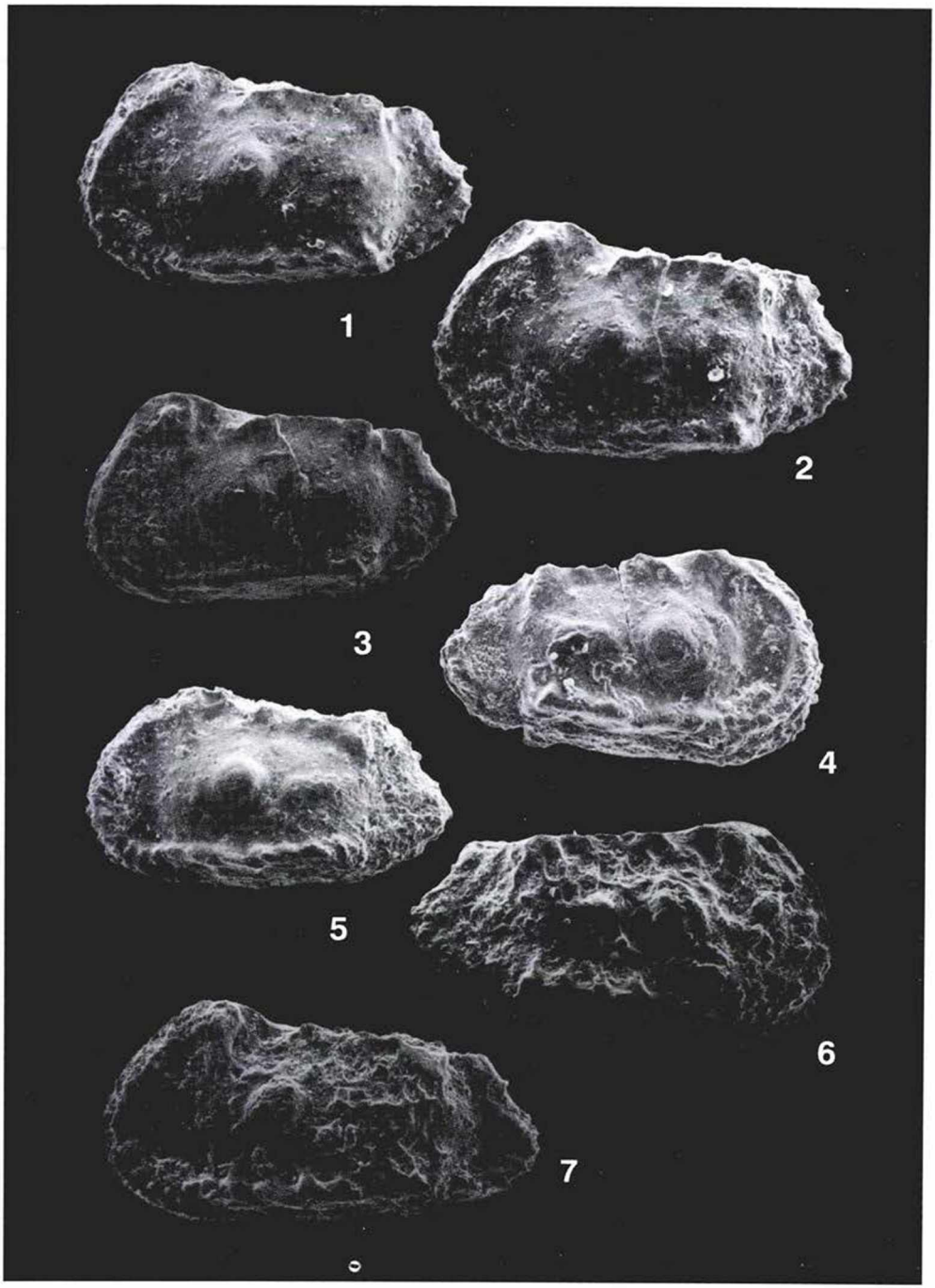

Plate 7

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

