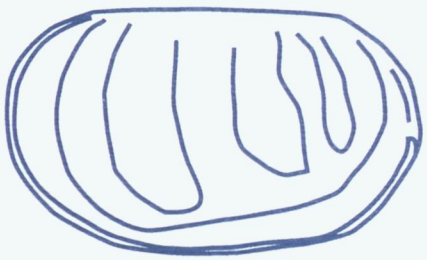
Late Ordovician Ostracodes of Estonia

Tõnu Meidla



Fossilia Baltica 2

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1. Introduction

Ordovician ostracodes have a long research tradition in Baltoscandia. They have been first mentioned in the 1850's, but only the papers of last decades (Jaanusson, 1957; Sarv, 1959; Ulst *et al.*, 1982; Schallreuter, 1986; Meidla and Sarv, 1990; Sidaravičiene, 1992) have demonstrated the extraordinary diversity of this microarthropode group in the Ordovician of Baltoscandia. The ostracode studies in the East Baltic were greatly intensified as a result of extensive drilling projects and corresponding stratigraphical work in the Ordovician subsurface area.

The general dynamics of the Ordovician ostracode fauna in Baltoscandia has been discussed in several papers (Männil *et al.*, 1966; Hints *et al.*, 1989). The most dramatic changes in the faunal composition took place at the Ordovician–Silurian boundary, which marks an almost complete faunal turnover (Nestor *et al.*, 1991). Similar events, but less conspicuous, can be recognized within the Ordovician. The most important changes in the ostracode succession occur at the lower boundary of the Oandu Stage, upper Viruan Series or, in other terms, Upper Caradocian (Hints *et al.*, 1989). Between these two marker horizons various ostracode assemblages show a close affinity, forming a comparatively homogeneous fauna, which is here termed the *late Ordovician ostracode fauna.*

The development of the late Ordovician ostracode fauna represents a complete cycle in the Ordovician sequence of the East Baltic, with a diversity increase up to the early Pirgu time and with a subsequent decline in the latest Ordovician. Due to this homogeneity, the ostracode fauna of the Oandu to Porkuni stages forms, as an entity, the subject of this paper. The stratigraphical range and integrity of this fauna is in a good accordance with the development stages of the East Baltic part of the Ordovician Palaeobasin of Baltoscandia (Põlma, 1982; Hints *et al.*, 1989).

The present study is based on Estonian material assembled from 23 core sections, 42 outcrops and one erratic boulder (figure 1). The exposures are concentrated to a sublatitudinal belt in North Estonia, corresponding to the outcrop area of the upper Viruan and Harjuan, whereas the core sections are rather evenly distributed over the Estonian territory. The distribution of the confacies belts (see Jaanusson, 1976, 1995) is also sublatitudinal within the Estonian territory. The material characterizes the North Estonian Confacies Belt and the peripheral area of the Central Baltoscandian Confacies Belt. The North Estonian Confacies Belt, representing a shallower part of the shelf basin and embracing the outcrop area, has always been more intensively studied in the East Baltic than deposits of the Central Baltoscandian Confacies Belt, known only from the subsurface.

A sublatitudinal zone in the figure 1 (a parallel hatch) agrees with the lithofacially transitional belt according to Põlma (1967). It roughly coincides with a belt of similar configuration, reflected in ostracode distribution pattern at some stratigraphical levels.

The stratigraphical framework used here (see fig. 2) is modified from the latest correlation charts of the Ordovician of the East European Platform (Männil and Meidla, 1994) and the East Baltic (Hints *et al.*, 1993). Ostracode studies were previously mostly focused on the Viru Series (e.g. Sarv in Põlma *et al.*, 1988), and the ostracode zonation compiled for this part of the sequence (Sidaravičiene, 1976) has been only recently extended up to the Ordovician—Silurian boundary (Meidla and Sarv, 1990).

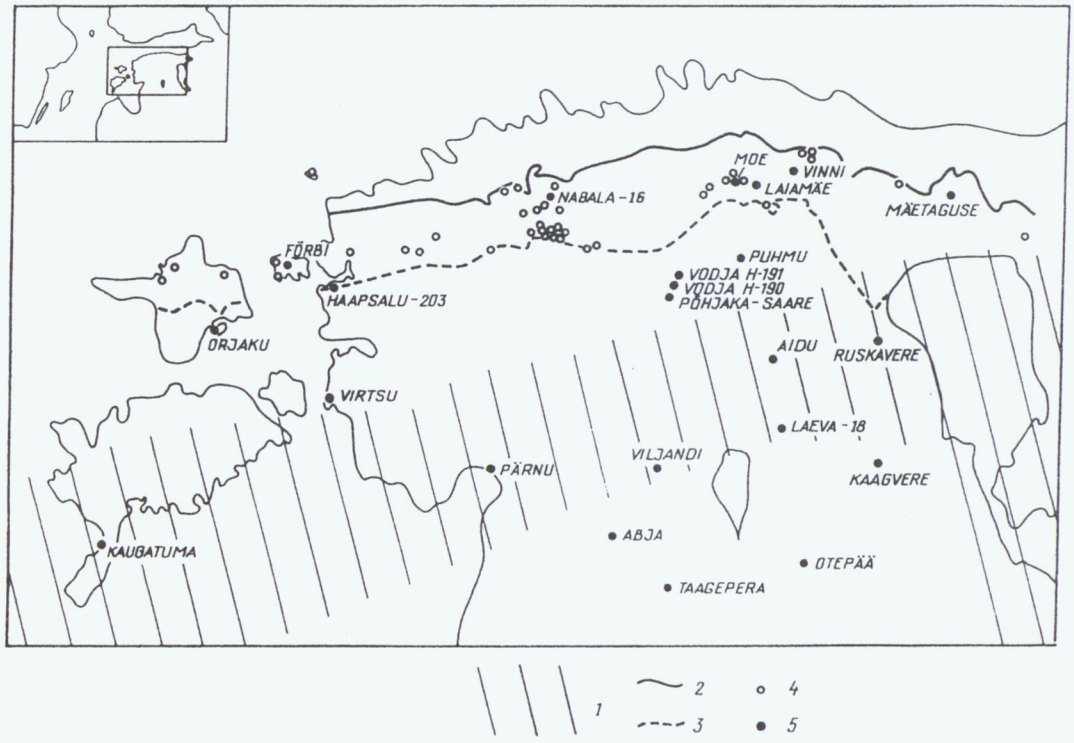

Figure 1. Location of core sections and outcrops. Legend: 1 — transitional zone by L. Põlma (1967); 2 — northern boundary of the distribution area of the Oandu Stage; 3 — southern boundary of the Ordovician outcrop area; 4 — outcrops (names are given in the figs 41–46); 5 — core sections.

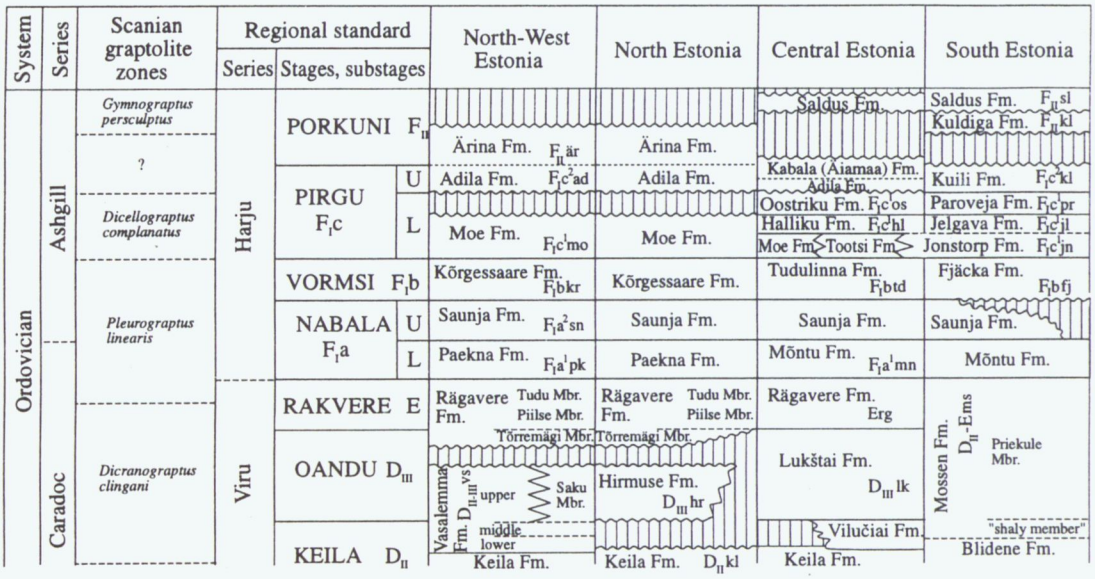

Figure 2. Stratigraphy of the uppermost Viruan and Harjuan in Estonia (modified from Hints *et al.*, 1993, Männil and Meidla, 1994). Indices of the stratigraphical units not presented in the figure: Kabala Fm. — F$_1$c–F$_{II}$kb; Tootsi Fm. — F$_1$c^{1}ts; Vilučiai Fm. — D$_{II}$vl; Blidene Fm. — D$_{II}$bl.

Acknowledgements. The author wishes to thank Mrs. A. Põldvere, H. Perens and J. Nõlvak for making unpublished information available. The mostly unpublished logs of core sections and valuable comments by late Lembit Põlma have been of great assistance. Special thanks are addressed to Dr. Lembit Sarv for placing several series of samples at author's disposal, for friendly advice and help in all stages of research. Prof. V. Jaanusson, Dr. L. Hints and colleague I. Puura are acknowledged for valuable comments on the manuscript.

The author would like to thank Dr. L. Gailīte, Dr. N. Sidaravičiene, Dr. E. Olempska, Dr. J. Sztejn and Prof. G. Henningsmoen for making their collections available for comparative study, and Prof. D. Bruton and I. Puura for their friendly help during studies of the collection in Oslo and in Uppsala. Of great assistance has been R. Klaas, who prepared numerous samples for ostracodes. L. Lippert and K. Ronk draw the text-figures, U. Moldov and G. Baranov prepared the photographs and A. Noor rendered linguistical help at several stages of my research. Author's sincere thanks are adressed to all.

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2. Material and methods

Altogether more than 1000 micropalaeontological samples from 66 localities have been analyzed (fig. 1). For comparative purposes other collections at the Institute of Geology (Tallinn, Estonia), and material of late Ordovician ostracodes from Latvia, Lithuania, north-eastern and southern Poland, Norway and, to some extent, Sweden, have been used. Some North American material and photographs of several type specimens from A. Krause's collection (courtesy of V. Jaanusson and L. Sarv) have been available for a comparative study. In 1984, the type specimens in A. Neckaja's ostracode collection, stored in St. Petersburg (All-Union Petroleum Scientific-Research Geological Institute — VNIGRI), were examined and photographed in Tallinn.

Weight of a sample from the cores was mostly 300–700 g with a sampling interval of 1–1.5 m. Samples from the exposures weighted 0.5–1.5 kg. The sampling interval varied from a single sample from a section up to bed-by-bed sampling in some cases (up to 20 samples). The samples were disintegrated by means of sodium hyposulphite, with repeated heating and cooling. Usually satisfactory results were obtained with up to 30 heating cycles (in case of argillaceous limestones or marls), but in some cases the number of cycles has been considerably larger (in case of pure limestones). Very clayey samples were subsequently processed with hydrogen peroxide for accelerating the washing process.

Figured specimens were coated with gold, with fine coat ion sputter ISC-1100, and photographed with TESLA BS-300 scanning electron microscope.

All figured specimens, figures of which have not been published earlier, belong to the collection of the Institute of Geology (Tallinn, Estonia) and are temporarily deposited at the Institute of Geology, Tartu University.

3. History of studies on late ordovician ostracodes of Baltoscandia

The present state of the knowledge of late Ordovician ostracodes in Baltoscandia is a result of studies in three main regions: the East Baltic area and Poland, Scandinavia and northern Germany, where the Ordovician ostracodes have been investigated from erratic boulders probably mostly derived from the submarine outcrop area of the Baltic sea.

The occurrence of ostracodes in the Ordovician deposits of Estonia was first recorded by Eichwald (1855) and Schmidt (1858). Some decades later the investigation of ostracodes from erratic boulders in Germany was started by Krause (1889, 1892, 1897 etc.), Steusloff (1895) and Kummerow (1924). An extensive review on these materials is given by Schallreuter (1993a).

In the years 1900–1940 studies on ostracodes of Estonia were mainly focused on the material from the middle Ordovician kukersite-bearing strata (Bonnema, 1909; Öpik, 1937). In other parts of Baltoscandia, Troedsson's (1918) review on the late Ordovician ostracodes from Scania is of great importance. A similar association of ostracodes has recently been established in the East Baltic core sections (Gailīte, 1970; Meidla, 1996).

In late 1940's studies of late Ordovician ostracodes from core sections was started in Baltoscandia. In Sweden, Henningsmoen (1948) described the fauna from the *Tretaspis* Series of the Kullatorp core. Several of these species have been identified later in the late Ordovician deposits of Estonia and Latvia (Sarv and Meidla, 1984; Ulst *et al.*, 1982). Henningsmoen's subsequent studies (1953, 1965) dealt with the problems of the classification of Palaeozoic ostracodes and related terminology and the description of new fauna from outcrops of the Oslo Region of Norway, in part of late Ordovician age (Henningsmoen, 1996).

In the East Baltic region the investigation of ostracodes in the core material were started by Neckaja in the 1950's. In a number of papers and monographs (Neckaja, 1952, 1953, 1958, 1966, 1973, Abushik *et al.*, 1960) numerous new species were described, among them more than 30 late Ordovician species from the East Baltic area and Pskov district of Russia. In 1966, Neckaja erected also three new families: Schmidtellidae, Longisculidae and Rectellidae.

A systematic study of Ordovician ostracodes in Estonia started in mid-1950's. In numerous papers Sarv (1956, 1959, 1960, 1962, 1963, 1968) described Ordovician palaeocope faunas, mainly from northern Estonia. In 1956 Stumbur provided a description of several species from the Porkuni Stage, mostly of long-range podocope ostracodes.

Of particular significance to the Ordovician ostracod studies in Sweden are the works by Jaanusson (1957, 1966, etc.) in which a modern systematics of Beyrichiocopa was introduced. References to late Ordovician ostracodes were published also by other Swedish authors (Martinsson, 1956; Hessland and Adamczak, 1974).

Since 1964, after a long pause, the investigation of ostracodes from erratic boulders in Germany was continued by Schallreuter, who published a great number of papers on the middle and late Ordovician ostracode taxonomy of Baltoscandia (for a recent review see Schallreuter, 1993a).

The study of Ordovician ostracodes in Latvia and Lithuania resumed, after Neckaja's activities, in the 1970's. Gailīte published several papers on late Ordovician ostracodes of Latvia, mostly describing new species (Gailīte, 1970, 1971, 1975a, 1975b), but also biostratigraphical results (Gailīte, 1972). Her data on the ostracode distribution in the Ordovician of Latvia are summarized in the monograph "Ordovician of Latvia" (Ulst *et al.*, 1982). The taxonomy of the Ordovician ostracodes of Lithuania is discussed in a set of articles by Sidaravičiene (1971, 1975), followed by a monograph (1992), which includes also late Ordovician material. The distribution pattern of the Ordovician ostracodes of Lithuania is presented in separate papers

(Sidaravičiene, 1976, 1985; Sidaravičiene and Saulenene, 1980). Occasional references to late Ordovician ostracodes are found also in the monograph by Pranskevičius (1972) on Silurian ostracodes of Lithuania.

Taxonomy and distribution pattern of late Ordovician ostracodes of Estonia have been discussed also in the 1980's and 1990's. (Sarv and Meidla, 1984, 1986; Meidla, 1983, 1986a, 1986b, 1993, 1995, 1996; Meidla and Pak, 1989; Hints *et al.*, 1989; Nõlvak *et al.*, 1989; Meidla *et al.*, 1990; Meidla and Sarv, 1990; Nõlvak and Meidla, 1990).

Several elements of the ostracode fauna of East Baltic type have been recorded also from the areas adjacent to the East Baltic region. Abushik and Sarv (1983) demonstrated a close similarity between the late Ordovician ostracode associations of the East Baltic area and the Molodovo Formation of Podolia. Sztejn (1985, 1989) distinguished a diverse assemblage of ostracodes in late Ordovician deposits of north-eastern Poland, with a composition close to that of the East Baltic fauna.

For a long time the highly diverse Ordovician ostracode fauna of Baltoscandia, rich in palaeocopes and metacopes, was considered as largely endemic. However, there are some faunal similarities between Baltoscandia and both North America (Copeland, 1965, 1983; Schallreuter and Siveter, 1985) and Britain (Vannier *et al.*, 1989). Some late Ordovician ostracode species which were described from Baltoscandia have been reported from other regions as well (Melnikova, 1986; Schallreuter, 1990c).

4. General remarks on ostracode fauna

The late Ordovician ostracode fauna of Estonia comprises 116 genera and 215 species. Their arrangement according to families is shown in table 1. 67% of the total number of species are representatives of the order Beyrichiocopa, 28% are assigned to Podocopa. Among the representatives of Beyrichiocopa the extraordinary diversity of the family Tetradellidae should be pointed out. This family becomes nearly extinct at the beginning of the Silurian Period. With regard to diversity of species, tetradellids are followed by Oepikellidae, Steusloffinidae, Krausellidae, Longisculidae, Bollidae and Circulinidae.

Temporal changes in the composition of the ostracode fauna are demonstrated in the figures 3 and 4. From Oanduan up to the end of the Ordovician the most important changes in the relative importance in the number of genera within various suborders (fig. 3) are as follows:

(1) — the role of the genera of Palaeocopa decreased from 51.0% to 38.0% by the end Ordovician;
(2) — the importance of Metacopa rised from 17.0% to 28.0% by the end Ordovician;
(3) — the genera of Leiocopa increased in importance during that time from 1.9% to 4.0%;
(4) — the relative importance of cytherelliform genera reduced from 7.6% to 2.0%.
(5) — in Baltoscandia an almost continuous increase in the diversity of Binodicopa (Vannier *et al.*, 1989), is reversed in the upper Ordovician of Estonia (from 13–15.1% to 8.3–9.6%), with a subsequent rapid increase in Porkuni time (up to 20%).

Similar trends are observed at the species level also (see fig. 4): The role of Palaeocopa decreases from 58.5% to 48.0% and of Cytherelliformes from 9.4% to 2.0%, a reverse tendency is noted by Metacopa (from 20.8% to 58.0%) and Leiocopa (from 1.9% to 8.0%).

Table 1. General taxonomical structure of the late Ordovician ostracode fauna of Estonia.

Family	Number of genera	Number of species and subspecies
Primitiopsidae	2	3
Oepikellidae	9	16
Eurychilinidae	1	1
Euprimitiidae	3	6
Tvaerenellidae	6	9
Hithidae	2	5
Ctenonotellidae	6	7
Tetradellidae	21	38
Bolbinidae	1	7
Hollinidae	1	1
Drepanellidae	2	4
Bolliidae	6	10
Aechminidae	3	4
Circulinidae	6	10
Spinigeritidae	2	3
Aparchitidae	2	6
Jaanussoniidae	2	7
Conchoprimitiidae	1	1
Eridoconchidae	1	1
Beyrichiocopa, suborder uncertain	4	5
Monotiopleuridae	3	5
Primitiidae	1	1
Leperditellidae	2	2
Amphissitidae	2	2
Thlipsuriidae	1	2
Bairdiocyprididae	4	6
Longisculidae	3	11
Steusloffinidae	5	14
Pachydomellidae	2	5
Krausellidae	8	12
Rectellidae	1	7
Bairdiidae	1	1
Podocopa, suborder uncertain	2	3

According to Vannier *et al.* (1989) in Baltoscandia the role of metacopes has been stable in the Ordovician up to the Caradocian (4–6%), but rises up to 12% in the Ashgillian. The rate of change rate for Estonia considerably exceeds the regional average, apparently due to the situation of Estonia in relation to the confacies zonation. The Central Baltoscandian Confacies Belt appears to have been less affected by these changes. The increase in the metacope diversity in the Harjuan of Estonia is associated with an increase in the average number of metacope specimens in samples. The increase in both diversity and abundance of metacopes in Baltoscandia at the end of the Ordovician is obviously related to the rapid shift of Baltica into the low latitude area.

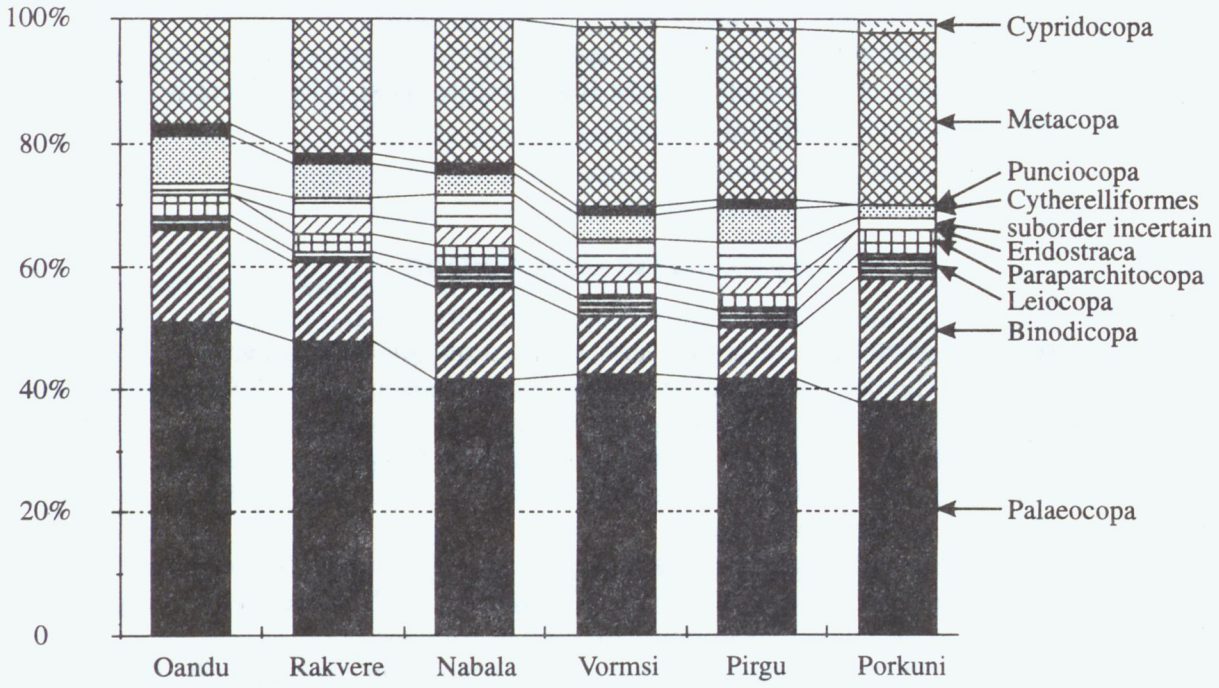

Figure 3. Generic percentage abundance of ostracode suborders in the Oandu to Porkuni stages.

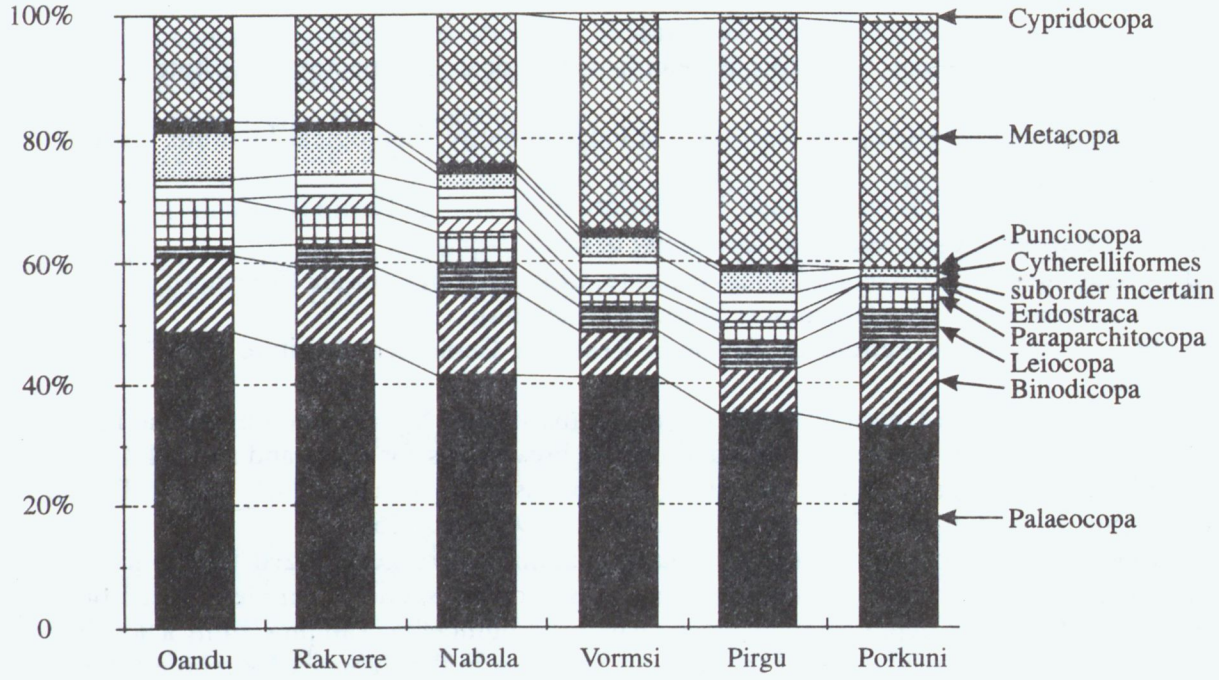

Figure 4. Species percentage abundance of ostracode suborders in the Oandu to Porkuni stages.

The dynamics of Binodicopa reflects the major events in the geological history of the Baltoscandian area. The decrease in its relative importance at the genus level during early late Ordovician (fig. 3) is apparently related to the above-mentioned palaeogeographical changes. An increase in binodicope diversity in the uppermost Ordovician is possibly due to the short-

term glacial event at the end of the Ordovician (see Brenchley *et al.*, 1994) and the corresponding faunal rearrangement (Meidla, 1996).

The role of other suborders is more or less stable (such as the diversity of Paraparchitocopa) or does not show distinct trends (Cytherelliformes). The diversity of several suborders (Punciocopa, Cypridocopa) is very low.

5. Systematic description

The classification of ostracodes used in this work is based mainly on Vannier *et al.*, 1989 and Sidaravičiene (1992). By the classification of Podocopa Benson *et al.* (1961), Adamczak (1976), Schallreuter (1986 etc.) and Neckaja (1966) were used additionally.

In addition to the late Ordovician ostracodes, ascribed to 215 species and subspecies of 116 genera, the data on five genera with 26 species, recorded from the uppermost Keila Stage or in the lowermost Silurian, are presented also.

Some special symbols and abbreviations are used in the descriptions. In the synonymy of a species, the reference marked with an asterisk ("*") contains further references, not given in this paper. Reference to the collection storages are used as follows:

CNIGRM — Central Scientific-Research Geological Exploration Museum (St. Petersburg, Russia);

GPIG — Geologisch-Paläontologisches Institut der Universität Greifswald (Germany);

GPIH — Geologisch-Paläontologisches Institut und Museum der Universität Hamburg (Germany);

IGT — Institute of Geology (Tallinn, Estonia);

LitNIGRI — Lithuanian Scientific-Research Geological Prospecting Institute (Vilnius, Lithuania);

LM — Department of Historical Geology and Palaeontology, Geological Institute, University of Lund (Sweden);

MN HUB — Museum für Naturkunde, Humboldt-Universität zu Berlin (Germany);

PMO — Palaeontological Museum, University of Oslo (Norway);

UM — Museum of the Palaeontological Institute, University of Uppsala (Sweden);

UT — University of Tartu (Geological Museum) (Estonia);

VNIGRI — All-Union Petroleum Scientific-Research Geological Institute (St. Petersburg, Russia).

VNIIMORGEO — All-Union Scientific-Research Institute of Marine Geology (Riga, Latvia).

The terminology of the descriptions and used abbreviations for lobes and sulci (L1 — first lobe, S1 — first sulcus etc.) are traditional (see, for instance, Vannier *et al.*, 1989). The term "sulcament" is used in accordance with Schallreuter (1967a, p. 626).

The descriptive part contains the distribution data in a very generalized form only. Apart from the general occurrence, the Estonian localities and core sections sampled for the present study are listed (with depth interval given, when the number of samples from a locality is more than one). The distribution of the sections is shown in the figures 1 (boreholes) and 41–46 (outcrops). The full data set is presented in the figures 5, 7–18, 20–24, 26–29, 31–38, 40 and tables 2, 4–9, and in Meidla, 1983, where the ostracode distribution in the Saxby beach exposure and Paluküla quarry is given. A summary table (table 9) contains the data on the distribution of ostracodes in the studied formations.

Subclass Ostracoda Latreille, 1802
Order Beyrichiocopa Pokorny, 1954
Suborder Palaeocopa Henningsmoen, 1953
Superfamily Primitiopsacea Swartz, 1936
Family Primitiopsidae Swartz, 1936
Subfamily Bubnoffiopsinae Schallreuter, 1964
Genus *Lembitites* Melnikova, 1979

Type species: *Bichilina? posterovelata* Sarv, 1963.
Diagnosis (from Melnikova, 1979): Carapace small, weakly convex, postplete. S2 a small depression centrodorsally. Indistinct zygal crista surrounds S2. Surface granulate. Heteromorphic velum wide, forming an open dolon posteriorly. Tecnomorphic velum narrow.
Other species: *Bubnoffiopsis incognitus* Sidaravičiene, 1975.
Distribution: Viruan and Harjuan of Baltoscandia.

Lembitites incognitus (Sidaravičiene, 1975)
Plate 1, figs 1–2.

1963 *Bichilina? posterovelata* sp. n. — Sarv, pl. 1, figs 19–21 (*partim*).
1966 *Circulina posterovelata* (Sarv) — Neckaja, p. 16, pl. 3, fig. 4.
1975 *Bubnoffiopsis incognitus* Sidaravičiene, sp. n. — Sidaravičiene, p. 30, pl. 4, figs 7–8.
1979 *Lembitites incognitus* (Sidaravičiene) — Melnikova, p. 55, pl. 5, fig. 6.
1985 *Bubnoffiopsis incognitus* Sidaravičiene — Sztejn, p. 70, pl. 4, fig. 1.
1992 *Bubnoffiopsis incognitus* Sidaravičiene — Sidaravičiene, p. 151, pl. 38, figs 3–4.

Holotype: Right heteromorphic valve No. 13–11/1, LitNIGRI. Lithuania, Lapes core, depth 702.3 m (Sidaravičiene, 1975). Nabala Stage.
Occurrence: Rakvere and Nabala stages of Estonia; Oandu, Rakvere and lowermost Nabala stages of Lithuania and northwestern Byelorussia; Nabala–Vormsi (undivided) stages of Poland.
Localities. Core sections: Orjaku — 102.40–117.70; Nabala — 4.50; Vinni — 21.40; outcrops: Paekna — 1.30–1.95; Nõmmeküla; over 30 specimens recorded in the studied sections.

Lembitites posterovelatus (Sarv, 1963)
Plate 1, figs 3–4.

1963 *Bichilina? posterovelata* sp. n. — Sarv, p. 165, pl. 1, figs 16–18 (*partim*).
1979 *Lembitites posterovelatus* (Sarv) — Melnikova, 1979, pp. 55–56, pl. 5, fig. 7.

Holotype: Heteromorphic carapace Os 2745, IGT. Estonia, Rakvere. Oandu Stage.
Occurrence: Oandu and Rakvere stages of Estonia; Oandu and Rakvere–Nabala (undivided) stages of Latvia.
Localities. Core sections: Puhmu — 127.50; Laiamäe — 89.20; Vinni — 42.60–44.10; Mäetaguse — 21.10; Ussimägi outcrop — 1.75–2.10; over 25 specimens recorded.

Subfamily Anisocyaminae Martinsson, 1960

Diagnosis (modified from Martinsson, 1960): Primitiopsid ostracodes lacking adductorial pit, preadductorial node, proper dorsum and all traces of other lobal features. Valves subequal in size, reticulate or pitted. Ornamentation of the right and left valve may differ, on the right valve it may be variously effaced.
Assigned genera: *Anisocyamus* Martinsson, 1960; Eurocyamus Schallreuter, 1967; *Neocyamus* Melnikova, 1979; *Baltocyamus* Meidla, 1995.

In the original diagnosis Martinsson (1960) mentioned the absence of velum in tecnomorphs. The presence of a distinct velum in both heteromorphs and tecnomorphs of *Baltocyamus* necessitates modification of the diagnosis for the subfamily.
Occurrence: Ordovician of North America, Baltoscandia, Siberia.

Genus *Baltocyamus* Meidla, 1995.

Type species: *Baltocyamus primarius* Meidla, 1995.
Diagnosis: Small, strongly convex Anisocyaminae with velum extending along entire free margin; tecnomorphic velum bend-like, heteromorphs differing by posteriorly concave open dolon. LV overlaps RV along the contact margin.
Other species: Type species only.
Distribution: Viruan (Oandu Stage) of Estonia.

Baltocyamus primarius Meidla, 1995.
Plate 1, figs 5–6.

1995 *Baltocyamus primarius* gen. et sp. n. — Meidla, pp. 1–4.

Holotype: Tecnomorphic carapace Os 3178, IGT. Estonia, Rakvere district, Tõrremägi. Oandu Stage.
Diagnosis: Carapace small (length up to 0.79 mm), high, strongly convex, slightly postplete with considerably larger anterior cardinal corner. Dorsum epicline. Bend-like velum of tecnomorphs extends along the entire free margin, widening ventrally where it merges with the lateral surface. Heteromorphs differ from tecnomorphs by posteriorly concave open dolon. Lateral surface irregularly coarse-pitted. Left valve overlaps the right one along the contact margin.

Dimensions in mm:	Length	Height	Width
Holotype, tecnomorphic carapace Os 3178	0.78	0.55	0.43
Heteromorphic carapace Os 3179	0.77	0.55	0.43

Variability: On juvenile valves the sulcus between lateral surface and marginal lobe is sometimes more distinctly developed. The pitted sculpture on the lateral valve surface, although very coarse, is irregular, differently developed even on right and left valves of the same carapace.
Occurrence: Oandu Stage of Estonia.
Localities. Vinni core — 43.25; Tõrremäe trench; over 120 specimens.

Superfamily Eurychilinacea Ulrich et Bassler, 1923
Family Oepikellidae Jaanusson, 1957
Subfamily Oepikellinae, Jaanusson, 1957
Genus *Oepikella* Thorslund, 1940

Type species. *Oepikella tvaerensis* Thorslund, 1940.
Diagnosis. Non-sulcate Oepikellidae with dolonate heteromorphs, tecnomorphic velum very narrow or missing. Lateral surface coarsely pitted, except of large adductorial muscle scar.
Other species: *Isochilina canaliculata* Krause, 1892; *Macronotella bonnemai* Öpik, 1937; *Oepikella luminosa* Sarv, 1959; ? *Oepikella*? *alta* Schallreuter, 1984.
Distibution: Viruan and Harjuan of Baltoscandia.

Oepikella luminosa Sarv, 1959
Plate 1, figs 7–8.

1959 *Oepikella luminosa* sp. n. — Sarv, 16–17, pl. 2, figs 14–17.
1982 *Oepikella luminosa* Sarv — Ulst *et al.*, p. 123.
1984 *Oepikella luminosa* Sarv — Sarv and Meidla, pp. 8–9.
1990 *Oepikella luminosa* — Meidla *et al.*, 1990, p. 135 (fig.).
1992 *Oepikella luminosa* Sarv — Sidaravičiene, pp. 144–145, pl. 36, fig. 10.

Holotype: Heteromorphic carapace Os 2063, IGT. Estonia, West Viru County, Moe. Pirgu Stage.
Occurrence: Nabala to Porkuni stages of Estonia, Pirgu Stage of Latvia, Oandu to Pirgu stages of Lithuania and north-western Byelorussia.
Localities. Core sections: Orjaku — 68.20–100.00 (107.80?); Förby — 8.00–19.90; Haapsalu-203 — 40.10–64.90; Moe — 3.00; Puhmu — 33.10–100.30 (115.40?); Laiamäe — 16.00–23.30; Kaugatuma — 353.00–386.60; Ruskavere — 71.32–116.30; outcrops: Turvaste; Tõrma; Paope — 0.85–1.20; Paluküla — 0.69–1.40; Saxby; Sutlepa; Kohila-2; Urge; Prillimäe — 0.30; Hosholm; Ruunavere; Põriki; Moe-1; over 200 specimens.

Subfamily Ampletochilininae Schallreuter, 1975
Genus *Platybolbina* Henningsmoen, 1953

Type species: *Primitia distans* Krause, 1889.
Diagnosis. Non-sulcate or almost non-sulcate Ampletochilininae, without lobation or with indistinct knob-like L2. Tecnomorphic velum along the entire free margin or shortened, heteromorphs with a convex dolon anteroventrally.
Other species: *Primitia plana* Krause, 1889; *Platybolbina kapteyni* Bonnema, 1909; *Platybolbina lunulifera* Henningsmoen, 1954; *Platybolbina tiara* Henningsmoen, 1954; *Platybolbina temperata* Sarv, 1956; *Platybolbina ampla* Jaanusson, 1957; *Platybolbina inflata* Jaanusson, 1957; *Platybolbina orbiculata* Sarv, 1959; *Platybolbina maslovi* Sarv, 1959; *Platybolbina schadidea* Kesling, 1960; *Platybolbina compsa* Kesling, 1960; *Platybolbina dictyota* Kesling, 1960; *Platybolbina psedna* Kesling, 1960; *Platybolbina omphalota* Kesling, 1960; *Platybolbina chalazia* Kesling, 1960; *Platybolbina punctata* Kraft, 1962; *Platybolbina rima* Schallreuter, 1964; *Platybolbina integra* Schallreuter, 1969; *Platybolbina ampla restricta* Schallreuter, 1970; *Platybolbina fragosa* Ivanova, 1970; *Platybolbina corneola*

Ivanova, 1970; *Platybolbina anguliacuta* Schallreuter, 1971; *Platybolbina spongiosoreticulata* Schallreuter, 1972; *Platybolbina shaleri* Copeland, 1973; *Platybolbina runica* Schallreuter et Krůta, 1984; ? *Platybolbina majsorica* Melnikova, 1986; *Platybolbina reducta* Schallreuter, 1990.

Remarks. The genus is in need of a revision, since in several species the range of variability is poorly known, several of the proposed species may prove to be synonyms (see also below). The definitions of the subgenera *P.* (*Platybolbina*), *P.* (*Rimabolbina*), *P.* (*Reticulobolbina*) and *P.* (*Abruptobolbina*), distinguished by Schallreuter (1969), need to be revised, because several recently established species (*P. reducta, P. runica, P. tiara, P. shaleri*) cannot be accommodated into these taxa without adjusting the subgeneric diagnoses.

Distribution. Middle and upper Ordovician and lower Silurian of Baltoscandia, Czechia, North America, Siberia.

Platybolbina maslovi Sarv, 1959

Plate 1, fig. 9.

1959 *Platybolbina maslovi* sp. n. — Sarv, 13–14, pl. 2, figs 4–9.
1984 *Platybolbina maslovi* Sarv — Sarv and Meidla, pp. 9, 12, 19.

Holotype: Right heteromorphic valve Os 2365, IGT. Estonia, West Viru County, Moe. Pirgu Stage.

Occurrence: Pirgu Stage of Estonia.

Localities. Core sections: Orjaku — 47.90?; Haapsalu-203 — 33.20?; Puhmu — 47.80; Pärnu — 299.00?; outcrops: Põriki; Moe-1; over 300 specimens recorded.

Platybolbina orbiculata Sarv, 1959

Plate 1, fig. 10.

? 1889 *Primitia plana* n. sp. — Krause, p. 5, pl. 1, figs 1a–b.
* 1954 *Platybolbina* cf. *plana* (Krause) — Henningsmoen, pp. 87–89, pl. 3, figs 1–8.
1956 *Platybolbina* cf. *plana* (Krause) — Martinsson, p. 91, pl. 1, fig. 7–8, pl. 2, figs 9–11.
1959 *Platybolbina orbiculata* sp. n. — Sarv, pp. 14–15, pl. 2, figs 10–11.
1982 *Platybolbina orbiculata* Sarv — Ulst *et al.*, p. 123.
1984 *Platybolbina orbiculata* Sarv — Sarv and Meidla, pp. 8–9.
? 1986 *Platybolbina* (*Platybolbina*) cf. *distans* (Krause) — Schallreuter, pl. 1, figs 1.
1989 *Platybolbina orbiculata* — Nõlvak *et al.*, p. 90.
1990 *Platybolbina orbiculata* — Meidla *et al.*, 1990, p. 135 (fig.).
* 1992 *Platybolbina orbiculata* Sarv — Sidaravičiene, pp. 135–136, pl. 34, figs 5–7.

Holotype: Heteromorphic carapace Os 2370, IGT. Estonia, West Viru County, Moe. Pirgu Stage.

Diagnosis: Carapace high, preplete; valves non-sulcate or with a weak sulcal depression and occasionally with flat, indistinct knob-like L2. Velum along the entire free margin, beginning at the anterior cardinal corner and becoming obsolete at the posterior cardinal corner. Lateral surface smooth, finely pitted or granulate.

Remarks. The species shows a wide range of variability. The variation of the ornamentation has been mentioned first by Henningsmoen (1954, p. 89). The Estonian material shows a comparable variability of the ornamentation, and the specimens from Estonia and Norway can

at present considered as conspecific. Until the the type specimen of *P. plana* is redescribed, the relationship between *P. plana* and *P. orbiculata* remains uncertain.

Occurrence: Oandu (?), Rakvere to Porkuni stages of Estonia, Pirgu Stage of Latvia and Pskov district of Rùssia, Nabala to Pirgu stages of Lithuania, Molodovo Formation of Podolia, units 5a and 5b of Norway (Oslo–Asker, Ringerike), glacial drift boulders from northern Germany (?) and southwestern Finland.

Localities. Core sections: Orjaku — 48.70–107.80 (119.40?); Förby — 5.00–25.20; Haapsalu-203 — 24.90–67.75; Põhjaka–Saare — 85.20–117.40; Vodja H-190 — 106.30; Vodja H-191 — 107.75; Moe — 14.80; Puhmu — 42.00–111.10 (132.50?); Laiamäe — 29.20–70.50 (85.70?); Vinni — 22.10–26.40 (36.20?); Mäetaguse — 9.90–17.10; Kaugatuma — 343.85–411.30; Pärnu — 241.9?, 249.20–301.80, 328.00?; Viljandi — 322.60; Aidu — 120.90–175.00; Laeva — 207.70–216.00; Ruskavere — 63.85–132.45; Abja — 365.20? 396.70–396.70; Otepää — 411.80; Kaagvere — 243.40; ourcrops: Tõrremäe; Paekna — 1.80–2.30; Rägavere; Piilse; Osmussaar (erratic boulder); Turvaste; Sutlema; Nõmmeküla; Tõrma; Permisküla; Paope — 0.85–1.20; Kõrgessaare; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.30–1.30; Lehtse; Tapa; Moe-2; Hosholm; Piirsalu; Lohu; Pirgu; Põriki; Moe-1; over 600 specimens recorded.

Platybolbina temperata Sarv, 1956

Plate 1, fig. 11.

1956 *Platybolbina temperata* sp. n. — Sarv, p. 39, pl. 2, figs 8–10.
1982 *Platybolbina temperata* Sarv — Ulst *et al.*, p. 123.
* 1983 *Platybolbina* (*Reticulobolbina*) *temperata* Sarv — Schallreuter, pp. 167–168, pl. 13, fig. 7.
* 1985 *Platybolbina* (*Reticulobolbina*) *temperata* Sarv — Schallreuter, p. 103, pl. 7, fig. 4.
1992 *Platybolbina* (*Reticulobolbina*) *temperata* Sarv — Sidaravičiene, p. 136, pl. 34, figs 8–9.

Holotype: Heteromorphic carapace Os 2005, IGT. Estonia, West Viru County, Tõrremägi. Oandu Stage.

Occurrence: Keila to Rakvere stages of Estonia, Keila and Oandu stages of Latvia and Lithuania, Moldå Limestone of Sweden, glacial drift boulders of northern Germany.

Localities. Core sections: Orjaku — 131.20–132.40; Virtsu — 224.70; Nabala — 17.40; Puhmu — 136.80(136.35?); Laiamäe — 89.60–93.00; Vinni — 36.80–44.10; Pärnu — 327.50–328.00; Laeva — 232.80–237.70; Taagepera — 460.40; ? Kaagvere — 259.85–265.00; outcrops: Koppelmaa; Saku; Tõrremäe; Ussimägi — 0.40–1.75; Rägavere; over 100 specimens recorded.

Platybolbina tiara Henningsmoen, 1954

Plate 1, fig. 12.

1954 *Platybolbina tiara* sp. n. — Henningsmoen, pp. 89–90, pl. 4, figs 4–9.
1984 *Platybolbina tiara* Henningsmoen — Sarv and Meidla, pp. 8–9.

Holotype: Heteromorphic left valve No. 66434, PMO. Norway, Oslo, Hovedøya. Unit 5b.

Diagnosis: High, slightly preplete *Platybolbina*; valves with a sulcal depression and with an indistinct node in front of it. Adductor muscle scar vertically elongated, depressed. Velum along the entire free margin, wide, in heteromorphs with a convex dolon anteroventrally. Lateral surface regularly pitted.

Remarks. Specimens of *P. tiara* from Estonia are represented by juvenile tecnomorphs, mostly with incompletely preserved adventral structures, but in other details they are similar to the type material. Jaanusson (1957) assigned *P. tiara* provisionally to *Cystomatochilina*. The species is characterized, according to Henningsmoen (1954), by a well-defined velar dimorphism, by absence of a distinct preadductorial node and the presence of a sulcal depression. With regard to the last features *P. tiara* differs from the type species of *Cystomatochilina* (*C. umbonata*), but resembles *Platybolbina*. In general features *P. tiara* is similar to incompletely known *P. runica* (Schallreuter and Kruta, 1984), but its relationship to the latter species remains open.
Occurrence: Vormsi, Pirgu and ? Porkuni stages of Estonia, unit 5b of Oslo–Asker, Norway.
Localities. Core sections: Förby — 21.10; Vodja H-190 — 108.60; ? Puhmu — 76.80; Laiamäe — 29.20; Pärnu — 280.50–300.00; ? Ruskavere — 115.75; ? Otepää — 374.40–411.80; outcrop: Kohila-2; over 30 specimens recorded.

Platybolbina? sp. n.
Plate 2, fig. 3.

Remarks: The specimens of *Platybolbina*? sp. n. are small, almost amplete and coarsely granulate. Velum is preserved in occasional specimens, developed at least along the antero- to centroventral margin. The assignment to *Platybolbina* is tentative.
Size of the figured specimens, mm: length — 0.91; height — 0.50.
Occurrence: Rakvere Stage of Estonia.
Localities. Puhmu core — 130.00–136.80; 15 specimens recorded.

Genus Apatochilina Ulrich & Bassler, 1923.

Type species: *Eurychilina obesa* Ulrich, 1890.
Occurrence: Middle and upper Ordovician of Europe and North America.

Apatochilina falacata Sarv, 1962
Plate 2, figs 1–2.

1962 *Apatochilina falacata* sp. n. — Sarv, pp. 104–105, pl. 3, figs 1–5.
1984 *Apatochilina falacata* Sarv — Sarv and Meidla, pp. 9, 13, 19.

Holotype: Heteromorphic (?) left valve Os 5044, IGT. Estonia, West Viru County, Porkuni. Porkuni Stage.
Remarks: Assignment of this species to *Apatochilina* remains somewhat provisional, because in *A. falacata* no dimorphism has yet been observed (see also Sarv, 1962).
Occurrence: Porkuni Stage of Estonia.
Localities. Kaugatuma core — 343.85–346.75; outcrops: Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 200 specimens recorded.

Genus *Cystomatochilina* Jaanusson, 1957.

Type species: *Primitia* (*Ulrichia*?) *umbonata* Krause, 1892.
Diagnosis (revised from Jaanusson, 1957): Unisulcate, sulcus narrow, located close to the prominent, distinct preadductorial node. Other nodes may be present. Tecnomorphs with a wide velar frill, heteromorphs ventrally and anteroventrally with a broad convex dolon.
Other species: *Cystomatochilina permira* Abushik, 1960; *Cystomatochilina matura* Schallreuter, 1965; *Cystomatochilina plicata* Schallreuter, 1986; *Cystomatochilina peculiaris* Melnikova, 1986; *Cystomatochilina clivosa* sp. n.
Remarks. Jaanusson (1957) assigned *Platybolbina tiara* Henningsmoen, 1954 provisionally to *Cystomatochilina*, but the absence of a distinct preadductorial node and some other features (see above) support its assignment to *Platybolbina*.
Occurrence: Viruan and Harjuan of Baltoscandia; Llandoverian of Central Siberia.

Cystomatochilina umbonata (Krause, 1892)
Plate 2, figs 4–5.

1892 *Primitia* (*Ulrichia*?) *umbonata* n. sp. — Krause, p. 389, pl. 21, figs 10–11.
1962 *Cystomatochilina umbonata* (Krause) — Sarv, pp. 100–101, pl. 1, fig. 1.
1984 *Cystomatochilina* cf. *umbonata* (Kr.) — Sarv and Meidla, p. 9.
1989 *Cystomatochilina umbonata* — Nõlvak *et al.*, p. 90.
1990 *Cystomatochilina umbonata* — Meidla *et al.*, 1990, p. 135 (fig.).
1992 *Cystomatochilina umbonata* (Krause) — Sidaravičiene, p. 139, pl. 35, figs 8–10.
* 1993 *Cystomatochilina umbonata* (Krause) — Schallreuter, pp. 95–96, pl. 61B, fig. 1, pl. 62A, figs 1–3.

Lectotype: Specimen figured by Krause (1892, pl. 21, fig. 10) and refigured by Triebel (1941, pl. 4, fig. 42) (elected by Henningsmoen, 1954). Erratic boulder by Müggelheim, Germany.
Occurrence: Nabala to Porkuni stages of Estonia; Vormsi to Pirgu stages of Lithuania and north-western Byelorussia; Pirgu Stage of Pskov region (Russia), erratic boulders from northern Germany and southwestern Finland.
Localities. Core sections: Orjaku — 53.50–77.90; Förby — 5.00–14.30; Haapsalu-203 — 28.70; Virtsu — 196.20; Puhmu — 76.20–90.70; Laiamäe — 29.20; outcrops: Turvaste; ? Nõmmeküla; Paluküla — 0.22–1.25; Saxby; Prillimäe — 0.70–1.30; ? Seli–Metsküla; Seli–Russalu; Siuge; Porkuni; over 40 specimens recorded.

Cystomatochilina clivosa sp. n.
Plate 2, figs 6–9.

1992 *Piretilina lina* sp. n. — Sidaravičiene, pp. 96–97 (*partim*), pl. 25, fig. 10.

Holotype: Right valve Os 2996, IGT. Estonia, West Viru County, Vinni core section, depth 41.4 m. Rakvere Stage.
Diagnosis: Carapace medium-sized, amplete. With a distinct preadductorial node and a short L2 close to it; another node in the posterodorsal part of the valve. Velum extends from anterior cardinal corner to posteroventral margin.

Dimensions in mm:	Length of domicilium	Height
Holotype, right valve Os 2996	1.52	0.81
Left valve Os 2995	1.27	0.69

Description: Carapace medium-sized, moderately convex, amplete. L2 narrow, short, arch-shaped, situated somewhat closer to the anterior end of the valve, a distinct round preadductorial node located immediately in front of L2. Another node (spine?) is developed behind the sulcus, closer to the dorsal margin. The velar frill extends from the anterior cardinal corner to the posteroventral part of the valve, it is slightly convex and wide in heteromorphs (?) (tecnomorphic velum is unknown). Marginal sculpture wide, radially striated. The valve surface, apart from the anterodorsal area, with rare coarse tubercles.

Remarks: From *C. umbonata* (Krause, 1892) the new species differs in the lack of the velum on the posterior margin and by the characteristic sculpture. The sculpture agrees well with that of *Piretilina lina* Sidaravičiene, 1992. However, our material shows a wide tubulose frill, beginning from the anterior cardinal corner, and this disagrees with Sidaravičiene's description. In the specimen from the Paukšiai core section (Sidaravičiene, 1992, pl. 25, fig. 10) the velum is poorly and incompletely preserved, but indistinct radial striation can be recognized. This specimen and possibly also other specimens of Rakverean age should probably be assigned to *C. clivosa*.

From *C. jueptneri* (Schallreuter, 1990), originally assigned to *Piretia*, *C. clivosa* differs by the termination of the velum posteroventrally. The relation of *C. jueptneri* to the genus *Piretilina* Sidaravičiene remains open, as only tecnomorphs of *J. jueptneri* are described (Schallreuter, 1990a, pp. 260, 266, pl. 1, fig. 6.).

Occurrence: Rakvere and Nabala stages of Estonia; ? Rakvere Stage of Lithuania.

Localities. Core sections: Orjaku — 107.80–126.50; Vinni — 40.00–41.40; Nõmmeküla quarry; 9 specimens recorded.

Genus *Ectoprimitia* Bouček, 1936

Type species: *Primitia corrugata* Krause, 1892.

Diagnosis: See Schallreuter, 1987a, p. 19.

Other species: *Parabolbina costata* Meidla, 1983; *Ectoprimitia corrugata inconstans* ssp. n. *E. costata* is a junior synonym of *E. corrugata* (see below).

Remarks. Similarity between *Ectoprimitia* and *Levisulculus* Jaanusson, 1957 should be underlined, particularly in the light of new material from Estonia. In the diagnosis of *Ectoprimitia* (Schallreuter, 1987a, p. 19) the presence of dolonate loculi and dorsal plica is mentioned, but the loculi are missing by *E. corrugata incostans* ssp. n., described below. However, the difference of *E. corrugata corrugata* and *E. corrugata inconstans* have rather subspecific than generic character, and the assignment of the latter to another genus looks questionable. *Levisulculus* may prove to be a junior synonym of *Ectoprimitia*.

Occurrence: Viruan and Harjuan of Baltoscandia.

Ectoprimitia corrugata (Krause 1892)

Subspecies: *E. corrugata corrugata* (Krause, 1892); *E. corrugata inconstans* ssp. n.

Ectoprimitia corrugata corrugata (Krause 1892)
Plate 2, fig. 10.

1892 *Primitia corrugata* n. sp. — Krause, pp. 386, 399, pl. 21, fig. 12.
1983 *Parabolbina costata* sp. n. — Meidla, 1983, pp. 56–57, pl. 2, fig. 1–4, 5?.
1984 *Loculibolbina costata* (Meidla) — Sarv and Meidla, pp. 9, 19.
1987 *Ectoprimitia corrugata* (Krause) — Schallreuter, pp. 20–21, pl. 1A, figs 1–4.
1992 *Loculibolbina*? *costata* (Meidla) — Sidaravičiene, p. 21 (*partim*) [**non** pl. 3, figs 8–9].
1993 *Ectoprimitia corrugata* (Krause) — Schallreuter, p. 97, pl. 62B, fig. 2.

Holotype: Left (?) valve, PMB. Erratic boulder by Müggelheim, Germany.
Diagnosis: See Schallreuter, 1987a.
Remarks: Schallreuter (1987a) mentioned heteromorphs with four poorly defined loculi from the erratic boulders. The association of ostracodes in these boulders (namely Ahl85/2, Ahl85/138, Ahl85/152 and Ahl1124) indicates a late Harjuan age of these boulders. However, the presence of four loculi cannot be confirmed in Lithuanian or Estonian material.

Figured specimens of *Loculibolbina*? *costata*: Sidaravičiene, 1992 come from the Rakvere Stage of Latvia and are characterized by a simple dolonal dimorphism. In the Estonian collections Rakverean and Vormsian–Pirguan subgroups of *E. corrugata* are reported, and the absence of the loculi by Rakverean specimens can be confirmed. The older cluster will be treated here as a new subspecies, *E. corrugata inconstans* sp. n.
Occurrence: Vormsi and Pirgu stages of Estonia; Pirgu Stage of Lithuania, erratic boulders in Germany.
Localities. Core sections: ? Orjaku — 71.80; Förby — 10.00–14.30; Haapsalu-203 — 30.90–37.40; Puhmu — 72.00; outcrops: Paluküla — 0.94; Saxby; Prillimäe — 1.10–1.30; Piirsalu; Lohu; 17 specimens recorded.

Ectoprimitia corrugata inconstans ssp. n.
Plate 2, figs 12–13.

1992 *Loculibolbina*? *costata*: Sidaravičiene, p. 21 (*partim*), pl. 3, figs 8–9.

Holotype: Heteromorphic left valve Os 3025, IGT. Estonia, West Viru County, Piilse. Rakvere Stage.
Diagnosis: Carapace medium-sized, slightly preplete. S2 forms a very shallow depression. Velum wide, extends from anterior cardinal corner to central part of the posterior margin. Dorsum epicline. with a narrow plica. Lateral surface bears irregular concentrical finely ribbed sculpture.

Dimensions in mm:	Length	Height
Holotype, heteromorphic left valve Os 3025	1.08	0.56
Tecnomorphic right valve Os 3023	1.12	0.62
Heteromorphic incomplete valve Os 3024	–	0.60
Tecnomorphic (juvenile) right valve Os 3026	0.84	0.48

Description: The carapace is medium-sized, moderately convex, preplete, with a long hinge margin. Dorsum epicline, with a narrow plica along the boundary of lateral/dorsal surfaces. At the midlength of the valve there is a very small arch-shaped depression. A wide velar frill extends from the anterior cardinal corner to the middle part of the posterior margin. In the females the velum is forming a convex dolon along the anteroventral and ventral margins.
Remarks: From *E. corrugata corrugata* the new subspecies differs by the simple dolonal dimorphism.

Occurrence: Rakvere Stage of Estonia and Lithuania.
Localities. Core sections: Puhmu — 127.50; Vinni — 40.00–41.40; Mäetaguse — 17.10; outcrops: Ussimägi — 0.40; Moonaküla; Piilse; 22 specimens recorded.

Genus *Levisulculus* Jaanusson, 1957

Type species: *Levisulculus lineatus* Jaanusson, 1957.
Diagnosis: See Jaanusson, 1957, p. 320–321.
Remarks: Differences between *Levisulculus* and *Ectoprimitia* Bouček, 1936 consist mainly of the absence of dorsal plica (and sculpture of the lateral surface). As it is demonstrated above, loculi may absent by *Ectoprimitia* also and *Levisulculus* may appear to be a synonym of *Ectoprimitia*.

Levisulculus sp. n.
Plate 2, fig. 11.

? 1992 *Leviculculus* sp. A — Sidaravičiene, pp. 140–141. pl. 35, fig. 12.

Description: Medium-sized, slightly preplete carapace with a depression-like S2 and smooth or granulate valve surface. Velum developed from anterodorsal to posteroventral margin, heteromorphic dolon moderately convex.

From *L. granulosus* (Thorslund, 1940) the tecnomorphs of this species differ in having a distinct sulcus reaching to about the midheight of the valve, and in the lack of a distinct adductor muscle scar. The species may be conspecific with *L.* sp. A in Sidaravičiene, 1992.
Dimensions of the figured specimen, mm: length — 1.48; height — 0.72.
Occurrence: Oandu to Rakvere stages of Estonia.
Localities. Core sections: Puhmu — 130.00–137.80; Vinni — 41.40; Mäetaguse — 17.10–21.10; over 40 specimens.

Genus *Moeckowia* Schallreuter, 1964

Type species: *Moeckowia moeckowbergensis* Schallreuter, 1964.
Diagnosis: See Schallreuter, 1975, p. 154.
Occurrence: Viruan, Harjuan and ? Silurian of Baltoscandia.

Moeckowia rava (Sarv, 1956)
Plate 3, figs 1–2.

1956 *Primitia rava* sp. n. — Sarv, 1956, p. 32, pl. 1, figs 1–4.
1959 *Levisulculus*? *rava* (Sarv) — Sarv, pp. 42–43, pl. 7, figs 2–4.
1979 *Levisulculus rava* (Sarv) — Ivanova, pp. 103–104, pl. 7, fig. 2.
1992 *Moeckowia rava* (Sarv) — Sidaravičiene, pp. 139–140, pl. 35, fig. 11.

Holotype: Carapace Os 2010, IGT. Estonia, West Viru County, Oandu. Oandu Stage.
Occurrence: Oandu and Rakvere stages of Estonia and Latvia.

Localities. Core sections: Orjaku — 131.20; Puhmu — 133.15–137.20; Laiamäe — 92.40–93.00; Vinni — 43.25–44.10; ? Pärnu — 327.50; outcrops: Koppelmaa; Saku; Tõrremäe; over 250 specimens recorded.

Genus *Gellensia* Schallreuter, 1967

Type species: *Gellensia gellensis* Schallreuter, 1967.
Diagnosis: See Schallreuter, 1975, p. 156.
Other species: *Gellensia gotlandica* Schallreuter, 1967; *Levisulculus ornatus* Kanygin, 1971; *Gellensia* sp. n.
Remarks: The genus *Gellensia* is imperfectly known, no dimorphism has been recorded. The possible new species, described herein, demonstrates the dimorphism similar to that of *Levisulculus* (=*Ectoprimitia*?).
Occurrence: Viruan and Harjuan of Baltoscandia; middle and upper Ordovician of Sette Daban; erratic boulders in Germany.

Gellensia sp. n.
Plate 3, figs 3–4.

Description, remarks: Like *G. gellensis* in shape, but differing in having an indistinct preadductorial node and sulcal depression (?) and both anterior and posterior acroidal spines. Tecnomorphic velum present along the anterior and ventral margins, bending in a latero-ventral direction anteroventrally and terminating abruptly, spine-like in the posteroventral region. Strongly convex heteromorphic dolon begins anterodorsally and reaches the end of the velum. Lateral surface coarsely granulate, the granules turn into short spines near the posterior margin.

Due to the coarse granulosity of the lateral surface the lobal sculpture is poorly visible. The sulcale depression may be an artefact (deformation) or in several specimens still embedded in rock. Most of the material is poorly and incompletely preserved.

Dimensions of the figured specimen, mm:	Length	Height
Right tecnomorphic (incomplete) valve Os 3316	1.04	0.57
Heteromorphic carapace Os 3317	1.07	0.61

Occurrence: ? Oandu and Rakvere Stage of Estonia.
Localities. Puhmu core — 133.15–137.80; over 60 specimens recorded.

Genus *Ampletochilina* Schallreuter, 1969

Type species: *Ampletochilina trapezoidea* Schallreuter, 1969.
Diagnosis: See Schallreuter, 1975, p. 159.
Occurrence: Viruan and Harjuan of Baltoscandia; erratic boulders in Germany. Lower Ordovician of Holy Cross Mountains, Poland.

Ampletochilina granifera (Sarv, 1962)
Plate 3, figs 5–6.

* 1962 *Platybolbina*? *granifera* sp. n. — Sarv, pp. 102–104, pl. 1, figs 4–8.
1984 *Ampletochilina granifera* (Sarv) — Sarv and Meidla, pp. 9, 12.
1986 *Ampletochilina*? *granifera* (Sarv) — Schallreuter, pl. 1, fig. 8.
1989 *Ampletochilina granifera* — Nõlvak *et al.*, p. 90.

Holotype: Left heteromorphic valve Os 5140. Estonia, Rapla County, Iida. Porkuni stage.
Diagnosis: See Sarv, 1962, p. 102.
Remarks: In many available specimens of *A. granifera* collection the velum is incompletely preserved or partly embedded in the rock matrix. Thus, the posterior part of the dolon is hardly observable and therefore it is difficult to distinguish between *Ampletochilina* and *Swantina* with certainty. A part of the specimens, referred here to *Ampletochilina granifera,* may have possessed a dolon of *Swantina* type.
Occurrence: Vormsi, Pirgu and Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia), erratic boulders in Germany.
Localities. Core sections: Orjaku — 59.80; Förby — 18.70–21.70; ? Haapsalu-203 — 34.50; Kaugatuma — 344.60–361.10; Ruskavere — 93.75(63.85?)–115.75; outcrops: Piirsalu; Lohu; Iida, Siuge; Seli–Metsküla; Seli–Russalu; Porkuni; over 60 specimens recorded in the studied sections.

Ampletochilina trapezoidea Schallreuter, 1969
Plate 3, fig. 7.

1969 *Ampletochilina trapezoidea* sp. n. — Schallreuter, pp. 347–348, fig. 2.
1984 *Ampletochilina trapezoidea* Schallreuter — Sarv and Meidla, pp. 9, 19.
? 1992 *Ampletochilina* aff. *trapezoidea* Schallreuter — Sidaravičiene, p. 142, pl. 36, fig. 2.

Holotype: Right heteromorphic valve Nr. 25/10, erratic boulder from Gotland (Öjlemyr-geschiebe AGG No. 794). Harjuan.
Occurrence: Vormsi and Pirgu stages of Estonia, Vormsi Stage of Lithuania; erratic boulders of Gotland.
Localities. Core sections: Orjaku — 63.50; Förby — 10.00–21.70; Puhmu — 48.10–76.80; Kaugatuma — 350.70–361.10(383.70?); ? Ruskavere — 117.10; over 30 specimens recorded.

Family Eurychilinidae Ulrich et Bassler, 1923
Subfamily Piretellinae Öpik, 1937
Genus *Piretella* Öpik, 1937

Type species: *Piretella acmaea* Öpik, 1937.
Diagnosis: See Schallreuter, 1975, p. 162.
Occurrence: Viruan and Harjuan of Baltoscandia (incl. north-western Poland); middle and late Ordovician of Holy Cross Mountains, Poland.

Piretella acmaea Öpik, 1937
Plate 3, figs 9–10.

1937 *Piretella acmaea* n. sp. — Öpik, p. 112, pl. 4, figs 6a, 6b and 7, pl. 7, figs 6–9.
1959 *Piretella acmaea* Öpik — Sarv, pp. 19–20, pl. 3, fig. 4–9.
1982 *Piretella acmaea* Öpik — Ulst *et al.*, pp. 118, 123 etc.
1984 *Piretella acmaea* Öpik — Sarv and Meidla, pp. 8–9, 19.
1992 *Piretella acmaea* Öpik — Sidaravičiene, 1992, p. 145, pl. 36, fig. 11.

Holotype: Heteromorphic carapace Os 2215, IGT. Estonia, West Viru County, Moe. Pirgu Stage.
Occurrence: Oandu?, Rakvere to Pirgu stages of Estonia, Rakvere to Pirgu stages of Latvia, Lithuania and north-western Byelorussia.
Localities. Core sections: ? Förby — 19.90–21.10; Laiamäe — 30.20–73.00; Vinni — 15.50–26.40; Pärnu — 327.70?, 314.70–315.70; Viljandi — 311.70; ? 325.30–327.80; Ruskavere — 115.30–119.50; outcrops: ? Paope — 0.85; Sutlepa; Moe-2; Põriki; Moe-1; over 200 specimens recorded.

Genus *Hesperidella* Öpik, 1937.

Type species: *Primitia esthonica* Bonnema, 1909.
Diagnosis: See Schallreuter, 1975, p. 166.
Occurrence: Viruan of Baltoscandia; middle Ordovician of U.S.A. and Holy Cross Mountains, Poland.

Hesperidella esthonica (Bonnema, 1909)
Plate 3, fig. 8.

Occurrence: Kukruse to Keila stages of Estonia, Latvia, Lithuania, north-western Byelorussia; upper part of the Dalby Limestone, Skagen Limestone and lowermost Moldå limestone of Sweden; erratic boulders in Germany.
Localities. Core sections: Kaugatuma — 414.05; Laeva — 239.50; 2 specimens recorded.

Family Euprimitiidae Hessland, 1949
Subfamily Gryphiswaldensiinae Schallreuter, 1968
Genus *Gryphiswaldensia* Schallreuter, 1965

Type species: *Gryphiswaldensia gryphiswaldensis* Schallreuter, 1965
Diagnosis: See Schallreuter, 1975, p. 179.
Species composition: ? *Euprimitia tenuireticulata* Hessland, 1949; *Euprimitia wilnoiensis* Neckaja, 1952; *Gryphiswaldensia visbya* Schallreuter, 1965; *Gryphiswaldensia plicata* Schallreuter, 1969; *Neoprimitiella plavinensis* Gailīte, 1975; *Gryphiswaldensia renava* Sidaravičiene, 1992; *Gryphiswaldensia waldensia* Sidaravičiene, 1992; ? *Gryphiswaldensia* sp. A: Sidaravičiene, 1992; *Gryphiswaldensia* sp. B: Sidaravičiene, 1992; *Gryphiswaldensia* sp. C: Sidaravičiene, 1992; *Gryphiswaldensia angustivelata* Olempska, 1994; *Gryphiswaldensia cavata* Olempska, 1994.

Remarks: *G. waldensia* is apparently a junior synonym of *G. plavinensis* (Gailīte). The assignment of *G.* sp. A in Sidaravičiene, 1992 to this genus is questionable, because it possesses a distinct S2 which is not common in the other representatives of the genus.
Distribution: Viruan and Harjuan of the East Baltic; Ordovician of the Holy Cross Mountains, Poland; erratic boulders in Germany and on Gotland, Sweden.

Gryphiswaldensia wilnoiensis (Neckaja, 1952)
Plate 3, figs 11–12.

1952 *Euprimitia wilnoiensis* sp. n. — Neckaja, 1952, p. 220, pl. 2, fig. 1–4.
1983 *Euprimitia wilnoiensis* Neckaja — Meidla, p. 54.
1984 *Gryphiswaldensia wilnoiensis* (Neckaja) — Sarv and Meidla, p. 9.
1986 *Gryphiswaldensia wilnoiensis* (Neckaja) — Schallreuter, 1986, pl. 2, fig. 4.
1992 *Gryphiswaldensia wilnoiensis* (Neckaja) — Sidaravičiene, pp. 12–13, pl. 1, fig. 1–4.

Holotype: Left (?) valve No. 16–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Lyckholm (Saaremõisa) beds (=Nabala to Pirgu stages).
Remarks: Sidaravičiene (1992, p. 13) mentioned differences between specimens from Lithuanian and German erratic boulders. The holotype could not be located in the collection of VNIGRI in 1984, but the Estonian material from North Estonian sections agrees well with the figure of the type specimen. Specimens from Kaugatuma and Aidu core sections are characterized by having a more distinct preadductorial node and slightly different sculpture on the lateral surface (with a less distinct concentrical pattern), looking more similar to the Lithuanian material (Sidaravičiene, 1992) or to the material from the erratics (Schallreuter, 1986, pl. 2, fig. 4).
Occurrence: Vormsi to Porkuni stages of Estonia; Vormsi to Pirgu stages of Lithuania and north-western Byelorussia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 64.70–81.40; Förby — 16.20; Haapsalu-203 — 24.90; Puhmu — 34.00–82.00; Laiamäe — 36.00; Kaugatuma — 346.75–366.90; Aidu — 114.00–116.00; outcrops: Paope — 0.10–0.40; Paluküla — 0.34–1.52; Kohila-1; Moe-2; over 50 specimens recorded.

Gryphiswaldensia gryphiswaldensis Schallreuter, 1965
Plate 3, fig. 14.

Occurrence: Keila Stage of Estonia; Idavere and Jõhvi stages of Lithuania; erratic boulders in Germany.
Localities. Pärnu core — 329.10; 3 specimens recorded.

Gryphiswaldensia plicata Schallreuter, 1969
Plate 3, fig. 13.

1969 *Gryphiswaldensia plicata* sp. n. — Schallreuter, pp. 350–351, fig. 4.
1984 *Gryphiswaldensia plicata* Schallreuter — Sarv and Meidla, p. 10.
1986 *Gryphiswaldensia plicata* Schallreuter — Schallreuter, pl. 2, fig. 5.

Holotype: Right heteromorphic valve No. 25/13. Erratic boulder (Öjlemyrgeschiebe) from Norderstrand, Visby, Gotland (Sweden).
Occurrence: Porkuni Stage of Estonia. Erratic boulders of Sweden (Gotland) and Germany.
Localities. Kaugatuma core — 344.60–348.00; Seli–Metsküla quarry; over 10 specimens recorded.

Gryphiswaldensia visbya Schallreuter, 1969
Plate 4, fig. 4.

1969 *Gryphiswaldensia visbya* Schallreuter — Schallreuter, pp. 348–350, figs 3.1–3.4.
1986 *Gryphiswaldensia visbya* Schallreuter — Schallreuter, pl. 2, fig. 6.

Holotype: Right heteromorphic valve No. 25/11. Erratic boulder (Öjlemyrgeschiebe) from Norderstrand, Visby, Gotland (Sweden).
Occurrence: Pirgu Stage of Estonia, Latvia and Lithuania. Erratic boulders in Sweden (Gotland) and Germany.
Estonian locality: Aidu core — 110.00–145.50 (5 specimens).

Gryphiswaldensia plavinensis (Gailīte, 1975)
Plate 4, figs 1–3.

1975 *Neoprimitiella plavinensis* Gailīte, sp. nov. — Gailīte, pp. 50–51, pl. 1, fig. 7.
1992 *Gryphiswaldensia waldensia* sp. n. — Sidaravičiene, p. 14, pl. 1, figs 7–8, pl. 2, figs 1–2.

Holotype: Right valve Os 31/463, VNIIMORGEO. Latvia, Talsi core section, depth 874.9 m. Pirgu Stage.
Diagnosis: Small, strongly convex, amplete to preplete *Gryphiswaldensia* with depression-like S2, high, prominent node-like L2 and indistinct elevation in the centroventral part of the valve. Lateral surface smooth or with fine irregular concentrical cristae. Dimorphism unknown.

Dimensions in mm:	Length	Height
Holotype, right valve Os 31/463 (according to Gailīte, 1975a)	0.85	0.55
Paratype, right valve Os 31/464 (according to Gailīte, 1975a)	0.7	0.5
Right valve Os 3328	0.63	0.41
Right juvenile valve Os 3329	0.51	0.33
Left valve Os 3330	0.65	0.49

Remarks: In Estonian material the outline of *G. plavinensis* varies considerably, and the same has been stated by Gailīte (1975a). Gailīte (*ibid.*) also mentioned the maximum convexity in the centroventral valve area, and this can be recognized on the photographs of the Lithuanian specimens also (Sidaravičiene, 1992, pl. 2, figs 1–2).
Occurrence: Pirgu stage of Estonia, Latvia and Lithuania.
Localities. Core sections: ? Kaugatuma — 360.25–377.05; Pärnu — 275.60–299.00; Viljandi — 301.50; Aidu — 172.50–177.00; Laeva — 180.60–214.10; Ruskavere — 71.32–110.40; Abja — 373.50–378.30; Taagepera — 427.70; Otepää — 384.20; Kaagvere — 233.10; over 90 specimens recorded.

? Genus *Dogoriella* Kanygin, 1967.

Type species: *Dogoriella dogoriensis Kanygin, 1967*

Dogoriella? pseudohistiata Schallreuter, 1972
Plate 4, fig. 5.

1972 *Dogoriella pseudohistiata* sp. n. — Schallreuter, p. 206, fig. 2.
1990 *Dogoriella pseudohistiata* Schallreuter — Schallreuter, pl. 1, fig. 4.

Holotype: Right valve (Schallreuter, 1972a, fig. 2). Erratic boulder (Öjlemyrflint) from Visby, Gotland, Sweden.
Remarks: *D.? pseudohistiata* is a typical member of Gryphiswaldensiinae, having a velum along the anterior and ventral margins, distinct node-like L2 and indistinct S2. Lateroventral crista is present in *Gryphiswaldensia* (*G. wilnoiensis*: Schallreuter, 1987a, pl. 2, fig. 4) or rudimentary in *Caprabolbina*. In *D. dogoriensis* the development of the greatest width of the velum and marginal sculpture (and a lateroventral crista) posteroventrally suggests the removal of the genus *Dogoriella* from Gryphiswaldensiinae and Euprimitiidae and custs doubt on the assignment of *D.? pseudohistiata* to this genus.
Occurrence: Pirgu Stage of Estonia. Erratic boulders from Gotland, Sweden.
Estonian locality: Pärnu core — 288.00–290.00 (2 specimens).

Genus *Caprabolbina* Schallreuter, 1972

Type species: *Caprabolbina capra* Schallreuter, 1972.
Distribution: Harjuan of Baltoscandia.

Caprabolbina capra Schallreuter, 1972
Plate 4, figs 6–7.

1972 *Caprabolbina capra* sp. n. — Schallreuter, pp. 206–207, fig. 3.
1986 *Caprabolbina capra* Schallreuter — Schallreuter, pl. 2, fig. 3.

Holotype: Right valve (Schallreuter, 1972a, fig. 3). Erratic boulder (Öjlemyrflint) from Visby, Gotland, Sweden. Harjuan.
Occurrence: Pirgu Stage of Estonia; erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Pärnu — 247.60–275.60(277.00?); Aidu — 145.50; Laeva — 181.80; ? Ruskavere — 93.75–96.40; over 20 specimens recorded.

Family Tvaerenellidae Jaanusson, 1957
Subfamily Tvaerenellinae Jaanusson, 1957
Genus *Uhakiella* Öpik. 1937

Type species: *Uhakiella coelodesma* Öpik, 1937.

Uhakiella jonesii (Krause, 1889)
Plate 4, figs 10–11.

1889 Primitia Jonesii n. sp. — Krause, p. 8, pl. 1, fig. 6.
? 1941 *Mirochilina jonesiana* n. nom. — Schmidt, p. 29–30, pl. pl. 3, fig. 20–23.
1954 *Chilobolbina*? cf. *jonesiana* (Schmidt) — Henningsmoen, 1954, p. 84, pl. 6, fig. 5.
1959 *Uhakiella magnifica* sp. n. — Sarv, pp. 27–28, pl. 3, fig. 10, pl. 4, figs 15–20, text-fig. 2g.
1982 *Uhakiella magnifica* Sarv — Ulst *et al.*, pp. 119, 124, etc. (*partim*).
1984 *Uhakiella magnifica* Sarv — Sarv and Meidla, p. 9.
1985 *Uhakiella jonesi* (Krause) — Sztejn, p. 62 (*partim*?), ? pl. 1, figs 6a, b.
1989 *Uhakiella magnifica* — Nõlvak *et al.*, p. 90.
1992 *Uhakiella jonesii* (Krause) — Sidaravičiene, 1992, pp. 91–92, pl. 24, fig. 3.

Lectotype: Tecnomorphic left valve figured by Krause (1889, pl. 1, fig. 6). Erratic boulder of northern Germany.
Remarks: Since Schallreuter (1973a, p. 78) most papers consider *Uhakiella magnifica* as a junior synonym of *Uhakiella jonesii*, but the type specimen of the latter species is not properly refigured and redescribed yet. In *Mirochilina jonesiana* Schmidt, 1941 the dorsal plica is poorly defined and its assignment to *U. jonesii* may be questioned. In several papers about the East Baltic area and Poland (Gailīte in Ulst *et al.*, 1982, Sztejn, 1985) *U. magnifica* (=*U. jonesii*) apparently includes *U. curta* also, as already mentioned by Sidaravičiene (1992). In the East Baltic these two species occur in the rocks of the same age, but they do not co-occur due to the confinement to distinctly different lithofacies.
Occurrence: Nabala to Porkuni stages of Estonia; ? Rakvere to Porkuni Stages of Latvia; Pirgu and ? Porkuni stages of Lithuania and southwestern Byelorussia; Pirgu Stage of Pskov region (Russia); ? Rakvere, Pirgu to Porkuni stages of Poland; units 5a and 5b of Norway, erratic boulders in Germany.
Localities. Core sections: Orjaku — 48.70–68.20; Förby — 5.00–8.00 (15.20?); Haapsalu-203 — 22.20–37.40; Virtsu — 135.85; Põhjaka–Saare — 88.00; Puhmu — 42.00–93.50; Kaugatuma — 344.60–362.85; Aidu — 123.00 (113.00?) — 125.70; Ruskavere — 71.32; outcrops: ? Turvaste; Tõrma; Adila; Lohu; Möldri — 0.00; Moe-1; Seli–Russalu; Porkuni; nearly 500 specimens recorded.

Uhakiella oanduensis Sarv, 1963
Plate 4, figs 12–13.

1963 *Uhakiella oanduensis* sp. n. — Sarv, pp. 162–163, pl. 1, figs 11–15.
1989 *Uhakiella oanduensis* Sarv — Sztejn, pp. 72–73, pl. 1, fig. 1.
* 1992 *Uhakiella oanduensis* Sarv — Sidaravičiene, p. 93, pl. 24, figs 10–11.

Holotype: Left heteromorphic valve Os 2643, IGT. Estonia, West Viru County, Oandu. Oandu Stage.
Occurrence: Oandu Stage of Estonia; Rakvere Stage of Lithuania; Oandu and Rakvere (undivided) stages of north-eastern Poland; erratic boulders in Germany.
Localities. Core sections: Orjaku — 131.20; Pärnu — 327.70–328.00; Viljandi — 327.80; ? Abja — 403.80; Tõrremäe trench; nearly 30 specimens recorded.

Uhakiella curta Sidaravičiene, 1975
Plate 4, figs 8–9.

1975 *Uhakiella curta* Sidaravičiene, sp. n. — Sidaravičiene, pp. 21, 26–28, pl. 3, figs 4–5, pl. 4, fig. 1.
1982 *Uhakiella magnifica* Sarv — Ulst *et al.*, pp. 119, 124, etc. (*partim.*).
? 1985 *Uhakiella jonesi* (Krause) — Sztejn, p. 62 (*partim*).
1990 *Uhakiella curta* Sidaravičiene — Meidla and Sarv, p. 69, pl. 8, figs 3–4.
1992 *Uhakiella curta* Sidaravičiene — Sidaravičiene, p. 90, pl. 23, figs 9–10.

Remarks: Gailīte (in Ulst et. al., 1982) apparently included *U. curta* into *U. magnifica*. The same has possibly happened in Sztejn, 1985.
Occurrence: Nabala to Pirgu stages of Estonia; Rakvere to Vormsi and ? Pirgu stages of Lithuania; Rakvere to Pirgu and ? Porkuni stages of Latvia; ? Rakvere, Pirgu and Porkuni stages of north-eastern Poland.
Localities. Core sections: Virtsu — 187.50; Vodja H-190 — 110.30–117.70; Vodja H-191 — 103.40–106.95; Kaugatuma — 384.45–408.64; Pärnu — 298.20–318.30; Viljandi — 308.20–318.30; Aidu — 175.00–186.10; Laeva — 206.45–228.60; Ruskavere — 108.90–119.50 (137.50?); Abja — 390.20–396.70; Otepää — 384.20–426.45 (427.40?); Kaagvere — 204.85–253.40; over 1400 specimens recorded.

Genus *Euprimites* Hessland, 1949.

Type species: *Euprimites reticulogranulata* Hessland, 1949.
Diagnosis: See Schallreuter, 1993a.

Subgenus *Euprimites* (*Euprimites*) Hessland, 1949

Diagnosis: See Schallreuter, 1993a.
Occurrence: Ordovician of Baltoscandia, north-eastern Siberia,

Euprimites (*Euprimites*) *kahalaensis* Sarv, 1963
Plate 5, fig. 1–2.

1963 *Euprimites kahalaensis* sp. n. — Sarv, 1963, pp. 163–165, pl. 1, figs 1–10.
1989 *Euprimites kahalaensis* Sarv — Sztejn, pp. 71, 73–74 (*partim*), pl. 1, figs 3a–c.
* 1992 *Euprimites kahalaensis* Sarv — Sidaravičiene, pp. 98–99, pl. 26, figs 1–2.

Holotype: Heteromorphic carapace Os 2739, IGT. Estonia, Kahala core section, depth 173.75 m. Oandu Stage.
Occurrence: Uppermost Keila and Oandu to Pirgu stages of Estonia; Oandu to Nabala stages of Latvia; Oandu to Pirgu stages of Lithuania and north-eastern Byelorussia.

Stratigraphic range of *E. kahalaensis* in the north-eastern Poland remains unclear. The isolated occurrence of *E. kahalaensis* in the Kukruse stage in the Lublin area (Sztejn, 1989, Table 1 and comments p. 74) may easily be based on misidentification. The specimens from the Kukruse Stage are not figured and data from the other parts of the East Baltic area do not support such a long stratigraphic range. Figured specimens originate from the undivided Oandu to Rakvere stages and from the Pirgu Stage.

Localities. Core sections: Puhmu — 127.50–137.80; Laiamäe — 74.20–89.60; Vinni — 43.80; Kaugatuma — 382.70–386.60; Pärnu — 308.15; Viljandi — 304.60–318.30; Aidu — 197.10; Laeva — 215.90–217.20; Ruskavere — 115.75; Taagepera — 456.30–458.10; Otepää — 428.90 (440.00?); Kaagvere — 252.60–257.10; over 180 specimens recorded.

Subgenus *Euprimites* (*Bichilina*) Sarv, 1959

Type species: *Bichilina prima* Sarv, 1959.
Occurrence: Ordovician of Baltoscandia and Bohemia.

Euprimites (*Bichilina*) *prima* Sarv, 1959
Plate 5, fig. 3.

* 1983 *Bichilina prima* Sarv — Schallreuter, p. 75, pl. 12, fig. 3.
1990 *Bichilina prima* Sarv — Meidla and Sarv, p.69, pl. 7, fig. 8.
1990 *Bichilina prima* — Hints *et al.*, p. 137 (fig.).
* 1992 *Bichilina prima* Sarv — Sidaravičiene, p. 101, pl. 26, fig. 11.

Occurrence: Idavere to Keila stages of Estonia, Latvia, Poland; Idavere to Keila and ?Oandu stages of Lithuania and north-western Byelorussia.
Localities. Core sections: Orjaku — 133.70–134.70; Virtsu — 225.40; Mäetaguse — 29.60; Laeva — 237.70–239.50; over 50 specimens recorded.

Genus *Piretia* Jaanusson, 1957.

Type species: *Piretia geniculata* Jaanusson, 1957.
Diagnosis: See Schallreuter, 1993a.
Occurrence: Ordovician of Baltoscandia.

Piretia rugosa (Steusloff, 1895)
Plate 5, fig. 4.

1895 *Primitia rugosa* — Steusloff, p. 783, pl. 58, fig. 16.
1986 *Piretia rugosa* — Schallreuter, pl. 3, fig. 2.
1989 *Piretia rugosa* — Nõlvak *et al.*, p. 90.

Holotype: not established.
Remarks: The material in the current collection agrees well with the specimen figured by Schallreuter (1986, pl. 3, fig. 2) as *P. rugosa*.
Occurrence: Pirgu Stage of Estonia and Pskov region (Russia); erratic boulders in Germany.
Localities. Core sections: Förby — 14.30; Virtsu — 150.85; Puhmu — 76.80; Kaugatuma — 344.60–361.10; Pärnu — 291.00; Aidu — 145.50; over 30 specimens recorded.

Piretia erinacea Schallreuter, 1964
Plate 5, fig. 5.

1964 *Piretia erinacea* sp. n. — Schallreuter, 1964, pp. 387, 428, pl. 12, fig. 1.
1973 *Piretia erinacea* Schallreuter — Schallreuter, pp. 90–92, pl. 17, figs 5–7, pl. 18, figs 1–2.

Occurrence: Keila Stage of Estonia; erratic boulders in Germany.
Estonian locality: Laeva core — 238.60–239.50 (4 specimens).

Genus *Tvaerenella* Jaanusson, 1957.

Type species: *Primitiella carinata* Thorslund, 1940.
Diagnosis: See Schallreuter, 1973a, p. 102.
Occurrence: Ordovician of Baltoscandia, Volynia, Canada, ?Siberia.

Tvaerenella longa Sarv, 1956

Subspecies: *T. longa longa* (Sarv, 1956); *T. longa pretiosa* Sarv, 1959.

Tvaerenella longa longa (Sarv, 1956)
Plate 5, fig. 6.

1956 *Primitiella longa* sp. n. — Sarv, p. 34, pl. 1, figs 9–11.
1957 *Tvaerenella*? *longa* (Sarv) — Jaanusson, 1957, p. 296.
1959 *Tvaerenella longa longa* (Sarv) — Sarv, pp. 32–33, pl. 5, figs 13–16.
? 1982 *Tvaerenella longa* (Sarv) — Gailīte in Ulst *et al.*, p. 124

Holotype: Heteromorphic carapace Os 2008, IGT. Estonia, West Viru County, Tuula. Oandu Stage.
Remarks. Data in Ulst *et al.* (1982) may be questioned — see remarks on *T. longa pretiosa.*
Occurrence: Keila and Oandu stages of Estonia; ?Oandu and ?Rakvere to Nabala (undivided) stages of Latvia.
Estonian locality: Orjaku core — 135.60 (1 specimen). See also Sarv, 1956 and 1959.

Tvaerenella longa pretiosa Sarv, 1959
Plate 5, figs 7–8.

1959 *Tvaerenella longa pretiosa* subsp. n. — Sarv, pp. 33–34, pl. 5, figs 17–22.
? 1982 *Tvaerenella pretiosa* Sarv — Gailīte in Ulst *et al.*, p. 124
1984 *Tvaerenella longa pretiosa* Sarv — Sarv and Meidla, pp. 8–9, 12.
1990 *Tvaerenella longa pretiosa* — Meidla *et al.*, 1990, p. 135 (fig.).
* 1992 *Tvaerenella longa pretiosa* Sarv — Sidaravičiene, p. 102, pl. 26, fig. 12, pl. 27, fig. 1.

Holotype: Left heteromorphic valve Os 2514, IGT. Estonia, West Viru County, Oandu. Oandu Stage.
Remarks. In Estonian sections the two subspecies *T. longa longa* and *T. longa pretiosa* occur in a temporal succession, the former in Keila and Oandu stages and the latter in Oandu

to Vormsi stages. In Latvian sections, judging from the Table 9 in Ulst *et al.*, 1982, their order seems to be reversed. As occurrence of *T. longa pretiosa* in Lithuania is in a good correspondence with the Estonian fossil record, the Latvian data may be questioned.

Occurrence: Oandu to Vormsi stages of Estonia, Lithuania and north-western Byelorussia; equivalents of the Keila to Nabala stages of Podolia; ? Idavere to Keila and ? Oandu stages of Latvia.

Localities. Core sections: Orjaku — 100.00–129.70; Virtsu — 196.20–197.30; Nabala — 4.50–9.75; Moe — 16.80–69.70; Puhmu — 89.40–137.80; Laiamäe — 41.90–88.30; Vinni — 18.80–41.40; Mäetaguse — 9.90–21.10; Pärnu — 320.80; Viljandi — 324.80–325.80; Laeva — 224.80–236.90; outcrops: Ussimägi — 0.40–1.75; Paekna — 1.30–2.70; Moonaküla; Rägavere; Piilse; Turvaste; Nõmmeküla; Tõrma; Paluküla — 2.10; Saxby; Kohila-1; over 300 specimens recorded.

Tvaerenella expedita Sarv, 1959
Plate 5, figs 9–11.

1954 *Öpikella* cf. *umbilicata* (Kummerow) — Henningsmoen, pp. 94–95 (*partim*), pl. 5, figs 1–5.
1959 *Tvaerenella expedita* sp. n. — Sarv, pp. 34–35, pl. 5, figs 23–28.
1984 *Tvaerenella expedita* Sarv — Sarv and Meidla, pp. 9, 19.
1989 *Tvaerenella expedita* — Nõlvak *et al.*, p. 90.
1990 *Tvaerenella expedita* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Tvaerenella expedita* Sarv — Sidaravičiene, p. 102, pl. 27, figs 2–3.

Holotype: Heteromorphic carapace Os 2520, IGT. Estonia, West Viru County, Moe. Pirgu Stage.

Occurrence: Vormsi to Porkuni stages of Estonia; Pirgu Stage of Latvia and Pskov district (Russia); Vormsi and Pirgu stages of Lithuania and north-western Byelorussia; units 5a and 5b of Norway.

Localities. Core sections: Orjaku — 46.60–75.90; Förby — 5.00–25.50; Haapsalu-203 — 22.20–54.80; Virtsu — 135.85; ? Põhjaka–Saare — 77.70; Moe — 3.80; Puhmu — 39.70–90.70; Laiamäe — 13.10; Kaugatuma — 343.85–382.70; Pärnu — 241.90–284.70; Aidu — 110.00–175.00; Laeva — 179.10–198.70; Ruskavere — 60.65–109.70; Kaagvere — 204.85; outcrops: Paluküla — 0.42–1.25; Kohila-2; Prillimäe — 0.70; Piirsalu; Adila; Lohu; Möldri — 0.50; Pirgu; Põriki; Moe-1; over 600 specimens recorded.

Genus *Retiprimites* gen. n.

Name: derived as a combination of name of the type species (*reticularis*) and the name of a related genus *Euprimites*.

Type species: *Retiprimites reticularis* gen. et. sp. n.

Diagnosis: Carapace amplete, moderately convex, equivalved. S2 short, developed as an elongate pit; preadductorial node low, indistinct. Velum in tecnomorphs weakly developed. Heteromorphs with a convex dolonal pouch along anteroventral and ventral margins. Marginal structures developed as a row of spines.

Other species: *Primitia osloensis* Henningsmoen, 1954.

Remarks: The new genus is close to *Uhakiella* Öpik, 1937 but differs by the lack of the dorsal ridge and a horseshoe-shaped lobe (=Zygalcrista of Schallreuter, 1973a). From

Piretia Jaanusson, 1957 the genus differs by having an adductorial pit and from *Euprimites* by its characteristic dolonal pouch in females.

Occurrence: Uppermost middle and upper Ordovician of Estonia, upper Ordovician of Lithuania, north-western Byelorussia and the Oslo Region in Norway.

Retiprimites reticularis gen. et sp. n.
Plate 6, figs 1–3.

1992 *Uhakiella osloensis* (Henningsmoen) — Sidaravičiene, p. 93, pl. 24, figs 8–9.

Holotype: Heteromorphic carapace Os 3180, IGT. Estonia, Puhmu core, depth 132.5 m. Rakvere Stage.

Diagnosis: Carapace medium-sized, amplete, moderately convex. S2 a narrow elongate pit. Heteromorphs with a convex dolonal pouch along the ventral margin. Surface finely reticulate.

Dimensions in mm:	Length	Height	Width
Holotype, heteromorphic carapace Os 3180	1.36	0.91	0.53
Tecnomorphic carapace Os 3181	1.33	0.77	0.55
Juvenile carapace Os 3182	0.90	0.52	0.36

Description: Carapace medium-sized, amplete, moderately convex, with greatest width at the midlength. Dorsal margin straight, long; cardinal angles blunt, anterior angle somewhat larger than the posterior. Valves posteriorly and anteriorly almost equally rounded, ventral margin is flatly arched. S2 situated distinctly in front of midlenght of the valve, narrow, elongate, extends ventrally to the midheight of the valve. Preadductorial node low, indistinct.

Heteromorphs with a closed dolonal pouch, which extends from the lower half of the anterior margin to the posteroventral margin. Surface of the dolon with a weak radial sculpture. In tecnomorphs ventral part of the lateral surface separated from the marginal surface only by a bend, no distinct velar structure is developed. The marginal structure consists of a number of spines; in heteromorphs the edge of the dolon is unsculptured. Surface of the valves distinctly and finely reticulate.

Remarks: Sidaravičiene (1992, p. 93, pl. 24, figs 8–9) assigned conspecific material with *Primitia osloensis* Henningsmoen, 1954. The type specimen of the latter, specimen No. 55081a (PMO, figured by Henningsmoen, 1954, pl. 1, fig. 6; examined by the author in 1991) is an internal mould, except of dolon, and therefore difficult to compare with the material from East Baltic. Another specimen figured by Henningsmoen (*ibid.*, fig. 7, deposited in Riksmuseum, Stockholm) has not been examined by the author, but it differs distinctly by its granular sculpture of the lateral surface. In addition, heteromorphic valves of *R. osloensis* appear to be smaller (length about 1.1 mm; Henningsmoen, 1954) than those of *R. reticularis*.

Occurrence: Rakvere to Porkuni stages of Estonia; Nabala to Pirgu stages of Lithuania and north-western Byelorussia.

Localities. Core sections: Orjaku — 100.00; Puhmu — 68.30–132.50; Vodja H-190 — 107.60; Kaugatuma — 343.85–346.75 (354.60?); Aidu — 116.00; Lohu quarry; over 25 specimens recorded.

Subfamily Martinssonopsinae Schallreuter, 1967
Genus *Eoaquapulex* Levinson, 1968

Type species: *Diplopsis socialis* Levinson, 1961.

Eoaquapulex frequens (Steusloff, 1895)
Plate 5, fig. 12.

1895 *Isochilina frequens* n. sp. — Steusloff, p. 784, pl. 58, fig. 4.
* 1962 *Oepikella? frequens* (Steusloff) — Sarv, pp. 105–107, pl. 2, figs 1–10.
1983 *Oepikella? frequens* (Steusloff) — Meidla, 1983, p. 54 (fig.).
1984 *Oepikella? frequens* (Steusloff) — Sarv and Meidla, 1984, pp. 8, 9.
1989 *Diplopsis frequens* (Steusloff) — Nõlvak *et al.*, p. 90 (fig. 2).
1990 *Eoaquapulex frequens* (Steusloff) — Meidla and Sarv, p. 69, pl. 8, fig. 5.
1990 *Eoaquapulex frequens* (Steusloff) — Meidla *et al.*, pp. 134, 135.
* 1992 *Eoaquapulex frequens* (Steusloff) — Sidaravičiene, p. 104, pl. 27, figs 11–12.

Lectotype: Heteromorphic valve figured by Steusloff (1895, pl. 58, fig. 4; chosen by Henningsmoen, 1954).
Occurrence: Vormsi to Porkuni stages of Estonia; Vormsi, Pirgu and ?Porkuni stages of Lithuania; units 5a and 5b of the Oslo region, Norway; erratic boulders in Germany.
Localities. Core sections: Orjaku — 48.70–84.80; Förby — 10.00–22.50; Haapsalu-203 — 23.50–56.80; Põhjaka–Saare — 76.30–117.40; Vodja H-190 — 107.60–113.40; Vodja H-191 — 104.30; Moe — 16.80; Puhmu — 33.60–81.00; Laiamäe — 29.20 (30.20?); Kaugatuma — 343.85–377.05; Pärnu — 257.50–306.30; Aidu — 107.20–177.00; Laeva — 179.10–215.00; Ruskavere — 60.65 (59.80?)–111.70; Abja — 388.40; outcrops: Turvaste; Paope — 0.10–1.20; Paluküla — 0.34–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 1.10; Lehtse; Moe-2; Piirsalu; Ruunavere; Lohu; Möldri — 0.00–1.50; Pirgu; Põriki; Moe-1; Röa–Jakobi; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 600 specimens recorded.

Family Hithidae Schallreuter, 1964 [fam. nov.]

Diagnosis: High, unisulcate, S2 some distance from the anterior and dorsal margins, comparatively deep only centrally. Posteroventral lobe distinct, high, occasionally spine-like; other nodes or elevations may be present. Velar dimorphism dolonal or locular, dolon located antero- and/or centroventrally.
Subfamilies: Hithinae Schallreuter, 1964 and Sarvininae Schallreuter, 1966
Remarks: Representatives of Hithidae differ from Bolbinidae Ivanova, 1979 by the lack of a U-shaped lobe (probably formed by merged L2 and posteroventral lobe) and domiciliar dimorphism, and by the anteroventral position of the dolon. Domiciliar dimorphism is not observed in the type species of *Bolbina* (*B. ornata*), which is imperfectly known, but it is present in several other well known species (*B. major, B, rakverensis, B. plicata*).

From unisulcate Glossomorphitinae with no histial structure the representatives of Hithidae differ by a short, high carapace and by the comparatively more central location of S2. Differences from Tvaerenellidae include the presence of a distinct posteroventral lobe. From the rest of Tetradellidae they differ by the lack of histium and quadrilobate lobation. Differences from Hollinidae include a continuous, uninterrupted ridge- or frill-like velum.

Euprimitiidae also possess a comparatively short and high carapace, but are characterized by a weak dimorphism.

Ivanova (1979, p. 30) assigned *Sarvina* to Hithinae (Tetradellidae). Since Hithinae and Sarvinidae (Schallreuter, 1966a, p. 861) obviously represent different evolutionary lineages, the latter is maintained as a subfamily.

Occurrence: Middle and late Ordovician and ?early Silurian of Baltoscandia, North America.

Subfamily Hithinae Schallreuter, 1964.

Type genus: *Hithis* Schallreuter, 1964.

Diagnosis: Hithidae with dolonal dimorphism; in closed carapaces dolon is closed ventrally.

Genera assigned: *Brevibolbina* Sarv, 1959; *Hithis* Schallreuter, 1964; *Cavhithis* Schallreuter, 1965.

Comparison. Representatives of Hithinae differ form Sarvininae by having a ventrally closed dolon in heteromorphs. If loculi are not developed, the dolon of Sarviniinae is ventrally open in closed carapaces.

Occurrence: Middle and late Ordovician of Baltoscandia.

Genus *Brevibolbina* Sarv, 1959

Type species: *Brevibolbina dimorpha* Sarv, 1959.

Diagnosis: See Schallreuter, 1973a, p. 74.

Occurrence: Middle and upper Ordovician of Baltoscandia.

Brevibolbina dimorpha dimorpha Sarv, 1959
Plate 6, figs 4–5.

1959 *Brevibolbina dimorpha dimorpha* gen. et subsp. n. — Sarv, pp. 144–145, pl. 25, figs 5–11, text-fig. 14A.

1984 *Brevibolbina dimorpha* Sarv — Sarv and Meidla, p. 9.

1990 *Brevibolbina dimorpha dimorpha* — Meidla *et al.*, p. 135 (fig.).

* 1992 *Brevibolbina dimorpha dimorpha* Sarv — Sidaravičiene, p. 85, pl. 21, figs 7–10.

Holotype: Left heteromorphic valve Os 2296, IGT. Estonia, Harju County, Nõmme (Nabala). Nabala Stage.

Occurrence: Oandu?, Rakvere and Nabala stages of Estonia; Rakvere to Vormsi and ?lower Pirgu stages of Latvia and Lithuania; Nabala to Pirgu stages of Poland.

Localities. Core sections: Orjaku — 101.40–129.70; Nabala — 4.50–12.00; Moe — 46.00–57.10; Puhmu — 119.40–121.90; Laiamäe — 70.50 (42.10?)–89.60; Vinni — 18.80–31.90; Mäetaguse — 9.90–21.10; Pärnu — 320.80; outcrops: Paekna — 0.40–2.70; Nõmmeküla; over 600 specimens recorded.

Brevibolbina dimorpha altonodosa Sarv, 1959
Plate 6, figs 6–7.

1959 *Brevibolbina dimorpha altonodosa* gen. et subsp. n. — Sarv, p. 145, pl. 25, figs 12–18, text-fig. 14V.
1984 *Brevibolbina altonodosa* Sarv — Sarv and Meidla, pp. 8–9, 19.
* 1992 *Brevibolbina dimorpha altonodosa* Sarv — Sidaravičiene, p. 85, pl. 21, fig. 11, pl. 22, figs 1–2.

Holotype: Tecnomorphic left valve Os 2401, IGT. Estonia, West Viru County, Moe. Pirgu Stage.
Occurrence: Vormsi and Pirgu stages of Estonia; Pirgu Stage of Latvia and Lithuania.
Localities. Core sections: Förby — 5.00–25.50; Haapsalu-203 — 63.15–65.85; Moe — 3.00–25.40; Puhmu — 86.70–88.10; Laiamäe — 36.00–41.90; outcrops: Kõrgessaare; Paluküla — 0.12–2.27; Sutlepa; Lehtse; Põriki; Moe-1; over 200 specimens recorded.

Brevibolbina pontificans Schallreuter, 1981
Plate 6, fig. 8.

1960 *Brevibolbina dimorpha altonodosa* Sarv — Sarv, table.
1981 *Brevibolbina pontificans* n. sp. — Schallreuter, pp. 64–65, figs 2–3.
1981 *Brevibolbina fissurata* Schallreuter — Schallreuter, pp. 65–67, figs 4–5.
1984 *Brevibolbina fissurata* Schallreuter — Sarv and Meidla, 1984, p. 9, 13, 19.
1992 *Brevibolbina fissurata* Schallreuter — Sidaravičiene, p. 86, pl. 22, figs 3–5.

Holotype: Left heteromorphic valve No. 2140, GPIH. Sweden, Gotland, beach at Gnisvärd. Erratic boulder, Harjuan.
Diagnosis: See Schallreuter, 1981a, pp. 64–65.
Remarks: *B. pontificans* and *B. fissurata* were originally described from different erratic boulders (see Schallreuter, 1981a). Minor differences between these species (*ibid.*, p. 65) are considered here as due to intraspecific variation. Judging from the figures (*ibid.*, fig. 4, 5) it is uncertain whether the crista of *B. fissurata* is completely preserved. It could encroached onto the dolon on heteromorphic valve, like by *B. pontificans*. Other features, such as details of S2 morphology and ornamentation, lie obviously within the limits of intraspecific variation.
Occurrence: Pirgu Stage of Estonia and Lithuania; erratic boulders of Gotland (Sweden) and Germany.
Localities. Core sections: ? Haapsalu-203 — 33.20; Virtsu — 132.50–135.00; Puhmu — 42.00; Pärnu — 262.10; Aidu — 114.00–116.00; outcrops: Kuie; ? Piirsalu; Adila; Lohu; Möldri — 0.50–1.50; over 50 specimens recorded.

Subfamily Sarvininae Schallreuter, 1966.

Diagnosis: Hithidae with dolonal or locular dimorphism, in case of dolonal dimorphism the dolon is open ventrally in closed carapaces.
Genera assigned: *Eohollina* Harris, 1957; *Distobolbina* Sarv, 1959; *Sarvina* Schallreuter, 1964.
Occurrence: Middle and upper Ordovician and ?lower Silurian of Baltoscandia and North America.

Genus *Distobolbina* Sarv, 1959.

Type species: *Distobolbina nabalaensis* Sarv, 1959.
Diagnosis: See Schallreuter, 1975, p. 182.
Occurrence: Middle and upper Ordovician of Baltoscandia.

Distobolbina tuberculata (Henningsmoen, 1954)
Plate 6, figs 9–10.

1954 *Bolbina tuberculata* sp. n. — Henningsmoen, p. 78, pl. 1, figs 3–5, text-fig. 2.
1983 *Distobolbina bispinata* Schallreuter — Meidla, p. 54 (fig.).
1984 *Distobolbina bispinata* Schallreuter — Sarv and Meidla, 1984, p. 10.
1989 *Distobolbina tuberculata* — Nõlvak *et al.*, p. 90.
1992 *Distobolbina tuberculata* (Henningsmoen) — Sidaravičiene, p. 18, pl. 2, fig. 9.

Holotype: Tecnomorphic left valve No. 66428a, PMO. Norway, Oslo, Hovedøya. Unit 5b.
Occurrence: Vormsi to Porkuni stages of Estonia; Pirgu Stage of Lithuania and Pskov region (Russia), unit 5b of the Oslo region of Norway; erratic boulders in Germany and on Gotland.
Localities. Core sections: Förby — 8.00–14.30 (23.50?); Haapsalu-203 — 37.40; Moe — 11.20; Laiamäe — 29.20; Kaugatuma — 344.60–366.90; Pärnu — 242.60–264.30; Aidu — 113.00–155.00; ? Laeva — 181.80; Ruskavere — 72.10; outcrops: Paluküla — 0.42–2.27; Kohila-1; ? Urge; Prillimäe — 1.30; Tapa; Lohu; Moe-1; over 100 specimens recorded.

Distobolbina nabalaensis Sarv, 1959
Plate 6, figs 11–12.

1959 *Distobolbina nabalaensis* sp. n. — Sarv, pp. 150–151, pl. 26, figs 17–20.
1984 *Distobolbina nabalaensis* Sarv — Sarv and Meidla, p. 10.
1990 *Distobolbina nabalaensis* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Distobolbina nabalaensis* Sarv — Sidaravičiene, p. 17, pl. 2, figs 7–8.

Holotype: Left heteromorphic valve Os 2407, IGT. Estonia, Harju County, Nõmme (Nabala). Nabala Stage.
Occurrence: Rakvere to Vormsi stages of Estonia; Nabala to Pirgu stages of Latvia; Rakvere to Pirgu stages of Lithuania; Oandu to Porkuni stages of Poland.
Localities. Core sections: Orjaku — 100.00–107.80 (126.50?); Haapsalu-203 — 64.90; Nabala — 5.85; Vodja H-191 — 118.80; Moe — 40.80–48.80; Puhmu — 79.60–119.40; Laiamäe — 31.90–70.50; Vinni — 15.50–26.40; ? Mäetaguse — 20.60; Kaugatuma — 408.64; Pärnu — 315.70–318.30; Viljandi — 322.60; Aidu — 188.20–197.10; Laeva — 227.10–230.70; Ruskavere — 119.50–124.00; outcrops: ? Ussimägi; Paekna — 1.80; Nõmmeküla; Tõrma; ? Urge; ? Moe-2; over 200 specimens recorded.

Family Ctenonotellidae Schmidt, 1941
Subfamily Wehrliinae Schallreuter, 1965
Genus *Rakverella* Öpik, 1937

Type species: *Rakverella spinosa* Öpik, 1937.
Diagnosis: See Schallreuter, 1976, p. 203.
Occurrence: Ordovician of Baltoscandia.

Rakverella spinosa Öpik, 1937
Plate 7, fig. 5.

1937 *Rakverella spinosa* n. sp. — Öpik, pp. 109–110, pl. 9, fig. 6, text-fig. 6.
1959 *Rakverella spinosa* Öpik — Sarv, pp. 75–76, pl. 11, fig. 14.

Occurrence: Idavere to Keila stages of Estonia
Localities. Core sections: Orjaku — 133.70 (134.70?); Virtsu — 225.40; 4 specimens recorded.

Rakverella? sp. n.
Plate 7, figs 3–4.

Description: Valves elongate, trilobate, lobes terminating spine-like dorsally; L1 and L3 reach beyond the dorsal margin, L2 ending near dorsal margin; tecnomorphic velum narrow, heteromorphs with strongly convex dolon along the ventral margin. Surface smooth. Differs from *R. pectinata* (Öpik, 1937) by smooth surface and more distinct lobation.

Dimensions of the figured specimen, mm:	Length	Height
Right heteromorphic valve Os 3357	1.09	0.79
Left tecnomorphic valve Os 3358	1.11	0.63

Occurrence: Vormsi Stage of Estonia.
Estonian locality: Laiamäe core — 41.90 (3 specimens).

Subfamily Steusloffiinae Schallreuter, 1966
Genus *Steusloffia* Ulrich et Bassler, 1908

Type species: *Strepula linnarssoni* Krause, 1889.
Diagnosis: See Schallreuter, 1976, p. 180.
Occurrence: Ölandian (Ontikan) and Viruan of Baltoscandia.

Steusloffia neglecta Sarv, 1959
Plate 7, fig. 1.

1959 *Steusloffia neglecta* sp. n. — Sarv, pp. 89–90, pl. 15, figs 5–8, text-fig: 8Z.
* 1992 *Steusloffia neglecta* Sarv — Sidaravičiene, p. 131, pl. 33, fig. 10.

Holotype: Right valve Os 2220, IGT. Estonia, West Viru County, Oandu. Rakvere Stage.
Occurrence: Rakvere Stage of Estonia and Lithuania.

Localities. Core sections: Puhmu — 127.50–136.90; Laiamäe — 88.30–89.60; Vinni — 34.50–41.40; Mäetaguse — 20.60; Laeva — 231.70; Ussimägi outcrop — 0.50; over 160 specimens recorded.

Subfamily Ctenentominae Schmidt, 1941
Genus *Ctenonotella* Öpik, 1937
(Syn. *Bilobatia* Schallreuter, 1976)

Type species: *Ctenonotella elongata* Öpik, 1937.

Ctenonotella supera Sarv, 1963
Plate 7, fig. 2.

1963 *Ctenonotella supera* sp. n. — Sarv, pp. 176–177, pl. 5, figs 8–11.
1976 *Pectidolon supera* (Sarv) — Schallreuter, p. 207.
1992 *Ctenonotella supera* Sarv — Sidaravičiene, 1992, pl. 28, figs 1–2.

Holotype: Right heteromorphic valve Os 2749, IGT. Estonia, West Viru County, Oandu. Rakvere Stage.
Occurrence: Rakvere Stage of Estonia and Lithuania.
Localities. Core sections: Orjaku — 112.30–113.30; Vinni — 29.00; 5 specimens recorded.

Subfamily Tallinnellinae Schallreuter, 1976
Genus *Tetrada* Neckaja, 1958

Type species: *Tetradella memorabilis* Neckaja, 1953.
Diagnosis: See Sidaravičiene, 1992, p. 112.
Occurrence: Viruan and Harjuan of Baltoscandia.

Subgenus *Tetrada* (*Tetrada*) Neckaja, 1958

Type species: *Tetradella memorabilis* Neckaja, 1953.

Tetrada (*Tetrada*) *harpa* (Krause, 1892)
Plate 7, fig. 7.

1892 *Beyrichia* (*Tetradella*) *harpa* n. sp. — Krause, pp. 394, 399, pl. 22, fig. 15.
1959 *Tallinnopsis ovalis* (Oraspõld, in coll.) — Sarv, pp. 70–71, pl. 13, figs 16–21, text-fig. 7E.
* 1985 *Tetrada harpa* (Krause) — Schallreuter, pp. 108–109, pl. 4, figs 1–3.
* 1992 *Tetrada* (*Tetrada*) *ovalis* (Sarv) — Sidaravičiene, pp. 113–114, pl. 29, fig. 11.

Lectotype: Not established (see Schallreuter, 1985a, p. 108).
Occurrence: Keila Stage of Estonia, Lithuania, north-western Byelorussia; Keila and Oandu stages of Latvia, erratic boulders in Germany.
Localities. Orjaku core — 133.70; over 100 specimens recorded.

Tetrada (*Tetrada*) *krausei* (Steusloff, 1895)
Plate 7, fig. 8.

1895 *Beyrichia Krausei* n. sp. — Steusloff, p. 779, pl. 58, fig. 26.
1959 *Tallinnopsis iewica* (Neckaja) — Sarv, pp. 68–69, pl. 13, figs 12–13, text-fig. 7G.
1988 *Tetrada troppenzorum* sp. n. — Schallreuter, p. 7, fig. 1, photos 2–3.
1990 *Tetrada krausei* (Steusloff) — Schallreuter, pl. 2, fig. 3.
1990 *Tetrada krausei* — Hints *et al.*, p. 137 (fig.).
* 1992 *Tetrada* (*Tetrada*) *krausei* (Steusloff) — Sidaravičiene, pp. 114–115, pl. 30, figs 1–2.
? 1992 *Tetrada* (*Tetrada*) *pseudoiewica* sp. n. — Sidaravičiene, pp. 115–116, pl. 30, figs 8–10.

Lectotype: Specimen figured by Steusloff (1895, pl. 58, fig. 26). Germany, erratic boulder from Neu-Brandenburg.
Remarks: Schallreuter (1976, p. 165) stated that *T. iewica* is conspecific with *T.* (*T.*) *krausei*. In 1984, when Neckaja's type specimens were photographed in Tallinn by the author and Dr. L. Sarv, the type specimen of *T. iewica* was missing in the collection. According to Schallreuter's (1976) viewpoint, which must be supported, Neckaja's (1953) material apparently lies within limits of the variability of *T.* (*T.*) *krausei*. Later the same author revised the species concept of *T. krausei* and distinguished a new species of this group, *Tetrada troppenzorum* Schallreuter (1988, p. 7, fig. 1, photos 2–3). However, the specimens assigned to *T. troppenzorum* agree better with the figure of Steusloff (1895, pl. 58, fig. 26) than with those of *T. krausei* figured by Schallreuter in the same paper (1988, fig. 2). *T. troppenzorum* is most likely a junior synonym of *T. krausei*. The same appears to be true with regard to *T. pseudoiewica* Sidaravičiene. Until the Steusloff's type material has become refigured, a comparison of *T.* (*T.*) *krausei* and *T.* (*T.*) *pseudoiewica* is difficult. A specimen figured by Neckaja, 1953 (pl. 2, fig. 12), shows a configuration of S2, which agrees with that described by Sidaravičiene (1992, p. 116) as characteristic to *T.* (*T.*) *pseudoiewica*.
Occurrence: Jõhvi to Oandu stages of Estonia; Idavere to Keila stages of Latvia; Jõhvi to lowermost Rakvere stages of Lithuania; Idavere to Jõhvi stages of north-western Russia; equivalents of the Oandu to Rakvere stages of Podolia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 133.70–134.70; Virtsu — 225.40; Kaagvere — 265.00–265.70; over 30 specimens recorded.

Tetrada (*Tetrada*) *neckajae* Meidla, 1986
Plate 7, fig. 9.

1986 *Tetrada neckajae* sp. n. — Meidla, pp. 12–15, pl. 3, figs 1–6.
1992 *Tetrada* (*Tetrada*?) *neckajae* Meidla — Sidaravičiene, p. 117, pl. 31, fig. 4.

Holotype: Right valve Os 3037, IGT. Estonia, West Viru County, Vinni core section, depth 15.5 m. Nabala Stage.
Occurrence: Nabala Stage of Estonia; Nabala and Vormsi stages of Lithuania.
Localities. Core sections: Vinni — 15.5–18.8; Moe — 40.8 m; Laiamäe — 62.50; over 40 specimens recorded.

Tetrada (*Tetrada*) *variabilis* Meidla, 1986
Plate 7, fig. 10.

1979 *Tallinnopsis* ex gr. *iewica* — Sidaravičiene, p. 134, 136.

1986 *Tetrada variabilis* sp. n. — Meidla, pp. 15–16, pl. 3, figs 7–10.
1992 *Tetrada variabilis* Meidla — Sidaravičiene, p. 115, pl. 30, figs 3–7.

Holotype: Left valve Os 3067, IGT. South-eastern Latvia, Berzini core section, depth 434.9 m. Nabala Stage.
Occurrence: Rakvere and Nabala stages of Estonia, Lithuania and north-western Byelorussia. Nabala Stage of Latvia.
Localities. Core sections: Orjaku — 112.30–115.60; Nabala — 8.45; Puhmu — 123.90; Laiamäe — 75.80; Vinni — 27.20–40.00; Ussimägi outcrop — 1.75; over 30 specimens recorded.

Subgenus *Tetrada* (*Neotsitrella*) Sarv, 1963
(Syn.: *Tetrada* (*Perplana*) Sidaravičiene, 1992)

Type species: *Tsitrella longata* Sarv, 1959.
Diagnosis (modified from Sidaravičiene, 1992): Lobes wide, flat, connected ventrally. S1 or/and S3 may be poorly developed or absent. Surface pitted.
Other species: *Tetradella perplana* Neckaja, 1953; *Tsitrella longata* Sarv, 1959; *Neotsitrella bisulcata* Sarv, 1963; *Tetrada* (*Perplana*) *pabradensis* Sidaravičiene, 1992.
Remarks: Sidaravičiene (1992, pp. 123–124) motivated the assignment of *Neotsitrella bisulcata*: Sarv (1963, pp. 186–187, pl 6, figs 1–6) to *Tetrada* (*Perplana*). Since this species is closely related to *Tsitrella longata* (see Sarv, 1963, p. 187) both species are assigned here to the subgenus. *Tsitrella longata* has been elected a type species of the genus *Neotsitrella* Sarv, 1963. As a consequence, the subgenus *Perplana* Sidaravičiene, 1992 appears to be a junior synonym of *Neotsitrella.*
Occurrence: Viruan of Baltoscandia.

Tetrada (*Perplana*) *longata* (Sarv, 1959)
Plate 7, fig. 6.

1959 *Tsitrella longata* sp. n. — Sarv, pp. 180–181, pl. 32, figs 4–7.

Holotype: Right valve Os 2550, IGT. Estonia, Rakvere. Keila Stage.
Occurrence: Keila Stage of Estonia.
Localities. Core sections: Orjaku — 133.70–134.70; Virtsu — 225.40; over 100 specimens recorded.

Genus *Quadritia* Schallreuter, 1966

Type species: *Entomis* (*Bursulella*?) *quadrispina* Krause, 1892.

Subgenus *Quadritia* (*Krutatia*) Schallreuter, 1981

Type species: *Quadritia* (*Krutatia*) *iunior* Schallreuter, 1981.

Quadritia(*Krutatia*) *iunior* Schallreuter, 1981
Plate 7, fig. 11.

1981 *Quadritia* (*Krutatia*) *iunior* subgen. et sp. nov. — Schallreuter, pp. 125–128.

Holotype: Right valve no. 2468, GPIH. Erratic boulder (no. G30) from Gotland, Sweden. Unknown stratigraphic unit, probably of Harjuan age.
Occurrence: Nabala Stage of Estonia; erratic boulders of Gotland (Sweden) and northern Germany.
Estonian locality: Puhmu core — 93.90 (1 specimen).

Genus *Homeokiesowia* Schallreuter, 1979

Type species: *Kiesowia frigida* Sarv, 1959.

Homeokiesowia frigida (Sarv, 1959)
Plate 7, fig. 12.

1959 *Kiesowia frigida* sp. n. — Sarv, pp. 79–80, pl. 12, figs 7–8.
* 1979 *Homeokiesowia frigida* (Sarv) — Schallreuter, pp. 75–78.
* 1992 *Homeokiesowia frigida* (Sarv) — Sidaravičiene, p. 127, pl. 33, fig. 3.

Holotype: Left heteromorphic valve Os 2201, IGT. Estonia, Rakvere. Keila Stage.
Occurrence: Idavere to Keila stages of Estonia, Lithuania and north-western Byelorussia, corresponding beds of Podolia; erratic boulders in Germany.
Estonian locality: Virtsu core — 225.40 (1 specimen).

Genus *Laevanotella* gen. n.

Name: derived from the name of Laeva locality (core section).
Type species: *Laevanotella nonsulcata* gen. et sp. n.
Diagnosis: Carapace medium-sized, moderately convex. Sulci and lobes missing or poorly developed. Velum extens along entire free margin. Dimorphism expressed by changing width and convexity of the velum in anteroventral part of the valve (?).
Other species: The genus is at present monotypic.
Comparison: With regard to its alobate valves the representatives of the new species resemble those of the genus *Tvaerenella* Jaanusson, 1957, but all specimens are characterized by a similar extent and width of the velum. Variation in the convexity of the velar structure may possibly reflect weak dimorphism of the ctenonotellid type. These features disagree with the assignment to the genus *Tvaerenella*.
Occurrence: Harjuan of Estonia.

Laevanotella nonsulcata gen. et sp. n.
Plate 8, figs 1–3.

Holotype: Right tecnomorphic valve Os 3169, IGT. Estonia, Tartu County, Laeva core section, depth 208.95 m. Pirgu Stage.
Diagnosis: Amplete to slightly preplete, with weak round depression at the location of S2.

Dimensions in mm:	Length	Height
Holotype, right tecnomorphic valve Os 3169	1.25	0.75
Right tecnomorphic valve Os 3176	1.33	0.83
Right heteromorphic (?) valve Os 3177	1.12	0.71

Description: Carapace medium-sized, moderately convex, amplete to slightly preplete. Cardinal angles distinct, blunt. A weak round depression (S2) occurs slightly anterodorsally of the middle of the valve. Velum extends along the entire free margin. Variation in the width and convexity of the velum anteroventrally suggests a possible weak velar dimorphism of ctenonotellid type. Valve surface smooth.
Occurrence: Pirgu Stage of Central Estonia.
Localities. Core sections: Kaugatuma — 371.33; Pärnu — 286.50–304.10; Aidu — 161.00–175.00; Laeva — 200.90–208.95; Ruskavere — 97.80–107.35 (109.70?); Abja — 378.30; Kaagvere — 235.90–238.00; over 60 specimens recorded.

Family Tetradellidae Swartz, 1936
Subfamily Tetradellinae Swartz, 1936
Genus *Tetradella* Ulrich, 1890
(?Syn. *Pleurodella* Copeland, 1965)

Type species: *Beyrichia quadrilirata* Hall et Whitfield, 1875.
Diagnosis: See Sidaravičiene, 1992, p. 59.
Remarks: *Pleurodella* may be a synonym of *Tetradella* (see *T. pulchra* below).
Occurrence: Viruan, Harjuan and lowermost Silurian of Baltoscandia; Ordovician of North America.

Tetradella plicatula (Krause, 1892)
Plate 8, figs 4–5.

1892 *Beyrichia plicatula* n. sp. — Krause, pp. 394, 399, pl. 22, fig. 13.
* 1954 *Tetradella plicatula* (Krause) — Henningsmoen, pp. 80–81, pl. 1, figs 8–11, text-fig. 3.
* 1978 *Tetradella pentaloculata* sp. nov. — Schallreuter, pp. 65–72.
1984 *Tetradella plicatula* (Krause) — Sarv and Meidla, pp. 9, 14, 19.
1987 *Pleurodella pentaloculata* Schallreuter — Schallreuter, pl. 4, fig. 3.
1990 *Tetradella plicatula* (Krause) — Meidla and Sarv, p. 69, pl. 8, fig. 1.
* 1992 *Tetradella pentaloculata* Schallreuter — Sidaravičiene, p. 61, pl. 13, figs 11–12.

Holotype: Specimen figured by Krause (1892, pl. 22, fig. 13). Germany, erratic boulder.
Remarks: Schallreuter (1978a, p. 69) stated that the holotype of *T. plicatula* differs fundamentally from *T. pentaloculata* by the elongate L2, morphology of cristae and the lack of plical cusps. This seems to be due to the inadequacy of the Krause's figure. A photograph of the type specimen (courtesy of V. Jaanusson and L. Sarv) shows that the specimen (apparently

a juvenile one, length 0.70–0.75 mm) possesses a round L2 with a crista-like continuation in the ventral direction, a plica which is considerably higher at both ends and a cristal sculpture which is very similar to that of *T. pentaloculata* (cristae not parallel to each other).
Occurrence: Pirgu and Porkuni stages of Estonia, Pirgu Stage of Lithuania and north-western Byelorussia; units 5a–5b of the Oslo region of Norway; erratic boulders from Gotland (Sweden) and Germany.
Localities. Core sections: Orjaku — 59.80; Haapsalu-203 — 33.20; Virtsu — 139.40 (150.85?); Kaugatuma — 345.38–366.9; Pärnu — 242.60–298.20; Aidu — 123.00–172.50; Laeva — 194.70–210.40; Ruskavere — 78.75–110.40; outcrops: Adila; Lohu; Siuge; Porkuni; over 100 specimens recorded.

Tetradella egorowi Neckaja, 1952
Plate 8, figs 6–7.

1952 *Tetradella egorowi sp. n.* — Neckaja, pp. 217, 225, 226, pl. 2, fig. 10.
* 1978 *Tetradella egorowi* Neckaja — Schallreuter, pp. 57–60.
1984 *Tetradella egorowi* Neckaja — Sarv and Meidla, p. 9.
1989 *Tetradella egorowi* Neckaja — Nõlvak *et al.*, p. 90.
1990 *Tetradella egorowi* Neckaja — Meidla and Sarv, p. 69, pl. 8, fig. 2.
* 1992 *Tetradella egorowi* Neckaja — Sidaravičiene, pp. 59–60, pl. 13, fig. 5.

Holotype: Right tecnomorphic valve No. 21–157, VNIGRI. Russia, Pskov District, vicinity of Porkhov (subsurface). Wesenberg Beds (=Rakvere Stage).
Occurrence: Rakvere to Porkuni stages of Estonia; Oandu to Pirgu stages of Latvia, Lithuania and north-western Byelorussia; Rakvere to Pirgu (?) stages of north-western Russia; unit 5b of the Oslo region of Norway; erratic boulders of Gotland (Sweden) and Germany.
Localities. Core sections: Orjaku — 47.90–129.70; Förby — 16.70–23.50; Haapsalu-203 — 24.90–64.50; Virtsu — 132.50–209.00; Nabala — 4.50–5.85; Moe — 48.80–67.60; Puhmu — 121.90–137.80; Laiamäe — 16.00–89.60; Vinni — 18.80–38.50; Kaugatuma — 345.38–413.60; Pärnu — 241.90–288.00; Aidu — 113.00–152.50; Laeva — 179.10–205.40; Ruskavere — 64.80–108.30; Kaagvere — 188.10–217.90; outcrops: Paekna — 2.60; Moonaküla; Rägavere; Piilse; Tõrma; Urge; Prillimäe — 1.10–1.30; Lohu; Moe-1; Seli–Russalu; over 450 specimens recorded.

Tetradella separata Sidaravičiene, 1971
Plate 8, figs 8–9.

1971 *Tetradella separata* sp. n. — Sidaravičiene, pp. 27–28, pl. 1, figs 2–3.
1984 *Tetradella separata* Sidaravičiene — Sarv and Meidla, pp. 9, 12, 19.
* 1992 *Tetradella separata* Sidaravičiene — Sidaravičiene, p. 60, pl. 13, figs 6–7.

Holotype: Right heteromorphic valve No. 13–31/1, LitNIGRI. Lithuania, Lapes core, depth 648.5 m. Pirgu Stage.
Occurrence: Pirgu Stage of Estonia, Lithuania and north-western Byelorussia; erratic boulders of Gotland (Sweden) and Germany.
Localities. Core sections: Orjaku — 52.50; Haapsalu-203 — 30.20–33.20; Puhmu — 47.80; Kaugatuma — 349.94–367.70; Pärnu — 242.60–295.00; ? Aidu — 120.90–123.00; Laeva — 178.20–181.80; Ruskavere — 66.30 (64.80?)–99.00; over 100 specimens recorded.

Tetradella triloculata Schallreuter, 1978
Plate 8, fig. 10.

1971 *Tetradella separata* sp. n. — Sidaravičiene, pp. 27, 28 (*partim*), pl. 1, fig. 3.
1978 *Tetradella*? *triloculata* sp. nov. — Schallreuter, pp. 73–80.
1992 *Tetradella triloculata* Schallreuter — Sidaravičiene, p. 61, pl. 14, figs 1–2.

Holotype: Right heteromorphic valve No. 1995, GPIH. Sweden, Isle of Gotland, beach at Gnisvärds, erratic boulder.
Occurrence: Pirgu Stage of Estonia and Lithuania; erratic boulders of Gotland (Sweden).
Localities. Core sections: Orjaku — 68.20; Haapsalu-203 — 41.30; Puhmu — 53.90; Kaugatuma — 352.00–367.70; Aidu — 128.70–149.00; Laeva — 181.80; Ruskavere — 64.80–82.50; Lohu quarry; over 60 specimens recorded.

Tetradella pulchra Neckaja, 1952
Plate 8, fig. 11.

1952 *Tetradella* (?) *pulchra* sp. n. — Neckaja, p. 226, pl. 3, fig. 7.
1984 *Tetradella*? *pulchra* Neckaja — Sarv and Meidla, p. 9.
1990 *Tetradella*? *pulchra* Neckaja — Nõlvak and Meidla, p. 141.
* 1992 *Pleurodella*? *pulchra* (Neckaja) — Sidaravičiene, p. 62, pl. 14, figs 3–5.

Holotype: Right heteromorphic valve No. 27–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Lyckholm beds (=Nabala to Pirgu stages).
Remarks: *T. pulchra* is obviously related to the late Harjuan group of *Tetradella* species (*T. separata* and others). Sidaravičiene (1992) assigned this species to *Pleurodella* Copeland, 1965. According to the original definition, the distinction of *Pleurodella from Tetradella* is based on the development of S1 and S3 as semisulci and development of cristae on lobes (Copeland, 1965, p. 23). In this respect there is no distinct difference between Baltoscandian species of *Tetradella.* The features on which the separation of *Pleurodella* from *Tetradella* is based, may have a transitional development. In the present paper *Pleurodella* is regarded as a junior synonym of *Tetradella.*
Occurrence: Rakvere to Vormsi stages of Estonia (the reference to the Pirgu Stage in Sarv and Meidla, 1984, p. 9 is based on a stratigraphical misinterpretation); Oandu to Pirgu stages of Latvia, Lithuania and north-western Byelorussia; Rakvere Stage of north-western Russia; unit 5b of the Oslo region of Norway; erratic boulders in Germany.
Localities. Core sections: Orjaku — 103.60; Förby — 24.30–25.00; Nabala — 4.50–7.70; Moe — 22.60–26.10; Laiamäe — 42.10; Vinni — 21.40; outcrops: Tõrma; Paope — 0.40–0.85; Urge; over 50 specimens recorded.

Genus *Foramenella* Stumbur, 1956

Type species: *Euprimitia parkis* Neckaja, 1958
Diagnosis (modified after Schallreuter, 1980a): Adults unisulcate or S2 developed as the most prominent sulcus and both S1 and S3 as poorly defined sulcal depressions; velum ridge-like or absent, heteromorphs with 4–5 (6?) loculi anteroventrally and ventrally.
Other species: *Foramenella porkuniensis* Sarv, 1962; *Foramenella phippsi* Copeland, 1973; *Foramenella* sp. A in Sidaravičiene, 1992, p. 44.

Remarks: In the preadult specimens of *F. phippsi* the primary quadrilobate sculpture is clearly expressed (see Copeland, 1973, p. 14–15 and fig. 9), but in adults S1 and S3 are less distinct which makes them to conform more with the original diagnosis of *Foramenella*. These changes during the growth apparently reflect a close relationship of *Foramenella* to quadrilobate Tetradellidae with locular dimophism and is an argument for its assignment to Tetradellinae. Similarly with *F. phippsi*, the velum is present in species from Baltoscandia (see below).The diagnosis of the genus *Foramenella* is modified here in accordance with this.
Occurrence: Uppermost Viruan and Harjuan of Baltoscandia; upper Ordovician of Canada.

Foramenella parkis (Neckaja, 1952)

Plate 9, figs 1–2.

1952 *Euprimitia parkis* sp. n. — Neckaja, p. 221, pl. 2, fig. 4.
1959 *Foramenella parkis* (Neckaja) — Sarv, p. 154, pl. 26, fig. 13.
? 1972 *Foramenella parkis* (Neckaja) — Gailīte, p. 5.
non? 1980 *Foramenella parkis* (Neckaja) — Schallreuter, pp. 17–20.
1984 *Foramenella parkis* (Neckaja) — Sarv and Meidla, 1984, pp. 10, 19.
non? 1986 *Foramenella parkis* (Neckaja) — Schallreuter, p. 7, pl. 4, fig. 7.
1989 *Foramenella parkis* — Nõlvak *et al.*, pp. 90–91.
* 1992 *Foramenella parkis* (Neckaja) — Sidaravičiene, p. 44, pl. 10, figs 1–2.

Holotype: Heteromorphic carapace (?) No. 17–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Lyckholm (Saaremõisa) Beds (=Nabala to Pirgu stages).
Diagnosis (modified): *Foramenella* with broad S2 and flat anterior and posterior lobes; heteromorphs with distinct crista-like velum and five (six?) isolated loculi above the velum.

Dimensions in mm:	Length	Height
Holotype, carapace No. 17–157 (VNIGRI) (according to Neckaja, 1952)	0.80	0.60
Left heteromorphic valve Os 2965	0.81	0.51

Remarks: Neckaja (1952, p. 221) mentioned the presence of six loculi in *F. parkis* but her figure of the type specimen (*ibid.*, pl. 2, fig. 4) shows only five loculi. In Estonian collections specimens with six loculi have not been observed. Six loculi could be misprint, but, on the other hand, in *Foramenella* the number of loculi has been reported to vary (*F. phippsi*, Copeland, 1973, p. 15). In 1984 the holotype was not found in the collection of VNIGRI.

In the heteromorphic specimen Os 2965 a crista-like velum is observable (see pl. 9, fig. 2) near the free margin, along the ventral margin of the loculi, discontinuously between the locular pits. The feature was mentioned also in the original description.
Occurrence: Vormsi to Pirgu and Porkuni (?) stages of Estonia; Pirgu Stage of Latvia and Pskov region (Russia); Vormsi to Pirgu stages of Lithuania and north-western Byelorussia.

Gailīte (1972) mentioned the occurrence of *F. parkis* in the Rakvere to Vormsi stages of Latvia. These finds are not reverberated in the later summarizing paper (Ulst *et al.*, 1982).
Localities. Core sections: Orjaku — 51.30–56.80; Förby — 15.20 (5.00?); ? Haapsalu-203 — 26.80; Virtsu — 150.85; Põhjaka–Saare — 76.30–77.70; Moe — 7.60; Puhmu — 39.70–76.80; Laiamäe — 29.20 (36.00?); Kaugatuma — 352.00 (345.38?)–354.60; Pärnu — 243.60; Aidu — 113.00–134.50; Ruskavere — 65.30–93.75; outcrops: Paluküla — 0.12–0.82; Prillimäe — 1.30 (1.10?); Piirsalu; Ruunavere; Põriki; Moe-1; over 130 specimens recorded.

Foramenella porkuniensis Sarv, 1962
Plate 9, figs 3–5.

1956 *Foramenella parkis* (Neckaja) — Stumbur, pp. 198–188, pl. 1, figs 4–11.
* 1962 *Foramenella porkuniensis* Sarv — Sarv, pp. 119–120, pl. 5, figs 6–10.
? 1980 *Foramenella parkis* (Neckaja) — Schallreuter, pp. 17–20.
1984 *Foramenella porkunienesis* Sarv — Sarv and Meidla, pp. 10, 14, 19.
? 1986 *Foramenella parkis* (Neckaja) — Schallreuter, p. 7, pl. 4, fig. 7.

Holotype: Heteromorphic carapace Os 5004, IGT. Estonia, West Viru County, Porkuni. Porkuni Stage.
Diagnosis: *Foramenella* with narrow S2 and convex anterior and posterior lobes; heteromorphs without velum and with five isolated adventral loculi.
Remarks: *F. porkuniensis* differs from *F. parkis* in possessing a narrower S2 and convex anterior and posterior lobes, and in lacking velum in heteromorphs.

In the *Foramenella* material from erratics (Schallreuter, 1980a, 1986) the velum is missing in heteromorphs. This material may belong to *F. porkuniensis*, as also Sidaravičiene (1992, p. 44) assumed.
Occurrence: Porkuni Stage of Estonia; erratic boulders of Gotland (Sweden) and Germany.
Localities. Quarries at Seli–Metsküla, Seli–Russalu, Iida, Siuge and Porkuni; nearly 90 specimens recorded.

Genus *Consonopsis* Schallreuter, 1967

Type species: *Tetradella consona* Sarv, 1959.

Consonopsis consona (Sarv, 1959)

Subspecies: *Consonopsis consona consona* (Sarv, 1959), *Consonopsis consona mecklenburgensis* Schallreuter, 1971.

Consonopsis consona consona (Sarv, 1959)
Plate 9, fig. 6.

1959 *Tetradella consona* sp. n. — Sarv, pp. 151–152, pl. 21, figs 18–20 (partim?).
? 1971 *Consonopsis consona meckenburgensis* subsp. n. — Schallreuter, p. 694, figs 1.5–1.7.
* 1982 *Consonopsis consona consona* (Sarv) — Schallreuter, pp. 10–12.
? 1992 *Consonopsis consona* (Sarv) — Sidaravičiene, p. 63, pl. 14, fig. 8.

Holotype: Left valve Os 2118, IGT. Estonia, East Viru County, Jõhvi. Idavere Stage, Vasavere Formation.
Remarks: Relationship of our material to the subspecies *C. consona mecklenburgensis* Schallreuter (1971a, p. 694, figs 1.5–1.7) is unclear. The state of preservation of the type material of the latter form seems to be insufficient for a detailed comparison.
Occurrence: Idavere to Oandu stages of Estonia and Latvia, ? Jõhvi to Oandu stages of Lithuania and north-western Byelorussia; erratic boulders of Gotland (Sweden) and Germany.

Localities. Core sections: Orjaku — 133.70; Laeva — 237.70; Abja — 411.30; over 15 specimens recorded from the Keila Stage.

Consonopsis zastrowensis (Schallreuter, 1969)
Plate 9, figs 7–8.

1969 *Tetrada zastrowensis* sp. n. — Schallreuter, pp. 352–354, fig. 5.
* 1992 *Consonopsis zastrowensis* (Schallreuter) — Sidaravičiene, p. 63, pl. 14, figs 9–11, pl. 15, figs 1–6.

Holotype: Left heteromorphic valve No. 25/16, GPIH. Germany, Klein-Zastrow by Greifswald, erratic boulder.
Occurrence: Oandu to Rakvere stages of Estonia; Oandu to Nabala stages of Lithuania and north-western Byelorussia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 132.40; Laiamäe — 92.40–93.00; Vinni — 43.25; Laeva — 237.70; Tõrremäe trench; over 40 specimens recorded.

Consonopsis litwiensis (Neckaja, 1952)
Plate 9, figs 9–12.

1952 *Tetradella litwiensis* sp. n. — Neckaja, pp. 224–225, pl. 2, figs 6–9.
1984 *Tetradella litviensis* Neckaja — Sarv and Meidla, p. 9.
* 1992 *Consonopsis litwiensis* (Neckaja) — Sidaravičiene, p. 64, pl. 15, figs 7–12, pl. 16, fig. 1.

Holotype: Right heteromorphic (?) valve No. 25–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Lyckholm beds (=Nabala to Pirgu stages).
Remarks: Presence of two loculi in heteromorphs of this species has been questioned by Sidaravičiene (1992, p. 64). In the Estonian material heteromorphs with one loculus have been recorded.
Occurrence: Rakvere to Pirgu stages of Estonia, Oandu to Pirgu stages of Latvia, Lithuania, north-eastern Poland and north-western Byelorussia.
Localities. Core sections: Orjaku — 100.00–120.50; Förby — 5.00–25.50; Haapsalu-203 — 24.90; Virtsu — 132.50–208.40; Moe — 22.60–46.00; ? Puhmu — 90.70; Laiamäe — 38.80–88.30; Vinni — 15.50–38.50; Laeva — 206.45 (194.70?)–206.45; outcrops: Paekna — 1.95 (1.30?); Moonaküla; Tõrma; Piirsalu; Lohu; over 150 specimens recorded.

Genus *Polyceratella* Öpik, 1937

Type species: *Ulrichia Kuckersiana* Bonnema, 1909.

Polyceratella aluverensis Sarv, 1959
Plate 10, fig. 1.

1953 *Ceratopsis margaritata* (Öpik) — Neckaja, pp. 341–342, pl. 7, figs 2–3.
1959 *Polyceratella aluverensis* sp. n. — Sarv, p. 121, pl. 22, figs 7–10.

* 1982 *Polyceratella aluverensis* Sarv — Schallreuter, pp. 7–10, pl 1, figs 1–9.
1990 *Polyceratella aluverensis* — Hints *et al.*, p. 137 (fig.).
* 1992 *Polyceratella aluverensis* Sarv — Sidaravičiene, p. 65, pl. 16, fig. 5.

Occurrence: Idavere to Keila and Oandu (?) stages of Estonia; Idavere to Jõhvi stages of Latvia; Idavere to Oandu stages of Lithuania and north-western Byelorussia; erratic boulders of Gotland (Sweden) and Germany.
Localities. Core sections: Orjaku — 133.70; ? Virtsu — 225.40; 7 specimens recorded.

Polyceratella spinosa Sarv, 1959
Plate 10, fig. 2.

1959 *Polyceratella spinosa* sp. n. — Sarv, pp. 122–123, pl. 22, figs 11–13.

Occurrence: Keila Stage of Estonia.
Localities. Core sections: Orjaku — 133.70; Virtsu — 225.40; over 10 specimens recorded.

Subfamily Sigmoopsinae Hennigsmoen, 1953
Genus *Kiesowia* Ulrich et Bassler, 1908
(Syn: *Pseudotallinnella* Sarv, 1959)

Type species: *Beyrichia dissecta* Krause, 1892.
Diagnosis: (modified from Schallreuter, 1979b). Medium-sized to large genus of Sigmoopsinae. Outline almost amplete to slightly preplete. Quadrilobate. S2 strongest sulcus, long and sigmoidal; S3 curved, S1 weakest sulcus. L3 or all lobes partitioned into broad nodes, L1 sometimes with a dorsal, posteriorly directed spine. Tecnomorphic velum developed as an entire, more or less distinct, broadly rounded elevation bearing spines; heteromorphic velum forms a weakly convex dolon anteriorly and ventrally. Histium ridge-like, broad to absent. Marginal structures formed by a row of spines.
Remarks: Schallreuter (1979b) treats *Kiesowia, Pseudotallinnella* and *Carinobolbina* Henningsmoen, 1953 as subgenera of *Kiesowia*, distinguishing *K.* (*Pseudotallinnella*) and *K.* (*Kiesowia*) by the appearance of lobes (undivided or partitioned into nodes). Specimens of *K. regalis* may also possess lobes partitioned into nodes to a varying degree (see, for instance, Neckaja, 1953, pl. 7, figs 5, 7, 9 or Sidaravičiene, 1992, pl. 11, fig. 10, pl. 12, fig. 1). The tendency of partitioning S3 into nodes is mentioned by Sarv (1959, p. 140) in the type species of *Pseudotallinnella, P. scopulosa* Sarv, 1959 ("...The third lobe higher than the others, its upper and lower parts more strongly inflated than the central part." — Sarv, 1959, p. 140). Thus, since specific features of both subgenera are recognized within the limits of variation of a single species, including the type species of *Pseudotallinnella*, the latter genus is regarded here as junior synonym of *Kiesowia*.

Kiesowia and *Carinobolbina* differ, first of all, by the character of lobation. Taking into the consideration the differences in the dimorphic structures (in heteromorphs of *Carinobolbina* histium is not confluent with velum, the histial antrum is long and distinct), *Carinobolbina* could be maintained as an independent genus.
Occurrence: Viruan, Harjuan and ?Llandoverian of Baltoscandia.

Kiesowia dissecta (Krause, 1892)
Plate 10, fig. 3.

1892 *Beyrichia dissecta* n. sp. — Krause, 1892, pp. 392–393, pl. 21, fig. 3.
1892 *Beyrichia mamillosa n. sp.* — Krause, 1892, p. 393, pl. 22, fig. 14.
1908 *Tetradella (Kiesowia) dissecta* (Krause) — Ulrich and Bassler, pp. 306–307, pl. 39, fig. 10.
1908 *Tetradella (Kiesowia) mamillosa* (Krause) — Ulrich and Bassler, pp. 306–307, pl. 39, fig. 11.
1923 *Kiesowia dissecta* (Krause) — Ulrich and Bassler, p. 311, text-fig. 20–6.
1956 *Kiesowia septenaria* sp. n. — Stumbur, pp. 188–189, pl. 2, fig. 1.
? 1959 *Pseudotallinnella regalis* (Neckaja) — Sarv, pp. 141–142 (*partim*), **non** pl. 21, fig. 17.
1962 *Kiesowia dissecta* (Krause) — Sarv, pp. 109–110, pl. 4, fig. 9.
1967 *Hithis leviconvexus* sp. n. — Schallreuter, pp. 619–621, text-fig. 3.
1979 *Kiesowia dissecta* (Krause) — Schallreuter, pp. 79–86, pl. 6.
1984 *Kiesowia dissecta* (Krause) — Sarv and Meidla, pp. 10, 15.
1990 *Kiesowia regalis* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Kiesowia mamillosa* (Krause) — Sidaravičiene, p. 53, pl. 12, fig. 3.

Lectotype: Right tecnomorphic (?) valve, unnumbered (Krause, 1892, pl. 21, fig. 3, designated by Henningsmoen, 1954, p. 79); MN HUB; upper Ordovician erratic boulder no. 667 from Müggelheim, Berlin.

Diagnosis: Lobes partitioned into nodes. Histium developed along the anterior and anteroventral margins, considerably shorter than the velum, may be rudimentary to absent.

Remarks: *K. dissecta* differs from *K. regalis* (Neckaja, 1952) by having a shorter histial flange (see Sidaravičiene, 1992).

Judging from the data by Krause (1892) and (unpublished) locality information submitted to the unpublished photographs of the specimens figured by him (courtesy of V. Jaanusson and L. Sarv), the figured specimens of *K. dissecta* and *K. mamillosa* are found in the same boulder (see the lectotype information above). Variation in the sculpture on the anterior end of the valve in the material assigned to these species is mentioned by several authors (Henningsmoen, 1954; Sarv, 1962; Schallreuter, 1979b; Sidaravičiene, 1992), and Henningsmoen (1954) mentioned that *K. mamillosa* resembles larval stages of *K. dissecta.* For this reason I tend to regard *K. mamillosa* as a synonym of *K. dissecta*, like several authors earlier (Henningsmoen, 1954; Sarv, 1962). Variation in the development of the histium (compare, for instance, Schallreuter, 1967a, 1979b and Sidaravičiene, 1992) seems to support this point of view.

Most of the material described and figured in the papers mentioned obviously belongs to preadult stages, as some (adult or preadult) specimens may reach the length over 2 mm (see Krause, 1892; Sarv, 1962). Among these large specimens only tecnomorphs and moulds (with some parts of the valve preserved) are known, and the histium of adult heteromorphs is unknown so far. On the photograph of the lectotype of *K. dissecta* the anterior part of the valve is broken away (a crack is shown already on Krause's figure), so the presence of a rudimentary histium or a row of tubercles (distinguishing features between the mentioned species by Schallreuter) cannot be proved.

Material, assigned by Sarv (1959) to *K. regalis*, may partly belong to *K. dissecta*, judging from the new finds of *K. dissecta* at the same stratigraphical level (Nabala and Pirgu stages).

Occurrence: Nabala, Pirgu, Porkuni and ?Raikküla (Silurian) stages of Estonia; Vormsi and ? Pirgu stages of Lithuania; erratic boulders in Germany.

Localities. Core sections: Nabala — 4.50; ? Laiamäe — 29.20; Vinni — 15.5–22.1; quarries at Sutlema and Tõrma; over 15 specimens recorded.

Kiesowia regalis (Neckaja, 1952)
Plate 10, figs 4–5.

1952 *Ceratopsis regalis* sp. n. — Neckaja, pp. 227–228, pl. 2, fig. 10.
1959 *Pseudotallinnella regalis* (Neckaja) — Sarv, pp. 141–142 (*partim*), pl. 21, fig. 17.
1983 *Pseudotallinnella* cf. *regalis* (Neckaja) — Abushik and Sarv, p. 110, pl. 1, fig. 10.
* 1992 *Kiesowia regalis* (Neckaja) — Sidaravičiene, pp. 52–53, pl. 11, figs 10–12, pl. 12, figs 1–2.

Holotype: Right heteromorphic valve No. 29–151, VNIGRI. Vicinity of Vilnius (subsurface) Lithuania. Rakvere Stage.
Diagnosis: Lobes undivided or partly partitioned into broad nodes. In heteromorphs histium reaches posterior half of the valve.
Relations: See description of *K. dissecta*.
Remarks: In the type specimen (judging from the photograph made by the author and L. Sarv in Tallinn in 1984) the lobes are almost undivided, except L3, which is narrower in the central part. By another specimen from the same stratigraphical level (figured by Sarv, 1959, pl. 21, fig. 17) the lobes are partitioned into distinct nodes.
Occurrence: Oandu, Rakvere, Nabala and ?Pirgu stages of Estonia; Oandu and Rakvere stages of Latvia, Lithuania, north-western Byelorussia and north-eastern Poland; Gräsgård Formation of Sweden.
Localities. Core sections: Orjaku — 102.40–113.30; Laiamäe — 62.50; Vinni — 31.95–36.80; outcrops: Ussimägi — 1.50; Moonaküla; Rägavere; Piilse; over 15 specimens recorded.

Kiesowia? *decima* Sarv, 1962
Plate 10, fig. 6.

1962 *Kiesowia*? *decima* K. Stumbur, in coll. — Sarv, p. 111, pl. 4, figs 10, 11.
1984 *Kiesowia*? *decima* Sarv — Sarv and Meidla, p. 10.

Holotype: Right valve Os 5006, IGT. Porkuni, West Viru County, Estonia. Porkuni Stage.
Remarks: As the species is rare and the character of the dimorphism unknown, the original, tentative assignment to *Kiesowia* is maintained here.
Occurrence: Porkuni Stage of Estonia.
Localities. Seli–Russalu quarry (2 specimens).

Genus *Sigmoopsis* Hennigsmoen, 1953

Type species: *Ceratopsis platyceras* Öpik, 1937.
Occurrence: Viruan and Harjuan of Baltoscandia, middle Ordovician of British Isles

Sigmoopsis rostrata (Krause, 1892)
Plate 10, fig. 7.

1892 *Beyrichia* (*Ctenobolbina*) *rostrata* n. sp. — Krause, pp. 395–396, pl. 21, fig. 2.
* 1982 *Sigmoopsis* (*Sigmoopsis*) *rostrata* (Krause) — Schallreuter, pp. 14–17, pl. 2, figs 1–6; pl. 4, fig. 3.
1990 *Sigmoopsis rostrata* — Hints *et al.*, p. 137 (fig.).

* 1992 *Sigmoopsis* (*Sigmoopsis*) *rostrata* (Krause) — Sidaravičiene, p. 47, pl. 10, fig. 6.

Occurrence: Kukruse to Keila stages of Estonia; Idavere to Oandu stages of Latvia, Kukruse to Oandu stages of Lithuania and north-western Byelorussia; Viruan of north-western Russia; Dalby Limestone, Skagen and Moldå topoformations of Sweden; erratic boulders in Germany, the Netherlands and Sweden.

Localities. Core sections: Orjaku — 133.70–135.60; Virtsu — 225.40; Mäetaguse — 29.60; Kaugatuma — 414.05; Viljandi — 335.60; Laeva — 237.70–239.50; over 50 specimens recorded.

Sigmoopsis granulata Sarv, 1956

Plate 10, fig. 8.

1956 *Ceratopsis granulata* sp. n. — Sarv, pp. 36–37, pl. 1, figs 12–15.
* 1985 *Sigmoopsis granulata* (Sarv) — Schallreuter, pp. 111–112, pl. 5, fig. 2.
1985 *Sigmoopsis* (*Sigmoopsis*) *granulata* (Sarv) — Sztejn, p. 74, pl. 4, fig. 14.
1990 *Sigmoopsis granulata* (Sarv) — Meidla and Sarv, p. 69, pl. 7, figs 10–11.
1992 *Sigmoopsis* (*Sigmoopsis*) *granulata* (Sarv) — Sidaravičiene, p. 48, pl. 10, figs 9–11.
? 1992 *Sigmoopsis* (*Sigmoopsis*) *kernavensis* sp. n. — Sidaravičiene, p. 48, pl. 11, fig. 1–2.

Holotype: Right valve Os 2002, IGT. Rakvere, Estonia. Oandu Stage.

Remarks: Sidaravičiene (1992) distinguished a new species, *Sigmoopsis kernavensis* from the material previously referred to *S. granulata*. The differences between these species could be considered as due to intraspecific variation. The figured specimen from the type locality area of *S. granulata* (Meidla and Sarv, 1990, pl. 7, fig. 11) agrees well with the diagnosis of *S. kernavensis*, another specimen from the same sample (*ibid.*, fig. 10) corresponds to the type material of *S. granulata*.

Occurrence: Oandu to Rakvere stages of Estonia, Latvia, Lithuania, north-western Byelorussia, north-eastern Poland; erratic boulders in Germany.

Localities. Core sections: Orjaku — 117.70–132.70; Virtsu — 224.70; Nabala — 13.40; Laiamäe — 92.40–93.00; Vinni — 42.60–44.10; Pärnu — 327.70–328.00; Viljandi — 327.80; Laeva — 236.90–237.70; outcrops: Tõrremäe; Ussimägi — 1.75–2.10; Moonaküla; over 600 specimens recorded.

Genus *Concavhithis* Schallreuter, 1982

Type species: *Neoprimitiella nebeni* Schallreuter, 1975.

Diagnosis: See Schallreuter, 1982b, pp. 101–104.

Occurrence: Viruan and Harjuan of Baltoscandia.

Concavhithis nebeni Schallreuter, 1975

Plate 10, fig. 12.

1975 *Neoprimitiella nebeni* n. sp. — Schallreuter, pp. 277, 279, fig. 6.
1982 *Concavhithis latosulcatus* gen. et sp. nov. — Schallreuter, pp. 101–104.
1986 *Concavhithis nebeni* (Schallreuter) — Schallreuter,p. 7, pl. 4, fig. 5.
1986 *Concavhithis nebeni* (Schallreuter) — Sidaravičiene, p. 59, pl. 13, figs 3–4.

Holotype: Right juvenile valve (unnumbered, see Schallreuter, 1975, fig. 6); Lickershamn, Gotland, Sweden; erratic boulder (Harjuan).
Occurrence: Rakvere and Vormsi stages of Estonia; Vormsi and ?Pirgu stages of Lithuania; erratic boulders of Sweden and Germany.
Localities. Laiamäe core — 30.20–41.90; outcrops: Moonaküla; Urge; Moe-2; over 10 specimens recorded.

Genus *Braderupia* Schallreuter, 1982

Type species: *Pseudostrepula asymmetrica* Neckaja, 1958.
Diagnosis: See Schallreuter, 1982c, p. 1.
Occurrence: Viruan of Baltoscandia.

Braderupia asymmetrica? (Neckaja, 1958)

? 1958 *Pseudostrepula asymmetrica* sp. n. — Neckaja, pp. 352–353, pl. 1, figs 8–9.
? * 1982 *Braderupia asymmetrica* (Neckaja) — Schallreuter, pp. 1–8.
? 1990 *Braderupia asymmetrica* — Hints *et al.*, p. 137 (fig.).
? * 1992 *Pseudostrepula asymmetrica* Neckaja — Sidaravičiene, p. 132, pl. 34, fig. 1.

Occurrence: Kukruse to Keila stages of Estonia, north-western Russia; Keila Stage of Latvia, Lithuania, north-western Byelorussia; erratic boulders in Germany.
Localities. Orjaku core — 133.70 (3 specimens).

Genus *Seviculina* Meidla, 1986

Type species: *Seviculina reticulata* Meidla, 1986.
Diagnosis: See Meidla, 1986a, p. 11.
Occurrence: Viruan and Harjuan of Baltoscandia.

Seviculina oanduensis (Sarv, 1956)
Plate 10, figs 9–10.

1956 *Haploprimitia oanduensis* sp. n. — Sarv, p. 33, pl. 1, figs 7–8.
* 1992 *Seviculina oanduensis* (Sarv) — Sidaravičiene, p. 51, pl. 11, figs 8–9, pl. 56, figs 2–3.

Holotype: Tecnomorphic carapace Os 2011, IGT; Oandu River, West Viru County, Estonia; Oandu Stage.
Occurrence: Oandu Stage of Estonia; Oandu to Nabala stages of Lithuania, north-western Byelorussia.
Localities. Core sections: Orjaku — 132.40–132.70; Virtsu — 224.70; Laiamäe — 89.60–90.30; outcrops: Tõrremäe; Ussimägi — 1.75; over 60 specimens recorded.

Seviculina reticulata Meidla, 1986
Plate 10, fig. 11.

1986 *Seviculina reticulata* sp. n. — Meidla, pp. 11–12, pl. 1, figs 1–10.
1992 *Seviculina reticulata* Meidla — Sidaravičiene, p. 51, pl. 11, figs 5–7.

Holotype: Tecnomorphic carapace Os 3033, IGT; Rägavere quarry, Rakvere, Estonia; Rakvere Stage.
Remarks: Rare, poorly preserved specimens from the Pirgu Stage of Estonia may belong to a new (sub)species.
Occurrence: Rakvere to Nabala and ?Pirgu stages of Estonia; Rakvere Stage of Lithuania.
Localities. Core sections: Orjaku — 115.60–117.70; ? Förby — 14.30; ? Moe — 26.10; ? Puhmu — 100.30; Laiamäe — 62.50(?), 82.50; Vinni — 25.50–36.20; Mäetaguse — 17.10; ? Pärnu — 327.50; outcrops: Ussimägi — 0.40; ? Paekna — 1.95–2.30; Rägavere; Piilse; ? Tõrma; nearly 50 specimens recorded.

Seviculina sp. n.
Plate 10, fig. 13.

Remarks: This species differs from *Seviculina reticulata* in possessing a prominent keel-like velum in the anteroventral part of the tecnomorphic carapace.
Occurrence: Vormsi Stage of Estonia.
Locality: Puhmu core — 83.30 (2 specimens).

Subfamily Perspicillinae Schallreuter, 1967
Genus *Sigmobolbina* Henningsmoen, 1953

Type species: *Entomis oblonga* var. *Kuckersiana* Bonnema, 1909.
Occurrence: Ölandian (Ontikan), Viruan and Harjuan of Baltoscandia; middle Ordovician of southern Poland (Holy Cross Mountains).

Sigmobolbina camarota Jaanusson, 1964
Plate 11, figs 2–4.

* 1966 *Sigmobolbina camarota* n. sp. — Jaanusson, pp. 19–21, pl. 3, figs 5–8, text-fig. 5.
* 1992 *Sigmobolbina camarota* Jaanusson — Sidaravičiene, 33, pl. 6, figs 3–9.

Holotype: Left heteromorphic valve No. 73666, PMO; Terneholmen, Oslo-Asker, Norway; Upper *Chasmops* Limestone.
Remarks: Estonian material differs from the type collection by heteromorphic velum terminating posteroventrally; the variability of some features in *S. camarota* is mentioned also by Sidaravičiene, 1992.
Occurrence: Oandu to Vormsi stages of Estonia; Keila to Porkuni stages of Latvia; Rakvere to Vormsi stages of Lithuania; Mossen Formation and Moldå Limestone of Sweden; Solvang Formation (Upper *Chasmops* Limestone) of Norway.
Localities. Core sections: Orjaku — 107.80–126.50; Haapsalu-203 — 59.55; Virtsu — 224.70; Vodja H-190 — 108.00–117.70; Mäetaguse — 9.90; Kaugatuma — 408.05–409.50;

Pärnu — 312.30–320.80; Viljandi — 317.80–325.30; Aidu — 186.10–188.20; Laeva — 224.80–231.70; Ruskavere — 115.45–130.60; Abja — 392.50–402.85; Taagepera — 451.40–461.00; Otepää — 426.45–431.45 (440.00?); Kaagvere — 246.60 (245.80?)–253.40 (256.70?); outcrops: Ussimägi — 1.75; Rägavere; Piilse; nearly 350 specimens recorded.

Sigmobolbina kolkaensis Gailīte, 1975
Plate 11, fig. 1.

1975 *Sigmobolbina kolkaensis* sp. n. — Gailīte, pp. 61–62, pl. 1, figs 1a, 1b, 2a, 2b.

Holotype: Right tecnomorphic valve Os 31/431, VNIIMORGEO. Latvia, Holdre core, depth 494.8 m. Nabala Stage, Harjuan.
Diagnosis: See Gailīte, 1975b, p. 61.
Occurrence: Vormsi Stage of Estonia; Rakvere to Vormsi stages of Latvia.
Estonian locality: Ruskavere core — 116.30–118.00 (2 specimens).

Genus *Naevhithis* Schallreuter, 1981

Type species: *Naevhithis naevus* Schallreuter, 1981 (= *Ordovicia pictis* Neckaja, 1958).
Diagnosis: See Sidaravičiene, 1992, p. 78.
Occurrence: Harjuan of Baltoscandia.

Naevhithis pictis (Neckaja, 1958)
Plate 11, figs 5–6.

1958 *Ordovicia pictis* Neckaja, sp. n. — Neckaja, pp. 351–352, pl. 1, figs 6–7.
1964 *Ordovicia pictis* (=*Henningsmoenia*) Neckaja — Schallreuter, p. 92.
1976 *Ordovicia pictis* Neckaja — Schallreuter, p. 198.
1981 *Naevhithis naevus* gen. et sp. nov. — Schallreuter, 137–140.
1982 *Sigmobolbina pictis* (Neckaja) — Ulst *et al.*, p. 120.
1985 *Naevhithis naevus* Schallreuter — Schallreuter, pl. 1, fig. 5.
1986 *Naevhithis naevus* Schallreuter — Schallreuter, p. 7, pl. 4, fig. 8.
1992 *Naevhithis pictis* (Neckaja) — Sidaravičiene, pp. 78–79, pl. 20, fig. 2.

Holotype: Left valve No. 23–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Saaremõisa beds (=Nabala to Pirgu stages).
Remarks: Neckaja (1958, p. 351) mentioned the development of partitions and pits (=loculi) anteroventrally on the subvelar area, but did not specify their number. In the photographs of the type specimen of *Ordovicia pictis* Neckaja, 1958 (made by the author and L. Sarv in 1984 in Tallinn) the elevation on the anterior part of the velum is distinct, but the presence of the partition(s) on the subvelar area cannot be observed. In the Estonian material the velum diverges anteriorly from the free margin more rapidly in some specimens (heteromorphs?), but no loculi can be distinguished.

Naevhithis naevus Schallreuter, 1981 agrees well with both the type material of *O. pictis* and specimens in Estonian collection, except for the faceted area on the ventral side of the posteroventral lobe, which cannot be distinguished (presumably for the preservational reasons). In *N. naevus* a loculus-like elevation in the anterior part of the velum is also present, but an inner partition does not seem to be developed in the figured specimen. Following

Sidaravičiene (1992) I tend to consider *N. naevus* as a junior synonym of *O. pictis* and, if this will be confirmed, it could be a case for the International Commission of Zoological Nomenclature (ICZN 70b — "Misidentified type species").

Occurrence: Pirgu and Porkuni stages of Estonia, Nabala to Pirgu (undivided) stages of Lithuania.

Localities. Core sections: Puhmu — 33.10; Kaugatuma — 353.00; Pärnu — 243.60 (247.60?); Kaagvere — (205.80?) 209.80; outcrops: Lohu; Seli–Metsküla; Porkuni; over 20 specimens recorded.

Genus *Pentagona* Schallreuter, 1964

Type species: *Sigmobolbina pentagona* Jaanusson, 1957.

Diagnosis: See Jaanusson, 1966, p. 16.

Occurrence: Viruan and Harjuan of Baltoscandia.

Pentagona pentagona Jaanusson, 1957
Plate 11, figs 7–8.

1957 *Sigmobolbina pentagona* n. sp. — Jaanusson, 1957, pp. 393–395, pl. 12, figs 1–5, text-fig. 43A.
1959 *Sigmobolbina prominesca* sp. n. — Sarv, p. 129, pl. 23, figs 9–11, text-fig. 13G.
* 1982 *Pentagona pentagona* (Jaanusson) — Schallreuter, pp. 27–29, pl. 5, figs 1–7.
? 1983 *Pentagona pentagona* (Jaanusson) — Schallreuter, p. 180, pl. 10, fig. 7.
1990 *Pentagona pentagona* (Jaanusson) — Schallreuter, pl. 4, fig. 2.
1994 *Pentagona* cf. *pentagona* — Olempska, p. 181, pl. 43, figs 3–7.

Holotype: Right heteromorphic valve T 154, UM. Sweden, Tvären area, Ringsö. Boulder of Dalby Limestone.

Remarks: Sidaravičiene (1992, p. 29) assigned *P. pentagona* of Schallreuter, 1983 to the new species, *P. nova*.

P. cf. *pentagona* Olempska, 1994 was tentatively assigned to this species, because in her material the carapace is relatively longer and no complete heteromorphic valves were available. Size and length/height ratio of the figured complete specimen from the Holy Cross Mountains (Olempska, 1994, pl. 43, fig. 3) fall into the limits of variation of *P. pentagona* from different localities, given by Schallreuter (1982a, p. 29). As other features are identical with those of the type material, these specimens are assigned to *P. pentagona*.

Occurrence: Upper Idavere to Keila and Rakvere stages of Estonia; Idavere to Jõhvi stages of Latvia; Idavere to Oandu stages of Lithuania; *serra* and *anserinus* zones (middle Ordovician) of southern Poland; erratic boulders of Sweden and Germany.

Localities. Core sections: Puhmu — 127.50–132.50; Vinni — 33.40; nearly 15 specimens recorded.

Genus *Deefgella* Schallreuter, 1981

Type species: *Deefgella dajsiveteri* Schallreuter, 1981.

Diagnosis: See Schallreuter, 1981a, pp. 67–68.

Occurrence: Viruan and Harjuan of Baltoscandia; ? upper Ordovician of North America (Missouri).

Deefgella sp. n.
Plate 11, fig. 13.

Remarks: Recorded juvenile specimen of *Deefgella* differs from the figured juvenile specimen of *D. dajsiveteri* in possessing a single posteroventral node on the valve, in having radially striated velum along the ventral margin (missing or broken at the ends of the valve) and by reticulate lateral surface.
Occurrence: Rakvere Stage of Estonia.
Dimensions of the figured specimen, mm: length — 0.77; height — 0.47.
Locality: Orjaku core — 107.80 (1 specimen).

Genus *Podolibolbina* Abushik et Sarv, 1983

Type species: *Podolibolbina podolica* Abushik et Sarv, 1983.
Diagnosis: See Abushik and Sarv, 1983, p. 109.
Occurrence: Harjuan of Baltoscandia; upper Ordovician of Podolia.

Podolibolbina cf. *podolica* Abushik et Sarv, 1983
Plate 11, figs 9–10.

cf. 1983 *Podolibolbina podolica* sp. n. — Abushik and Sarv, pp. 109–110, pl. 2, figs 9–16.

Remarks: The Estonian specimens differ from *P. podolica* by the lack of a dorsal plica. Tecnomorphs of *P.* cf. *podolica* are unknown.
Occurrence: Vormsi Stage of Estonia. *P. podolica* was reported from the Molodovo Formation of Podolia.
Locality: Paope quarry — 0.85; 2 specimens (heteromorphic right valves) recorded.

Genus *Pelecybolbina* Jaanusson, 1966

Type species: *Pelecybolbina pelecyoides* Jaanusson, 1966.
Diagnosis: See Jaanusson, 1996, p. 23.
Occurrence: Viruan and Harjuan of Baltoscandia.

Pelecybolbina illativis (Neckaja, 1952)
Plate 11, figs 11–12.

1952 *Dilobella illativis* sp. n. — Neckaja, pp. 222–223, pl. 1, fig. 1.
? 1952 *Dilobella illativis* var. *bisulcata* sp. et var. n. — Neckaja, p. 223, pl. 1, figs 2–3.
non (partim?) 1959 *Sigmobolbina illativis* (Neckaja) — Sarv, p. 133, pl. 23, fig. 12.
* 1992 *Pelecybolbina illativis illativis* (Neckaja) — Sidaravičiene, p. 39, pl. 8, figs 1–2.
?* *Pelecybolbina illativis bisulcata* (*Neckaja*) — Sidaravičiene, p. 39–40, pl. 8, figs 3–4.
?* *Pelecybolbina illativis virbalensis* subsp. n. — Sidaravičiene, p. 40–41, pl. 8, figs 5–7.
* *Pelecybolbina illativis lelensis* subsp. n. — Sidaravičiene, p. 4, pl. 8, figs 8–10.

Holotype: Left heteromorphic (?) valve No. 19–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Wesenberg Beds (Rakvere Stage?).
Diagnosis: See Sidaravičiene, 1992, p. 38.
Remarks: Neckaja (1952) described, apart from the main form, also a variety named *bisulcata*. Sidaravičiene (1992) regarded the latter as a subspecies and distinguished two additional subspecies, *P. illativis virbalensis* and *P. illativis lelensis*. She mentioned that in the Lithuanian collection various subspecies of *illativis* co-occur and are linked by transitional forms, but also that the specific features of the valve morphology of these subspecies are not controlled by their ontogeny (*ibid.*, p. 39). The validity of the subspecies may be questioned and some or all "subspecies" may represent terminal members in a continuous intraspecific range of variation.

Figured specimen of *P. illativis* by Sarv (1959, p. 133, pl. 23, fig. 12) differs from *P. illativis* in possessing of a sulcal depression along the postadductorial part of the histium, wavy histial margin, arched below S2, and a dorsal plica. Qvale (1980, p. 105) and Schallreuter (1981d) regarded this material as belonging to the genus *Eolomatella* Schallreuter, 1974.

The Estonian material of *P. illativis* is characterized by the absence of depressed areas on the lobes; the configuration and convexity of the lobes and the width of the dolon vary to some degree.
Occurrence: This species is with certainty recorded from the Oandu Stage of Estonia and Lithuania and from the undivided Oandu to Rakvere stages of north-western Poland. Its occurrence in the Rakvere to Vormsi stages of Lithuania is possible.
Localities. Core sections: Orjaku — 132.70; ? Virtsu — 224.70; Pärnu — 327.50–328.00; Viljandi — 327.80; Laeva — 234.70–237.70; Abja — 403.80 (402.85?)–404.30; over 140 specimens recorded.

Pelecybolbina pelecyoides Jaanusson, 1966
Plate 12, figs 1–2.

1966 *Pelecybolbina pelecyoides* n. sp. — Jaanusson, p. 25–26, pl. 3, figs 14–18, text-fig. 6 E-H.
* 1992 *Pelecybolbina pelecyoides* Jaanusson — Sidaravičiene, 1992, p. 42, pl. 9, figs 3–7.

Holotype: Left heteromorphic valve No. 1164, UM. Sweden, Siljan County, Fjäcka, locality No. 9. Moldå Limestone, 1.15–1.25 from the upper boundary.
Occurrence: Rakvere Stage of Estonia; Oandu to Vormsi stages of Lithuania; Moldå Limestone of Sweden.
Localities. Core sections: Pärnu — 319.80–320.80; Viljandi — 324.80–325.30; Laeva — 230.70–233.80; Abja — 399.10–402.40; Taagepera — 460.40–464.40; Otepää — 431.45 (440.00?); over 60 specimens recorded.

Pelecybolbina graesgardensis Schallreuter, 1977
Plate 12, fig. 3.

1977 *Pelecybolbina graesgardensis* sp. n. — Schallreuter, pp. 409, 411, fig. 1.

Holotype: Left heteromorphic valve No. 1961, GPIH. Sweden, Öland, Gråsgard, southern slope of the Råbäck Valley ca. 200 m east from the road bridge 1.5 km south of the Gräsgård church. Erratic boulder (Gräsgård Siltstone), sample Gr. 1.
Occurrence: Keila Stage of Estonia; Sweden, erratic boulders of Öland (*loc. typicus*).
Localities. Core sections: Pärnu — 329.10; Abja — 418.80; over 15 specimens recorded.

Subfamily Glossomorphitinae Hessland, 1953

Genus *Hippula* Tromelin et Lebesconte, 1876

(for synonymy see Schallreuter, 1983)

Type species: *Hippa latens* Barrande, 1872.
Diagnosis: See Schallreuter, 1983.
Remarks: Schallreuter (1983, 1984a) has established four subgenera (*H.* (*Cetona*), *H.* (*Hippula*), *H.* (*Kanyginia*) and *H.* (*Pseudocetona*)) based on the number of toral ridges. This subdivision of the genus appears to be largely artificial.
Occurrence: Middle and upper Ordovician of Europe, North America and Siberia.

Hippula edolensis (Gailīte, 1975)

Plate 12, figs 7–8.

1975 *Oecematobolbina edolensis* Gailīte, sp. nov. — Gailīte, pp. 48–49, pl. 1, figs 4–5.
1982 *Oecematobolbina edolensis* Gailīte — Gailīte in Ulst *et al.*, p. 120 (etc.).
1984 *Hippula eddolensis* (Gailīte) — Sarv and Meidla, p. 10.

Holotype: Heteromorphic carapace Os 31/346, VNIIMORGEO. Latvia, Mezhmali core, depth 922m. Pirgu Stage.
Occurrence: Nabala to Pirgu stages of Estonia; Rakvere to Pirgu stages of Latvia.
Localities. Core sections: Förby — 22.50; Kaugatuma — 386.60; Pärnu — 295.80–310.10 (318.00?); Aidu — 169.00–183.60; Ruskavere — 96.40–137.50; Laeva — 210.40–224.80; outcrops: Paluküla — 1.69; Kuie; over 30 specimens recorded.

Genus *Vitteplana* Sidaravičiene, 1992

Type species: *Ordovicia plana* Neckaja, 1958.
Diagnosis: See Sidaravičiene, 1992, p. 79.
Occurrence: Harjuan of Baltoscandia.

Vitteplana plana (Neckaja, 1958)

Plate 12, fig. 4.

1958 *Ordovicia plana* Neckaja, sp. n. — Neckaja, p. 352, pl. 1, figs 4–5.
1984 *Hesslandella plana* (Neckaja) — Sarv and Meidla, p. 10.
1990 *Hesslandella plana* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Vitteplana plana* (Neckaja) — Sidaravičiene, p. 79, pl. 20, figs 3–5.

Holotype: Left tecnomorphic (?) valve No. 24–157, VNIGRI. Lithuania, vicinity of Vilnius (subsurface). Saaremõisa beds (Nabala to Pirgu stages).
Occurrence: Vormsi to Porkuni Stages of Estonia; Nabala to Pirgu stages of Lithuania and north-western Byelorussia.
Localities. Core sections: Förby — 16.20–25.20 (25.50?); Pärnu — 249.20; Aidu — 114.00; outcrops: Paope — 1.20 (0.85?); Paluküla — 0.12–2.40; Saxby; Urge; Prillimäe — 0.70–1.10; Piirsalu; Lohu; Möldri — 0.00–1.50; Pirgu; Siuge; over 40 specimens recorded.

Vitteplana? sp. n.
Plate 12, figs 5–6.

Remarks: Estonian material, tentatively assigned to *Vitteplana*, differs from the type species of the genus by longitudinally convex, reticulate valves. Crista-like velum is developed along the entire free margin, more distinct anteriorly; heteromorph differing by the presence of a narrow ridge-like velum along the anterior and anteroventral margins.
Occurrence: Oandu and ?Rakvere stages of Estonia.
Locality: Pärnu core — 327.50 (320.80?)–328.00 (3 specimens).

Genus *Vittella* Schallreuter, 1964

Type species: *Vittella vittensis* Schallreuter, 1964.
Diagnosis: See Schallreuter, 1983, pp. 138–139.
Occurrence: Ordovician of Baltoscandia, Siberia, England and Wales.

Vittella invasa Sidaravičiene, 1975
Plate 12, figs 9–10.

1975 *Vittella invasa* sp. n. — Sidaravičiene, pp. 28–29, pl. 4, figs 2–3.
1984 *Vittella invasa* Sidaravičiene — Sarv and Meidla, p. 10.
1992 *Vittella invasa* Sidaravičiene — Sidaravičiene, p. 77.
* 1992 *Vittella invasa invasa* Sidaravičiene — Sidaravičiene, p. 77, pl. 19, figs 3–8.
1992 *Vittella invasa vasa* subsp. n. — Sidaravičiene, pp. 77–78, pl. 19, figs 9–12, pl. 20, fig. 1, pl. 56, fig. 6.

Holotype: Heteromorphic carapace No. 13–58/1, LitNIGRI. Lithuania, Lapes core, depth 672 m. Pirgu Stage.
Remarks: Sidaravičiene (1992) distinguished two subspecies within *V. invasa* (*invasa* and *vasa*), differing mainly by width of the heteromorphic velum and stratigraphical ranges (*ibid.*, p. 77). The locality information, however, shows that in Lithuania the ranges of the subspecies are in several cases partly overlapping (Nabala–Vormsi stages) and that the subspecies even co-occur: in localities No. 87 (Sutkai, 947.8–951.4), No, 104 (Jakshiai, 982 m), No. 105 (Grauzhiai, 965.3–969.6 m) and No. 434 (Virbalishkis, 824.7–825.5). Owing to overlapping range and co-occurrence in several localities, as well as the somewhat vague definitions, I tend to consider the differences between Sidaravičiene 's subspecies of *V. invasa* as due to intraspecific variation.
Occurrence: Nabala to Vormsi and ?Pirgu stages of Estonia; Rakvere to Pirgu stages of Latvia, Lithuania and north-western Byelorussia.
Localities. Core sections: Puhmu — 83.30–117.50; Laiamäe — 62.50; Vinni — 15.50; Pärnu — 308.15–310.10; Aidu — 197.10; Ruskavere — 114.00–119.50; Abja — 392.50; Otepää — 424.20; Kaagvere — 244.60–246.30; over 290 specimens recorded.

Genus *Loculibolbina* Schallreuter, 1983

Type species: *Parabolbina unica* Sarv, 1962.

Diagnosis (modified from Schallreuter, 1983): Median-sized, subamplete to slightly preplete. S2 and preadductorial node poorly defined. Tecnomorphic velum distinct, narrow to wide; heteromorphic velum wide, with 5–6 loculi. Acroidal spines may be present.
Remarks: In the original diagnosis Schallreuter mentioned the presence of a very narrow velum in the tecnomorphs.
Occurrence: Harjuan of Baltoscandia.

Loculibolbina primitiva (Sarv, 1962)
Plate 12, figs 11–12.

1962 *Parabolbina primitiva* sp. n. — Sarv, pp. 112–113, pl. 4, figs 2–5.
1984 *Loculibolbina primitiva* (Sarv) — Sarv and Meidla, pp. 9, 13.
* 1992 *Loculibolbina primitiva* (Sarv) — Sidaravičiene, p. 20, pl. 3, fig. 6, pl. 55, fig. 7.

Holotype: Right heteromorphic valve Os 2650, IGT. Estonia, West Viru County, Tõrma quarry. Nabala Stage.
Remarks: Sidaravičiene (1992, p. 20) mentioned the presence of tecnomorphs with radially striated velum in Lithuanian material. In the present material avelate to nearly avelate tecnomorphs and juveniles are predominant, whereas velate heteromorphs are rare.
Occurrence: Rakvere to Pirgu stages of Estonia and Lithuania; Pirgu Stage of Latvia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 54.80–107.80; Förby — 5.00–25.20; Haapsalu-203 — 22.20–64.90; Põhjaka–Saare — 76.30–117.40; Vodja H-190 — 106.30; Moe — 46.00–59.00; Puhmu — 38.50–93.90; Vinni — 15.50–21.40; Kaugatuma — 386.95–408.64; Pärnu — 299.00–318.00; Aidu — 113.00–145.50; Ruskavere — 119.50; ? Abja — 397.50; outcrops: Paekna — 1.80; Nõmmeküla; Tõrma; ? Paluküla — 0.82–1.83; ? Saxby; Sutlepa; nearly 150 specimens recorded.

Loculibolbina unica (Sarv, 1962)
Plate 13, figs 1–2.

1962 *Parabolbina unica* sp. n. — Sarv, pp. 113–114, pl. 1, figs 9–11, pl. 4, fig. 1.
1984 *Loculibolbina unica* (Sarv) — Sarv and Meidla, p. 9.
1986 *Loculibolbina unica* (Sarv) — Schallreuter, pl. 4, fig. 10.

Holotype: Right heteromorphic valve Os 5145, IGT. Estonia, West Viru County, Porkuni. Porkuni Stage.
Remarks: Available material consists of tecnomorphs and juveniles, mostly poorly preserved at least what velum is concerned. For this reason the assignment of the specimens to *L. unica* is somewhat tentative.
Occurrence: Porkuni Stage of Estonia; erratic boulders in Germany.
Estonian locality: Seli–Russalu quarry (10 specimens).

Subfamily Sylthinae Schallreuter, 1982
Genus *Disulcinoides* Schallreuter, 1982

Type species: *Entomis auricularis* Krause, 1892.

Diagnosis: See Sidaravičiene, 1992, p. 21.
Other species: *Disulcinoides ignalinensis* Sidaravičiene, 1992.
Occurrence: Viruan and Harjuan of Baltoscandia.

Disulcinoides auricularis (Krause, 1892)
Plate 13, fig. 4.

1892 *Entomis auricularis* n. sp. — Krause, p. 390, pl. 22, fig. 5.
* 1983 *Disulcinoides auricularis* (Krause) — Schallreuter, pp. 159–161, pl. 7, figs 1–10, pl. 9, fig. 4.
1992 *Disulcinoides auricularis* (Krause) — Sidaravičiene, p. 22, pl. 3, fig. 10.

Lectotype: Right valve (Krause, 1892, pl. 22, fig. 5), MN HUB. Germany, Berlin, Müggelheim. Erratic boulder (Viruan).
Occurrence: Idavere to Keila stages of Estonia; Idavere to Oandu stages of Lithuania, north-western Byelorussia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 134.70; Kaugatuma — 414.05; 3 specimens recorded.

Disulcinoides ignalinensis Sidaravičiene, 1992
Plate 13, fig. 3.

1992 *Disulcinoides ignalinensis* sp. n. — Sidaravičiene, p. 22, pl. 3, fig. 11, pl. 4, figs 1–3.

Holotype: Right valve No. 12–155/1, LitNIGRI. Lithuania, Drukshiai-324 core, depth 431.9 m. Oandu–Rakvere (undivided) stages.
Occurrence: Nabala to Vormsi stages of Estonia; Rakvere to Vormsi stages of Lithuania.
Localities. ? Vinni core — 15.50; Turvaste; 2 specimens recorded.

Genus *Disulcina* Sarv, 1959
(Syn. *Sylthis* Schallreuter, 1982)

Type species: *Ctenobolbina perita* Sarv, 1956.
Diagnosis: See Sidaravičiene, 1992, p. 22.
Other species: *Disulcina perita explicata* Sarv, 1959; *Disulcina interminata* Sarv, 1959; *Disulcina minata* Sidaravičiene, 1971; *Sylthis persona* Schallreuter, 1982; *Disulcinoides longocristatus* Schallreuter, 1982; *Disulcinoides wachsi* Schallreuter, 1987.
Remarks: Schallreuter (1982d, p. 558) regarded the genus *Disulcina* as a *nomen dubium* and erected two new genera, *Disulcinoides* and *Sylthis*, based on the different morphology of S2 (open sulcus or narrow, partly closed "cavum"). The value of this feature seems to be strongly overestimated. The specimens of *Disulcina perita perita* may possess S2 as a simple, semiclosed (constricted in the central part) or "cavum"-like sulcus, as it is demonstrated below. Therefore *Disulcina* is regarded as valid and, consequently, *Sylthis* considered as a junior synonym. Great intraspecific variability in the morphology of S2 by *Disulcina perita perita* puts the interpretation of the cavum as a buoyancy organ in doubt (see Schallreuter, 1982e). *D. longocristatus, D. persona* and *D. wachsi* are considered to be conspecific with *D. perita* (see below).
Occurrence: Viruan and Harjuan of Baltoscandia.

Disulcina perita (*Sarv,* 1956)

Subspecies: *D. perita perita* (Sarv, 1956), *D. perita explicata* Sarv, 1959.

Disulcina perita perita (Sarv, 1956)
Plate 13, figs 5–7.

1956 *Ctenobolbina perita* sp. n. — Sarv, pp. 37–38, pl. 2, figs 1–13.
1959 *Disulcina perita perita* (Sarv) — Sarv, pp. 147–148, pl. 26, figs 4–9, text-fig. 15A.
1976 *Disulcina perita* (Sarv) — Sidaravičiene, pp. 49, 55.
1976 *Disulcina explicata* Sarv — Sidaravičiene, p. 49 (*partim*).
1979 *Disulcina perita* (Sarv) — Sidaravičiene, pp. 134–138.
1979 *Disulcina explicata* Sarv — Sidaravičiene, pp. 134–138 (*partim*).
1982 *Sylthis persona* n. sp. — Schallreuter, pp. 556–557.
1982 *Disulcinoides longocristatus* n. sp. — Schallreuter, p. 558, fig. 1.2.
1982 *Disulcina perita* (Sarv) — Gailīte in Ulst *et al.*, p. 125.
1985 *Disulcina perita* (Sarv) — Sztejn, p. 80, pl. 6, figs 4a–b.
1985 *Sylthis persona* Schallreuter — Schallreuter, pl. 3, fig. 1.
1987 *Disulcinoides wachsi* sp. n. — Schallreuter, p. 79, figure.
1989 *Sylthis persona* Schallreuter — Schallreuter, fig. 4.1.
1990 *Disulcina perita perita* (Sarv) — Nõlvak and Meidla, p. 141.
1992 *Disulcina explicata* Sarv — Sidaravičiene, p. 23 (*partim*), **non** pl. 4, fig. 4.
1992 *Disulcina persona* (Schallreuter) — Sidaravičiene, pp. 23–24, pl. 4, fig. 5.

Holotype: Right valve Os 2004, IGT. Estonia, East Viru County, Oandu. Oandu Stage.
Diagnosis (modified from Sarv, 1959): Small, moderately convex. Sulci bow-shaped, developed as pits, anterior sulcus (S2) narrower or occasionally closed ("cavum"), posterior sulcus (S3) longer and wider than S2. Velum developed along the anterior and ventral margins.
Remarks: In this subspecies variation of the configuration and width of S2 can be considerable. Selected specimens from the Orjaku core, from the same sample (117.71–117.77 m) demonstrate S2 as a simple, centrally stongly constricted (semi-closed) or "cavum"-like sulcus. This material can be regarded as belonging to a single population, as the character of the sediment — very fine-grained, cyptocrystalline limestone — makes redeposition hardly believable. S3 is always broader and longer than S2, as mentioned already in the original diagnosis by Sarv.