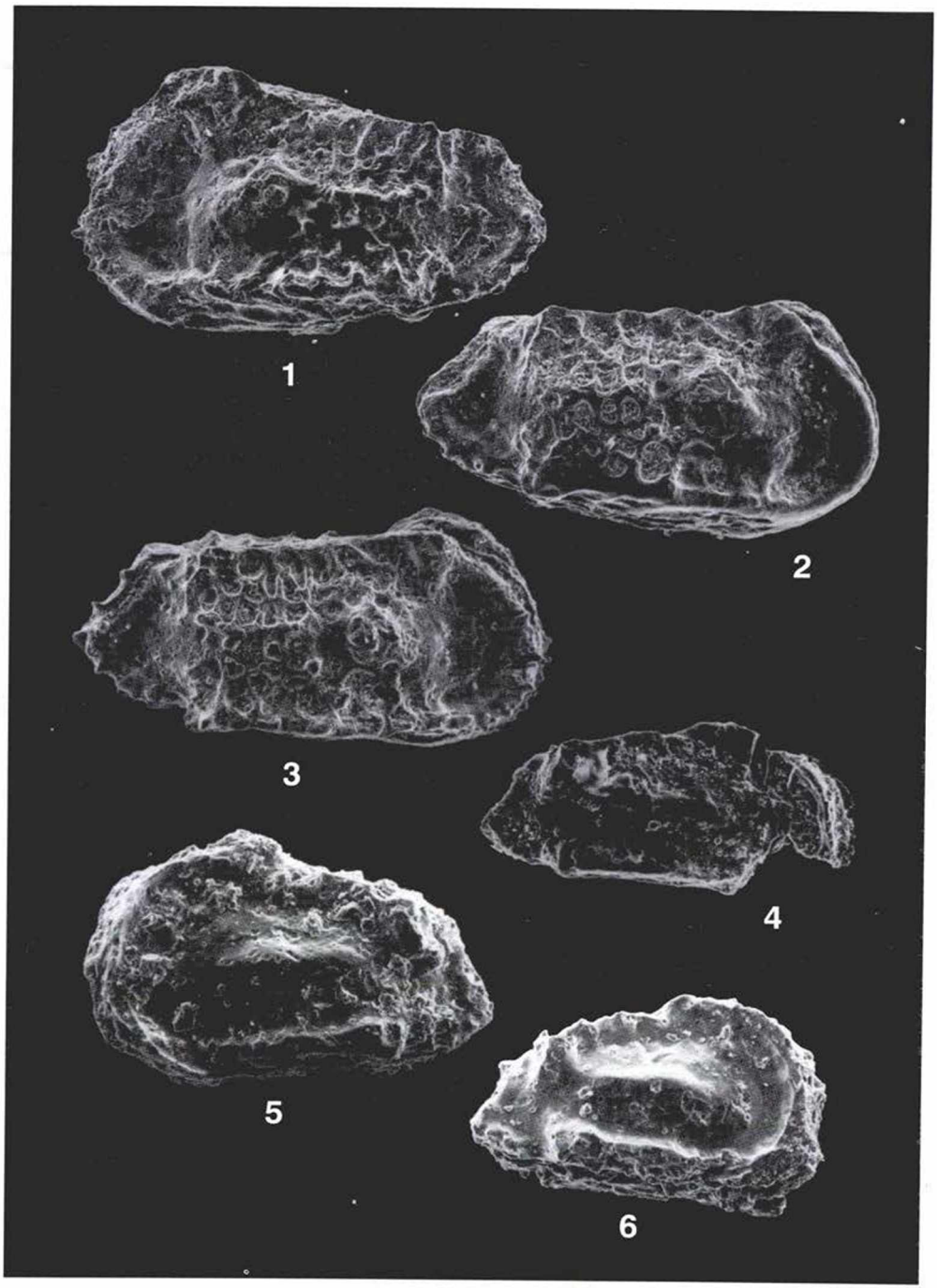

Plate 8

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