D. longocristatus, D. persona and *D. wachsi* are considered here to be junior synonymes of *D. perita perita.*

Sidaravičiene (1992), judging from the ranges of *D. explicata* and *D. persona*, regarded specimens of *D. perita perita* with pit-like sulcus as belonging to *D. perita explicata.* Both (sub)species are recorded in several sections from the same levels, documented in detail (Sidaravičiene, 1979). In 1980 Sidaravičiene and Saulenene (1980, figure) recorded from the Butkunai core section the appearance of *D. perita explicata* below the first occurrence of *D. perita perita*, higher up in the sequence the latter was replaced again by the former subspecies. In Estonian sequence the earliest finds of *D. perita,* in the Oandu Stage, are represented by the holotype-like forms with a comparatively wide, open sulcus, in the Rakvere Stage specimens with a narrower sulcus prevail. Higher up in the sequence *D. perita perita* is replaced by the younger subspecies. Until details are not clarified in the Lithuanian material, the ranges of the subspecies of *D. perita* as defined here are unclear in Lithuania.

Occurrence: Oandu to Rakvere stages of Estonia; Oandu and Rakvere to Nabala (undivided) stages of Latvia; Keila to Vormsi stages of Lithuania (?); Oandu to Vormsi stages of north-western Poland; erratic boulders in Germany.
Localities. Core sections: Orjaku — 106.80–130.50; Virtsu — 209.00 (207.40?); Nabala — 7.70–19.40; Moe — 64.20 (59.00?); Laiamäe — 74.70–92.40; Vinni — 26.40–43.25; Mäetaguse — 9.90–21.10; outcrops: Saku; Tõrremäe; Ussimägi — 1.50–2.10; Paekna — 1.30–2.30; Moonaküla; Rägavere; Piilse; over 300 specimens recorded.

Disulcina perita explicata Sarv, 1959
Plate 13, fig. 8.

1959 *Disulcina perita explicata* subsp. n. — Sarv, p. 148–149, pl. 26, figs 10–12, text-fig. 15V.
1976 *Disulcina explicata* Sarv — Sidaravičiene, p. 49 (*partim*).
1979 *Disulcina explicata* Sarv — Sidaravičiene, pp. 134–138 (*partim*).
1982 *Disulcina explicata* Sarv — Gailīte in Ulst *et al.*, p. 125.
1990 *Disulcina explicata* Sarv — Meidla and Sarv, p. 69, pl. 8, figs 9–10.
1992 *Disulcina explicata* Sarv — Sidaravičiene, p. 23 (*partim*), pl. 4, fig. 4.

Holotype: Left valve Os 2418, IGT. Estonia, Harju County, Nõmme (Nabala). Lower substage of the Nabala Stage.
Diagnosis (modified from Sarv, 1959): Small, moderately convex. Sulci long and wide, anterior sulcus (S2) may reach the dorsal margin, posterior sulcus (S3) normally longer and narrower, or both sulci are approximately of equal width. Velum well defined along the anterior margin and indistinct along the ventral margin.
Occurrence: Nabala Stage of Estonia; Rakvere to Nabala (undivided) and Vormsi stages of Latvia; Oandu to Vormsi stages of Lithuania (?).
Localities. Core sections: Orjaku — 102.40–104.90; Nabala — 4.50–6.45; ? Moe — 48.80–52.00; Laiamäe — 70.50; Vinni — 18.80–23.60; ? Pärnu — 320.80; Nõmmeküla quarry; over 70 specimens recorded.

Disulcina minata Sidaravičiene, 1971
Plate 13, fig. 10.

1971 *Disulcina minata* Sidaravičiene, sp. n. — Sidaravičiene, pp. 24–25, pl. 2, fig. 4.
1984 *Disulcina minata* Sidaravičiene — Sarv and Meidla, pp. 10, 19.
* 1992 *Disulcina minata* Sidaravičiene — Sidaravičiene, p. 24, pl. 4, figs 6–8.

Holotype: Left valve No. 13–1/1, LitNIGRI. Lithuania, Lapes core, depth 668.4 m. Pirgu Stage.
Occurrence: Vormsi to Pirgu stages of Estonia, Lithuania and north-western Byelorussia.
Localities. Moe core — 22.60; quarries at Urge and Moe-1; 3 specimens recorded.

Genus *Airina* Sidaravičiene, 1971.
(?Syn. *Hallatia* Kay, 1934)

Type species: *Hallatia cornuta* Neckaja, 1958.
Diagnosis (modified from Sidaravičiene, 1992): Small or medium-sized, moderately convex, equivalved, with short S2 and occasionally with indistinct knob-like L2. Tecno-

morphic velum narrow, developed along the anteroventral and ventral margins, terminating more or less sharply posteroventrally. Heteromorphs with a wide velum, confluent with the lateral surface, reaching beyond the free margin ventrally and terminating abruptly posteriorly.

Other species: ? *Hallatia healeyensis* Kay 1934; *Hallatia convexa* Kay, 1940; ? *Hallatia particylindrica* Kay, 1945; *Hallatia amabilis* Neckaja, 1958; *Airina adducta* Sidaravičiene, 1971; *Hallatia mezciemensis* Gailīte, 1975; *Disulcina syltensis* Schallreuter, 1980; *Airina airina* Sidaravičiene, 1992; *Airina kuldigensis* Sidaravičiene, 1992; *Airina* sp. A in Sidaravičiene, 1992.

Remarks: *Hallatia healeyensis* Kay is poorly known, but seems to be close to the type species of the genus *Airina*. The main differences (mentioned already by Neckaja in Abushik *et al.*, 1958) are in the shape of S2 and the absence of a spine terminating the velum posteriorly. As shown by Sidaravičiene in 1992, the morphology of S2 varies within *Airina*, being cavum-like to wide and reaching very close to the dorsal margin in some species (*A.* sp. A: Sidaravičiene, 1992). If the redescription of *H. healeyensis* will confirm this similarity, the genus *Airina* should be considered a synonym of *Hallatia*. *H. convexa* apparently belongs to *Airina* (?=*Hallatia*). The assignment of several other North American species assigned to *Hallatia* requires confirmation.

Disulcina syltensis Schallreuter (1980b) fits with the diagnosis of *Airina* and should be assigned to this genus. However, the figured material consists of specimens of the same type (presumed heteromorphs), and therefore details of the dimorphism are unknown.

Occurrence: Viruan and Harjuan of Baltoscandia; middle and ?upper Ordovician of North America.

Airina cornuta (Neckaja, 1958)

Plate 13, figs 11–12.

1954 *Sigmobolbina*? sp. — Henningsmoen, p. 77, pl. 1, figs 1–2, text-fig. 1.
1958 *Hallatia cornuta* sp. n. — Neckaja in Abushik *et al.*, p. 247, pl. 2, fig. 7.
1975 *Hallatia mezciemensis* Gailīte, sp. nov. — Gailīte, pp. 49–50, pl. 1, figs 6a–v.
1983 *Airina cornuta* (Neckaja) — Abushik and Sarv, p. 111, pl. 10, fig. 7.
1984 *Airina cornuta* (Neckaja) — Sarv and Meidla, p. 10.
1990 *Airina cornuta* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Airina cornuta* (Neckaja) — Sidaravičiene, p. 26, pl. 4, fig. 11.
* 1992 *Airina mezciemensis* (Gailīte) — Sidaravičiene, p. 26, pl. 5, figs 2–3.
? *1992 Airina kuldigensis* sp. n. — Sidaravičiene, p. 27, pl. 5, fig. 5.

Holotype: see Abushik *et al.*, 1958, p. 247.

Diagnosis: S2 partly covered ("cavum") or widely open, pit-like. Tecnomorphic velum proceeds from the middle part of the anterior margin to the posteroventral margin, it diverges as a ridge sharply from the free margin anteriorly, converges with the free margin ventrally, where it is crista-like to indistinct, and terminates posteroventrally with a spine of various morphology. Heteromorphs are comparatively higher, with velum diverging continuously from the free margin anteroventrally, reaching beyond the free margin along the ventral margin and terminating posteroventrally as a blunt spine.

Dimensions in mm:	Length	Height
Right heteromorphic valve Os 3422	1.09	0.74
Left juvenile valve Os 3423	0.87	0.51

Remarks: *A. cornuta* differs from *A. adducta* Sidaravičiene by a spine-like process on the posterior end of the velum and by a less distinctly outlined posterior margin of the posterior lobe.

In 1984 the holotype of *A. cornuta* has not been found in the collection of VNIGRI.

The morphology of the posteroventral area in *A. cornuta* varies considerably, mainly due to differences between growth stages. Some preadult specimens of *A. cornuta* are characterized by a simple, spineless posteroventral area which makes them similar to the adults of *A. mezciemensis*. The morphology of S2 also varies from narrow cavum-like structure to an open sulcus, slightly constricted in the central part.

A. mezciemensis Gailīte is conspecific with *A. cornuta*. The lectotype of *A. cornuta* is characterized by a sulcus resembling that of *A. mezciemensis*, and the definition of the latter species is apparently based on the inadequacy of the original description of *A. cornuta*. Type specimen of *A. kuldigensis* can also tentatively be assigned to the same species. *Brevibolbina? porkuniensis* in Gailīte (1970, 1982), assigned by Sidaravičiene (1992) to *A. kuldigensis,* has no velar flange and can be classified with *Spinopleura*.

Occurrence: Rakvere to Porkuni stages of Estonia; Vormsi to Pirgu stages of Latvia; ? Keila and Oandu to Pirgu stages of Lithuania and north-western Byelorussia; erratic boulders in Germany.

Localities. Core sections: Orjaku — 79.70–119.40; Förby — 5.00–25.00; Haapsalu-203 — 40.10–65.85; Virtsu — 150.85; Nabala — 4.00–19.40; Põhjaka–Saare — 76.30–106.10; Vodja H-190 — 108.60; Vodja H-191 — 118.80; Moe — 7.60–46.00; Puhmu — 42.00–117.50; Laiamäe — 29.20–85.70; Vinni — 15.50–41.40; Mäetaguse — 17.10; Kaugatuma — 346.75 (344.60?)–367.70 (411.30?); Pärnu — 242.60 (241.90?)–299.00; Viljandi — 287.10–301.50; Aidu — 114.00–191.20; Laeva — 191.90–211.60; Ruskavere — 64.80–119.65; Abja — 373.50; Otepää — 384.20–408.00; Kaagvere — 188.10–235.90; outcrops: Ussimägi — 0.40–1.75; Paekna — 0.40–2.60; Moonaküla; Rägavere; Piilse; Paope — 0.85–1.20; Paluküla — 0.12–2.10; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.70–1.30; Lehtse; Tapa; Moe-2; Möldri — 1.00; Moe-1; over 600 specimens recorded.

Genus *Scrobisylthis* Schallreuter

Type species: *Sigmobolbina quanta reticulata* Sarv, 1959

Diagnosis: See Schallreuter, 1982d, p. 557.

Occurrence: Viruan of Baltoscandia.

Scrobisylthis reticulatus (Sarv, 1959)

Plate 13, fig. 9.

1959 *Sigmobolbina quanta* var. *reticulata* sp. et var. n. — Sarv, p. 132, pl. 23, figs 20–21.

* 1983 *Scrobisylthis reticulatus* (Sarv) — Schallreuter, pp. 161–162, pl. 14, fig. 4.

1985 *Scrobisylthis reticulatus* (Sarv) — Schallreuter, pl. 3, fig. 3.

Holotype: Left heteromorphic (?) valve Os 2290, IGT. Estonia, Alliku. Jõhvi Stage.

Occurrence: Jõhvi to Oandu stages of Estonia; erratic boulders in Germany.

Localities. Orjaku core — 134.70–135.60; outcrops: Saku; Ussimägi — 2.10; 12 specimens recorded.

Family Bolbinidae Ivanova, 1979

Diagnosis and assigned genera: See Ivanova, 1979, p. 111.
Remarks: The Hithinae in Schallreuter, 1967b (p. 930) consist of two distinct groups. One of them (*Brevibolbina* Sarv, *Hithis* Schallreuter, *Cavhithis* Schallreuter) shows a well-defined dolonal dimorphism. The occurrence of domiciliar and/or antral dimorphism within the genus *Bolbina* and related genera (e.g. *Bolbihithis* Schallreuter, *Boreobolbina* Ivanova, 1979) indicates that this group should be excluded from Tvaerenellidae. The range of variation of the type species of *Bolbina, B. ornata* (Krause, 1897), is imperfectly known (only one complete heteromorphic specimen is known with certainty — see Schallreuter, 1990a, pl. 1, fig. 10), but that it is congeneric with other species which have a distinct domiciliar dimorphism is accepted by several authors (Schallreuter, 1973a; Sarv, 1959).

The type genus of Hithinae, *Hithis* Schallreuter, 1964, and related genera are assigned here to Sarvinidae (see above).
Occurrence: Viruan and Harjuan of Baltoscandia; middle and upper Ordovician of Central Siberia and North America.

Genus *Bolbina* Henningsmoen, 1953

Type species: *Bollia ornata* Krause, 1897.
Diagnosis: See Ivanova, 1979, p. 111.
Remarks: Henningsmoen (1953, p. 208) stated the presence of domiciliar dimorphism (dimorphism of the posteroventral lobe) in *Bolbina* but did not describe it properly. Later on domiciliar dimorphism has been established in several species of this genus (*B. major* Krause, 1892, *B. rakverensis* Sarv, 1956, *B. latimarginata* Bonnema, 1909, *B. plicata* Krause, 1892) although it does not seem to be developed in the type species.
Occurrence: Viruan and Harjuan of Baltoscandia; erratic boulders in Germany and in the Netherlands.

Bolbina cf. *ornata* (Krause, 1897)
Plate 13, fig. 13.

cf. 1897 *Bollia minor* var. *ornata* n. v. — Krause, p. 936, pl. 25, fig. 5.
cf.? 1909 *Bollia ornata* Krause sp. var. *latimarginata* nov. var. — Bonnema, pp. 62–63, pl. 4, figs 9–11.
cf.?* 1979 *Bolbina latimarginata* (Bonnema) — Ivanova, pp. 113–114, pl. 8, fig. 6.
cf.* 1983 *Bolbina ornata* (Krause) — Schallreuter, p. 22, pl. 13, fig. 9.
cf. 1985 *Bolbina ornata* (Krause) — Schallreuter, p. 104, pl. 2, figs 1–3.
cf. 1990 *Bolbina ornata* (Krause) — Schallreuter, p. 257, pl. 1, fig. 10.

Holotype: Left tecnomorphic valve No. 34113, Rijksmuseum van Geologie en Mineralogie Leiden. The Netherlands, Zwiepschen Berge by Lochen, erratic boulder No. 11068.
Remarks: In the available material only one very young instar could be conspecific with *B. ornata*, but it is unclear, whether the differences in lobation reflect growth variation or that the specimen belongs to a different species.

The relationship of *B. ornata* and *B. latimarginata*, referred to as different species (Jaanusson, 1957, pp. 330–331), still remains open. Heteromorphs of *B. latimarginata* (Bonnema, 1909) are considerably smaller than the adults of *B. ornata*, but as the disproportion in the size

has been the main argument of their distinction, they could represent preadult heteromorphs. Such preadult heteromorphs have been reported by Schallreuter (1985a, p. 107) both in *B. major* and *B. rakverensis* and are recorded in the present collection also.

Occurrence: Oandu Stage of Estonia. For the occurrence of *B. ornata* see Schallreuter, 1973a, 1983).

Estonian locality: Ussimägi outcrop — 2.10 (1 specimen).

Bolbina major (Krause, 1892)

Plate 14, figs 1–2.

1892 *Bollia minor* n. sp. — Krause, p. 391, pl. 21, fig. 15.
1892 *Bollia major* n. sp. — Krause, p. 392, pl. 21, fig. 18.
1959 *Bolbina lehtmetsaënsis* (Oraspõld, in coll) — Sarv, pp. 50–51, pl. 8, figs 5–9, text-fig. 4b.
1990 *Bolbina major* — Hints *et al.*, p. 137 (fig.).
* 1992 *Bolbina major* (Krause) — Sidaravičiene, p. 81, pl. 20, figs 8–11.

Lectotype: Left heteromorphic valve (figured by Krause, 1892, pl. 21, fig. 18; designated by Jaanusson, 1962), MN HUB. Germany, Berlin, Müggelheim. erratic boulder (Viruan).

Remarks: *B. major* differs from *B. rakverensis* (Sarv, 1956) in possessing a wider posterior lobe in tecnomorphs, by well-defined velum in heteromorphs and by a reticulate surface.

Examined specimens included also preadult heteromorphs.

Occurrence: Keila to Nabala and ? Vormsi stages of Estonia, Keila to Rakvere stages of Latvia and north-western Byelorussia; Keila to Nabala stages of Lithuania; erratic boulders in Germany.

Localities. Core sections: Orjaku — 117.70 (91.00?)–134.70; ? Förby — 25.00; Nabala — 8.10–19.40; ? Moe — 54.20; ? Puhmu — 90.70; Laiamäe — 85.70–93.00; Vinni — 25.50–38.50; ? Ruskavere — 120.10; Abja — 403.80; outcrops: Tõrremäe; Ussimägi — 0.40–2.10; ? Paekna — 0.40; Rägavere; Piilse; ? Osmussaar (erratic boulder); ? Turvaste; Nõmmeküla; ? Tõrma; ? Permisküla; over 200 specimens recorded.

Bolbina plicata (Krause, 1892)

Plate 14, fig. 5.

Primitia
1892 ~~*Bollia*~~ *plicata* n. sp. — Krause, pp. 386–387 (*partim*?), pl. 22, fig. 1.
1990 *Bolbina plicata* — Meidla *et al.*, p. 135 (fig.).
* 1985 *Bolbina plicata* (Krause) — Schallreuter, pp. 103–104, pl. 2, fig. 4, pl. 8, fig. 2.

Lectotype: Specimen figured by Krause (1892, pl. 22, fig. 1; designated herein), MN HUB. Germany, Berlin, Müggelheim, erratic boulder (Viruan).

Occurrence: Rakvere to Nabala stages of Estonia; erratic boulders in Germany.

Localities. Core sections: Nabala — 6.75–19.40; Moe — 30.50–40.80 (59.00?); Puhmu — 93.50–104.20; Vinni — 36.80; Mäetaguse — 17.10; outcrops: Ussimägi — 0.40; Paekna — 0.40–1.60; Rägavere; Piilse; Turvaste; Tõrma; over 50 specimens recorded.

Bolbina rakverensis Sarv, 1956

Plate 14, figs 3–4.

1956 *Bolbina rakverensis* sp. n. — Sarv, pp. 33–34, pl. 2, figs 1–4.

1983 *Bolbina rakverensis* Sarv — Abushik and Sarv, p. 106, pl. 2, fig. 1–2.
1984 *Bolbina rakverensis* Sarv — Sarv and Meidla, pp. 8–9.
* 1992 *Bolbina rakverensis* Sarv — Sidaravičiene, pp. 80–81, pl. 20, figs 6–7.

Holotype: Heteromorphic carapace Os 2013, IGT. Estonia, Rakvere. Oandu Stage.
Remarks: The original description of this species is based on heteromorphs only. The tecnomorphs of *B. rakverensis* are similar to those of *B. major* but differ by a smooth surface and by a more equal width of the anterior and posterior lobes.
Occurrence: Oandu to Rakvere and ?Nabala stages of Estonia, Latvia, Lithuania, north-western Byelorussia, north-eastern Poland; ?Vormsi Stage of Estonia.
Localities. Core sections: Orjaku — 113.30–132.40; ? Förby — 18.70–25.20; Virtsu — 207.40–224.70; Nabala — 13.40 (12.00?)–16.60; Moe — 61.90; Puhmu — 127.50; Laiamäe — 85.70–90.30; Vinni — 28.00–44.10; Mäetaguse — 17.10; ? Pärnu — 327.70–328.00; ? Taagepera — 451.32; outcrops: Tõrremäe; Ussimägi — 0.40–1.75; Paekna — 0.40; Moonaküla; Rägavere; Piilse; over 700 specimens recorded.

Bolbina saxbya Meidla, 1983
Plate 14, fig. 6.

1983 *Bolbina saxbya* sp. n. — Meidla, pp. 55–56, pl. 1, figs 1–4.
1984 *Bolbina saxbya* Meidla — Sarv and Meidla, p. 9.
1989 *Bolbina saxbya* — Nõlvak *et al.*, p. 90.
* 1993 *Bolbina saxbya* Meidla — Schallreuter, pp. 102–103, pl. 62B, fig. 1.

Holotype: Carapace Os 11, UT. Estonia, Island of Vormsi, Saxby beach exposure. Vormsi Stage.
Occurrence: Rakvere to Porkuni Stages of Estonia; Pirgu Stage of Lithuania and Pskov district (Russia); erratic boulders in Germany.
Localities, Core sections: Orjaku — 53.50–116.40; Haapsalu-203 — 27.60–53.80; Nabala — 16.60; Puhmu — 33.60–95.00; Ruskavere — 120.10 (73.10?)–131.70; Osmussaar (erratic boulder); outcrops: Turvaste; Tõrma; Paope — 0.85; Paluküla — 0.82–2.40; Saxby; Kohila-2; Prillimäe — 1.30; Hosholm; Adila; Lohu; over 30 specimens recorded.

Bolbina cf. *valensis* Schallreuter, 1984
Plate 13, fig. 14.

non 1983 *Bolbina rakverensis* Sarv — Abushik and Sarv, p. 106, pl. 2, figs 1–2.
cf. 1984 *Bolbina valensis* n. sp. — Schallreuter, pp. 12–13, pl. 1, fig. 2.
1990 *Bolbina* cf. *valensis* — Meidla *et al.*, p. 135 (fig.).

Holotype: Left valve No. 2902, GPIH. Sweden, NW-Gotland, coast at Vale. Boulder (Harjuan?).
Remarks: A single specimen has been found in Estonian collection. The anterior lobe and the sculpture of the lateral surface seem to be less distinctly defined than in Schallreuter's material. As the range of variation is unknown both in original material of *B. valensis* and the Estonian *in situ* material, the identification is tentative.
Occurrence: Pirgu Stage of Estonia. *B. valensis* occurs in erratic boulders on the Island of Gotland, Sweden.
Locality: Förby core — 14.30 (1 specimen).

Bolbina? *globosa* (Krause, 1889)
Plate 14, figs 7–10.

1889 *Kloedenia*? *globosa* n. sp. — Krause, pp. 21–22, pl. 2, fig. 14.
1959 *Bolbina*? *excessa* sp. n. — Sarv, pp. 52–53, pl. 8, fig. 20–21, text-fig. 4E.
1984 *Bolbina*? *excessa* Sarv — Sarv and Meidla, p. 9.
* 1991 *Bolbina*? *globosa* (Krause) — Schallreuter, pp. 238–239, fig. 1.

Holotype (Lectotype?): Tecnomorphic specimen figured by Krause (1889, pl. 2, fig. 14), PM HUB. Germany, Berlin, Müggelheim (?). Erratic boulder (Harjuan?).
Remarks: The assignment of this species to *Bolbina* should be regarded as tentative. Judging from a single, slightly incomplete heteromorphic specimen, the dimorphic features recognized in *B.*? *globosa* do not resemble those of any known species of *Bolbina*. The dimorphism is expressed in the presence of a wide subhistial/subvelar depression along the ventral part of the anterior and ventral margins (see pl. 14, figs 8, 10). Histium (?) is bend-like, merges with the lateral surface, diverges from the velum (?) anteriorly and reaches the posteroventral margin. Velum (?) proceeds from the anterior margin up to the posteroventral margin and appears as a low crista on a broad histiovelar antrum near the histium ventrally. The free margin is flattened ventrally, projecting strongly beyond the histial (?) margin.
Occurrence: Nabala and Pirgu stages of Estonia; erratic boulders in Germany.
Localities. Orjaku core — 54.80; Osmussaar (erratic boulder); outcrops: Turvaste; Sutlema; Tõrma; Lohu; Moe-1; nearly 30 specimens recorded.

Family Hollinidae Swartz, 1936
Subfamily Hollininae Swartz, 1936
Genus *Grammolomatella* Jaanusson, 1957

Type species: *Biflabellum vestrogothicum* Henningsmoen, 1948.
Diagnosis: See Jaanusson, 1957, p. 410.
Occurrence: Viruan and Harjuan of Baltoscandia; Silurian of the Oslo region of Norway, England and Wales, Australia.

Grammolomatella vestrogothica (Henningsmoen, 1948)
Plate 14, fig. 11.

1948 *Biflabellum vestrogothicum* n. sp. — Henningsmoen, p. 418, pl. 25, fig. 12.
1957 *Grammolomatella vestrogothica* (Henningsmoen) — Jaanusson, pp. 410–411, pl. 12, figs 23–25, text-fig. 45.
* 1992 *Grammolomatella vestrogothica* (Henningsmoen) — Sidaravičiene, p. 18–19, pl. 3, figs 1–3.

Holotype: Right heteromorphic valve Os 90, UM. Sweden, Vestergötland, Kinnekulle core, depth 57.0 m. Fjäcka Shale.
Occurrence: Rakvere to Vormsi stages of Estonia; Keila to Pirgu stages of Latvia; Oandu to Vormsi stages of Lithuania; Fjäcka Shale of Sweden.
Localities. Core sections: Kaugatuma — 408.64; Ruskavere — 115.75; Taagepera — 460.40; Otepää — 424.20 (440.00?); Kaagvere — 253.00; 10 specimens recorded.

Suborder Binodicopa Schallreuter, 1972
Superfamily Drepanellacea Ulrich et Bassler, 1923
Family Drepanellidae Ulrich et Bassler, 1923
Genus *Drepanella* Ulrich, 1894
Drepanella? *pauxilla* Gailīte, 1970
Plate 14, fig. 12.

1970 *Drepanella*? *pauxilla* Gailīte, sp. n. — Gailīte, pp. 22–23, pl. 1, fig. 3.
non 1985 *Klimphores pauxilla* (Gailīte) — Sztejn, p. 74, pl. 4, fig. 12.
1984 *Drepanella*? *pauxilla* Gailīte — Sarv and Meidla, pp. 10, 14.
1992 *Drepanella*? *pauxilla* Gailīte — Sidaravičiene, p. 157, pl. 53, fig. 11.

Holotype: Right valve Os 31/307, VNIIMORGEO. Latvia, Holdre core, depth 439 m. Porkuni Stage.
Remarks: The assignment to *Drepanella* is tentative, as mentioned already in the original description.
Occurrence: Porkuni Stage of Estonia, Latvia and Lithuania.
Estonian locality: Taagepera core — 419.00 (1 specimen).

Genus *Kinnekullea* Henningsmoen, 1948

Type species: *Kinnekullea waerni* Henningsmoen, 1948.
Diagnosis: See Sidaravičiene, 1992, p. 154.
Occurrence: Uppermost Viruan and Harjuan of Baltoscandia.

Kinnekullea hesslandi Henningsmoen, 1948
Plate 14, fig. 14.

1948 *Kinnekullea hesslandi* n. gen & n. sp. — Henningsmoen, pp. 413–414, pl. 25, figs 5–6.
* 1992 *Kinnekullea hesslandi* Henningsmoen — Sidaravičiene, p. 155, pl. 39, fig. 3.

Holotype: Left valve os. 95, UM. Sweden, Västergötland, Kullatorp core, depth 62.87 m. Glauconitic marlstone at the base of the Fjäcka Shale.
Occurrence: Oandu and Nabala stages of Estonia; Keila to Nabala stages of Latvia; Vormsi Stage of Lithuania; Fjäcka Shale of Sweden.
Localities. Core sections: Kaugatuma — 402.50; Taagepera — 466.40; 10 specimens recorded.

Kinnekullea thorslundi Henningsmoen, 1948
Plate 15, fig. 1.

1948 *Kinnekullea thorslundi* n. gen. & n. sp. — Henningsmoen, pp. 414–415, pl. 25, figs 7–9.
1982 *Kinneullea thorslundi* Henningsmoen — Gailīte in Ulst *et al.*, p. 121.
1984 *Kinnekullea thorslundi* Henningsmoen — Sarv and Meidla, pp. 8, 11, 19.
1992 *Kinnekullea waerni* Henningsmoen — Sidaravičiene, p. 155, pl. 39, fig. 2.

Holotype: Right valve os. 97, UM. Sweden, Västergötland, Kinnekulle core, depth 54.40 m. Red Jonstorp Mudstone.

Remarks: *Kinnekullea waerni* in Sidaravičiene, 1992 (p. 155) should be assigned to *K. thorslundi*. *K. waerni* has a ridge running subparallel to the whole free margin, but in Lithuanian material the ridge developed at the anterior end only, as in *K. thorslundi*.
Occurrence: Vormsi Stage of Estonia and Lithuania; Keila to Nabala and Pirgu stages of Latvia; Jonstorp Formation of Sweden.
Localities. Core sections: Abja — 391.10–392.50; Taagepera — 451.00; Otepää — 422.60–424.20; Kaagvere — 245.30–246.30; over 40 specimens recorded.

Kinnekullea intermedia Gailīte, 1975
Plate 15, fig. 2.

1975 *Kinnekullea intermedia* Gailīte, sp. nov. — Gailīte, pp. 51–52, pl. 2, fig.1.
1992 *Kinnekullea martinssoni* Gailīte — Sidaravičiene, p. 154, pl. 39, fig. 1.

Holotype: Left valve Os 31/309, VNIIMORGEO. Latvia, Bernate core, depth 1020.3 m. Pirgu Stage.
Remarks: According to Gailīte's definition (1975a, p. 52) *K. intermedia* differs from *K. martinssoni* in possessing a sulcus between the ridge and the posterodorsal spine; in *K. martinssoni* the latter two structures are merged. Specimen of *K. martinssoni* figured by Sidaravičiene (1992, pl. 39, fig. 1) seems to agree with the definition of *K. intermedia*.
Occurrence: Pirgu Stage of Estonia; Pirgu and Porkuni stages of Latvia; Pirgu Stage of Lithuania.
Localities. Core sections: Kaagvere — 239.50; Aidu — 153.90–158.30; 3 specimens recorded.

Family Bolliidae Bouček, 1936
Genus *Scanipisthia* Schallreuter and Krůta, 1990

Type species: *Jonesina rectangularis* Troedsson, 1918.
Diagnosis: See Schallreuter and Krůta, 1990.
Remarks: Schallreuter and Krůta (1990) assigned the genus tentatively to Lomatopisthiidae. Since the dimorphism is not observed in the type species, the assignment to Bolliidae, introduced by Gailīte (1970), is maintained.
Occurrence: Harjuan of Baltoscandia; upper Ordovician of Bohemia and Carnic Alps.

Scanipisthia rectangularis (Troedsson, 1918)
Plate 14, fig. 13.

1918 *Jonesina rectangularis* n. sp. — Troedsson, pp. 56–57, fig. 9.
1970 *Bollia mezmalensis* Gailīte, sp. n. — Gailīte, p. 24, pl. 1, fig. 5.
1984 *Bollia mezmalensis* Gailīte — Sarv and Meidla, pp. 10, 14, 19.
1990 *Scanipisthia rectangularis* (Troedsson) — Schallreuter, p. 121, fig. 1.1.
* 1990 *Scanipisthia rectangularis* (Troedsson) — Schallreuter and Krůta, pp. 89–92.

Lectotype: External mould of a right valve No. L02909t, LM. Sweden, Scania, Röstånga. Hirnantian Tommarp Formation.

Occurrence: Porkuni Stage of Estonia, Latvia, north-western Poland; uppermost Ordovician of Sweden, Bohemia and Carnic Alps.
Estonian locality: Taagepera core — 423.80 (1 specimen).

Genus *Harpabollia* Schallreuter, 1990

Type species: *Bollia harparum* Troedsson, 1918.
Diagnosis: See Schallreuter, 1990c, p. 121.
Occurrence: Harjuan of Baltoscandia; upper Ordovician of Bohemia and Carnic Alps.

Harpabollia harparum (Troedsson, 1918)
Plate 15, fig. 3.

1918 *Bollia harparum* n. sp. — Troedsson, p. 55, pl 2, figs 19–20.
1970 *Bollia mezvagarensis* Gailīte, sp. n. — Gailīte, pp. 23–24. pl. 1, fig. 4.
1984 *Bollia mezvagarensis* Gailīte — Sarv and Meidla, pp. 10, 14, 19.
* 1990 *Harpabollia harparum* (Troedsson) — Schallreuter, pp. 122–124, fig. 2.1.

Lectotype: Mould of a left valve no. LO2904T, LM. Sweden, Scania, Röstånga. Hirnantian Tommarp Formation, uppermost Ordovician.
Occurrence: Porkuni Stage of Estonia, Latvia and north-western Poland; Hirnantian Stage of Sweden, Bohemia and Carnic Alps.
Estonian locality: Taagepera — 411.00–419.00 core (15 specimens).

Genus *Ulrichia* Jones, 1890

Type species: *Ulrichia conradi* Jones, 1890.
Diagnosis: See Jones, 1987, p. 82.
Occurrence: Ordovician of Baltoscandia; middle Ordovician of England and Wales; Devonian of North America.

Ulrichia lauta Gailīte, 1971
Plate 15, fig. 5.

1971 *Ulrichia lauta* Gailīte, sp. n. — Gailīte, pp. 45–46, pl. 2, fig. 4.
1982 *Ulrichia lauta* Gailīte — Gailīte in Ulst *et al.*, 1982, p. 121.

Holotype: Left valve Os 31/413, VNIIMORGEO. Latvia, Priekule core, depth 1398.9 m. Pirgu Stage.
Occurrence: Vormsi and Pirgu stages of Estonia; Pirgu Stage of Latvia.
Localities. Core sections: Pärnu — 307.20; Laiamäe — 30.20; Ruskavere — 116.30–119.50; 5 specimens recorded.

Genus *Klimphores* Schallreuter, 1966

Type species: *Klimphores planus* Schallreuter, 1966.

Diagnosis: See Schallreuter, 1966b, p. 394.
Occurrence: Viruan and Harjuan of Baltoscandia; middle Ordovician of France and England and Wales.

Klimphores minimus (Sarv, 1956)
Plate 15, fig. 4.

1956 *Parulrichia minima* sp. n. — Sarv, pp. 38–39, pl. 1, figs 17–18.
1966 *Ulrichia litwiensis* Neckaja, sp. n. — Neckaja, p. 37, pl. 6, fig. 9.
1990 *Klimphores minimus* (Sarv) — Meidla and Sarv, p. 69, pl. 8, fig. 6.
* 1992 *Klimphores minimus* (Sarv) — Sidaravičiene, p. 160, pl. 39, figs 9–11, pl. 40, fig. 1.

Holotype: Right valve Os 2001, IGT. Estonia, East Viru County, Oandu. Oandu Stage.
Occurrence: ?Keila and Oandu to Nabala stages of Estonia; Keila to Rakvere stages of Latvia; Keila to Nabala stages of Lithuania and north-western Byelorussia; Kukruse to Vormsi stages of northern Poland; erratic boulders in Germany.
Localities. Core sections: Orjaku — 132.40; Laiamäe — 92.40–93.00; Vinni — 43.25–44.10; Pärnu — 327.50–328.00; Viljandi — 327.80; Laeva — 233.80–236.90; Abja — 399.10–404.30; Taagepera — 459.00–466.40 (467.40?); Otepää — 431.45 (440.00?); over 250 specimens recorded.

Klimphores digitatus (Neckaja, 1958)
Plate 15, fig. 6.

1958 *Ulrichia digitata* Neckaja, sp. n. — Neckaja, pp. 254–255, pl. 3, fig. 10.
* 1992 *Klimphores digitatus* (Neckaja) — Sidaravičiene, p. 161, pl. 40, figs 2–3.

Occurrence: Nabala and Pirgu stages of Estonia; Vormsi Stage of Latvia.
Localities. Core sections: Pärnu — 316.20–318.00; Laeva — 181.80; Ruskavere — 96.40 (93.75?); over 20 specimens recorded.

Klimphores simplex (Neckaja, 1958)
Plate 15, fig. 7.

1958 *Ulrichia simplex* Neckaja, sp. n. — Neckaja, pp. 253–254, pl. 3, fig. 11.
* 1992 *Klimphores simplex* (Neckaja) — Sidaravičiene, pp.161–162.

Occurrence: Keila, Rakvere to Nabala and ?Pirgu stages of Estonia; Idavere to Keila stages of Latvia (cf.); Kukruse to Jõhvi stages of Lithuania and north-western Byelorussia; Idavere Stage of north-western Russia; erratic boulders in Germany.
Localities. Core sections: Puhmu — 136.80; Vinni — 15.50; ? Viljandi — 291.30; ? Aidu — 145.50; ? Abja — 402.40; ? Taagepera — 453.50–461.00; 8 specimens recorded.

Klimphores bimembris Gailīte, 1971
Plate 15, fig. 8.

1971 *Klimphores bimembris* Gailīte, sp. n. — Gailīte, pp. 39–41, pl. 1, fig. 1.

* 1992 *Klimphores bimembris* (Gailīte) — Sidaravičiene, p. 161, pl. 40, fig. 4.

Occurrence: Keila Stage of Estonia; Uhaku to Nabala stages of Latvia; Kukruse to Jõhvi and ?Keila stages of Lithuania and north-western Byelorussia.
Localities. Core sections: ? Abja — 412.80; Taagepera — 469.80; over 10 specimens recorded.

Klimphores holdrensis Gailīte, 1971
Plate 15, fig. 9.

1971 *Klimphores holdrensis* Gailīte, sp. n. — Gailīte, p. 42, pl. 1, fig. 4.
? * *Klimphores* ex gr. *holdrensis* Gailīte — Sidaravičiene, pp. 162–163, pl. 40, figs 8–9.
* 1992 *Klimphores holdrensis* Gailīte — Sidaravičiene, p. 162, pl. 40, figs 6–7.

Holotype: Left valve Os 31/405, VNIIMORGEO. Latvia, Holdre core, depth 484–485 m. Pirgu Stage.
Remarks: *K. holdrensis* in Sidaravičiene, 1992 and *K.* ex gr. *holdrensis* Sidaravičiene, 1992 have successive stratigraphical ranges. The specimens from the same stratigraphical intervals in Estonia could be regarded as conspecific.
Occurrence: Rakvere and Vormsi stages of Estonia; Oandu to Pirgu stages of Latvia, Lithuania, north-western Byelorussia; Oandu and Rakvere stages of north-eastern Poland.
Localities. Core sections: Vodja H-190 — 115.80; Vinni — 31.90; 2 specimens recorded.

Klimphores plienkalnensis Gailīte, 1971
Plate 15, fig. 10.

1971 *Klimphores plienkalnensis* Gailīte, sp. n. — Gailīte, pp. 41–42, pl. 1, fig. 3.
1982 *Klimphores plienkalnensis* Gailīte — Gailīte in Ulst *et al.*, pp. 122, 126.

Holotype: Carapace Os 31/403, VNIIMORGEO. Latvia, Plienkalne core, depth 917–198 m. Nabala Stage.
Occurrence: Nabala stage of Estonia; Kukruse to Vormsi stages of Latvia.
Localities. Core sections: Orjaku — 103.60; Kaugatuma — 407.70–408.64; Pärnu — 318.00; ? Viljandi — 317.80; Laeva — 224.80–227.10; over 30 specimens recorded.

Genus *Parphores* Schallreuter, 1969

Type species: *Parphores fastigatus* Schallreuter, 1969.
Diagnosis: See Schallreuter, 1969b, p. 354.
Occurrence: Viruan? and Harjuan of Baltoscandia.

Parphores fastigatus Schallreuter, 1969
Plate 15, fig. 12.

1969 *Parphores fastigatus* sp. n. — Schallreuter, pp. 355–356.
? 1992 *Parphores* sp. A — Sidaravičiene, p. 166, pl. 41, figs 7–9.

Holotype: Left valve No. 25/20, MN HUB (?). Sweden, Island of Gotland, north-western coast near Lummelunda's Bruk. Boulder, Harjuan.
Remarks: The range of variation of the species in topotype material (from an erratic boulder) is unknown. The Lithuanian *Parphores* sp. A (Sidaravičiene, 1992) appears to show a considerable range of variation and may even be conspecific with *P. fastigatus*.
Occurrence: Vormsi? and Pirgu stages of Estonia, Lithuania and north-western Byelorussia. Erratic boulders of Gotland in Sweden.
Localities. Core sections: Pärnu — 310.10; Ruskavere — 71.32–116.60; 5 specimens recorded.

Genus *Bullaeferum* Qvale, 1980

Type species: *Ulrichia? tapaënsis* Sarv, 1959.
Diagnosis: See Qvale, 1980, p. 99.
Occurrence: Viruan and Harjuan of Baltoscandia; middle Ordovician of England and Wales.

Bullaeferum tapaënsis (Sarv, 1959)
Plate 15, fig. 11.

1959 *Ulrichia? tapaënsis* sp. n. — Sarv, pp. 181–182, pl. 32, figs 8–12.
1989 *Bullaeferum tapaensis* — Nõlvak *et al.*, p. 90.
* 1992 *Laterophores? tapaënsis* (Sarv) — Sidaravičiene, pp. 164–165, pl. 41, fig. 5.

Holotype: Carapace Os 2570, IGT. Estonia, West Viru County, Tõrma quarry. Nabala Stage.
Occurrence: Nabala to Pirgu stages of Estonia, Lithuania. Rakvere to Pirgu stages of Latvia; Pirgu Stage of Pskov region (Russia), erratic boulders in Germany.
Localities. Core sections: Orjaku — 100.00–102.40; Moe — 40.80–48.80; Laiamäe — 62.50; Vinni — 15.50–21.40; Kaugatuma — 354.60–408.64; Pärnu — 284.70 (274.20?)–314.40; Viljandi — 311.00–312.50; Aidu — 114.00–155.00; Ruskavere — 96.40–119.50; outcrops: Turvaste; Tõrma; Lohu; Moe-1; over 140 specimens recorded.

Superfamily Aechminacea Bouček, 1936
Family Aechminidae Bouček, 1936
Genus *Crescentilla* Barrande, 1872

Type species: *Crescentilla pugnax* Barrande, 1872.
Diagnosis: See Jones, 1987, p. 85.
Occurrence: Middle and upper Ordovician of Bohemia; middle Ordovician of England and Wales; upper Ordovician of Thuringia; Viruan and ?Harjuan of Baltoscandia.

Crescentilla? *baltica* Neckaja, 1966
Plate 16, fig. 1.

1966 *Crescentilla baltica* Neckaja, sp. n. — Neckaja, pp. 18–19, pl. 5, figs 4, 8.
1987 *Crescentilla*? *baltica* Neckaja — Jones, p. 85.

Holotype: Right valve No. 157–32, VNIGRI. Lithuania, Vilnius R-1 core, depth 242.0 m. Rakvere stage.
Remarks: The assignment of this species to *Crescentilla* has been questioned by Jones (1987).
Occurrence: Rakvere to Nabala stages of Estonia; Rakvere Stage of Lithuania.
Localities. Core sections: Orjaku — 117.70–124.10; Puhmu — 106.00; 5 specimens recorded.

Genus *Aechmina* Jones et Holl, 1869
(Syn. *Antiaechmina* Schallreuter, 1968)

Type species: *Aechmina cuspidata* Jones et Holl, 1869.
Diagnosis: See Benson et al., 1961, p. 127.
Remarks: In the type species of *Aechmina*, *A. cuspidata* Jones et Holl, 1869, a prominent spine is located antero- to centrodorsally (see Benson *et al.*, 1961, fig. 61.1). Since the position of the adductor muscle field is not reflected in the external morphology, it is hardly possible do determine the position of the spine relative to S2 (see also Schallreuter, 1968a, p. 254), but the distinction of *Aechmina* and *Antiaechmina* Schallreuter, 1968 is based on this very feature. However, the location of the spine anterior of the midlenght by the type species of *Aechmina* suggests, that it could be located anterior of S2 and, accordingly, that *Antiaechmina* could be a junior synonym of *Aechmina*.

Aechmina groenwalli Troedsson, 1918
Plate 16, fig. 2.

1918 *Aechmina grönwalli* n. sp. — Troedsson, pp. 52–53, 93, pl. 2, figs 14–15.
1966 *Aechmina* aff. *bovina* Jones — Neckaja, p. 26, pl. 4, fig. 1.
1970 *Aechmina ciecerensis* Gailīte, sp. n — Gailīte, pp. 20–21, pl. 1, fig. 1.
1984 *Aechmina ciecerensis* Gailīte — Sarv and Meidla, pp. 10, 14, 19.
1985 *Aechmina ciecerensis* Gailīte — Sztejn, pp. 56–57.
? 1973 *Aechmina maccormicki* n. sp. — Copeland, pp. 19–20; pl. 1, fig. 8, pl. 3, figs 5–7.

Type specimen: Troedsson (1918) did not select a holotype. A complete left valve LO 2399T (LM) figured by Troedsson (1918, pl. 2, fig. 15), is herein proposed as a lectotype. The specimen comes from Röstånga, locality III i (*ibid.* p. 14–17), from *Staurocephalus* beds, uppermost Jerrestad Stage according to Jaanusson, 1963.
Diagnosis: Carapace elongate-oval, subamplete or slightly preplete, moderately convex. Dorsal margin straight, no distinct dorsum developed. Both ends and ventral margin rounded. Prominent dorsal, posterolaterally curved spine is located in front to midlenght of each valve and projects far beyond the dorsal margin. Surface smooth.

Dimensions in mm:	Length	Height	
Lectotype, LO2899 (LM)	0.98	0.48+	(dorsal part embedded in the rock)
Left valve Os 31/300 (IG, Riga)	2.3	1.1	(according to Gailite, 1970)
Carapace Os 31/301 (IG, Riga)	2.0	0.9	(according to Gailite, 1970)
Right valve Os 3449	0.75	0.40	(without spine)

The lectotype is apparently a preadult specimen, because considerably larger specimens are known from Latvia.

Occurrence: Porkuni Stage of Estonia, Latvia, Lithuania, and north-eastern Poland, uppermost Jerrestad and Hirnantian stages of Sweden (Scania, Västergötland).

Localities. Core sections: Abja — 366.30; Taagepera — 411.00–423.80; 6 specimens recorded.

Genus *Pseudulrichia* Schmidt, 1941

Type species: *Leperditia bivertex* Ulrich, 1879.

Diagnosis: See Schallreuter, 1968a, p. 251.

Occurrence: Viruan and Harjuan of Baltoscandia; middle and upper Ordovician of Bohemia, England and Wales, France and North America.

Pseudulrichia ? *tubulata* (Neckaja, 1966)

Plate 16, fig. 3.

1966 *Parulrichia* ? *tubulata* Neckaja, sp. n. — Neckaja, pp. 32–33, pl. 5, figs 5, 10.

* 1992 *Pseudulrichia tubulata* (Neckaja) — Sidaravičiene, p. 167, pl. 42, figs 1–3.

Holotype: Carapace No. 157–35, VNIGRI. Lithuania, Vilnius R-1 core, depth 264 m. Saaremõisa Stage (=undivided Nabala to Pirgu Stages).

Remarks: Sztejn (1985) and Sidaraviciene (1992) assigned this species to *Pseudulrichia*, although it lacks another spine in the dorsal region of the valve.

Occurrence: Oandu to Nabala stages of Estonia; Keila to Vormsi stages of Lithuania; Oandu to Pirgu stages of north-western Poland; Molodovo Formation of Podolia.

Localities. Core sections: Kaugatuma — 388.40–407.70; Pärnu — 318.30–327.70; Viljandi — 327.80; Taagepera — 459.00–466.40; over 15 specimens recorded.

Pseudulrichia disputabile Sidaravičiene, 1975

Plate 16, fig. 4.

1970 *Pseudulrichia norvegica* Henningsmoen — Gailīte, p. 25, pl. 1, fig. 7.

1975 *Pseudulrichia disputabile* Sidaravičiene, sp. n. — Sidaravičiene, pp. 31–32, pl. 5, fig. 1.

1992 *Pseudulrichia disputabile* Sidaravičiene — Sidaraviciene, p. 168, pl. 54, figs 8–10.

Holotype: Carapace No. 13–60/1, LitNIGRI. Lithuania, Paroveja core, depth 767.9 m. Porkuni Stage.

Occurrence: Porkuni Stage of Estonia, Latvia and Lithuania.

Localities. Core sections: Abja — 366.30; Taagepera — 420.90; 4 specimens recorded.

Family Circulinidae Neckaja, 1966
Genus *Pyxion* Thorslund, 1948

Type species: *Primitia carinata* Hadding, 1913.
Diagnosis: See Sidaravičiene, 1992, p. 190.
Occurrence: Viruan of Baltoscandia.

Pyxion nitidum Sarv, 1963
Plate 16, figs 5–6.

1963 *Pyxion nitidum* sp. n. — Sarv, pp. 181–182, pl. 6. figs 9–17.
* 1992 *Pyxion nitidum* Sarv — Sidaravičiene, p. 191.

Occurrence: Idavere to Keila and ?Oandu stages of Estonia; Idavere to Keila stages of Latvia; Idavere to Jõhvi stages of Lithuania and north-western Byelorussia.
Estonian locality: Orjaku core — 133.70–135.60; over 110 specimens recorded.

Pyxion rakverensis Meidla, 1986
Plate 16, fig. 7.

1986 *Pyxion rakverensis* sp n. — Meidla, pp. 16–17, pl. 4, figs 8–12.

Holotype: Carapace Os 3041, IGT. Estonia, East Viru County, Piilse. Rakvere Stage.
Occurrence: Rakvere Stage of Estonia.
Localities. Core sections: Orjaku — 113.30–117.70; ? Förby — 17.40; Laiamäe — 85.70; Vinni — 33.40–40.00; Mäetaguse — 17.10; outcrops: Ussimägi — 1.75; Paekna — 2.30; Moonaküla; Rägavere; Piilse; over 150 specimens recorded.

Genus *Vogdesella* Baker, 1924
(Syn: *Parapyxion* Jaanusson, 1957, ?*Pariconchoprimitia* Schallreuter, 1980)

Type species: *Jonesella obscura* Ulrich, 1894.
Diagnosis: See Jones, 1987, p. 97.
Remarks: Schallreuter (in 1968a and subsequent papers) regarded *Parapyxion* to be a junior synonym of *Vogdesella*.

The relationship between *Vogdesella* and *Pariconchoprimitia* is unclear. Difficulties to differentiate these genera have been mentioned by Jones (1987, p. 92) also. A great similarity between the type species of *Pariconchoprimitia, P. conchoides*, and *Vogdesella subovata* in Schallreuter, 1980c should be mentioned. In some specimens of *P. conchoides* (Schallreuter, 1980c, pl. 7, fig. 2) a round adductor muscle spot can be recognized in the same position as in *V. subovata* and occasionally it occurs in a shallow depression (pl. 6, fig. 2). The internal features of these species are almost identical, only minor outline differences occur between the specimens identified as *conchoides* (pl. 8, fig. 4) or *subovata* (pl. 7, fig. 6). Although the L/H-ratios (Schallreuter, 1980c, figs 2, 3 and tabs. 3, 4) suggest the presence of two more or less distinct groups (=species?; L/H 1.34–1.41 by *V. subovata* and 1.39–1.53 by *P. conchoides*), the distinction of the genera and the validity of the genus *Pariconchoprimitia* appears to be questionable.

Occurrence: Viruan of Baltoscandia; middle Ordovician of France, England and Wales, North America.

Vogdesella subovata (Thorslund, 1948)
Plate 16, figs 9–10.

1948 *Primitia subovata* n. sp. — Thorslund, p. 365, pl. 20, fig. 5.
* 1980 *Vogdesella subovata* (Thorslund) — Schallreuter, pp. 14–16, pl. 5, figs 4–5, pl. 7, figs 5–7.
1982 *Parapyxion subovatum* (Thorslund) — Gailīte in Ulst *et al.*, pp. 121, 126 etc.
1992 *Parapyxion subovatum* (Thorslund) — Sidaravičiene, p. 172, pl. 43, figs 3–4.

Holotype: Left valve Vg 17, UM. Sweden, Västergötland, Kullatorp core, depth 77.42 m. Upper Dalby Mudstone.
Occurrence: Keila Stage of Estonia; Keila to Nabala stages of Latvia; Dalby Formation and Sularp Shale of Sweden.
Localities. Core sections: Abja — 411.30 (409.50?); Taagepera — 467.80; nearly 100 specimens recorded.

Vogdesella sp. n.
Plate 16, figs 11–12.

Description: Like *V. subovata*, but differing in having more distinct dorsal nodes; the anterior node round, high, with poorly defined bend-like extension which disappears gradually mid-anteriorly. The posterior node is higher than the anterior one, distinct (except at the posterior margin), elongate, almost parallel to the dorsal margin. Surface smooth.
Occurrence: Porkuni Stage of Estonia.
Locality: Pärnu core — 241.90–242.60 (7 specimens).

Genus *Orechina* Krůta, 1968

Type species: *Orechina punctata* Krůta, 1968.
Diagnosis: See Schallreuter and Krůta, 1987, p. 58.
Occurrence: Viruan and Harjuan of Baltoscandia; middle and upper Ordovician of Bohemia.

Orechina procera Schallreuter, 1980
Plate 16, fig. 8.

? 1975 *Parapyxion bernatiensis* Gailīte, sp. nov. — Gailīte, pp. 63–64, pl. 1, fig. 6.
1980 *Orechina procera* sp. n. — Schallreuter, p. 17, pl. 8, figs 1–3.
* 1987 *Orechina procera* Schallreuter — Schallreuter and Krta, p. 61, figs 2.1–2.
? * 1987 *Orechina bernatiensis* (Gailīte) — Schallreuter and Krta, pp. 61–62.
? 1992 *Orechina bernatiensis* (Gailīte) — Sidaravičiene, pp. 168–169, pl. 42, fig. 4.

Holotype of *O. procera* is the right valve No. 2307, GPIH. Sweden, Scania, coast at Gislövshammer. Boulder (Gis29: Schallreuter, 1980c). Viruan.

Remarks. The figured specimen from Estonia (pl. 16, fig. 8) possesses a L/H ratio >1.50, suggesting the assignment to *O. procera*. The sulcus, however, is less distinct than in the type material and resembles more that of *O. bernatiensis*. These two species may easily be conspecific, as mentioned already by Schallreuter and Krůta (1987).
Occurrence: Keila Stage of Estonia; Oandu to Pirgu stages of Latvia; Oandu Stage of Lithuania; Viruan of Sweden (loose boulders).
Estonian locality: Taagepera core — 467.80 (3 specimens).

Genus *Pedomphalella* Swain et Cornell, 1961

Type species: *Pedomphalella intermedia* Swain and Cornell, 1961.
Diagnosis: See Jones, 1987, p. 94.
Occurrence: Viruan of Baltoscandia; middle Ordovician of North America (Minnesota) and England and Wales; erratic boulders in Germany and Gotland.

Pedomphalella egregia (Sarv, 1963)
Plate 17, fig. 2.

1963 *Schmidtella egregia* sp. n. — Sarv, pp. 178–179, pl. 7, figs 1–5.
* 1968 *Pedomphalella egregia* (Sarv) — Schallreuter, pp. 256–258, pl. 2, fig. 2.
1990 *Pedomphalella jonesi* (Krause) — Schallreuter, p. 257, pl. 5, fig. 6.
1990 *Pedomphalella egregia* (Sarv) — Meidla and Sarv, p. 69, pl. 8, fig. 11.
1990 *Pedomphalella egregia* — Hints *et al.*, p. 137 (fig.).
* 1992 *Pedomphalella egregia* — Sidaravičiene, pp. 169–170, pl. 42, fig. 5.

Holotype: Left valve Os 2728, IGT. Estonia, Rakvere. Keila Stage.
Remarks: Schallreuter (1990b, p. 274) regarded *P. egregia* as a synonym of *P. jonesi* (Krause, 1897). Judging from Schallreuter (1968a, p. 258), *P. jonesi* is represented in Krause's collection by a single internal mould. As the exterior morphology of *P. jonesi* is not known, the name should be confined to Krause's specimen.
Occurrence: Idavere to Keila stages of Estonia, Latvia, Lithuania, north-western Russia (Pskov region), north-western Byelorussia and north-eastern Poland; erratic boulders in Germany, Sweden (Gotland) and ?Netherlands.
Estonian localities. Core sections: Orjaku — 133.70–135.60; Virtsu — 225.40; Mäetaguse — 29.50; Laeva — 237.70–239.50; Abja — 418.80; Taagepera — 469.80; Otepää — 446.20; over 40 specimens recorded.

Pedomphalella mica ? Sidaraviciene, 1971

? 1971 *Pedomphalella mica* Sidaravičiene, sp. n. — Sidaravičiene, p. 29, pl. 1, fig. 6.
? 1992 *Pedomphalella mica* Sidaravičiene — Sidaravičiene, p. 170, pl. 42, fig. 7, pl. 56, fig. 7.

Holotype: Left valve No. 13–13/1, Institute of Geology (Vilnius). Lithuania, Paroveja core, depth 831.7 m. Nabala Stage.
Occurrence: Rakvere Stage of Estonia; *Pedomphalelle mica* occurs in the Oandu to Rakvere stages of Lithuania.
Estonian locality: Puhmu core — 136.90 (1 specimen).

Pedomphalella ? sp. n.
Plate 17, figs 3–4.

1983 *Cavellina* ? sp. — Meidla, p. 54 (faunal log).

Description: Carapace high, postplete, convex, dorsal margin (=hinge line) straight, no distinct dorsum. Anterior and posterior margins rounded, the posterior one more widely; ventral margin nearly straight in the middle. Distinct, short elongate swelling present in the posterocentral area of the valve. Central valve area with rare punctae, which are mostly concentrated to the antero- and posterocentral regions.

The structures of the valves are similar to those of *Pseudoancora*, but the valves are high and therefore untypical for Spinigeritidae. The assignment to *Pedomphalella* should be regarded as tentative.

Dimensions of figured specimen, mm:	Length	Height
Right valve Os 3461	0.75	0.46
Carapace Os 3462	0.68	0.45

Occurrence: Vormsi Stage of Estonia.
Estonian locality: Paluküla quarry — 1.40–2.40 (6 specimens).

Genus *Circulinella* gen. n.

Name: Derived from the name of related genus *Circulina.*
Type species: *Circulina nuda* Neckaja, 1966.
Diagnosis: Small, amplete to slightly postplete, dorsal angles >90°. Greatest width and convexity in the dorsal part of the valve, central valve area flattened and may be slightly (indistinctly) depressed. Nonsulcate or with wide, indistinct depression mid-dorsally.
Other species: *Circulinella gailitae* sp. n.
Remarks: Neckaja (1966, pp. 15–16) assigned the type species to *Circulina* Neckaja, 1966, although it lacks a distinct pseudovelum present in *C. fimbriata* Neckaja, 1966 (the type species of the latter genus). From *Conchoprimitiella* Schallreuter, 1980 new genus differs by its characteristic convexity, from *Orechina* Krůta, 1968 and *Vogdesella* Baker, 1924 by the lack of both distinct S2 and cristae.
Occurrence: Viruan and Harjuan of Baltoscandia.

Circulinella nuda (Neckaja, 1966)
Plate 18, figs 11–12.

1966 *Circulina nuda* Neckaja, sp. n. — Neckaja, pp. 15–16. pl. 2, figs 7–10.
non 1970 *Circulina nuda* Neckaja — Gailīte, p. 26, pl. 1, fig. 9.
1990 *Circulina nuda* — Hints *et al.*, p. 137 (fig.).

Holotype: Right (?) valve No. 256–20, VNIGRI. Lithuania, Zhezhmary R-2 core, depth 558.8 m.
Remarks: Neckaja (1966, in the explanation to the plate 2) regarded the holotype to be a left valve. Judging from the photograph of the type specimen made by the author and Dr. L. Sarv in 1984 in Tallinn, the valve appears to be slightly postplete and represents a right one. The postplete outline is demonstrated in the set of paratypes figured by Neckaja (1966, pl. 2, figs 7–9).

The type material from Lithuania is poorly dated (upper Ordovician in the description, pp. 15–16, middle and upper Ordovician on p. 70, table 2 in Neckaja, 1966). Sidaravičiene (1992) did not report conspecific material from Lithuania. In Estonia the species occurs in the Oandu Stage; Latvian material from the uppermost Ordovician is represented by ornamented valves not conspecific with *C. nuda* (see below).

Occurrence: The species is known with certainty from the Keidla and Oandu stages of Estonia. The range in Lithuania requires specification.

Localities. Core sections: ? Orjaku — 133.70; Virtsu — 224.70; Laiamäe — 90.30–93.00; Vinni — 43.25–44.10; outcrops: Saku; Tõrremäe; over 70 specimens recorded.

Circulinella gailitae gen. et sp. n.

Plate 19, figs 1–2.

? 1918 *Primitia* cf. *tolli* Bonnema — Troedsson, p. 52, pl. 2, fig. 13.
? 1970 *Circulina nuda* Neckaja — Gailīte, p. 26, tabl. 1, fig. 9.
? 1982 *Parapyxion nuda* (Neckaja) — Gailīte *in* Ulst *et al.*, p. 121 (table 8).
1984 *Circulina* cf. *nuda* Neckaja — Sarv and Meidla, p. 10 (table 2).
1990 *Circulina* sp. n. — Meidla and Sarv, p. 69, pl. 8, fig. 7.

Holotype: Carapace Os 3204, IGT. Estonia, Taagepera core, depth 419.0 m. Porkuni Stage.

Diagnosis: Small, amplete *Circulinella,* occasionally with an indistinct depression mid-dorsally. Surface reticulate, except for a smooth belt along free margin.

Dimensions in mm:	Length	Height
Holotype, carapace Os 3204	0.60	0.45
Juvenile specimen Os 3205	0.42	0.32

Description: Carapace small, irregularly oval, subamplete. Dorsal margin short, straight, without distinct dorsum. Greatest width and convexity in dorsal part of the valve. Mid-dorsal valve area with an indistinct vertical depression in some specimens. Valve surface reticulate, except for a smooth belt along free margin.

Remarks: The new species resembles *Circulina nuda* Neckaja, 1966, but differs in having comparatively higher, ornamented valves.

The species is poor in diagnostic features. The sculpture is often poorly developed or indistinct and therefore the width of the smooth marginal area is difficult to estimate. The Estonian collection shows a considerable outline variability.

Primitia cf. *tolli* of Troedsson (1918) may be conspecific.

Gailīte (1970) figured a specimen of *Circulina nuda* from the Dreimana core (western Latvia), which differs from the Estonian material by a very high carapace and probably also by the ornamentation of the valve. It is unclear whether this specimen falls into the range of variability of *C. gailitae*. This form occurs in a distinctive assemblage which according to Gailite has been recognized in several core sections of Latvia. Later studies on South Estonian and Latvian material have shown *Circulinella gailitae* to be a typical component of a similar assemblage.

Occurrence: Porkuni Stage of Estonia, Latvia (?) and Lithuania; uppermost Ordovician of Sweden (Västergötland: Meidla, in preparation).

Localities. Core sections: Abja — 364.60; Taagepera — 411.00–423.80; Otepää — 374.40; nearly 20 specimens recorded.

Genus *Easchmidtella* Schallreuter, 1967

Tyep species: *Easchmidtella crassiumbonata* Schallreuter, 1967.
Diagnosis: See Schallreuter, 1967a, p. 626.
Remarks: As in *Pariconchoprimitia* Schallreuter, 1980 (?=*Vogdesella* Baker, 1924), the valves of *Easchmidtella* can be multilamellar, the larger valves retaining 1–2 early instars (see below).
Occurrence: Viruan and Harjuan of Baltoscandia; middle and upper Ordovician of North America.

Easchmidtella fragosa (Neckaja, 1960)
Plate 17, figs 5–6.

1960 *Schmidtella fragosa* Neckaja, sp. n. — Neckaja *in* Abushik *et al.*, p. 286, pl. 58, figs 8–9.
* 1972 *Easchmidtella fragosa* (Neckaja *in* Abushik *et al.*, 1960) — Schallreuter, pp. 142–144, fig. 2.2.
1990 *Easchmidtella fragosa* (Neckaja) — Schallreuter, pp. 257–259, pl. 5, fig. 9.
1990 *Easchmidtella fragosa* — Hints *et al.*, p. 137 (fig.).
* 1992 *Easchmidtella fragosa* (Neckaja) — Sidaravičiene, p. 174, pl. 43, figs 8–9.

Holotype: Right valve No. 3/157, VNIGRI. Western Russia, Pskov region, Porchow R-1 core, depth 420 m. Idavere Stage.
Remarks: Retention of early instars occurs in some specimens. In a carapace (Pärnu core, depth 327.5 m) one valve is bi- and another trilamellar.
Occurrence: Idavere to Nabala stages of Estonia; Idavere to Vormsi stages of Latvia; Jõhvi to Nabala stages of Lithuania; Oandu to Rakvere stages of north-western Poland; erratic boulders in Germany.
Localities. Core sections: Orjaku — 130.50–135.60; Puhmu — 136.80; Laiamäe — 90.30–93.00; Vinni — 42.60–44.10; Mäetaguse — 29.50–29.60; Pärnu — 327.50–328.00; Viljandi — 325.80; Laeva — 235.50–237.70; Abja — 402.40–404.30; Taagepera — 459.00–466.40; Kaagvere — 257.60; outcrops: Tõrremäe; Ussimägi — 1.75–2.10; nearly 300 specimens recorded.

Easchmidtella angulata Sidaravičiene, 1975
Plate 17, fig. 7.

1975 *Easchmidtella angulata* Sidaravičiene, sp. n. — Sidaravičiene, p. 33, pl. 4, fig. 6.
1984 *Easchmidtella angulata* Sidaravičiene — Sarv and Meidla, p. 10.
* 1992 *Easchmidtella angulata* Sidaravičiene — Sidaravičiene, p. 174, pl. 43, figs 6–7.

Holotype: Carapace No. 13–42/1, LitNIGRI. Lithuania, Lapes core, depth 687.0 m. Pirgu Stage.
Occurrence: Vormsi to Pirgu stages of Estonia; Nabala to Pirgu stages of Lithuania.
Localities. Core sections: Orjaku — 77.90–84.80; Haapsalu-203 — 22.20–23.50; outcrops: Paluküla — 0.22–2.10; Prillimäe — 0.70; Moe-1; 15 specimens recorded.

Easchmidtella orbicularis sp. n.
Plate 17, figs 8–10.

1989 *Easchmidtella* sp. n. — Nõlvak *et al.*, pp. 90–91.

Holotype: Carapace Os 2921, IGT. Estonia, Orjaku core, depth 48.7 m. Pirgu Stage.
Diagnosis: Carapace medium-sized, comparatively very high, preplete, with short dorsal margin. Dorsum epicline, indistinct, anterior cardinal angle not developed (very blunt), posterior angle blunt. Left valve overlaps the right valve along the free margin. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 2921	1.33	1.03	0.59
Carapace Os 2922	1.54	1.16	0.64
Carapace Os 2923	1.07	0.83	0.49
Carapace Os 2924	0.77	0.59	0.36
Carapace Os 2962	1.48	1.15	0.65

Description: Carapace medium-sized, relatively very high, almost round, preplete. Dorsal margin short, dorsum epicline, indistinct. Anterior cardinal angle indistinct (very blunt), dorsal margin merges fluently with the free margin anteriorly; posterior cardinal angle is more distinct. The ends and ventral margin of the carapace rounded. Left valve is larger than the right, slightly overlapping along the free margin. Surface of the valves smooth. Carapace outline varies slightly.
Remarks: The new species differs from *Arpaschmidtella abnormis* (Sidaravičiene, 1975) (=*E. flexilis* Abushik et Sarv, 1983) by its asymmetrical ends, from *E. crassiumbonata* Schallreuter, 1967, by the flatly arched dorsal margin. From *E. fragosa* (Neckaja, 1960) and *E. lata* (Neckaja, 1960) this species differs by the absence of distinct cardinal angles. In addition, *E. orbicularis* sp. n. reaches a considerably greater size than all species, mentioned above.
Occurrence: Pirgu to Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia).
Localities. Core sections: Orjaku — 48.70–58.30; Haapsalu-203 — 22.20–33.20; Virtsu — 158.50; Puhmu — 38.50–39.70; Kaugatuma — 343.85; Aidu — 110.00–131.50; outcrops: Lohu; Pirgu; Röa–Jakobi; Seli–Metsküla; Seli–Russalu; Siuge; over 140 specimens recorded.

Genus *Arpaschmidtella* nom. nov.
(Syn. *Paraschmidtella* Sidaravičiene, 1992, **non** Swartz, 1936)

Type species: *Parapyxion abnormis* Sidaravičiene, 1975.
Diagnosis: See Sidaravičiene, 1992, p. 174.
Remarks: The new name is derived as an anagram of the preoccupied name *Paraschmidtella*.
Occurrence: Viruan and Harjuan of Baltoscandia; Molodovo Formation of Podolia.

Arpaschmidtella abnormis (Sidaravičiene, 1975)
Plate 17, fig. 1.

1975 *Parapyxion abnormis* Sidaravičiene, sp. n. — Sidaravičiene, pp. 32–33, pl. 5, figs 2–3.
1983 *Easchmidtella flexilis* sp. n. — Abushik and Sarv, pp. 14–115, pl. 4, figs 1–3.

1992 *Paraschmidtella abnormis* (Sidaravičiene) — Sidaravičiene, p. 175, pl. 43, fig. 10, pl. 56, fig. 8.

Holotype: Carapace No. 13–41/1, LitNIGRI. Lithuania, Lapes core, depth 675.6 m. Pirgu Stage.

Occurrence: Rakvere to Porkuni stages of Estonia; Nabala to Pirgu stages of Lithuania; Molodovo Formation of Podolia.

Localities. Core sections: Orjaku — 61.00–120.50; Förby — 18.70; Moe — 11.20–64.20; Puhmu — 69.30–115.40; Vinni — 15.50–38.50; Mäetaguse — 9.90–21.10; Pärnu — 315.10–320.80; Aidu — 140.50–186.10; Ruskavere — 116.40–131.70; Abja — 392.10; Kaagvere — 245.80–249.00; outcrops: Paekna — 0.40–2.70; Moonaküla; Rägavere; Piilse; Sutlema; Nõmmeküla; Permisküla; Paope — 0.85–1.20; Sutlepa; Porkuni; over 120 specimens recorded.

Family Spinigeritidae Schallreuter, 1980.

Genus *Pseudoancora* Sidaravičiene, 1979

(Syn. *Ancora* Sidaravičiene, 1975, **non** Labbe, 1899; ?Syn. *Eocytherella* Bonnema, 1933)

Type species: *Rectella confragosa* Gailīte, 1970.

Diagnosis: See Sidaravičiene, 1992, p. 177.

Remarks: Schallreuter (1980c, p. 18) treated *Pseudoancora* as a synonym of *Eocytherella* Bonnema, 1933. The latter genus and its type species are incompletely known and need to be redescribed.

Occurrence: Viruan and Harjuan of Baltoscandia.

Pseudoancora confragosa (Gailīte, 1970)

Plate 17, fig. 13.

1970 *Rectella confragosa* Gailīte, sp. n. — Gailīte, p. 27, pl. 1, figs 10a, b.

* 1992 *Pseudoancora confragosa* (Gailīte) — Sidaravičiene, p. 177, pl. 44, figs 6–7.

Holotype: Carapace Os 31/308, VNIIMORGEO. Latvia, Adze core, depth 841 m. Porkuni Stage.

Remarks: Gailīte (1970) stated the lateral surface of this species to be smooth. The Estonian material is rarely and indistinctly pitted and the same sculpture can with some difficulty be recognized in Latvian (Gailīte, 1970, fig. 10a) and Lithuanian (Sidaravičiene, 1992, pl. 44, fig. 6) material.

Occurrence: Porkuni Stage of Estonia, Latvia and Lithuania. Conspecific material has been recognized also at Borenshult in Västergötland (Sweden; Meidla, in preparation).

Estonian locality: Taagepera core — 419.00 (over 10 specimens).

Pseudoancora parovina (Sidaravičiene, 1975)

Plate 17, fig. 12.

1975 *Ancora parovina* Sidaravičiene, sp. n. — Sidaravičiene, pp. 34–35, pl. 5, figs 4–5.

? 1975 *Primitiella ansiensis* Gailīte, sp. n. — Gailīte, pp. 64–65, pl. 1, fig. 7.

? 1982 *Primitiella ansiensis* Gailīte — Gailīte *in* Ulst *et al.*, p. 121

1992 *Pseudoancora parovina* Sidaravičiene — Sidaravičiene, p. 177, pl. 44, figs 8–10.

Holotype: Right valve No. 13–14/1, LitNIGRI. Lithuania, Paroveja core, depth 839.4 m. Oandu Stage.
Remarks: *Primitiella ansiensis* (Gailīte, 1975) is apparently assignable to *Pseudoancora*. The description of this species agrees roughly with the description of *P. parovina* and the stratigraphical ranges of these two species are partly overlapping. In order to clarify the relationship of these forms a comparative study is needed. The Estonian material shows a great variability in the outline and heigth of both anterior and posterior elevations of the lateral surface, but it may turn out to be heterogeneous.
Occurrence: Keila? and Oandu to Pirgu stages of Estonia; Keila to Vormsi stages of Latvia (?); Keila? and Oandu to Rakvere stages of Lithuania.
Localities. Core sections: Orjaku — 130.50; Vinni — 37.70; Kaugatuma — 392.20 (382.70?)–402.50; Pärnu 310.10–327.70; Ruskavere — 115.75; Aidu — 183.60; Taagepera — 466.40 (467.40?); Otepää — 431.45; Kaagvere — 245.80; over 50 specimens recorded.

Genus *Spinigerites* Schallreuter, 1980

Type species: *Primitiella? spiniger* Lindström, 1953.
Diagnosis: See Schallreuter, 1980c, p. 18.
Remarks: *Spinigerites* is closely related to *Pseudoancora* Sidaravičiene (?=*Eocytherella* Bonnema, 1933). In some cases specimens assigned here to *P. parovina* have a very short posterior elevation on the valve which appears to possess a blunt, spine-like extension.
Occurrence: Viruan and Harjuan of Baltoscandia; middle Ordovician of England and Wales; upper Ordovician of North America.

Spinigerites spiniger Lindström, 1953
Plate 17, fig. 11.

1953 *Primitiella? spiniger* n. sp. — Lindström, pp. 131, 141–143, 147, pl. 1, fig. 9.
* 1980 *Spinigerites spiniger* Lindström — Schallreuter, pp. 19–21, pl. 5, fig. 3, pl. 9, figs 1–4.

Holotype: Heteromorphic juvenile valve No. LO 3529T, LU. Sweden, Scania, Fågelsång, locality E55 (Lindström, 1953, p. 130).
Occurrence: Rakvere to Nabala stages of Estonia.
Localities. Core sections: Orjaku — 119.40; ? Virtsu — 207.40; Otepää — 428.90; Moonaküla quarry; 10 specimens recorded.

Suborder Leiocopa Schallreuter, 1973
Superfamily Aparchitacea Jones, 1901
Family Aparchitidae Jones, 1901
Genus *Baltonotella* Sarv, 1959
(Syn.: *Brevidorsa* Neckaja, 1973)

Type species: *Macronotella kuckersiana* Bonnema, 1909.
Diagnosis: Carapace circular to oval, with short hinge line, evenly convex. Contact margin straight. Dorsum indistinct, may be symmetrical or slightly asymmetrical, in the latter case dorsum of the left valve projects slightly beyond that of the the right valve. Right valve

overlaps the left valve along the free margin. Left valve may bear an admarginal structure in the form of a frill or a row of denticles or spines. Lateral surface smooth or pitted. Adductor muscle scar, if present, appears as a smooth area on the valve.

Remarks: Vannier *et al.*, 1989 referred four Baltoscandian ostracode genera to Aparchitidae, among them *Baltonotella* Sarv, 1959 and *Brevidorsa* Neckaja, 1973. Neckaja (1973, p. 19), in the description of *B. sarvi*, distinguished the genera *Baltonotella* and *Brevidorsa* in first hand by differences in the outline. Sidaravičiene (1992) mentioned the presence of an admarginal ridge or denticles on the left valve of *Brevidorsa* and possible differences in the morphology of the dorsum, but on the basis of these features the genera seem to be difficult to distinguish. Williams and Vannier (1993) demonstrated the presence of minute admarginal denticles in *B. elegans* (Harris, 1957), not documented by Harris (1957). Sidaravičiene (1992, p. 179) mentioned the variability of the admarginal area in *B. ledaia* and stated the occasional presence in this species of admarginal left valve structures anteroventrally. Thus, the distinction of these two genera is controversial and requires further study. Williams and Vannier (1995) referred species from both Sidaravičiene's groups to *Baltonotella*. In this paper *Brevidorsa* is regarded as a synonym of *Baltonotella*.

Occurrence: Ordovician of Baltoscandia, Bohemia and North America.

Baltonotella ledaia Sidaravičiene, 1975

Plate 18, fig. 1.

1975 *Baltonotella*? *ledaia* Sidaravičiene, sp. n. — Sidaravičiene, p. 24, pl. 2, figs 1, 2.
1984 *Baltonotella ledaia* Sidaravičiene — Sarv and Meidla, p. 10.
1989 *Baltonotella ledaia* — Nõlvak *et al.*, pp. 90–91.
1990 *Baltonotella ledaia* — Meidla *et al.*, p. 135 (fig.).
1992 *Brevidorsa ledaia* (Sidaravičiene) — Sidaravičiene, p. 178, pl. 44, fig. 13, pl. 45, fig. 10, pl. 46, figs 1, 2.

Holotype: Carapace No. 13–37/1, LitNIGRI. Lithuania, Lapes core, depth 693.5 m. Vormsi Stage.

Occurrence: Rakvere to Pirgu stages of Estonia and Lithuania, Pirgu Stage of Pskov region (Russia).

Localities. Core sections: Orjaku — 81.40–107.80; Vodja H-190 — 106.30; Moe — 46.00–52.00; Puhmu — 86.70–115.40; Laiamäe — 29.20; Vinni — 21.40–27.20; Kaugatuma — 361.10–371.33; Pärnu — 298.20–309.10; Aidu — 125.70–175.00; Laeva — 180.60–230.40; Ruskavere — 72.10–120.10; Abja — 385.00–390.85; Taagepera — 442.50–446.10; Otepää — 417.40; Kaagvere — 238.00–249.00; Prillimäe outcrop — 0.70; over 100 specimens recorded.

Baltonotella mistica Sidaravičiene, 1992

Plate 18, fig. 2.

? 1962 *Baltonotella* cf. *kiesowii* (Steusloff) — Sarv, pp. 132–133, pl. 9, figs 7–11 (*partim*?)
? 1973 *Brevidorsa sarvi* (nom. nov. for *Baltonotella* cf. *kiesowii* in Sarv, 1962) — Neckaja, p. 19.
1984 *Baltonotella kiesowii* (Steusloff) — Sarv and Meidla, p. 10.
1990 *Baltonotella mistica* — Meidla *et al.*, p. 135 (fig.) (*nomen nudum*).
1992 *Baltonotella mistica* Sidaravičiene — Sidaravičiene, pp. 181–182, pl. 46, figs 3–5.

Holotype: Carapace No. 13–36/1, LitNIGRI. Lithuania, Liedai core, depth 834.8 m. Pirgu Stage.
Remarks: *B. sarvi* (Neckaja, 1973) is similar to *B. mistica*; the main difference seems to be the size. According to Sidaravičiene (1992, p. 181) the length of *B. mistica* may reach up to 1.75 mm, but the lenght of the measured specimens of *B. sarvi* (Sarv, 1962, p. 133) may reach up to 3.0 mm. If the Lithuanian material belongs to juvenile stages, these species may be conspecific. The other differences are apparently restricted to the variation of the ornamentation.
Occurrence: Rakvere to Porkuni stages of Estonia; Rakvere to Pirgu stages of Lithuania.
Localities. Core sections: Orjaku — 57.40 (107.80?); Förby — 17.40 (5.00?)–21.70 (25.20?); Haapsalu-203 — 37.40–63.15; Vodja H-190 — 106.30; Puhmu — 90.70–137.80; Laiamäe — 41.90 (29.20?)–41.90; Kaugatuma — 346.75–408.05; Pärnu — 300.00–316.20 (318.00?); Viljandi — 308.20–311.70; Aidu — 177.00; Laeva — 194.70 (181.80?)–230.70; Ruskavere — 65.30–120.10; Abja — 385.00–390.60; Taagepera — 448.80–459.40; Otepää — 417.40–431.45 (440.00?); Kaagvere — 204.85–256.70; outcrops: Turvaste; ?Tõrma; Sutlepa; Urge; Tapa; Moe-2; ? Põriki; Iida; Siuge; over 220 specimens recorded.

Baltonotella limbata Sidaravičiene, 1975
Plate 18, fig. 3.

1973 *Hyperchilarina* sp. A — Schallreuter, pp. 45–46, fig. 5A.
1975 *Baltonotella*? *limbata* Sidaravičiene, sp. n. — Sidaravičiene, p. 23, pl. 1, figs 1–3.
1984 *Baltonotella limbata* Sidaravičiene — Sarv and Meidla, p. 10.
1989 *Hyperchilarina limbata* — Nõlvak *et al.*, p. 90.
* 1992 *Brevidorsa limbata* (Sidaravičiene) — Sidaravičiene, p. 178, pl. 44, figs 11–12.

Holotype: Carapace No. 13–38/1, LitNIGRI. Lithuania, Lapes core, depth 692.8 m. Vormsi Stage.
Occurrence: Oandu? and Rakvere to Porkuni stages of Estonia; Oandu to Pirgu stages of Lithuania; Pirgu Stage of Pskov region (Russia), erratic boulders on Gotland, Sweden.
Localities. Core sections: Orjaku — 59.80–75.90; Förby — 5.00–21.70; Vodja H-190 — 106.30–113.40; Vodja H-191 — 107.75; Puhmu — 43.70–137.80; Kaugatuma — 345.38–386.60; Pärnu — 315.70–318.30 (327.70?); ? Viljandi — 327.80; Aidu — 116.00–134.50; Ruskavere — 63.85–119.50; Abja — 376.50; Taagepera — 456.30; outcrops: Tõrma; Paope — 0.10–0.40; Sutlepa; Kohila-1; Prillimäe — 0.30–1.10; Moe-2; Põriki; Moe-1; Porkuni; over 80 specimens recorded.

Genus *Longidorsa* Schallreuter, 1985
(Syn.: *Tschingizella* Melnikova, 1986)

Type species: *Longidorsa rectelloides* Schallreuter, 1985.
Diagnosis (modified from Schallreuter, 1985c): Elongate, amplete to slightly preplete. Hinge margin straight and relatively long. Unevenly convex, the greatest width somewhat posteroventrally of the center. Right valve evenly overlaps the left valve along the free margin; no bow-shaped projection. Bend- or ridge-like structure may be present near the free margin, on one or both valves, continuous or discontinuous, parallel to the free margin. Surface smooth.
Other species: ? *Brevibolbina*? *porkuniensis* Stumbur, 1956; *Tschingizella bakanasensis* Melnikova, 1986; *Longidorsa*? sp.: Schallreuter, 1993 (pl. 6, fig. 1); *Longidorsa*? sp. n. A:

Schallreuter, 1994; *Longidorsa*? sp.: Schallreuter, 1994; *Longidorsa humilis* sp. n.; *Longidorsa*? *baltica* sp. n.

Remarks: *Tschingizella* Melnikova, 1986 is apparently a synonym of *Longidorsa* Schallreuter, 1985. Both types are similar in the outline, convexity and overlap, and differences occur only in the morphology of the admarginal area, where a ridge- or bend-like structure may be present. Schallreuter (1985c, p. 34) referred to this structure as stop-ridges, as in Rectellidae, but in a more recent paper (Vannier *et al.*, 1989) he assigned the genus to Aparchitidae (like Melnikova, 1986 also).

When establishing the genus *Tschingizella* (=*Longidorsa*), Melnikova termed the inflation at the greatest width and convexity of the carapace the "cruminal inflation" (*kruminal'noe vzdutie*: Melnikova, 1986, p. 48–49). The terms "cruminal" and "crumina" is a term for a distinctive domiciliar dimorphic structure (Jaanusson, 1957; Benson *et al.*, 1961; Ivanova, 1979; etc.). A true crumina differs from the characteristic, non-dimorphic convexity of the valves of *Longidorsa* morphologically and probably also functionally.

Primitia porkuniensis Stumbur, 1956 resembles *Longidorsa* in general features (shape, convexity, overlap), but differs in having indistinct S2 and preadductorial node, and a prominent spine on the posteroventral area in both valves (in the area of maximum width and convexity of *Longidorsa*). It belongs possibly to a new genus.

Occurrence: Ordovician of Baltoscandia and Kazakhstan.

Longidorsa humilis sp. n.

Plate 18, figs 4–6.

1984 *Tschingizella* sp. n. — Meidla *et al.*, p. 135 (fig.).

Holotype: Juvenile carapace Os 13, UT. Estonia, Paluküla quarry. Pirgu Stage.

Diagnosis: Carapace elongate, amplete, strongly convex, equivalved; ends rounded, dorsal angles blunt. Greatest convexity of valves in posteroventral part. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 13 (UT)	0.81	0.45	–
Carapace Os 14 (UT)	0.92	0.51	–
Carapace Os 3183	1.36	0.82	0.80

Description: Carapace medium-sized, elongate, amplete to slightly preplete, strongly convex; ends rounded, dorsal angles blunt, the anterior angle being larger than the posterior one. Hinge margin straight, long, ventral margin arched. Greatest length of the carapace at midlength, greatest convexity of valves somewhat posteroventrally from the midlength. No sulci or lobes. The carapace is equivalved, but the free margin of the right valve may slightly overlap the free margin of the left valve. The narrow marginal surface is separated from the lateral surface by a crest. Surface of the valves smooth.

Remarks: From the type species *L. humilis* differs in its lower carapace. Some variation of the degree and character of the convexity occurs.

Occurrence: Vormsi to Porkuni stages of Estonia.

Localities. Core sections: Orjaku — 53.50–85.50; Förby — 14.30; Haapsalu-203 — 63.15–65.85; Põhjaka–Saare — 76.30; Kaugatuma — 358.15; Ruskavere — 63.85; outcrops: Paope — 0.10; Paluküla — 0.58–1.46; Kohila-1; Seli–Russalu; over 30 specimens recorded.

Longidorsa? *baltica* sp. n.
Plate 18, figs 9–10.

Holotype: Carapace Os 3184, IGT. Estonia, Puhmu core, depth 102.2 m. Nabala Stage.
Diagnosis: Carapace small, postplete, with rounded ends and very blunt dorsal angles. Free margin of the right valve slightly overlaps the left valve. On the left valve a low ridge extends parallel to the overlap. Rounded adductor muscle field is expressed near dorsal margin, closer to the anterior end. Surface smooth.
Dimensions of the holotype, mm: length — 0.89, height — 0.53, width — 0.41.
Description. Carapace small, postplete. Dorsal margin of the carapace straight, dorsum hypocline; ventral margin flatly arched, ends rounded. Dorsal angles are very blunt, indistinct, the posterodorsal one is somewhat better defined. Greatest width of the carapace at the midlength of the valve. Carapace moderately convex, almost equivalved; margin of the right valve slightly overlaps that of the left valve; left valve with a low ridge which extends parallel to the line of overlap. Near the dorsal margin, closer to the anterior end, adductor muscle field is observed in a form of a indistinct round tubercle. Surface of the valves smooth.
Remarks: The new species differs conspicuously from the other well-known species of *Longidorsa* in having a strongly postplete outline, smaller convexity, and by the occurrence of the marginal ridge only on the left valve. This species is included in the genus *Longidorsa* only tentatively, with consideration of overlap features, lack of sulci and lobes. The orientation of the carapace is based on the location of the adductor muscle scar; the accepted interpretation of orientation excludes the possibility of ascribing the new species to *Leperditella* Ulrich, 1897, which has an opposite overlap of the valves, as well as to *Baltonotella* Sarv, 1959. It should be noted that the general structure of the carapace (outline, type of overlap, location of the adductor scar) of the new species resembles somewhat the condition of these features in leperditiids.
Occurrence: Nabala Stage of Estonia.
Localities. Core sections: Puhmu — 100.30–104.20; Kaugatuma — 388.40–395.10; Ruskavere — 130.60; 10 specimens recorded.

Longidorsa? *porkuniensis* (Stumbur, 1956)
Plate 18, figs 7–8.

1956 *Primitia porkuniensis* sp. n. — Stumbur, p. 186, pl. 1, figs 1–3.
1962 *Brevibolbina*? *porkuniensis* (Stumbur) — Sarv, pp. 120–121, pl. 5, figs 1–5.
1984 *Brevibolbina*? *porkuniensis* Sarv — Sarv and Meidla, pp. 9, 14.
1989 *Tschingizella*? *porkuniensis* — Nõlvak *et al.*, p. 90.

Holotype: Carapace Os 5002, IGT. Estonia, West Viru County, Porkuni quarry. Porkuni Stage.
Remarks: This species is tentatively assigned to *Longidorsa*, as it possesses characteristic outline, convexity and contact margin structures, but differs from the typical representatives of the genus in having a posteroventral spine and a weak S2.
Occurrence: Pirgu to Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia).
Localities. Förby core — 5.00; quarries at Seli–Metsküla; Siuge; Porkuni; 9 specimens recorded.

Suborder Paraparchitocopa Gramm, 1975
Superfamily Paraparchitacea Scott, 1959
Family Jaanussoniidae Schallreuter, 1971
Genus *Hemiaechminoides* Morris et Hill, 1952
(Syn.: *Jaanussonia* Schallreuter, 1971)

Type species: *Hemiaechminoides monospinus* Morris et Hill, 1952.
Diagnosis (modified from Schallreuter, 1971b): Valves small, oval to elongate, nearly amplete. Hinge margin relatively short. Right valve overlaps the left valve along the free margin. Left valve with a spine centro- to posterodorsally. Surface smooth.
Remarks: Schallreuter (1971b) distinguished *Hemiaechminoides* and *Jaanussonia* by differences in the position of the dorsal spine. This feature is not unambiguous. In *H. rossica* Neckaja, 1966 the spine is situated in centro/posterodorsal valve area, relative to the hinge line it has approximately the same position of the spine as *H. excentricus* Schallreuter, 1971. In other details the species resembles *"Jaanussonia" unicerata* Schallreuter, 1971.
Occurrence: Viruan and Harjuan of Baltoscandia; Silurian of North America.

Hemiaechminoides rossica Neckaja, 1966
Plate 19, fig. 3.

1966 *Hemiaechminoides rossica* Neckaja, sp. n. — Neckaja, p. 11, pl. 2, fig. 3.
1984 *Hemiaechminoides rossica* Neckaja — Sarv and Meidla, p. 10.
1989 *Hemiaechminoides rossica* — Nõlvak *et al.*, pp. 90–91.
1990 *Hemiaechminoides rossica* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Hemiaechminoides rossica* Neckaja — Sidaravičiene, p. 184, pl. 46, fig. 10, pl. 47, figs 1–2, 5.

Holotype: Carapace No. 953–24, VNIGRI. Lithuania, Krekenava core, depth 895.2 m.
Remarks: The type stratum and affinities of the species are discussed by Sidaravičiene (1992, p. 184).
Occurrence: Rakvere to Porkuni stages of Estonia; Rakvere to Pirgu stages of Lithuania; Pirgu Stage of Pskov region (Russia), Molodovo Formation of Podolia.
Localities. Core sections: Orjaku — 54.80–129.70; Förby — 14.30–25.20; Haapsalu-203 — 36.50 (32.10?)–67.75; Vodja H-190 — 107.60; Puhmu — 48.10–108.10 (136.80?); Laiamäe — 29.20–41.00; Mäetaguse — 21.10; Kaugatuma — 343.85–408.05; Pärnu — 245.80–316.20; Viljandi — 309.30; Aidu — 113.00–175.00; Laeva — 222.60; Ruskavere — 97.55; Abja — 388.40; Paekna — 2.70; outcrops: Tõrma; Paope — 0.40; Paluküla — 1.14–2.40; Kohila-1; Kohila-2; Tapa; Piirsalu; Põriki; Moe-1; over 180 specimens recorded.

Hemiaechminoides excentricus Schallreuter, 1971
Plate 19, fig. 4.

1971 *Hemiaechminoides excentricus* n. sp. — Schallreuter, pp. 252–253, figs 3, 6.
1986 *Hemiaechminoides excentricus* Schallreuter — Schallreuter, pl. 6, fig. 11.

Holotype: Left valve figured by Schallreuter, 1971b, fig. 3. Sweden, Gotland, coast near Visby. Erratic boulder (Harjuan).
Occurrence: Pirgu Stage of Estonia. Erratic boulders in Sweden and Germany.
Localities. Core sections: Orjaku — 62.60; Aidu — 172.50; 2 specimens recorded.

Hemiaechminoides minusculus Meidla, 1986
Plate 19, figs 5–6.

1986 *Hemiaechminoides minusculus* sp. n. — Meidla, p. 18, pl. 2, figs 4–8.
1992 *Hemiaechminoides minusculus* Meidla — Sidaravičiene, p. 185, pl. 47, figs 3–4.

Holotype: Carapace Os 3001, IGT. Estonia, Vajangu core, depth 125.5 m. Rakvere Stage.
Occurrence: Oandu? and Rakvere to Nabala stages of Estonia; Rakvere to Nabala stages of Lithuania and north-western Byelorussia.
Localities. Core sections: Orjaku — 115.60–116.40; Virtsu — 208.40; Nabala — 9.75; Moe — 48.80–56.50; Puhmu — 91.80–132.50; Laiamäe — 73.90 (48.00?)–89.60; Vinni — 24.60–38.50; Mäetaguse — 12.40–20.60; Kaugatuma — 407.70–411.30; ? Pärnu — 318.30; Laeva — 224.80–230.70 (235.50?); outcrops: Ussimägi — 1.75; Paekna — 1.60–1.80; nearly 50 specimens recorded.

Genus *Hemeaschmidtella* Schallreuter, 1971

Type species: *Hemeaschmidtella exula* Schallreuter, 1971.
Diagnosis: See Schallreuter, 1971b, p. 257.
Occurrence: Viruan and Harjuan of Baltoscandia; Molodovo Formation of Podolia.

Hemeaschmidtella exula Schallreuter, 1971
Plate 19, figs 7–9.

1971 *Hemeaschmidtella exula* n. sp. — Schallreuter, pp. 258–259, figs 5, 8.
1983 *Hemeaschmidtella exula* Schallreuter — Abushik and Sarv, pp. 115–116, pl. 4, figs 4–7.
1984 *Hemeaschmidtella exula* Schallreuter — Sarv and Meidla, pp. 8, 10.
1986 *Hemeaschmidtella exula* Schallreuter — Schallreuter, pl. 6, fig. 10.
1990 *Hemeaschmidtella exula* — Meidla *et al.*, p. 135 (fig.).
1992 *Hemeaschmidtella exula* Schallreuter — Sidaravičiene, p. 183, pl. 46, fig. 7.

Holotype: Left valve figured by Schallreuter, 1971b, fig. 5. Sweden, Gotland, Norderstrand by Visby. Erratic boulder (Harjuan).
Occurrence: Oandu to Porkuni stages of Estonia; Vormsi to Pirgu stages of Lithuania; Molodovo Formation of Podolia; erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Orjaku — 47.90–115.60; Förby — 5.00–25.20; Haapsalu-203 — 22.20–64.90; Virtsu — 131.10–158.50; Nabala — 5.30–12.00; Vodja H-190 — 106.30; Vodja H-191 — 118.80; Moe — 3.00–61.90; Puhmu — 45.70–137.80; Laiamäe — 62.50; Vinni — 18.80–41.40; Mäetaguse — 9.90–21.10; Kaugatuma — 345.38–411.30; Pärnu — 320.80; Aidu — 113.00 (110.00?)–175.00; Laeva — 234.70 (212.60?)–235.50; Ruskavere — 63.85–104.25 (118.00?); ? Abja — 397.50; ? Taagepera — 458.10–461.00?; ? Kaagvere — 244.30; outcrops: Ussimägi — 0.40–1.75; Paekna — 1.80–2.70; Moonaküla; Rägavere; Piilse; Turvaste; Sutlema; Nõmmeküla; Tõrma; Paope — 0.10–1.20; Paluküla — 0.12–2.40; Sutlepa; Kohila-2; Urge; Prillimäe — 0.30–1.10 (1.30?); Lehtse; Kuie; Adila; Lohu; ? Möldri — 0.50–1.00; Pirgu; Põriki; Moe-1; ? Röa–Jakobi; ? Porkuni; over 700 specimens recorded.

Hemeaschmidtella faba Schallreuter, 1984
Plate 20, figs 1–2.

1984 *Hemeaschmidtella faba* sp. n. — Schallreuter, pp. 97–98, fig. 4a.
1992 *Hemeaschmidtella faba* Schallreuter — Sidaravičiene, p. 183, pl. 54, figs 3–4.

Holotype: Carapace No. 2775, GPIH. Sweden, Dalarna, Fjäcka section. Upper member of the Dalby Limestone, 1.15–1.25 m below the boundary of the Skagen Topoformation.
Occurrence: Rakvere to Nabala stages of Estonia, Dalby Formation of Dalarna (Sweden).
Localities. Core sections: Puhmu — 108.10 (115.40?); Vinni — 40.00–41.40; Mäetaguse — 21.10; Viljandi — 324.50; Ussimägi outcrop — 0.40–0.50; over 20 specimens recorded.

Hemeaschmidtella? sp. 1
Plate 20, figs 3–5.

Description: Small, elongate-oval, amplete. Dorsum asymmetrical, left valve projects beyond the right valve. Along the ventral margin on both valves a ridge-like bend; marginal area of both valves depressed ventrally, building an antrum; right valve overlaps the left valve along the free margin. Surface smooth. Differs from *H. exula* Schallreuter, 1971 by a more elongate carapace and peculiar ventral marginal area. The assignment to the genus is tentative.

Dimensions of figured specimens, mm:	Length	Height
Carapace Os 3484	0.52	0.31
Carapace Os 3485	0.56	0.38

Occurrence: Pirgu to Porkuni stages of Estonia.
Localities. Kaugatuma core — 343.85–354.60; Siuge quarry; 13 specimens recorded.

Hemeaschmidtella sp. 2
Plate 19, figs 10–12.

Description: Elongate-oval, slightly preplete. Umbo on the left valve very high and tumid, highest anteriorly. Right valve moderately overlaps the left one along the free margin. Surface smooth. Differs from *H. exula* Schallreuter, 1971 by a more elongate carapace and the high tumid hump on the left valve.

Dimensions of figured specimens, mm:	Length	Height
Carapace Os 3487	0.89	0.62
Juvenile carapace Os 3488	0.70	0.48
Juvenile carapace Os 3489	0.75	0.54

Occurrence: Rakvere Stage of Estonia.
Localities. Core sections: ? Nabala — 9.75; Moe — 67.60; Puhmu — 130.00; Laiamäe — 82.50–89.60; Mäetaguse — 7.10–17.10; 17 specimens recorded.

Suborder Eridostraca Adamczak, 1961
Family Conchoprimitiidae Öpik, 1935
Genus *Ahlintella* Schallreuter, 1985

Type species: *Ahlintella orvikui* Schallreuter, 1985.
Diagnosis: See Schallreuter, 1985c, p. 33.
Occurrence: Ordovician of Baltoscandia.

Ahlintella? *marginata* (Sidaravičiene, 1975)
Plate 20, figs 7–8.

1975 *Baltonotella*? *marginata* Sidaravičiene, sp. n. — Sidaravičiene, p. 24, pl. 2, fig. 3, pl. 3, fig. 1.
1984 *Baltonotella marginata* Sidaravičiene — Sarv and Meidla, p. 10.
1992 *Ahlintella*? *marginata* (Sidaravičiene) — Sidaravičiene, p. 188, pl. 48, figs 4–5.

Holotype: Carapace 13-35/1, LitNIGRI. Lithuania, Krekenava core, depth 896.4 m. Vormsi Stage.
Occurrence: Rakvere? and Nabala to Pirgu stages of Estonia; Rakvere to Vormsi and ?Pirgu stages of Lithuania.
Localities. Core sections: Orjaku — 57.40; Virtsu — 188.55; Kaugatuma — 365.00–408.64; Pärnu — 303.00–314.90 (316.20?); Aidu — 186.10; Laeva — 227.10; Ruskavere — 64.80–119.65 (124.00?); Abja — 390.60–393.30 (397.80?); Taagepera — 442.50 (427.70?)–458.10 (460.40?); Otepää — 417.40–422.60; Kaagvere — 243.40–253.00; over 60 specimens recorded.

Family Eridoconchidae Henningsmoen, 1953
Genus *Cryptophyllus* Levinson, 1951
(Syn.: *Pygoconcha* Schallreuter, 1968)

Type species: *Eridoconcha oboloides* Ulrich et Bassler, 1923.
Diagnosis: See Sidaravičiene, 1992, p. 186.
Remarks: Abushik and Sarv (1983, p. 118) and Sidaravičiene (1992, p. 186) considered *Pygoconcha* Schallreuter, 1968 to be a junior synonym of *Cryptophyllus*, based on the relationship of *Cryptophyllus gutta* Schallreuter, 1968 with *Pygoconcha trilamellae* Schallreuter, 1968 (the type species of the genus *Pygoconcha*), which apparently are synonymous.
Occurrence: Viruan and Harjuan of Baltoscandia; Ordovician of Siberia, North America.

Cryptophyllus gutta Schallreuter, 1968
Plate 20, figs 9–11.

1968 *Cryptophyllus gutta* sp. n. — Schallreuter, p. 110, pl. 13, figs 4–7.
1968 *Pygoconcha trilamellae* sp. n. — Schallreuter, pp. 112–113, pl. 13, figs 1–3.
1984 *Cryptophyllus gutta* Schallreuter — Sarv and Meidla, pp. 8, 10.
1989 *Cryptophyllus gutta* — Nõlvak *et al.*, p. 90.
1990 *Cryptophyllus gutta* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Cryptophyllus gutta* Schallreuter — Sidaravičiene, p. 186, pl. 47, figs 9–10.

Holotype: Right valve No. 40/4, GPIG. Sweden, Gotland, Norderstrand in Visby. Erratic boulder (Harjuan).
Remarks: *Pygoconcha trilamellae* is apparently conspecific with *C. gutta*, as has been mentioned already by Abushik and Sarv (1983, p. 118).
Occurrence: Rakvere to Pirgu stages of Estonia and north-eastern Poland; Oandu to Pirgu stages of Lithuania and north-western Byelorussia; Pirgu Stage of Pskov region (Russia), erratic boulders in Sweden (Gotland).
Localities. Core sections: Orjaku — 84.80–93.00; Förby — 14.30–25.20; Haapsalu-203 — 36.50–67.75; Virtsu — 132.50; Nabala — 7.70–19.40; Vodja H-191 — 118.80; Moe — 24.70–40.00; Puhmu — 79.70–100.30; Laiamäe — 29.20–62.50; Vinni — 15.50–28.00; Mäetaguse — 9.90–12.40; Kaugatuma — 377.05–411.30; Pärnu — 264.30–318.00; Laeva — 181.80–210.40; Ruskavere — 76.45–137.50; Abja — 393.30; Taagepera — 440.90–459.00; Otepää — 433.10; Kaagvere — 246.30; outcrops: Ussimägi — 0.40; Paekna — 0.40–2.70; Osmussaar (erratic boulder); Turvaste; Sutlema; Tõrma; Permisküla; Paope — 0.10–1.20; Paluküla — 0.58–1.83; Saxby; Sutlepa; Kohila-1; Kohila-2; Prillimäe — 0.70–1.30; over 250 specimens recorded.

Beyrichiocopa, suborder uncertain
Genus *Neoprimitiella* Sarv, 1962

Type species: *Primitia* (?) *litvaensis* Neckaja *in* Abushik *et al.*, 1960.
Diagnosis: See Sarv, 1962, p. 135.
Occurrence: Ordovician (Viruan, Harjuan) and Silurian of Baltoscandia; Ordovician of North America.

Neoprimitiella bisulcata Schallreuter, 1969
Plate 20, fig. 6.

1969 *Neoprimitiella bisulcata* — Schallreuter, pp. 207–208, fig. 2.1.

Holotype: Left valve No. 25/23, GPIG. Sweden, Gotland, Visby. Erratic boulder (Harjuan).
Occurrence: Pirgu stage of Estonia; erratic boulders in Sweden (Gotland).
Estonian locality: Aidu core — 147.80 (1 specimens).

Genus *Disparigonya* Schallreuter, 1985

Type species: *Disparigonya voigti* Schallreuter, 1985.
Diagnosis: Elongate-oval, equivalved. Straight hinge line very short, hinge located posteriorly. The anterior cardinal angle very obtuse, the posterior one more distinct, notably >90°. A poorly defined sulcus located close to the anterior cardinal angle. A preadductorial node may be present. Surface smooth.
Other species: *Disparigonya* sp. n.
Occurrence: Viruan and Harjuan of Baltoscandia.

Disparigonya sp. n.
Plate 20, fig. 12.

Description: Oval, equivalved, moderately convex, with short straight hinge located posteriorly. The ends are rounded, the anterior one projecting strongly beyond the hinge line. Ventral margin almost straight in the middle, parallel to the hinge line. A very wide, indistinct depression located dorsally, somewhat posteriorly of the anterior cardinal angle. Surface smooth. Differs from *D. voigti* in having parallel hinge and ventral margins, in having a very indistinct sulcal depression.
Dimensions of figured specimen, mm: length — 0.78; height — 0.52.
Occurrence: Nabala Stage of Estonia.
Locality: Ruskavere core — 128.30 (2 specimens).

Genus *Estonaceratella* Schallreuter, 1984

Type species: *Monoceratella estona* Sarv, 1962.
Diagnosis: See Schallreuter, 1984a, p. 33.
Occurrence: Ordovician (Harjuan) and Silurian of Baltoscandia; ?Silurian of Greenland.

Estonaceratella estona (Sarv, 1962)
Plate 21, fig. 1.

1962 *Monoceratella estona* sp. n. — Sarv, pp. 122–123, pl. 6, figs 1–6.
1984 *Monoceratella estona* Sarv — Sarv and Meidla, p. 10.
* 1992 *Estonaceratella estona* (Sarv) — Sidaravičiene, p. 182, pl. 46, fig. 6.

Holotype: Right valve Os 5135, IGT. Estonia, West Viru County, Porkuni. Porkuni Stage.
Occurrence: Vormsi to Porkuni stages of Estonia; Vormsi to Pirgu stages of Lithuania; erratic boulders in Germany.
Localities. Core sections: Orjaku — 46.60–76.80; Förby — 14.30–19.90; Haapsalu-203 — 23.50–47.20; Põhjaka–Saare — 77.70; Moe — 3.00; Puhmu — 43.70–84.50; Laiamäe — 29.20; Kaugatuma — 363.92; Aidu — 123.00–131.50; Ruskavere — 66.30–82.50; outcrops: Paluküla — 0.12–1.65; Saxby; Kohila-2; Prillimäe — 1.10–1.30; Ruunavere; Põriki; Moe-1; Seli–Metsküla; Härgla; Iida; Siuge; Porkuni; over 150 specimens recorded.

Genus *Gotlandina* Schallreuter, 1968

Type species: *Gotlandina erratica* Schallreuter,1968.
Diagnosis: See Sidaravičiene, 1992, p. 203.
Remarks: Schallreuter (1968c, p. 145) assigned *Gotlandina* to Youngiellacea Kellett, 1933. Sidaravičiene (1992, p. 203) included the genus in Thlipsuracea, 1894, but did not motivate it (apparently following the paper of Schallreuter, 1986, which also does not contain such a discussion).
Occurrence: Viruan and Harjuan of Baltoscandia.

Gotlandina caudica (Neckaja, 1966)
Plate 21, figs 2–3.

1966 *Steusloffina*? *caudica* Neckaja, sp. n. — Neckaja, p. 60, pl. 8, fig. 5.
1992 *Gotlandina caudica* (Neckaja) — Sidaravičiene, p. 204, pl. 53, figs 5–7.
1992 *Gotlandina ariogalina* sp. n. — Sidaravičiene, pp. 203–204, pl. 53, figs 1–4, pl. 56, figs 10–11.

Holotype: Left valve No. 953–14, VNIGRI. Lithuania, Krekenava R-7 core, depth 907.05 m. Upper Ordovician.
Remarks: *G. ariogalina* is possibly conspecific with *G. caudica.* Sidaravičiene (1992, p. 204) mentioned two distinguishing features: *G. ariogalina* is comparatively higher and the configuration of the lateroventral process differs. The L/H ratio (data from Sidaravičiene, 1992, explanations to the plates) of *G. ariogalina* varies from 1.72 to 2.17, in the larger specimens (L>0.7 mm) from 1.80 to 1.92. In *G. caudica* the two figured specimens possess a L/H ratio 2.03; however, in the type specimen it is between 1.79–1.88 (data from Neckaja, 1966, p. 60 and from the photograph of the holotype made by the author and L. Sarv in 1984), thus practically the same value as in *G. ariogalina*. The general features of the lateroventral process of these two species are similar, and are stated to be variable in the description of both *G. ariogalina* and *G. caudica* (Sidaravičiene, 1992, p. 204).
Occurrence: Rakvere to Nabala stages of Estonia; Rakvere to Vormsi and ?Pirgu stages of Lithuania.
Localities. Core sections: Kaugatuma — 408.05–409.50; Pärnu — 315.70–318.30; ? Taagepera — 459.00; Otepää — 431.45; over 15 specimens recorded.

Gotlandina erratica Schallreuter, 1968
Plate 21, fig. 5.

1968 *Gotlandina erratica* sp. n. — Schallreuter, pp. 145–146, fig. 19.
1986 *Gotlandina erratica* Schallreuter — Schallreuter, pl. 8, fig. 9.

Holotype: Left valve No. 28/19, GPIG. Sweden, Gotland, Norderstrand in Visby. Erratic boulder Go 3 (Harjuan).
Occurrence: Vormsi to Pirgu stages of Estonia; erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Kaugatuma — 366.90; Pärnu — 288.00; Aidu — 144.50–172.50; Ruskavere — 91.50–116.60; 18 specimens recorded.

Order Platycopa Sars, 1866
Suborder Cytherelliformes Skogsberg, 1920
Superfamily Kloedenellacea Ulrich et Bassler, 1908
Family Monotiopleuridae Guber et Jaanusson, 1965
Genus *Priminsolenia* gen. n.

Name: Derived as a combination from the genus name *Primitiella* and the name of the type species.
Type species: *Primitiella*? *insolens* Meidla, 1986.

Diagnosis: Carapace small, weakly convex. Small, round adductorial pit located nearer to the anterior end. Marginal structures lacking, distinct dimorphism not observed. Valve surface coarsely reticulate.

Other species: *Karinutatia ren* Schallreuter, 1984; *Byrsolopsina*? *insolens meyerae* Schallreuter, 1990; *Priminsolenia minima* sp. n.

Remarks: The new genus is tentatively assigned to Monotiopleuridae. It differs from *Karinutatia* in having simply and coarsely reticulated valves (in *Karinutatia* longitudinal ribs dominate in the sculpture — see Schallreuter, 1978d). Dimorphism is not observed with certainty in *Priminsolenia*. Schallreuter (1990a, p. 264) assumes the presence of kloedenellid dimorphism in the type species. The outline varies considerably, but does not qualify as a proof of definite dimorphism, due to the unsatisfactory state of preservation of the material.

Schallreuter (1989a, 1990a) assigned the type species of *Priminsolenia* to *Byrsolopsina* Swain et Cornell, 1961 (*in* Swain *et al.*, 1961, p. 363). The latter genus possesses an internal ridge (=*Sulcament* by Schallreuter, 1967a, p. 626) instead of the adductorial pit of *Priminsolenia.* It also does not seem to be dimorphic.

Occurrence: Viruan and Harjuan of Baltoscandia.

Priminsolenia insolens (Meidla, 1986)

Plate 21, figs 8–9.

1986 *Primitiella*? *insolens* sp. n. — Meidla, pp. 17–18, pl. 4, figs 1–7.
1989 *Byrsolopsina meyerae* n. sp. — Schallreuter, p. 253 (figs 4.3–4.4).
1990 *Byrsolopsina*? *insolens meyerae* Schallreuter — Schallreuter, p. 264.
1992 *Primitiella*? *insolens* Meidla — Sidaravičiene, p. 193, pl. 49, figs 10–11.

Holotype: Left valve Os 3015, IGT. Estonia, Vinni core, depth 21.4 m. Nabala Stage.

Remarks: The differences between *P. insolens meyerae* Schallreuter and *P. insolens insolens* seem to lye within the limits of intraspecific variation. The size of *P. insolens,* as demonstrated in the figure (Meidla, 1986a, text-fig. 5), does not exceed 0.74 mm (not up to 0.97, as referred to by Schallreuter, 1990a, p. 264). The L/H ratio of *P. insolens* is 1.25–1.64 (in the same sample), and a considerable variation of the outline can be mentioned. The variation in the ornamentation is demonstrated in pl. 21, figs 8 and 9 (specimens from the same sample).

The specific feature of the type species is a solid, thickened adductorial field, developed as a pit in other species. This feature supposedly lies within the range of generic variability.

Occurrence: Rakvere to Nabala stages of Estonia and north-western Byelorussia; Oandu to Nabala stages of Lithuania; erratic boulders in Germany.

Localities. Core sections: Orjaku — 109.50–117.70; Nabala — 4.50–19.40; Moe — 52.00; Laiamäe — 89.60; Vinni — 21.40–38.50; Mäetaguse — 9.90–20.60; outcrops: Ussimägi — 1.75; Moonaküla; Piilse; over 50 specimens recorded.

Priminsolenia minima gen. et sp. n.

Plate 21, figs 4, 6–7.

Holotype: Right valve Os 3186, IGT. Estonia, Laeva-18 core, depth 235.55 m. Oandu Stage.

Diagnosis: Carapace very small, preplete. Adductorial pit located nearer to anterior end, above the midlength of valve. Valve surface reticulate, apart from a smooth belt at free margin.
Dimensions of the holotype, in mm: length — 0.38 (posterior end destroyed); height — 0.26.
Description. Carapace very small, preplete. Dorsal margin straight, dorsal angles blunt; the ends and the ventral margin of the carapace rounded. The adductorial pit is located above the midlength of the valve and nearer to the anterior end. A wide unsculptured belt extends along the entire free margin, narrowing slightly in the direction of cardinal angles; rest of the lateral surface coarsely reticulate. The left valve carries a marginal structure in the form of a low crest.
Remarks: The new species differs from other species of the genus *Priminsolenia* in having an unsculptured belt along the entire free margin.
Occurrence: Keila to Oandu stages of Estonia.
Localities. Core sections: Laeva — 236.90; Abja — 411.30; Taagepera — 466.40; over 10 specimens recorded.

Genus *Primitiella* Ulrich, 1894

Primitiella? sp.
Plate 21, figs 10–11.

Description: Small, postplete (?), moderately convex, with flattened lateral surface, without distinct border of the flattened area. Ends rounded, the posterior one more broadly. Dorsum slightly epicline, indistinct. No sulcal nor lobal structures, no admarginal structures. Marginal structure developed as a low ridge on the free margin of the right valve, left valve with a marginal semi-groove, suggesting slight right-over-left overlap. Surface smooth. The assignment to *Primitiella* is tentative.

Dimensions of the figured specimens, in mm:	Length	Height
Left valve Os 3604	0.59	0.38
Right valve Os 3605	0.70	0.46

Occurrence: Oandu? and Vormsi to Pirgu stages of Estonia.
Localities. Ruskavere core — 111.70–117.10; ? Ussimägi outcrop — 2.10; over 40 mostly poorly preserved specimens recorded.

Genus *Unisulcopleura* Schallreuter, 1968

Type species: *Unisulcopleura unisulcata* Schallreuter, 1968.
Definition: See Schallreuter, 1968c, p. 131.
Remarks: The dimorphism is unknown in most species of this genus, except questionable dimorphism recorded in the type species (Schallreuter, 1968c, p. 131). The limited material from Estonian sections did not deliver the sufficient quantities of specimens for discussing the systematic position of the genus.
Occurrence: Viruan of Baltoscandia.

Unisulcopleura carina Sidaravičiene, 1992
Plate 21, fig. 12.

1992 *Unisulcopleura carina* sp. n. — Sidaravičiene, p. 194, pl. 50, figs 3–4.

Holotype: Left valve No. 13–196/1, LitNIGRI. Lithuania, Paukshiai-192 core, depth 532.2 m. Rakvere Stage.
Occurrence: Rakvere Stage of Estonia; Oandu to Rakvere stages of Lithuania.
Localities. Orjaku core — 117.70; Ussimägi outcrop — 1.75. 2 specimens recorded.

Unisulcopleura rakverensis Sidaravičiene, 1992
Plate 21, fig. 13.

1992 *Unisulcopleura rakverensis* sp. n. — Sidaravičiene, pp. 193–194, pl. 49, fig. 12, pl. 50, figs 1–2, pl. 56, fig. 9.

Holotype: Right valve No. 13–195/1, LitNIGRI. Lithuania, Geluva-199 core, depth 1041.5 m. Rakvere Stage.
Occurrence: Rakvere Stage of Estonia and Lithuania.
Localities. Core sections: Vinni — 33.40; Kaugatuma — 411.30. 3 specimens recorded.

Superfamily Leperditellacea Ulrich et Bassler, 1906
Family Primitiidae Ulrich et Bassler, 1923
Genus *Lilitia* Gailīte *in* Abushik, 1990
(Syn.: *Paraprimitia* Gailīte, 1967, *Bipunctoprimitia* Gailīte, 1991,
non *Paraprimitia* Shi, 1964)

Type species: *Primitia*? *bipunctata* Henningsmoen, 1954.
Diagnosis: See Abushik, 1990, p. 118.
Remarks: The preoccupied name *Paraprimitia* has been replaced in Abushik, 1990 (p. 118) with *Lilitia*. Subsequently the name *Bipunctoprimitia* has been suggested by Gailīte (1991, p. 173), but the former one has the priority. The assignment of the genus to Primitiidae, introduced by Gailīte (*in* Gailīte *et al.*, 1967, p. 94), is maintained here.
Occurrence: Ordovician (Harjuan) and Silurian (Llandoverian) of Baltoscandia.

Lilitia sp. n.
Plate 22, figs 1–2.

Description: Elongate, amplete, moderately convex; anterior cardinal angle notably larger, both cardinal angles >90°. S2 distinct, located dorsally, somewhat anteriorly of the midlength, divided into two parts by a horizontal fold which anteriorly grades into round preadductorial node. Surface finely reticulate. Differs form *Lilitia bipunctata* (Henningsmoen, 1954) in having unequal cardinal angles, completely and finely sculptured valves.
Dimensions of the figured specimen, mm: length — 0.79; height –0.44.
Occurrence: Vormsi to Pirgu stages of Estonia.
Locality: Förby core — 14.30–24.30 (3 specimens).

Family Leperditellidae Ulrich et Bassler, 1906
Genus *Leperditella* Ulrich, 1897

Type species: *Leperditia inflata* Ulrich, 1892.
Diagnosis: See Sarv, 1959, p. 158.
Occurrence: Ordovician and Silurian of Europe and North America.

Leperditella brachynotos (Schmidt, 1858)
Plate 22, fig. 3.

1858 *Leperditia brachynotos* n. sp. — Schmidt, p. 195.
1924 *Leperditella baltica* n. sp. — Kummerow, p. 418, pl. 20, fig. 10.
1959 *Leperditella globosa* sp. n. — Sarv, 1959, p. 161, pl. 28, figs 10–16.
* 1983 *Leperditella brachynotos* (Schmidt) — Abushik and Sarv, pp. 113–114, pl. 3, figs 10–15.
1984 *Leperditella brachynotos* (Schm.) — Sarv and Meidla, pp. 8, 10.
1989 *Leperditella brachynotos* — Nõlvak *et al.*, p. 90.
1990 *Leperditella brachynotos* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace Os 2029, IGT. Estonia, West Viru County, Moe quarry. Pirgu Stage.
Occurrence: Rakvere to Porkuni stages of Estonia; Vormsi to Pirgu stages of Latvia; Pirgu Stage of Pskov region (Russia), Molodovo Formation of Podolia; erratic boulders in Germany.
Localities. Core sections: Orjaku — 53.50–119.40; Förby — 5.00–25.20; Haapsalu-203 — 28.70–59.55; Põhjaka–Saare — 115.00; Moe — 4.60–25.40; Puhmu — 33.10–130.00 (137.80?); Kaugatuma — 344.60–411.30; Viljandi — 308.20–319.60; Laeva — 228.60 (229.50?); Ruskavere — 70.55–120.10; outcrops: Paekna — 1.60; Tõrma; ? Permisküla; Paope — 0.85; Paluküla — 0.34–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Hosholm; Piirsalu; Adila; Lohu; Pirgu; Põriki; Moe-1; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 500 specimens recorded.

Leperditella prima Sarv, 1956
Plate 22, fig. 4.

1956 *Leperditella prima* sp. n. — Sarv, 1956, p. 31, pl. 2, figs 5–7.
1959 *Leperditella prima* Sarv — Sarv, 1959, pl. 28, figs 8–9.
1990 *Leperditella prima* — Hints *et al.*, p. 137 (fig.).

Holotype: Carapace Os 2007, IGT. Estonia, East Viru County, Oandu. Oandu Stage.
Occurrence: Keila to Rakvere stages of Estonia.
Locality: Mäetaguse core — 21.10–29.50 (2 specimens).

Genus *Fallaticella* Schallreuter, 1984

Type species: *Fallaticella schaeferi* Schallreuter, 1984.
Diagnosis: See Schallreuter, 1984a, p. 26.
Remarks: The original definition of the type species was based on tecnomorphs only. Subsequently the species has been redescribed (Schallreuter, 1989b) and specific structures

similar to the beyrichiid crumina discovered in heteromorphs. This necessitates a modification of the diagnosis of *Fallaticella*. The systematic position of *Fallaticella* still remains uncertain, because according to Schallreuter (*ibid.*, p. 20) the crumina of *Fallaticella* differs from that of Beyrichiidae. In this paper the original tentative placement in Leperditellidae is maintained.
Occurrence: Viruan and Harjuan of Baltoscandia.

Fallaticella schaeferi Schallreuter, 1984
Plate 22, fig. 5.

1984 *Fallaticella schaeferi* n. sp. — Schallreuter, pp. 27–28, fig. 2.3.
* 1989 *Fallaticella schaeferi* Schallreuter — Schallreuter, pp. 19–20, fig. 2.

Holotype: Right tecnomorphic juvenile (incomplete) valve No. 2800, GPIH. Sweden, Gotland, coast north-western of Hästings. Lose boulder (Harjuan).
Occurrence: Pirgu Stage of Estonia; erratic boulders on Gotland (Sweden) and in Germany.
Localities. Core sections: Kaugatuma — 353.00; Aidu — 114.00; 2 specimens recorded.

Suborder Punciocopa Schallreuter, 1968
Superfamily Kirkbyacea Ulrich et Bassler, 1906
Family Amphissitidae Knight, 1928
Genus *Ordovizona* Schallreuter, 1969

Type species: *Ordovizona sulcata* Schallreuter, 1969.
Diagnosis: See Schallreuter, 1969c, p. 205.
Occurrence: Viruan and Harjauan of Baltoscandia; Molodovo Formation of Podolia.

Ordovizona sulcata Schallreuter, 1969
Plate 22, fig. 6.

1969 *Ordovizona sulcata* n. sp. — Schallreuter, pp. 205–206, fig. 1.
1983 *Ordovizona sulcata* Schallreuter — Abushik and Sarv, p. 116, pl. 10, figs 5–6.
1986 *Ordovizona sulcata* Schallreuter — Schallreuter, pl. 6, fig. 5.

Holotype: Left valve No. 25/21. Sweden, Gotland, Visby, Norderstrand. Erratic boulder (Harjuan).
Occurrence: Oandu to Nabala stages of Estonia; erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Puhmu — 95.70–132.50; Vinni — 43.25–43.80; Laeva — 224.80; Piilse riverside section; 7 specimens recorded.

Genus *Nonsulcozona* Schallreuter,
Nonsulcozona praepleta Schallreuter, 1972
Plate 22, fig. 7.

1972 *Nonsulcozona praepleta* sp. n. — Schallreuter, p. 207, fig. 4.

Holotype: Carapace figured by Schallreuter (1972a, fig. 3.1). Sweden, Gotland, Visby, Norderstrand. Erratic boulder (Harjuan).
Occurrence: Pirgu Stage of Estonia; erratic boulders on Gotland (Sweden).
Estonian locality: Aidu core — 113.00–114.00 (2 specimens).

Order Podocopa Sars, 1866
Suborder Metacopa Sylvester-Bradley, 1961
Superfamily Thlipsuracea Ulrich, 1894
Family Thlipsuriidae Ulrich, 1894
Genus *Olbianella* nom. nov.

(Syn.: *Olbia* Pranskevičius, 1972, **non** Stål, 1862; **non** Marcusen, 1867)

Type species: *Olbia fabacea* Pranskevičius, 1972.
Diagnosis: See Pranskevičius, 1972, p. 99.
Remarks: The original assignment of this genus to Thlipsuriidae was apparently based on general shape and symmetry of the valves comparable with those of early thlipsuriids. With regard to the flattened lateral surface and outline the genus resembles *Octonaria* Jones, 1887. However, in *Olbianella* no distinctive pits, furrows or depressed areas can be recognized. The lateral surface may bear fine sculpture. The genus differs from the members of Longisculidae by longitudinally uniform thickness of the valve and in a higher degree of asymmetry of the carapace: a distinct overlap of the left valve can be recognized along the free margin.
Occurrence: Viruan and Harjuan of Baltoscandia.

Olbianella fabacea (Pranskevičius, 1972)
Plate 22, figs 8–10.

1972 *Olbia fabacea* Pranskevičius, gen. et sp. n. — Pranskevičius, pp. 100–101, pl. 16, fig. 4.
1984 *Olbia fabacea* Pranskevičius — Sarv and Meidla, pp. 11–12.
1990 *Olbia fabacea* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace No. 12–14/1, Institute of Geology (Vilnius). Lithuania, Ukmerge core, depth 510.5 m.
Occurrence: Rakvere? and Nabala to Pirgu stages of Estonia; Harjuan (undivided) of Lithuania.
Localities. Core sections: Orjaku — 48.70–68.20 (111.00?); Förby — 5.00–10.00; Haapsalu-203 — 22.20–47.20; Virtsu — 135.00–158.50; Põhjaka–Saare — 76.30–88.00; Moe — 26.10–40.00; Puhmu — 38.50–93.90; Laiamäe — 13.10–58.60; Aidu — 114.00 (123.00?); Ruskavere — 65.30; erratic boulder from Osmussaar; outcrops: Turvaste; Tõrma; Hosholm; Kuie; Piirsalu; Adila; Lohu; Möldri — 0.00–1.50; Pirgu; over 800 specimens recorded.

Olbianella cf. *braderupensis* (Schallreuter, 1980)
Plate 22, figs 11–13.

cf. 1980 *Pachydomelloides braderupensis* sp. nov. — Schallreuter, pp. 77–80.
1990 *Olbia* cf. *braderupensis* (Schallreuter) — Meidla and Sarv, p. 69, pl. 7, fig. 12.

Holotype of *Olbianella braderupensis* is a left valve No. 2462, GPIH. Germany, Isle of Sylt, vicinity of Braderup. Erratic boulder from N_2-Q sediments, Viruan.
Remarks: The specimens figured in pl. 22 (figs 11–13) resemble *O. braderupensis* in outline and convexity of valves, but differ in having fine sculpture on the valves, consisting of longitudinally ordered fine tubercles. Besides, in the middle part of the ventral margin of *O.* cf. *braderupensis* there is developed a narrow duplicature, which has been recognized in thin section. The differences may partly be due to differences in methods of preparation and state of preservation. The type material of *O. braderupensis* came from erratic boulders of Sy 167-type (Sy 39 and Sy 52, see Schallreuter, 1984a, p. 8); in addition the species has been identified from erratie boulders of type Sy 154 (Schallreuter, 1987c, p. 27). The age of these boulders is given by Schallreuter as Idaverean–Jõhvian (Schallreuter, 1984a, p. 6). Consequently, the finds of *O.* cf. *braderupensis* in northern Estonia are from much younger beds.

Initially *O. braderupensis* was included in *Pachydomelloides* Swain, 1962, but this genus differs differs from *Olbianella* by its depressed posterior end, presence of a subvertical elevation on the internal valve surface and the lack of stop-ridges.
Occurrence: Uppermost Oandu and Rakvere Stage of Estonia. *O. braderupensis* is recorded from erratic boulders in Germany.
Localities. Core sections: Orjaku — 121.80–129.70; Moe — 67.60–69.70; Laiamäe — 88.30–89.60; Vinni — 40.00–41.40; Mäetaguse — 20.60–21.10; Ussimägi outcrop — 0.40–1.75; over 400 specimens recorded.

Superfamily Bairdiocypridacea Shaver, 1961
Family Bairdiocyprididae Shaver, 1961

Diagnosis (modified from Benson *et al.*, 1961 and Adamczak, 1976): Carapace moderately convex, with long, usually concave or almost straight ventral margin. Carapace inequivalved, left valve larger than the right one. Valve surface unsculptured. Ventral margin of left valve carries stop-ridges on its inner surface. Shell thickness uniform in longitudinal section (no sulcament observed). Adductor muscle scar defined as round aggregate of separate tubercles. Interior lamella at ventral margin sometimes weakly calcified.
Genera. Apart from *Bairdiocypris*, the genera *Silenis* Neckaja, 1958, *Uthoernia* Schallreuter, 1986, and tentatively *Bulbosclerites* Knüpfer, 1968 are here included in Bairdiocyprididae.
Remarks. The above diagnosis differs somewhat from that by Shaver in Benson *et al.*, 1961, p. 364), as internal features described by F. Adamczak (1976) have been taken into account.

Bairdiocyprididae differ from Longisculidae by the absence of a sulcament. Stop-ridges have been recorded also in Steusloffinidae, but Bairdiocyprididae differ by their moderately convex carapaces and a concave, long ventral margin, which makes them different from Pachydomellidae also. From Krausellidae and Rectellidae Bairdiocyprididae differ in the occurrence of stop-ridges, from Krausellidae also in a more regular overlap of the left valve.
Occurrence: See Benson *et al.*, 1961. Notable is the appearance of earliest Bairdiocyprididae in the middle Ordovician of Baltoscandia.

Genus *Bairdiocypris* Kegel, 1932

Type species: *Bythocypris* (*Bairdiocypris*) *gerolsteinensis* Kegel, 1932.
Diagnosis: See Shaver in Benson *et al.*, 1961, p. 365.
Occurrence: Ordovician *to* Devonian, worldwide.

Bairdiocypris indeterminatus Pranskevičius, 1972
Plate 23, figs 1–2.

1972 *Bairdiocypris indeterminatus* Pranskevičius, sp. nov. — Pranskevičius, pp. 139–140, pl. 27, figs 6–7.
1983 *Bairdiocypris indeterminatus* Pranskevičius — Meidla, p. 54 (fig.).
1983 *Bairdiocypris indeterminatus* Pranskevičius — Abushik and Sarv, pp. 127–128, pl. 8, figs 8–21.
1984 *Bairdiocypris indeterminatus* P. — Sarv and Meidla, pp. 8, 11.
1989 *Bairdiocypris indeterminatus* Pranskevičius — Nõlvak *et al.*, pp. 90–91.
1990 *Bairdiocypris*? *indeterminatus* Pranskevičius — Meidla *et al.*, p. 135 (fig. 28).

Holotype: Carapace No. 12–15/1, Institute of Geology (Vilnius). Lithuania, Ukmerge core, depth 509.0 m. Harjuan (undivided).
Remarks: The species has been assigned to *Bairdiocypris* by its author. The interior structures of the valves are unknown.
Occurrence: Rakvere to Porkuni stages of Estonia; Harjuan of Lithuania; Pirgu Stage of Pskov region (Russia), Molodovo Formation of Podolia.
Localities. Core sections: Orjaku — 53.50–95.70; Förby — 5.00–25.50; Haapsalu-203 — 22.20–69.50; Nabala — 5.85; Põhjaka–Saare — 76.30–117.40; Vodja H-190 — 106.30–117.70; Vodja H-191 — 107.75; Moe — 2.00–40.00; Puhmu — 33.10–117.50 (137.80?); Laiamäe — 29.70–89.60; Vinni — 33.40; Kaugatuma — 345.38–411.30; Pärnu — 257.50–318.30; Aidu — 113.00–197.10; Laeva — 178.20–230.70 (231.70?); Ruskavere — 76.45 (75.60?)–124.00 (127.25?); Abja — 388.40; Taagepera — 442.50–459.00; Otepää — 414.60–417.40; Kaagvere — 238.00–245.80; erratic boulder from Osmussaar; outcrops: Turvaste; Tõrma; Permisküla; Paope — 0.10–1.20; Paluküla — 0.12–2.40; Saxby — 0.33–2.03; Kohila-1; Kohila-2; Urge; Prillimäe — 0.30–1.30; Lehtse; Tapa; Moe-2; Kuie; Adila; Lohu; Pirgu; Põriki; Moe-1; Porkuni; over 700 specimens recorded.

Genus *Silenis* Neckaja, 1958

Type species: *Silenis subtriangulatus* Neckaja, 1958.
Description: see Neckaja, 1958, p. 370.
Occurrence: Ordovician? and Silurian, East European Platform, England and Wales (?).

Silenis? *trapeziformis* Abushik et Sarv, 1983
Plate 23, figs 3–4.

1983 *Silenis*? *trapeziformis* sp. n. — Abushik and Sarv, pp. 120–121, pl. 5, figs 1–4.

Holotype: Carapace No. 50/11412, CNIGRM. Podolia, right bank of Dnestr River near Studenica. Molodovo Formation.

Occurrence: Rakvere to Pirgu stages of Estonia; Molodovo Formation of Podolia.
Localities. Core sections: Haapsalu-203 — 22.20–59.55; Põhjaka–Saare — 77.70; Puhmu — 136.65 (61.40?)–137.80; Vinni — 21.40; Kaugatuma — 408.64; Pärnu — 313.50–314.40; Aidu — 185.00; Paluküla quarry — 2.27; over 30 specimens recorded.

Silenis? sp. n.
Plate 23, fig. 5.

Description: Small, moderately and evenly convex, with dorsal and ventral margins almost parallel to each other to the posterior end slightly higher. Ends are evenly rounded, ventral margin nearly straight to concave. No distinct dorsum. Narrow left-over-right overlap occurs mid-centrally.

The species is tentatively assigned to *Silenis*, due to the similarity with *S.*? *trapeziformis*, which is comparatively shorter, higher and possesses a left-over-right overlap along the entire free margin. Most specimens classified as *S.*? sp. n. are small, possibly juveniles.
Dimensions of the figured specimen, mm: length — 0.82; height — 0.37.
Occurrence: Rakvere to Pirgu stages of Estonia.
Localities. Core sections: Orjaku — 68.20–94.00; Virtsu — 135.00; Nabala — 9.75–17.40; Põhjaka–Saare — 117.40; Moe — 2.00–33.30; Puhmu — 102.20 (93.90?)–108.10; Laiamäe — 82.50; Vinni — 24.60–38.50; ? Mäetaguse — 20.60; Kaugatuma — 400.38–411.30; Aidu — 110.00–191.20; Ruskavere — 71.32–117.10; outcrops: Ussimägi — 0.40; Rägavere; Piilse; Nõmmeküla; Tõrma; Paluküla — 1.25–2.40; over 60 specimens recorded.

Genus *Bulbosclerites* Knüpfer, 1968

Type species: *Bulbosclerites longa* Knüpfer, 1968.
Diagnosis: See Knüpfer, 1968, p. 13.
Occurrence: Viruan and Harjuan of Baltoscandia; upper Ordovician in Germany (Thuringia).

Bulbosclerites unicornis (Neckaja, 1952)
Plate 23, fig. 6.

1952 *Mica unicornis* sp. n. — Neckaja, pp. 229–230, pl. 2, figs 1–2.
* 1980 *Bulbosclerites unicornis* (Neckaja) — Schallreuter, pp. 73–76.
1984 *Bulbosclerites unicornis* (N.) — Sarv and Meidla, pp. 11, 14, 19.
1986 *Bulbosclerites unicornis* (Neckaja) — Schallreuter, p. 8, pl. 7, fig. 5.

Holotype: Carapace No. 14–128, VNIGRI. Estonia, West Viru County, Kamariku core (depth unknown). Porkuni Stage.
Remarks: In the specimens studied the posterodorsal spine on the right valve is similar to that of the type specimen. The specimens figured by Schallreuter (1980e) are apparently juveniles, because length of some specimens reaches up to 0.70 mm (Neckaja, 1952). The range of variation of the species is incompletely known, but the material from the erratic boulders of Gotland and Germany is considered here as conspecific with *B. unicornis*.
Occurrence: Pirgu? and Porkuni stages of Estonia; erratic boulders in Sweden (Gotland) and Germany.

Localities. Core sections: ? Põhjaka–Saare — 76.30; Puhmu — 33.10–34.00 (55.70?); Aidu — 107.20; outcrops: Seli–Metsküla; Seli–Russalu; Iida; Siuge; over 30 specimens recorded.

Bulbosclerites sp. n.
Plate 23, figs 7–8.

Remarks: The specimens of *B.* sp. n. differ from the type species by having a comparatively higher carapace and more broadly arched posterior margin. The posterodorsal spine on the right valve is short, blunt, like in the East Baltic material of *B. unicornis*.

Dimensions of figured specimens, in mm:	Length	Height
Carapace Os 3618	0.66	0.31
Carapace Os 3619	0.63	0.34 (slightly deformed)

Occurrence: Rakvere Stage of Estonia.
Localities. Puhmu core — 127.50–132.50; Piilse riverside section; 16 specimens recorded.

Genus *Uthoernia* Schallreuter, 1986

Type species: *Uthoernia lunata* Schallreuter, 1986.
Diagnosis: See Schallreuter, 1986, p. 11.
Occurrence: Harjuan of Baltoscandia.

Uthoernia lunata Schallreuter, 1986
Plate 23, fig. 9.

1986 *Uthoernia lunata* gen. et sp. n. — Schallreuter, p. 11, pl. 7, fig. 13.

Holotype: Left valve No. 3393, GPIH. Germany, Isle of Sylt. Erratic boulder (Harjuan).
Occurrence: Pirgu Stage of Estonia; erratic boulders in Germany.
Estonian locality: Haapsalu-203 core — 22.20–39.00 (2 specimens).

Family Longisculidae Neckaja, 1966

Diagnosis (modified from Neckaja, 1966, p. 55): Carapace elongate, more or less subtringular, with straight to concave ventral margin and arched to straigh dorsal margin. Valves equally convex, moderate left-over-right overlap developed along the free margin, deeper on ventral and anterodorsal margins. A reversed, right-over left overlap may be present centro/posterodorsally. Carapace moderately convex, lateral surface may be slightly flattened in longitudinal section. The greatest width is located centrally or dorsocentrally. Ends are rounded or the posterior one acuminate. Nodes may be present posteriorly in both valves, in some cases a dorsal protrusion, occasionally spine-like, may occur. Large circular adductor muscle scar located anterocentrally on the interior surface, in front of a sulcament (subvertical elevation). Two interior stop-ridges present in the antero- and posteroventral parts of the left valve. Lateral surface smooth to granulate.

Genera: *Longiscula* Neckaja, 1958, *Pullvillites* Öpik, 1937, *Arcuaria* Neckaja, 1958 (=*Pullvillites*), *Trapezisylthere* Schallreuter, 1986
Remarks: Longisculidae may be a junior synonym of Bairdiocypprididae, as suggested by Schallreuter (1979c). The main difference seems to the presence of an elongate, subvertical elevation on the interior valve surface in *Longiscula* and related genera, and stable features of the overlap by Longisculidae.
Occurrence: Ordovician and Silurian, worldwide.

Genus *Longiscula* Neckaja, 1958

Type species: *Longiscula arcuaris* Neckaja, 1958.
Diagnosis: See Meidla, 1993, p. 290.
Occurrence: Ordovician of Baltoscandia, North America, Kazakhstan, Podolia, Bohemia (?) and China; lower Silurian of Baltoscandia, England and Wales, East Siberia, Tian-Shan, Urals and Altai.

Longiscula cf. smithii (Jones, 1887)
Plate 23, fig. 10.

cf. 1887 *Pontocypris smithii* n. sp. — Jones, p. 184, pl. 4, fig. 5.
cf. 1967 *Longiscula smithii* (Jones) — Gailīte, p. 159, pl. 13, fig. 6.

Occurrence: Juuru Stage of Estonia; lower Silurian of Latvia; Llandovery of Gotland, Sweden.
Localities. Core sections: Viljandi — 275.50–276.20; Aidu — 105.00; Laeva — 173.50; over 20 specimens recorded.

Longiscula parrectis? Neckaja, 1958
Plate 23, fig. 12.

? 1958 *Longiscula parrectis* sp. n. — Neckaja, p. 306, pl. 3, figs 5–6.
? 1993 *Longiscula parrectis* Neckaja — Meidla, p. 294, figs 1.9–1.15.

Occurrence: Uhaku to Kukruse and ?Keila stages of Estonia; Uhaku to Kukruse stages of Pskov district, north-western Russia.
Localities. Core sections: Kaugatuma — 414.05; Pärnu — 329.10; Viljandi — 338.40; 9 specimens recorded.

Longiscula tersa (Neckaja, 1966)
Plate 23, figs 13–14.

1966 *Pseudorayella tersa* sp. n. — Neckaja, p. 63, pl. 12, fig. 2.
* 1993 *Longiscula tersa* (Neckaja) — Meidla, p. 298.

Holotype: Carapace No. 953–16, VNIGRI. Lithuania, Krekenava R-7 core, depth 899.0 m.
Occurrence: Oandu to Pirgu stages of Estonia; Harjuan of Lithuania; Molodovo Formation of Podolia.

Localities. Core sections: Orjaku — 78.60; ? Förby — 14.30–18.70; Nabala — 4.50; Vodja H-191 — 108.50; ? Puhmu — 67.20–72.00; Laiamäe — 90.30; Vinni — 41.40 (43.25?); ? Mäetaguse — 9.90; Kaugatuma — 402.50 (411.30?); Pärnu — 327.50 (270.50?); Aidu — 114.00; Ruskavere — 106.30 (85.15?)–124.00 (130.60?); Abja — 390.20; Taagepera — 459.00–459.40; Otepää — 431.45; outcrops: Ussimägi — 0.40; Paekna — 1.80–1.95; Rägavere; Piilse; ? Paope — 0.85; Paluküla — 2.27–2.40; ? Põriki; over 50 specimens recorded.

Longiscula obliqua Abushik et Sarv, 1983
Plate 23, fig. 11.

1983 *Longiscula obliqua* sp. n. — Abushik and Sarv, p. 119, pl. 5, figs 13–18.
1993 *Longiscula obliqua* Abushik & Sarv — Meidla, p. 298.

Holotype: Carapace No. 47/11412, CNIGRM. Podolia, right bank of the Dnestr River opposite of Studenica village. Molodovo Formation.
Occurrence: Nabala to Porkuni stages of Estonia; Molodovo Formation of Podolia.
Localities. Core sections: Förby — 5.00–14.30; Haapsalu-203 — 27.60–67.75; Puhmu — 93.90–100.30; Kaugatuma — 343.85; Ruskavere — 85.15 (82.50?)–126.30; Taagepera — 427.70; erratic boulder from Osmussaar; outcrops: Tõrma; Paope — 0.10–1.20; Kohila-1; Urge; Prillimäe — 0.70–1.30; over 20 specimens recorded.

Longiscula perfecta Meidla, 1993
Plate 24, figs 1–3.

1989 *Longiscula* sp. n. 1 — Nõlvak *et al.*, p. 90.
* 1993 *Longiscula perfecta* n. sp. — Meidla, pp. 298–301, figs 3.10–1.12, 4.1–4.3, 5.1–5.12.

Holotype: Carapace Os 3082, IGT. Estonia, Põriki quarry. Pirgu Stage.
Occurrence: Oandu to Pirgu and ?Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia).
Localities. Core sections: Orjaku — 52.50–103.60; Förby — 5.00–25.20; Haapsalu-203 — 23.50–64.90; Virtsu — 192.80; Nabala — 4.50–9.75; Põhjaka–Saare — 117.40; Vodja H-190 — 106.30–107.60; Vodja H-191 — 100.10; Moe — 2.00–26.10; Puhmu — 38.50 (32.40?)–115.40; Laiamäe — 29.20–89.60; Vinni — 19.70–38.50; Mäetaguse — 20.60 (12.40 ?); Kaugatuma — 350.70–411.30; Pärnu — 242.60–318.30 (328.00?); Viljandi — 301.50–324.50 (327.80?); Aidu — 175.00–191.20; Laeva — 208.95 (197.20?)–229.50 (230.70?); Ruskavere — 60.65–131.70 (132.45?); Abja — 373.50–404.30; Taagepera — 427.70–459.00 (464.40?); Otepää — 425.40 (408.00?)–433.10; Kaagvere — 205.80–257.10; outcrops: Ussimägi — 0.40 (1.75?); Paekna — 0.40–2.70; Osmussaar (erratic boulder); Turvaste; Sutlema; Nõmmeküla; Tõrma; Permisküla; Paope — 1.20; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Prillimäe — 0.70–1.30; Hosholm; Piirsalu; Lohu; Põriki; Moe-1; over 700 specimens recorded.

Longiscula porrecta Stumbur *in* Meidla, 1993
Plate 24, fig. 4.

? 1924 *Bythocypris subreniformis* n. sp. — Kummerow, p. 436, pl. 21, figs 18 a–b.
1989 *Longiscula* sp. n. 2 — Nõlvak *et al.*, p. 90.
1993 *Longiscula porrecta* Stumbur, n. sp. — Meidla, pp. 301–302, figs 2.1–2.12, 3.1–3.4, 4.4.

Holotype: Carapace Os 5053, IGT. Estonia, West Viru County, Porkuni. Porkuni Stage.
Remarks: The available specimens from the Vormsi and Pirgu stages of Estonia are characterized by comparatively high carapace, and may prove to belong to a new (sub)species.
Occurrence: Vormsi to Pirgu? and Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia). *L. porrecta* region may be conspecific with *B. subreniformis* (see Meidla, 1993, p. 302),.
Localities. Core sections: ? Orjaku — 76.80; ? Förby — 5.00–17.90; Puhmu — 33.60–34.00; ? Laiamäe — 23.30–29.20; Kaugatuma — 343.85–348.00; ? Pärnu — 245.80–265.40; outcrops: ? Prillimäe — 0.30–1.30; ? Kuie; ? Piirsalu; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; Röa–Jakobi; over 250 specimens recorded.

Longiscula impercepta sp. n.
Plate 24, figs 5–7.

Holotype: Carapace Os 3019, IGT. Estonia, Rapla County, Siuge quarry. Porkuni Stage.
Diagnosis: Carapace irregularly oval, moderately convex, with irregularly arched dorsal margin; ends equally rounded, ventral margin concave, anteroventral margin of the carapace flattened.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3019	1.25	0.71	0.50
Carapace Os 3020	1.18	0.65	0.46
Carapace Os 3021	1.08	0.60	0.43

Description: Carapace medium-sized, irregularly oval. Dorsal margin irregularly arched, with somewhat shorter and steeper anterior slope. The ends of the carapace almost equally rounded, ventral margin weakly concave, with greatest concavity nearer to the anterior end. Carapace is moderately convex, with ventrally flattened anterior end. Greatest width of the carapace at the midlength. Left valve overlaps the right valve along the ventral and anterodorsal margins, but the overlap extends also slightly posterodorsally and posteriorly. Surface of the valves smooth. Ventral margin with a narrow duplicature. Length/height ratio fluctuates somewhat.
Remarks: *L. impercepta* differs in its flattened anteroventral margin of the carapace from all known Ordovician species.
Occurrence: Pirgu? and Porkuni stages of Estonia.
Localities. Core sections: Puhmu — 32.00 (29.50?); ? Pärnu — 257.50; Kaagvere — 188.10; outcrops: Seli–Metsküla; Seli–Russalu; Siuge; over 20 specimens recorded.

Longiscula ovata Neckaja 1966
Plate 24, fig. 8.

1966 *Longiscula ovata* sp. n. — Neckaja, p. 56, pl. 10, fig. 2.
* 1993 *Longiscula ovata* Neckaja — Meidla, p. 296, figs 3.5–3.6.

Holotype: Carapace No. 953–12, VNIGRI. Lithuania, Krekenava R-7 core, depth 893.55 m.
Occurrence: Pirgu Stage of Estonia; Harjuan (undivided) of Lithuania.
Locality. Paluküla quarry — 0.34 (1 specimen).

Genus *Pullvillites* Öpik, 1937
(Syn.: *Arcuaria* Neckaja, 1958)

Type species: *Pullvillites triangulus* Öpik, 1937.
Diagnosis: See Abushik and Sarv, 1983, p. 123.
Occurrence: Ordovician and lower Silurian of Baltoscandia and Podolia.

Pullvillites rostratus (Krause, 1891)
Plate 24, figs 9–10.

1891 *Bursulella* (?) *rostrata* n. sp. — Krause, p. 512, pl. 33, figs 10 a–c.
* 1983 *Pullvillites rostratus* (Krause) — Abushik and Sarv, pp. 123–124, pl. 9, figs 9–17, pl. 10, figs 11–12.
1990 *Pullvillites rostratus* — Meidla *et al.*, p. 135 (fig.).

Lectotype: Carapace figured by Krause (1891, pl. 33, figs 10 a–c; selected by Abushik and Sarv, 1983). Germany, vicinity of Brandenburg. Erratic boulder, Ordovician.
Remarks: In the material examined the shape of the dorsal spine varies considerably, being very blunt and tumid in some specimens.
Occurrence: Keila? and Rakvere to Vormsi stages of Estonia; Nabala to Pirgu stages of Lithuania and Molodovo Formation of Podolia (Abushik and Sarv, 1983)
Localities. Core sections: Orjaku — 91.00; ? Förby — 22.50–24.30; Haapsalu-203 — 63.15 (62.10?); Vodja H-190 — 117.70; ? Vodja H-191 — 118.80; Puhmu — 88.10–115.40; Laiamäe — 41.00–58.60; Vinni — 21.40–26.40; Kaugatuma — 386.95–408.05; Pärnu — 315.70 (316.20?); ? Laeva — 238.60; Ruskavere — 118.00; over 50 specimens recorded.

Pullvillites laevis Abushik et Sarv, 1983
Plate 24, figs 11–14.

1972 *Arcuaria sineclivula* Neckaja — Pranskevičius, p. 145, pl. 31, fig. 1.
1983 *Pullvillites laevis* sp. n. — Abushik et Sarv, p. 124, pl. 9, figs 1–8, pl. 10, figs 8–10.

Holotype: Carapace No. 61/11412, CNIGRM. Podolia, right bank of the Dnestr River opposite of the Studenica village. Molodovo Formation.
Remarks: The species has a very wide range of variation, but attempts do distinguish subgroups have not been successful. The height of the carapace varies considerably. In some beds in the Nabala and Pirgu stages of Central Estonia, within an interval of a few metres, the specimens tend to have node- or bulb-like elevations, mostly on the posterior, but in some specimens also on the anterior ends of both valves. The height of these structures varies considerably within a sample, some specimens being slightly more flattened and angular only in dorsal view, whereas in some other specimens the greatest width is situated in the posterior part of the carapace. The variability of the species requires a special study.

Occurrence: Rakvere to Pirgu and Porkuni? stages of Estonia; Harjuan of Lithuania, Molodovo Formation of Podolia (see Abushik and Sarv, 1983 for details and discussion).
Localities. Core sections: Orjaku — 59.80–95.70; Förby — 25.00; Haapsalu-203 — 39.00–64.90; Nabala — 4.50–6.45; Vodja H-190 — 107.60–117.70; Vodja H-191 — 105.40–118.80; Moe — 52.00–60.30; Puhmu — 63.70–137.80; Laiamäe — 73.00 (60.50?)–74.20 (74.70?); Vinni — 23.60–31.65; Kaugatuma — 356.83–411.90; Pärnu — 260.60–318.30 (320.80?); Viljandi — 296.30–322.60; Aidu — 123.00–197.10; Laeva — 191.90–230.70; Ruskavere — 90.30–116.40 (120.10?); Abja — 376.50 (370.20?)–397.80; Taagepera — 427.70–460.40 (461.00?); Otepää — 387.60–428.90 (440.00?); Kaagvere — 204.85–255.25; outcrops: ? Paekna — 1.60–2.30; Paope — 1.20; Lohu; ? Põriki; over 1000 specimens recorded.

Pullvillites? *inornatus* sp. n.
Plate 25, figs 1–2.

Holotype: Carapace Os 2952, IGT. Estonia, Orjaku core, depth 54.8 m. Pirgu Stage.
Diagnosis: Carapace triangular, unequivalved. Dorsal margin curved, with a short straight stretch in middle part by the left valve; ends of carapace rounded, flattened in dorsal view, ventral margin concave. Left valve overlaps the right valve in anterodorsal and ventral parts of the carapace; at dorsal margin right valve projects beyond the left valve. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 2952	1.14	0.62	0.42
Carapace Os 2952	0.71	0.48	0.31

Description: Carapace medium-sized, moderately convex, unequivalved, with triangular outline. Dorsal margin curved, on the left valve straight in the middle, on the right valve slightly angular somewhat posteriorly. Ends of the carapace rounded, ventral margin weakly concave in the middle. Left valve overlaps slightly right valve along the ventral margin and in antero- and posterodorsal parts of the carapace. In the middle of the dorsal margin right valve projects beyond the right valve. Ends of the carapace flattened in dorsal view, lateral surface of the valves also slightly flattened centrally. Surface of the valves smooth. In juveniles the anterior slope of the dorsal margin is longer and the carapace is comparatively higher.
Remarks: The species is tentatively included in the genus *Pullvillites*, based on the general shape and details of the overlap. It differs from the other species of the genus in flattened ends of the carapace.
Occurrence: Pirgu and Porkuni stages of Estonia.
Localities. Core sections: Orjaku — 54.80–61.00; Haapsalu-203 — 39.00; ? Virtsu — 158.50; Põhjaka–Saare — 85.20; Puhmu — 48.10–63.70; Kaugatuma — 343.85; Aidu — 107.20; Ruskavere — 60.65–74.25 (91.50?); outcrops: Ruunavere; Lohu; 30 specimens recorded.

Genus *Trapezisylthere* Schallreuter, 1986

Type species: *Pseudorayella admirebilis* Neckaja, 1966 (=*Trapezisylthere divisia* Schallreuter, 1986).
Diagnosis: The type species of this monotypic genus has been redescribed by Schallreuter (1986, p. 11).
Occurrence: Harjuan of Baltoscandia; erratic boulders in Germany.

Trapezisylthere admirebilis (Neckaja, 1966)
Plate 25, fig. 2.

1966 *Pseudorayella admirebilis* (*P. admirabilis*) — Neckaja, p. 64, pl. 12, fig. 7.
1986 *Trapezisylthere divisia* (*T. divisa*) — Schallreuter, p. 11, pl. 7, fig. 14.

Holotype: Carapace No. 953–15, VNIGRI. Lithuania, Krekenava R-7 core, depth 883.9 m Harjuan.
Remarks: The specimen figured by Schallreuter (1986, pl. 7, fig. 14) is somewhat higher (L/H 2.58, in the type specimen 2.51), but this difference may fall within the range of intraspecific variation.
Occurrence: Vormsi to Pirgu stages of Estonia; Harjuan (undivided) of Lithuania; erratic boulders in Germany.
Localities. Core sections: ? Pärnu — 306.30; Aidu — 155.00; Ruskavere — 71.20–108.30; outcrops: Paope — 0.40; Paluküla — 2.27; Moe-2; 15 specimens recorded.

Family Steusloffinidae Schallreuter, 1984

Diagnosis (modified): Nonsulcate Bairdiocypridacea with moderately to very long dorsal margin, rounded anterior end and rounded to acuminate posterior end. Ventral margin convex. Left valve considerably larger, projecting beyond the smaller right valve and overlapping along the free margin, with deepest overlap ventrally ("bow-shaped projection": Hessland and Adamczak, 1974). Left valve interiorly with two stop-ridges (antero- and posteroventrally) and a partial contact groove. Adductor muscle field large, circular, consisting of a large number of individual scars. Lateral surface smooth or with spines or ridges (?).
Remarks: Steusloffininae has been classified with Balticellidae by Schallreuter (1984a, p. 34). In the type species of *Balticella*, *B. binodis* (Krause, 1897; =*B. oblonga* Thorslund, 1940), the features of the interior are unknown and contact conditions of the valves poorly known, but *B. deckeri* Harris, 1957 shows in many respects a great similarity to *Steusloffina* Teichert, 1937 (see Kraft, 1962). *Balticella* differs from both Steusloffinidae and Bairdiocyprididae in its distinct, deep sulcation, which is not common within Metacopa, although a sulcament is present in some families (Longisculidae).
Occurrence: Ordovician and lower Silurian, worldwide.

Genus *Steusloffina* Teichert, 1937

Type species: *Steusloffina ulrichi* Teichert, 1937.
Diagnosis: See Neckaja, 1966, p. 59.
Remarks: The diagnosis of the genus *Steusloffina* needs to be emended. Schallreuter (1979c, 1986) questioned the former assignment of *S. lintra* Schallreuter, 1972 to *Steusloffina*. In the present paper the species is retained in *Steusloffina*, together with new, unnamed varieties which are briefly described and figured below. A full description and formal establishment of these taxa is postponed, due to poor knowledge of their range of variation and to insufficient material.
Occurrence: Ordovician (Viruan and Harjuan) and lower Silurian of Baltoscandia; middle and upper Ordovician of North America.

Steusloffina cuneata (Steusloff, 1895)
Plate 25, figs 4–6.

1895 *Primitia cuneata* n. sp. — Steusloff, p. 782, pl. 58, figs 5 a–b.
1956 *Steusloffina diversa* sp. n. — Stumbur, p. 192, pl. 3, figs 7–9.
* 1968 *Steusloffina cuneata* (Steusloff) — Schallreuter, pp. 138–141, figs 12–15.
1972 *Steusloffina cuneata* (Steus) — Pranskevičius, p. 142, pl. 28, figs 3–4.
1974 *Steusloffina cuneata* (Steusloff) — Hessland and Adamczak, p. 61, pl. 1, figs 1–4, text-figs 1–2.
1984 *Steusloffina cuneata* (Steusloff) — Sarv and Meidla, pp. 8, 11.
1989 *Steusloffina cuneata* — Nõlvak *et al.*, p. 90.
1990 *Steusloffina cuneata* — Meidla *et al.*, p. 135 (fig.).
* 1992 *Steusloffina cuneata* (Steusloff) — Sidaravičiene, pp. 202–203, pl. 52, fig. 11.

Lectotype: Carapace figured by Schallreuter (1968c, figs 12.1–12.2), Geologisch-Paläontologisches Institut der Universität Rostock. Germany, vicinity of Neubrandenburg. Erratic boulder (Harjuan?).
Occurrence: Rakvere to Porkuni stages of Estonia, Latvia, Lithuania and north-western Byelorussia; Pirgu to Porkuni stages of north-western Poland; Pirgu Stage of Pskov region (Russia), Molodovo Formation of Podolia; uppermost Ordovician (Ellis Bay Formation) of Anticosti Island, Quebec, Canada (Copeland, 1983).
Localities. Core sections: Orjaku — 46.60–109.20; Förby — 5.00–25.50; Haapsalu-203 — 22.20–67.75; Virtsu — 132.50–158.50; Nabala — 5.30; Põhjaka–Saare — 85.20–119.90; Vodja H-190 — 106.30–113.40; Vodja H-191 — 101.15–118.80; Moe — 2.00–48.80; Puhmu — 33.10–119.40; Laiamäe — 25.30–75.80; Vinni — 19.70–29.00; Kaugatuma — 343.85–381.60 (382.70?); Pärnu — 241.90–305.00; Viljandi — 301.50; Aidu — 110.00–177.00; Laeva — 179.10–210.40; Ruskavere — 59.80–130.60 (137.50?); Kaagvere — 191.00; outcrops: Paekna — 2.70; Turvaste; Tõrma; Permisküla; Paope — 0.10–1.20; Kõrgessaare; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Urge; Prillimäe — 0.30–1.30; Lehtse; Tapa; Moe-2; Hosholm; Kuie; Piirsalu; Ruunavere; Adila; Lohu; Möldri — 0.00–1.50; Pirgu; Põriki; Moe-1; Seli–Metsküla; Seli–Russalu; Härgla; Iida; Siuge; Porkuni; over 5000 specimens recorded.

Steusloffina aputa Stumbur, 1956
Plate 25, figs 8–9.

1956 *Steusloffina aputa* sp. n. — Stumbur, pp. 192–193, pl. 3, figs 10–13.
1962 *Steusloffina aputa* K. Stumbur — Sarv, 1962, pp. 96–97.
1984 *Steusloffina aputa* Stumbur — Sarv and Meidla, 1984, pp. 11, 14.

Holotype: Carapace Os 5014, IGT. Estonia, West Viru County, Porkuni quarry. Porkuni Stage.
Occurrence: Porkuni Stage of Estonia.
Localities. Outcrops: Röa–Jakobi; Seli–Metsküla; Siuge; Porkuni; over 30 specimens recorded.

Steusloffina lintra Schallreuter, 1968
Plate 25, fig. 7.

1972 *Steusloffina lintra* sp. n. — Schallreuter, pp. 210–211, figs 8.1–8.4.
? 1979 *Steusloffina*? *lintra* Schallreuter — Schallreuter, pl. 1, fig. 4.
1986 *Steusloffina*? *lintra* Schallreuter — Schallreuter, p. 8, pl. 2, fig. 7.

Holotype: Right valve figured by Schallreuter, 1972a, figs 8.1–8.2. Sweden, Gotland, Visby. Erratic boulder (No. 794), Harjuan.
Remarks: The specimen figured by Schallreuter (1979c, pl. 1, fig. 4) differs from the type specimen by its convexity and resembles more *S.* sp. 2, described below.
Occurrence: Pirgu Stage of Estonia; erratic boulders on Gotland (Sweden) and in Germany.
Locality. Aidu core — 113.00 (1 specimen).

Steusloffina dilatata Meidla, 1983
Plate 25, figs 10–11.

1983 *Steusloffina dilatata* sp. n. — Meidla, p. 58, pl. 2, figs 6–10.
1984 *Steusloffina dilatata* Meidla — Sarv and Meidla, 1984, p. 11.

Holotype: Carapace Os 1, UT. Estonia, Vormsi Island, beach exposure at Saxby. Vormsi Stage.
Occurrence: Rakvere and Vormsi to Porkuni stages of Estonia.
Localities. Core sections: Orjaku — 68.20–85.50; Förby — 21.10; Haapsalu-203 — 33.20–58.65; Põhjaka–Saare — 76.30–106.10; Puhmu — 33.10–137.80; Laiamäe — 29.20; ? Pärnu — 241.90–306.30; ? Laeva — 216.00–230.70; outcrops: Paope — 1.20; Paluküla — 1.69–2.27; Saxby; Kohila-1; Urge; Tapa; Lohu; Möldri; Põriki; Siuge; over 170 specimens recorded.

Steusloffina? sp. 1
Plate 26, fig. 2.

Description: Like *S. dilatata* in shape, but differs in having a blunt spine in the postero-central area and fine sculpture consisting of longitudinal-concentrically arranged striae in the central valve area. Striae are very fine, of uniform size, not differentiated as in *Duplicristatia* Schallreuter, 1978.
Dimensions of the figured specimen Os 3637, in mm: length — 0.86; height — 0.44.
Occurrence: Pirgu Stage of Estonia.
Localities. Core sections: Haapsalu-203 — 33.20; Puhmu — 47.80; Ruskavere — 110.40; 3 specimens recorded.

Steusloffina? sp. 2
Plate 25, figs 12–13.

? 1979 *Steusloffina*? *lintra* Schallreuter — Schallreuter, pl. 1, fig. 4.

Description: Like *S. dilatata*, but differs in greater width of the carapace and in having a very short blunt spine in the central valve area, making the outline distinctly rhomb-like in dorsal or ventral view.
Dimensions of the figured specimen Os 3638, mm: length — 1.22; height — 0.60.
Occurrence: Pirgu to Porkuni stages of Estonia.
Localities. Ruskavere core — (60.65?) 71.32; outcrops: Seli–Russalu; Iida; 14 specimens recorded.

Steusloffina? sp. 3
Plate 26, figs 3–4.

Description: Like *S. dilatata*, but strongly compressed in dorsoventral direction; the greatest width is situated posterocentrally, exceeding considerably the greatest heigth. In dorsal view the carapace is almost drop-like, except for the acuminate posterior end. Valves laterally very strongly convex, forming a longitudinal crest-like elevation which begins anterocentrally and terminates close to the posterior end. Central area of the lateral surface coarsely tuberculate, with the coarsest tubercles posteriorly.
Dimensions of the figured specimen Os 3640, mm: length — 0.94; height — 0.46.
Occurrence: Vormsi to Pirgu stages of Estonia.
Localities. Core sections: Förby — 21.10; Vodja H-190 — 107.60; Puhmu — 84.50–90.70; Saxby beach exposure; over 10 specimens recorded.

Genus *Medianella* Neckaja, 1966

Type species: *Medianella aequa* (Stumbur, 1956).
Diagnosis: See Neckaja, 1966, p. 61.
Other middle and late Ordovician species: *Bythocypris intecta* Stumbur, 1956, *Bythocypris longa* Stumbur, 1956, *Bythocypris*? *depressoterminata* Kraft, 1962, *Microcheilinella blidenensis* Gailīte, 1975, *Microcheilinella kandavensis* Gailīte, 1975, *Medianella turgida* Abushik et Sarv, 1983, *Medianella*? *pudica* Olempska, 1994.
Remarks: In *Medianella blidenensis* two interior stop-ridges have been recognized, as in *Steusloffina*. The main difference is a shorter hinge line in *Medianella*, making the outline more circular in lateral view.
Remarks: The specimen figured by Neckaja (1966, pl. 10, figs 1 a, b) as *Medianella aequa* Stumbur, 1956, should apparently be assigned to *M. intecta* (Stumbur, 1956).
Occurrence: Ordovician and lower Silurian of Baltoscandia, Middle Ordovician of North America.

Medianella aequa (Stumbur, 1956)
Plate 26, figs 5–6.

1956 *Bythocypris aequa* sp. n. — Stumbur, p. 189, pl. 2, figs 2–5.
1962 *Bythocypris aequa* K. Stumbur — Sarv, pp. 96–97.
non 1966 *Medianella aequa* (Stumbur) — Neckaja, p. 62, pl. 10, figs 1a–1b (=*M. intecta*).
non 1972 *Medianella aequa* (Stumbur) — Pranskevičius, pp. 169–170, pl. 42, figs 1–3 (=*M. intecta*).
? 1982 *Medianella aequa* (Stumbur) — Gailīte *in* Ulst *et al.*, p. 126.

1984 *Medianella aequa* (Stumbur) — Sarv and Meidla, pp. 11, 13–14.
1990 *Medianella aequa* (Stumbur) — Meidla and Sarv, p. 69, pl. 8, fig. 8.

Holotype: Carapace Os 5007, IGT. Estonia, West Viru County, Porkuni quarry. Porkuni Stage.

Remarks: Neckaja (1966) described and figured specimens of *M. intecta* (Stumbur, 1956) as *M. aequa*. The same happened to Pranskevičius (1972) who apparently followed Neckaja's misidentification.

The identification of *M. aequa* by Gailīte (*in* Ulst *et al.*, 1982) requires confirmation, because the stratigraphic ranges in Estonia and Latvia differ. In Estonian sections *M. aequa* has a short stratigraphical range and the species has not been observed in the lower part of the Pirgu Stage (Moe Formation).

Occurrence: Pirgu? and Porkuni stages of Estonia; ?Pirgu Stage of Latvia.

Localities. Core sections: Puhmu — 33.10–34.00 (34.90?); Kaugatuma — 341.20–343.85 (344.60?); Aidu — 107.20 (113.00?); outcrops: Röa–Jakobi; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 290 specimens recorded.

Medianella longa (Stumbur, 1956)

Plate 26, figs 7–8.

1956 *Bythocypris longa* sp. n. — Stumbur, p. 190, pl. 2, figs 6–9.
1962 *Bythocypris longa* K. Stumbur — Sarv, 1962, pp. 96–97 (*partim*).
1983 *Bythocypris longa* Stumbur — Meidla, p. 54 (fig.).
1984 *Medianella longa* (Stumbur) — Sarv and Meidla, pp. 11, 13–15.
1989 *Medianella longa* — Nõlvak *et al.*, p. 90.
1990 *Medianella longa* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace Os 5008, IGT. Estonia, West Viru County, Porkuni quarry. Porkuni Stage.

Remarks: The range of variation of *M. longa* requires a special study. Earliest representatives (particularly those from the Oandu Stage) may belong to a new (sub)species, but available material is insufficient for a definite conclusion.

Sarv (1962) recorded *M. longa* from the lower Silurian, but these specimens belong to a new species (see also Sarv and Meidla, 1984).

Occurrence: Oandu? and Rakvere to Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia).

Localities. Core sections: Orjaku — 57.40–112.30; Förby — 5.00–25.00; Haapsalu-203 — 30.90–58.65; Nabala — 6.75–8.10 (17.40?); Moe — 16.80–18.00; Puhmu — 33.10–76.80 (137.80?); ? Laiamäe — 33.00–89.60; Vinni — 21.40–33.40 (44.10?); Mäetaguse — (6.60?) 9.90 (17.10?); Kaugatuma — 343.85–411.30; Pärnu — 242.60–319.80; Aidu — 125.70; ? Laeva — 231.70–232.80; Ruskavere — (60.65?) 83.90; ? Abja — 397.50; Kaagvere — 257.10; outcrops: ? Ussimägi — 1.75–2.10; Paekna — 0.40–2.70; Nõmmeküla; Paope — 0.40–1.20; Paluküla — 0.42–1.83; Saxby; Sutlepa; Röa–Jakobi; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 470 specimens recorded.

Medianella intecta (Stumbur, 1956)
Plate 26, figs 9–10.

? 1924 *Cytherellina robusta* n. sp. — Kummerow, p. 438, pl. 21, figs 23a–b.
1956 *Bythocypris intecta* sp. n. — Stumbur, pp. 190–191, pl. 2, figs 10–13.
1962 *Bythocypris intecta* K. Stumbur — Sarv, pp. 97–98.
1966 *Medianella aequa* (Stumbur) — Neckaja, p. 62 (*partim*?), pl. 10, figs 1a–1b.
1972 *Medianella aequa* (Stumbur) — Pranskevičius, pp. 169–170 (*partim*?), pl. 42, figs 1–3.
1983 *Medianella intecta* (Stumbur) — Meidla, p. 54 (fig.).
1984 *Medianella intecta* (Stumbur) — Sarv and Meidla, pp. 11, 13–15.
1986 *Medianella robusta* (Kummerow) — Schallreuter, pl. 7, fig. 6.
1989 *Medianella intecta* — Nõlvak *et al.*, p. 90.
1990 *Medianella intecta* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace Os 5009, IGT. Estonia West Viru County, Porkuni quarry. Porkuni Stage.
Remarks: The figured specimens referred to *M. aequa* (Stumbur) by Neckaja (1966) and Pranskevičius (1972) belong to *M. intecta* (see above).

The species may be conspecific with *Cytherellina robusta* Kummerow, 1924. On the figure of *C. robusta* (Kummerow, pl. 21, figs 23a–b) the ends of the carapace are more acuminate but with respect to other details the figure nearly agrees with that of *M. intecta*. Material referred to as *M. robusta* by Schallreuter (1986, pl. 7, fig. 6) is conspecific with *M. intecta*.
Occurrence: Rakvere to Porkuni stages of Estonia; Pirgu Stage of Pskov region (Russia), Harjuan of Lithuania; ?erratic boulders in Germany.
Localities. Core sections: Orjaku — 50.20 (47.90?)–107.80; Förby — 5.00–23.50; Nabala — 8.45; Põhjaka–Saare — 76.30–117.40; Vodja H-190 — 106.30–117.70; Vodja H-191 — 101.15; Moe — 2.00–40.00; Puhmu — 38.50–115.40; Laiamäe — 16.00–58.60; Vinni — 26.40; Kaugatuma — 343.85–386.60; Pärnu — 243.60 (242.60?)–306.30; Aidu — 123.00–134.50 (144.50?); Laeva — 179.10; Ruskavere — 60.65–128.30; outcrops: Turvaste; Sutlema; Tõrma; Paope — 0.40–1.20; Paluküla — 0.34–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.30–1.30; Lehtse; Tapa; Moe-2; Kuie; Piirsalu; Adila; Lohu; Möldri — 0.00–1.00; Pirgu; Põriki; Moe-1; Seli–Metsküla; Iida; Siuge; Porkuni; over 600 specimens recorded.

Medianella blidenensis (Gailīte, 1975)
Plate 26, figs 11–12.

1975 *Microcheilinella blidenensis* sp. nov. — Gailīte, p. 52, pl. 2, figs, 2a–b.
1983 *Microcheilinella blidenensis* Gailīte — Meidla, p. 54 (fig.).
1983 *Medianella aequa* (Stumbur) — Abushik and Sarv, pp. 121–122, pl. 7, figs 1–14.
1989 *Medianella blidenensis* — Nõlvak *et al.*, p. 90.
1990 *Medianella blidenensis* (Gailīte) — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace 31/316, VNIIMORGEO. Latvia, Mezhciems core, depth 456.2 m. Nabala Stage.
Remarks: The range of morphological variation of *M. blidenensis* and the relation of this species to *M. aequa* require a special study. A particularly wide range of variability (with regard to convexity, outline and detailed morphology of the posterior end) has been noted in the material from the Pirgu Stage of North Estonia.

Occurrence: Rakvere to Pirgu and Porkuni? stages of Estonia; Nabala to Porkuni stages of Latvia; Pirgu Stage of Pskov region (Russia).
Localities. Core sections: Orjaku — 53.50–107.80; Förby — 5.00–24.30; Haapsalu-203 — 27.60–69.50; Virtsu — 135.00–180.60; Nabala — 4.50–8.45 (9.75?); Põhjaka–Saare — 117.40 (76.30?); Vodja H-190 — 106.30–117.70; Vodja H-191 — 101.80–118.80; Moe — 2.00–57.10; Puhmu — 43.70–121.90; Laiamäe — 23.30–75.80; Vinni — 15.50–33.40; Mäetaguse — 9.90–12.40; Kaugatuma — 353.90 (345.38?)–411.30 (412.90?); Pärnu — 241.90–319.80 (320.80?); Viljandi — 296.30–322.60; Aidu — 110.00–185.00 (197.10?); Laeva — 181.80 (178.20?)–231.70; Ruskavere — 65.30–137.50; Abja — 376.50 (365.20?)–397.80; Taagepera — 446.10 (420.90?)–459.00 (459.40?); Otepää — 417.40 (384.20?); Kaagvere — 188.10–253.40; outcrops: Paekna — 2.70; Turvaste; Nõmmeküla; Permisküla; Paope — 0.10–1.20; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.70–1.30; Lehtse; Tapa; Moe-2; Kuie; ? Lohu; Pirgu; Põriki; Moe-1; over 2500 specimens recorded.

Genus *Kroemmelbeinia* Schallreuter, 1969
(Syn.: Beecherellita Neckaja, 1973)

Type species: *Kroemmelbeinia ala* Schallreuter, 1969.
Diagnosis: See Schallreuter, 1969c, pp. 210–211.
Remarks: Schallreuter (1969c) emphasized the overall similarity of this genus to the imperfectly known genus *Spinobairdia* Morris et Hill, 1952 and assigned both *Kroemmelbeinia* and *Spinobairdia* to Bairdiidae. However, the type species of *Kroemmelbeinia* demonstrates all essential features of Steusloffinidae (characteristic overlap and asymmetry, presence of stop-ridges).
Occurrence: Viruan and Harjuan of Baltoscandia.

Kroemmelbeinia spina Schallreuter, 1969
Plate 26, fig. 13.

1969 *Kroemmelbeinia spina* sp. n. — Schallreuter, pp. 212–213, figs 3.3–3.4.
1983 *Kroemmelbeinia spina* Schallreuter — Abushik and Sarv, pp. 118–119, pl. 5, figs 9–12.
1984 *Kroemmelbeinia spina* Schallreuter — Sarv and Meidla, pp. 11, 19.
1986 *Spinobairdia spina* (Schallreuter, 1969) — Schallreuter, 1986, pl. 8, fig. 13.
1989 *Kroemmelbeinia spina* — Nõlvak *et al.*, p. 90.

Holotype: Left valve No. 25/27. Sweden, north-western Gotland, coast by Lummelunda's Bruk. Erratic boulder (No. 791), Harjuan.
Remarks: This species differs from the type species of the genus, *K. ala* Schallreuter, 1969, in lacking interior stop-ridges and in having a spine posterocentrally. Because of the similarity with respect to other details (outline, character of the overlap and ornamentation), it is reassigned here to *Kroemmelbeinia*. The assignment of this species to *Spinobairdia* Morris et Hill, 1952 (Schallreuter, 1978e and subsequent papers) poorly motivated seems to be and the assignment to the Bairdiidae (apparently due to a somewhat "bairdian" outline) is questioned here. Sohn (1960) also regards the reference of *Spinobairdia* to a family as uncertain.
Occurrence: Nabala to Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia); erratic boulders on Gotland (Sweden) and in Germany.

Localities. Core sections: Orjaku — 46.60; Förby — 25.00 (14.30?); Haapsalu-203 — 26.80–28.70; Põhjaka–Saare — 76.30; Puhmu — 90.70; Kaugatuma — 345.38 (344.60?)–387.45; Pärnu — 242.60–306.30; Aidu — 116.00–183.60; Laeva — 202.00–208.95; Ruskavere — 60.65–128.30; outcrops: Piirsalu; Möldri — 1.00–1.50; Seli–Metsküla; Porkuni; over 180 specimens recorded.

Genus *Duplicristatia* Schallreuter, 1978

Type species: *Duplicristatia asymmetrica* Schallreuter, 1978.
Diagnosis: See Schallreuter, 1978f.
Remarks: *Duplicristatia* is here tentatively assigned to Steusloffinidae, based on a similar development of interior structures. Although a well-defined linear ornamentation is generally not common in this group, fine longitudinal ridges do occur among species included in *Steusloffina* in this paper.
Occurrence: Viruan and Harjuan of Baltoscandia.

Duplicristatia asymmetrica Schallreuter, 1978
Plate 26, fig. 1.

1978 *Duplicristatia asymmetrica* gen. et sp. nov. — Schallreuter, pp. 49–56.
1984 *Duplicristatia asymmetrica* Schallreuter — Sarv and Meidla, pp. 11, 13–14.
1986 *Duplicristatia asymmetrica* Schallreuter — Schallreuter, p. 8, pl. 7, fig. 5.
1989 *Duplicristatia asymmetrica* — Nõlvak *et al.*, pp. 90–91.

Holotype: Left valve No. 1985, GPIH. Sweden, Gotland, beach north of Lickershamn. Erratic boulder (G6), Harjuan.
Occurrence: Porkuni Stage of Estonia; Pirgu Stage of Pskov region (Russia), erratic boulders on Gotland (Sweden) and in Germany.
Localities. Core sections: Puhmu — 32.40–33.60; Taagepera — 420.90–422.90; 6 specimens recorded.

Genus *Crucicornina* Schallreuter, 1984

Type species: *Crucicornina ahemuelleri* n. sp.
Diagnosis: See Schallreuter, 1984a, p. 29.
Remarks: The original diagnosis of the genus *Crucicornina* is obviously incomplete but will not be revised here because of insufficient material. It is not clear, whether additional topotype specimens of the type species are available. The two specimens figured by Schallreuter (1984a, figs 4.3–4.4) are represented by left valves, and thus the overlap features of the type species are unknown. In one figured specimen (*ibid.*, fig. 4.4) a poorly defined contact groove can be recognized along the anterior margin, suggesting a left-over-right overlap. In the Estonian specimen of *Crucicornina* sp., a completely preserved left valve, a bow-shaped projection is present, suggesting relationship with Steusloffinidae (and with *Steusloffina* in particular) and questioning the original assignment of *Crucicornina* to equivalved Tricorninidae.
Occurrence: Harjuan of Baltoscandia.

Crucicornina sp.
Plate 26, fig. 14.

Description, remarks: Small, elongate-triangular, with long, straight dorsal margin and widely arched ventral margin. Strongly elevated central valve area with a very thick spine (broken in the specimen available). A bow-shaped projection is present ventrally. Valve surface smooth.
Dimensions of the figured specimen Os 3650, in mm: length — 0.63 (posterior end broken); height — 0.30.
Occurrence: Vormsi Stage of Estonia.
Locality: Puhmu core — 90.70 (1 specimen).

Family Pachydomellidae Berdan et Sohn, 1961

Remarks: Morphologically Ordovician *Microcheilinella*, particularly *M. lubrica* (Stumbur, 1956), are similar to later species of *Microcheilinella*, differing only in the lack of reliable traces of large pore canals. Possible pore canals have been discovered only in *M. dagoensis* sp. n. A well-developed system of pore canals is observed in the Ordovician representatives of the genus *Daleiella*, and the genus is here assigned to Pachydomellidae. The genus *Trianguloschmidtella* Sarv, 1962 is also included in Pachydomellidae, on the basis of its similarity to Ordovician representatives of *Microcheilinella*.
Occurrence: Ordovician to Devonian

Genus *Microcheilinella* Geis, 1933
(Syn.: *Microcheilus* Geis, 1932, **non** Kittl, 1894)

Type species: *Microcheilus distortus* Geis, 1932.
Diagnosis: See Geis, 1932, p. 181.
Occurrence: Ordovician to Carboniferous, worldwide.

Microcheilinella lubrica (Stumbur, 1956)
Plate 27, figs 1–5.

1956 *Bythocypris lubrica* sp. n. — Stumbur, p. 191, pl. 3, figs 1–6.
1962 *Bythocypris lubrica* K. Stumbur — Sarv, pp. 96–98 (*partim*).
1966 *Microcheilinella lubrica* (Stumbur) — Neckaja, pp. 44–45, pl. 10, figs 4–5.
1972 *Trianguloschmidtella posterolatissima* sp. n. — Schallreuter, pp. 257–258, figs 2.1–2.5.
1972 *Microcheilinella lubrica* (Stumbur) — Pranskevičius, p. 113, pl. 23, figs 4–6.
1979 *Trianguloschmidtella posterolatissima* Schallreuter — Schallreuter, p. 26, pl. 1, figs 5–6.
1983 *Microcheilinella lubrica* (Stumbur) — Meidla, p. 54 (fig.).
1983 *Microcheilinella lubrica* (Stumbur) — Abushik and Sarv, p. 127, pl. 8, figs 1–7.
1984 *Microcheilinella lubrica* (Stumbur) — Sarv and Meidla, pp. 8, 11, 13–15.
1986 *Trianguloschmidtella posterolatissima* Schallreuter — Schallreuter, pl. 7, fig. 4.
1989 *Microcheilinella lubrica* — Nõlvak *et al.*, p. 90.
1990 *Microcheilinella lubrica* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace Os 5010, IGT. Estonia, West Viru County, Porkuni quarry. Porkuni Stage..

Remarks: The species is characterized by a considerable variation in carapace length. Some specimens have a comparatively strongly elongate carapace (for instance, the specimen figured by Stumbur, 1956, pl. 3, figs 3–4); most such specimens are recorded from the Porkuni Stage, where "normal" valves and carapaces dominate. The heigth of the outer stop-ridges on the right valve also varies considerably. The range of variation of this species requires a special study.

Sarv (1962) mentioned the occurrence of *M. lubrica* in the lower Silurian, but these specimens belong to another species (Sarv and Meidla, 1984). *Trianguloschmidtella posterolatissima* Schallreuter, 1972 is a junior synonym of *M. lubrica.*

Occurrence: Rakvere to Porkuni stages of Estonia; Pirgu Stage of Pskov region (Russia), erratic boulders on Gotland (Sweden) and in Germany.

Localities. Core sections: Orjaku — 48.70–107.80; Förby — 5.00–25.20; Haapsalu-203 — 22.20–67.75; Virtsu — 150.85; Nabala — 5.30–5.85; Põhjaka–Saare — 76.30–115.00; Vodja H-190 — 106.30; Vodja H-191 — 107.75; Moe — 2.00–40.00; Puhmu — 32.40–115.40; Laiamäe — 29.20–41.90; Vinni — 21.40–30.50; Kaugatuma — 343.85–408.05; Pärnu — 242.60–316.20; Viljandi — 309.30; Aidu — 107.20–197.10; Laeva — 177.15–225.50; Ruskavere — 60.65–137.50; Abja — 385.00–392.50; Taagepera — 422.90–427.70; Kaagvere — 188.10–246.30; outcrops: Paekna — 0.40–2.60; Turvaste; Tõrma; Paope — 0.10–1.20; Kõrgessaare; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 1.10–1.30; Tapa; Moe-2; Hosholm; Kuie; Piirsalu; Ruunavere; Adila; Lohu; Möldri — 1.00; Pirgu; Moe-1; Röa–Jakobi; Seli–Metsküla; Seli–Russalu; Iida; Siuge; Porkuni; over 1200 specimens recorded.

Microcheilinella rozhdestvenskaja Neckaja, 1966

Plate 27, figs 6–7.

1966 *Microcheilinella rozhdestvenskaja* Neckaja, sp. n. — Neckaja, pp. 45–46, pl. 8, figs 1–3.
1972 *Microcheilinella rozhdestvenskaja* Neckaja — Pranskevičius, pp. 114–115, pl. 24, figs 3–5.

Occurrence: Lowermost Silurian (Juuru Stage) of Estonia, upper Ordovician? and lower Silurian of Latvia and Lithuania.

Localities. Core sections: Viljandi — 275.50; Laeva — 173.50; 9 specimens recorded.

Microcheilinella dagoensis sp. n.

Plate 27, figs 8–9.

Holotype: Carapace Os 2930, IGT. Estonia, Orjaku core, depth 52.55 m. Pirgu Stage.

Diagnosis: Carapace with slightly angular, oval outline. Dorsal margin flatly curved, ventral margin arch-shaped, ends rounded, the anterior one higher. Hinge margin situated in a narrow depression. Left valve overlaps the right one along the ventral and posterodorsal margins and projects beyond the right valve along the ventral margin, right valve projects beyond the left valve on antero- and posteroventral margins. Lateral surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 2930	1.19	0.66	0.74
Carapace Os 2931	1.16	0.70	0.73

Description: Carapace medium-sized, of oval outline, strongly convex and unequivalved. Left valve larger than the right valve, overlapping it strongly along the ventral margin. Along posterodorsal margin the overlap is considerably smaller, along other margins not observed. Dorsal margin of both valves curved and the hinge line is situated in a narrow but distinct depression. Ends almost symmetrical, the anterior margin being somewhat more broadly curved than the posterior one. Ventral margin of the left valve arched, that of the right valve weakly curved. Antero- and posteroventral parts of the right valve with fairly high, short bend, projecting beyond the left valve in lateral view. Along other margins left valve projects beyond the right valve: strongly along ventral margin, weakly along dorsal margin. Greatest width of the carapace lies posteroventrally. Surface of the valves smooth.

Lateral surface locally with round pits (diam. about 0.002 mm), possibly openings of surficial pore canals. Irregular distribution of pits on the lateral surface may be caused by preservational factors (partial recrystallization).

Remarks: The species differs from *M. lubrica* (Stumbur, 1956) by a more straighter dorsal margin and nearly symmetrical hinge furrow.

Occurrence: Pirgu Stage of Estonia.

Localities. Core sections: Orjaku — 52.50; Haapsalu-203 — 23.50–30.90; Puhmu — 39.70–49.90; Ruskavere — 71.32; 20 specimens recorded.

Microcheilinella pirguensis sp. n.
Plate 27, figs 10–11.

Holotype: Carapace Os 2927, IGT. Estonia, Orjaku core, depth 56.85 m. Pirgu Stage.