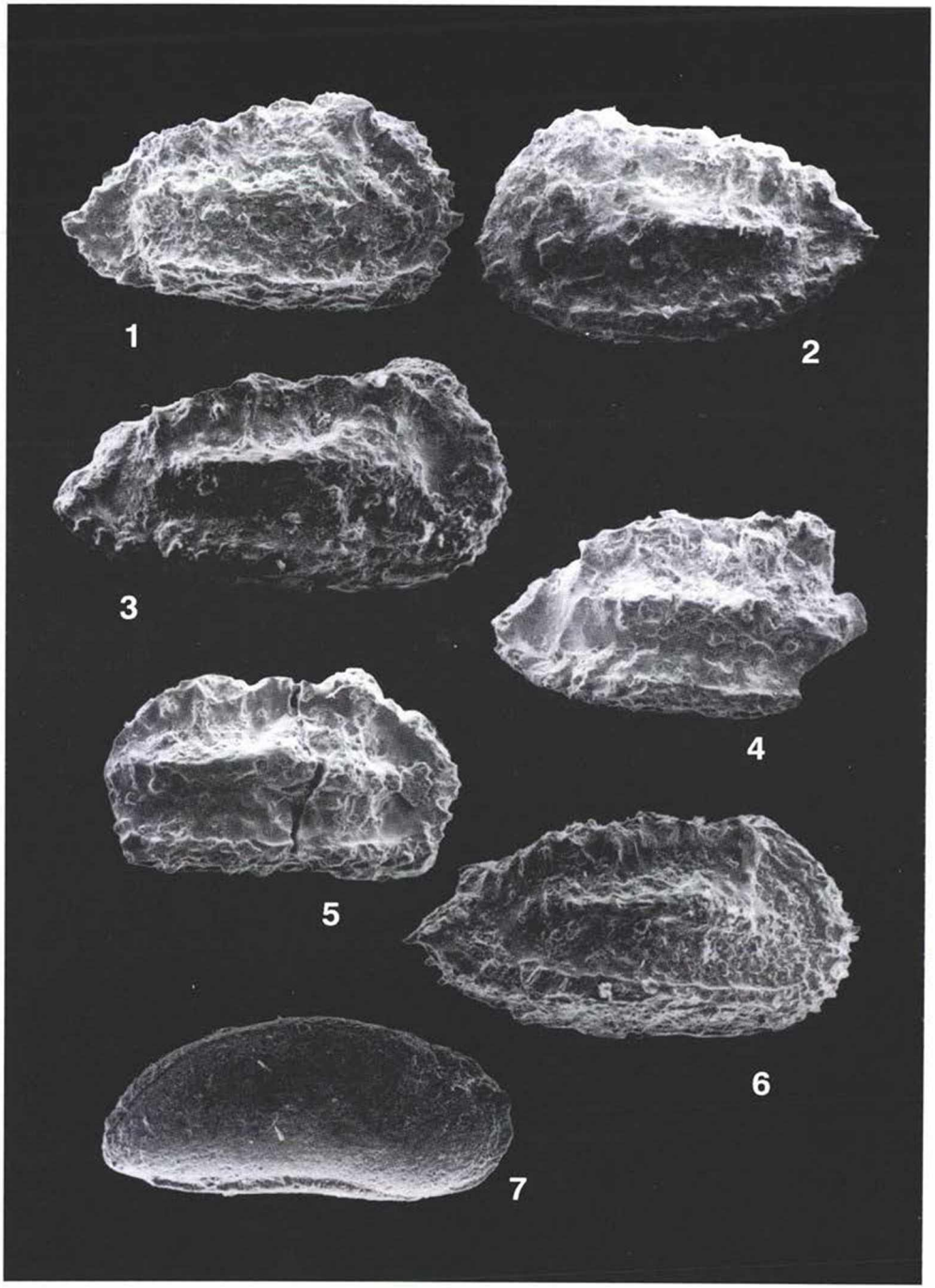

Plate 9

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