Diagnosis: Carapace oval, with arched dorsal margin and distinctly asymmetrical dorsum, left valve projecting beyond the right valve dorsally. Ends equally rounded. A wide ventral surface is formed. Left valve overlaps right valve along free margin, strongest along ventral margin. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 2927	0.93	0.60	0.60
Carapace Os 2928	0.91	0.57	0.56
Carapace Os 2929	0.63	0.41	0.36

Description: Carapace small, oval, strongly convex, unequivalved. Left valve larger than the right valve, overlapping the latter along the free margin and overreaching it slightly at the ends, but more extensively along the ventral and dorsal margins. Dorsal margin of left valve bow-shaped, forming a high dorsal protrusion. Right valve with low but distinct dorsal protrusion. Hinge is located in a short depression. Ends almost equally rounded. In the ventral part of the lateral surface, somewhat closer to the posterior end on both valves, the lateral surface is strongly inflated and, because of that, a wide ventral surface is formed, resulting in a rhomb-shaped outline of the carapace in dorsal (or ventral) view and rounded-triangular cross-section. Short bends occur antero- and posteroventrally, parallel to the contact line. Valve surface smooth. In juveniles the width of the ventral surface decreases and the surface is increasingly tilted to the left valve.

Remarks: The new species differs from *Microcheilinella lubrica* (Stumbur, 1956) by its more asymmetrical dorsum, presence of swellings on the lateral surface and the formation of a characteristic ventral surface.

Occurrence: Pirgu Stage of Estonia.

Localities. Core sections: Orjaku — 56.80–57.40; Förby — 5.00; Haapsalu-203 — 28.70–40.10; Puhmu — 48.10–63.70; Aidu — 120.90; 39 specimens recorded.

Genus *Daleiella* Bouček, 1937

Type species: *Cythere corbuloides* Jones et Holl, 1869.
Diagnosis: See Neckaja, 1966, p. 47.
Remarks: Pranskevičius (1972) and Abushik (1979) treat *Daleiella* as a junior synonym of the genus *Microcheilinella* Geis, 1933. Pranskevičius (1972, p. 113) states that it is rather difficult to distinguish these genera on the basis of the relative size of dorsal elevations and points out the occurrence of numerous transitional forms in the Silurian of the East Baltic. The present author has made an attempt to compare the interior structure of the carapace of the Ordovician *Microcheilinella* and (supposed) *Daleiella* as observable in cross-sections. Despite some recrystallization of the valves studied, it appears that the valves of *Daleiella admiranda* (Sidaravičiene, in coll) are considerably thicker than those of several Ordovician *Microcheilinella*. Diagnosis of *Daleiella* was modified by Neckaja (1966). She emphasized the sharp asymmetry of the carapace, the rhomboidal outline of the left valve and the different convexity of the left and right valves, maximum convexity being located almost centrally in the left valve and postriorly in the right valve. Based on these features, and the different valve thickness as well, the Ordovician species included here in *Daleiella* are fairly distinct from the Ordovician *Microcheilinella*. The two genera are regarded as closely related, with the reservation that most details of interior morphology of species assigned here to *Daleiella* are still unknown. Open to debate is also the relation between the forms, here attributed to *Daleiella*, and *Tubulibairdia* Swartz, 1936.
Occurrence. Viruan, Harjuan and Silurian of Baltoscandia; Silurian of Podolia, England.

Daleiella admiranda (Sidaravičiene, in coll.)
Plate 28, figs 1–4.

1990 *Daleiella* sp. n. — Meidla and Sarv, p. 69 (fig.).
1990 *Daleiella* sp. n. — Nõlvak and Meidla, p. 141 (fig.).

Holotype: Carapace Os 3167, IGT. Estonia, Harju County, Paekna, depth 2.24–2.31 m. Rakvere Stage.
Diagnosis: Carapace small, oval, very strongly convex. Left valve exceeds the right one in size, overreach and overlap developed along all margins except dorsal margin, where a wide and deep furrow is developed between bend-like elevations. Greatest convexity of valves situated ventrally. Ventral margin of carapace with lens-shaped flat ventral surface, separated from the lateral surface by distinct bends.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3167	0.84	0.53	0.59
Carapace Os 3187	0.77	0.45	0.76
Carapace Os 3188	0.78	0.49	0.53
Carapace Os 3189	0.78	0.48	0.50

Description: Carapace small, oval. Dorsal margin arch-shaped, ventral margin flatly arch-shaped to almost straight. Ends rounded, posterior end lower than the anterior one. Dorsal margin with high dorsal elevations, the left one being somewhat higher than the right one. Greatest length of the carapace at midheigth, greatest heigth at midlength or somewhat closer to the anterior end. Carapace very strongly convex, greatest width below the midlength and somewhat posteriorly. Greatest convexity of valves in ventral part of the carapace; at the ventral margin of the carapace a lens-shaped flattened surface is developed, which is flat on

the right valve and somewhat convex on the left valve. Ventral surface separated from the lateral surface by a bend, which is distinct on the right valve and rounded on the left valve. Carapace unequivalved, left valve larger than the right valve. Overlap and overreach of the left valve developed along all margins except dorsal; the overlap is particularly great at the ventral margin. Surface of valves looks mostly smooth; in some specimens the medio-dorsal part of valves may carry an irregularly fine-striated sculpture (Os 3167, pl. 28, fig. 1). Occasionally very small pits are seen on the valve surface, which might correspond to the openings of surfical pore canals.

Width of the carapace varies slightly.

Remarks: From the type species of *Daleiella*, *D. corbuloides* (Jones et Holl, 1869), but also from *D. ianica* Neckaja, 1960 the new species differs in having an almost equal size of dorsal elevations.

The name has been introduced in a manuscript of Sidaravičiene in 1971 (carapace No.13–121/1 in LitNIGRI, from the Ledai core, depth 857.7 m (Lithuania), from Nabala Stage has been proposed for a holotype), but the species is not mentioned in later publications.

Occurrence: Rakvere Stage of Estonia; according to Sidaravičiene the species occurs in the Rakvere and Nabala stages of Lithuania.

Localities. Core sections: Orjaku — 109.20–116.40; Nabala — 9.20–12.00; Moe — 59.00–64.20; Puhmu — 122.60–125.40; Laiamäe — 75.30–80.30; Vinni — 27.20–33.40; Mäetaguse — 9.90–12.40; Kaugatuma — 411.30; Pärnu — 319.80–320.80; Laeva — 230.40–231.70; Paekna — 2.30–2.70; over 1300 specimens recorded.

Daleiella rotundata sp. n.

Plate 28, figs 5–9.

Holotype: Carapace Os 3168, IGT. Estonia, Pärnu core, depth 243.6 m. Pirgu Stage.

Diagnosis: Carapace medium-sized, relatively short, oval, very strongly convex. Left valve exceeds right one in size, overreach and overlap developed along all margins except the dorsal, particularly extensive along the ventral margin. Left dorsal elevation considerably bigger and higher than right one. Greatest convexity of carapace posteriorly, greatest width — below the midlength.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3168	1.01	0.74	0.70
Left valve Os 3190	1.01	0.68	–
Carapace Os 3191	1.07	0.66	0.67
Right valve Os 3192	0.93	0.57	–
Carapace Os 3193	1.07	0.76	0.73

Description: Carapace medium-sized, relatively short, oval. Ventral and dorsal margins arch-shaped, ends rounded, the posterior end more narrowly. Dorsal elevations high, indistinctly defined, the left one being much bigger than the right one. Greatest length and height of the carapace situated centrally. Carapace very strongly convex. Greatest width at the midlength to somewhat posteriorly, greatest convexity of valves is situated posteriorly, on the right valve distinctly closer to the posterior end. Carapace strongly unequivalved. Larger left valve overlaps the smaller right valve along all margins except the dorsal. Left valve extends beyond the right valve more distinctly at the ventral and dorsal margins, weaker at the ends. Surface of the valves smooth. Small pits on the lateral surface, seemingly distributed regularly over the entire valve surface, may be interpreted as openings of surficial pore canals. Outline of the left valve, width of the carapace and, to some extent, the character of convexity vary.

Remarks: The species differs from *D. admiranda* in having the greatest width and convexity not in the ventral part but at the midheight of the carapace, and also in the asymmetry of the dorsal elevations.
Occurrence: Vormsi?, Pirgu and ?Porkuni stages of Estonia.
Localities. Core sections: ? Förby — 25.00–25.50; ? Vodja H-191 — 107.75; Kaugatuma — 343.85–381.60; Pärnu — 241.90–295.80; Viljandi — 301.50–304.60; Aidu — 116.00–149.00; Laeva — 202.00–212.60; Ruskavere — 91.20–92.55 (93.75?); Abja — 376.50–390.20; Taagepera — 427.70; ? Otepää — 417.40; Kaagvere — 235.90–243.40 (244.30?); over 800 specimens recorded.

Genus *Trianguloschmidtella* Sarv, 1963

Type species: *Trianguloschmidtella triangulata* Sarv, 1963.
Diagnosis: See Sarv, 1963, p. 183.
Other species: *Trianguloschmidtella triangulata* Sarv, 1963, *Trianguloschmidtella torrida* Sidaravičiene, 1975.
Remarks: Sidaravičiene (1992, p. 196) followed Sarv (1963) in assigning *Trianguloschmidtella* to Leperditellidae. However, the asymmetry, character of the overlap and presence of outer stop-ridges on the right valve (see Sarv, 1963, pl. 7, fig. 9) suggest a close relationship to *Microcheilinella* Geis, 1933.

Trianguloschmidtella torrida is apparently a junior synonym of the type species, as suggested already by Sidaravičiene (1992, p. 197). *Trianguloschmidtella posterolatissima* Schallreuter, 1972 is a junior synonym of *Microcheilinella lubrica* (Stumbur, 1956).
Occurrence: Viruan of Baltoscandia.

Trianguloschmidtella triangulata Sarv, 1963
Plate 27, figs 12–13.

1963 *Trianguloschmidtella triangulata* gen. et sp. n. — Sarv, pp. 183–185, pl. 7, figs 7–13.
1975 *Trianguloschmidtella torrida* Sidaravičiene, sp. n. — Sidaravičiene, p. 22, pl. 1, fig. 4.
1982 *Trianguloschmidtella triangulata* Sarv — Gailīte *in* Ulst *et al.*, 1982, p. 126.
1988 *Trianguloschmidtella triangulata* Sarv — Sarv *in* Põlma *et al.*, 1988, pp. 62–63 etc.
* 1992 *Trianguloschmidtella torrida* Sidaravičiene — Sidaravičiene, pp. 196–197, pl. 50, figs 8–12.

Occurrence: Idavere to Keila stages of Estonia; Idavere to Oandu stages of Latvia; Kukruse to Keila stages of Lithuania and north-western Byelorussia.
Localities. Core sections: Orjaku — 134.70; Virtsu 225.40; Pärnu — 329.10; Viljandi — 338.40; 8 specimens recorded.

Family Krausellidae Berdan, 1961

Diagnosis: Carapce asymmetrical, elongate, oval to trapezoidal, moderately convex, smooth. Valves distinctly different, left valve larger than right valve, overreaches it and overlaps ventrally. Greatest convexity of carapace at to below midheigth, ventral part of carapace flattened to various degrees. Posterior end of the carapace may bear spine-like

processes. Hinge line straight, shorter than the greatest length, hinge simple. Stop-ridges and sulcament absent, adductor muscle scar unknown.

Genera in the Ordovician of Baltoscandia: Only *Krausella* Ulrich, 1894 and *Krauselloides* gen. n. may by assigned with certainty to Krausellidae. In the present work also *Reversocypris* Přibyl, 1954, *Pseudorayella* Neckaja, 1960, *Cadmea* Pranskevičius, 1972, *Revisylthere* Schallreuter, 1986, *Dagoerayella* gen. n. and *Estoniosylthere* gen. n. have been tentatively included in this family.

Remarks: The above diagnosis differs from that of Berdan (*in* Benson *et al.*, 1961, p. 371). In addition to Estonian material, it is based on examination of specimens of *Krausella variata* Kraft, 1962, *Krausella calvini* (Kay, 1940) (pl. 28, fig. 10 in the present paper) and *Krausella* sp. (pl. 28, fig. 11) from the middle Ordovician of Oklahoma.

A spine on the posteroventral part of the right valve has initially been considered as diagnostic for Krausellidae. In Rectellidae, whose carapaces are similarly asymmetrical, the spine (process) on the right valve may be ornamental (as in *Rectella carinaspinata* Schallreuter, 1972) or even lacking (e.g. *Rectella romboformis* Neckaja, 1966). Such processes on valves are apparently not related to the anatomy but may have had a balancing function in strongly inequivalved carapaces. Consequently, they have hardly a high taxonomic importance.

With regard to the inequivalved carapaces Krausellidae resemble Rectellidae, but differ in more irregular convexity of carapaces and deep overlap (and also greater dimensions, in general). Compared to Longisculidae, Krausellidae lack a sulcament and stop-ridges, with respect to the latter feature they differ from Bairdiocyprididae.

Occurrence in Baltoscandia: Viruan, Harjuan and ? Silurian.

Genus *Krausella* Ulrich, 1894

Type species: *Krausella inaequalis* Ulrich, 1894.

Diagnosis: See Ulrich, 1894, p. 691.

Occurrence: Ordovician, Silurian and ?Devonian of Europe and North America (Benson *et al.*, 1961; Kraft, 1962).

Krausella sp. n.
Plate 29, figs 1–3.

Description: Carapace large, subelliptical, elongate, with greatest width centrally and greatest height posteriorly. Maximum convexity of the right valve nearly at the midheight, that of the left valve distinctly in the ventral part, making the cross-section irregularly rounded-triangular, with an indistinctly outlined, tilted ventral surface. Ends rounded, the posterior one more widely, dorsal margin flatly curved. Ventral margin nearly straight, with a slight concavity in the anterior half. Dorsum epicline, not distinctly separated from the lateral surface. Hinge margin short. Right valve with a short comparatively thin spine-like process on the posteroventral valve area, apparently slightly overreaching the posterior margin (broken in available specimens). Left valve larger than the right one and deeply overlapping it along the ventral margin. Lateral surface smooth. The species differs from *K. variata* Kraft, 1962 in more elongate carapace and narrow and short posteroventral spine.

Dimensions in mm:	Length	Height
Carapace Os 3658	2.00	0.97
Juvenile carapace Os 3659	1.63	0.78

Occurrence: Vormsi and Pirgu stages of Estonia.
Localities. Core sections: Förby — 21.70–22.50; Haapsalu-203 — 30.90–37.40; 4 specimens recorded.

Genus *Reversocypris* Přibyl, 1955

Type species: *Reversocypris regularis* Přibyl, 1955.
Occurrence: Ordovician to Devonian, worldwide.

Reversocypris? nabalaensis sp. n.
Plate 29, figs 4–7.

1990 *Reversocypris*? sp. n. — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace Os 3114, IGT. Estonia, Puhmu core, depth 93.9 m. Nabala Stage.
Diagnosis: Carapace elongated-oval, with nearly straight ventral margin, strongly convex. Greatest convexity in left valve at midlength, in right valve closer to dorsal margin which carries strongly convex dorsal node. Left valve larger than right valve, overlapping it along ventral, anterodorsal and posterodorsal margins. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3114	1.60	0.80	0.91
Juvenile carapace Os 3115	0.95	0.61	0.50

Description: Carapace medium-sized, elongated-oval; dorsal margin arched, ventral one straight. Ends of the carapace rounded, posterior one slightly acuminate. Carapace strongly convex, asymmetrical; on the left valve the greatest convexity and width occur at midlength, on the right valve considerably above the midlength, almost at the level of the hinge line, the dorsal part of the valve being strongly inflated. Left valve overlaps the right valve in the middle part of the ventral margin, posterodorsally and along the anterodorsal margin. No distinct dorsum. Dorsal part of the carapace asymmetrical, a protrusion of variable morphology is developed on the right valve, the latter projecting beyond the left valve. Surface of the valves smooth.
Remarks: *R.*? *nabalaensis* sp. n. is tentatively assigned to *Reversocypris,* based on its similarity with *R.* sp. in Warshauer and Berdan, 1982 (p. 71, Pl.XIX, figs 1–5) and *R. variabilis* Melnikova, 1986, from which the new species differs in the occurrence of a straight middle part of the ventral margin.

Variation of this species is not sufficiently studied. The degree and character of the convexity of the right valve are highly variable whereas upwards in the stratigraphical section there is observed a tendency of the greatest height of the right valve to shift towards the posterior end, simultaneously with the decrease of the convexity of the dorsal protrusion. In the Vormsi and Pirgu stages occasional adult specimens differ notably from the holotype, but it is difficult to distinguish between different varieties due to insufficient material and great similarity of specimens at earlier growth stages.
Occurrence: Rakvere to Pirgu stages of Estonia.

Localities. Core sections: Orjaku — 85.50–100.00; Förby — 19.90 (16.20?)–25.50; Vodja H-190 — 117.70; Vodja H-191 — 107.75; Puhmu — 84.50–114.80; Laiamäe — 47.60–62.50; Vinni — 18.80–25.50; Kaugatuma — 386.95–409.50; Pärnu — 300.00–314.40; Aidu — 185.00–197.10; Laeva — 214.10 (216.00?); Ruskavere — 112.70 (70.55?)–132.45; Abja — 392.35–393.30; ? Taagepera — 453.50; Kaagvere — 244.60–246.60; outcrops: Paekna — 0.40–1.80; Sutlema; Tõrma; Paope — 0.40–1.20; ? Paluküla — 2.10–2.40; ? Saxby; Urge; Moe-2; over 130 specimens recorded.

Genus *Pseudorayella* Neckaja, 1960

Type species: *Pseudorayella scala* Neckaja *in* Abushik *et al.*, 1960.
Diagnosis: See Neckaja *in* Abushik *et al.*, 1960, p. 360.
Occurrence: Ordovician and Silurian of Baltoscandia, Silurian of the Siberian Platform.

Pseudorayella concinna Neckaja, 1960
Plate 29, figs 8–9.

1960 *Pseudorayella concinna* Neckaja, gen. et sp. nov. — Neckaja *in* Abushik *et al.*, pp. 361–362, pl. 69, fig. 8.
1984 *Pseudorayella concinna* Neckaja — Sarv and Meidla, p. 11.
1990 Pseudorayella concinna — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace No. 9/193, VNIGRI. Latvia, Plavinas (subsurface). Itfer Beds (?), Viruan.
Remarks: Specimens which occur in the uppermost Viruan and Harjuan of Estonia generally agree well with the type specimen of *P. concinna*. The original data on the distribution of the species (Abushik *et al.*, 1960) are too incomplete for defining the stratigraphic range, but it appears to be very long. In Latvian sections the full stratigraphic range of this species is unknown, because it has not been referred to in more recent papers (Ulst *et al.*, 1982; etc.).

Variation of *P. concinna* requires a special study. The outline of the posterior end varies moderately. In the specimens from the uppermost Ordovician of Estonia (Pirgu and Porkuni stages) the ventral margin tends to be more strongly arched. Two or more subspecies might be present in the available material.
Occurrence: Oandu to Vormsi and ?Pirgu to Porkuni stages of Estonia; Viruan of Latvia.
Localities. Core sections: Orjaku — 111.00–129.70; Förby — 17.40–25.00; Nabala — 4.50–19.40; ? Vodja H-190 — 106.30; Moe — 61.90 (33.30?); Puhmu — (33.10?) 100.30–111.10 (121.90?); Laiamäe — 42.10–90.30; Vinni — 19.70–40.00; ?Aidu — 110.00–114.00; Mäetaguse — 6.60–20.60; Pärnu — (293.00?) 327.50; Laeva — 231.70; Ruskavere — 107.35 (92.55?)–125.20; Kaagvere — 257.60; outcrops: Ussimägi — 0.40–1.75; Paekna — 0.40–2.70; Rägavere; Piilse; Nõmmeküla; ?Urge; ? Paope — 1.20; ?Moe-2; Paluküla — 0.94–2.40; ?Röa–Jakobi; ?Seli–Metsküla; ?Porkuni; over 160 specimens recorded.

Pseudorayella kaufmanni Schallreuter, 1975
Plate 29, figs 10–11.

1975 *Pseudorayella*? *kaufmanni* n. sp. — Schallreuter, pp. 281–283, figs 7–8.
cf. 1975 *Pseudorayella*? cf. *kaufmanni* Schallreuter — Schallreuter, 1986, pl. 7, fig. 12.

1989 *Pseudorayella kaufmanni* — Nõlvak *et al.*, p. 90.

Holotype: Carapace figured by Schallreuter (1975, figs 7–8). Sweden, Gotland, Lickershamn. Boulder (Harjuan).

Remarks: The species differs from other known representatives of *Pseudorayella* in the Ordovician of the East Baltic and adjacent areas in having an admarginal ridge anteroventrally and a spine posteroventrally on the right valve. In other details — outline, overlap and convexity — it corresponds to the diagnosis of *Pseudorayella*.

Occurrence: Pirgu to Porkuni stages of Estonia, Pirgu Stage of Pskov region (Russia). Erratic boulders in Sweden (Gotland) and Germany.

Localities. Core sections: Orjaku — 46.60; Põhjaka–Saare — 76.30; Puhmu — 39.70–47.80; Iida carst cave; 11 specimens recorded.

Genus *Cadmea* Pranskevičius, 1972

Type species: *Cadmea inexplorata* Pranskevičius, 1972.

Diagnosis: See Pranskevičius, 1972, p. 161.

Occurrence: Harjuan and lower Silurian of Baltoscandia.

Cadmea sp.
Plate 29, figs 12–13.

1983 *Cadmea*? sp. — Meidla, 1983, p. 54 (fig.).

Description: Carapace large, elongate (considerably higher in juvenile specimens), with narrowly curved anterior end and very long and sharp posterior end. Dorsal margin broadly arched, ventral one flatly curved, sometimes with slight concavity posterior of the midlength. Left valve deeply overlaps the right one centro- to posteroventrally. Along other margins the overlap is very narrow or absent. Right valve projects strongly beyond the left one dorsally. Ends of the carapace flattened in dorsal view. Lateral surface smooth. Considerable variation of the outline should be mentioned. The specimens agree with the diagnosis of *Cadmea*, but differ from the type species (*C. inexplorata* Pranskevičius, 1972), above all, in narrowly curved anterior end.

Dimensions of the figured specimen Os 2977 in mm: length — 2.08; height — 0.97.

Occurrence: Vormsi to Porkuni stages of Estonia.

Localities. Core sections: Orjaku — 91.90; Puhmu — 82.00; Ruskavere — 73.10–82.50; outcrops: Paope — 0.10–1.20; Paluküla — 1.40; Kohila-2; Prillimäe — 1.10–1.30; Moe-1; Siuge; Porkuni; 15 specimens recorded.

Genus *Revisylthere* Schallreuter, 1986

Type species: *Platyrhomboides breviclaustrum* Schallreuter, 1968.

Diagnosis: See Schallreuter, 1986, p. 12.

Occurrence: Harjuan of Baltoscandia.

Revisylthere breviclaustrum Schallreuter, 1986
Plate 30, figs 1–3.

1968 *Platyrhomboides breviclaustrum* sp. n. — Schallreuter, pp. 85–87, pl. 9, figs 7–8.
1979 *Platyrhomboides? breviclaustrum* Schallreuter — Schallreuter, p. 26, pl. 1, figs 7–8.
1984 *Platyrhomb. breviclaustrum* Sch. — Sarv and Meidla, p. 11.
1986 *Revisylthere breviclaustrum* (Schallreuter) — Schallreuter, 1986, pl. 7, fig. 11.

Holotype: Right (?) valve figured by Schallreuter (1968d, pl. 9, figs 7–8). Sweden, Gotland, Visby. Erratic boulder (Harjuan).
Occurrence: Vormsi to Porkuni stages of Estonia; erratic boulders on Gotland (Sweden) and in Germany.
Localities. Core sections: Förby — 24.30 (16.20?); Haapsalu-203 — 64.90; Põhjaka–Saare — 76.30; Vodja H-191 — 107.75; Kaugatuma — 343.85–354.60; Aidu — 145.50; Ruskavere — 60.65; over 15 specimens recorded.

Genus *Krauselloides* gen. n.

Name: Derived from the name of a related genus *Krausella*.
Type species: *Krauselloides peregrinus* sp. n.
Diagnosis: Carapace elongate, moderately convex. Dorsal margin flatly arched, hinge margin located in a furrow. Carapace ends rounded, posterior end slightly angular and higer than the anterior end. Ventral margin nearly straight. Left valve exceeds right valve in size overreaching it on all margins except dorsal and overlapping along ventral margin. Ventral part of the valve flattened. Valve surface smooth.
Other species: *Krauselloides*? sp. n. is tentatively included in this genus (see below).
Remarks: The new genus differs from *Krausella* Ulrich, 1894 in the lack of spine in the posteroventral part of the right valve and from *Janusella* Roth, 1929 in the absence of spines on the left valve.
Occurrence: Viruan of Baltoscandia.

Krauselloides peregrinus gen. et sp. n.
Plate 29, figs 14–16.

Holotype: Carapace Os 3094, IGT. Estonia, Vinni core, depth 43.25 m. Oandu Stage.
Diagnosis: Carapace medium-sized, trapezoidal, moderately and unevenly convex, with greatest height on posterior half. Dorsal margin of carapace arched, ends rounded, posterior end somewhat angular, ventral margin weakly concave. Hinge margin located in a small groove. Left valve larger than the right one, overreaching it along entire free margin and overlapping along ventral margin. Ventral part of carapace slightly flattened. Valve surface smooth.
Dimensions of the holotype in mm: length — 1.15; height — 0.61; width — 0.47.
Description: Carapace medium-sized, trapezoidal, elongate, moderately and unevenly convex. Dorsal margin arched, its anterior slope longer than the posterior. Ends of the carapace rounded, posterior one angular and higher than the anterior one. Ventral margin weakly concave at the midlength. Greatest height of the carapace lies on the posterior half, greatest length and width below the midheight. Hinge margin located in a groove, which deepens slightly towards the posterior end. Dorsum indistinct, right valve may slightly

protrude beyond the left one. Left valve larger than the right valve, overreaching the latter along all margins except the hinge margin and deeply overlaps it along the ventral margin. Greatest convexity of valves, particularly that of the left valve, occurs in the ventral part. Ventral part of the carapace slightly flattened, the surface formed in such a way merges with the general lateral surface.Valves smooth.
Remarks: Some specimens are comparatively higher and possess a slightly convex ventral margin. The variation has not been studied specially.
Occurrence: Oandu Stage of Estonia.
Localities. Core sections: Laiamäe — 93.00; Vinni — 43.25–44.10; Pärnu — 327.50–327.70; Laeva — 236.90–237.70; outcrops: Tõrremäe; ? Ussimägi — 2.10; over 30 specimens recorded.

Krauselloides? sp. n.
Plate 29, figs 17–18.

Description: Carapace subquadrate in lateral view, moderately convex. Straight dorsal and ventral margins parallel to each other, ends rounded near ventral margin, nearly symmetrical. Dorsum hypocline, distinct, separated from the lateral surface by narrow cristae. Left valve overlaps the right valve deeply along the ventral margin and slightly at ends. Lateral surface smooth. The assignment to *Krauselloides* is tentative, the species differs from known members of *Krausella* and *Krauselloides* by distinct, symmetrical, epicline dorsum.
Dimensions of the figured specimen Os 2983 in mm: length — 0.70; height — 0.38.
Occurrence: Nabala to Pirgu stages of Estonia.
Localities. Core sections: Orjaku — 91.00; Förby — 18.70; Haapsalu-203 — 60.60; Puhmu — 74.10–86.70; Kaugatuma — 386.60; outcrops: Permisküla; Paope — 0.85; Paluküla — 1.69–2.27; 11 specimens recorded.

Genus *Dagoerayella* gen. n.

Name: Derived from the historical name of the Isle of Hiiumaa (Dago), combined with *Rayella.*
Type species: *Dagoerayella sulcata* gen. et sp. n.
Diagnosis. Carapace elongate-oval, with flatly arched dorsal margin and rounded, almost symmetrical ends. Crista-like dorsal elevations developed on one or both valves. Carapace moderately convex, greatest convexity below midheigth. Carapace inequivalved, left valve overreaches the right one along all margins except the dorsal one. Overlap is greatest at midlength of ventral margin. Surface smooth.
Other species: *Pullvillites elongatus* Meidla, 1983.
Remarks: From other genera which are included in Krausellidae in the present work, the new genus differs in its rounded, almost symmetrical ends (*Pseudorayella* Neckaja, 1960, *Cadmea* Pranskevičius, 1972, *Krauslloides* gen. n.) or crest-like dorsal elevation (*Reversocypris* Přibyl, 1955).
Occurrence. Harjuan of Baltoscandia.

Dagoerayella elongata (Meidla, 1983)
Plate 30, figs 6–8.

1983 *Pullvillites elongatus* sp. n. — Meidla, pp. 54, 57–58, pl. 1, figs 5–8.
1984 *Pullvillites elongatus* Meidla — Sarv and Meidla, p. 11.

Holotype: Carapace Os 18, UT. Estonia, Island of Hiiumaa, Paluküla quarry. Vormsi Stage.
Diagnosis: Carapace elongated-oval, with asymmetrical dorsum. Right valve carries an arched dorsal elevation at midlength of dorsal margin.
Remarks: The stratum typicum is Vormsi Stage (not Pirgu stage, as referred to in Meidla, 1983).
Occurrence: Nabala to Porkuni stages of Estonia.
Localities. Core sections: Orjaku — 87.70; Förby — 14.30–21.10 (22.50?); Haapsalu-203 — 53.80; Vodja H-190 — 107.60; Moe — 6.50; Puhmu — 74.00–100.30; Laiamäe — 29.20–33.00; Kaugatuma — 379.30; Viljandi — 308.20; Ruskavere — 63.85; ? Taagepera — 422.90; ? Kaagvere — 249.00; outcrops: Paope — 0.85–1.20; Paluküla — 0.34–2.40; Moe-1; Seli–Metsküla; 35 specimens recorded.

Dagoerayella sulcata gen. et sp. n.
Plate 30, figs 4–5.

Holotype: Carapace Os 2978, IGT. Estonia, Orjaku core, depth 56.85 m. Pirgu Stage.
Diagnosis: Carapace elongate-oval, with epicline dorsum. Dorsal crests relatively long (about 50% the total length), symmetrical. Ventral part of right valve slightly concave.
Dimensions of holotype, mm: length — 0.81; height — 0.42; width — 0.32.
Description: Carapace small, elongate-oval; dorsal and ventral margins flatly arched, ends rounded, the posterior end somewhat lower. Dorsum epicline, with fairly long (about 50% the total carapace length), distinct crest-shaped dorsal elevations are rather long. Greatest convexity and width of the carapace occur below midlength. Carapace unequivalved; left valve overlaps the right valve along all margins except dorsal; overlap moderate, being deepest in the middle of the ventral margin and decreasing evenly towards the ends. Right valve somewhat shorter and lower than the left valve, its ventral margin slightly concave at the midlength. Valve surface is smooth.
Remarks: From *D. elongata* (Meidla,1983) the new species differs in the presence of dorsal crests on both valves.
Occurrence: Pirgu and Porkuni stages of Estonia.
Localities. Core sections: Orjaku — 56.80–57.40; Puhmu — 33.60–34.00; Kaugatuma — 343.85–353.90; Porkuni quarry; 29 specimens recorded.

Genus *Estoniosylthere* gen. n.

Name: Derived as a combination from "Estonia" and name of a related genus *Revisylthere.*
Type species: *Estoniosylthere cristata* gen. et sp. n.
Diagnosis: Carapace small, elongate, dorsal and ventral margins flatly arched. Anterior end of the carapace rounded, posterior end acuminate near the ventral margin. Greatest length of carapace in its ventral part. Ventral surface separated from the lateral surface by a crest,

which is most distinct at posterior end and disappears gradually anteroventrally. Dorsum epicline, indistinct. Valve surface smooth.
Comparison. The new genus is most similar to *Revisylthere* Schallreuter, 1986 and *Inisylthere* Schallreuter, 1986. Data about the interior structures of *Estoniosylthere* are lacking, but its exterior morphology (particularly the absence of dorsal angularity, only partial development of crest-like structures on the margin of lateral and ventral surfaces) is similar to that of *Revisylthere*, differing from it in a widely rounded anterior end.
Occurrence. Uppermost Viruan and Harjuan of Estonia.

Estoniosylthere cristata gen. et sp. n.
Plate 32, figs 13–14.

Holotype: Carapace Os 2982, IGT. Estonia, Orjaku core, depth 76.8 m. Pirgu Stage.
Diagnosis: Carapace small, elongate; dorsal and ventral margins flatly arched. Anterior end of carapace rounded, posterior end — acuminate near the dorsal margin. Ventral surface tilted towards the left valve and separated from the lateral surface by a crest (right valve) or bend (left valve). Left valve overlaps the right valve on all margins except the dorsal margin which carries low dorsal crests. Valve surface smooth.
Dimensions of holotype, mm: length — 0.67; height — 0.32; width — 0.29.
Description: Carapace small, elongate. Dorsal and ventral margins very flatly arched. Anterior end of the carapace rounded, posterior end acuminate near the ventral margin. Central part of the dorsal margin with low dorsal elevations. Carapace strongly convex, with greatest width related to the ventral surface, which is somewhat tilted towards the left valve (especially in the anterior half of the carapace). On the right valve the ventral surface is separated from the lateral surface by a distinct crest which extends from the anteroventral part of the valve to its acuminate posterior end. Convexity of the left valve more regular, the lateral surface merges with the ventral one, with a distinct crest developed only at the posterior end, turning into a bend more anteriorly. Carapace moderately inequivalved, the left valve overlaps the right one along all margins except the dorsal one. The overlap is greatest in the middle part of the ventral margin. Valve surface smooth.
Remarks: The new species differs from *Revisylthere breviclaustrum* (Schallreuter, 1968) in having a widely rounded anterior end.
Occurrence: Uppermost Rakvere to Pirgu stages of Estonia.
Localities. Core sections: Orjaku — 76.80; Förby — 19.20 (25.50?); Nabala — 5.30; Põhjaka–Saare — 117.40; Moe — 18.00; Puhmu — 82.00–100.30; Laiamäe — 41.90; Kaugatuma — 388.40; Ruskavere — 117.10; outcrops: Paekna — 0.40; Osmussaar (erratic boulder); Turvaste; Tõrma; ? Paope — 1.20; Urge; 25 specimens recorded.

Estoniosylthere longata gen. et sp. n.
Plate 30, figs 12–14.

Holotype: Carapace Os 3201, IGT. Estonia, Vajangu core, depth 125.5 m. Rakvere Stage, Viruan.
Diagnosis: Carapace small, elongate; dorsal and ventral margins flatly arched; anterior end rounded; posterior end very narrowly rounded near the ventral margin. Ventral surface tilted towards left valve, separated from the lateral surface by a bend which in posterior part of the

carapace turns into a distinct crest. Left valve larger than right valve, overlapping it along all margins except the dorsal one. Valve surface smooth.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3201	0.78	0.35	0.31
Carapace Os 3202	0.77	0.29	0.32
Carapace Os 3203	0.73	0.34	0.32

Description: Carapace small, elongate. Dorsal and ventral margins flatly arched. Anterior end of the carapace rounded, posterior end very narrowly rounded near the ventral margin. Dorsum with an indistinct furrow. Carapace fairly convex, with its greatest width in the ventral part, at the midlength or nearer to the posterior end; ventral surface bent towards the left valve, more distinctly anteriorly. Ventral surface separated from the lateral surface by a bend extending from the anteroventral part of the carapace up to the posterior end, where it turns into a distinct crest. On the right valve the crest is longer. Carapace slightly inequivalved, left valve overlaps the right valve along all margins except the dorsal one, deepest overlap in the middle part of the ventral margin. Valve surface smooth. Juvenile carapace less convex, a distinct ventral surface is developed only at the posterior end of the carapace.

Remarks: Compared to *E. cristata* gen. et sp. n., the carapace of *E. longata* is relatively longer, dorsal furrow less distinct, and the crest-like structures occur only on the posterior half of the carapace.

Occurrence: Rakvere Stage of Estonia.

Localities. Puhmu core — 130.00–137.80; Ussimägi outcrop — 1.75; over 25 specimens recorded.

Family Rectellidae Neckaja, 1966

Diagnosis: See Neckaja, 1966, p. 52.

Remarks: According to Neckaja (1966) moderately unequivalved metacopes are assigned to Rectellidae. They do not possess a sulcament or interior stop-ridges on the left valve, but outer stop-ridges on the right valve are well developed in most species and the posterior ridge occasionally bears a spine-like process. Rectellidae differ from Bairdiocyprididae in the lack of interior stop-ridges, from Longisculidae in the lack of a sulcament. Krausellidae, which are characterized by processes on the right valve, differ in their strongly asymmetrical carapace with deep overlap along the ventral margin, and by more or less flattened ventral surface. However, in some papers Rectellidae are considered as a synonym of Bairdiocyprididae (Schallreuter, 1979c) or Krausellidae (Schallreuter, 1972c, 1979c).

Occurrence: Ordovician to Devonian of Baltoscandia; Ordovician of Podolia.

Genus *Rectella* Neckaja, 1958

(Syn.: *Mica* Neckaja, 1952, **non** Budda-Luna, 1908)

Type species: *Mica inaequalis* Neckaja, 1952.

Diagnosis: See Neckaja, 1952, p. 228.

Occurrence: Ordovician to Devonian of Baltoscandia; Ordovician of Podolia.

Rectella cf. *inaequalis* (Neckaja, 1952)

Remarks: In some poorly preserved specimens, generally similar to *Rectella nais* Neckaja, 1958, the anterior process on the right valve seems to be absent. These specimens are tentatively assigned here to *R.* cf. *inaequalis*. The Estonian rectellids from the Idavere to Keila stages require a special study.
Occurrence: Keila Stage of Estonia.
Locality: Laeva core — 239.50 (2 specimens).

Rectella nais Neckaja, 1958
Plate 31, figs 12–14.

1952 *Mica inaequalis* sp.n. — Neckaja, pp. 228–229 (*partim*), pl. 3, figs 3–4.
1958 *Rectella nais* Neckaja, sp. n. — Neckaja, pp. 355–356, pl. 1, figs 12–13.
1983 *Rectella nais* Neckaja — Meidla, p. 54. (fig.) (*partim*).
1984 *Rectella nais* Neckaja — Sarv and Meidla, pp. 8, 11.
1990 *Rectella nais* — Meidla *et al.*, p. 135 (fig.).

Holotype: Right valve No. 54–157, VNIGRI. Estonia, Viljandi County, Võhma core, depth unknown. Rakvere Stage (according to Neckaja, 1958).
Remarks: The species in the present meaning shows a considerable variation. A revision of the material is not possible for the time being, because the type specimen has not been found in the collections of VNIGRI in 1984 and a lectotype should be selected.

According to Neckaja (1958), the species has a very long stratigraphic range: from the Itfer Beds (=Idavere Stage) to the Rakvere Beds (Stage). The occurrence in the Idavere to Keila stages cannot be confirmed here.
Occurrence: Idavere to Keila? and Oandu to Pirgu stages of Estonia.
Localities. Core sections: Orjaku — 53.50–132.40; Förby — 5.00–25.00; Haapsalu-203 — 24.90–64.90; Virtsu — 135.00–187.50; Nabala — 4.50–12.00; Põhjaka–Saare — 88.00; Vodja H-190 — 108.60–117.70; Vodja H-191 — 118.80; Moe — 14.80–58.50; Puhmu — 45.70–137.80; Laiamäe — 29.20 (25.30?)–83.70; Vinni — 15.50–34.50 (43.80?); Mäetaguse — 6.60–21.10; Kaugatuma — 356.20–411.30; Pärnu — 306.30 (295.80?)–328.00; Viljandi — 312.50–319.60; Aidu — 144.50–188.20; Laeva — 208.95 (179.10?)–235.50; Ruskavere — 68.72 (63.85?)–123.35; Abja — 392.10–393.30; Taagepera — 451.00–459.00; Kaagvere — 244.60–257.60; outcrops: Ussimägi — 0.40 (0.50?); Paekna — 0.40–2.70; Piilse; Osmussaar (erratic boulder); Turvaste; Sutlema; Nõmmeküla; Tõrma; Permisküla; Paope — 0.40–1.20; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.30–1.10; Lehtse; Tapa; Moe-2; Adila; Lohu; Põriki; Moe-1; over 1300 specimens recorded.

Rectella romboformis Neckaja, 1966
Plate 30, figs 9–11.

1966 *Rectella romboformis* Neckaja, sp. n. — Neckaja, pp. 52–53, pl. 9, fig. 6.
1983 *Rectella romboformis* Neckaja — Meidla, p. 54 (fig.).
1986 *Rectella romboformis* Neckaja — Schallreuter, 1986, pl. 7, fig. 8.
1984 *Rectella romboformis* Neckaja — Sarv and Meidla, pp. 8, 11.
1989 *Rectella romboformis* Neckaja — Nõlvak *et al.*, p. 90.
1990 *Rectella romboformis* — Meidla *et al.*, p. 135 (fig.).

Holotype: Carapace No. 953–18, VNIGRI. Lithuania, Krekenava R-7 core, depth 893.55 m.
Remarks: The variation of the outline and morphology of the posteroventral area might be mentioned. Distinct subspecies cannot be distinguished for the time being.
Occurrence: Oandu? and Rakvere to Porkuni stages of Estonia; Pirgu Stage of Pskov region (Russia), Harjuan (undivided) of Lithuania. Erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Orjaku — 48.70–117.70; Förby — 5.00–25.50; Haapsalu-203 — 23.50 (22.20?)–64.90; Virtsu — 131.10–150.85 (192.80?); Nabala — 4.50–6.45; Põhjaka–Saare — 76.30–117.40; Vodja H-190 — 106.30–108.60; Vodja H-191 — 107:75–118.80; Moe — 3.00–56.50 (59.00?); Puhmu — 38.50–115.40 (137.80?); Laiamäe — 25.30–73.00 (93.00?); Vinni — 15.50–38.50 (44.10?); Mäetaguse — 9.90; Kaugatuma — 343.85–402.50; Pärnu — 241.90 (239.40?)–316.20 (328.00?); Viljandi — 296.30 (275.50?); Aidu — 107.20–183.60 (188.20?); Laeva — 178.20 (174.50?)–181.80; Ruskavere — 60.65–137.50; Abja — 373.50–388.40; Taagepera — 423.80–431.90; Otepää — 374.40–387.60 (402.60?); Kaagvere — 188.10–217.90; outcrops: ? Saku; ? Tõrremäe; Moonaküla; Rägavere; Turvaste; Sutlema; Tõrma; Permisküla; Paope — 0.10–1.20; Kõrgessaare; Paluküla — 0.12–2.40; Saxby; Sutlepa; Kohila-1; Kohila-2; Urge; Prillimäe — 0.30–1.10; Tapa; Moe-2; Kuie; Piirsalu; Adila; Lohu; Möldri — 0.00; Pirgu; Moe-1; Härgla; Siuge; over 3000 specimens recorded.

Rectella carinaspinata Schallreuter, 1972
Plate 31, figs 1–3.

1972 *Rectella carinaspinata* sp. n. — Schallreuter, p. 257, fig. 1.4.
1979 *Rectella carinaspinata* Schallreuter — Schallreuter, pl. 1, fig. 3.
1983 *Rectella nais* Neckaja — Meidla, p. 54 (fig.) (*partim*).
1984 *Rectella carinaspinata* Schallreuter — Sarv and Meidla, p. 11.
1986 *Rectella carinaspinata* Schallreuter — Schallreuter, 1986, pl. 7, fig. 3.
1990 *Rectella carinaspinata* — Meidla *et al.*, p. 135 (fig.).

Holotype: Specimen figured by Schallreuter, 1972c, fig. 1.4. Sweden, Gotland, Norderstrand. Erratic boulder (Harjuan).
Occurrence: Rakvere to Porkuni stages of Estonia; erratic boulders in Sweden (Gotland) and Germany.
Localities. Core sections: Orjaku — 51.30–93.00; Förby — 14.30–25.50; Haapsalu-203 — 24.90 (22.20?)–65.85; Põhjaka–Saare — 76.30–106.10; Vodja H-190 — 106.30; ? Moe — 3.00–48.80; Puhmu — 43.70–117.50; Laiamäe — 33.00–41.90; Kaugatuma — 344.60–374.53; Pärnu — 241.90–314.40; Aidu — 120.90 (110.00?)–134.50; Laeva — 224.10–231.70; Ruskavere — 71.32–119.65; Abja — 379.50–394.70 (397.50?); Taagepera — 429.80; Otepää — 384.20; Kaagvere — 209.80 (252.60?); outcrops: Turvaste; ? Nõmmeküla; Paope — 0.10–1.20; Kõrgessaare; Paluküla — 0.34–2.40; Kohila-1; Kohila-2; Urge; Prillimäe — 0.70–1.30; Lehtse; Tapa; Moe-2; Lohu; Põriki; Moe-1; over 400 specimens recorded.

Rectella sturiensis Gailīte, 1975
Plate 31, figs 4–5.

1975 *Rectella sturiensis* Gailīte, sp. nov. — Gailīte, pp. 53–54, pl. 2, figs 4a–b.

1984 *Rectella* cf. *sturiensis* Gailīte — Sarv and Meidla, p. 11.

Holotype: Carapace Os 31/485, VNIIMORGEO. Latvia, Talsy-55 core, depth 866.5 m. Porkuni Stage.

Remarks: The outline of the Estonian specimens is identical with that of the type specimen in lateral view, but differences occur in dorsal view (see Gailīte, 1975a, fig. 4a–b), the Estonian material being considerably wider. However, the data given about the width of the holotype seem to disagree with the dimensions on the photograph. In the figure the L/W ratio of this specimen is 3.1 (from the figure 4b), L/H ratio 1.75 (fig. 4a) and calculated H/W ratio 1.77; according to the dimensions given given in the text (*ibid.*, p. 54) the L/W (3.0) and L/H (1.8) ratios agree well with the dimensions in the photograph, but H/W (1.11!) differs considerably. It is possible that another specimen has been figured on pl. 2, fig. 4b: with the same nominal magnification the specimen is more than 10% longer in lateral view and shows an overreach of the left valve posteriorly, which is not seen in dorsal view.

Occurrence: Pirgu? and Porkuni stages of Estonia; Porkuni Stage of Latvia; Tommarp Stage of Sweden (Östergötland — Meidla, in preparation).

Localities. Core sections: ? Pärnu — 260.60; Taagepera — 419.00; 2 specimens recorded.

Rectella explanata sp. n.

Plate 31, figs 6–8.

Holotype: Carapace Os 3170, IGT. Estonia, Laeva-18 core, depth 198.65 m. Pirgu Stage.

Diagnosis: Carapace irregularly oval, with curved dorsal and concave ventral margins. Ends rounded, lateral surface flattened. Overlap weak, developed along all margins except dorsally.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3170	0.75	0.41	0.32
Left valve Os 3194	0.69	0.41	–
Right valve Os 3195	0.69	0.38	–

Description: Carapace small, irregularly elongated-oval. Dorsal margin slightly acuminate in the anterior half, its anterior slope arch-shaped, much shorter than the flatly arched posterior slope. Ventral margin of the carapace weakly concave in the anterior half. Greatest length of the carapace situated below the midheight, greatest height in the anterior half. Carapace moderately convex, lateral surface of valves flattened. Left valve larger than the right valve, moderately overreaching the latter on all margins except dorsally. Hinge margin situated in a faint, shallow depression between the dorsal elevations which are located far from the hinge margin. Surface of the valves smooth. Hinge simple, consisting of a groove on the right valve and a ridge on the left valve.

Remarks: From the majority of the representatives of *Rectella*, including also the type species, the new species differs in the lack of spines, elevations and crest-like structures in the ventral part of the right valve. With regard to the outline *R. explanata* resembles that of *R. romboformis* Neckaja, 1966, but it differs from the latter species by a flattened lateral surface. The relations between *R. explanata* and *R. sturiensis* Gailīte, 1975 are more complicated. In the latter species the proportions of the carapace and general morphology are close to those of *R. explanata* (see Gailīte, 1975a, p. 54), but the outline differs (in *R. sturiensis* the anterior end is sharper and the posterior end is higher than in *R. explanata*).

Occurrence: Pirgu Stage of Estonia.

Localities. Core sections: ? Kaugatuma — 375.95; Pärnu — 268.50–287.40 (298.20?); Viljandi — 296.30–301.50; Laeva — 193.40–205.40; Ruskavere — 108.30; Abja — 378.30; Otepää — 387.60–408.00; Kaagvere — 233.10; over 100 specimens recorded.

Rectella composita sp. n.
Plate 31, figs 9–11.

Holotype: Carapace Os 3196, IGT. Estonia, Taagepera core, depth 420.9 m, Porkuni Stage.
Diagnosis: Carapace small, elongate-oval. Dorsal and ventral margins parallel to each other, ends rounded. Carapace moderately convex; process in posteroventral part of right valve indistinctly outlined, located far from contact margin.

Dimensions in mm:	Length	Height	Width
Holotype, carapace Os 3196	0.70	0.38	0.36
Carapace Os 3197	0.66	0.34	0.32
Carapace Os 3198	0.63	0.39	0.36
Carapace Os 3199	0.63	0.32	0.31
Carapace Os 3200	0.56	0.29	0.31

Description: Carapace small, elongate-oval; dorsal and ventral margins straight, parallel to each other, ends rounded, the posterior end being angular in its lower part. Greatest height and width of the carapace situated at the midlenght. Carapace moderately convex, unequivalved. Left valve larger than the right valve, overlapping the latter more strongly along ventral margin, less strongly along anterior and posterior margins. Hinge margin situated in a shallow depression between indistinct dorsal elevations. Posteroventral part of the right valve with an angular inflation (like a very blunt spine), it overreaches the posterior margin and is situated farther from the contact margin. Surface of the valves smooth. Relative length of the carapace varies considerably.
Remarks: The new species is close to *R. nais* Neckaja, 1958, but differs in the morphology of the posteroventral area — in having a tumid process comparatively far from the contact margin — and in the lack of a crest anteroventrally.
Occurrence: Pirgu? and Porkuni stages of Estonia.
Localities. Core sections: Puhmu — 33.60 (33.10?)–34.00; ? Viljandi — 283.20; Aidu — 107.20; Abja — 366.30–368.50; Taagepera — 420.90–423.80; 58 specimens recorded.

Rectella? *proposita* Abushik et Sarv, 1983
Plate 32, figs 1–2.

1983 *Rectella*? *proposita* sp. n. — Abushik and Sarv, pp. 126–127, pl. 6, figs 5–7.

Holotype: Carapace No. 70/11412, CNIGRM. Podolia, right bank of the Dnestr River near Studenica. Molodovo Formation.
Occurrence: Vormsi and Pirgu stages of Estonia; Molodovo Formation of Podolia.
Localities. Core sections: Orjaku — 56.80; ? Förby — 21.10; Haapsalu-203 — 64.90; outcrops: Paope — 0.85; Kohila-1; Prillimäe; Piirsalu; 7 specimens recorded .

Suborder Cypridocopa Jones, 1901
Superfamily Bairdiacea Sars, 1887
Family Bairdiidae Sars, 1887
Genus *Bairdia* McCoy, 1844
Bairdia? *iocus* Schallreuter, 1987
Plate 32, fig. 3.

* 1986 *Bairdia*? *iocus* Schallreuter, 1986 — Schallreuter, 1986, pl. 8, fig. 14 (nomen nudum).
1987 *Bairdia*? *iocus* sp. n. — Schallreuter, pp. 48–49. fig. 3.5.
1989 *Bairdia*? *iocus* — Nõlvak *et al.*, p. 90.

Holotype: Right valve No. 3320, GPIH. Germany, Isle of Sylt, pit at Keitumer Heide. Erratic boulder of Harjuan age in the Kaolinsand of the Braderup Series (Quaternary).
Remarks: The assignment of this species to *Bairdia* and Bairdiidae is tentative, as mentioned already by Schallreuter (1987c, p. 48). It possibly represents a new metacope genus.
Occurrence: Vormsi? and Pirgu to Porkuni stages of Estonia; Pirgu Stage of Pskov region (Russia), erratic boulders on Gotland (Sweden) and in Germany.
Localities. Core sections: Kaugatuma — 345.38–354.60; Ruskavere — 116.40; ? Röa–Jakobi quarry; 4 specimens recorded.

Podocopida, superfamily uncertain
Genus *Adamczakia* Schallreuter, 1986

Type species: *Adamczakia holosolenica* Schallreuter, 1986.
Diagnosis: For the diagnosis of the type species see Schallreuter, 1986, p. 11. The generic diagnosis is largely based on interior features, not shown on the figures of the type specimen and invisible in Estonian specimens studied, which are represented by closed, bivalved carapaces.
Occurrence: Harjuan of Baltoscandia.

Adamczakia holosolenica Schallreuter, 1986
Plate 32, figs 4–6.

1986 *Adamczakia holosolenica* gen. et sp. n. — Schallreuter, p. 11, pl. 8, fig. 1.
1989 *Adamczakia holosolenica* — Nõlvak *et al.*, pp. 90–91.

Holotype: Left valve No. 3395, GMIH. Germany, Isle of Sylt. Erratic boulder (Harjuan).
Occurrence: Pirgu Stage of Estonia and Pskov region (Russia); erratic boulders in Germany.
Localities. Core sections: Orjaku — 47.90–72.50; Förby — 5.00; Haapsalu-203 — 24.90–47.20; Puhmu — 43.70–48.10; Aidu — 127.80–134.50; Ruskavere — 63.85; outcrops: Adila; Pirgu; over 30 specimens recorded.

Genus *Brevantia* gen. n.

Name: A combination of the names of the new species, assigned to the genus (*brevis*, *antis*).
Type species: *Brevantia antis* gen. et sp. n.
Diagnosis: Carapace small, moderately convex; dorsal and ventral margins almost straight, ends rounded, anterior end lower than the posterior one. Right valve overreaches and overlaps the left valve along all margins, except dorsally, where a faint depression occurs. Valve surface smooth.
Other species: *Brevantia brevis* gen. et sp. n.
Remarks: The new genus differs from all other Ordovician podocopes of the East Baltic in having a reverse overlap. The same type of overlap has been described in Ordovician *Macrocyproides* Spivey, 1939, whose systematic position is unclear. Valves of the type species of *Macrocyproides, M. clermontensis* Spivey, 1939 are very high and possess a strongly curved dorsal margin, whereas the valves of *Brevantia* gen. n. are distinctly elongate.
Remarks: In both new species was difficult to determine the orientation of carapace. In *B. brevis* the adductorial imprint could not be observed. In the holotype of *B. antis*, however, there is a low tubercle on the lateral surface, somewhat nearer to the lower end of the carapace. As no other characters indicate the possible orientation, and details of the interior structure and hinge are not known (closed carapaces prevail in the material), *B. antis* is oriented in the way demonstrated below. By analogy, *B. brevis* is also oriented with the lower end anteriorly. Consequently, in both species the right valve turned out to be larger than the left one, like in the type species of *Macrocyproides* (Spivey, 1939, p. 174, pl. 21, figs 38–39). Subsequently Kraft (1962, p. 68) regarded the higher end of the valve in *Macrocyproides* to be the anterior end, but the reason for this orientation was not explained in the text. The discrepance between the diagnosis of *Macrocyproides* in Benson *et al.*, 1961 (p. 387) and the associated figure (*ibid.*, fig. 310A. 9a–b), where the orientation of valves is reversed compared to the diagnosis may have played some role in his decision.
Occurrence: Viruan and Harjuan of Baltoscandia.

Brevantia antis gen. et sp. n.
Plate 32, figs 7–8.

Holotype: Carapace Os 3185, IGT. Estonia, Vinni core, depth 36.8 m. Rakvere Stage.
Diagnosis: Carapace very small, moderately convex. Dorsal margin almost straight, ventral margin concave. Ends of carapace rounded, the anterior one lower, ventrally extended. Right valve moderately overlaps and overreaches the left valve along all margins, except dorsally. Indistinct adductorial imprint occurs at about midlength of the valve. Valve surface smooth.
Dimensions of the holotype in mm: length — 0.58; height — 0.34; width — 0.25.
Description: Carapace very small, irregularly oval. Dorsal margin nearly straight, ventral margin slightly concave. Anterior end rounded, strongly ventrally extended, posterior end broadly rounded. Transition from dorsal to posterior margin somewhat angular. A shallow depression occurs at dorsal margin. Carapace moderately convex, unequivalved. Right valve larger than the left valve, overlaps and overreaches the latter along all margins, except dorsally. At the midlength of the carapace, somewhat nearer to the anterior end, a very low, round adductorial imprint is descernable. Valve surface smooth.
Occurrence: Rakvere to Vormsi stages of Estonia.

Localities. Core sections: Orjaku — 107.80–129.70; Förby — 25.00; Nabala — 12.00–19.40; Moe — 54.20–69.70; Laiamäe — 83.70; Vinni — 36.80–41.40; Mäetaguse — 17.10; Taagepera — 459.00; outcrops: Ussimägi — 1.75; Paekna — 2.70; Rägavere; Tõrma; 29 specimens recorded.

Brevantia brevis gen. et sp. n.
Plate 32, figs 9–12.

Holotype: Carapace Os 3009, IGT. Estonia, East Viru County, Piilse. Rakvere Stage.
Diagnosis: Carapace very small, moderately convex. Dorsal and ventral margins straight, parallel to each other; ends of the carapace rounded, the anterior one extended ventrally. Right valve overlaps and overreaches left valve along free margin. Dorsal margin with a shallow depression, with a moderate overreach of the right valve.

Dimensions in mm:	Length	Height	Width
Holotype carapace Os 3009	0.54	0.35	0.25
Carapace Os 3079	0.54	0.34	0.27
Carapace Os 3080	0.54	0.35	0.25
Carapace Os 3078	0.49	0.33	0.27
Carapace Os 3008	0.46	0.31	0.23

Description: Carapace very small, irregularly oval. Dorsal and ventral margins straight, parallel to each other. Ends of the carapace rounded, anterior end extended ventrally. Dorsal margin with a shallow depression. Carapace moderately convex, inequivalved, right valve overlaps and overreaches moderately the left valve along free margin. Dorsally the overreach of the right valve is less distinct. Surface of the valves smooth. Juvenile carapaces seem to be somewhat higher than those of adults.
Remarks: *B. brevis* differs from *B. antis* gen. et sp. n. in its higher anterior end, straight ventral margin and relatively short carapace.
Occurrence: Oandu to Vormsi stages of Estonia.
Localities. Core sections: Orjaku — 101.40–129.70; Nabala — 9.75–12.00; Vodja H-191 — 118.80; Moe — 57.10–59.00; Puhmu — 100.30–119.40; Laiamäe — 42.10–89.20; Vinni — 22.10–38.50; Kaugatuma — 389.25; Pärnu — 313.50–320.80 (328.00?); Laeva — 227.10–228.60 (236.90?); Ruskavere — 119.65 (114.20?); Abja — 397.80; Taagepera — 456.30–466.40; outcrops: Ussimägi — 1.75; Paekna — 1.95–2.70; Rägavere; Piilse; over 240 specimens recorded.

6. Stratigraphical distribution of ostracodes

In this chapter the correlation of sections and the ostracode distribution pattern are discussed. Some improvements to the correlation are suggested, based on the evidence from the distribution of the ostracodes.

Detailed data on the ostracode distribution are presented together with logs from core sections and some outcrops. The boundaries between lithostratigraphical units are mostly defined in a traditional, macrolithological sense, in accordance with the interpretations of L. Põlma. In some cases the stage boundaries are adjusted in accordance with the evidence from the distributions of ostracodes.

Based on ranges of ostracode species some formations can be subdivided into several units, as shown in the legends on the right side of the columns. In most cases such a subdivision contributes greatly to the precision of correlation. The sections are mostly subdivided to the formation level. As an exception, for the detailed analysis of the ostracode distribution in the boundary beds between the Oandu and Rakvere Stages, the Tõrremägi Member is distinguished whereever possible.

6.1. Oandu Stage

The ostracodes of the Oandu Stage (more than 20 species) were first described by Sarv (1956, 1959). He was also the first to point out a close connection between the ostracode associations of the Oandu and Rakvere stages (Põlma *et al.*, 1988, p. 77). According to the data in the present work, the Oandu Stage contains 64 ostracode species (see table 9). The diversity is relatively low, compared to the upper Ordovician stages of Estonia (see Hints *et al.*, 1989).

In the northern Estonian sections, discussed in the present work, the lower boundary of the Oandu Stage coincides with that of the Hirmuse Formation (fig. 2). Various authors (Oraspõld and Rõõmusoks, 1956; Põlma, 1982; Põlma *et al.*, 1988; Hints *et al.*, 1989) have repeatedly pointed out the particular significance of this boundary. More than 30 genera of various fossil groups make their first appearance here. With regard to ostracodes this is one of the most distinct boundaries in the whole Ordovician of Estonia. It is characterized by the disappearance of a large number of genera (*Tallinnella*, *Polyceratella*, *Hesperidella*, *Homeokiesowia*), and most of the dominant species as well (*Sigmoopsis rostrata*, *Pedomphalella egregia*, *Tetrada krausei*, *Trianguloschmidtella triangulata*, *Pyxion nitidum*, etc.). Only a small number of species pass from the Keila Stage to the Oandu Stage (*Bolbina major*), *Leperditella prima*, and some others), but nearly 80% of the ostracode species of the Hirmuse Formation make their first appearance here.

The available material from the Oandu Stage of North Estonia comes mostly from the Hirmuse Formation and Tõrremägi Member. Scarce ostracode finds have been recorded from the Saku Member of the Koppelmaa trench and Saku quarry (table 2), but they are not discussed here.

In argillaceous limestones and marlstones of the Hirmuse Formation 36 ostracode species have been identified. More widely distributed species are *Bolbina rakverensis*, *Bolbina major*, *Consonopsis zastrowensis*, *Circulinella nuda*, *Klimphores minimus*, *Easchmidtella fragosa*, *Sigmoopsis granulata* and *Platybolbina temperata* (see also Põlma *et al.*, 1988). The list of the ostracodes from the Hirmuse Formation (but also from all other formations dealt with in this paper) is presented in table 9. It is based on the collections from numerous sections: Tõrremägi trench (table 2) and Ussimägi outcrop (fig. 5), but also from the Orjaku (fig. 7), Virtsu (fig. 8), Laiamäe (fig. 9) and Vinni (fig. 10) cores.

Table 2. Ostracode distribution in the outcrops of the Hirmuse Formation, Oandu Stage (with number of specimens given).

	Koppelmaa	Saku	Tõrremägi
Platybolbina temperata Sarv	1	1	35
Moeckowia rava (Sarv)	1	5	19
Disulcina perita perita (Sarv)		1	6
Circulinella nuda Neckaja		3	2
Rectella cf. *romboformis* Neckaja		1	1
Scrobisylthis reticulatus (Sarv)			2
Bolbina rakverensis Sarv			510
Bolbina major (Krause)			60
Sigmoopsis granulata Sarv			505
Platybolbina cf. *orbiculata* Sarv			11
Uhakiella oanduensis Sarv			11
Consonopsis zastrowensis Schallreuter			7
Seviculina oanduensis (Sarv)			53
Easchmidtella fragosa (Neckaja)			1
Krauselloides peregrinus gen. et sp. n.			16
Baltocyamus primarius Meidla,			122

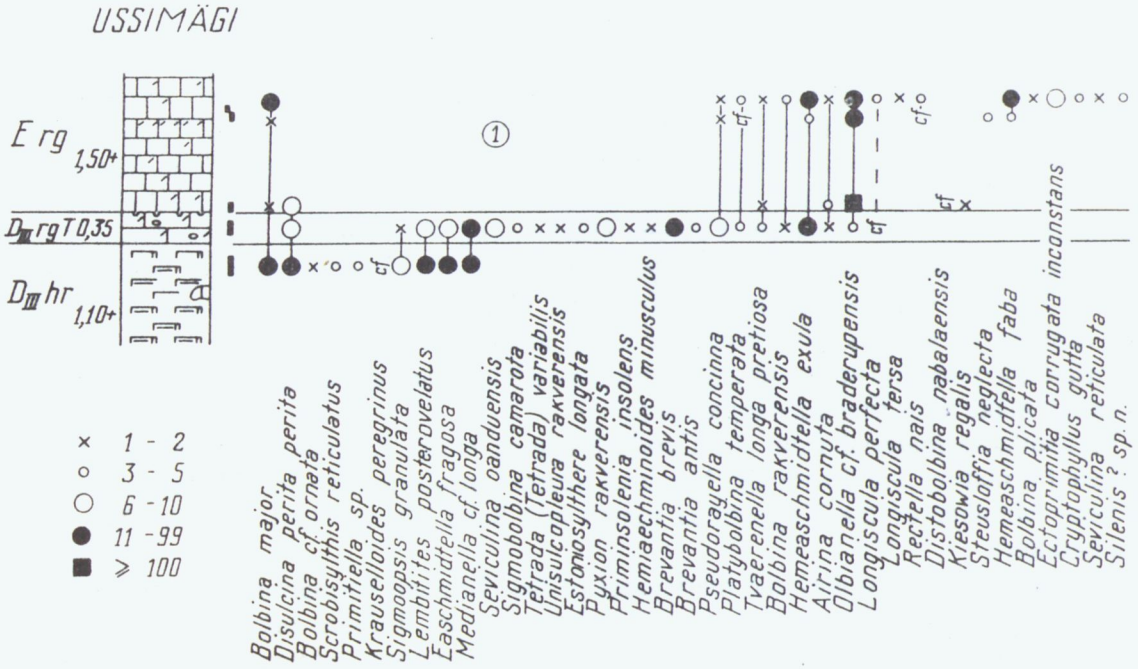

Figure 5. The distribution of ostracodes in the Ussimägi outcrop. Legend see figure 6. The indeces of stratigraphical units see figure 2. In the lower left corner the symbols showing the number of specimens are given.

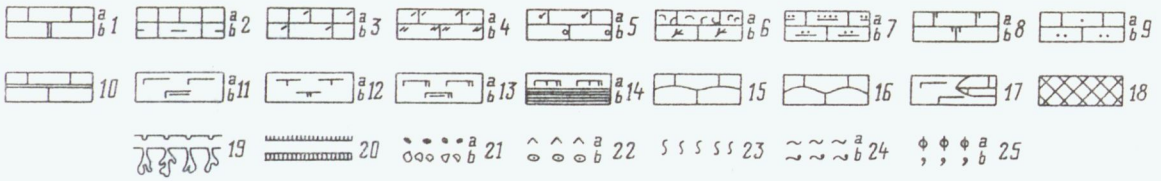

Figure 6. Legend for lithological columns: 1a — limestone in general, 1b — dolomite in general, 2a — cryptocrystalline (aphanitic) limestone, 2b — argillaceous limestone, 3a, b — fine-grained skeletal packstone, 4a — fine skeletal grainstone, 4b — coarse skeletal grainstone, 5a — limestone with pyritized skeletal sand, 5b — pelletal packstone, 6a — coquinoid limestone, 6b — algal limestone, 7a — argillaceous silty limestone; 7b — argillaceous sandy limestone, 8a, b — dolomitic limestones, 9a — sandy limestone, 9b — silty limestone, 10 — limestone-marl interbedding (ratio ~1:1), 11a — calcareous marl, 11b — argillaceous marl, 12a — marls in general, 12b — domerites in general, 13a — dolomitic calcareous marl, 13b — dolomitic argillaceous marl, 14a — calcareous dolomitic marl, 14b — argillite, 15 — seminodular limestone, 16 — nodular limestone, 17 — limestone nodules in calcareous marl, 18 — biohermal and mound limestones, 19 — discontinuity surface, 20 — K-bentonite, 21a — pyritized rounded lithoclasts, 21b — unrounded lithoclasts, 22a — organic content, 22b — oolitic limestone, 23 — subvertical burrows, 24a — subhorizontal burrows, 24b — the same, pyritized, 25a — silicification, 25b — glauconite grains.

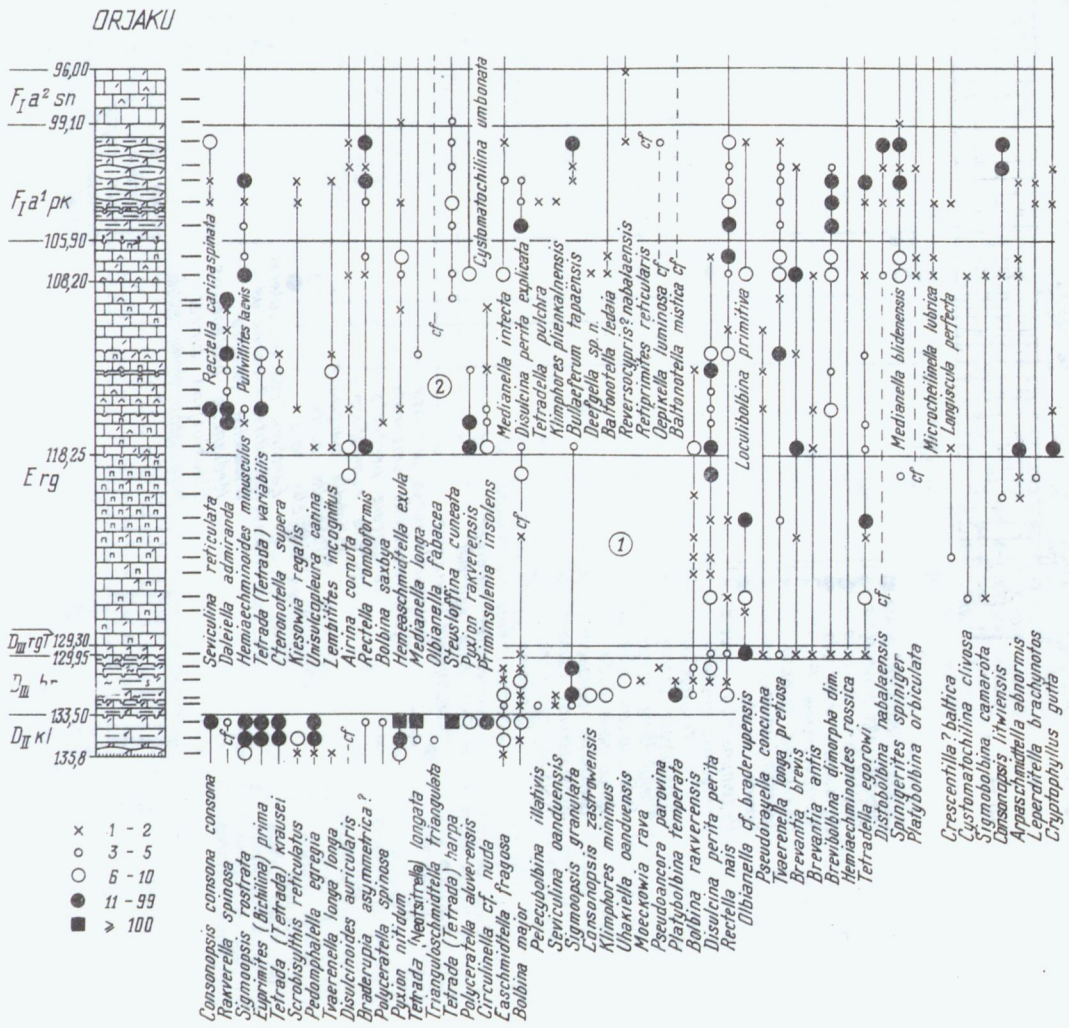

Figure 7. The distribution of ostracodes in the Orjaku core section, Keila to Nabala stages. The Vormsi to Porkuni Stages see fig. 32. Legend see figs 2, 6.

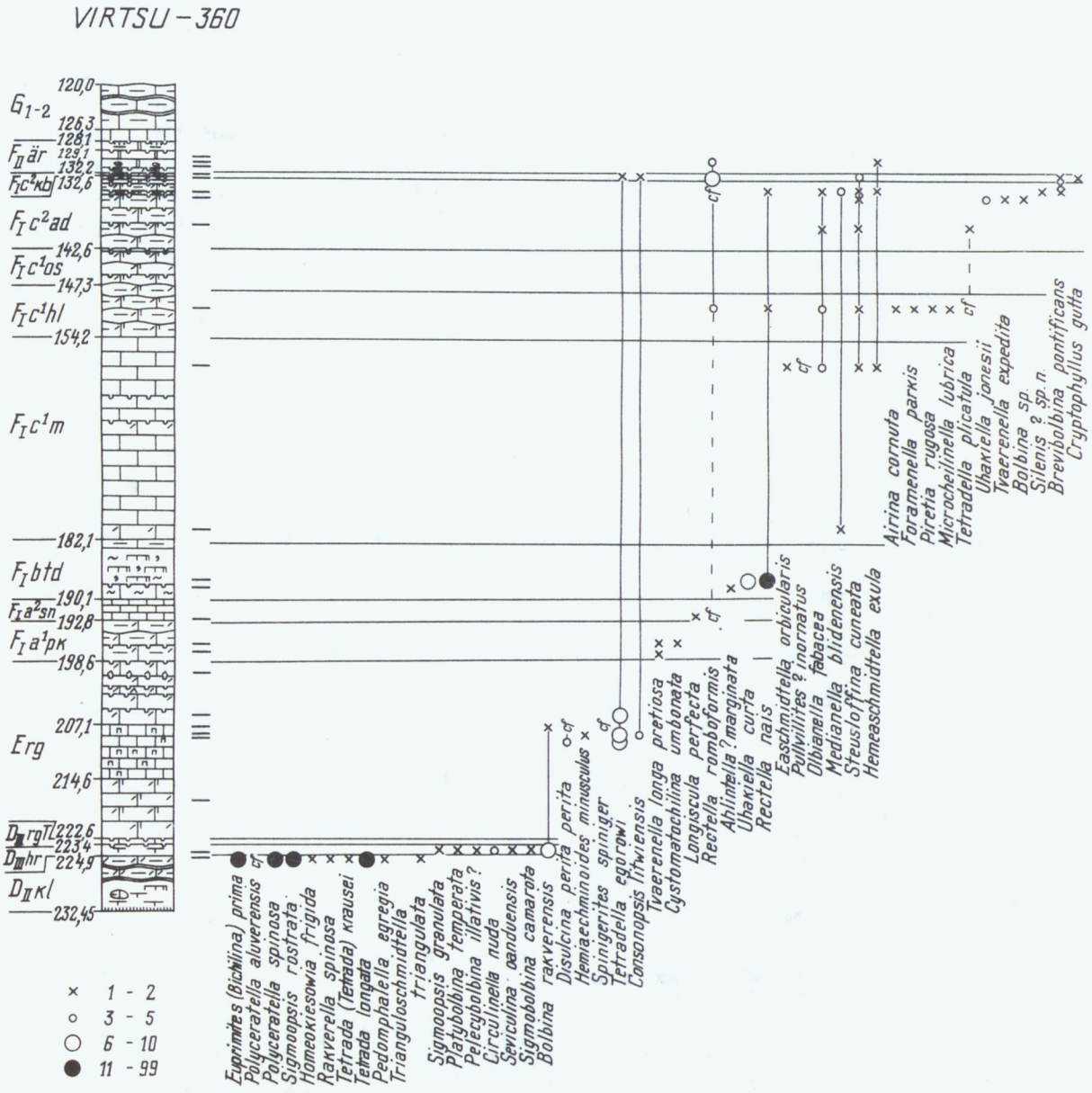

Figure 8. The distribution of ostracodes in the Virtsu core section. Legend see figs 2, 6.

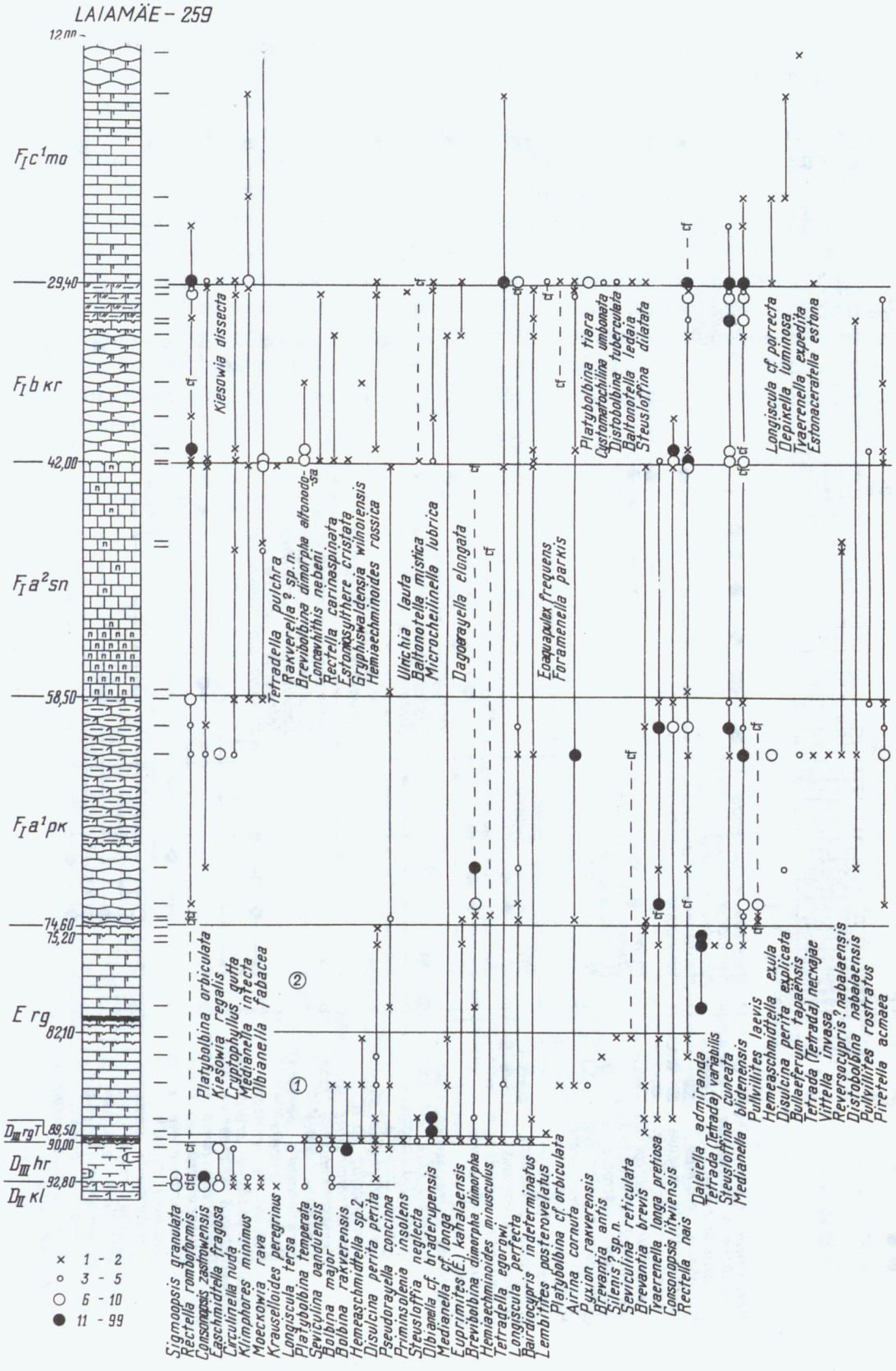

Figure 9. The distribution of ostracodes in the Laiamäe-259 core section. Legend see figs 2, 6.

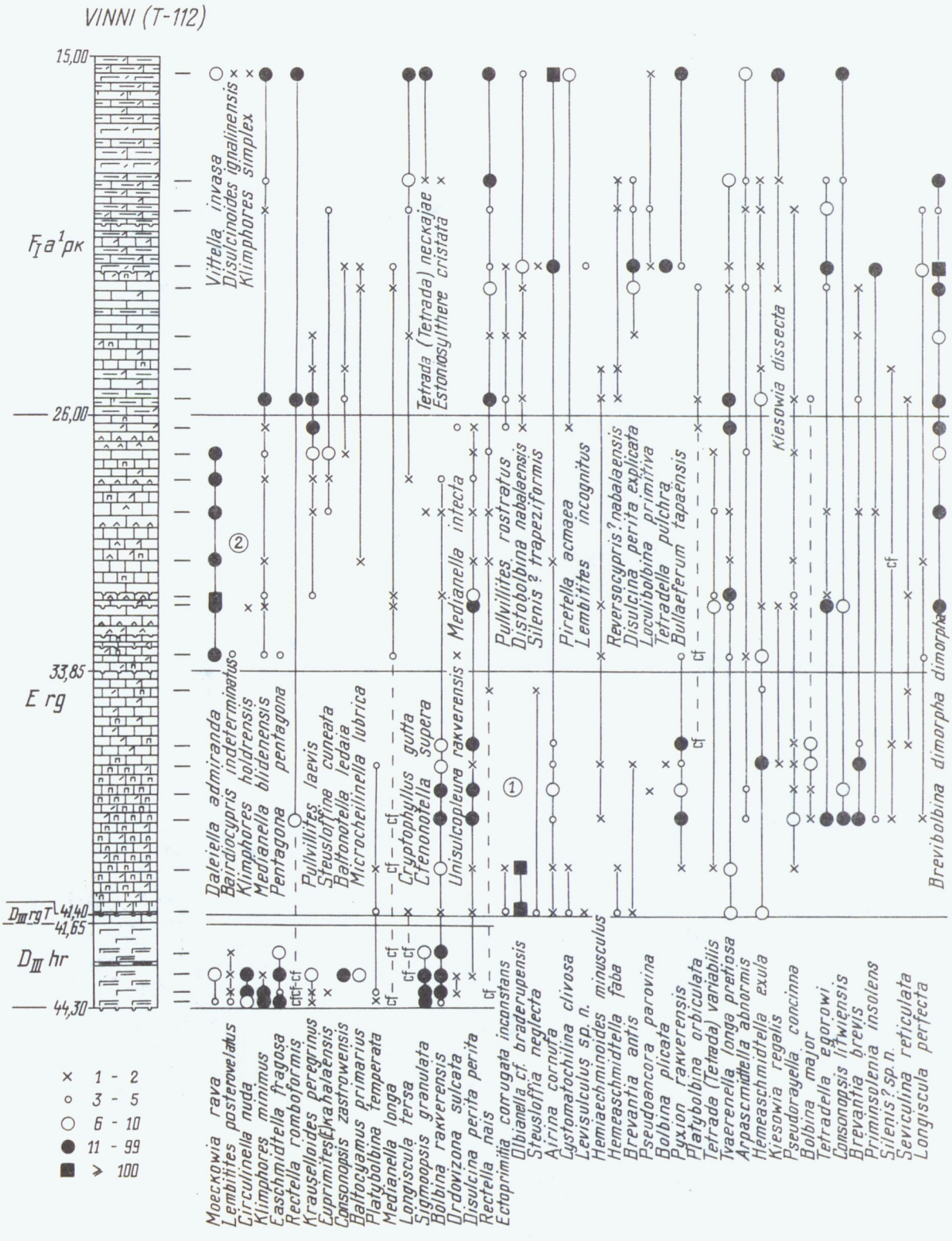

Figure 10. The distribution of ostracodes in the Vinni (T-112) core section. Legend see figs 2, 6.

The topmost part of the Oandu Stage in North Estonia, the Tõrremägi Member, represents the lower, lithologically transitional part of the Rägavere Formation. It is represented by micro- and cryptocrystalline limestones and contains 38 ostracode species (see tables 3 and 9), and some species with open nomenclature (see Põlma *et al.*, 1988). The ostracodes of the Tõrremägi Member have been investigated by the author from the Ussimägi outcrop section (fig. 5), but also in Orjaku (fig. 7), Laiamäe (fig. 9), Mäetaguse (fig. 11), Viljandi (fig. 12) and Laeva-18 (fig. 13) core sections. The most widespread forms in this member are *Olbianella* cf. *braderupensis*, *Tvaerenella longa pretiosa* and *Disculcina perita perita*. The lower boundary of the Tõrremägi Member is palaeontologically fairly distinct, due to the appearance of 16 new ostracode species (see table 3) and by the absence of *Uhakiella oanduensis*, *Scrobisylthis reticulatus*, *Pelecybolbina illativis*, *Baltocyamus primarius*, *Priminsolenia minima*, *Krauselloides peregrinus* which are common in the underlying strata. In the practice the lower boundary of the Rakvere Stage has traditionally been defined at the top of the Tõrremägi Member, but in North Estonia the biostratigraphical control over this boundary is rather limited.

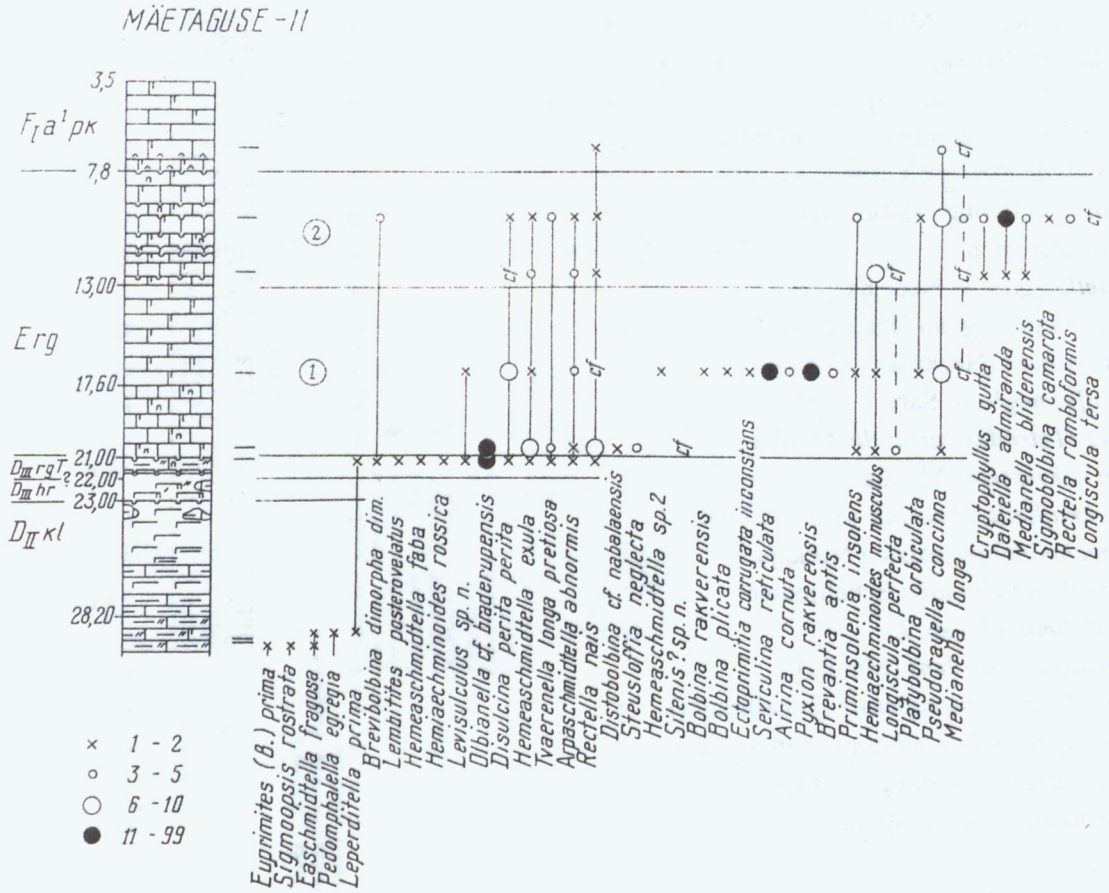

Figure 11. The distribution of ostracodes in the Mäetaguse-11 core section. Legend see figs 2, 6.

Table 3. Faunal relationships of the Tõrremägi Member with under- and overlying strata.

	Hirmuse and Lukštai Fm.	Tõrremägi Mbr.	Rägavere Fm.
Seviculina oanduensis (Sarv)	+	+	
Lembitites posterovelatus (Sarv)	+	+	+
Platybolbina temperata Sarv	+	+	+
Sigmoopsis granulata Sarv	+	+	+
Moeckowia rava (Sarv)	+	+	+
Sigmobolbina camarota Jaanusson	+	+	+
Disulcina perita perita (Sarv)	+	+	+
Pelecybolbina pelecyoides Jaanusson	+	+	+
Euprimites (Euprimites) kahalaensis Sarv	+	+	+
Tvaerenella longa pretiosa Sarv	+	+	+
Bolbina rakverensis Sarv	+	+	+
Leperditella prima Sarv	+	+	+
Ordovizona sulcata Schallreuter	+	+	+
Easchmidtella fragosa (Neckaja)	+	+	+
Hemeaschmidtella exula Schallreuter	+	+	+
Pseudorayella concinna Neckaja	+	+	+
Longiscula perfecta Meidla	+	+	+
Rectella nais Neckaja	+	+	+
Brevantia brevis gen. et sp. n.	+	+	+
Hemiaechminoides minusculus Meidla	o	+	+
Brevibolbina dimorpha dimorpha Sarv	o	+	+
Medianella cf. *longa* (Stumbur)	o	o	+
Levisulculus sp. n.		+	+
Tetradella egorowi Neckaja		+	+
Pentagona pentagona (Jaanusson)		+	+
Airina cornuta (Neckaja)		+	+
Steusloffia neglecta Sarv		+	+
Tetrada (Tetrada) variabilis Meidla		+	+
Pyxion rakverensis Meidla		+	+
Arpaschmidtella abnormis (Sidaravičiene)		+	+
Hemiaechminoides rossica Neckaja		+	+
Hemeaschmidtella faba Schallreuter		+	+
Hemeaschmidtella sp. 2		+	+
Priminsolenia insolens (Meidla)		+	+
Olbianella cf. *braderupensis* (Schallreuter)		+	+
Bairdiocypris indeterminatus Pranskevičius		+	+
Estoniosylthere longata gen. et sp. n.		+	+
Brevantia antis gen. et sp. n.		+	+

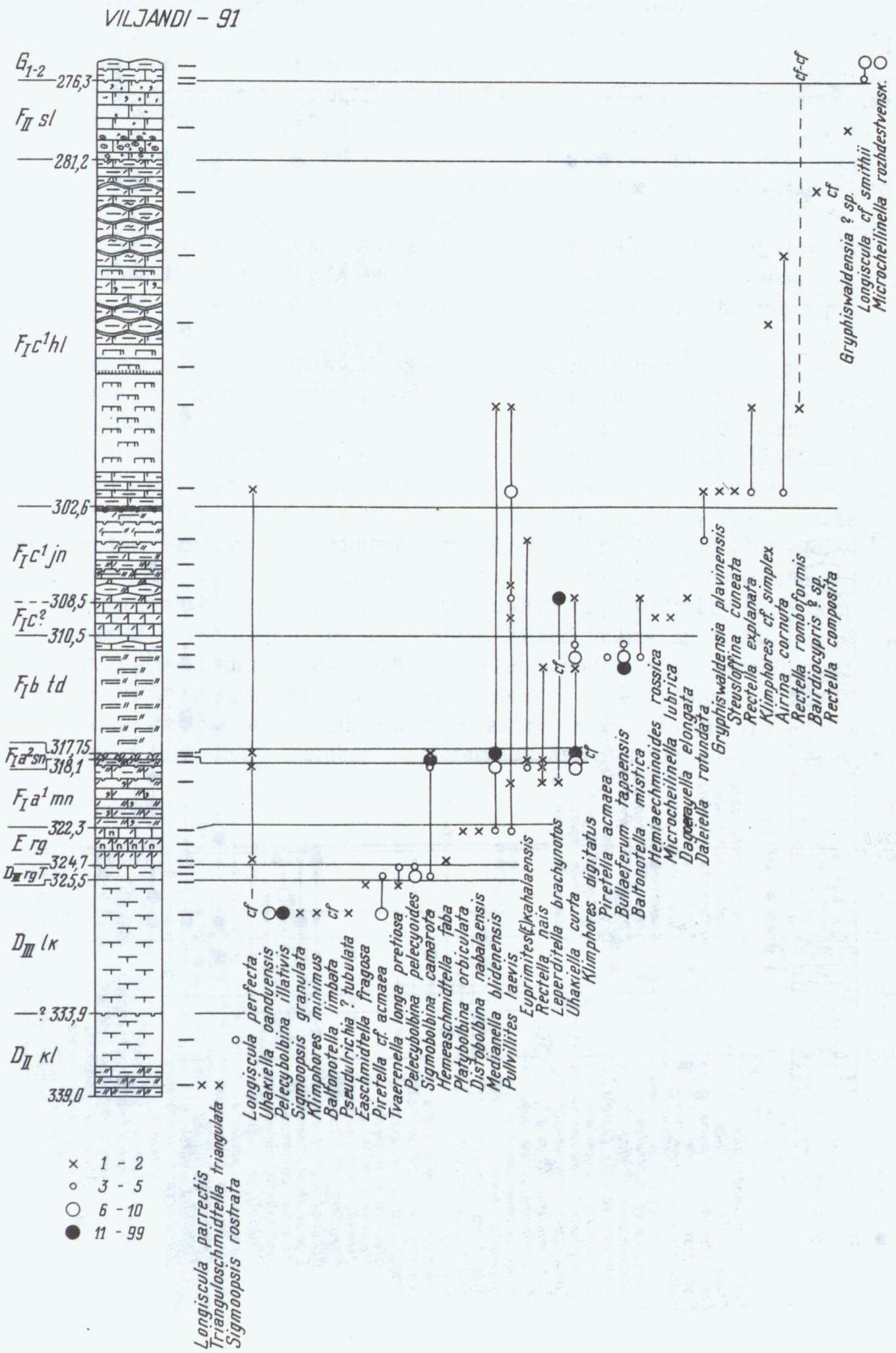

Figure 12. The distribution of ostracodes in the Viljandi-91 core section. Legend see figs 2, 6.

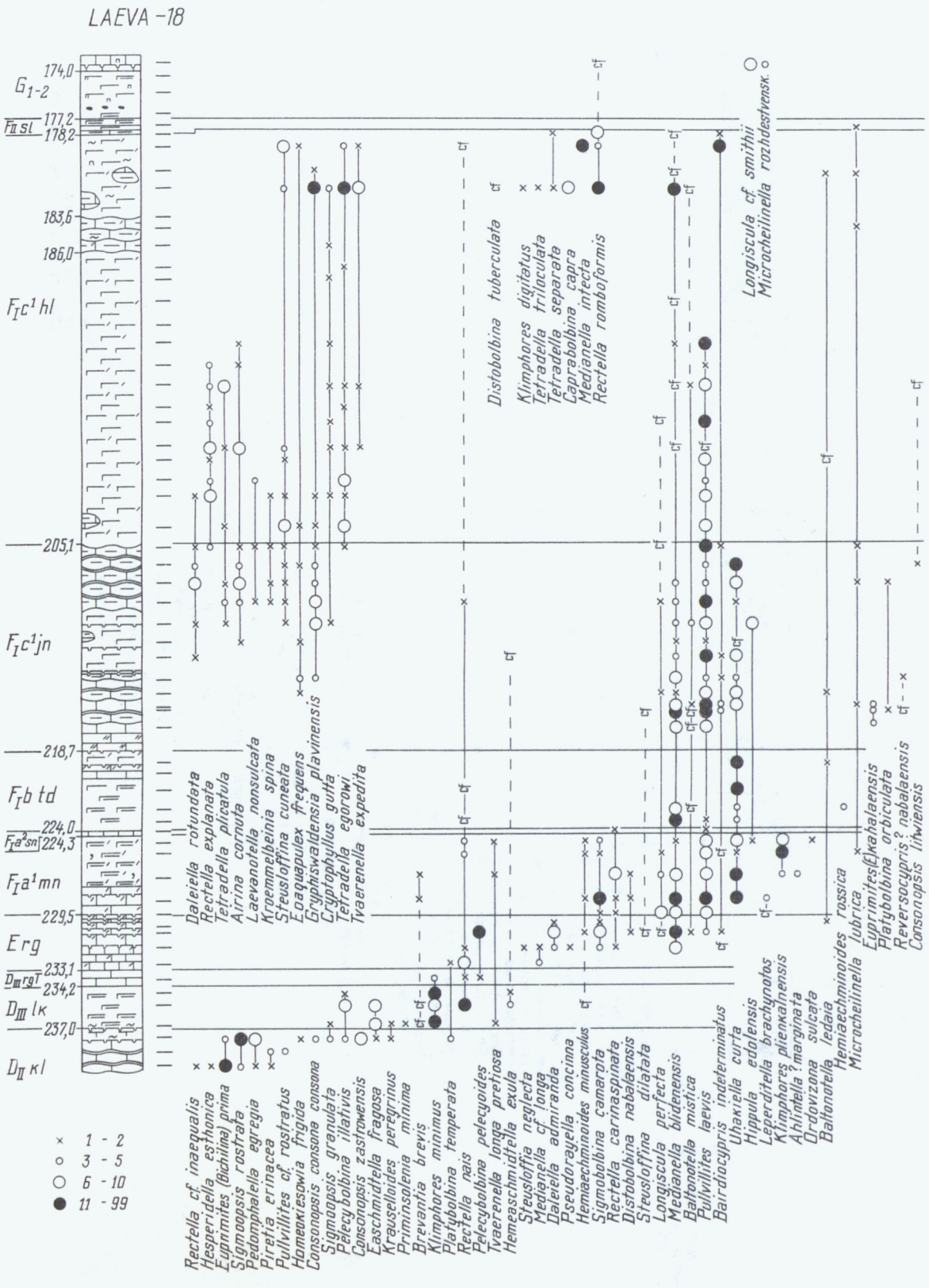

Figure 13. The distribution of ostracodes in the Laeva-18 core section. Legend see figs 2, 6.

The species composition of the ostracode assemblage of the Lukštai Formation differs only inconsiderably from that of the Hirmuse formation, but *Pelecybolbina illativis* (?=*Pelecybolbina pelecyoides* in Põlma *et al.*, 1988, figs 35, 37), *Eashmidtella fragosa*, *Rectella nais* and *Klimphores minimus* dominate quantitatively. In the Pärnu core (fig. 14) species predominating in more northern sections are still comparatively abundant in the Lukštai Formation, but eastwards, in the Viljandi (fig. 12) and Laeva-18 (fig. 13) cores, their importance decreases. In the Kaagvere core (fig. 15) the diversity decreases notably and the lower boundary of the Oandu Stage is tentatively drawn at the appearance of *Pelecybolbina* sp. (?= *P. illativis*) and *Piretella* sp. (? *P.* cf. *acmaea*) above the level of disappearance of *Euprimites* (*Bichilina*) sp. and *Tetrada krausei*.

In some core sections of Central Estonia the lowermost beds of the Rägavere Formation are distinguished as the Tõrremägi Member (e.g. Viljandi and Laeva-18 cores, figs 12, 13). With regard to the ostracode assemblage they do not differ from the main part of the formation.

In the Otepää core (fig. 16), the thickness and boundaries of the Oandu Stage were not determined, because data from the interval 343.3–445,1 m appears to be unreliable. The samples demonstrate the co-occurrence of species which commonly occur at different stratigraphical levels, possibly reflecting the poor quality of the core in this interval. This interpretation does not contradict the distribution pattern of other fossil groups (see Männil, 1966, fig. 13). The interval 237.0–237.8 m in the Laeva-18 core (fig. 13) also has yielded a mixed fauna, containing both the "Keilan" and "Oanduan" species, but the interval is characterized by an extensive bioturbation, associated with several (not less than four) discontinuity surfaces. Therefore, as most probably younger fauna entered older deposits through fairly deep vertical borings, the interval is ascribed to the Keila Stage. Mixed faunas, apparently caused by the same factor, occur also in some erratic boulders of Baltoscandian origin (Schallreuter, 1993b)

According to the latest stratigraphical charts (Hints *et al.*, 1993; Männil and Meidla, 1994) in southern Estonia the Oandu and Rakvere stages are represented by the Mossen Formation, whereas the lower thin "shaly member" is tentatively assigned to the Oandu Stage and the

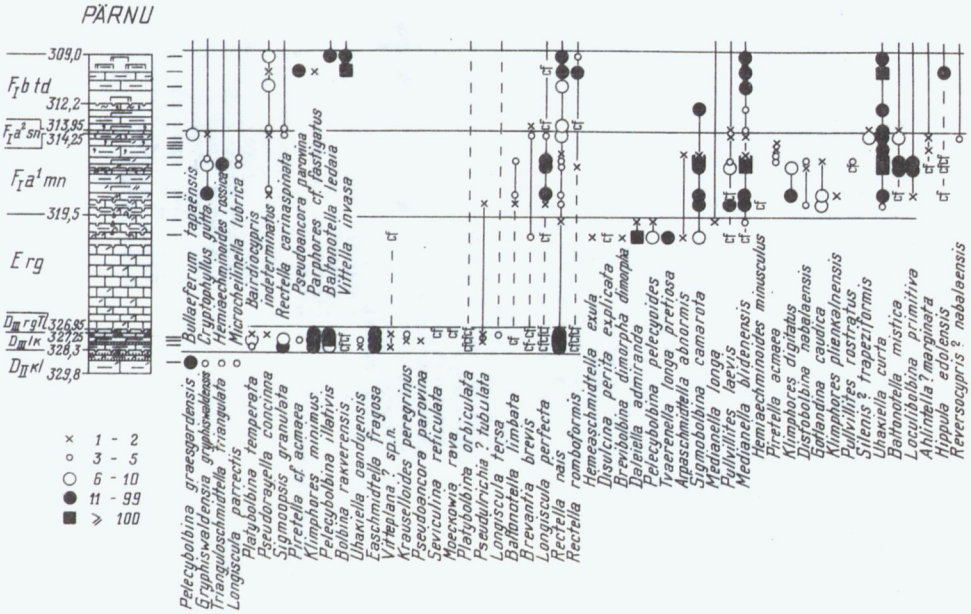

Figure 14. The distribution of ostracodes in the Pärnu core section, Keila to Vormsi stages. The Pirgu to Porkuni stages see fig. 40. Legend see figs 2, 6.

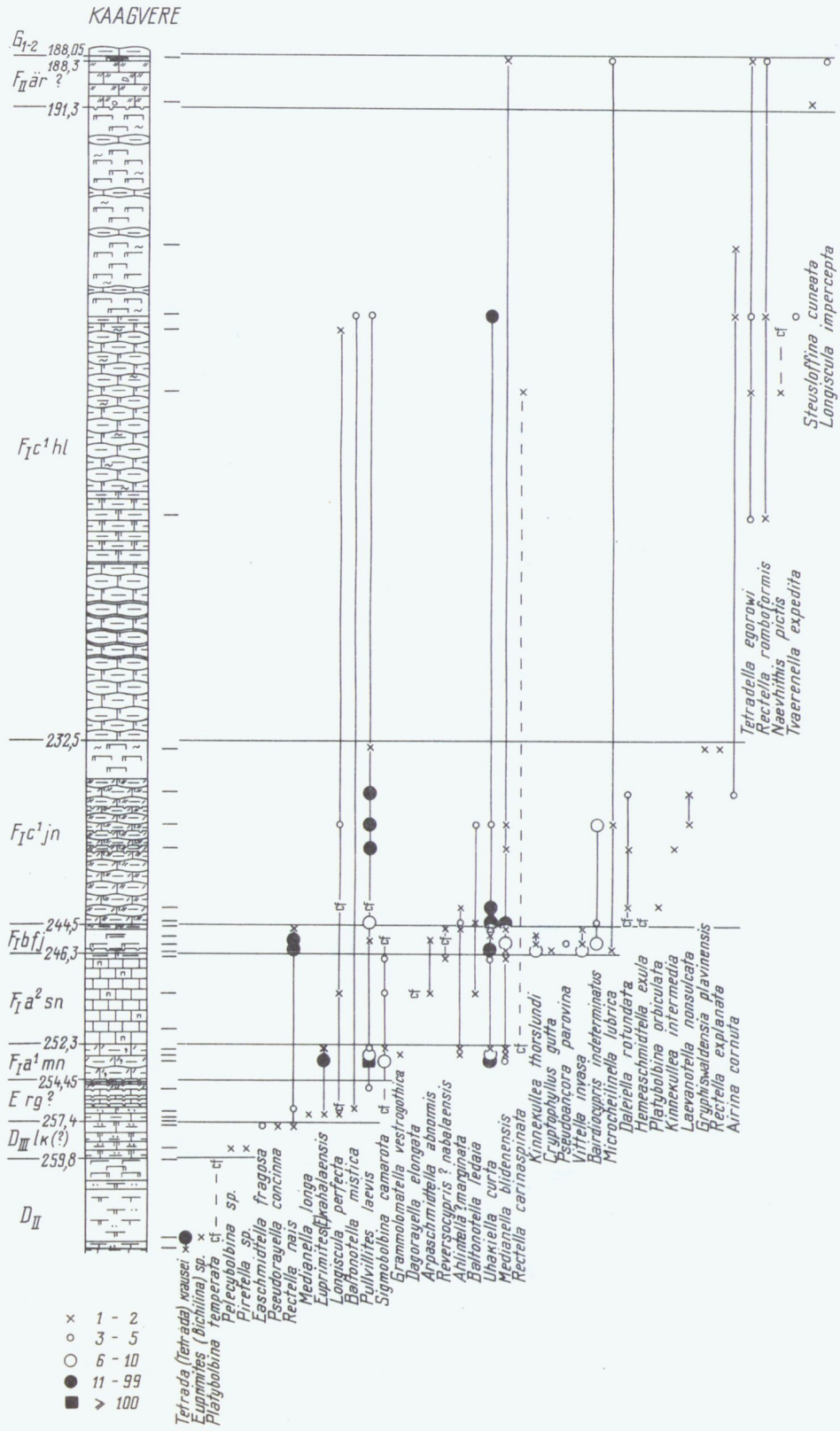

Figure 15. The distribution of ostracodes in the Kaagvere-1 core section. Legend see figs 2, 6.

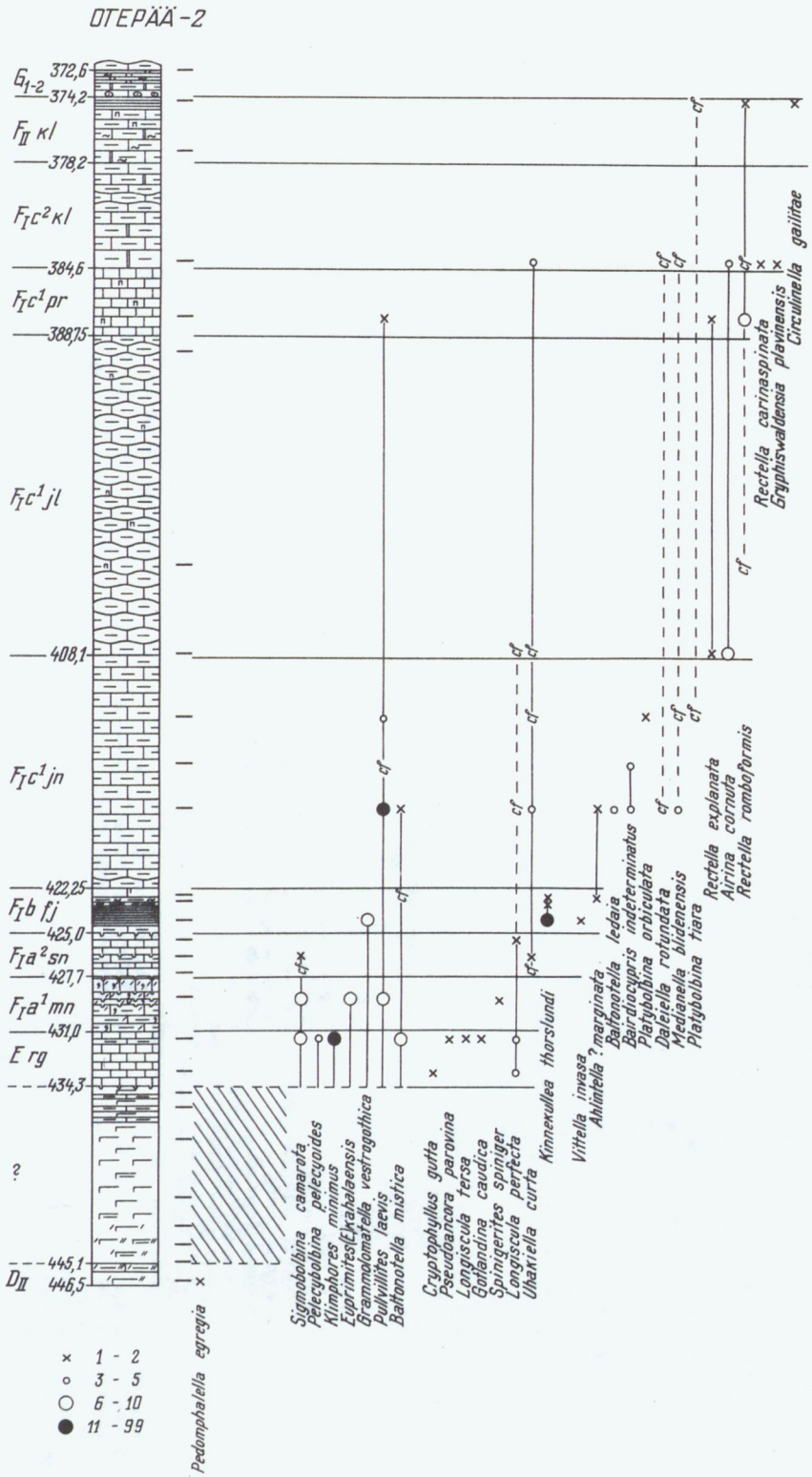

Figure 16. The distribution of ostracodes in the Otepää-2 core section. Legend see figs 2, 6.

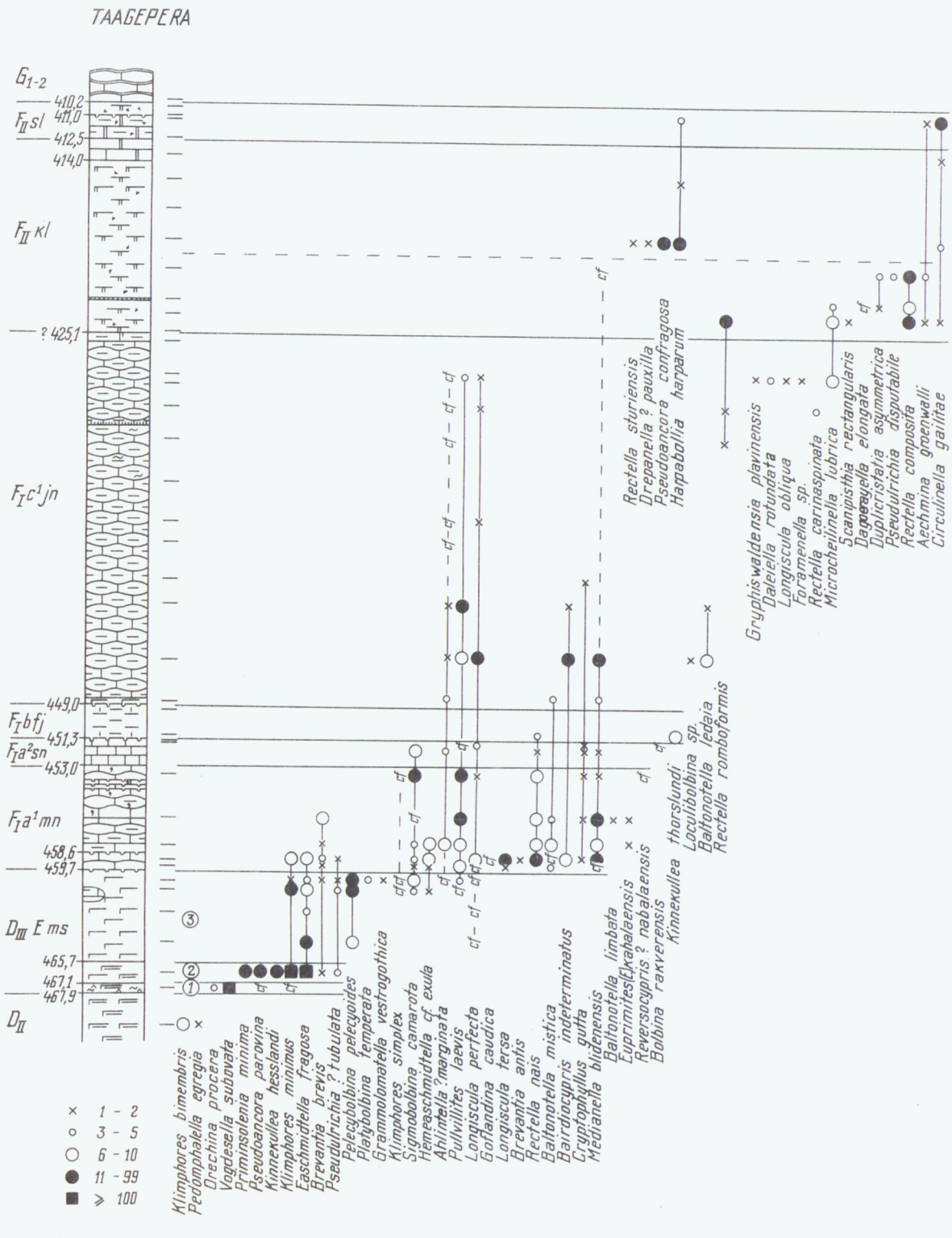

Figure 17. The distribution of ostracodes in the Taagepera core section. Legend see figs 2, 6.

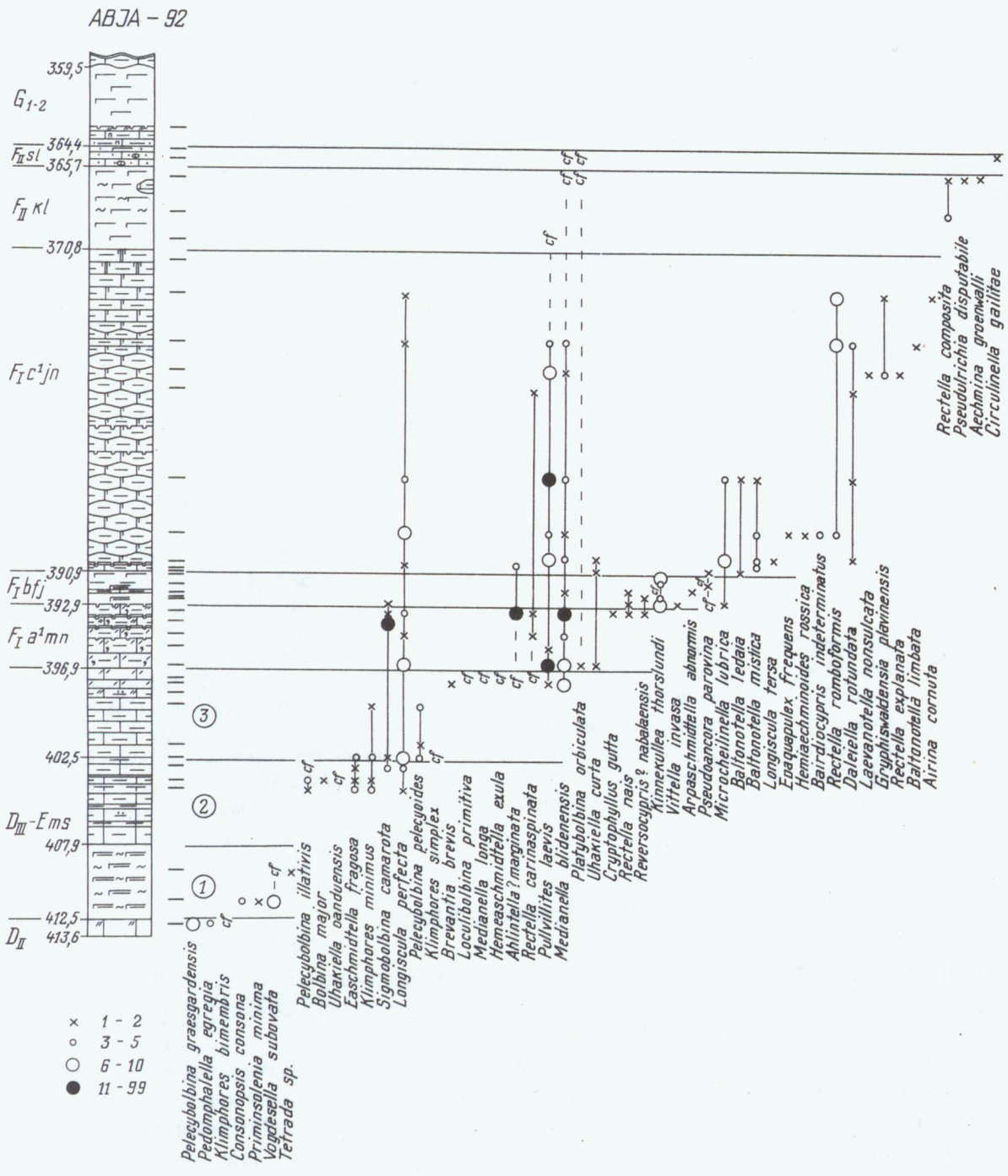

Figure 18. The distribution of ostracodes in the Abja-92 core section. Legend see figs 2, 6.

main, upper part of the formation the Priekule Member) is regarded as of Rakverean age. In the Taagepera (fig. 17) and Abja (fig. 18) cores the Mossen Formation can be subdivided, based on ostracodes, into three parts (designated with numbers 1–3 on the right side of the column). Abja core, 25 km north-west of Taagepera, is characterized by an increased thickness of both the lower part of the Priekule Member and the shaly member, the latter being less bituminous here compared to the Taagepera section. In the shaly member of the Taagepera section (interval 467.1–467.9 m) only *Vogdesella subovata* has been identified with confidence, but in the shaly member of the Abja core it is associated with *Consonopsis consona consona* and *Tetrada* sp. (?=*T. krausei*), suggesting the Keila age of the corresponding interval. In the lower part of the Priekule Member of the Taagepera core (interval 465.7–467–1 m) *Klimphores minimus* and *Eashmidtella fragosa* have been identified. In the Abja section these two species occur in a comparable interval together with *Pelecybolbina illativis*, which is known from the Lukštai Formation also. The upper part of the Priekule Member (interval 459.7–465.7 m in the Taagepera core, 402.5–407,9 m in the Abja core) is characterized by a more diverse ostracode assemblage, including *Pelecybolbina pelecyoides* that has been recorded also in more northern sections (Pärnu, Laeva-18) from the Rakverean limestones. The correlation of the sections of the Oandu Stage along the Orjaku-Taagepera line in the figure 19 is based on these conclusions.

The above conclusions do not conform fully with the data on the distribution of ostracodes in western Latvian sections (Ulst *et al.*, 1982, table 8). This discrepance, possibly related to differences in facies, requires further study.

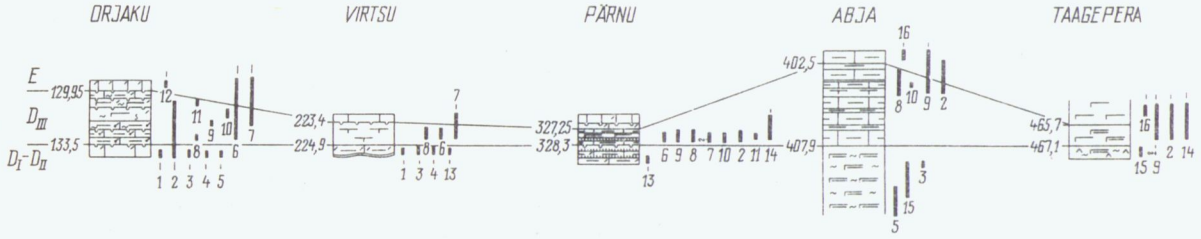

Figure 19. The correlation of the sections of the Oandu Stage along the Orjaku — Taagepera line by ostracodes. Legend see figs 2, 6. The distribution of ostracodes: 1 — *Euprimites (Bichilina) prima*, 2 — *Easchmidtella fragosa*, 3 — *Tetrada (Tetrada) krausei*, 4 — *Pedomphalella egregia*, 5 — *Consonopsis consona consona*, 6 — *Sigmoopsis granulata*, 7 — *Bolbina rakverensis*, 8 — *Pelecybolbina illativis*, 9 — *Klimphores minimus*, 10 — *Uhakiella oanduensis*, 11 — *Pseudoancora parovina*, 12 — *Tetradella egorowi*, 13 — *Triangulo-schmidtella triangulata*, 14 — *Pseudulrichia ? tubulata*, 15 — *Vogdesella subovata*, 16 — *Pelecybolbina pelecyoides*.

6.2. Rakvere Stage

From the Rakvere Stage 86 ostracode species and subspecies have been identified. Compared to the underlying Oandu Stage, the ostracode assemblage is here considerably renewed and has a much higher diversity.

Uneven distribution of ostracodes in the lower part of the stage makes it essential to distinguish several ostracode associations in this interval of the section (see next chapter). At the same time, in the upper half of the stage their distribution is relatively uniform, whereas the abundance and diversity of podocopid ostracodes increases greatly. The latter trend can be observed in the sections of both North Estonian and Central Baltoscandian Confacies Belts. Many ostracode species, which are characteristic to the Harjuan strata, including a large number of podocopid ostracodes, appear for the first time in the Rakvere Stage.

The main part of the Rägavere Formation (excluding the Tõrremägi Member), has revealed a total of 86 ostracode species, which partly appear already in the underlying strata. The occurrence of a limited number of species, such as *Retiprimites reticularis*, *Ctenonotella supera* and *Ectoprimitia corrugata inconstans,* is restricted to the Rakvere Stage, whilst *Pelecybolbina pelecyoides*, *Pentagona pentagona*, *Steusloffia neglecta* and *Olbianella* cf. *braderupensis* occur also in the underlying Tõrremägi Member. In the cryptocrystalline limestones of the Rägavere Formation ostracodes are documented from the Orjaku (fig. 7), Virtsu (fig. 8), Pärnu (fig. 14), Nabala-16 (fig. 20), Moe (fig. 21), Laiamäe (fig. 9), Vinni (fig. 10) and Mäetaguse (fig. 11) cores and from several outcrops such as Paekna quarry (fig. 22), Ussimägi outcrop (fig. 5), Moonaküla quarry, Rägavere quarry and Piilse riverside section (table 4). In these sections the Rakvere Stage is characterized by numerous *Tetradella egorowi*, *Brevibolbina dimorpha dimorpha*, *Brevantia brevis*, *Disulcina perita perita*, *Rectella nais*, *Olbianella* cf. *braderupensis*, *Pyxion rakverensis*, *Daleiella admiranda*, *Tvaerenella longa pretiosa*, *Bolbina major*, *Bolbina rakverensis*, *Hemeaschmidtella exula* and *Bolbina plicata*. A specific assemblage of ostracodes was registered in the Puhmu core (fig. 23), where the lowermost beds of the Rägavere Formation are argillaceous and contain abundant algae *Vermiporella* sp. The most common species in these beds are *Moeckowia rava*, *Hemeaschmidtella exula*, *Rectella nais*, *Euprimites* (*Euprimites*) *kahalaensis*, *Steusloffia neglecta* and *Steusloffina dilatata*. Upward in the section the ostracode assemblage gradually becomes similar to those of other northern Estonian sections.

Table 4. Ostracode distribution in the outcrops of the Rägavere Formation, Rakvere Stage (with number of specimens given).

	Moonaküla	Piilse	Rägavere
Consonopsis litwiensis Neckaja	8		
Sigmoopsis granulata Sarv	5		
Concavhithis nebeni Schallreuter	6		
Spinigerites spiniger Schallreuter	5		
Priminsolenia insolens (Meidla)	4	1	
Ectoprimitia corrugata inconstans ssp. n.	1	6	
Bolbina rakverensis Sarv	46	13	18
Tetradella egorowi Neckaja	5	9	16
Kiesowia regalis (Neckaja)	5	6	2
Airina cornuta (Neckaja)	1	8	9
Disulcina perita perita (Sarv)	15	40	14
Tvaerenella longa pretiosa Sarv	1	7	19
Pyxion rakverensis Meidla	8	35	28
Arpaschmidtella abnormis (Sidaravičiene)	2	2	3
Hemeaschmidtella exula Schallreuter	2	23	22
Rectella romboformis Neckaja	2		12
Rectella nais Neckaja		12	
Ordovizona sulcata Schallreuter		1	
Bulbosclerites sp. n.		1	
Sigmobolbina camarota Jaanusson		4	1
Bolbina major (Krause)		4	28
Bolbina plicata (Krause)		6	3
Platybolbina cf. *orbiculata* Sarv		45	13
Pseudorayella concinna Neckaja		6	3
Seviculina reticulata Meidla		4	4
Silenis ? sp. n.		3	1
Longiscula tersa (Neckaja)		5	1
Brevantia brevis gen. et sp. n.		1	8
Brevantia antis gen. et sp. n.			2
Platybolbina temperata Sarv			1

In the southern direction the ostracode assemblage of the Rägavere Formation changes. In the Kaugatuma (fig. 24), Viljandi (fig. 12), Laeva-18 (fig. 13), Otepää (fig. 16) and Kaagvere (fig. 15) sections *Pelecybolbina pelecyoides*, *Pullvillites laevis*, *Sigmobolbina camarota* and *Klimphores minimus* are most widespread. In the Pärnu core (fig. 14) the upper part of the the Rägavere formation has yielded a similar assemblage.

There are certain faunal differences between the lower and upper half of the Rägavere Formation. The boundary between these subdivisions, recognisable by the appearance of *Daleiella admiranda*, coincides approximately with the base of the Tudu Member of the Rägavere Formation. The lower part of the stage is characterized by numerous *Olbianella* cf. *braderupensis* and by the occurrence of *Lembitites posterovelatus*, *Ectoprimitia corrugata inconstans* and *Easchmidtella fragosa*. The upper part of the stage is distinguished by the presence of *Daleiella admiranda* together with *Lembitites incognitus*, *Loculibolbina primitiva*, *Reversocypris*? *nabalaensis*, *Microcheilinella lubrica*, *Medianella blidenensis* and *Steusloffina cuneata*. These differences are apparent in the Orjaku (fig. 7), Nabala-16 (fig. 20), Moe (fig. 21), Laiamäe (fig. 9), Vinni (fig. 10) and Mäetaguse (fig. 11) core sections; the upper assemblage is also distinct in the Puhmu core (fig. 23). In the figures the upper and lower units are marked as assemblages 1 and 2 on the right side of the column. Different assemblages are also recorded in the outcrops in which the lower (see table 4, fig. 5) or upper (fig. 22) part of the stage is exposed. In Central Estonia the thickness of the Rägavere

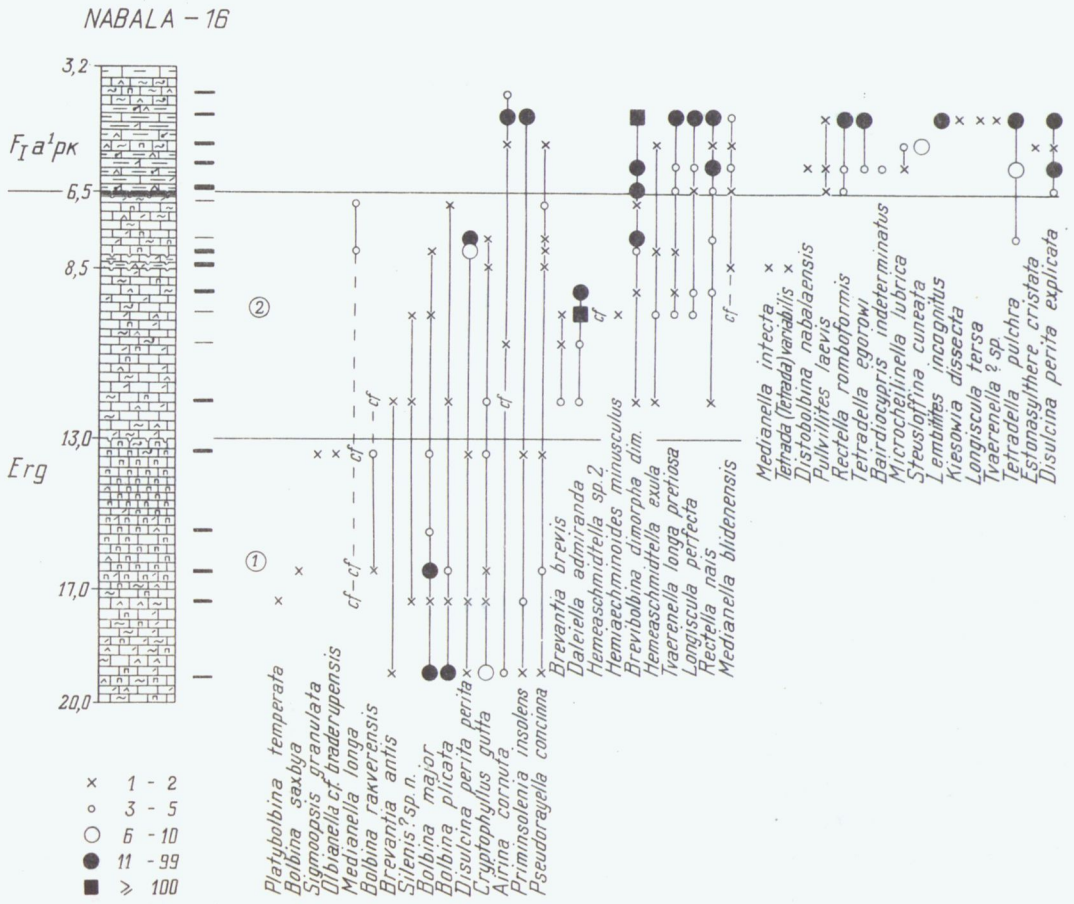

Figure 20. The distribution of ostracodes in the Nabala-16 core section. Legend see figs 2, 6.

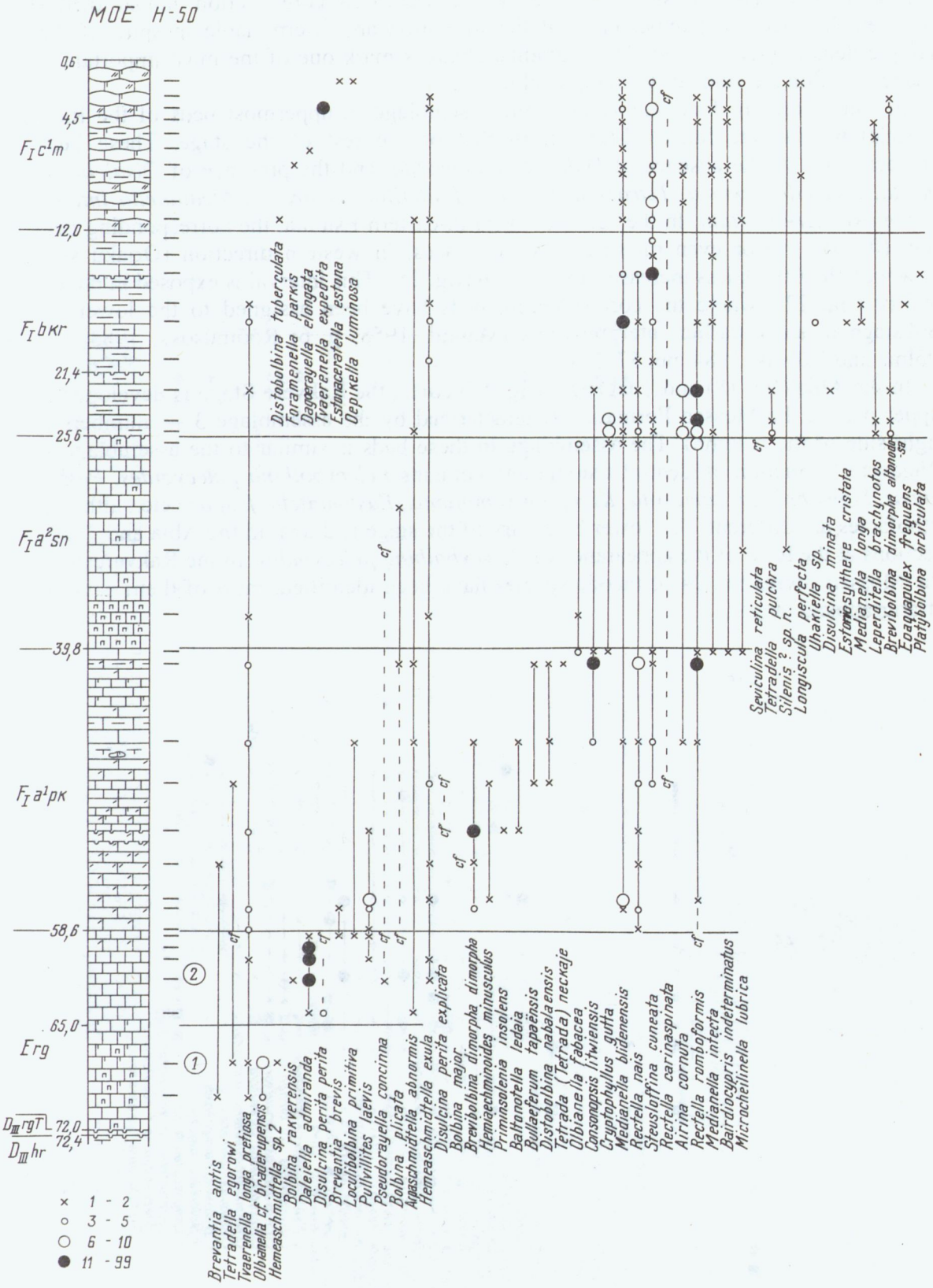

Figure 21. The distribution of ostracodes in the Moe (H-50) core section. Legend see figs 2, 6.

Formation decreases considerably, but in the Laeva-18 core section faunal differences between the lower and upper parts of the formation are determinable in spite of the low sample density (see fig. 13). These gradual changes mark one of the most important faunal changes within the studied stratigraphical interval.

In some northern Estonian sections the assemblage in uppermost beds of the Rägavere Formation (Rakvere Stage) differs from that of the rest of the stage. These beds are characterized by the absence of *Daleiella admiranda*, and the presence of *Disulcina perita perita*, *Piretella acmaea*, *Tetradella pulchra*, *Pullvillites rostratus*, *Medianella intecta* and *Estoniosylthere cristata*. In the sections of north-eastern Estonia, the corresponding beds are thin (0.6–0.7 m) or even missing in some places; in western direction (Orjaku section), however, their thickness increases up to 2.3 m (fig. 25). This interval is exposed in the Paekna quarry (fig. 22), where the corresponding beds have been assigned to the lower Nabala Substage in some earlier interpretations (Männil, 1958, p. 6; Rõõmusoks, 1983, p. 129; Põlma and Nõlvak, 1984, pp. 57–58).

In the Abja (fig. 18) and Taagepera (fig. 17) cores, the Rakvere Stage is developed as the upper part of the Mossen Formation (characterized by the assemblage 3 — numbers at the right side of the column). The assemblage in these beds is similar to the assemblage in the Rägavere Formation of Central Estonia and contains *Pelecybolbina pelecyoides*, *Pullvillites laevis*, *Sigmobolbina camarota*, *Klimphores minimus*, *Eashmidtella fragosa* etc., although the lithofacies are different. The lower boundary of the stage is drawn in the Abja and Taagepera sections at the level of the appearance of *Pelecybolbina pelecyoides*. In the Rakverean part of the Mossen Formation 24 ostracode species have been identified, most of them having long stratigraphical ranges.

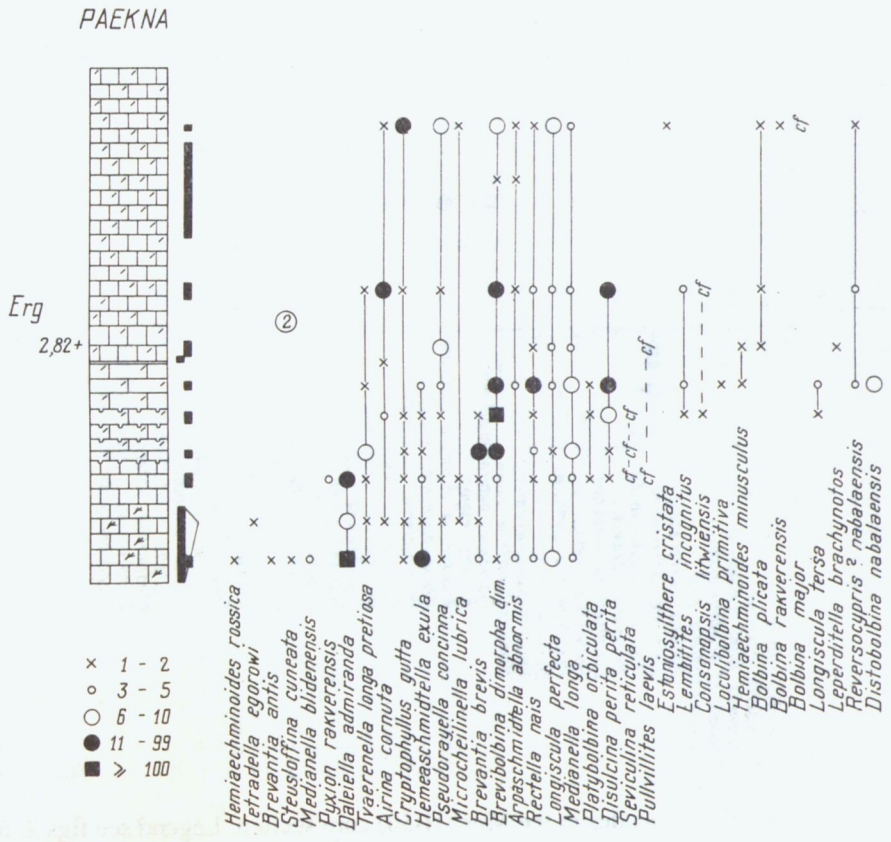

Figure 22. The distribution of ostracodes in the Paekna quarry. Legend see figs 2, 6.

Figure 23. The distribution of ostracodes in the Puhmu-567 core section, Rakvere to Nabala stages. The Vormsi to Porkuni Stages see fig. 34. Legend see figs 2, 6.

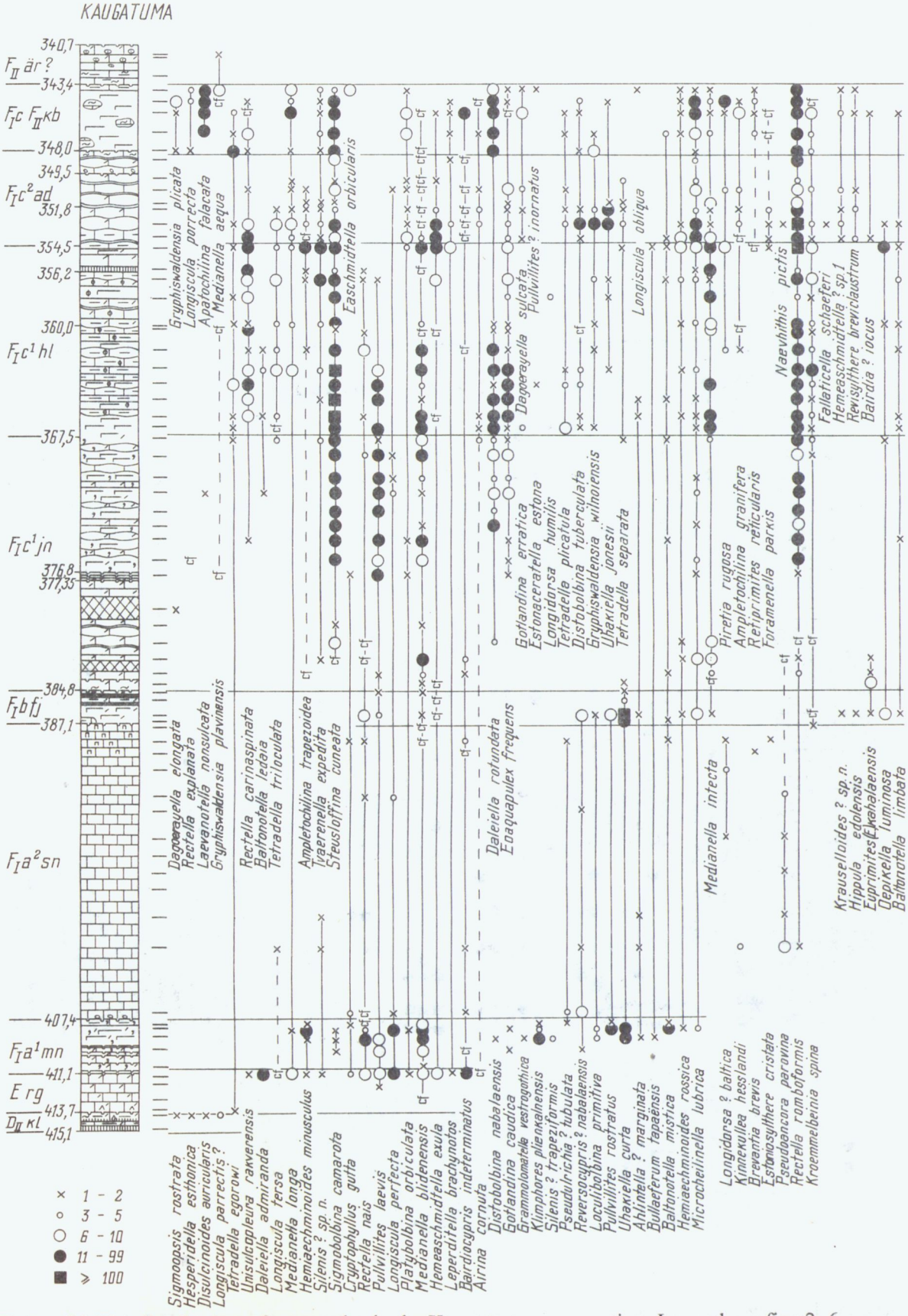

Figure 24. The distribution of ostracodes in the Kaugatuma core section. Legend see figs 2, 6.

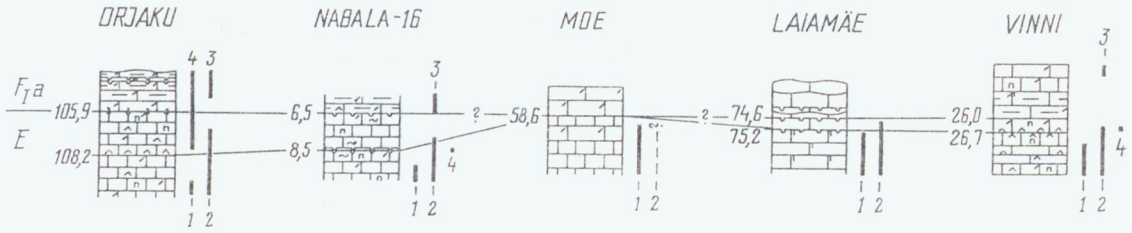

Figure 25. The correlation of the Rakvere-Nabala boundary beds along the Orjaku — Vinni line by ostracodes. Legend see figs 2, 6. The distribution of ostracodes: 1 — *Daleiella admiranda*, 2 — *Disulcina perita perita*, 3 — *Disulcina perita explicata*, 4 — *Medianella intecta*.

6.3. Nabala Stage

In the Nabala Stage 82 ostracode species and subspecies are recorded. The innovation of the ostracode fauna started already in the late Rakvere time and continued during the Nabala time. Most of the species which occur in the Nabala Stage are common also in the under- and/or overlying strata; only a limited number of species (*Disulcina perita explicata*, *Tetrada* (*Tetrada*) *neckajae*, *Quadritia* (*Krutatia*) *iunior*, *Klimphores plienkalnensis* and *Longidorsa? baltica*) are restricted to the Nabala Stage. In northern Estonia the lower boundary of the stage is indistinctly marked by ostracodes. Southwards the ostracode assemblage changes abruptly and in the sections of central and southern Estonia the lower boundary of the stage is more distinct. The distribution of ostracodes within the stage is uneven, but no distinct faunal changes occur at the boundary between the substages.

Ostracodes of the Paekna Formation have been studied by the author in the Nõmmeküla quarry and Permisküla riverside section (see table 5) and in the Orjaku (fig. 7), Virtsu (fig. 8), Nabala-16 (fig. 20), Vodja H-191 (fig. 26), Moe (fig. 21), Puhmu (fig. 23), Laiamäe (fig. 9), Vinni (fig. 10) and Mäetaguse (fig. 11) cores. Among the most widespread of the 61 ostracode species are *Rectella romboformis*, *Cryptophyllus gutta*, *Steusloffina cuneata*, *Medianella blidenensis*, *Rectella nais*, *Tetradella egorowi*, *Brevibolbina dimorpha dimorpha*, *Tvaerenella longa pretiosa*, *Consonopsis litwiensis*, *Airina cornuta*, *Bullaeferum tapaensis*, *Disulcina perita explicata*. In the Paekna quarry (fig. 22) and Nabala-16 core section (fig. 20) the uppermost beds of the Rakvere Stage have yielded, apart from long-ranging species, also *Distobolbina nabalaensis* Sarv and *Tetradella pulchra* Neckaja, which so far were considered as index species of the Nabala and Vormsi stages, respectively. The appearance of several palaeocope species ranging through most of the Harjuan sequence of North Estonia (*Oepikella luminosa*, *Cystomatochilina umbonata*, *Vittella invasa*) has been recorded in this stage.

In the overlying Saunja Formation the most frequent species are *Rectella romboformis*, *Rectella nais*, *Olbianella fabacea*, *Steusloffina cuneata*, *Loculibolbina primitiva*, *Platybolbina orbiculata*, *Airina cornuta*, *Longiscula perfecta*, *Bullaeferum tapaensis*, all recorded also from the underlying strata. In the Saunja Formation this assemblage occurs in the Kaugatuma (fig. 24), Orjaku (fig. 7), Aidu (fig. 27), Virtsu (fig. 8), Nabala-16 (fig. 20), Vodja H-191 (fig. 26), Moe (fig. 21), Puhmu (fig. 23), Laiamäe (fig. 9), Haapsalu-203 (fig. 28) and Ruskavere (fig. 29) cores. The same stratigraphical interval is accessible for investigation also in Tõrma quarry, Sutlema quarry and Turvaste outcrop (see table 5). A similar assemblage has been recorded from an erratic boulder from Osmussaar Island in the Gulf of Finland (table 5), apparently derived from the area where the corresponding rocks have been accessible for erosion. 63 ostracode species have been identified in the Saunja Formation, but their stratigraphical and spatial distribution is very uneven.

Table 5. Ostracode distribution in the outcrops of the Paekna Formation (Nõmmeküla, Permisküla) and Saunja Formation (Tõrma, Sutlema and Turvaste) of the Nabala Stage, and Nabala age erratic boulder from the Osmussaar Island (with number of specimens given).

	Nõmmeküla	Permisküla	Tõrma	Sutlema	Turvaste	Osmussaar (errat.)
Disulcina perita explicata Sarv	1					
Lembitites incognitus Sidaravičiene	2					
Foramenella sp.	2					
Cystomatochilina cf. *umbonata* (Krause)	1					
Cystomatochilina clivosa sp. n.	1					
Pseudorayella concinna Neckaja	13					
Medianella longa (Stumbur)	5					
Rectella cf. *carinaspinata* Schallreuter	1					
Brevibolbina dimorpha dimorpha Sarv	20					
Medianella blidenensis (Gailīte)	3	2				
Arpaschmidtella abnormis (Sidaravičiene)	4	1				
Loculibolbina primitiva (Sarv)	1		26			
Silenis ? sp. n.	1		17			
Distobolbina nabalaensis Sarv	4		2			
Hemeaschmidtella exula Schallreuter	5		16	2		
Tvaerenella longa pretiosa Sarv	4		11		1	
Bolbina cf. *major* (Krause)	1	1	4		2	5
Platybolbina orbiculata Sarv	4	2	14	1	1	6
Longiscula perfecta Meidla	4	5	80	2	1	1
Rectella nais Neckaja	7	3	6	4		1
Krauselloides ? sp. n.		2				
Leperditella brachynotos (Schmidt)		6?	11			
Steusloffina cuneata (Steusloff)		6	102			
Rectella romboformis Neckaja		10	5	1		
Bairdiocypris indeterminatus Pranskevičius		3	1			6
Cryptophyllus gutta Schallreuter		7	1	3	1	1
Oepikella luminosa Sarv			4			
Uhakiella jonesii (Krause)			172			
Bullaeferum tapansis (Sarv)			59			
Microcheilinella lubrica (Stumbur)			5			
Consonopsis litwiensis (Neckaja)			7			
Baltonotella mistica Sidaravičiene			?			
Hemiaechminoides rossica Neckaja			49			
Brevantia antis gen. et sp. n.			2			
Tetradella egorowi Neckaja			37			
Tetradella pulchra Neckaja			10			
Baltonotella limbata Sidaravičiene			5			
Seviculina cf. *reticulata* Meidla			2			
Kiesowia dissecta (Krause)			5	1		
Reversocypris ? *nabalaensis* sp. n.			25	1		
Hemeaschmidtella exula Schallreuter			16	2		
Medianella intecta (Stumbur)			40	1		
Bolbina plicata (Krause)			4		3	
Estoniosylthere cristata gen. et sp. n.			5			1
Longiscula obliqua Abushik et Sarv			1			1
Bolbina ? *globosa* (Krause)			3	11	4	1
Bolbina saxbya Meidla			4		1	1
Olbianella fabacea (Pranskevičius)			344		2	4

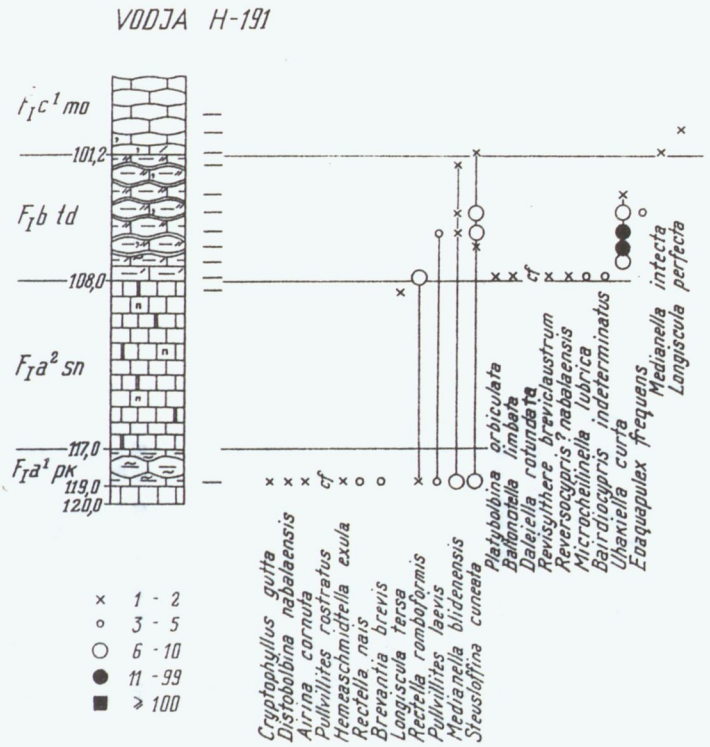

Figure 26. The distribution of ostracodes in the Vodja (H-191) core section. Legend see figs 2, 6.

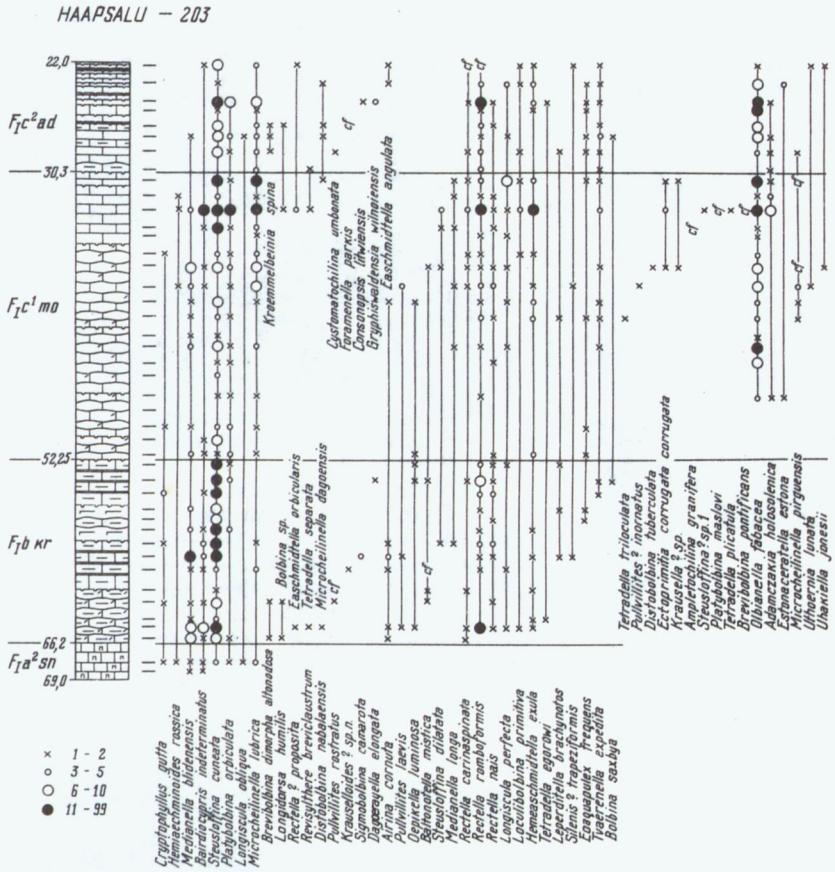

Figure 27. The distribution of ostracodes in the Aidu-427 core section. Legend see figs 2, 6.

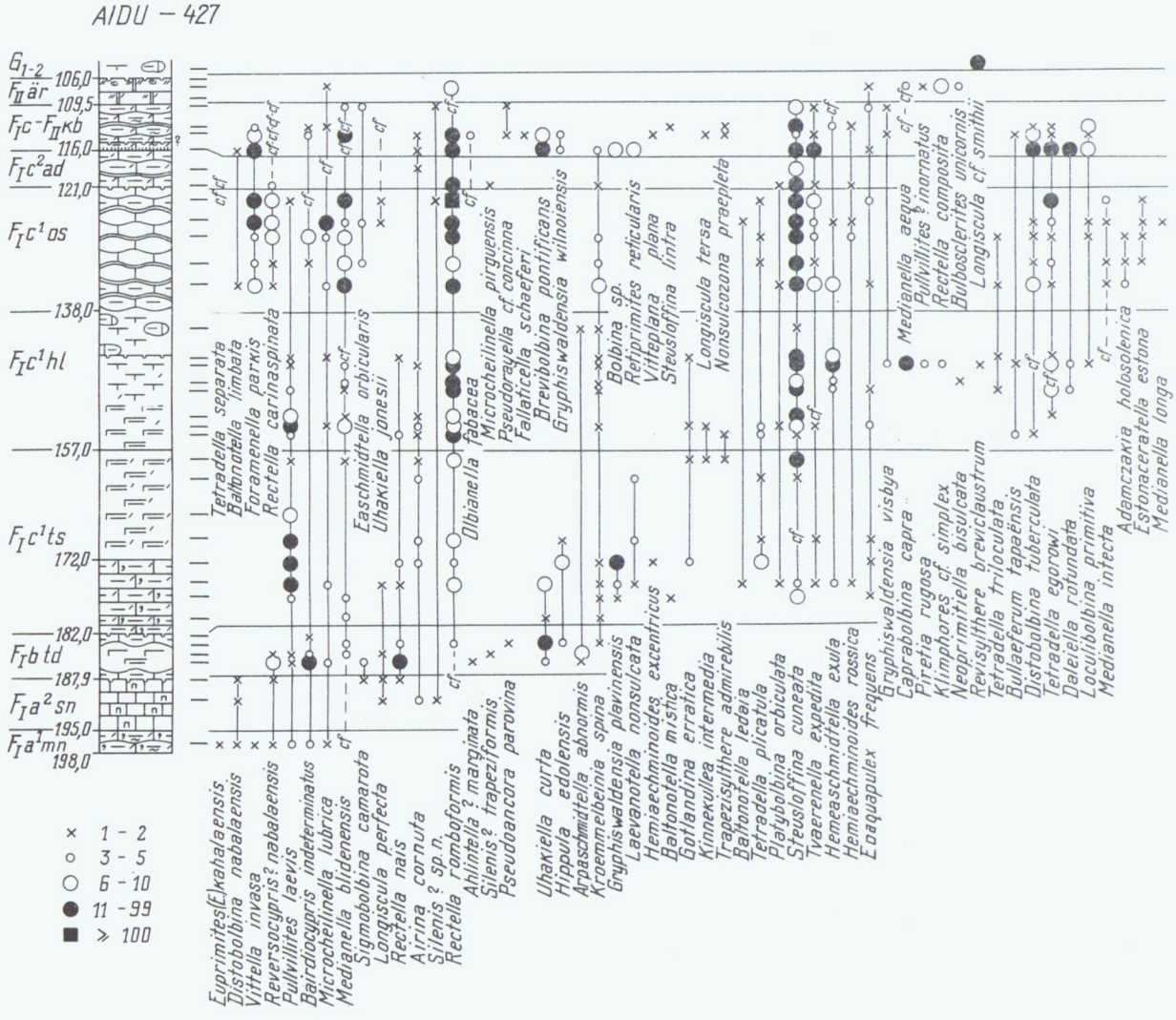

Figure 28. The distribution of ostracodes in the Haapsalu-203 core section. Legend see figs 2, 6.

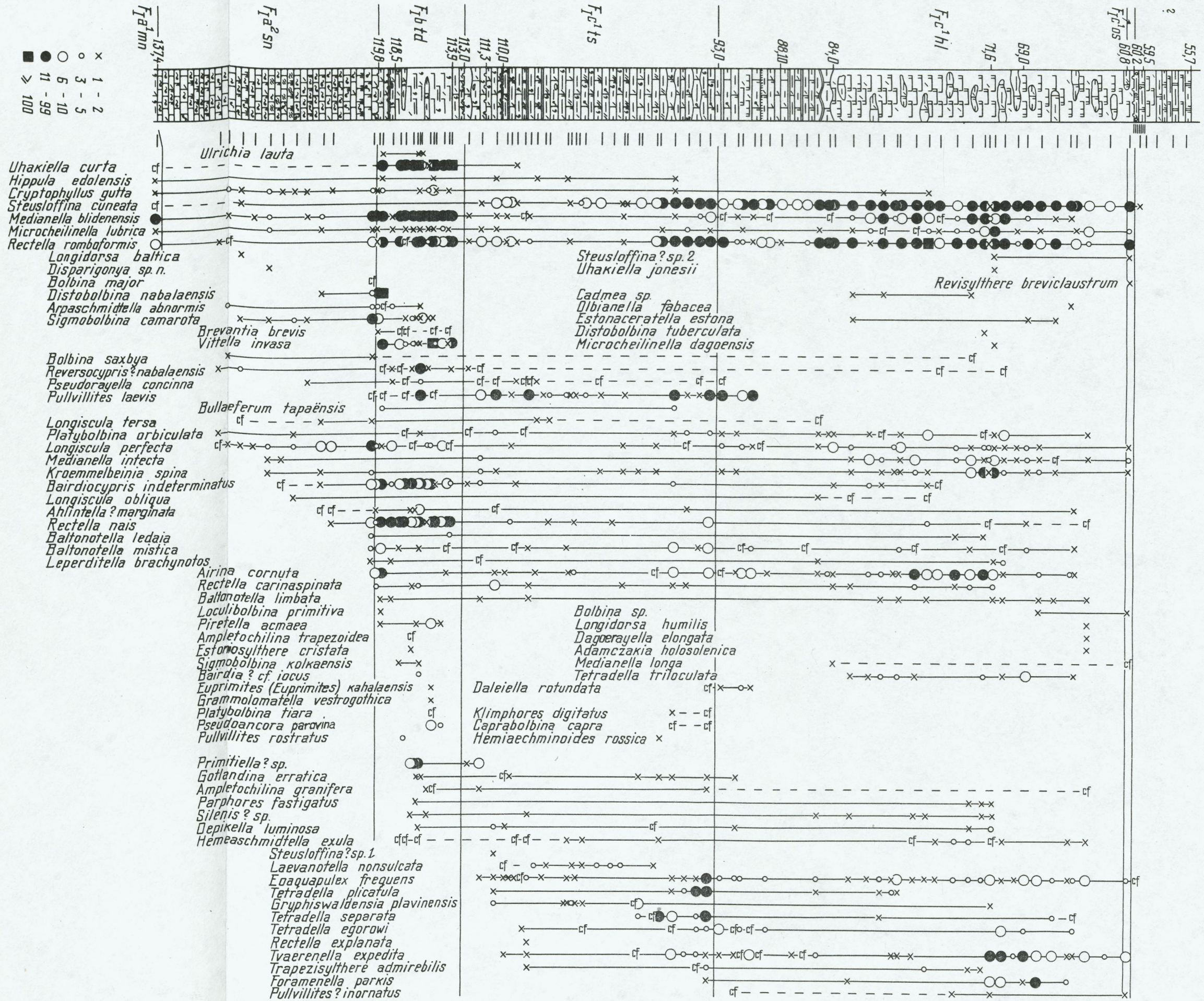

Figure 29. The distribution of ostracodes in the Ruskavere-451 core section. Legend see figs 2, 6.

In the central and southern Estonian sections, characterized by a small thickness of dense, cryptocrystalline limestones (Viljandi core — fig. 12, Taagepera core — fig. 17, Laeva-18 core — fig. 13, Otepää core — fig. 16), the Saunja Formation contains an impoverished assemblage consisting of long-ranging species: *Sigmobolbina camarota* and *Uhakiella curta*, more rarely *Pullvillites laevis, Medianella blidenensis* and *Longiscula perfecta*; it does not differ from the underlying Mõntu Formation faunistically. In the Kaugatuma (fig. 24) and Ruskavere (fig. 29) cores, the ostracode assemblage of the Saunja Formation is more similar to the assemblage in North Estonian sections.

In central and southern Estonia the lower substage of the Nabala Stage is represented by argillaceous glauconitiferous limestones of the Mõntu Formation (see fig. 2). Compared to the Paekna Formation, the ostracode assemblage of the Mõntu Formation is notably poorer, comprising 41 species. The assemblage differs in several respects from that in contemporaneous beds of North Estonia. It is characterized by *Uhakiella curta*, *Longiscula perfecta*, *Pullvillites laevis*, *Medianella blidenensis*, *Klimphores plienkalnensis*, *Rectella nais*, *Sigmobolbina camarota* and *Baltonotella mistica*. Due to the absence of common index species of ostracodes in the Paekna and Mõntu Formation, a direct correlation of these strata is impossible. In the lower part of the Mõntu Formation in the Kaugatuma (fig. 24), Pärnu (fig. 14), Abja (fig. 18), Viljandi (fig. 12), Laeva-18 (fig. 13) and Kaagvere (fig. 14) cores *Uhakiella curta* makes its appearance above the latest occurrence of *Disulcina perita perita* and *Daleiella admiranda*. The correlation of the Kaugatuma and Orjaku sections which contain different ostracode assemblages can be supported by evidence from chitinozoans (see fig. 30). *Armoricochitina reticulifera* (=*Cyathochitina dispar* in Männil, 1976, pp. 114–115 and Nõlvak, 1984, p. 24) Zone is regarded to correspond to early Nabala time (Nõlvak and Grahn, 1993). In the Orjaku core Männil (1976, p. 114, fig. 6) has distinguished the *A. reticulifera* Zone in the interval 104.2–105.9 m. In the Kaugatuma core, however, the zonal boundary is situated at the depth of 410.8 m (J. Nõlvak, pers. comm.).

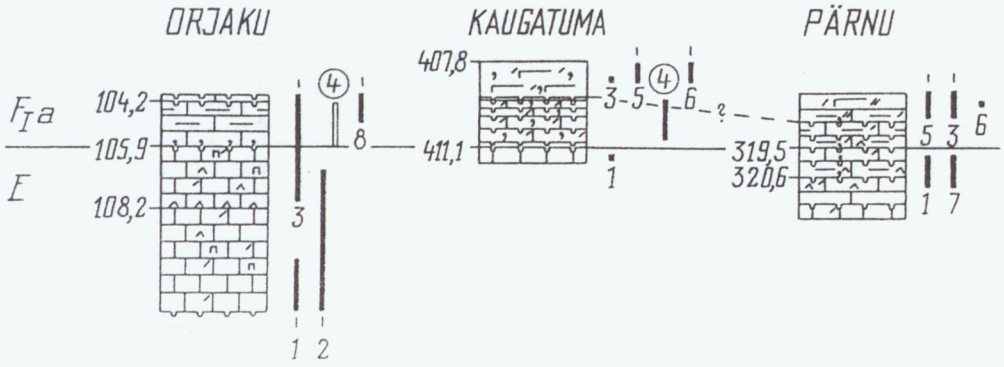

Figure 30. The correlation of the Rakvere–Nabala boundary beds along the Orjaku — Pärnu line by ostracodes. Legend see figs 2, 6. The distribution of ostracodes and chitinozoans (number in a circle): 1 — *Daleiella admiranda*, 2 — *Disulcina perita perita*, 3 — *Distobolbina nabalaensis*, 4 — *Cyathochitina reticulifera*, 5 — *Uhakiella curta*, 6 — *Klimphores plienkalnensis*, 7 — *Pelecybolbina pelecyoides*, 8 — *Disulcina perita explicata*.

6.4. Vormsi Stage

In the Vormsi Stage a total of 97 ostracode species have been identified, showing an increase in the species diversitiy compared to the Nabala Stage. The lower boundary of the stage is marked by a sharp change in lithofacies, but is comparatively weakly expressed in the distribution of ostracodes.

Ostracodes have comparatively uniform distribution in the Vormsian sediments. The species occuring solely in the Vormsi Stage include *Kinnekullea thorslundi* (in southern Estonia) and very rare *Sigmobolbina kolkaensis*, *Podolibolbina* cf. *podolica* and *Ulrichia lauta*. Numerous species, including *Vitteplana plana*, *Gryphiswaldensia wilnoiensis*, *Tvaerenella expedita*, *Eoaquapulex frequens*, *Brevibolbina dimorpha dimorpha*, *Distobolbina tuberculata*, *Estonaceratella estona*, *Revisylthere breviclaustrum* appear in the Vormsi Stage, and range into the Porkuni and/or Pirgu stages.

Argillaceous limestones of the Kõrgessaare Formation have yielded a rich and diverse assemblage of ostracodes consisting of 86 species and subspecies. The ostracodes have been studied in the Förby (fig. 31), Orjaku (fig. 32), Haapsalu (fig. 27), Põhjaka–Saare (fig. 33),

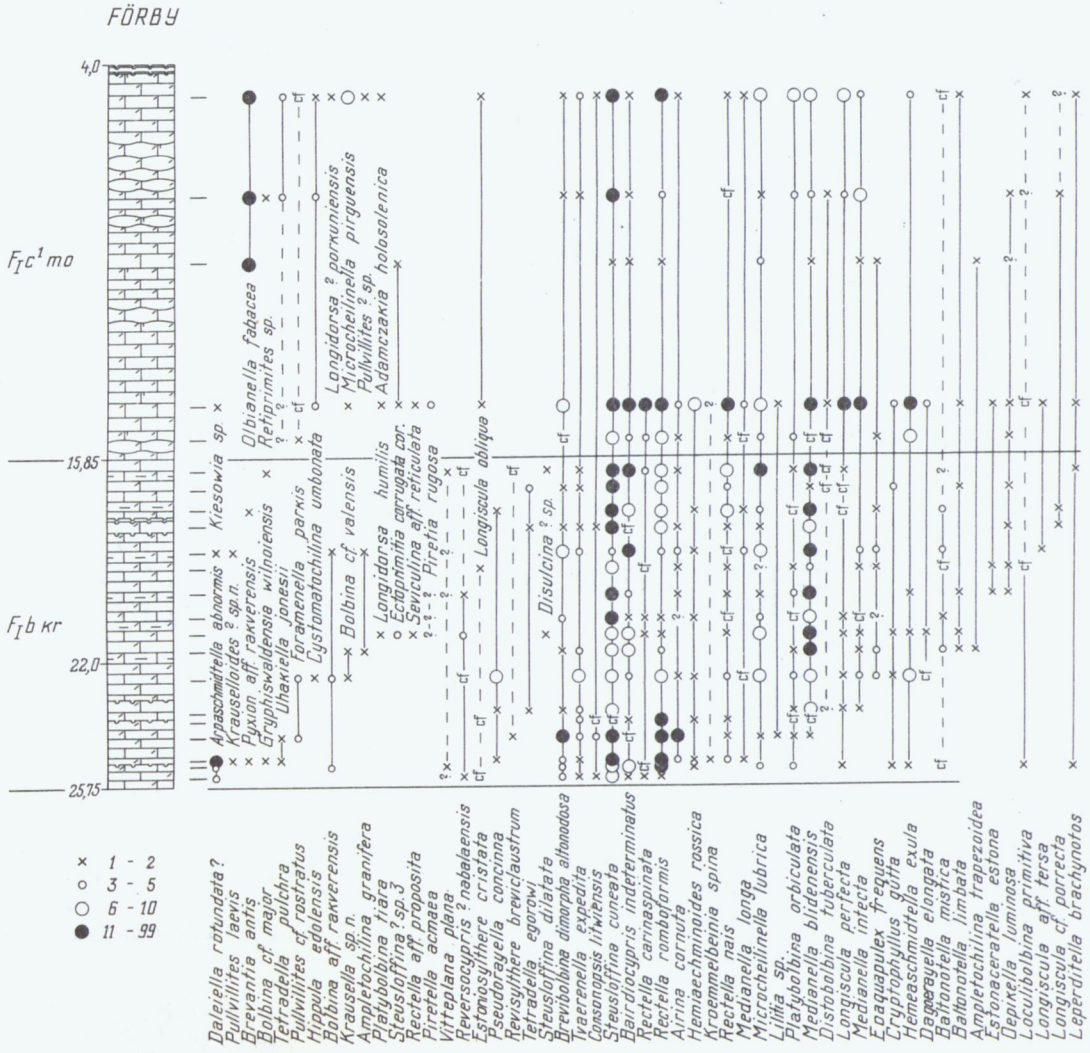

Figure 31. The distribution of ostracodes in the Förby-369 core section. Legend see figs 2, 6.

Table 6. Ostracode distribution in the outcrops of the Kõrgessaare Formation, Vormsi Stage (with number of specimens given).

	Kõrgessaare	Sutlepa	Turvaste	Kohila-1	Kohila-2	Urge	Lehtse	Tapa	Moe-2
Brevibolbina dimorpha altonodosa Sarv	1	26					12		
Platybolbina orbiculata Sarv	1	2	3	5	32	5	12	cf	1
Microcheilinella lubrica (Stumbur)	2	3	4	6	1	17		1	2
Steusloffina cuneata (Steusloff)	2	80	28	118		129	25	154	284
Rectella carinaspinata Schallreuter	2		2	4	2	5	1	1	3
Rectella romboformis Neckaja	1	3	2	11	3	13		5	9
Arpaschmidtella abnormis (Sidaravičiene)		1							
Medianella longa (Stumbur)		3							
Loculibolbina primitiva (Sarv)		2							
Cryptophyllus gutta Schallreuter		3		4	1				
Longiscula perfecta Meidla		1	4	5	12				
Leperditella brachynotos (Schmidt)		2		2	10				
Oepikella luminosa Sarv		1	2		4	2			
Hemeaschmidtella exula Schallreuter		3	4		1	2	1		
Rectella nais Neckaja		3	1	28	5	6	1	2	4
Medianella intecta (Stumbur)		2	5	1	10	2	9	1	1
Medianella blidenensis (Gailīte)		6	21	18	18	23	5	34	20
Eoaquapulex frequens (Steusloff)		2	2	1	2	2	3		5
Baltonotella mistica Sidaravičiene		1	1			1		1	3
Baltonotella limbata Sidaravičiene		1		1					1
Piretella acmaea Öpik		1							3
Airina cornuta (Neckaja)		1		4	2	16	5	1	1
Disulcinoides ignalinensis Sidaravičiene			1						
Bolbina major (Krause)			cf						
Uhakiella jonesii (Krause)			cf						
Bullaeferum tapansis (Sarv)			1						
Cystomatochilina umbonata (Krause)			1						
Tvaerenella longa pretiosa Sarv			7	2					
Estoniosylthere cristata gen. et sp. n.			1			1			
Bairdiocypris indeterminatus Pranskevičius			4	2	6	14	3	5	9
Longidorsa humilis sp. n.				1					
Rectella ? proposita Abushik et Sarv				1					
Longiscula obliqua Abushik et Sarv				2		1			
Distobolbina tuberculata (Henningsmoen)				3		cf		2	
Steusloffina dilatata Meidla				1		1		1	
Hemiaechminoides rossica Neckaja				1	1			2	
Gryphiswaldensia wilnoiensis (Neckaja)				1					1
Platybolbina tiara Henningsmoen					1				
Cadmea sp.					1				
Estonaceratella estona (Sarv)					4				
Bolbina saxbya Meidla					2				
Tvaerenella expedita Sarv					1				
Tetradella egorowi Neckaja						1			
Tetradella pulchra Neckaja						1			
Disulcina minata Sidaravičiene						1			
Vitteplana plana (Neckaja)						3			
Distobolbina nabalaensis Sarv						cf			2?
Concavhithis nebeni Schallreuter						2			1
Pseudorayella cf. *concinna* Neckaja						3			1
Reversocypris ? nabalaensis sp. n.						1			1
Trapezisylthere admirebilis (Neckaja)									2

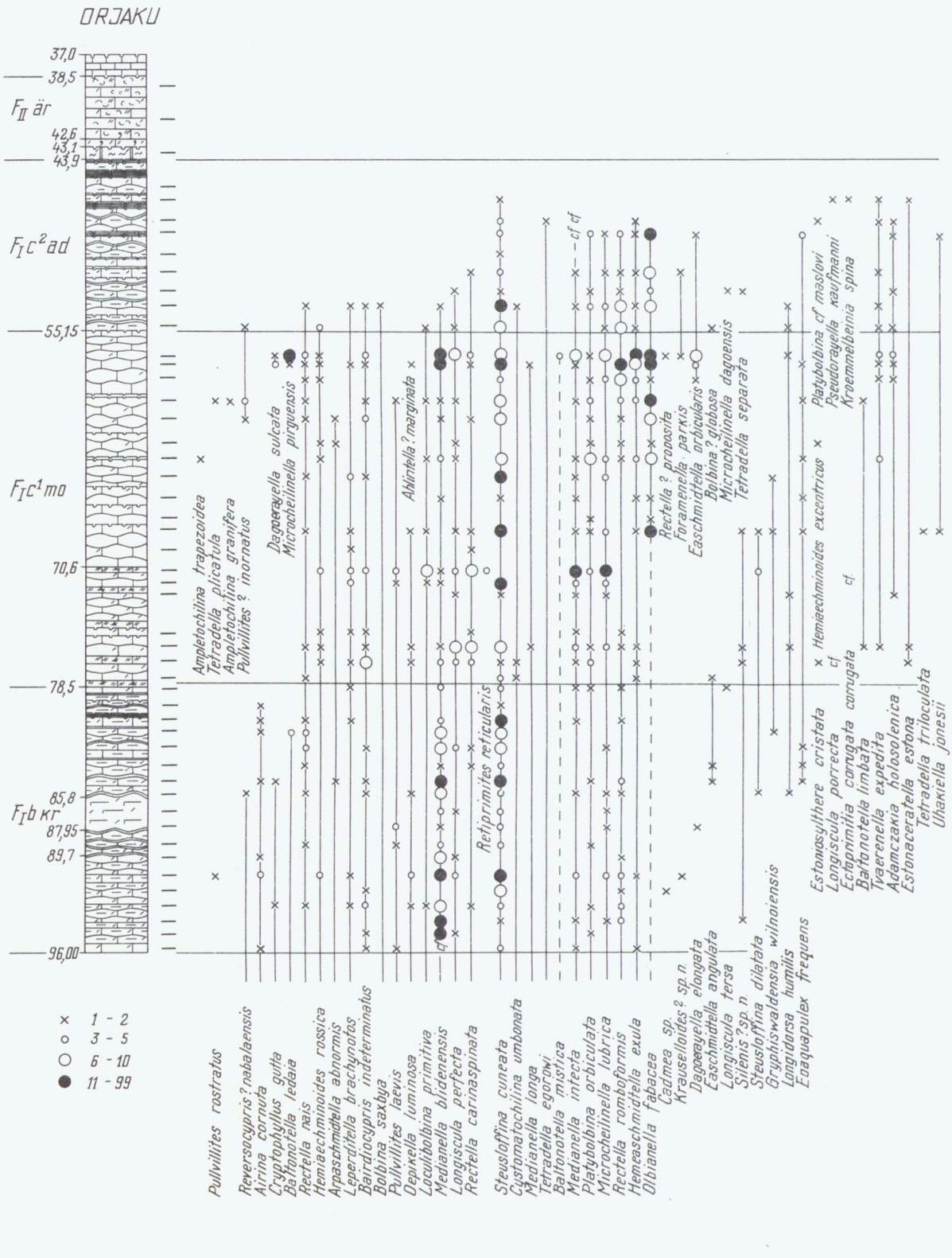

Figure 32. The distribution of ostracodes in the Orjaku core section,Vormsi to Porkuni stages. The Oandu to Nabala stages see fig. 7. Legend see figs 2, 6.

Moe (fig. 21), Puhmu (fig. 34) and Laiamäe (fig. 9) cores and in numerous quarries and excavations: Paope quarry (fig. 35), Paluküla quarry and Saxby beach exposure (see Meidla, 1983), quarries at Kõrgessaare, Sutlepa, Kohila (Kohila-1 in the table 6) and Urge, exposures and temporary excavations at Turvaste, Kohila (Kohila-2 in the table 6), Prillimäe, Lehtse, Moe (Moe-2 in the table 6) and Tapa (for the list of sections without special reference see table 6). *Steusloffina cuneata*, *Medianella blidenensis* and *Rectella romboformis* are very frequent, at some levels also *Longiscula perfecta*, *Bairdiocypris indeterminatus*, *Rectella nais*, *Brevibolbina dimorpha altonodosa* and *Rectella carinaspinata*. *Brevibolbina dimorpha dimorpha*, *Longidorsa humilis* and *Ordovizona sulcata* which occur in the Nabala Stage are not recorded. Southwards from the outcrop area of the formation the diversity of ostracodes decreases.

The Tudulinna Formation, corresponding to the Vormsi Stage in central Estonia, is represented by glauconitiferous argillaceous limestones and marls. Compared to the Kõrgessaare Formation, the species diversity decreases here. 50 ostracode species are recorded, dominated by *Uhakiella curta*, *Rectella nais*, *Medianella blidenensis*, *Bairdiocypris indeterminatus*, *Sigmobolbina camarota*, *Vittella invasa* and *Recella romboformis*. The appearance of *Eoaquapulex frequens* (Steusloff), *Platybolbina tiara* Henningsmoen and *Revisylthere breviclaustrum* Schallreuter is nearly contemporaneous in the Kõrgessaare and Tudulinna formations.

Farther northwards (Virtsu core — fig. 8, Vodja cores — figs 26 and 36, Aidu core — fig. 27, Ruskavere core — fig. 29), the ostracode assemblage changes abruptly above the lower boundary of the Tudulinna Formation. In the southern part of the distribution area of the Tudulinna Formation the appearance of new ostracode species at its lower boundary was not observed.

In the Tudulinna Formation of the Pärnu core (fig. 14) two successive assemblages of ostracodes can be distinguished. In the interval 309.0–312.2 m the ostracode assemblage is

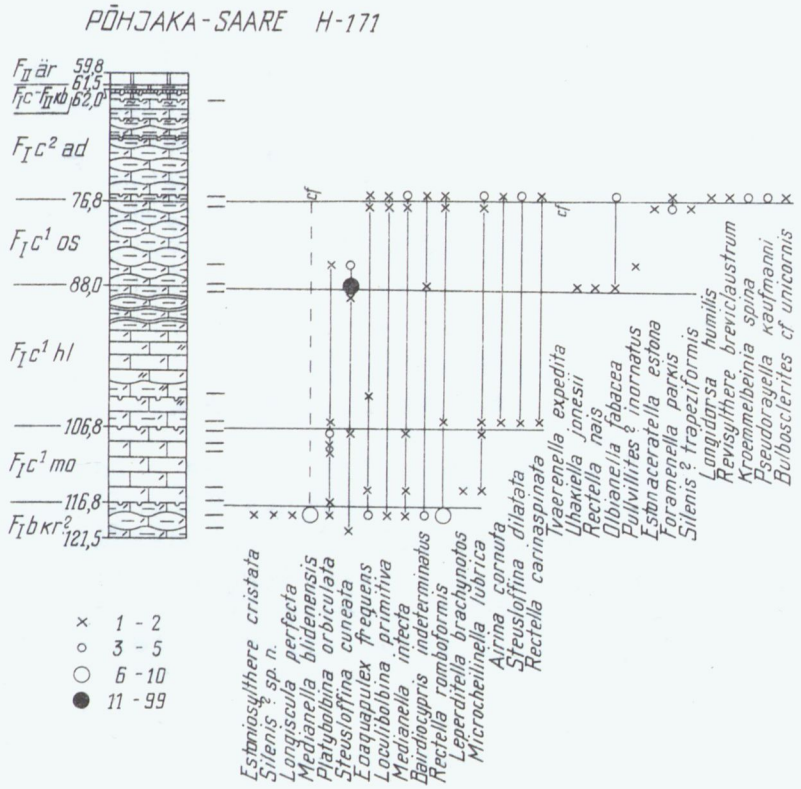

Figure 33. The distribution of ostracodes in the Põhjaka–Saare (H-171) core section. Legend see figs 2, 6.

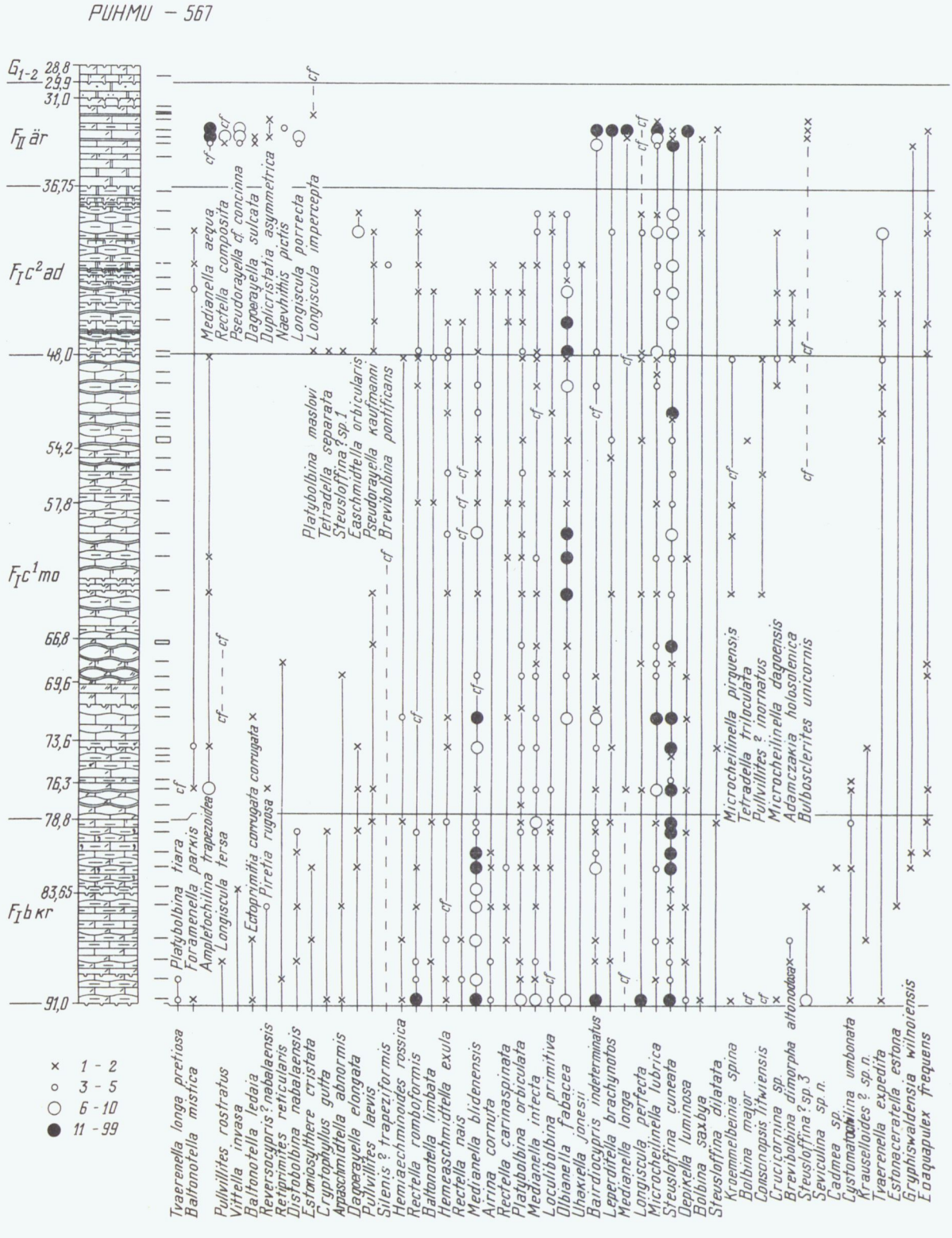

Figure 34. The distribution of ostracodes in the Puhmu-567 core section, Vormsi to Porkuni stages. The Rakvere to Nabala stages see fig. 23. Legend see figs 2, 6.

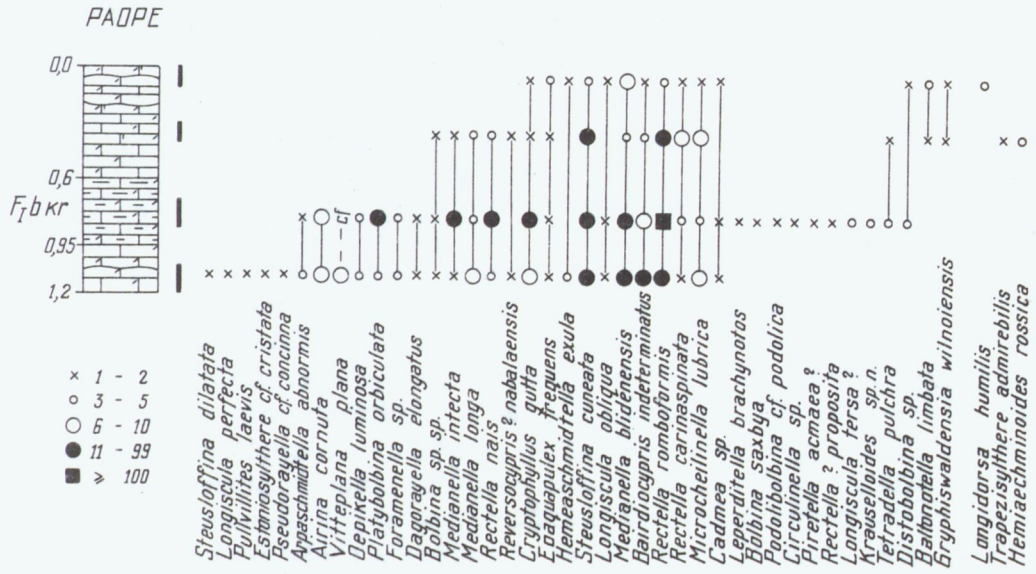

Figure 35. The distribution of ostracodes in the Paope quarry. Legend see figs 2, 6.

closely similar to the one recorded from the Tudulinna Formation of the Ruskavere core section (fig. 29): it is characterized by mass occurrence of *Vittella invasa* and the occurrence *Pseudoancora parovina* and *Parphores fastigatus*. In the Pärnu core (fig. 14), the lithology and the faunal composition of the interval 312.2–313.95 m is similar to those of the Mõntu Formation, distinguishable below the level of 314.25 m. This interval is separated from the Mõntu Formation by a thin (0.3 m) bed of dense, cryptocrystalline limestone, which in thedescription of the core has been attributed to the Saunja Formation, but could be, judging from the ostracode distribution, considered as an intraformational unit.

In southern Estonia, the Vormsi Stage is represented by the argillites of the Fjäcka Formation. The ostracode assemblage of this formation has been examined in the sections of the Kaugatuma (fig. 24), Abja (fig. 18), Taagepera (fig. 17), Otepää (fig. 16) and Kaagvere (fig. 15) cores. The assemblage is relatively poor, including only 27 ostracode species; the species distribution appears to be strongly dependent on the lithofacies. The most widespread species are *Kinnekullea thorslundi*, *Uhakiella curta*, *Vittella invasa* and *Rectella nais*.

6.5. Pirgu Stage

In the Pirgu time, the ostracode species diversity reached 120 species, the maximum value for the Harjuan. According to the recent data, a comparatively large number of species are restricted to the stage: *Tetradella separata*, *Tetradella triloculata*, *Laevanotella nonsulcata*, *Caprabolbina capra*, *Piretia rugosa*, *Brevibolbina pontificans*, *Gryphiswaldensia plavinensis*, *Microcheilinella dagoensis*, *Microcheilinella pirguensis*, *Rectella explanata*, *Adamczakia holosolenica* and some other, very rare species. This facilitates the distinguishing of the stage in Estonian sections based on ostracodes, but the correlation of Pirguan formations remains partly inconclusive. In Latvia and Lithuania, several of the above species seem to have a longer stratigraphical range (see Ulst *et al.*, 1982; Sidaravičiene, 1992). Many Pirguan species are recorded from the erratic boulders in Germany and Gotland also (see Schallreuter, 1986 etc.).

The studied material comes mainly from the Moe, Tootsi, Jonstorp, Halliku, Oostriku, Adila and Kabala formations. Jelgava, Paroveja and Kuili formations are studied in a single section each.

From the Moe Formation, represented by brownish-grey microcrystalline limestones, 84 ostracode species have been identified. The prevailing species are *Steusloffina cuneata*, *Olbianella fabacea*, *Medianella blidenensis*, *Medianella intecta*, *Longiscula perfecta* and *Hemeaschmidtella exula*. The ostracodes of the Moe Formation were studied in the cores of Orjaku (fig. 32), Förby (fig. 31), Haapsalu-203 (fig. 28), Virtsu (fig. 8), Põhjaka–Saare (fig. 33), Vodja H-190 (fig. 36), Moe (fig. 21), Puhmu (fig. 34) and Laiamäe (fig. 9), and also from numerous outcrops: Prillimäe outcrop (fig. 37), Paluküla quarry and Saxby beach

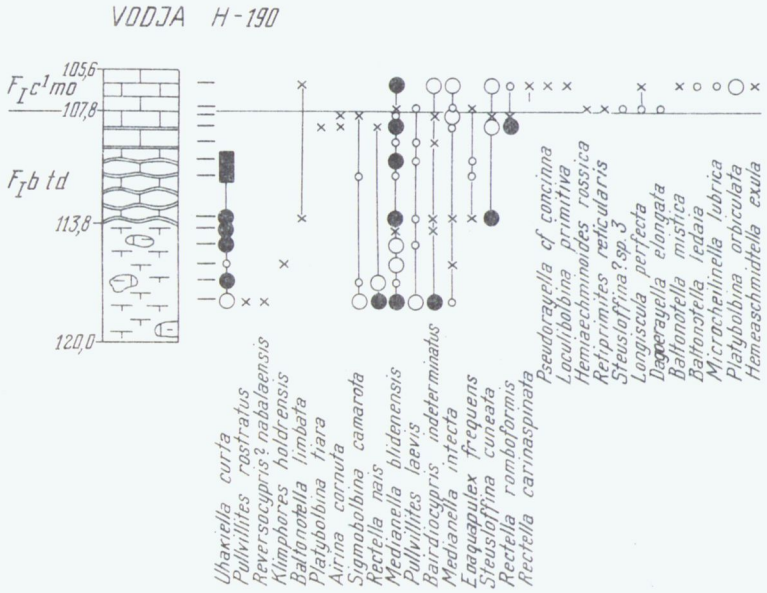

Figure 36. The distribution of ostracodes in the Vodja (H-190) core section. Legend see figs 2, 6.

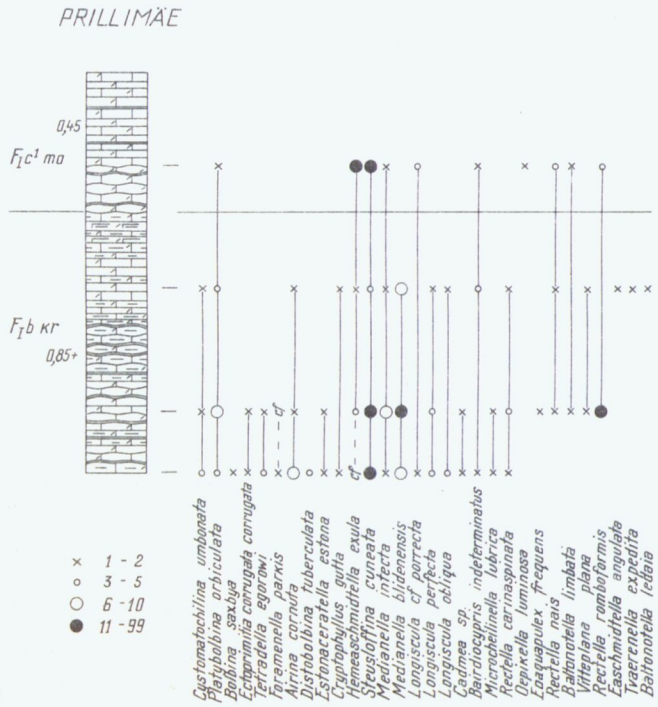

Figure 37. The distribution of ostracodes in the Prillimäe outcrop section. Legend see figs 2, 6.

exposure (see Meidla, 1983), quarries at Adila, Põriki and Moe (Moe-1) (see in table 7). More remarkable faunal changes, apparently not dependent on the lithofacies, can be recorded in the upper part of the Moe Formation (Haapsalu core — fig. 28, Orjaku core — fig. 32). South of the outcrop area the composition of the ostracode assemblage of the Moe Formation does not seem to display any considerable changes.

The ostracode assemblage of the Adila Formation was examined in the core sections of Orjaku (fig. 32), Haapsalu-203 (fig. 28) and Puhmu (fig. 34), and in the exposures at Hosholm, Kuie, Piirsalu, Ruunavere, Rabivere, Lohu, Pirgu (see table 7) and Möldri (fig. 38). 70 ostracode species were identified in the formation, predominated by *Steusloffina cuneata*, *Olbianella fabacea*, *Medianella intecta*, *Platybolbina orbiculata*, *Tvaerenella expedita*, *Microcheilinella lubrica* and *Rectella romboformis*. The main qualitative difference from the assemblage of the Moe Formation is the occurrence of *Naevhithis pictis*, *Brevibolbina pontificans* and *Pseudorayella kaufmanni* in the Adila Formation and the absence of *Platybolbina tiara*, *Piretella acmaea*, *Disulcina minata*, *Brevibolbina dimorpha altonodosa* and *Arpaschmidtella abnormis*. No distinct changes in the ostracode distribution were observed at the substage boundary, which according to the definition (Männil, 1966, p. 89), coincides with the base of the Adila Formation.

The Tootsi Formation is represented by glauconitiferous argillaceous limestones and marls. It was distinguished in the Ruskavere (fig. 29) and Aidu cores (fig. 27), located far from the stratotype area of the formation. The Tootsi Formation yielded 47 ostracode species, of which *Steusloffina cuneata*, *Rectella romboformis* and *Pullvillites laevis* are most common. In both the Moe and Tootsi formations *Tetradella plicatula* appears and there are rare finds of *Hemiaechminoides excentricus*. On the other hand the Tootsi Formation lacks a number of species which in northern Estonia appear in the upper half the Moe Formation but have been recorded from the sediments resting on the Tootsi Formation in the Aidu and Ruskavere sections. Such species are *Tetradella triloculata*, *Easchmidtella orbicularis*, *Dagoerayella sulcata*, *Microcheilinella dagoensis*, *Microcheilinella pirguensis* and *Pullvillites*? *inornatus*. This suggests that the Tootsi Formation (or the Tootsi Formation together with the lower part of the Halliku Formation) corresponds only to the lower half of the Moe Formation (see fig. 39; compare Nõlvak, 1984, 1986).

The ostracode assemblages in the lowermost Tootsi Formation of the Ruskavere and Aidu sections are similar to the assemblage in the uppermost part of the underlying Tudulinna Formation. The record of the chitinozoan species *Acanthochitina barbata* Eisenack, 1931 in the Moe and Ruskavere core sections (J. Nõlvak, pers. comm.) suggest a similar (late Vormsian) age of the uppermost Kõrgessaare and Tudulinna formations. A distinct change in ostracode succession occurs a few metres above the base of the Tootsi Formation, where *Gryphiswaldensia plavinensis* and *Laevanotella nonsulcata* appear.

The Jonstorp Formation is represented in Estonia mainly by red-coloured limestones and marls. The ostracode assemblage of the formation consists of 50 species, among which *Pullvillites laevis*, *Medianella blidenensis* and *Uhakiella curta* are most common, accompanied by *Steusloffina cuneata*, *Daleiella rotundata*, *Rectella romboformis* and *Gryphiswaldensia plavinensis*. The ostracodes of this formation have been studied in the core sections of Kaugatuma (fig. 24), Pärnu (fig. 40), Abja (fig. 18), Viljandi (fig. 12), Taagepera (fig. 17), Laeva-18 (fig. 13), Otepää (fig. 16) and Kaagvere (fig. 15). The appearance of *Daleiella rotundata*, *Tetradella plicatula*, *Gryphiswaldensia plavinensis* and *Laevanotella nonsulcata* in the lower part of the formation indicates similarity with the stratigraphic position of the Tootsi Formation. In the Viljandi core (fig. 13) the marls of the Tudulinna Formation (interval 308.5–310.5 m) are overlain by a bed of dense, cryptocrystalline limestone. *Pullvillites laevis*, identified in this bed, is widespread in the lowermost Pirgu Stage of central Estonia.

Table 7. Ostracode distribution in the outcrops of the Moe Formation (Adila, Põriki and Moe quarries) and Adila Formation, Pirgu Stage (with number of specimens given).

	Adila	Põriki	Moe-1	Hosholm	Kuie	Piirsalu	Ruunavere	Rabivere	Lohu	Pirgu
Uhakiella jonesii (Krause)	2		234					7	10	
Rectella nais Neckaja	3	2	63					2	1	
Bolbina saxbya Meidla	2			1					4	
Tetradella plicatula (Krause)	1								4	
Brevibolbina pontificans Sch.	2				1	cf		cf	23	
Hemeaschmidtella exula Sch.	9	2	5		1			2	3	2
Steusloffina cuneata (Steusloff)	22	35	200	8	5	73	5	26	113	16
Medianella intecta (Stumbur)	3	19	18		1	13		3	13	2
Bairdiocypris indeterminatus Pr.	1	5	14		2			2	8	2
Leperdit. brachynotos (Schmidt)	1	6	54	2		2		1	1	2
Tvaerenella expedita Sarv	5	12	243			1		2	17	1
Rectella romboformis Neckaja	2		64		1	3		3	2	3
Microcheilinella lubrica (Stumbur)	3		27	5	1	17	2	4	115	7
Olbianella fabacea (Pranskevičius)	20			6	4	24		23	73	9
Adamczakia holosolenica Schallr.	1							3		1
Baltonotella mistica Sidaravičiene		cf								
Baltonotella limbata Sidaravičiene		2	3							
Brevibolbina dimorpha altonodosa Sarv		1	122							
Piretella acmaea Öpik		3	156							
Platybolbina maslovi Sarv		4	311							
Hemiaechminoides rossica Neckaja		2	6			2				
Foramenella parkis (Neckaja)		1	4			7	2			
Estonaceratella estona (Sarv)		5	86				1			
Oepikella luminosa Sarv		7	55	1			5			
Longiscula tersa (Neckaja)		cf						cf		
Steusloffina dilatata Meidla		1							1	
Pullvillites laevis Abushik et Sarv		cf							2	
Longiscula perfecta Meidla		19	31	1		3			19	
Rectella carinaspinata Schallreuter		1	2						2	
Platybolbina orbiculata Sarv		10	36	2		5		1	14	4
Eoaquapulex frequens (Steusloff)		11	42			6	1		2	3
Medianella blidenensis (Gailīte)		12	235		1				cf	3
Disulcina minata Sidaravičiene			1							
Easchmidtella angulata Sidaravičiene			1							
Airina cornuta (Neckaja)			4							
Cadmea sp.			1							
Dagoerayella elongata (Meidla)			1							
Distobolbina tuberculata (Henningsmoen)			5						2	
Bolbina ? *globosa* (Krause)			2						8	
Bullaeferum tapansis (Sarv)			1						1	
Tetradella egorowi Neckaja			8						4	
Hippula edolensis (Gailīte)					1					
Longiscula cf. *porrecta* Stumbur					cf	cf				
Rectella ? *proposita* Abushik et Sarv						1				
Kroemmelbeinia spina Schallreuter						2				
Consonopsis litwiensis (Neckaja)						13			3	
Ectoprimitia corrugata corrugata (Krause)						1			1	
Ampletochilina granifera (Sarv)						2			3	
Vitteplana plana (Neckaja)						6			1	1
Pullvillites ? *inornatus* sp. n.							2		1	
Medianella aequa (Stumbur)								cf		
Retiprimites explicatus gen. et sp. n.									1	
Naevhithis pictis (Neckaja)									14	
Tetradella triloculata Schallreuter									1	
Easchmidtella orbicularis sp. n.									6	1

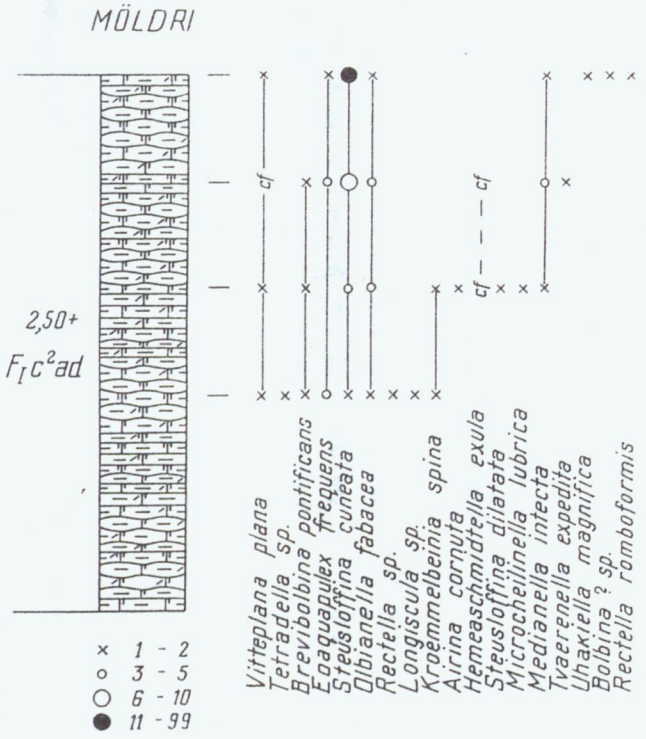

Figure 38. The distribution of ostracodes in the Pirgu River bank at Möldri. Legend see figs 2, 6.

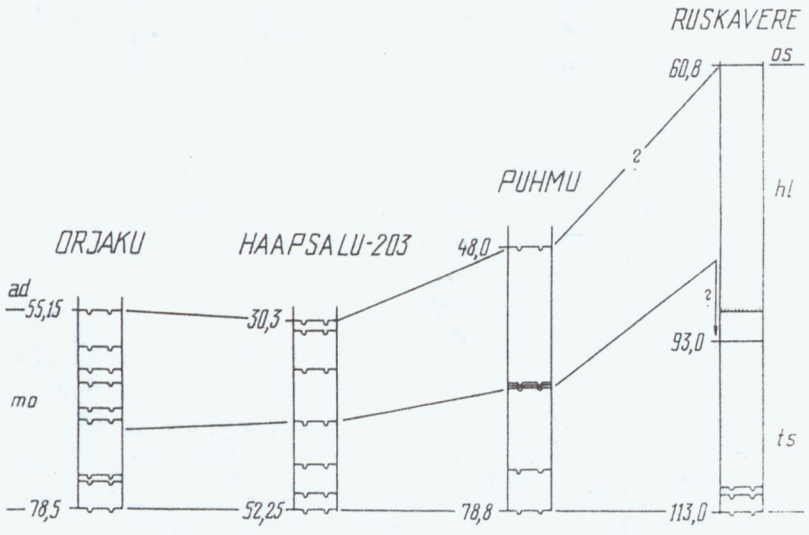

Figure 39. The correlation of the sections of the Pirgu Stage along the Orjaku–Ruskavere line by ostracodes. Legend see figs 2, 6.

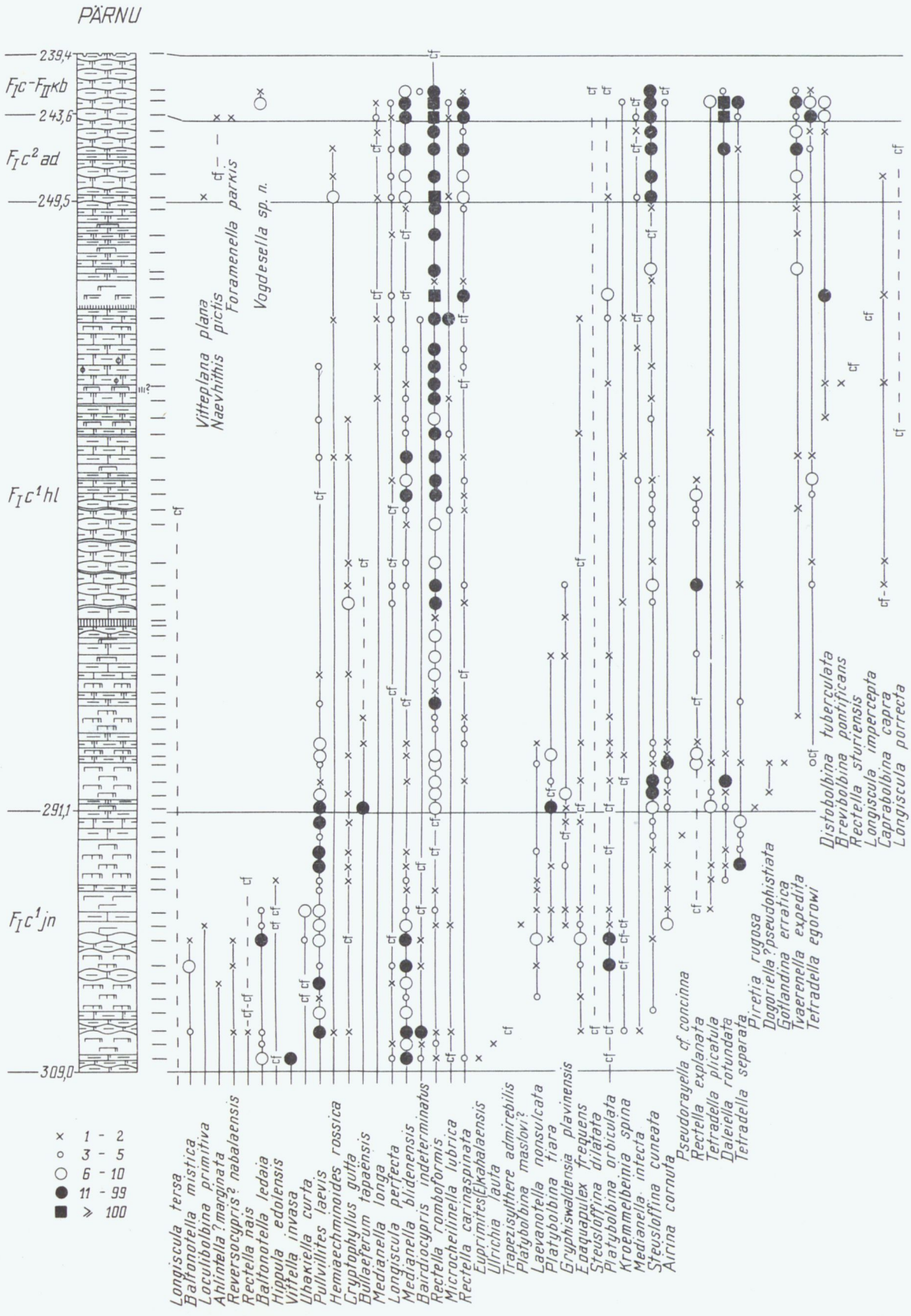

Figure 40. The distribution of ostracodes in the Pärnu core section, Pirgu to Porkuni stages. The Keila to Vormsi stages see fig. 14. Legend see figs 2, 6.

From the Halliku Formation, represented by marls and argillaceous limestones, a total of 76 ostracode species have been identified, but notable faunal differences exist between various sections. In the northernmost part of the distribution area, e.g. in the Virtsu (fig. 9) and Põhjaka–Saare core sections (fig. 33), the Halliku Formation, with a moderate thickness (6.9–18.8 m), lies between the Moe and Oostriku formations. In these sections the ostracode assemblage of the Halliku Formation does not differ much from that of the Moe Formation, except of a comparatively low diversity of ostracodes. In the sections in which the ostracode assemblage is most diverse, the Halliku Formation rests on the Jonstorp (Kaugatuma — fig. 24) or Tootsi (Aidu — fig. 27 and Ruskavere — fig. 29) formations and is overlain by the Oostriku or Adila formations. In the Pärnu (fig. 40), Viljandi (fig. 12), Laeva-18 (fig. 13) and Kaagvere (fig. 15) cores the Halliku Formation is overlain by the sediments of Porkuni age (?) or by the Adila (?) Formation and is mainly characterized by transient taxa.

In the hypostratotype of the Halliku Formation, Ruskavere core (fig. 29), the ostracode assemblage consists of 53 species, including many long-ranging forms. *Steusloffina cuneata*, *Rectella romboformis*, *Airina cornuta*, *Kroemmelbeinia spina*, *Medianella blidenensis* and *Tvaerenella expedita* are common, accompanied with some short-ranged species which in North Estonia appear in the early Pirguan Moe Formation (*Tetradella triloculata*, *Microcheilinella dagoensis*, *Pullvillites*? *inornatus*). These faunal links suggest that in the hypostratotype section the lower part of the Halliku Formation is equivalent to the Moe Formation of northern Estonia.

In the Kaugatuma, Pärnu and Laeva-18 cores the above dominant species are supplemented by *Daleiella rotundata* and *Pullvillites laevis*. In the Viljandi (fig. 12) and Kaagvere (fig. 15) cores, ostracode assemblages of the Halliku Formation are relatively poor. In the Aidu (fig. 27), Pärnu (fig. 40) and Laeva-18 (fig. 13) sections, affinities with the underlying Tootsi/Jonstorp formations can be recognized in the lower part of the Halliku Formation (e.g. short-ranged *Laevanotella nonsulcata* passes into the Halliku Formation). In the Kaugatuma core (fig. 24), on the contrary, *Tetradella triloculata* has been identified in the uppermost part of the Jonstorp Formation. These differences suggest that the lower boundary of the Halliku Formation can be considered as diachronous.

The Oostriku Formation has been established in the Virtsu (fig. 8), Põhjaka–Saare (fig. 33), Aidu (fig. 27) and Ruskavere (fig. 29) cores. The formation has yielded more than 40 ostracode species, but it is insufficiently studied as yet. The most diverse ostracode assemblage, dominated by *Rectella romboformis* and *Steusloffina cuneata*, has been recorded from the Aidu core section, whereas the majority of the ostracode species identified are transients. *Eashmidtella orbicularis*, the appearance of which has been recorded here, in North Estonia appears in the uppermost part of the Moe Formation (Orjaku core — fig. 32 and Haapsalu-203 core — fig. 28) or in the Adila Formation (Puhmu core — fig. 32) in North Estonia.

The Adila (?) Formation has been distinguished also in the Virtsu, Põhjaka–Saare, Aidu, Kaugatuma and Pärnu cores, but the age of these beds relative to the sections of North Estonia is still unclear. In the Virtsu (fig. 8) and Põhjaka–Saare (fig. 33) sections the ostracode assemblage of the Adila Formation does not differ much from that of North Estonia. In the Kaugatuma section (fig. 24) the species composition of the ostracode assemblage of the Adila Formation is also similar to the one recorded from the stratotype area, although quantitative relations between the species are not typical. In the Pärnu section (fig. 40) the Adila Formation is characterized by faunal elements specific to Central Estonia (*Daleiella rotundata*, *Caprabolbina capra*). In the Aidu core section (fig. 27) the Adila Formation yields an improverished assemblage of ostracodes.

The Jelgava, Paroveja and Kuili formations have a restricted distribution in Estonia, and ostracodes of these formations were studied only in the Otepää core section (fig. 17). They have yielded impoverished ostracode assemblages (see also table 9).

6.6. Porkuni Stage

A considerable decrease in the species diversity is characteristic of the Porkuni time. In the Porkunian strata of various lithofacies altogether 73 ostracode species have been identified.

The Ärina Formation has a variable lithological composition (Oraspõld, 1975). Ostracode finds are related to the arenaceous limestones of the Vohilaid Member, bituminous limestones of the Siuge Member and reef limestones of the Tõrevere Member; the dolomites of the Röa Member and sandy limestones of the Kamariku Member have not yielded ostracodes. 50 ostracode species have been recorded in the Ärina Formation.

In the outcrops (quarries at Röa–Jakobi, Seli–Metsküla, Seli–Russalu, Härgla, Siuge and Porkuni and the carst cave at Iida — see table 8) the Porkuni ostracode assemblage is dominated by representatives of Podocopa: *Steusloffina cuneata*, *Medianella aequa*, *Medianella longa*, *Microcheilinella lubrica* and *Longiscula porrecta*. Several species have not been recorded from older deposits (*Medianella aequa*, *Apatochilina falacata*, *Kiesowia* (?) *decima*, *Foramenella porkuniensis*, *Loculibolbina unica*, *Gryphiswaldensia plicata*, *Bulbosclerites unicornis* etc.). In the Puhmu core (fig. 34) the above dominant species are accompanied by *Rectella composita* and *Duplicristatia asymmetrica*. Southward from the outcrop belt of the stage the assemblage becomes poorer. In the Orjaku core (fig. 32) ostracodes have not been recorded in the Ärina Formation. In the Virtsu core (fig. 8) only two widely distributed species were identified. In the Põhjaka–Saare core (fig. 33) the Porkuni an sediments are strongly dolomitized and do not contain ostracodes. Several ostracode species, including *Medianella aequa*, *Rectella composita* and *Bulbosclerites unicornis* have been identified from the Ärina Formation of the Aidu core (fig. 27). In the Kaagvere (fig. 15) and Kaugatuma (fig. 24) cores the topmost Ordovician strata contain occasional specimens only. It should also be noted that in some sections (Virtsu, Kaugatuma) the type of lithofacies suggests that the possibility of redeposition of specimens is not excluded (see also below).

In a sublatitudinal belt in Central Estonia a sequence of alternating limestones and marls rests on the Pirguan Adila Formation. This unit, referred to as the Kabala Formation (Kaljo *et al.*, 1988, Hints *et al.*, 1993) or Äiamaa Formation (Männil and Rõõmusoks, 1984; Männil and Meidla, 1994), was studied in the Virtsu (fig. 8), Kaugatuma (fig. 24), Pärnu (fig. 40) and Aidu (fig. 27) cores. Ostracodes of these strata in the Äiamaa core have been studied by Sarv (1960). In the Virtsu, Äiamaa and Aidu cores the formation is characterized by *Brevibolbina pontificans* (=*Brevibolbina dimorpha altonodosa* in Sarv, 1960), in some sections associatied with *Bullaeferum tapaensis* and *Bolbina*? *globosa*. Most of the species occurring here are transients, but the presence of species listed above suggests a Pirguan age of these sediments. The same assemblage was recorded from those strata in the sections of Hiiumaa Island, from which *Holorhynchus* sp. was reported by Hints (1993), and this supports the Pirguan age of these beds.

In the Aidu core (fig. 27) the ostracode assemblage of the Kabala Formation is not typical to those from the stratotype area (*Daleiella rotundata* is abundant, *Distobolbina tuberculata*, *Foramenella parkis* and *Tvaerenella expedita* occur). Only higher up in the sequence, in the Ärina Formation, the presence of *Rectella composita*, *Bulbosclerites unicornis* and other indicative species suggest the Porkuni age of the corresponding strata.

In the Kaugatuma core (fig. 24), in the assemblage from the Kabala Formation the species listed above are absent. The long-ranging species are accompanied by *Apatochilina falacata* and *Gryphiswaldensia plicata*, otherwise recorded in the Ärina Formation only. Thus, at least two different ostracode assemblages can be distinguished in the Kabala Formation, the latter assemblage being possibly of Porkuni age.

Table 8. Ostracode distribution in the outcrops of the Ärina Formation, Porkuni Stage (with number of specimens given).

	Röa–Jakobi	Seli–Metsküla	Seli–Russalu	Härgla	Iida	Siuge	Porkuni
Bairdia ? *iocus* Schallreuter	cf						
Easchmidtella orbicularis sp. n.	3	18	48			35	
Eoaquapulex frequens (Steusloff)	1	21	6		8	5	181
Medianella longa (Stumbur)	2	98	23		62	56	12
Longiscula porrecta Stumbur	4	88	31		34	49	25
Steusloffina aputa Stumbur	1	12				17	4
Hemeaschmidtella exula Schallreuter	cf						cf
Microcheilinella lubrica (Stumbur)	7	96	20		39	103	cf
Medianella aequa (Stumbur)	9	63	18		62	100	8
Pseudorayella cf. *concinna* Neckaja	1	2					4
Gryphiswaldensia plicata Schallreuter		2					
Dagoerayella elongata (Meidla)		3					
Euprimites ? sp.		1	9				
Longiscula impercepta sp. n.		4	1			9	
Bulbosclerites unicornis (Neckaja)		14	6		3	1	
Steusloffina cuneata (Steusloff)		513	52	10	169	83	2
Medianella intecta (Stumbur)		12			9	18	3
Leperditella brachynotos (Schmidt)		22	8		19	42	241
Apatochilina falacata Sarv		68	5		4	16	62
Naevhithis pictis (Neckaja)		1					1
Foramenella porkuniensis Sarv		2	6		3	17	61
Estonaceratella estona (Sarv)		2		2	4	6	13
Kroemmelbeinia spina Schallreuter		5					1
Cystomatochilina umbonata (Krause)		cf	6			2	3
Ampletochilina granifera (Sarv)		3	2		12	16	33
Duplicristatia sp.		3					1
Longidorsa ? *porkuniensis* (Stumbur)		1				1	6
Longidorsa humilis sp. n.			13				
Steusloffina ? sp. 2			12				
Tetradella egorowi Neckaja			3		3		
Kiesowia ? *decima* Sarv			2				
Uhakiella jonesii (Krause)			11				15
Loculibolbina unica (Sarv)			18				
Rectella romboformis Neckaja				2		4	
Pseudorayella kaufmanni Schallreuter					3		
Baltonotella mistica Sidaravičiene				2	2		
Steusloffina dilatata Meidla						2	
Vitteplana plana (Neckaja)						2	
Tetradella plicatula (Krause)						3	5
Cadmea sp.						1	1
Baltonotella limbata Sidaravičiene							1
Arpaschmidtella abnormis (Sidaravičiene)							2
Dagoerayella sulcata gen. et sp. n.							8
Bairdiocypris indeterminatus Pranskevičius							1

Questionable is the age of the Kabala Formation in the Pärnu core (fig. 40), where the composition of the ostracode fauna lacks features characterizing either assemblage type. *Vogdesella* sp. n., identified from this interval, is not otherwise recorded in the East Baltic. *Brevibolbina pontificans*, which is characteristic to the uppermost Pirgu Stage, occurs in this section almost 18 m below the occurrence of *Vogdesella*.

In the Kabala Formation altogether 58 ostracode species have been identified. In the author's opinion, the differences between the ostracode assemblages of the Kabala Formation suggest the Pirguan age of the formation in the stratotype section (but also in the Virtsu and Aidu sections) and a Porkunian age in the Kaugatuma and possibly Pärnu sections. Data on the distribution of ostracodes in the Kabala Formation are summarized in table 9. The Pirgu-type ostracode assemblage ("1") does not differ essentially from that of the underlying deposits. The Porkuni-type assemblage ("2") lacks 12 ostracode species which occur in the former assemblage (among these *Brevibolbina pontificans*, *Bullaeferum tapaensis*, *Consonopsis litwiensis*), and they are replaced by *Apatochilina falacata* and *Gryphiswaldensia plicata*. These strata may not have analogues in the North Estonian sections or may correspond to the Porkunian Ärina Formation.

The Kuldiga Formation has been distinguished in the Abja, Taagepera and Otepää sections. The total number of ostracode species recorded in this formation is 16. According to Gailīte (1970) the Kuldiga Formation in Latvia is characterized by a specific ostracode assemblage, which includes *Scanipisthia rectangularis* (=*Bollia mezmalensis* in Gailīte), *Harpabollia harparum* (=*Bollia mezvagarensis* in Gailīte), *Aechmina groenwalli* (=*A. ciecerensis* Gailīte), *Circulinella gailitae* (=*Circulina nuda* in Gailīte), etc. Almost identical assemblage occurs in the Estonian core sections. In southern Estonia the formation is thickest and faunally most diverse in the Taagepera core (fig. 17), where it rather clearly can be subdivided into two parts. The lower unit (420–425.1 m) is characterized by prevalence of the *Rectella* species (*R. romboformis*, *R. composita*), which occur together with *Microcheilinella lubrica*, *Duplicristatia asymmetrica*, *Circulinella gailitae*, *Aechmina groenwalli* and *Harpabollia harparum*. The upper unit lacks completely *Rectella*, and only *Circulinella gailitae*, *Aechmina groenwalli* and *Harpabollia harparum* have been recorded. The presence of *Rectella composita* and *Duplicristatia asymmetrica* in the lower part of the formation indicates a close relationship (and possibly similar age) of this interval with the Ärina Formation in the core sections of eastern Estonia (Puhmu, Aidu). The same part of the formation is probably developed in the Abja (fig. 18) and Otepää (fig. 16) cores, where *Rectella* is present, but *Harpabollia harparum* absent.

The Saldus Formation is distinguished above the Kuldiga Formation in the Taagepera (fig. 17), Abja (fig. 18) and Otepää (fig. 16) core sections, and also in some sections of Central Estonia (Laeva-18 and Viljandi, figs 13 and 12). In Estonia the Saldus Formation is characterized by an impoverished ostracode assemblage. In all sections studied the fauna is closely related to that of the underlying deposits. Thus, in the Taagepera and Abja sections, the formation is characterized by *Circulinella gailitae* and some other representatives of the Kuldiga assemblage. The Viljandi and Laeva-18 cores lack the elements of the Kuldiga assemblage. The rarity of specimens, and the character of lithofacies, suggest that redeposition of specimens is possible. Rare specimens, recorded in the Ruskavere core (fig. 29) in the interval of 59.5–60.2 m, may have the same origin and the corresponding thin-bedded deposits may also be comparable to the Saldus Formation.

6.7. The Ordovician–Silurian boundary

In Estonian sections, the Ordovician–Silurian boundary is marked by a major gap, corresponding to the late Hirnantian. The taxonomic composition of most fossil groups changes dramatically at this boundary (Nestor *et al.*, 1991). In the ostracode distribution the end of the Ordovician marks almost complete faunal turnover. The decline of the Ordovician ostracode assemblages started already in the early Porkuni time with the notable decrease in species diversity. Later on, the appearance of the *Harpabollia* fauna (Meidla, 1996) supressed most of common beyrichiocopes and caused a decrease in the diversity of podocopes. The lowermost Silurian strata are characterized by a comparatively poor ostracode association, dominated by new podocope species together with first craspedobolbinids (Sarv and Meidla, 1984). In the studied sections, the lowermost Silurian strata are characterized by *Longiscula* cf. *smithii* and *Microcheilinella rozhdestvenskaja*.

7. Ostracode associations

The end of the middle Ordovician (from the beginning of the Oanduan time) and late Ordovician can be distinguished as a uniform, relatively independent phase in the development of the East Baltic ostracode fauna (see also Hints *et. al.*, 1989). This phase is characterized by wide distribution of podocope ostracodes, which have replaced Ctenonotellidae, occuring abundantly in the middle Ordovician. Successive changes in the late Ordovician ostracode composition are mostly concentrated to certain stratigraphical levels and facies boundaries, permitting to distinguish a number of associations, more or less stable both spatially and temporally. The first attempt at distinguishing ostracode associations in the late Ordovician of Estonia is based on the analysis of spatial variability of ostracode complexes in different stages (Meidla 1986b), but as the actual boundaries between associations do not often correspond to those of the stages the approach is modified in the present study.

For facilitating definition of associations, three categories of species have been distinguished, based on their relative frequency in the units studied:
(1) — dominant species (dominant) — occurs abundantly and in the majority of samples;
(2) — frequent species — occurs in small numbers in numerous samples; may be abundant at some levels;
(3) — rare species — occurs as rare specimens in some samples.
As the adequacy of application of pure quantitative methods is questionable, due to the specific features of the preparation method used, the distinction of such categories must be based on semiquantitative numerical estimates.

The associations are distinguished by the repeated occurrence of dominant species in the sequence. The dominants are accompanied by a distinct group of frequent and rare species. The descriptions of the associations are based, first of all, on those sections which have yielded more numerous and representative material; rare species and poor record were taken into consideration only for defining the area of distribution of the associations. Some of the distinguished associations could obviously be considered as monotypical communities; however, some of them have a "collective" character, not representing a natural unity. Due to this heterogeneity, the term "association" has been used instead of "community".

The *Sigmoopsis granulata* association occurs mainly in argillaceous limestones and marls (calcarenites) of the Hirmuse Formation of the Oandu Stage. In its characteristic form the association is distinguished in the Vinni core section (interval 42.6–44.1 m; fig. 10). It is dominated, in addition to the index species, by *Bolbina major*, *Bolbina rakverensis*, *Klimphores minimus* and *Easchmidtella fragosa*. This association is the most diverse among those of Oanduan age. It has a stable species composition throughout the entire distribution belt (see fig. 41). In the southermost area (Pärnu core — fig. 14) the association becomes transitional and is grading into the *Pelecybolbina illativis* association.

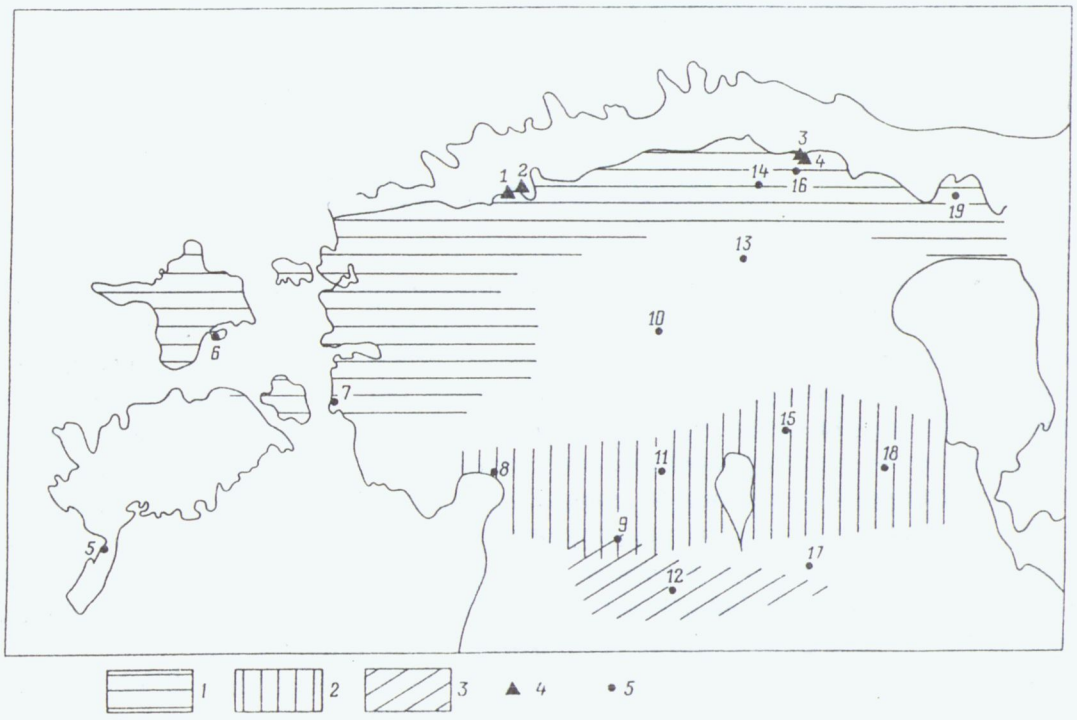

Figure 41. The distribution of ostracode associations in the Oandu time (considering the data by Sarv, 1960 and Männil, 1966). Legend: 1–3 — distribution areas of ostracode associations (1 — *Sigmoopsis granulata*, 2 — *Pelecybolbina illativis*, 3 — *Klimphores minimus*), 4 — outcrop, 5 — borehole. Localities in the figure — outcrops: 1 — Koppelmaa trench, 2 — Saku quarry, 3 — Tõrremägi trench, 4 — Ussimägi outcrop; boreholes: 5 — Kaugatuma, 6 — Orjaku, 7 — Virtsu, 8 — Pärnu, 9 — Abja, 10 — Äiamaa, 11 — Viljandi, 12 — Taagepera, 13 — Puhmu, 14 — Laiamäe, 15 — Laeva-18, 16 — Vinni, 17 — Otepää, 18 — Kaagvere, 19 — Mäetaguse.

The *Pelecybolbina illativis* association occurs in the marls (calcarenites) of the Lukštai Formation. It is most typically developed in the Viljandi core section (depth 327.8 m — fig. 12); in the Laeva-18 core section it is recorded in the interval 234.2–237.0 m (fig. 13). The association is dominated by *Pelecybolbina illativis*, *Rectella nais* and *Easchmidtella fragosa*. The *Pelecybolbina illativis* association is distributed in southern Estonia, except for its southernmost part (see fig. 41). To the north (Pärnu core, fig. 14) it includes abundantly elements of the *Sigmoopsis granulata* association, southwards, however, it looses its species diversity.

The *Klimphores minimus* association is distributed in the marlstones of the Priekule member of the Mossen Formation, apparently forming a lateral analogue of the *Sigmoopsis granulata* and *Pelecybolbina illativis* associations (see the correlation of the Oanduan sections above). The association is characterized by a low diversity, abundance of *Klimphores minimus*, *Eashmidtella fragosa*, *Kinnekullea hesslandi* and *Psedoancora parovina*, and by almost total absence of Eurychilianacea and Hollinacea. The association apparently characterizes a large area in north-western Latvia (see Ulst *et al.*, 1982); in Estonia (fig. 41) it has been recorded so far only from the Taagepera core section (fig. 17) at a depth of 466.4 m. A transitional association, containing some palaeocope component, has been registered in the Abja core section (fig. 18).

The *Disulcina perita perita* association occurs in aphanitic limestones (calcilutites) of the lower part of the Rägavere Formation. Its distribution area covers northern and Central Estonia (see fig. 42). In the north-western and north-eastern parts of its area of distribution the *Disulcina perita perita* association is partly replaced by the *Olbianella* cf. *braderupensis* association, which, however, has not been recorded from the Puhmu section. The composition of the association is mostly variable, most abundant are, in addition to the index species, *Airina cornuta*, *Pyxion rakverensis*, *Bolbina rakverensis*, *Tetradella egorowi*, *Pseudorayella concinna* and *Brevantia brevis*. In the Orjaku core section (fig. 7) the *Disulcina perita perita* association is distinguished in the interval of 99.4–125.1 m. Southwards it is replaced by the *Pelecybolbina pelecyoides* association.

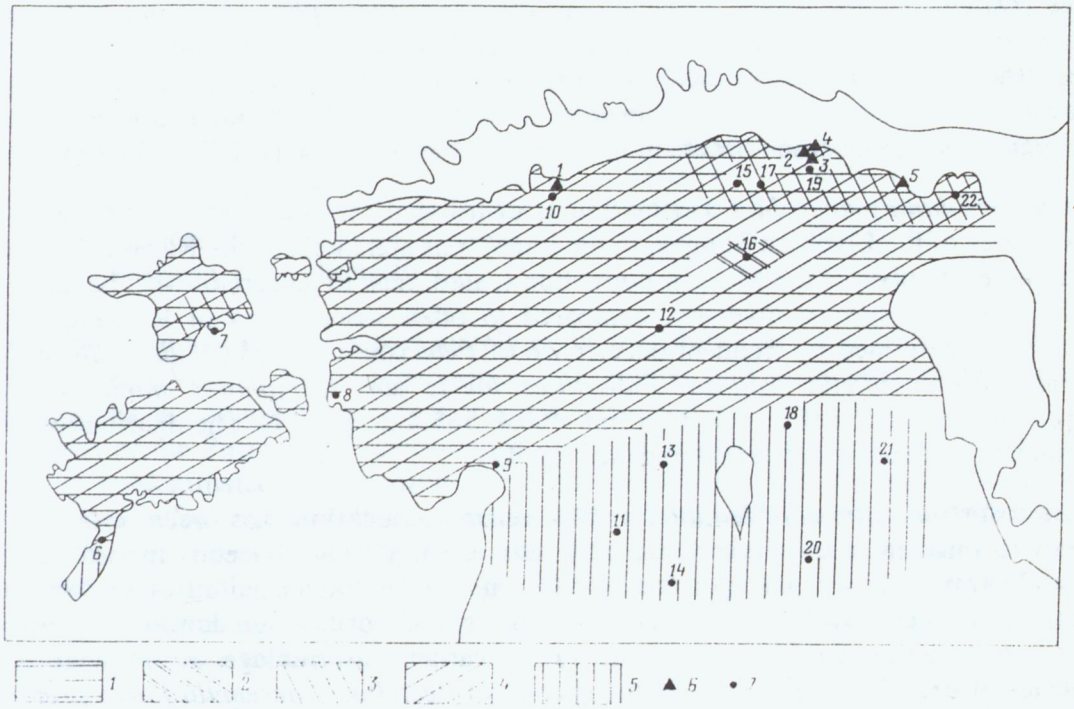

Figure 42. The distribution of ostracode associations in the Rakvere time (considering the data by Sarv, 1960). Legend: 1–5 — distribution areas of ostracode associations (1–3 of early Rakvere age, 1 — *Disulcina perita perita*, 2 — *Steusloffia neglecta*, 3 — *Olbianella* cf. *braderupensis*, 4–5 of late Rakvere age, 4 — *Daleiella admiranda*, 5 — *Pelecybolbina pelecyoides*), 6 — outcrop, 7 — borehole. Localities in the figure — outcrops: 1 — Paekna quarry, 2 — Moonaküla quarry, 3 — Rägavere quarry, 4 — Ussimägi outcrop; 5 — Piilse riverside section; core sections: 6 — Kaugatuma, 7 — Orjaku, 8 — Virtsu, 9 — Pärnu, 10 — Nabala, 11 — Abja, 12 — Äiamaa, 13 — Viljandi, 14 — Taagepera, 15 — Moe, 16 — Puhmu, 17 — Laiamäe, 18 — Laeva-18, 19 — Vinni, 20 — Otepää, 21 — Kaagvere, 22 — Mäetaguse.

The *Steuloffia neglecta* association is associated with aphanitic algal limestones of the lower part of the Rägavere Formation, containing abundant *Vermiporella* sp. So far it has been identified only in the Puhmu core section in the interval 127.6–137.8 m (see figs 23, 42). Rare specimens of *Steusloffina neglecta* are recorded from other sections as well, but in the Puhmu core it forms rich accumulations, associated with numerous *Moeckowia rava*, *Gellensia* sp. n., *Euprimites* (*Euprimites*) *kahalaensis*, *Hemeaschmistella exula*, *Rectella nais* and *Steusloffina dilatata*. Lateral analogues of this association probably are the *Disulcina perita perita* and *Olbianella* cf. *braderupensis* associations.

The *Olbianella* cf. *braderupensis* association is distributed in the aphanitic and semiaphanitic limestones (calcilutites) of the lowermost part of the Rägavere Formation. In the typical form it is represented in the Orjaku core section (interval 126.45–129.75 m; fig. 7). Characteristic is the predominance of *Olbianella* cf. *braderupensis*, *Tvaerenella longa pretiosa* and *Hemeaschmidtella exula* occur also frequently. The association is distributed in the outcrop belt of the Rakvere Stage and in the neighbouring subsurface areas of western and eastern Estonia (see fig. 42). There are no data available about the association type between the Orjaku and Moe sections, except the Nabala-16 core section (fig. 20), where this association has not been recorded. Southwards the distribution area of the association does not reach the Virtsu–Äiamaa–Puhmu line.

The *Daleiella admiranda* association is recorded from the aphanitic and semiaphanitic limestones (calcilutites) of the upper half of the Rägavere Formation. In addition to the dominant species (*Daleiella admiranda*), *Brevibolbina dimorpha dimorpha*, *Disulcina perita perita*, *Hemeaschmidtella exula* and *Tvaerenella longa pretiosa* are also abundant. This association, distinguished in all sections of the North Estonian Confacies Belt (see fig. 42), is replaced southwards by the *Pelecybolbina pelecyoides* association. In the characteristic form the *Daleiella admiranda* association occurs in the Vinni core section (interval 27.2–33.4 m, fig. 10).

The *Pelecybolbina pelecyoides* association is distributed in South Estonia, in the northern marginal area of the Livonian Tongue, in the limestones and marls of the Rägavere Formation and Priekule Member of the Mossen Formation (calcilutites to calcarenites). The association shows the lowest species diversity, compared to other associations of Rakvere time. Its character is determined by frequent occurrence of *Pelecybolbina pelecyoides*, *Sigmobolbina camarota*, *Easchmidtella fragosa*, *Pullvillites laevis* and *Klimphores minimus*, as, for example, in the Taagepera core section (int. 460.4–565.4 m, fig. 17). The distribution area of the association covers southern Estonia (see fig. 42).

The *Steusloffina cuneata-Medianella blidenensis* assocation has been established in northern Estonia, in aphanitic and microcrystalline, variably argillaceous limestones of the Nabala, Vormsi and Pirgu stages (calcilutites and calcarenitic calcilutites of the Paekna, Saunja, Kõrgessaare and Moe formations). In its composition predominate *Steusloffina cuneata* and *Medianella blidenensis* and rather variable assemblage of frequent species: subspecies of *Brevibolbina dimorpha*, the species of *Rectella*, *Tvaerenella longa pretiosa*. In the Orjaku core section (figs 7 and 32) this association occurs in the interval 71–106 m. The spatial distribution of the association is presented in figs 43–45. The southern margin of the distribution area oscillates within the lithologically transitional belt (see fig. 1) in the Nabala and Pirgu times, during the Vormsi time, however, it shifted farther to the north. The composition and distribution pattern of the *Steusloffina cuneata-Medianella blidenensis* association needs special study, as it could presumably be subdivided into several associations.

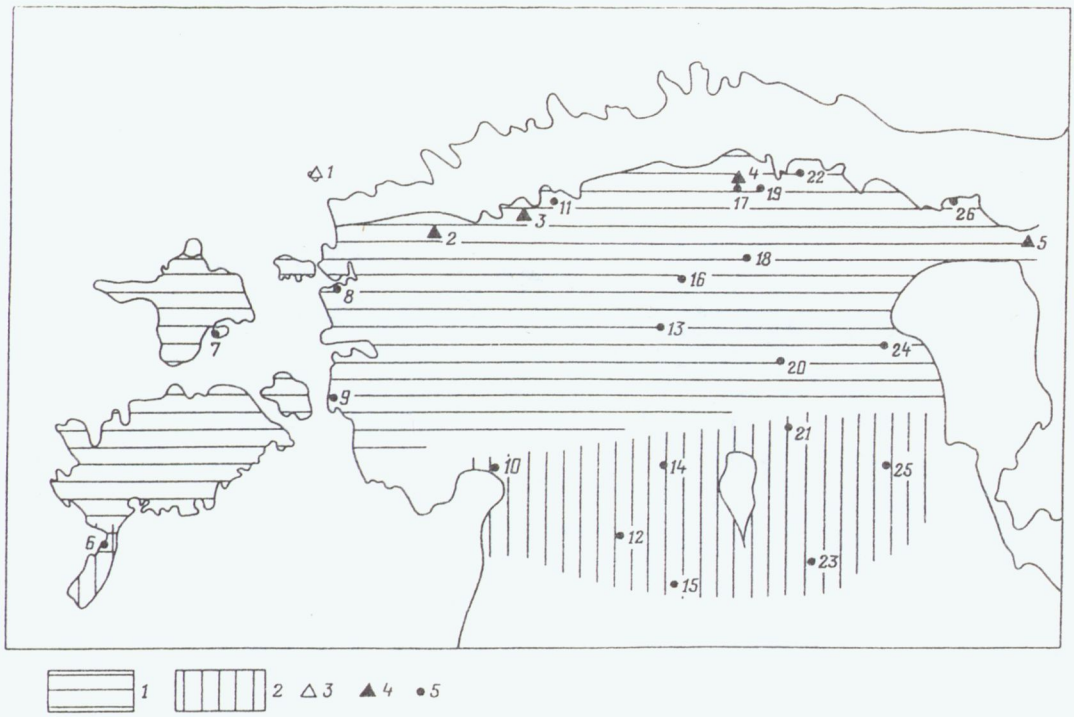

Figure 43. The distribution of ostracode associations in the Nabala time (considering the data by Sarv, 1960). Legend: 1–2 — distribution areas of ostracode associations (1 — *Steusloffina cuneata-Medianella blidenensis*, 2 — *Uhakiella curta*), 3 — outcrop, 4 — borehole. Localities in the figure — outcrops: 1 — Osmussaar (erratic boulder), 2 — Turvaste outcrop, 3 — Sutlema quarry, 4 — Tõrma quarry; 5 — Permisküla riverside section; core sections: 6 — Kaugatuma, 7 — Orjaku, 8 — Haapsalu, 9 — Virtsu, 10 — Pärnu, 11 — Nabala, 12 — Abja, 13 — Äiamaa, 14 — Viljandi, 15 — Taagepera, 16 — Vodja H-191, 17 — Moe, 18 — Puhmu, 19 — Laiamäe, 20 — Aidu, 21 — Laeva-18, 22 — Vinni, 23 — Otepää, 24 — Ruskavere, 25 — Kaagvere, 26 — Mäetaguse.

The *Uhakiella curta* association occurs mainly in the marlstones and argillaceous limestones of the Nabala and Vormsi stages (calcilutites, calcarenites and mudstones of the Mõntu, Tudulinna, Fjäcka and Saunja formations), in some sections it has been established also in the lowermost part of the Pirgu Stage (calcarenites of the Tootsi and Jonstorp formations). The association is predominated by *Uhakiella curta* and usually (except the northernmost sections) lacks *Steusloffina cuneata*. It has a rather stable composition, comprising *Medianella blidenensis*, *Rectella romboformis*, *Rectella nais*. The *Uhakiella curta* association is distributed in middle and southern Estonia (see figs 43–44). In the Laeva-18 core section (fig. 13) it occurs on the interval 212–229 m. In the Vormsi time it was replaced southwards by the *Kinnekullea thorslundi* association.

The *Kinnekullea thorslundi* association is related to carbonate-terrigeneous sediments (kerogeneous argillites) of the Fjäcka Formation. Its distribution area covers southern and southeastern Estonia (see fig. 44). In Latvia *Kinnekullea thorslundi* has a much wider stratigraphical distribution (see Ulst *et al.*, 1982), but in Estonia it is restricted to the Vormsi Stage only. Except for the index species, the association includes *Rectella nais*, *Vittella invasa* and *Pseudoancora parovina*. Northward (e.g. Kaagvere borehole, fig. 15) the index species associates often with *Uhakiella curta* Sidaravičiene. In the Abja core section (fig. 18) the *Kinnekullea thorslundi* association has been recorded from the interval of 391.1–393.0 m.

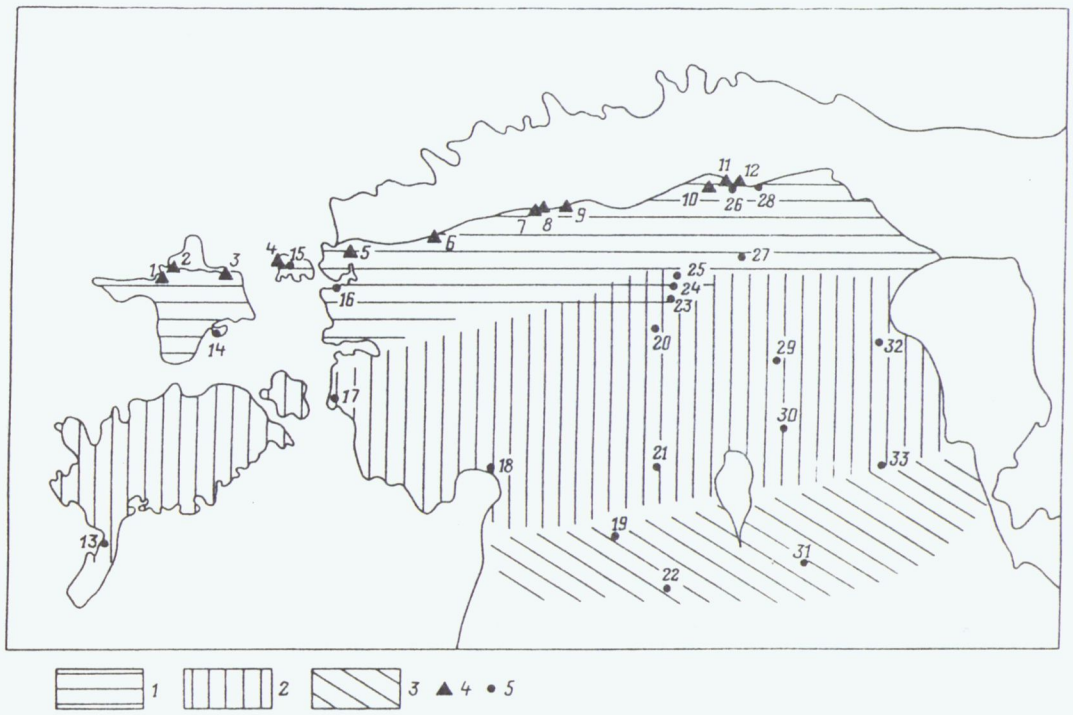

Figure 44. The distribution of ostracode associations in the Vormsi time (considering the data by Sarv, 1960). Legend: 1–3 — distribution areas of ostracode associations (1 — *Steusloffina cuneata-Medianella blidenensis*, 2 — *Uhakiella curta*, 3 — *Kinnekullea thorslundi*), 4 — outcrop, 5 — borehole. Localities in the figure — outcrops: 1 — Paope quarry, 2 — Kõrgessaare quarry, 3 — Paluküla quarry, 4 — Saxby beach exposure; 5 — Sutlepa quarry, 6 — Turvaste outcrop, 7 — Kohila quarry and temporary exposure (Kohila-2); 8 — Urge quarry, 9 — Prillimäe outcrop, 10 — Lehtse excavation, 11 — Tapa excavation; 12 — Moe excavation (Moe-2); core sections: 13 — Kaugatuma, 14 — Orjaku, 15 — Förby, 16 — Haapsalu, 17 — Virtsu, 18 — Pärnu, 19 — Abja, 20 — Äiamaa, 21 — Viljandi, 22 — Taagepera, 23 — Põhjaka–Saare, 24 — Vodja H-190, 25 — Vodja H-191, 26 — Moe, 27 — Puhmu, 28 — Laiamäe, 29 — Aidu, 30 — Laeva-18, 31 — Otepää, 32 — Ruskavere, 33 — Kaagvere.

The *Steusloffina cuneata-Olbianella fabacea* association occurs in pure and weakly argillaceous limestones (calcarenitic calcilutites) of Pirguan Moe and Adila formations in northern Estonia (see fig. 45). Beside the predominating species *Steusloffina cuneata* and *Olbianella fabacea*, the association contains numerous *Medianella blidenensis*, *Platybolbina orbiculata*, *Medianella intecta*. Rare accumulations and finds of *Olbianella fabacea* are known to occur in the Nabala and Vormsi stages, but this species is more abundant in the Pirgu Stage, distinguishing the *Steusloffina cuneata-Medianella blidenensis* and *Steusloffina cuneata-Olbianella fabacea* associations. In the typical form the association occurs in the Orjaku core section (fig. 32), in the interval of 46–70 m.

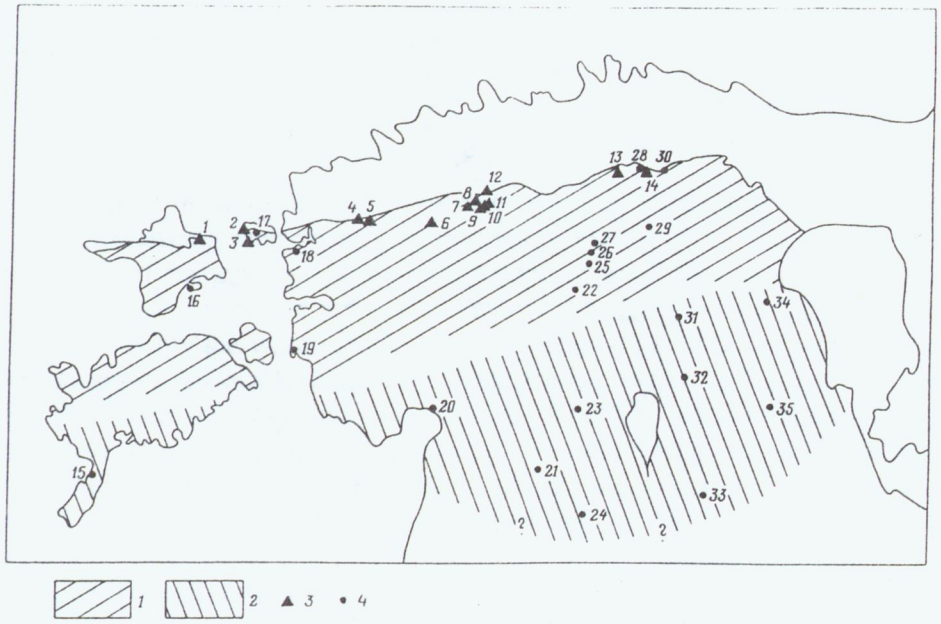

Figure 45. The distribution of ostracode associations in the Pirgu time (considering the data by Sarv, 1960). Legend: 1–2 — distribution areas of ostracode associations (1 — *Steusloffina cuneata-Olbianella fabacea* and *Steusloffina cuneata — Medianella blidenensis* (in early Pirgu time), 2 — *Steusloffina cuneata — Rectella romboformis*), 3 — outcrop, 4 — borehole. Localities in the figure — outcrops: 1 — Paluküla quarry, 2 — Saxby beach exposure; 3 — Hosholm beach exposure, 4 — Kuie quarry, 5 — Piirsalu quarry; 6 — Ruunavere exposure, 7 — Adila quarry, 8 — Lohu quarry, 9 — Rabivere quarry; 10 — Pirgu riverside section at Möldri; 11 — Pirgu riverside section at Pirgu, 12 — Prillimäe exposure, 13 — Põriki quarry, 14 — Moe quarry; core sections: 15 — Kaugatuma, 16 — Orjaku, 17 — Förby, 18 — Haapsalu, 19 — Virtsu, 20 — Pärnu, 21 — Abja, 22 — Äiamaa, 23 — Viljandi, 24 — Taagepera, 25 — Põhjaka–Saare, 26 — Vodja H-190, 27 — Vodja H-191, 28 — Moe, 29 — Puhmu, 30 — Laiamäe, 31 — Aidu, 32 — Laeva-18, 33 — Otepää, 34 — Ruskavere, 35 — Kaagvere.

The *Steusloffina cuneata-Rectella romboformis* association is distributed in Pirguan to Porkunian argillaceous limestones and marls (calcarenites and calcarenitic calcilutites) in middle and southern Estonia (figs 45–46). In the characteristic form it has been recorded in the Aidu core section (fig. 27) in the interval of 110–175 m. Except for the index species there occur often *Pullvillites laevis*, *Daleiella rotundata*, *Tetradella egorowi*, *Tetradella plicatula*, *Gryphiswaldensia plavinensis*, *Tvaerenella expedita*, *Eoaquapulex frequens*. The predominance of *Steusloffina cuneata* and *Rectella romboformis* has been established also in the Kabala Formation of the Kaugatuma (fig. 24) and Pärnu (fig. 40) cores, in association with *Daleiella rotundata*. Only scanty information is available from the southernmost sections of Estonia (Otepää — fig. 16, Taagepera — fig. 17). The absence of *Steusloffina cuneata* (Steusloff) in these sections may possibly mark the transistion to a succeeding association, existence of which can be assumed according to the Latvian data (Ulst *et al.*, 1982).

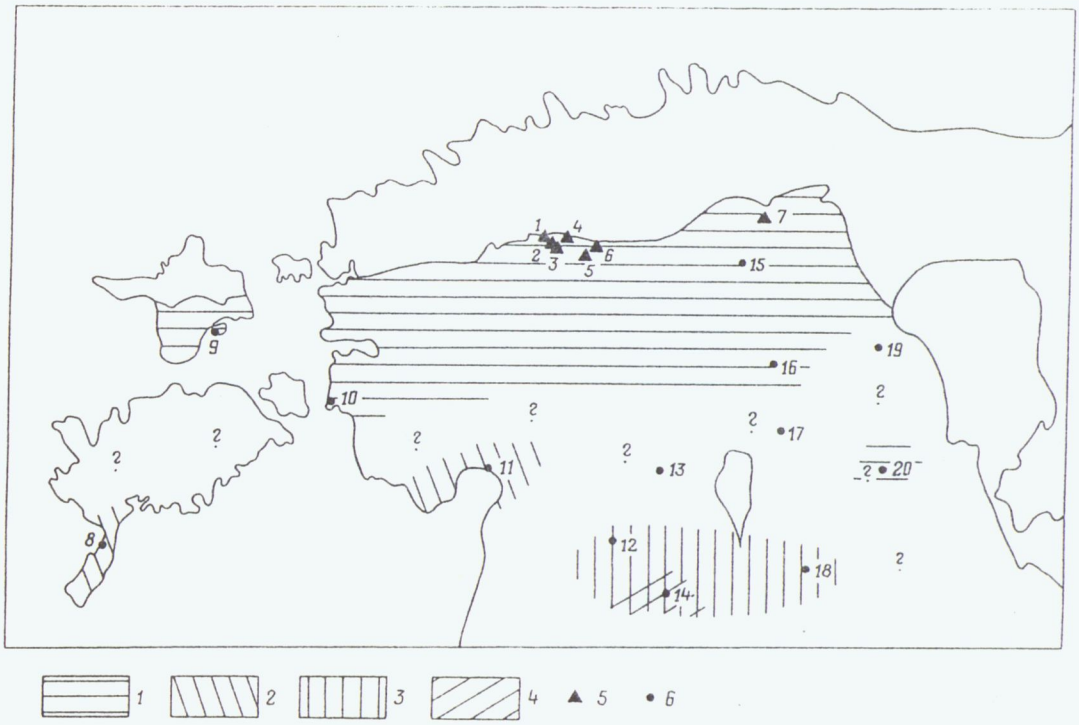

Figure 46. The distribution of ostracode associations in the Porkuni time. Legend: 1–4 — distribution areas of ostracode associations (1 — *Medianella aequa*, 2 — *Steusloffina cuneata-Rectella romboformis*, 3 — *Rectella composita*, 4 — *Harpabollia harparum*), 5 — outcrop, 6 — borehole. Localities in the figure — outcrops: 1 — Röa–Jakobi quarry, 2 — Seli–Metsküla quarry; 3 — Seli–Russalu quarry, 4 — Härgla quarry, 5 — Iida carst cave; 6 — Siuge quarry, 7 — Porkuni quarry; core sections: 8 — Kaugatuma, 9 — Orjaku, 10 — Virtsu, 11 — Pärnu, 12 — Abja, 13 — Viljandi, 14 — Taagepera, 15 — Puhmu, 16 — Aidu, 17 — Laeva-18, 18 — Otepää, 19 — Ruskavere, 20 — Kaagvere.

The *Medianella aequa* association is related to the reef limestones, nodular and microcrystalline limestones of the Ärina Formation. It is characterized by the prevalence of podocope ostracodes: *Steusloffina cuneata*, *Medianella longa*, *Medianella intecta*, *Microcheilinella lubrica* and *Medianella aequa* constitute about 50–90% of the total number of specimens in the sections studied. The distribution area of the association is mostly restricted to northern Estonia (see fig. 46), but the dolomitization of the sediments complicates its limitation. In the characteristic form the *Medianella aequa* association is recorded from the Siuge and Porkuni outcrop sections (table 8).

The *Rectella composita* association characterizes the terrigeneous-carbonate deposits of the Kuldiga Formation in southern Estonia (fig. 46). It almost lacks Eurychilinacea and Hollinacea, which are replaced by Drepanellacea and Aechminacea in both *Rectella composita* and *Harpabollia harparum* associations. The most numerous are *Rectella composita*, *Rectella romboformis*, *Microcheilinella lubrica* and *Aechmina groenwalli*. Such an association of species has been discovered in the Taagepera core section (fig. 17) in the interval 420–425 m, which presumably corresponds to the fossiliferous part of the Ärina Formation (see the correlation of the Porkunian sections above).

The *Harpabollia harparum* association has been established in Estonia so far only in the Taagepera core section (fig. 17) in the upper part of the Kuldiga Formation and in the Salduse Formation (interval 410–420 m), but its distribution area covers probably most of western

Latvia (see Gailīte, 1970). In the Taagepera section the most abundant are, beside *Harpabollia harparum*, *Pseudoancora confragosa*, *Circulinella gailitae*, *Drepanella*? *pauxilla*. The association nearly corresponds to the *Harpabollia* fauna in Meidla, 1996. The species composition of the latter one is more variable, being transitional between the *Rectella composita* and *Harpabollia harparum* association in Estonia. The presence of these transitional assemblages could serve as additional evidence for correlation of the lowermost Kuldiga Formation with the fossiliferous part of the Ärina Formation in North Estonia (see above).

Concluding remarks. The distribution of later Ordovician ostracode associations is presented in fig. 47, generalizing their spatial and temporal relationships.

Lateral succession of associations is usually connected with the change of the lithofacies. The most important limiting factors are the content of the terrigeneous argillaceous material in the deposits and possibly the water depth. The dependence on the lithofacies has resulted in distinct contemporanous associations in the limestones, marls and argillites, as is best examplified by the Vormsian associations (figs 44, 47). The calcilutites of the Rägavere Formation may serve as an example of the influence of bathymetry. In this formation, lateral changes of the faunal composition take place along the supposed paleodepth gradient (southern direction within Estonian territory), resulting in the appearance of a distinct association in deeper-water marls and limestones of the upper Priekule Member.

By stratigraphical alteration of associations, in some cases the relationship with lithofacies is noted also, particularly within the Central Baltoscandian Confacies Belt, but vertical changes may take place in comparatively monotonous lithofacies also, in case of minor changes only (like by the Rakverean associations in North Estonia — figs 42, 47).

Within the North Estonian Confacies Belt, the boundaries of ostracode associations are less distinct, compared to those in the Central Baltoscandian Confacies Belt, and their composition of associations is much more variable. The highest diversity of ostracodes occurs exclusively in North Estonia, with a gradual decrease to the south, along the main facies gradient. According to Jaanusson (1995), the boundary of two main confacies belts could be drawn by fairly abrupt change in benthic faunas and the transitional belt should be considered as a pure lithological phenomena. However, in the distribution of late Ordovician ostracode fauna, in a large scale, these abrupt changes are not always recorded. In Oandu and particularly in Vormsi time a distinct transitional belt can be distinguished, nearly corresponding to the Põlma's (1967) transitional zone (see fig. 1). This intermediate belt is characterized by a specific faunal association, distinct from the associations of the North Estonian and Central Baltoscandian confacies belts. The occurrence of the Vormsian transitional association is controlled by the distribution of lithofacies, mainly by the certain clay/carbonate ratio characterizing the Tudulinna Formation. Such a transitional lithofacies belt apparently had certain control over the distribution of benthic faunal assemblages and the distinction of a transitional confacies (sub-)belt looks reasonable in such cases. However, the presence of a distinct transitional confacies belt cannot be demonstrated, in the light of present data, in all studied stages or its presence needs further approval. The full extent of facies transitions can be demonstrated only by incorporating the semiquantitative ostracode data from Latvian sections also.

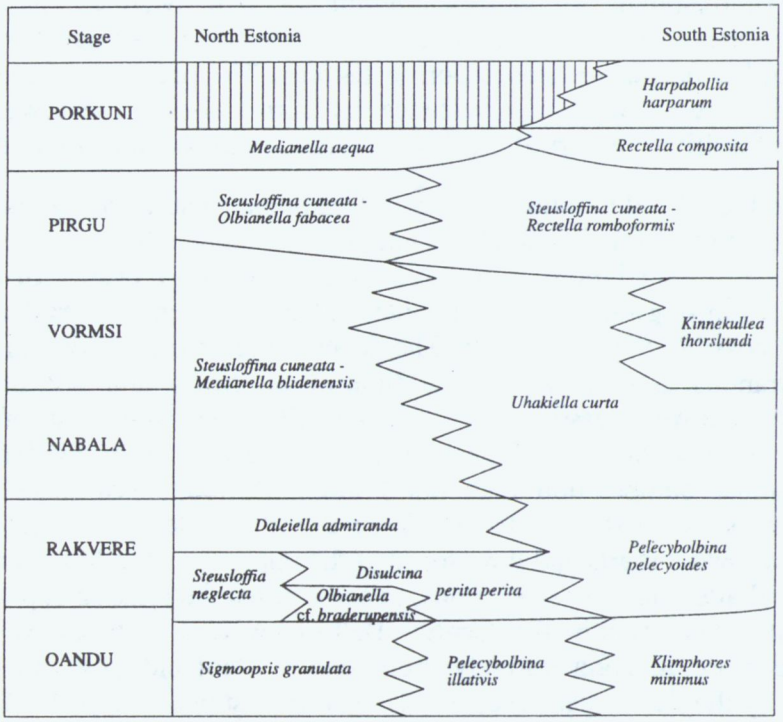

Figure 47. The distribution of ostracode assiociations.

Some fluctuation in the position of association boundaries can be recognized throughout the Estonian sequence. They can be followed in the figures 41 to 46. These fluctuations apparently reflect the sea-level changes in the Ordovician Paleobasin and the related dynamics of the confacies belts.

Table 9. Distribution of ostracode species in the formations. Indeces of the formations see fig. 2. Legend: "+" — present; "o" — questionably present.

Family, species, subspecies	D_{II}	D_{III}vs	D_{II}–Ems 1	2	3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	2	F_I^1apk	F_I^1amn	F_I^2asn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_I^1cmo	F_I^1cts	F_I^1cjn	F_I^1chl	F_I^1cjl	F_I^1cos	F_I^1cpr	F_I^2cad	F_I^2ckl	F_Ic–F_{II}kb 1	2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Primitiopsidae Swartz, 1936																															
Lembitites incognitus (Sidaravičiene, 1975)										+	+																				
Lembitites posterovelatus (Sarv, 1963)							+	+	+																						
Baltocyamus primarius Meidla, 1995							+																								
Oepikellidae Jaanusson, 1957																															
Oepikella luminosa Sarv, 1959											+		+	+	+	+	+	+	+	+				+				+			
Platybolbina maslovi Sarv, 1959																	+		+					+							
Platybolbina orbiculata Sarv, 1959						o	o	o	+	+	+	+	+	+	+		+	+	+	+		+		+			+		o	o	
Platybolbina temperata Sarv, 1956		+			+	+	+	+	+	+																					
Platybolbina tiara Henningsmoen, 1954														+	+		+		+	+									o		
Platybolbina? sp. n.									+																						
Apatochilina falacata Sarv, 1962																											+	+			
Cystomatochilina umbonata (Krause, 1892)											+			+			+							+			+			
Cystomatochilina clivosa sp. n.									+	+	+																				
Ectoprimitia corrugata corrugata (Krause, 1892)														+			+							+							
Ectoprimitia corrugata inconstans ssp. n.									+																						
Levisulculus sp. n.								+	+																						
Moeckowia rava (Sarv, 1956)		+				o	+	+	+																						
Gellensia sp. n.									+																						
Ampletochilina granifera (Sarv, 1962)														+	+		+	+		+		+		+			+	+			
Ampletochilina trapezoidea Schallreuter, 1969														+	o		+		o	+		+		+							
Eurychilinidae Ulrich et Bassler, 1923																															
Piretella acmaea Öpik,1937						o				+	+	+		+	+		+														
Hesperidella esthonica (Bonnema,1909)	+																														
Euprimitiidae Hessland, 1949																															
Gryphiswaldensia wilnoiensis (Neckaja, 1952)														+			+			+		+		+		+	+	+			
Gryphiswaldensia gryphiswaldensis Schallreuter, 1965	+																														

Table 9, continued.

Family, species, subspecies	D_{II}	D_{III}vs	D_{II}–Ems 1	2	3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	2	$F_I a^1$pk	$F_I a^1$mn	$F_I a^2$sn	$F_I$bkr	$F_I$btd	$F_I$bfj	$F_I c^1$mo	$F_I c^1$ts	$F_I c^1$jn	$F_I c^1$hl	$F_I c^1$jl	$F_I c^1$os	$F_I c^1$pr	$F_I c^2$ad	$F_I c^2$kl	$F_I c$–F_{II}kb 1	2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Gryphiswaldensia plicata Schallreuter, 1969																											+	+			
Gryphiswaldensia visbya Schallreuter, 1969																				+						+					
Gryphiswaldensia plavinensis Gailīte, 1975																		+	+	+					+						
Dogoriella? *pseudohistiata* Schallreuter, 1972																				+											
Caprabolbina capra Schallreuter, 1972																		o		+				+							
Tvaerenellidae Jaanusson, 1957																															
Uhakiella jonesii (Krause, 1889)													+	+			+			+		+		+		+	+	+			
Uhakiella oanduensis Sarv, 1963			o			+	+																								
Uhakiella curta Sidaravičiene, 1975											o	+	+		+	+		+	+	+	o					+					
Euprimites (Euprimites) kahalaensis Sarv, 1963							+	+	+	+	+	+	+		+	+			+												
Euprimites (Bichilina) prima Sarv, 1959	+																														
Piretia rugosa (Steusloff, 1895)																	+			+				+							
Piretia erinacea Schallreuter, 1964	+																														
Tvaerenella longa longa (Sarv, 1956)	+																														
Tvaerenella longa pretiosa Sarv, 1959						+	+	+	+	+	+	+	+	+																	
Tvaerenella expedita Sarv, 1959														+			+	+	+	+		+		+		+	+				
Retiprimites reticularis gen. et sp. n.									+		+			+			+			o				+		+	+				
Eoaquapulex frequens (Steusloff, 1895)														+	+		+	+	+	+		+		+			+	+			
Hithidae Schallreuter, 1964																															
Brevibolbina dimorpha dimorpha Sarv, 1959						o			+	+	+	+																			
Brevibolbina dimorpha altonodosa Sarv, 1959														+			+														
Brevibolbina pontificans Schallreuter, 1981																	+			+				+		+					
Distobolbina tuberculata (Henningsmoen, 1954)														+			+			+		+		+			+				
Distobolbina nabalaensis Sarv, 1959									+	+	+	+	+	+	+																
Ctenonotellidae Schmidt, 1941																															
Rakverella spinosa Öpik, 1937	+																														
Rakverella? sp. n.														+																	
Steusloffia neglecta Sarv, 1959								+	+	+																					
Ctenonotella supera Sarv, 1963									+	+																					

Table 9, continued.

Family, species, subspecies	D_{II}	D_{III}vs	D_{II}–Ems 1	2	3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	2	F_Ia^{1}pk	F_Ia^{1}mn	F_Ia^{2}sn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_Ic^{1}mo	F_Ic^{1}ts	F_Ic^{1}jn	F_Ic^{1}hl	F_Ic^{1}jl	F_Ic^{1}os	F_Ic^{1}pr	F_Ic^{2}ad	F_Ic^{2}kl	F_Ic–F_{II}kb 1	2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Tetrada (Tetrada) harpa (Krause, 1892)	+																														
Tetrada (Tetrada) krausei (Steusloff, 1895)	+		?																												
Tetrada (Tetrada) neckajae Meidla, 1986											+																				
Tetrada (Tetrada) variabilis Meidla, 1986								+	+	+	+																				
Tetrada (Neotsitrella) longata (Sarv, 1959)	+																														
Quadritia (Krutatia) iunior Schallreuter, 1981													+																		
Homeokiesowia frigida (Sarv, 1959)	+																														
Laevanotella nonsulcata gen. et sp. n.																		+	+	+											
Tetradellidae Swartz, 1936																															
Tetradella plicatula (Krause, 1892)																	+	+	+	+		+		+		+	+	+			
Tetradella egorowi Neckaja, 1952								+	+	+	+		+	+			+	+	+	+		+		+		+	+	+			
Tetradella separata Sidaravičiene, 1971																	+	+	+	+		+		+							
Tetradella triloculata Schallreuter, 1978																	+		+	+		+		+							
Tetradella pulchra Neckaja, 1952										+	+		+	+																	
Foramenella parkis (Neckaja, 1952)														+			+	+		+		+		+		+	o				
Foramenella porkuniensis Sarv, 1962																												+			
Consonopsis consona consona (Sarv, 1959)	+		+																												
Consonopsis zastrowensis (Schallreuter, 1969)						+	+	+																							
Consonopsis litwiensis (Neckaja, 1952)									+	+	+		+	+		+	+							+		+					
Polyceratella aluverensis Sarv, 1959	+																														
Polyceratella spinosa Sarv, 1959	+																														
Kiesowia dissecta (Krause, 1892)											+		+	+			+											+			
Kiesowia regalis (Neckaja, 1952)							+		+	+	+																				
Kiesowia? *decima* Sarv, 1962																												+			
Sigmoopsis rostrata (Krause, 1892)	+																														
Sigmoopsis granulata Sarv, 1956						+	+	+	+	+																					

Table 9, continued.

Family, species, subspecies.	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	$F_I a^1$pk	$F_I a^1$mn	$F_I a^2$sn	$F_I$bkr	$F_I$btd	$F_I$bfj	$F_I c^1$mo	$F_I c^1$ts	$F_I c^{1-}$jn	$F_I c^1$hl	$F_I c^{1-}$jl	$F_I c^1$os	$F_I c^1$pr	$F_I c^2$ad	$F_I c^2$kl	$F_I c$–F_{II}kb 1	$F_I c$–F_{II}kb 2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Concavhithis nebeni Schallreuter, 1975									+					+																	
Braderupia asymmetrica? (Neckaja, 1958)	+																														
Seviculina oanduensis (Sarv, 1956)							+	+																							
Seviculina reticulata Meidla, 1986									+	+	+		o				?														
Seviculina sp. n.														+																	
Sigmobolbina camarota Jaanusson, 1964				+	+		+	+	+	+	+	+	+	+	+	+															
Sigmobolbina kolkaensis Gailīte, 1975															+																
Naevhithis pictis (Neckaja, 1958)																				+				+				+			
Pentagona pentagona Jaanusson, 1957								+	+	+																					
Deefgella sp. n.										+																					
Podolibolbina cf. *podolica* Abushik et Sarv, 1983														+																	
Pelecybolbina illativis (Neckaja, 1952)				+		+	+																								
Pelecybolbina pelecyoides Jaanusson, 1966					+			+	+	+																					
Pelecybolbina graesgardensis Schallreuter, 1977	+																														
Hippula edolensis (Gailīte, 1975)											+	+		+	+	+		+	+					+							
Vitteplana plana (Neckaja, 1958)														+			+							+				+			
Vitteplana? sp. n.					+			o																							
Vittella invasa Sidaravičiene, 1975											+			+	+	+			?												
Loculibolbina primitiva (Sarv, 1962)					o					+	+	+	+	+		+	+		+	+		+		+				+			
Loculibolbina unica (Sarv, 1962)																													+		
Disulcinoides auricularis (Krause, 1892)	+																														
Disulcinoides ignalinensis Sidaravičiene, 1992							+			+																					
Disulcina perita perita (Sarv, 1956)		+					+	+	+	+																					
Disulcina perita explicata Sarv, 1959											+																				
Disulcina minata Sidaravičiene, 1971														+			+														
Airina cornuta (Neckaja, 1958)								+	+	+	+		+	+	+		+	+	+	+	+	+		+	+	+	+				
Scrobisylthis reticulatus (Sarv, 1959)	+	+					+																								

Table 9, continued.

Family, species, subspecies.	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	F_Ia^{1}pk	F_Ia^{1}mn	F_Ia^{2}sn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_Ic^{1}mo	F_Ic^{1}ts	F_Ic^{1}jn	F_Ic^{1}hl	F_Ic^{1}jl	F_Ic^{1}os	F_Ic^{1}pr	F_Ic^{2}ad	F_Ic^{2}kl	F_Ic–F_{II}kb 1	F_Ic–F_{II}kb 2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Bolbinidae Ivanova, 1979																															
Bolbina cf. *ornata* (Krause, 1897)							+																								
Bolbina major (Krause, 1892)	+			+			+		+	+	+		o	o																	
Bolbina plicata (Krause, 1892)									+	+	+		+																		
Bolbina rakverensis Sarv, 1956						+	+	+	+	+			o	?																	
Bolbina saxbya Meidla, 1983									+	+			+	+			+			o				+				+			
Bolbina cf. *valensis* Schallreuter, 1984																	+														
Bolbina? *globosa* (Krause, 1889)													+				+							+			+				
Hollinidae Swartz, 1936																															
Grammolomatella vestrogothica Henningsmoen, 1948	+											+			+	+															
Drepanellidae Ulrich et Bassler, 1923																															
Drepanella? *pauxilla* Gailīte, 1970																												+			
Kinnekullea hesslandi Henningsmoen, 1948				+									+					+		+											
Kinnekullea thorslundi Henningsmoen, 1948																+															
Kinnekullea intermedia Gailīte, 1975																			+												
Bolliidae Bouček, 1936																															
Scanipisthia rectangularis (Troedsson, 1918)																														+	
Harpabollia harparum (Troedsson, 1918)																														+	
Ulrichia lauta Gailīte, 1971														+	+																
Klimphores minimus (Sarv, 1956)			o	+	+	+	+		+	+		+																			
Klimphores digitatus (Neckaja, 1958)																		+		+											
Klimphores simplex (Neckaja, 1958)					o				+		+	o								o											
Klimphores bimembris Gailīte, 1971	+																														
Klimphores holdrensis Gailīte, 1971										+					+																
Klimphores plienkalnensis Gailīte, 1971											+	+	o																		
Parphores fastigatus Schallreuter, 1969															o					+											
Bullaeferum tapansis (Sarv, 1959)											+	+	+	+	+		+	+		+				+			+				

Table 9, continued.

Family, species, subspecies.	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	F_Ia^1pk	F_Ia^1mn	F_Ia^2sn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_Ic^1mo	F_Ic^1ts	F_Ic^1jn	F_Ic^1hl	F_Ic^1jl	F_Ic^1os	F_Ic^1pr	F_Ic^2ad	F_Ic^2kl	F_Ic–F_{II}kb 1	F_Ic–F_{II}kb 2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Aechminidae Bouček, 1936																															
Crescentilla? *baltica* Neckaja, 1966									+	+			+																		
Aechmina groenwalli Troedsson, 1918																													+	+	
Pseudulrichia? *tubulata* Neckaja, 1966				+	+	+						+	+																		
Pseudulrichia disputabile Sidaravičiene, 1975																													+		
Circuliniidae Neckaja, 1966																															
Pyxion nitidum Sarv, 1963	+																														
Pyxion rakverensis Meidla, 1986									+	+				?																	
Vogdesella subovata (Thorslund, 1948)		+																													
Vogdesella sp. n.																										?	?				
Orechina procera Schallreuter, 1980		+																													
Pedomphalella egregia (Sarv, 1963)	+																														
Pedomphalella mica ? Sidaravičiene, 1971									+																						
Circulinella nuda (Neckaja, 1966)	+						+																								
Circulinella gailitae gen. et sp. n.																													+	+	
Easchmidtella fragosa (Neckaja, 1960)	+		+	+	+	+	+	+	+			+																			
Easchmidtella angulata Sidaravičiene, 1975														+			+							+							
Easchmidtella orbicularis sp. n.																	+					+		+		+	+	+			
Arpaschmidtella abnormis (Sidaravičiene, 1975)								+	+	+	+	+	+	+	+	+	+			+								+			
Spinigeritidae Schallreuter, 1980																															
Pseudoancora confragosa (Gailīte, 1970)																													+		
Pseudoancora parovina (Sidaravičiene, 1975)	o		+			+	+		+	+			+		+	+			+												
Spinigerites spiniger Schallreuter, 1980									+			+																			
Aparchitidae Jones, 1901																															
Baltonotella ledaia Sidaravičiene, 1975									+	+	+		+	+	+		+	+	+	+		+									
Baltonotella mistica Sidaravičiene, 1992					+				+	+	o	+	+	+	+	+	+	+	+	+		+					+	+			
Baltonotella limbata Sidaravičiene, 1975							o		+			+	+	+	+	+	+	+	+	+		+		+		+	+	+			
Longidorsa humilis sp. n.														+			+			+				+				+			
Longidorsa? *baltica* sp. n.												+																			
Longidorsa? *porkuniensis* (Stumbur, 1956)																	+											+			

Table 9, continued.

Family, species, subspecies	D_{II}	D_{III}vs		D_{II}–Ems		D_{III}lk	D_{III}hr	D_{III}rgT		Erg		F_Ia^{1}pk	F_Ia^{1}mn	F_Ia^{2}sn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_Ic^{1}mo	F_Ic^{1}ts	F_Ic^{1}jn	F_Ic^{1}hl	F_Ic^{1}jl	F_Ic^{1}os	F_Ic^{1}pr	F_Ic^{2}ad	F_Ic^{2}kl		F_Ic–F_{II}kb		F_{II}är	F_{II}kl	F_{III}sl	G_{1-2}
		1	2		3					1	2																1	2				
Jaanussoniidae Schallreuter, 1971																																
Hemiaechminoides rossica Neckaja, 1966								+		+	+		+	+	+	+	+	+	+	+		+		+			+	+			
Hemiaechminoides excentricus Schallreuter, 1971																		+	+												
Hemiaechminoides minusculus Meidla, 1986							o	+		+	+	+	+	+																	
Hemeaschmidtella exula Schallreuter, 1971				o		+	+	+		+	+	+	o	+	+	o		+	+	o	+		+		+		+	+	+		
Hemeaschmidtella faba Schallreuter, 1984								+		+	+		o	+																	
Hemeaschmidtella? sp. 1.																								+			+				
Hemeaschmidtella sp. 2.								+		+	+																				
Conchoprimitiidae Öpik, 1935																															
Ahlintella? *marginata* (Sidaravičiene, 1975)				o									+	+		+	+	+	+	+	+										
Eridoconchidae Henningsmoen, 1953																															
Cryptophyllus gutta Schallreuter, 1968				+						+	+	+	+	+	+	+	+	+	+	+	+							+			
Beyrichiocopa, family uncertain																															
Neoprimitiella bisulcata Schallreuter, 1969																					+										
Disparigonya sp. n.														+																	
Estonaceratella estona (Sarv, 1962)															+			+			+		+		+				+		
Gotlandina caudica (Neckaja, 1966)				o						+			+																		
Gotlandina erratica Schallreuter, 1968																+			+		+										
Monotiopleuridae Guber et Jaanusson, 1964																															
Priminsolenia insolens (Meidla, 1986)								+		+	+	+																			
Priminsolenia minima gen. et sp. n.	+	+					+																								
Primitiella? sp. n.							+									+			+												
Unisulcopleura carina Sidaravičiene, 1992								+		+																					
Unisulcopleura rakverensis Sidaravičiene, 1992											+																				
Lilitia sp. n.															+			+													
Leperditellidae Ulrich et Bassler, 1906																															
Leperditella brachynotos (Schmidt, 1858)										+	+	+	+	+	+	+		+	o	+	+		+		+			+	+		
Leperditella prima Sarv, 1956	+						+	+		+	+																				
Fallaticella schaeferi Schallreuter, 1984																										+			+			

Table 9, continued.

Family, species, subspecies.	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	F_Ia^{1}pk	F_Ia^{1}mn	F_Ia^{2}sn	$F_I$bkr	$F_I$btd	$F_I$bfj	F_Ic^{1}mo	F_Ic^{1}ts	F_Ic^{1}jn	F_Ic^{1}hl	F_Ic^{1}jl	F_Ic^{1}os	F_Ic^{1}pr	F_Ic^{2}ad	F_Ic^{2}kl	F_Ic–F_{II}kb 1	F_Ic–F_{II}kb 2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Amphissitidae Knight, 1928																															
Ordovizona sulcata Schallreuter, 1969							+	+	+	+			+	+																	
Nonsulcozona praepleta Schallreuter, 1972																										+					
Thlipsuriidae Ulrich, 1894																															
Olbianella fabacea Pranskevičius, 1972										o	+		+	+			+			+		+		+		+					
Olbianella cf. *braderupensis* (Schallreuter, 1980)								+	+																						
Bairdiocypridae Shaver, 1961																															
Bairdiocypris indeterminatus Pranskevičius, 1972				+				+	+	+	+	+	+	+	+	+	+	+	+	+		+		+		+	+	+			
Silenis? *trapeziformis* Abushik et Sarv, 1983									+		+	+		+	+		+					+		+							
Silenis? sp. n.									+	+	+		+	+			+					+		+		+					
Bulbosclerites unicornis (Neckaja, 1952)																	o							o				+			
Bulbosclerites sp. n.									+																						
Uthoernia lunata Schallreuter, 1986																	+							+							
Longisculidae Neckaja, 1966																															
Longiscula cf. *smithii* (Jones, 1887)																															+
Longiscula parrectis? Neckaja, 1958	+																														
Longiscula tersa (Neckaja, 1966)				+	+	+		+	+	+			+	+			o	+	+	o				o		+					
Longiscula obliqua Abushik et Sarv, 1983													+	+			+		+	+							+				
Longiscula perfecta Meidla, 1993			+	+	o			+	+	+	+	+	+	+	+		+	+	+	+	o	+		+		+		o			
Longiscula porrecta Stumbur, 1993														o			o			o				o			+	+			
Longiscula impercepta sp. n.																				o								+			
Longiscula ovata Neckaja, 1966																	+														
Pullvillites rostratus (Krause, 1891)			o							+	+	+		+	+	+															
Pullvillites laevis Abushik et Sarv, 1983				+					+	+	+	+	+	+	+	+	+	+	+	+		+	+	+					o		
Pullvillites? *inornatus* sp. n.																	+			+		+		+			+	+			
Trapezisylthere admirebilis (Neckaja, 1966)														+				+	o	+											
Steusloffinidae Schallreuter, 1984																															
Steusloffina cuneata (Steusloff, 1895)										+	+		+	+	+		+	+	+	+		+		+		+	+	+			
Steusloffina aputa Stumbur, 1956																												+			
Steusloffina lintra Schallreuter, 1968																										+					

Table 9, continued.

Family, species, subspecies	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	$F_I a^1$pk	$F_I a^1$mn	$F_I a^2$sn	$F_I$bkr	$F_I$btd	$F_I$bfj	$F_I c^1$mo	$F_I c^1$ts	$F_I c^{1\cdot}$jn	$F_I c^1$hl	$F_I c^{1\cdot}$jl	$F_I c^1$os	$F_I c^1$pr	$F_I c^2$ad	$F_I c^2$kl	$F_I c$–F_{II}kb 1	$F_I c$–F_{II}kb 2	F_{II}är	F_{II}kl	F_{II}sl	G_{1-2}
Steusloffina dilatata Meidla, 1983									+	+				+			+		o	+				+		o		+			
Steusloffina? sp. 1																	+	+					+								
Steusloffina? sp. 2																				+		+						+			
Steusloffina? sp. 3														+			+														
Medianella aequa (Stumbur, 1956)																								o		o	+	+			
Medianella longa (Stumbur, 1956)					o		o	o	+	+	+	+		+			+			+		o						+			
Medianella intecta (Stumbur, 1956)										+	+		+	+	+	+	+	+	+	+		+		+		+	+	+			
Medianella blidenensis (Gailīte, 1975)					+					+	+	+	+	+	+	+	+	+	+	+		+		+	o	+	o		o	o	
Kroemmelbeinia spina Schallreuter, 1969													+	+	+	o	?	+	+	+		+		+		+	+	+			
Duplicristatia asymmetrica Schallreuter, 1978																												+	+		
Crucicornina sp.														+																	
Pachydomellidae Berdan et Sohn, 1961																															
Microcheilinella lubrica (Stumbur, 1956)										+	+	+	+	+	+	+	+	+	+	+		+		+		+	+	+	+		
Microcheilinella rozhdestvenskaja Neckaja, 1966																															+
Microcheilinella dagoensis sp. n.																	+			+				+							
Microcheilinella pirguensis sp. n.																	+							+							
Daleiella admiranda Sidaravičiene, in coll.										+				o																	
Daleiella rotundata sp. n.																		+	+	+				+	+	+	+				
Trianguloschmidtella triangulata Sarv 1963	+																														
Krausellidae Berdan, 1961																															
Krausella sp. n.														+																	
Reversocypris? *nabalaensis* sp. n.										+	+	o	+	+	+	o		+	+	o											
Pseudorayella concinna Neckaja, 1960						+		+	+	+	+		+	+	+		o	+	o							o		o			
Pseudorayella kaufmanni Schallreuter, 1975																								+							
Cadmea sp.														+			+			+								+			
Revisylthere breviclaustrum (Schallreuter, 1968)														+	+					+		+		+			+				
Krauselloides peregrinus gen. et sp. n.						+	+																								
Krauselloides? sp. n.											+			+		+	+														
Dagoerayella elongata (Meidla, 1983)													+	+			+		+	+								+			

Table 9, continued.

Family, species, subspecies	D_{II}	D_{III}vs	D_{II}–Ems 1	D_{II}–Ems 2	D_{II}–Ems 3	D_{III}lk	D_{III}hr	D_{III}rgT	Erg 1	Erg 2	F_Ia^1pk	F_Ia^1mn	F_Ia^2sn	F_Ibkr	F_Ibtd	F_Ibfj	F_Ic^1mo	F_Ic^1ts	F_Ic^1jn	F_Ic^1hl	F_Ic^1jl	F_Ic^1os	F_Ic^1pr	F_Ic^2ad	F_Ic^2kl	F_Ic–F_{II}kb 1	F_Ic–F_{II}kb 2	F_{II}är	F_{II}^1kl	F_{II}sl	G_{1-2}
Dagoerayella sulcata gen. et sp. n.																	+							+			+	+			
Estoniosylthere cristata gen. et sp. n.										+	+		+	+	+		+														
Estoniosylthere longata gen. et sp. n.								+	+																						
Rectellidae Neckaja, 1966																															
Rectella cf. inaequalis (Neckaja, 1952)	+																														
Rectella nais Neckaja, 1958					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+							
Rectella romboformis Neckaja, 1966		o				o	o	o	+	+	+	+	+	+	+		+	+	+	+	o	+	+	+	o	+	+	+	+		
Rectella carinaspinata Schallreuter, 1972					o				+	+	+	+	+	+	+		+	+	+	+		+		+	+	o	+				
Rectella sturiensis Gailīte, 1975																				o									+		
Rectella explanata sp. n.																		+	+	+	+		+								
Rectella composita sp. n.																				o								+	+		
Rectella? *proposita* Abushik et Sarv, 1983														+			+							+							
Bairdiidae Sars, 1887																															
Bairdia? *iocus* Schallreuter, 1987															o									+			+	+			
Podocopa, family uncertain																															
Adamczakia holosolenica Schallreuter, 1986																			+			+		+		+					
Brevantia antis gen. et sp. n.					+			+	+	+	+		+	+																	
Brevantia brevis gen. et sp. n.				+	+	o		+	+	+	+	+	+		+																

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Plates

Plate 1

Figures 1–2. *Lembitites incognitus* (Sidaravičiene, 1975).
1 — left tecnomorphic valve Os 3300, lateral view, ×101. Paekna, 1.30 m. Rakvere Stage.
2 — left heteromorphic valve Os 3301, lateral view, ×101. Paekna, 1.80 m. Rakvere Stage.

Figures 3–4. *Lembitites posterovelatus* (Sarv, 1963).
3 — left heteromorphic valve Os 3302, lateral view, ×101. Ussimägi, 2.10 m. Oandu Stage.
4 — left heteromorphic valve Os 3303, lateral view, ×101. Ussimägi, 2.10 m. Oandu Stage.

Figures 5–6. *Baltocyamus primarius* Meidla, 1995.
5 — heteromorphic carapace Os 3293, right lateral view, ×57. Tõrremägi. Oandu Stage.
6 — heteromorphic carapace Os 3289, ventral view, ×57. Tõrremägi. Oandu Stage.

Figures 7–8. *Oepikella luminosa* Sarv, 1959.
7 — heteromorphic carapace Os 3304, left view, ×22. Põriki. Pirgu Stage.
8 — juvenile carapace Os 3305, right view, ×22. Saxby. Pirgu Stage.

Figure 9. *Platybolbina maslovi* Sarv, 1959.
Left heteromorphic valve Os 3306, lateral view, ×22. Moe quarry. Pirgu Stage.

Figure 10. *Platybolbina orbiculata* Sarv, 1959.
Right heteromorphic valve Os 3307, lateral view, ×30. Kohila, temporary exposure (Kohila-2), Vormsi Stage.

Figure 11. *Platybolbina temperata* Sarv, 1956.
Juvenile carapace Os 3308, left view, ×32. Orjaku core, depth 132.4 m. Oandu Stage.

Figure 12. *Platybolbina tiara* Henningsmoen, 1954.
Right juvenile valve (velum incompletely preseserved) Os 2964, lateral view, ×30. Paluküla quarry, depth 0.22 m. Pirgu Stage.

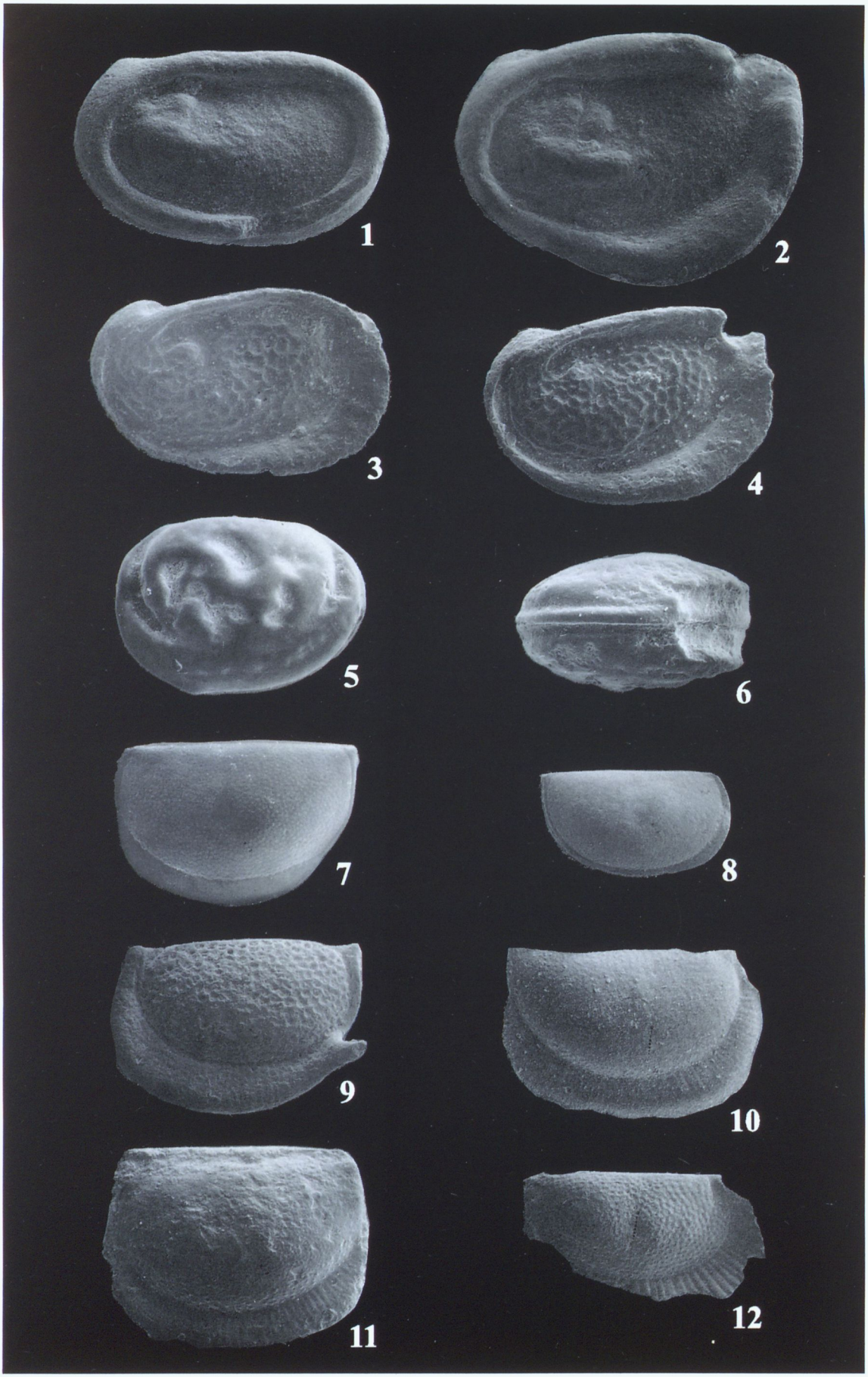
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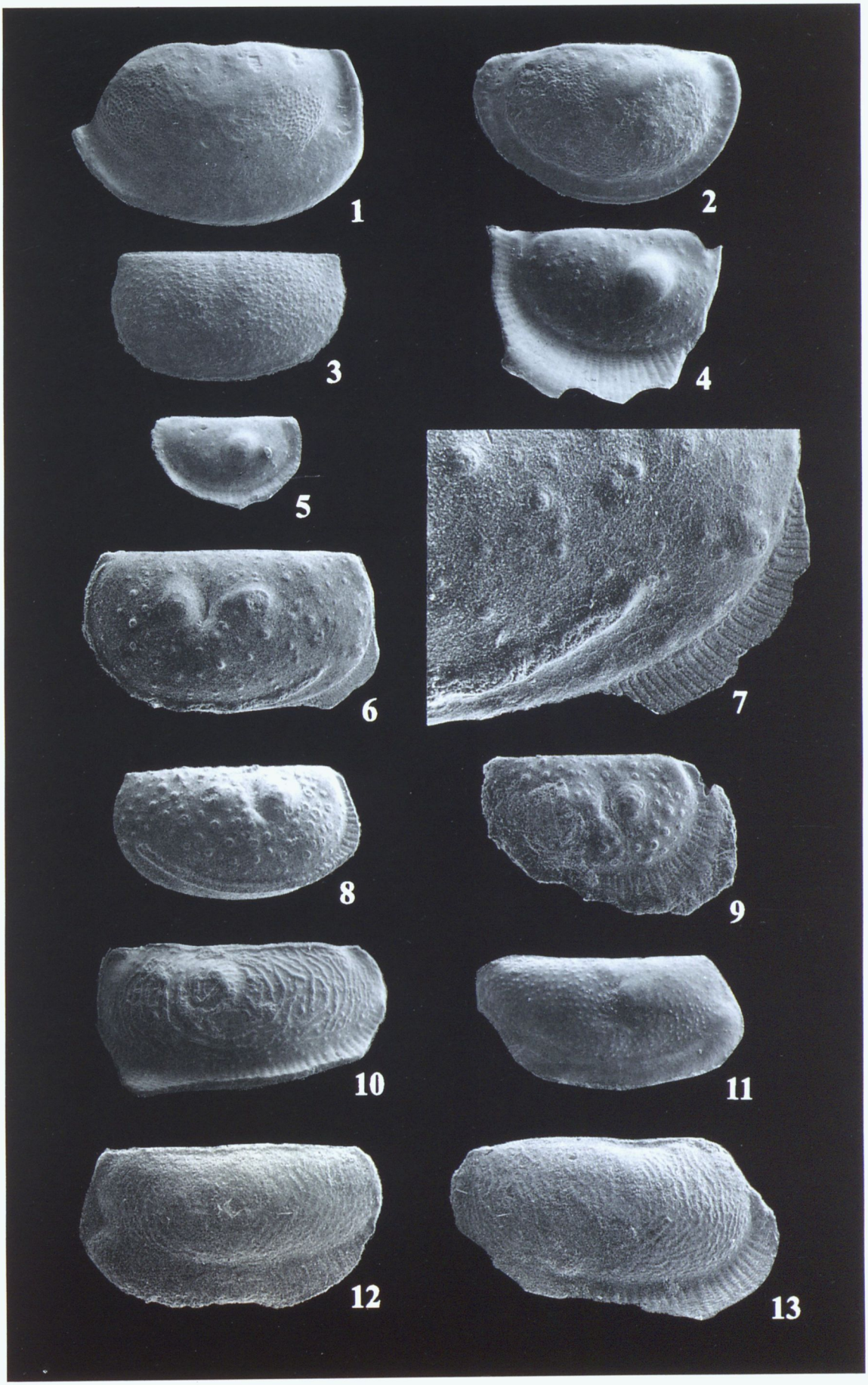
Plate 2



Figures 1–2. *Apatochilina falacata* Sarv, 1962.
1 — right incomplete heteromorphic valve Os 3311, lateral view, ×32. Seli–Russalu quarry, 0.70 m. Porkuni Stage.
2 — right tecnomorphic valve Os 3310, lateral view, ×32. Seli–Russalu quarry, 0.70 m. Porkuni Stage.

Figure 3. *Platybolbina*? sp. n.
Carapace Os 3309, left view, ×46. Puhmu core, depth 134.3 m. Rakvere Stage.

Figures 4–5. *Cystomatochilina umbonata* (Krause, 1892).
4 — right juvenile valve Os 2993, lateral view, ×32. Hiiumaa, Paluküla quarry, 0.12 m. Pirgu Stage.
5 — right juvenile valve Os 3312, lateral view, ×32. Hiiumaa, Paluküla quarry, 0.22 m. Pirgu Stage.

Figures 6–9. *Cystomatochilina clivosa* sp. n.
6–7 — left valve Os 2995, lateral view (×41) and posteroventral area with marginal sculpture (×117). Vinni core, depth 41.4 m. Rakvere Stage.
8 — holotype, right valve Os 2996, lateral view, ×29. Vinni core, depth 41.4 m. Rakvere Stage.
9 — right valve Os 2997, lateral view, ×19. Vinni core, depth 41.4 m. Rakvere Stage.

Figure 10. *Ectoprimitia corrugata corrugata* (Krause, 1892).
Left valve Os 8 (UT), lateral view, ×46. Saxby beach exposure. Pirgu Stage.

Figure 11. *Levisulculus* sp. n.
Right heteromorphic valve Os 3313, lateral view, ×32. Puhmu core, depth 137.6 m. Rakvere Stage.

Figures 12–13. *Ectoprimitia corrugata inconstans* ssp. n.
12 — holotype, left heteromorphic valve Os 3025, lateral view, ×49. Piilse riverside section. Rakvere Stage.
13 — right tecnomorphic valve Os 3023, lateral view, ×49. Piilse riverside section. Rakvere Stage.

Plate 3

Figures 1–2. *Moeckowia rava* (Sarv, 1956).
1 — right valve Os 3314, lateral view, ×32. Tõrremägi. Oandu Stage.
2 — juvenile carapace Os 3315, left view, ×32. Tõrremägi. Oandu Stage.

Figures 3–4. *Gellensia* sp. n.
3 — right tecnomorphic (incomplete) valve Os 3316, lateral view, ×46. Puhmu core, depth 136.55 m. Rakvere Stage.
4 — heteromorphic carapace Os 3317 (slightly deformed), left view, ×46. Puhmu core, depth 136.55 m. Rakvere Stage.

Figures 5–6. *Ampletochilina granifera* (Sarv, 1962).
5 — right valve Os 3318, lateral view, ×32. Iida carst cave. Porkuni Stage (Siuge Member).
6 — left juvenile valve Os 3319, lateral view, ×32. Siuge quarry. Porkuni Stage (Tõrevere Member).

Figure 7. *Ampletochilina trapezoidea* Schallreuter, 1969.
Right valve Os 2963, lateral view, ×46. Orjaku core, depth 63.5 m. Pirgu Stage.

Figure 8. *Hesperidella esthonica* (Bonnema, 1909).
Left juvenile valve Os 3322, lateral view, ×46. Laeva-18 core, depth 239.5 m. Keila Stage.

Figures 9–10. *Piretella acmaea* Öpik, 1937.
9 — right tecnomorphic valve Os 3321, lateral view, ×22. Moe quarry (Moe-1). Pirgu Stage.
10 — right heteromorphic valve Os 3320, lateral view, ×22. Moe quarry (Moe-1). Pirgu Stage.

Figures 11–12. *Gryphiswaldensia wilnoiensis* (Neckaja, 1952).
11 — right valve valve Os 3323, lateral view, ×68. Paluküla quarry, depth 1.04 m. Vormsi Stage.
12 — left juvenile valve Os 3324, lateral view, ×68. Kaugatuma core, depth 359.0 m. Pirgu Stage.

Figure 13. *Gryphiswaldensia plicata* Schallreuter, 1969.
Right juvenile valve Os 3326, lateral view, ×68. Kaugatuma core, depth 344.6 m. Porkuni Stage, Kabala Formation.

Figure 14. *Gryphiswaldensia gryphiswaldensis* Schallreuter, 1965.
Left valve Os 3325, lateral view, ×68. Pärnu core, depth 329.1 m. Keila Stage.

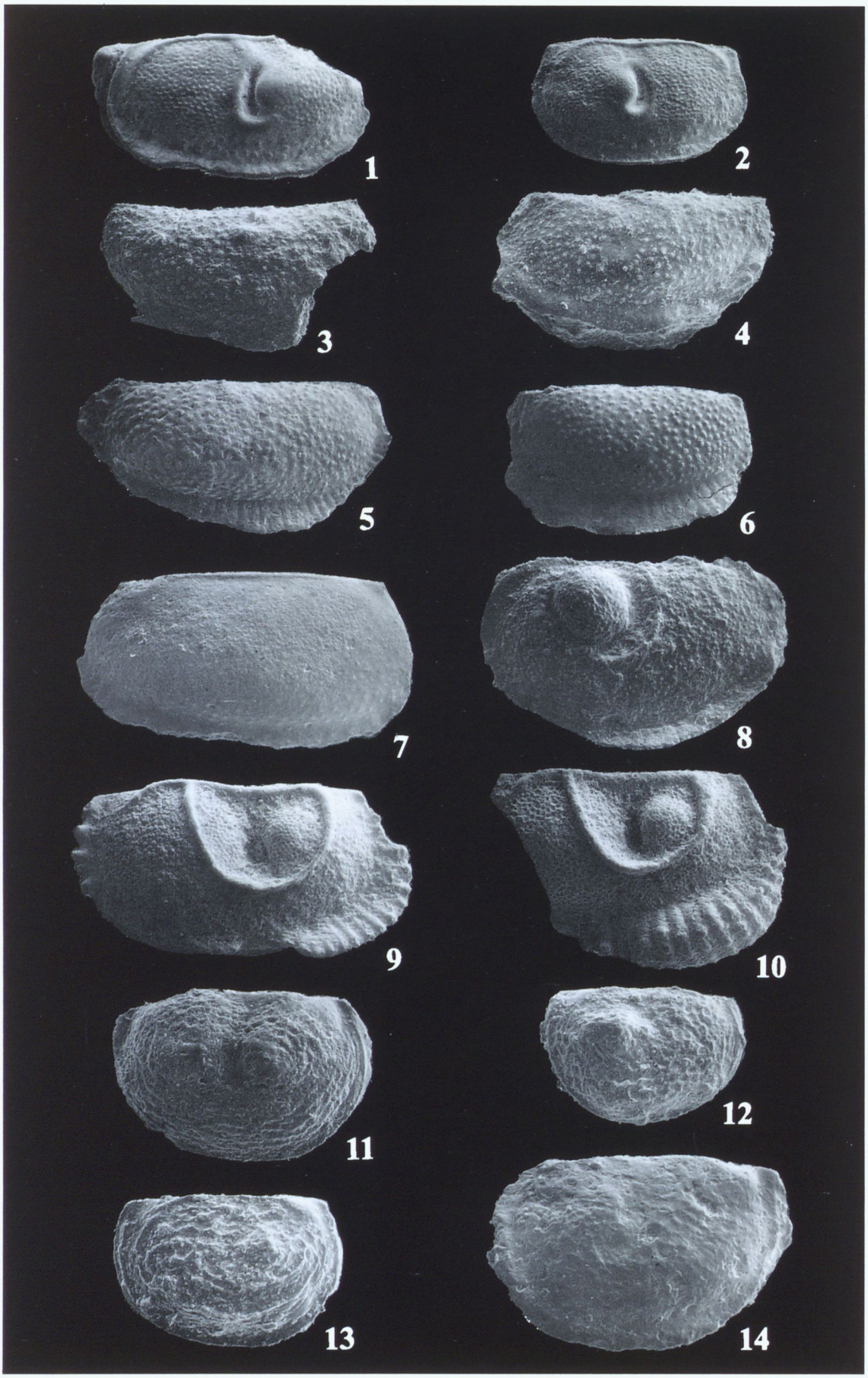

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Plate 4

Figures 1–3. *Gryphiswaldensia plavinensis* (Gailīte, 1975).
1 — right valve Os 3328, lateral view, ×68. Laeva-18 core, depth 208.95 m. Pirgu Stage.
2 — right juvenile valve Os 3329, lateral view, ×68. Aidu core, depth 172.5 m. Pirgu Stage.
3 — left valve Os 3330, lateral view, ×68. Laeva-18 core, depth 181.8 m. Pirgu Stage.

Figure 4. *Gryphiswaldensia visbya* Schallreuter, 1969.
Right valve Os 3327, lateral view, ×101. Aidu core, depth 145.5 m. Pirgu Stage.

Figure 5. *Dogoriella? pseudohistiata* Schallreuter, 1972.
Right valve Os 3216, lateral view, ×68. Pärnu core, depth 288.0 m. Pirgu Stage.

Figures 6–7. *Caprabolbina capra* Schallreuter, 1972.
6 — right juvenile valve Os 3332, lateral view, ×68. Laeva-18 core, depth 181.8 m. Pirgu Stage.
7 — left valve Os 3331, lateral view, ×68. Laeva-18 core, depth 181.8 m. Pirgu Stage.

Figures 8–9. *Uhakiella curta* Sidaravičiene, 1975.
8 — right heteromorphic valve Os 3230, lateral view, ×32. Vodja H-190 core, depth 114.8 m. Vormsi Stage.
9 — right juvenile valve Os 3337, lateral view, ×32. Vodja H-190 core, depth 114.8 m. Vormsi Stage.

Figures 10–11. *Uhakiella jonesii* (Krause, 1889).
10 — right tecnomorphic valve Os 3333, lateral view, ×22. Lohu quarry. Pirgu Stage.
11 — right heteromorphic valve Os 3334, lateral view, ×22. Lohu quarry. Pirgu Stage.

Figures 12–13. *Uhakiella oanduensis* Sarv, 1963.
12 — heteromorphic carapace Os 3335, right view, ×22. Tõrremägi trench. Oandu Stage.
13 — left tecnomorphic valve Os 3336, lateral view, ×22. Tõrremägi trench. Oandu Stage.

Plate 5

Figures 1–2. *Euprimites (Euprimites) kahalaensis* Sarv, 1963.
1 — heteromorphic carapace Os 3338, left view, ×32. Puhmu core, depth 136.8 m. Rakvere Stage.
2 — tecnomorphic carapace Os 3339, left view, ×32. Puhmu core, depth 136.8 m. Rakvere Stage.

Figure 3. *Euprimites (Bichilina) prima* Sarv, 1959.
Left tecnomorphic (?) valve Os 3340, lateral view, ×46. Laeva-18 core, depth 239.5 m. Keila Stage.

Figure 4. *Piretia rugosa* (Steusloff, 1895).
Right tecnomorphic valve Os 3341, lateral view, ×68. Saxby beach exposure. Pirgu Stage.

Figure 5. *Piretia erinacea* Schallreuter, 1964.
Right heteromorphic (?) valve Os 3342, lateral view, ×46. Laeva-18 core, depth 239.5 m. Keila Stage.

Figure 6. *Tvaerenella longa longa* (Sarv, 1956).
Right juvenile valve Os 3343, lateral view, ×68. Orjaku core, depth 135.6 m. Keila Stage.

Figures 7–8. *Tvaerenella longa pretiosa* Sarv, 1959.
7 — heteromorphic carapace Os 3344, left view, ×32. Nabala-16 core, depth 4.5 m. Nabala Stage.
8 — left tecnomorphic valve Os 3345, lateral view, ×32. Laiamäe core, depth 73.0 m. Nabala Stage.

Figures 9–11. *Tvaerenella expedita* Sarv, 1959.
9 — heteromorphic carapace Os 3171, right view, ×32. Pärnu core, depth 242.6 m. Porkuni (?) Stage.
10 — right tecnomorphic valve Os 3172, lateral view, ×32. Pärnu core, depth 242.6 m. Porkuni (?) Stage.
11 — right juvenile valve Os 3173, lateral view, ×32. Pärnu core, depth 242.6 m. Porkuni (?) Stage.

Figure 12. *Eoaquapulex frequens* (Steusloff, 1895).
Tecnomorphic carapace Os 3346, right view, ×22. Seli–Metsküla quarry. Porkuni Stage, Siuge Member.

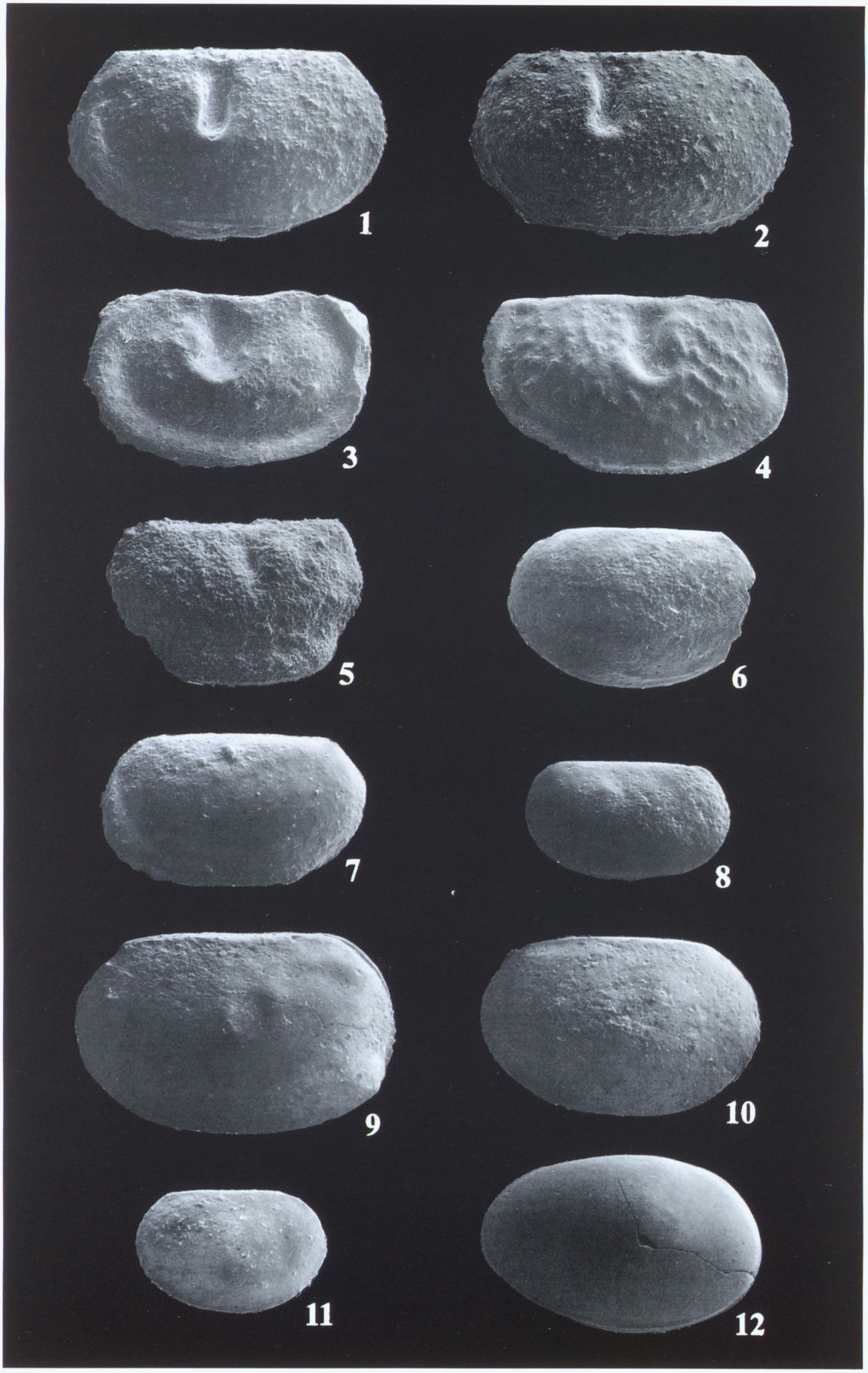
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Plate 6

Figures 1–3. *Retiprimites reticularis* gen. et sp. n.
1 — tecnomorphic carapace Os 3181, right view, ×44. Puhmu core, depth 132.5 m. Rakvere Stage.
2 — holotype, heteromorphic carapace Os 3180, right view, ×44. Puhmu core, depth 132.5 m. Rakvere Stage.
3 — juvenile carapace Os 3182, left view, ×44. Puhmu core, depth 132.5 m. Rakvere Stage.

Figures 4–5. *Brevibolbina dimorpha dimorpha* Sarv, 1959.
4 — right heteromorphic valve Os 3347, lateral view, ×68. Orjaku core, depth 104.9 m. Nabala Stage.
5 — right tecnomorphic valve Os 3348, lateral view, ×68. Orjaku core, depth 115.6 m. Rakvere Stage.

Figures 6–7. *Brevibolbina dimorpha altonodosa* Sarv, 1959.
6 — left heteromorph valve Os 3349, lateral view, ×68. Sutlepa quarry. Vormsi Stage.
7 — juvenile carapace Os 3350, left view, ×68. Sutlepa quarry. Vormsi Stage.

Figure 8. *Brevibolbina pontificans* Schallreuter, 1981.
Left heteromorphic valve Os 3351, lateral view, ×68. Kuie quarry. Pirgu Stage.

Figures 9–10. *Distobolbina tuberculata* (Henningsmoen, 1954).
9 — right heteromorphic valve Os 3352, lateral view, ×68. Kaugatuma core, depth 353.0 m. Pirgu Stage.
10 — right tecnomorphic valve Os 3353, lateral view, ×68. Kaugatuma core, depth 353.0 m. Pirgu Stage.

Figures 11–12. *Distobolbina nabalaensis* Sarv, 1959.
11 — right heteromorphic valve Os 3354, lateral view, ×68. Ruskavere core, depth 119.5 m. Vormsi Stage.
12 — left juvenile valve Os 3355, lateral view, ×68. Ruskavere core, depth 119.5 m. Vormsi Stage.

Plate 7

Figure 1. *Steusloffia neglecta* Sarv, 1959.
Juvenile carapace Os 3359, right view, ×32. Puhmu core, depth 136.9 m. Rakvere Stage.

Figure 2. *Ctenonotella supera* Sarv, 1963.
Left valve Os 3360, lateral view, ×32. Orjaku core, depth 113.3 m. Rakvere Stage.

Figures 3–4. *Rakverella* ? sp. n.
3 — left tecnomorphic valve Os 3358, lateral view, ×46. Laiamäe core, depth 41.9 m. Vormsi Stage.
4 — right heteromorphic valve Os 3357, lateral view, ×46. Laiamäe core, depth 41.9 m. Vormsi Stage.

Figure 5. *Rakverella spinosa* Öpik, 1937.
Right incomplete valve Os 3356, lateral view, ×32. Orjaku core, depth 133.7 m. Keila Stage.

Figure 6. *Tetrada (Neotsitrella) longata* (Sarv, 1959).
Left valve Os 3364, lateral view, ×46. Orjaku core, depth 133.7 m. Keila Stage.

Figure 7. *Tetrada (Tetrada) harpa* (Krause, 1892).
Left valve Os 3361, lateral view, ×46. Orjaku core, depth 133.7 m. Keila Stage.

Figure 8. *Tetrada (Tetrada) krausei* (Steusloff, 1895).
Left valve Os 3362, lateral view, ×46. Orjaku core, depth 133.7 m. Keila Stage.

Figure 9. *Tetrada (Tetrada) neckajae* Meidla, 1986.
Right valve Os 3035, lateral view, ×68. Vinni core, depth 15.5 m. Nabala Stage.

Figure 10. *Tetrada (Tetrada) variabilis* Meidla, 1986.
Carapace Os 3363, right view, ×68. Vinni core, depth 40.0 m. Rakvere Stage.

Figure 11. *Quadritia(Krutatia) iunior* Schallreuter, 1981.
Juvenile carapace Os 3365, right view, ×68. Puhmu core, depth 93.9 m. Nabala Stage.

Figure 12. *Homeokiesowia frigida* (Sarv, 1959).
Right valve Os 3366, lateral view, ×22. Virtsu core, depth 225.4 m. Keila Stage.

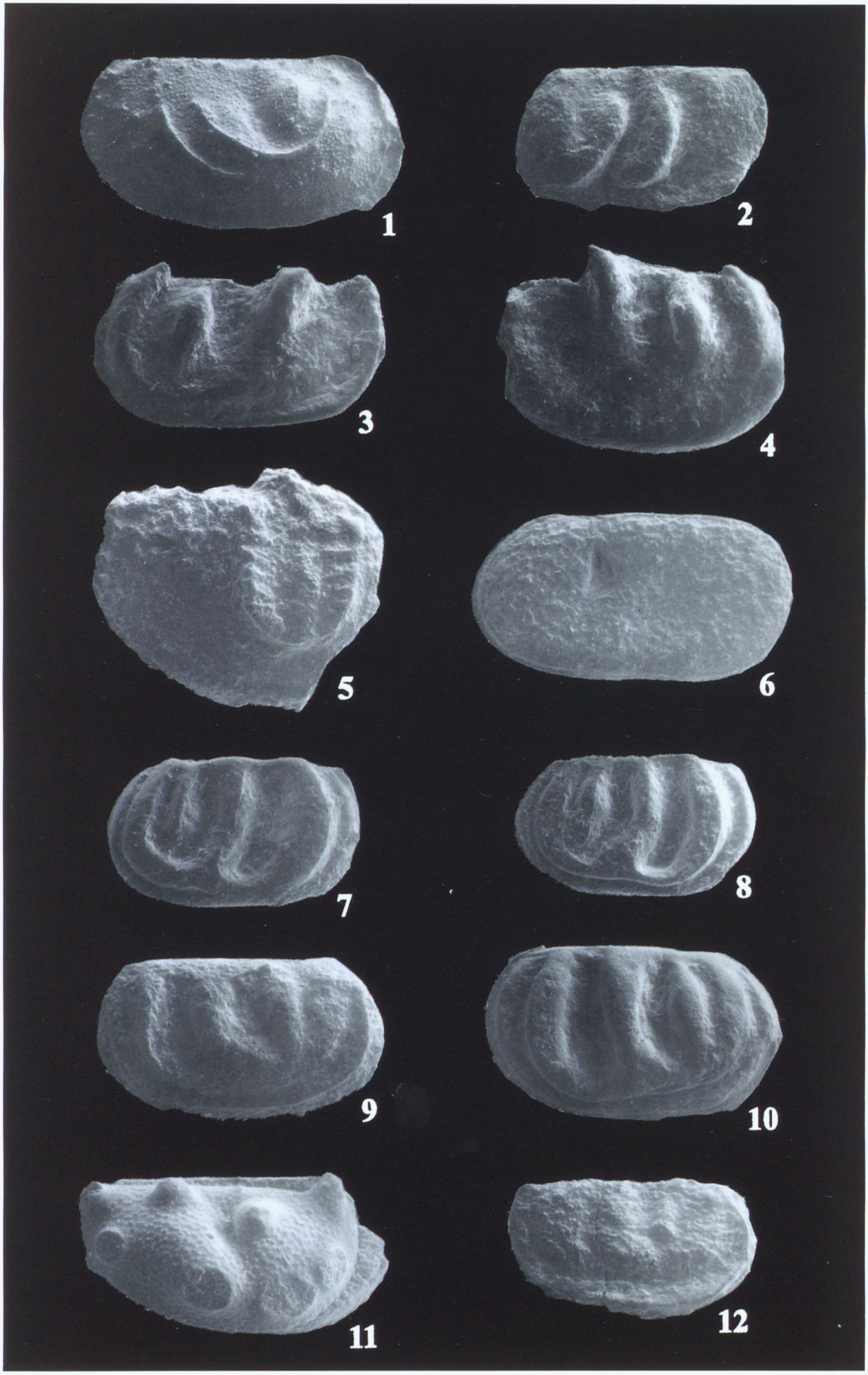
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Plate 8

Figures 1–3. *Laevanotella nonsulcata* gen. et sp. n.
1 — holotype, right tecnomorphic (?) valve Os 3169, lateral view, ×46. Laeva-18 core, depth 208.95 m. Pirgu Stage.
2 — right, posteriorly incomplete tecnomorphic (?) valve Os 3176, lateral view, ×46. Pärnu core, depth 300.0 m. Pirgu Stage.
3 — right heteromorphic (?) valve Os 3177, lateral view, ×46. Pärnu core, depth 300.0 m. Pirgu Stage.

Figures 4–5. *Tetradella plicatula* (Krause, 1892).
4 — heteromorphic carapace Os 3367, left view, ×46. Lohu quarry. Pirgu Stage.
5 — tecnomorphic carapace Os 3368, right view, ×46. Lohu quarry. Pirgu Stage.

Figures 6–7. *Tetradella egorowi* Neckaja, 1952.
6 — heteromorphic carapace Os 3369, right view, ×68. Vinni core, depth 38.5 m. Rakvere Stage.
7 — right tecnomorphicvalve Os 3370, lateral view, ×68. Vinni core, depth 21.4 m. Nabala Stage.

Figures 8–9. *Tetradella separata* Sidaravičiene, 1971.
8 — right heteromorphic valve Os 3371, lateral view, ×68. Pärnu core, depth 295.0 m. Pirgu Stage.
9 — tecnomorphic carapace Os 3372, left view, ×68. Puhmu core, depth 42.0 m. Pirgu Stage.

Figure 10. *Tetradella triloculata* Schallreuter, 1978.
Right heteromorphic valve Os 3373, lateral view, ×46. Lohu quarry. Pirgu Stage.

Figure 11. *Tetradella pulchra* Neckaja, 1952.
Right heteromorphic valve Os 3122, lateral view, ×68. Vinni core, depth 21.4 m. Nabala Stage.

Plate 9

Figures 1–2. *Foramenella parkis* (Neckaja, 1952).
Left heteromorphic valve Os 2965, lateral and lateroventral view, ×68. Paluküla quarry, depth 0.58 m. Pirgu Stage.

Figures 3–5. *Foramenella porkuniensis* Sarv, 1962.
3–4 — heteromorphic carapace Os 3374, left lateral and lateroventral view, ×68. Siuge quarry. Porkuni Stage, Tõrevere Member.
5 — right tecnomorphic valve Os 3375, lateral view, ×68. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figures 6. *Consonopsis consona consona* (Sarv, 1959).
Left tecnomorphic valve Os 3376, lateral view, ×68. Orjaku core, depth 133.7 m. Keila Stage.

Figures 7–8. *Consonopsis zastrowensis* (Schallreuter, 1969).
Left tecnomorphic valve Os 3377, lateral and anteroventral view, ×68. Vinni core, depth 43.25 m. Oandu Stage.

Figures 9–12. *Consonopsis litwiensis* (Neckaja, 1952).
9–10 — left heteromorphic valve Os 3378, lateral and anteroventral view, ×68. Vinni core, depth 15.5.m. Nabala Stage.
11–12 — right heteromorphic valve Os 3379, lateral and anteroventral view, ×68. Vinni core, depth 15.5.m. Nabala Stage.

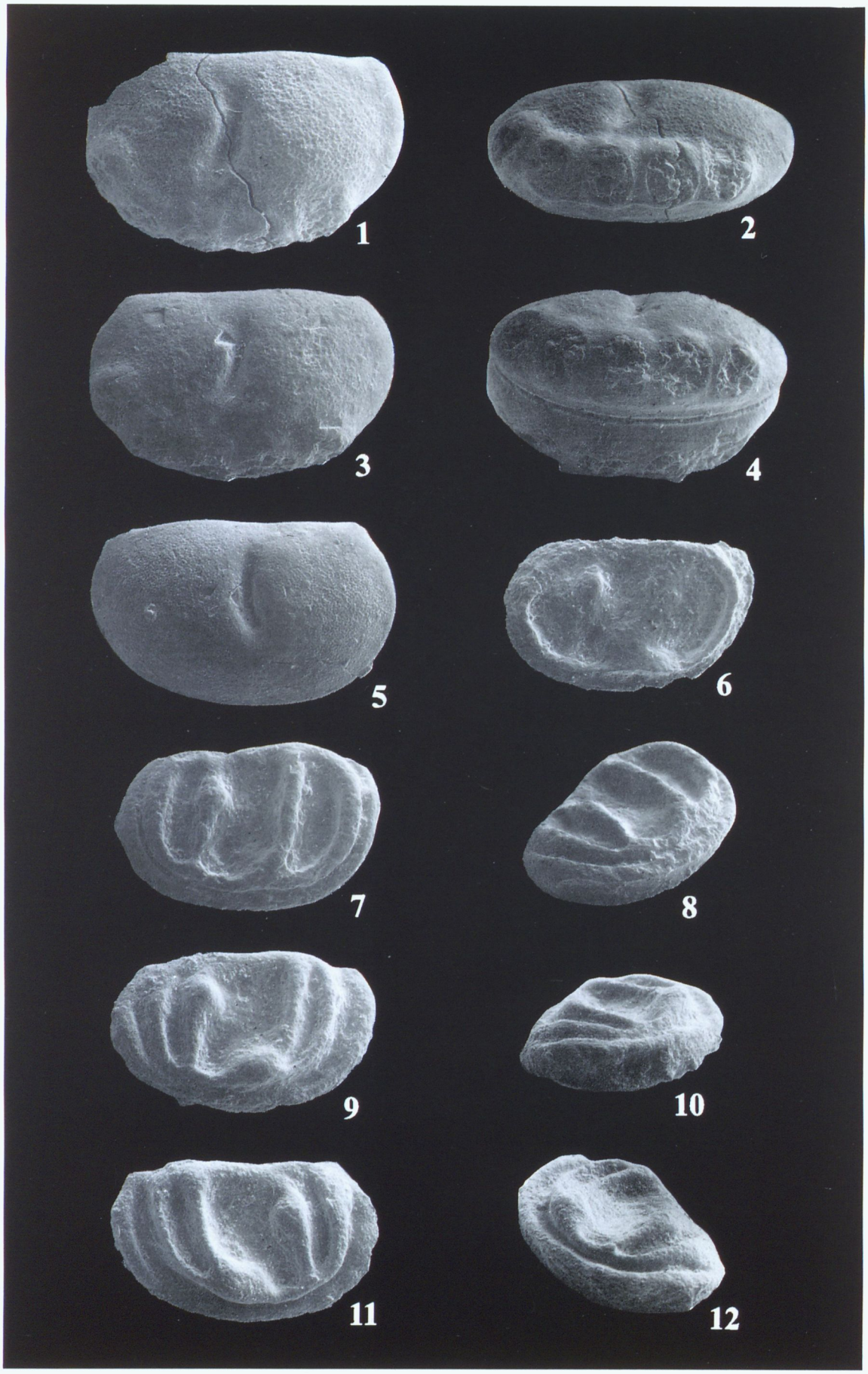
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Plate 10

Figure 1. *Polyceratella aluverensis* Sarv, 1959.
Right valve Os 3380, lateral view, ×46. Orjaku core, depth 133.7 m. Keila Stage.

Figure 2. *Polyceratella spinosa* Sarv, 1959.
Left valve Os 3381, lateral view, ×32. Orjaku core, depth 133.7 m. Keila Stage.

Figure 3. *Kiesowia dissecta* (Krause, 1892).
Heteromorphic carapace Os 3382, left view, ×32. Lohu quarry. Pirgu Stage.

Figures 4–5. *Kiesowia regalis* (Neckaja, 1952).
4 — left heteromorphic valve Os 3383, lateral view, ×29. Moonaküla quarry. Rakvere Stage.
5 — left incomplete heteromorphic valve Os 3384, lateral view, ×32. Piilse riverside section. Rakvere Stage.

Figure 6. *Kiesowia? decima* Sarv, 1962.
Juvenile carapace Os 3385, left view, ×68. Seli–Russalu quarry. Porkuni Stage, Tõrevere Member.

Figure 7. *Sigmoopsis rostrata* (Krause, 1892).
Left heteromorphic valve Os 3386, lateral view, ×32. Orjaku core, depth 133.7 m. Keila Stage.

Figure 8. *Sigmoopsis granulata* Sarv, 1956.
Right tecnomorphic valve Os 3388, lateral view, ×46. Vinni core, depth 44.1 m. Oandu Stage.

Figures 9–10. *Seviculina oanduensis* (Sarv, 1956).
9 — heteromorphic carapace Os 3389, left view, ×41. Tõrremägi trench. Oandu Stage.
10 — tecnomorphic carapace Os 3390, left view, ×46. Tõrremägi trench. Oandu Stage.

Figure 11. *Seviculina reticulata* Meidla, 1986.
Juvenile carapace Os 3391, right view, ×68. Piilse riverside section. Rakvere Stage.

Figure 12. *Concavhithis nebeni* Schallreuter, 1975.
Carapace Os 2298, right view, ×68. Moonaküla quarry. Rakvere Stage.

Figure 13. *Seviculina* sp. n.
Tecnomorphic carapace Os 3392, left view, ×46. Puhmu core, depth 83.3 m. Vormsi Stage.

Plate 11

Figure 1. *Sigmobolbina kolkaensis* Gailīte, 1975.
Left juvenile valve Os 3393, lateral view, ×68. Ruskavere core, depth 116.3 m. Vormsi Stage.

Figures 2–4. *Sigmobolbina camarota* Jaanusson, 1964.
2 — left heteromorpic valve Os 3320, lateral view, ×46. Laeva-18 core, depth 231.7 m. Rakvere Stage.
3 — tecnomorphic carapace Os 3321, right valve, ×46. Laeva-18 core, depth 231.7 m. Rakvere Stage.
4 — tecnomorphic carapace Os 3321, left valve, ×46. Laeva-18 core, depth 231.7 m. Rakvere Stage.

Figures 5–6. *Naevhithis pictis* (Neckaja, 1958).
Carapace Os 3394, right lateral and anterior view, ×46. Seli–Metsküla quarry. Porkuni Stage.

Figures 7–8. *Pentagona pentagona* Jaanusson, 1957.
7 — tecnomorphic carapace Os 3395, left view, ×46. Puhmu core, depth 130.0 m. Rakvere Stage.
8 — right incomplete valve Os 3396, lateral view, ×46. Puhmu core, depth 130.0 m. Rakvere Stage.

Figures 9–10. *Podolibolbina* cf. *podolica* Abushik et Sarv, 1983.
Right heteromorphic valve Os 3398, lateral and anteroventral view, ×68. Paope quarry, depth 0.85 m. Vormsi Stage.

Figures 11–12. *Pelecybolbina illativis* (Neckaja, 1952).
11 — right posteriorly incomplete heteromorphic valve Os 3400, lateral view, ×46. Pärnu core, depth 327.7. m. Oandu Stage.
12 — left tecnomorphic valve Os 3399, lateral view, ×46. Pärnu core, depth 327.7 m. Oandu Stage.

Figure 13. *Deefgella* sp. n.
Juvenile carapace Os 3397, right view, ×68. Orjaku core, depth 107.8 m. Rakvere Stage.

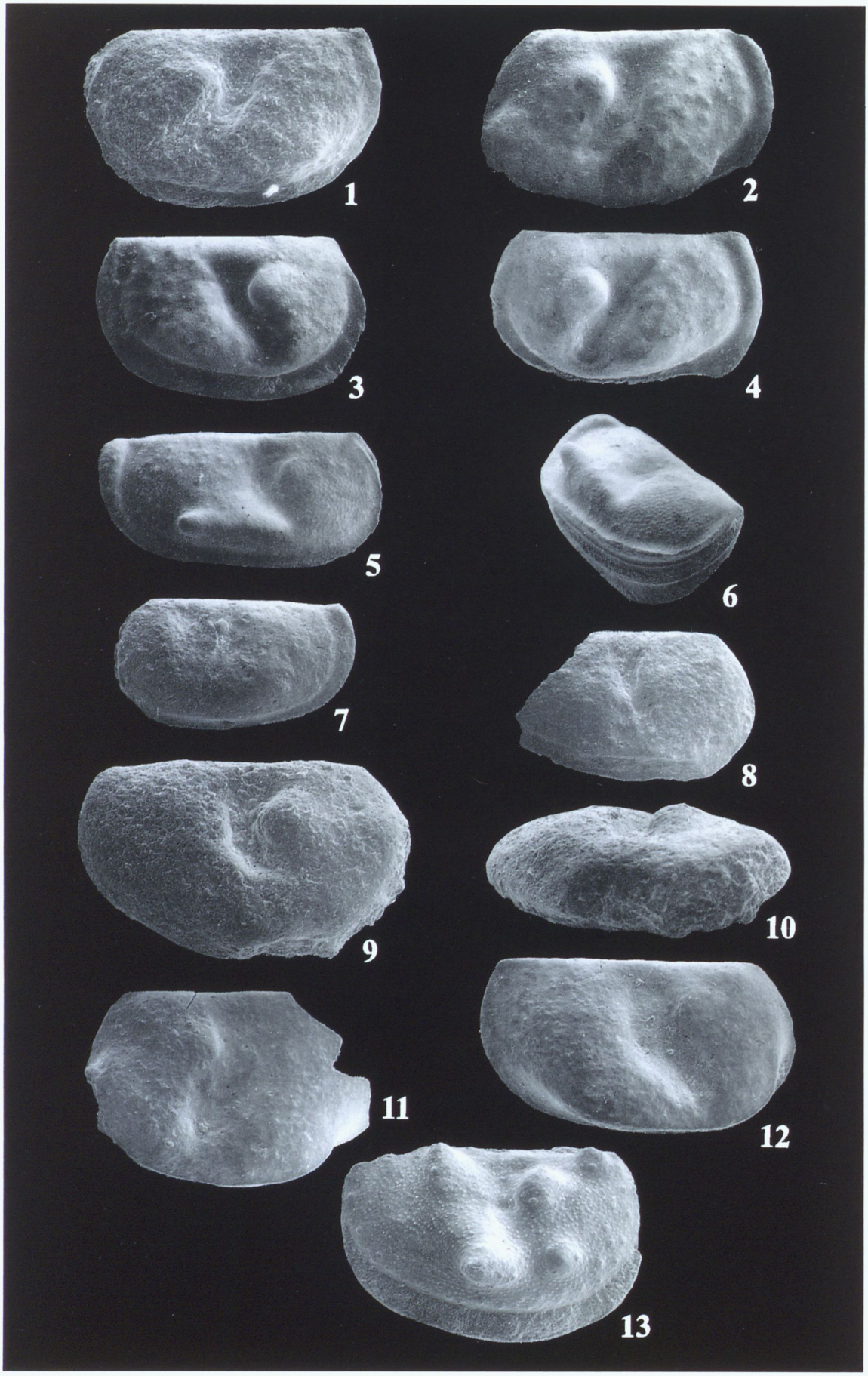
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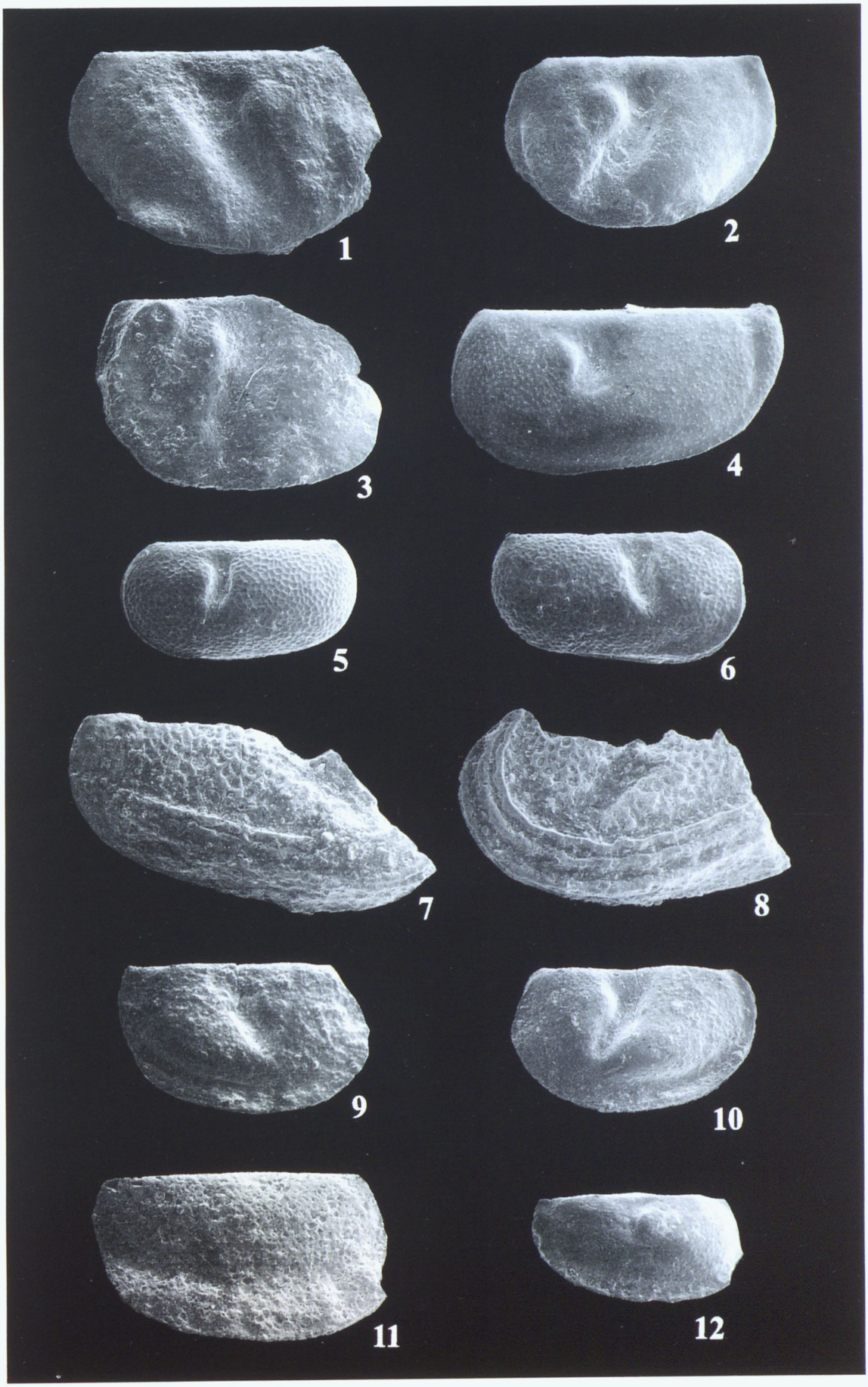
Plate 12



Figures 1–2. *Pelecybolbina pelecyoides* Jaanusson, 1966.
1 — right heteromorphic valve Os 3401, lateral view, ×46. Laev-18 core, depth 230.7 m. Rakvere Stage.
2 — left juvenile valve Os 3402, lateral view, ×46. Laev-18 core, depth 230.7 m. Rakvere Stage.

Figure 3. *Pelecybolbina graesgardensis* Schallreuter, 1977.
Left heteromorphic posterodorsally incomplete valve Os 3403, lateral view, ×46. Pärnu core, depth 329.1 m. Keila Stage.

Figure 4. *Vitteplana plana* (Neckaja, 1958).
Juvenile carapace Os 3406, left view, ×68. Paope quarry, depth 1.2 m. Vormsi Stage.

Figures 5–6. *Vitteplana*? sp. n.
5 — tecnomorphic carapace Os 3407, left view, ×68. Pärnu core, depth 327.5 m. Oandu Stage.
6 — heteromorphic right valve Os 3408, lateral view, ×68. Pärnu core, depth 328.0 m. Oandu Stage.

Figures 7–8. *Hippula edolensis* (Gailīte, 1975).
7 — left incomplete valve Os 3404, lateral view, ×68. Pärnu core, depth 310.1 m. Nabala Stage.
8 — right incomplete valve Os 3405, lateral view, ×46. Pärnu core, depth 310.1 m. Nabala Stage.

Figures 9–10. *Vittella invasa* Sidaravičiene, 1975.
9 — right heteromorphic valve Os 3409, lateral view, ×46. Ruskavere core, depth 115.45 m. Vormsi Stage.
10 — left tecnomorphic valve Os 3410, lateral view, ×46. Ruskavere core, depth 115.45 m. Vormsi Stage.

Figures 11–12. *Loculibolbina primitiva* (Sarv, 1962).
11 — right heteromorphic valve Os 3411, lateral view, ×46. Tõrma quarry. Nabala Stage, Saunja Formation.
12 — right juvenile valve Os 3412, lateral view, ×46. Pärnu core, depth 315.7 m. Nabala Stage.

Plate 13

Figures 1–2. *Loculibolbina unica* (Sarv, 1962).
1 — tecnomorphic carapace Os 3413, left view, ×41. Seli–Russalu quarry. Porkuni Stage, Tõrevere Member.
2 — tecnomorphic right valve Os 3414, lateral view, ×41. Seli–Russalu quarry. Porkuni Stage, Tõrevere Member.

Figure 3. *Disulcinoides ignalinensis* Sidaravičiene, 1992.
Right valve Os 3416, lateral view, ×68. Vinni core, depth 155.5 m. Nabala Stage.

Figure 4. *Disulcinoides auricularis* (Krause, 1892).
Right valve Os 3415, lateral view, ×68. Orjaku core, depth 134.7 m. Keila Stage.

Figures 5–7. *Disulcina perita perita* (Sarv, 1956).
5 — right valve Os 3417, lateral view, ×68. Orjaku core, depth 117.7 m. Rakvere Stage.
6 — right valve Os 3418, lateral view, ×68. Orjaku core, depth 117.7 m. Rakvere Stage.
7 — right valve Os 3419, lateral view, ×68. Orjaku core, depth 117.7 m. Rakvere Stage.

Figure 8. *Disulcina perita explicata* Sarv, 1959.
Right valve Os 3420, lateral view, ×68. Nabala core, depth 4.5 m. Nabala Stage.

Figure 9. *Scrobisylthis reticulatus* (Sarv, 1959).
Left valve Os 3424, lateral view, ×68. Ussimägi outcrop, depth 2.10 m. Oandu Stage.

Figure 10. *Disulcina minata* Sidaravičiene, 1971.
Right valve Os 3421, lateral view, ×68. Moe quarry. Pirgu Stage.

Figures 11–12. *Airina cornuta* (Neckaja, 1958).
11 — right heteromorphic valve Os 3422, lateral view, ×46. Moe core, depth 25.4 m. Vormsi Stage.
12 — left juvenile valve Os 3423, lateral view, ×46. Paope quarry, depth 0.8 m. Vormsi Stage.

Figure 13. *Bolbina* cf. *ornata* (Krause, 1897).
Juvenile carapace Os 3425, right view, ×68. Ussimägi outcrop, depth 2.10 m. Oandu Stage.

Figure 14. *Bolbina* cf. *valensis* Schallreuter, 1984.
Right valve Os 3428, lateral view, ×45. Förby core, depth 14.3 m. Pirgu Stage.

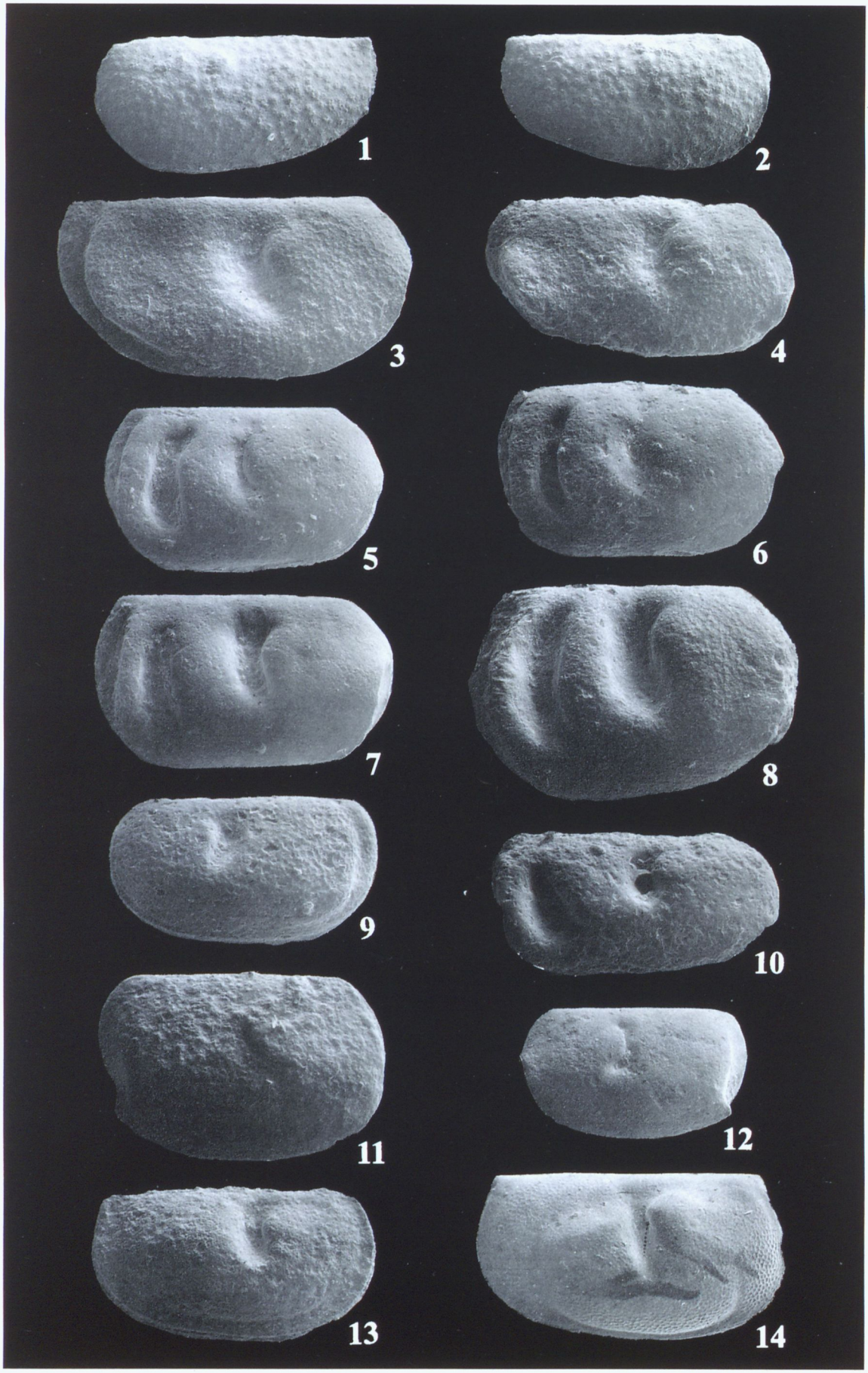

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Plate 14

Figures 1–2. *Bolbina major* (Krause, 1892).
1 — tecnomorphic carapace Os 3426, left view, ×46. Tõrremägi trench. Oandu Stage.
2 — heteromorphic carapace Os 3427, left view, ×46. Tõrremägi trench. Oandu Stage.

Figures 3–4. *Bolbina rakverensis* Sarv, 1956.
3 — heteromorphic carapace Os 3429, right view, ×32. Tõrremägi trench. Oandu Stage.
4 — tecnomorphic carapace Os 3430, left view, ×32. Tõrremägi trench. Oandu Stage.

Figure 5. *Bolbina plicata* (Krause, 1892).
Juvenile carapace Os 2992, right view, ×68. Vinni core, depth 36.8 m. Rakvere Stage.

Figure 6. *Bolbina saxbya* Meidla, 1983.
Holotype, carapace Os 11 (UT), left view, ×30. Saxby beach exposure. Vormsi Stage.

Figures 7–10. *Bolbina? globosa* (Krause, 1889).
7, 9 — right tecnomorphic valve Os 3431, lateral and lateroventral view, ×22. Turvaste outcrop. Nabala Stage.
8, 10 — heteromorphic carapace Os 3432, right lateral and anteroventral view, ×22. Turvaste outcrop. Nabala Stage.

Figure 11. *Grammolomatella vestrogothica* (Henningsmoen, 1948).
Heteromorphic right valve Os 3433, lateral view, ×46. Taagepera core, depth 460.4 m. Rakvere Stage.

Figure 12. *Drepanella? pauxilla* Gailīte, 1970.
Right valve Os 3434, lateral view, ×68. Taagepera core, depth 419.0 m. Porkuni Stage.

Figure 13. *Scanipisthia rectangularis* (Troedsson, 1918).
Carapace Os 3438, right view, ×68. Taagepera core, depth 423.8 m. Porkuni Stage.

Figure 14. *Kinnekullea hesslandi* Henningsmoen, 1948.
Right valve Os 3435, lateral view, ×68. Kaugatuma core, depth 402.5 m. Nabala Stage.

Plate 15

Figure 1. *Kinnekullea thorslundi* Henningsmoen, 1948.
Right valve Os 3436, lateral view, ×68. Taagepera core, depth 451.0 m. Vormsi Stage.

Figure 2. *Kinnekullea intermedia* Gailīte, 1975.
Right valve Os 3437, lateral view, ×60. Aidu core, depth 153.9 m. Pirgu Stage.

Figure 3. *Harpabollia harparum* (Troedsson, 1918).
Carapace Os 3439, right view, ×68. Taagepera core, depth 419.0 m. Porkuni Stage.

Figure 4. *Klimphores minimus* (Sarv, 1956).
Carapace Os 3441, right view, ×101. Pärnu core, depth 327.5 m. Oandu Stage.

Figure 5. *Ulrichia lauta* Gailīte, 1971.
Carapace Os 3440, right view, ×101. Pärnu core, depth 307.2 m. Pirgu Stage.

Figure 6. *Klimphores digitatus* (Neckaja, 1958).
Right valve Os 3442, lateral view, ×68. Viljandi core, depth 317.8 m. Nabala Stage.

Figure 7. *Klimphores simplex* (Neckaja, 1958).
Carapace Os 3443, right view, ×101. Laeva-18 core, depth 240.4 m. Keila Stage.

Figure 8. *Klimphores bimembris* Gailīte, 1971.
Right valve Os 3444, lateral view, ×68. Taagepera core, depth 469.8 m. Keila Stage.

Figure 9. *Klimphores holdrensis* Gailīte, 1971.
Carapace Os 3445, right view, ×101. Vinni core, depth 31.9 m. Rakvere Stage.

Figure 10. *Klimphores plienkalnensis* Gailīte, 1971.
Right valve Os 3446, lateral view, ×101. Laeva-18 core, depth 224.8 m. Nabala Stage.

Figure 11. *Bullaeferum tapaënsis* (Sarv, 1959).
Carapace Os 3038, right view, ×45. Vinni core, depth 15.5. m. Nabala Stage.

Figure 12. *Parphores fastigatus* Schallreuter, 1969.
Left valve Os 3447, lateral view, ×88. Ruskavere core, depth 73.10 m. Pirgu Stage.

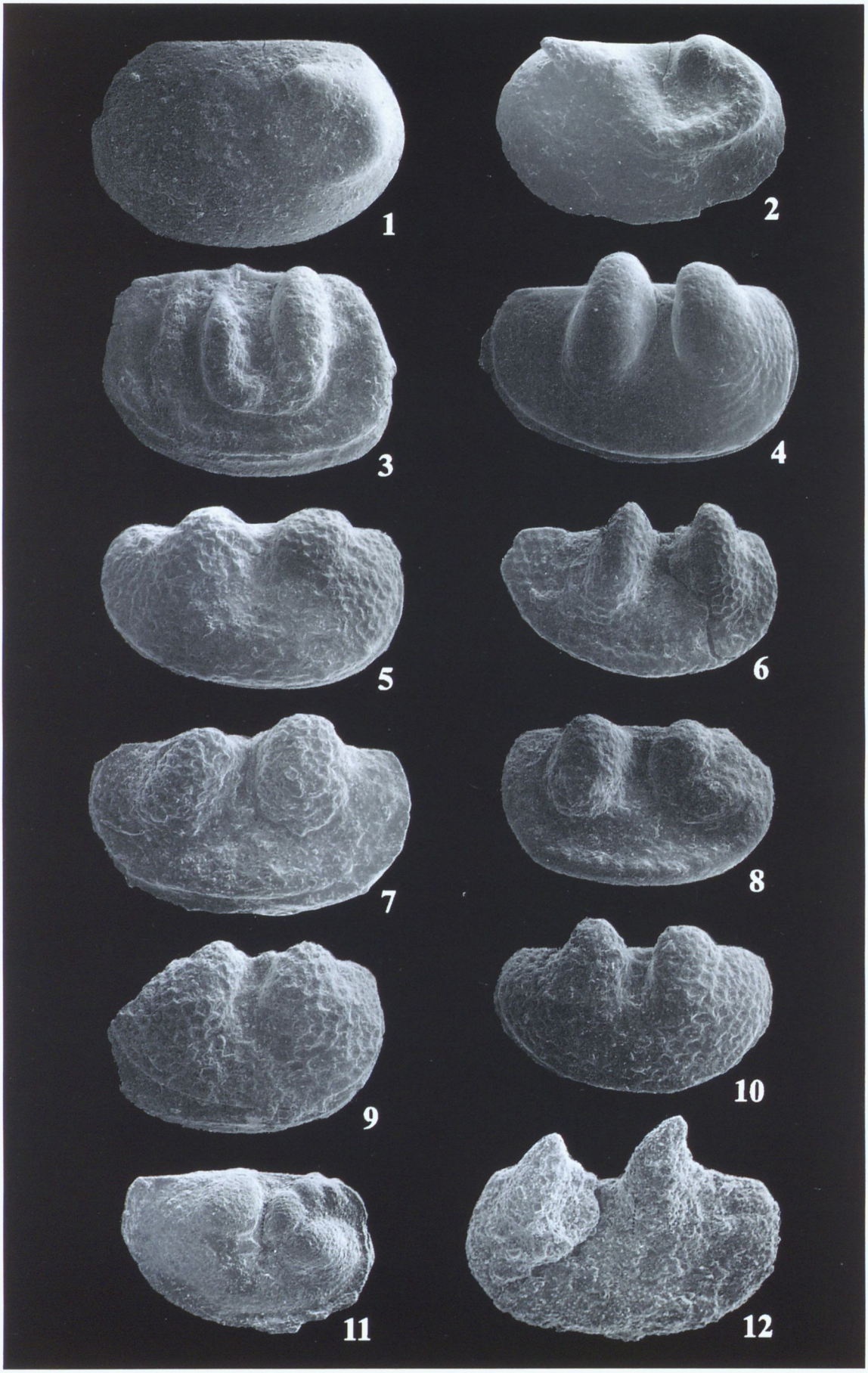
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Plate 16

Figure 1. *Crescentilla*? *baltica* Neckaja, 1966.
Carapace Os 3448, right view, ×88. Orjaku core, depth 124.1 m. Rakvere Stage.

Figure 2. *Aechmina groenwalli* Troedsson, 1918.
Right valve Os 3449, lateral view, ×63. Taagepera core, depth 420.9 m. Porkuni Stage.

Figure 3. *Pseudulrichia*? *tubulata* (Neckaja, 1966).
Carapace Os 3450, right view, ×88. Taagepera core, depth 460.4 m. Rakvere Stage.

Figure 4. *Pseudulrichia disputabile* Sidaravičiene, 1975.
Carapace Os 3451, left view, ×30. Taagepera core, depth 420.9 m. Porkuni Stage.

Figures 5–6. *Pyxion nitidum* Sarv, 1963.
5 — right valve Os 3452, lateral view, ×63. Orjaku core, depth 133.7 m. Keila Stage.
6 — right valve Os 3453, lateral view, ×63. Orjaku core, depth 133.7 m. Keila Stage.

Figure 7. *Pyxion rakverensis* Meidla, 1986.
Carapace Os 3040, right view, ×63. Vinni core depth 38.5 m. Rakvere Stage.

Figure 8. *Orechina procera* Schallreuter, 1980.
Carapace Os 3459, right view, ×63. Taagepera core, depth 467.8 m. Keila Stage.

Figures 9–10. *Vogdesella subovata* (Thorslund, 1948).
9 — right valve Os 3455, lateral view, ×63. Taagepera core, depth 467.8 m. Keila Stage.
10 — right juvenile valve Os 3456, lateral view, ×63. Taagepera core, depth 467.8 m. Keila Stage.

Figures 11–12. *Vogdesella* sp. n.
11 — right valve Os 3457, lateral view, ×63. Pärnu core, depth 242.6 m. Pirgu (Porkuni ?) Stage.
12 — left valve Os 3458, lateral view, ×63. Pärnu core, depth 242.6 m. Pirgu (Porkuni ?) Stage.

Plate 17

Figure 1. *Arpaschmidtella abnormis* (Sidaravičiene, 1975).
Carapace Os 3468, right view, ×88. Orjaku core, depth 117.7 m. Rakvere Stage.

Figure 2. *Pedomphalella egregia* (Sarv, 1963).
Left valve Os 3460, lateral view, ×63. Orjaku core, depth 133.7 m. Keila Stage.

Figures 3–4. *Pedomphalella*? sp. n.
3 — right valve Os 3461, lateral view, ×63. Paluküla quarry, depth 1.83 m. Vormsi Stage.
4 — carapace Os 3462, left view, ×63. Paluküla quarry, depth 1.69 m. Vormsi Stage.

Figures 5–6. *Easchmidtella fragosa* (Neckaja, 1960).
5 — deformed carapace Os 3466, right view, ×63. Pärnu core, depth 327.5 m. Oandu Stage.
6 — right valve Os 3465, lateral view, ×41. Pärnu core, depth 327.5 m. Oandu Stage.

Figure 7. *Easchmidtella angulata* Sidaravičiene, 1975.
Carapace Os 3467, right view, ×63. Paluküla quarry, depth 1.83 m. Vormsi Stage.

Figures 8–10. *Easchmidtella orbicularis* sp. n.
8 — holotype, carapace Os 2921, left view, ×45. Orjaku core, depth 48.7m. Pirgu Stage.
9 — carapace Os 2962, left view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.
10 — carapace Os 2924, dorsal view, ×45. Haapsalu-203 core, depth 22.2 m. Pirgu Stage.

Figure 11. *Spinigerites spiniger* Lindström, 1953.
Carapace Os 3471, left view, ×45. Otepää core, depth 428.9 m. Nabala Stage.

Figure 12. *Pseudoancora parovina* (Sidaravičiene, 1975).
Juvenile carapace Os 3470, left view, ×88. Kaugatuma core, depth 402.5 m. Nabala Stage.

Figure 13. *Pseudoancora confragosa* (Gailīte, 1970).
Carapace Os 3469, right view, ×45. Taagepera core, depth 419.0 m. Porkuni Stage.

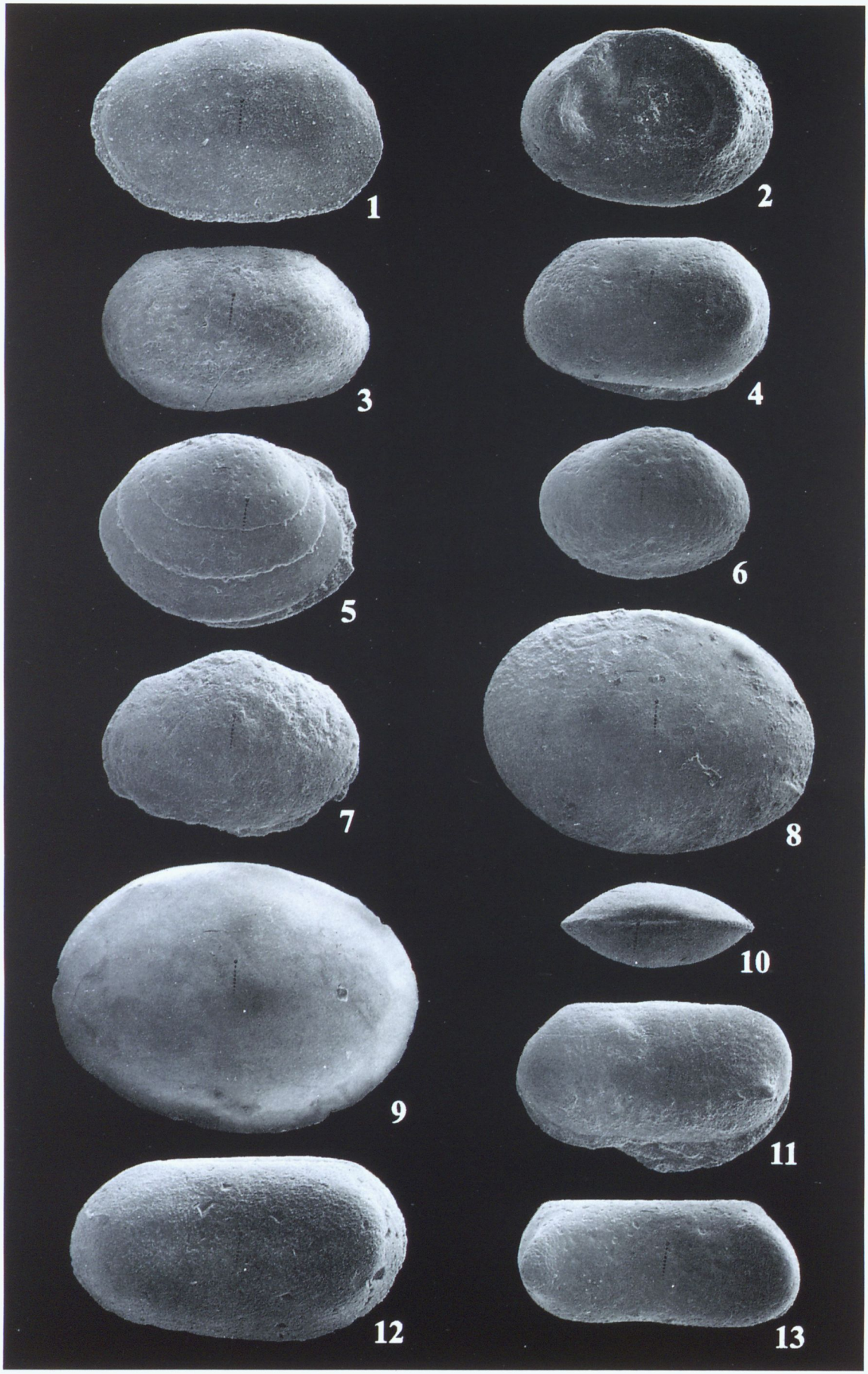
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Plate 18

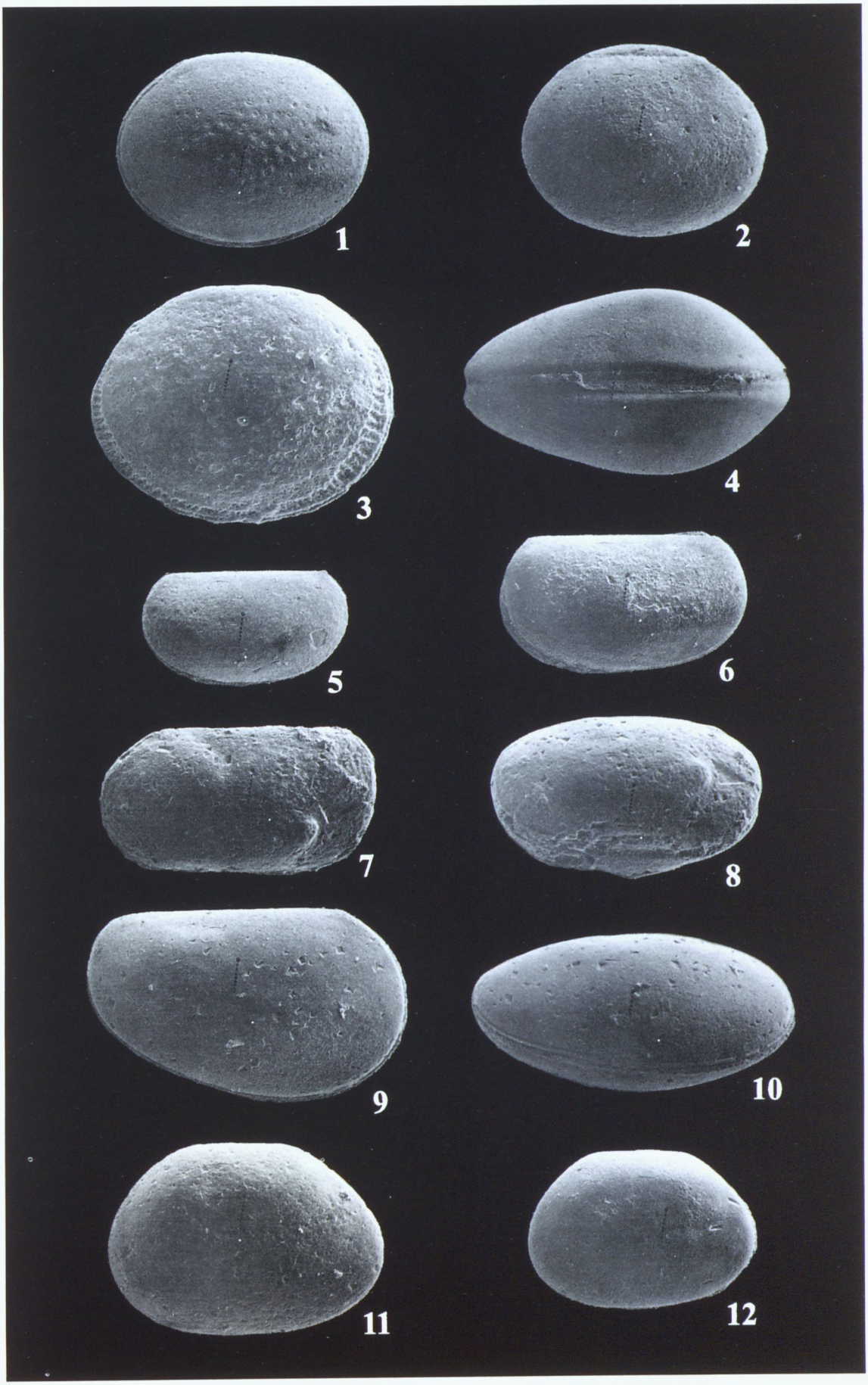

Figure 1. *Baltonotella ledaia* Sidaravičiene, 1975.
Carapace Os 3472, left view, ×45. Ruskavere core, depth 120.1 m. Nabala Stage.

Figure 2. *Baltonotella mistica* Sidaravičiene, 1992.
Carapace Os 3473, right view, ×45. Põriki quarry. Pirgu Stage.

Figure 3. *Baltonotella limbata* Sidaravičiene, 1975.
Carapace Os 3474, left view, ×63. Moe quarry. Pirgu Stage.

Figures 4–6. *Longidorsa humilis* sp. n.
4 — carapace Os 3183, ventral view, ×45. Seli–Metsküla quarry. Porkuni Stage.
5 — holotype, juvenile carapace Os 13 (UT), left view, ×45. Paluküla quarry, depth 0.58 m. Pirgu Stage.
6 — juvenile carapace Os 14 (UT), right view, ×45. Paluküla quarry, depth 1.46 m. Vormsi Stage.

Figures 7–8. *Longidorsa? porkuniensis* (Sarv, 1962).
Carapace Os 3475, left lateral and lateroventral view, ×63. Siuge quarry. Porkuni Stage, Siuge Member.

Figures 9–10. *Longidorsa? baltica* sp. n.
Holotype, carapace Os 3184, left lateral and lateroventral view, ×63. Puhmu core, depth 102.2 m. Nabala Stage.

Figures 11–12. *Circulinella nuda* Neckaja, 1966.
11 — left valve Os 3463, lateral view, ×63. Vinni core, depth 43.3 m. Oandu Stage.
12 — juvenile carapace Os 3464, left view, ×63. Vinni core, depth 43.3 m. Oandu Stage.

Plate 19

Figures 1–2. *Circulinella gailitae* sp. n.
1 — holotype, carapace Os 3204, left view, ×88. Taagepera core, depth 419.0 m. Porkuni Stage.
2 — juvenile carapace Os 3205, right view, ×88. Taagepera core, depth 419.0 m. Porkuni Stage.

Figure 3. *Hemiaechminoides rossica* Neckaja, 1966.
Carapace Os 3476, left view, ×88. Põriki quarry. Pirgu Stage.

Figure 4. *Hemiaechminoides excentricus* Schallreuter, 1971.
Carapace Os 2970, left view, ×88. Orjaku core, depth 62.6 m. Pirgu Stage.

Figures 5–6. *Hemiaechminoides minusculus* Meidla, 1986.
5 — juvenile carapace Os 3478, left view, ×88. Orjaku core, depth 115.6 m. Rakvere Stage.
6 — carapace Os 3479, left view, ×88. Ussimägi outcrop, depth 1.75 m. Oandu (?) Stage.

Figures 7–9. *Hemeaschmidtella exula* Schallreuter, 1971.
7 — carapace Os 3480, left view, ×88. Ussimägi outcrop, depth 1.75 m. Oandu (?) Stage.
8 — carapace Os 3481, right view, ×88. Ussimägi outcrop, depth 1.75 m. Oandu (?) Stage.
9 — carapace Os 2925, right view, ×88. Moe quarry. Pirgu Stage.

Figures 10–12. *Hemeaschmidtella* sp. 2.
10 — carapace Os 3487, left view, ×63. Puhmu core, depth 130.0 m. Rakvere Stage.
11 — juvenile carapace Os 3488, left view, ×63. Puhmu core, depth 130.0 m. Rakvere Stage.
12 — juvenile carapace Os 3489, right view, ×63. Puhmu core, depth 130.0 m. Rakvere Stage.


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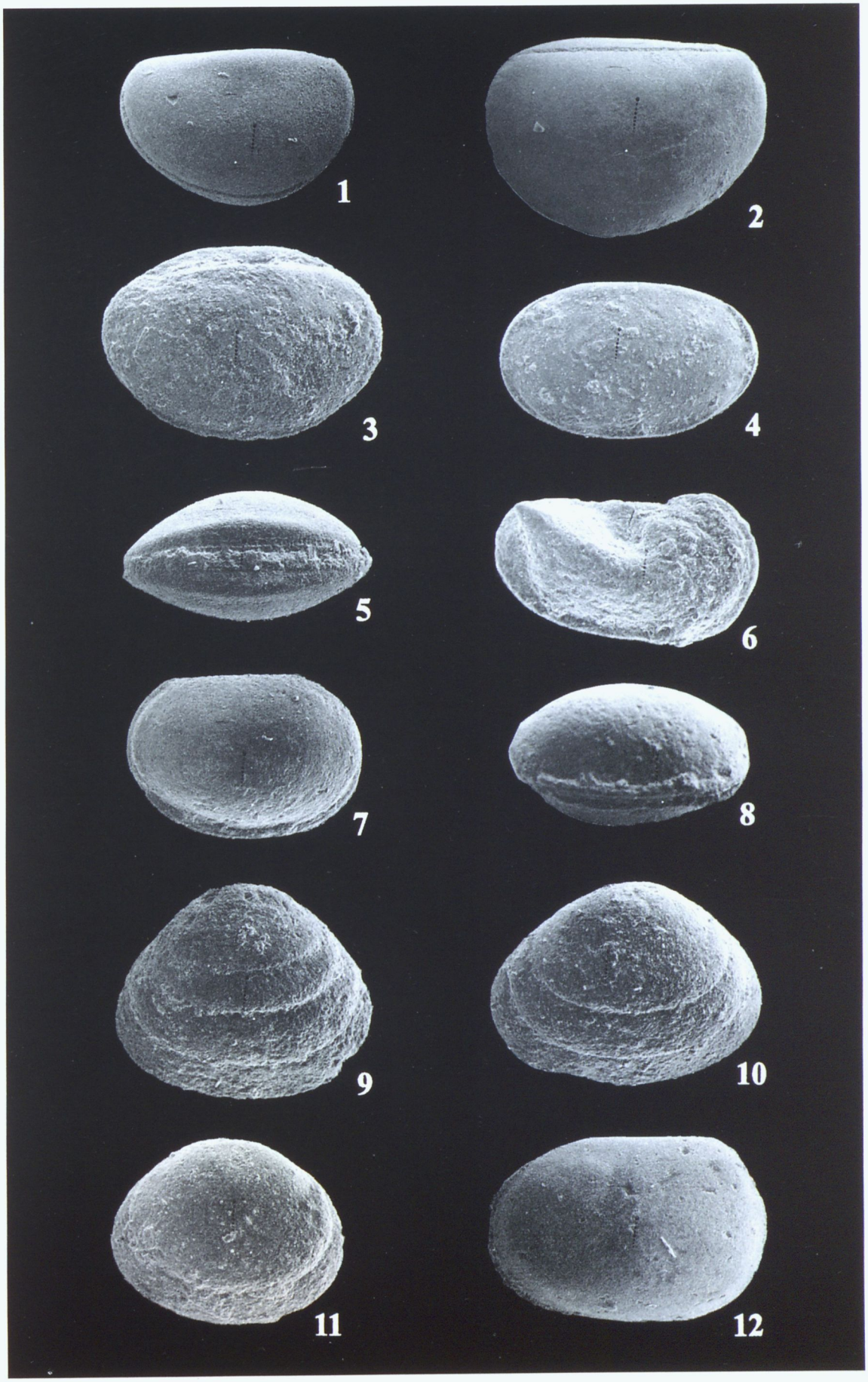
Plate 20



Figures 1–2. *Hemeaschmidtella faba* Schallreuter, 1984.
1 — juvenile carapace Os 3482, left view, ×63. Vinni core, depth 41.4 m. Rakvere Stage.
2 — carapace Os 3483, right view, ×63. Vinni core, depth 41.4 m. Rakvere Stage.

Figures 3–5. *Hemeaschmidtella*? sp. 1.
3 — carapace Os 3485, right view, ×88. Kaugatuma core, depth 353.0 m. Pirgu Stage.
4 — carapace Os 3484, left view, ×88. Kaugatuma core, depth 353.0 m. Pirgu Stage.
5 — carapace Os 3486, ventral view, ×88. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figure 6. *Neoprimitiella bisulcata* Schallreuter, 1969.
Right juvenile valve Os 3494, lateral view, ×88. Aidu core, depth 147.8 m. Pirgu Stage

Figures 7–8. *Ahlintella*? *marginata* (Sidaravičiene, 1975).
Carapace Os 3490, right and lateroventral view, ×45. Laeva-18 core, depth 227.1 m. Nabala Stage.

Figures 9–11. *Cryptophyllus gutta* Schallreuter, 1968.
9 — left valve Os 3491, lateral view, ×63. Vinni core, depth 15.5 m. Nabala Stage.
10 — right valve Os 3492, lateral view, ×63. Vinni core, depth 15.5 m. Nabala Stage.
11 — left valve Os 3493, lateral view, ×63. Vinni core, depth 15.5 m. Nabala Stage.

Figure 12. *Disparigonya* sp. n.
Carapace Os 3495, left view, ×63. Ruskavere core, depth 128.3 m. Nabala Stage.

Plate 21

Figure 1. *Estonaceratella estona* (Sarv, 1962).
Carapace Os 3496, left view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figures 2–3. *Gotlandina caudica* (Neckaja, 1966).
2 — right valve Os 3497, lateral view, ×63. Pärnu core, depth 318.0 m. Nabala Stage.
3 — right valve Os 3498, lateral view, ×63. Pärnu core, depth 318.0 m. Nabala Stage.

Figures 4, 6–7. *Priminsolenia minima* gen. et sp. n.
4 — holotype, right valve Os 3186, lateral view, ×134. Laeva-18 core, depth 235.55 m. Oandu Stage.
6 — left valve Os 3601, lateral view, ×134. Taagepera core, depth 466.4 m. Oandu Stage.
7 — right valve Os 3602, lateral view, ×134. Taagepera core, depth 466.4 m. Oandu Stage.

Figure 5. *Gotlandina erratica* Schallreuter, 1968.
Left valve Os 3215, lateral view, ×63. Pärnu core, depth 288.0 m. Pirgu Stage.

Figures 8–9. *Priminsolenia insolens* (Meidla, 1986).
8 — left valve Os 3499, lateral view, ×63. Vinni core, depth 21.4 m. Nabala Stage.
9 — left valve Os 3500, lateral view, ×63. Vinni core, depth 21.4 m. Nabala Stage.

Figures 10–11. *Primitiella*? sp.
10 — right valve Os 3605, lateral view, ×63. Ruskavere core, depth 117.1 m. Vormsi Stage.
11 — left valve Os 3604, lateral view, ×63. Ruskavere core, depth 116.4 m. Vormsi Stage.

Figure 12. *Unisulcopleura carina* Sidaravičiene, 1992.
Left valve Os 3605, lateral view, ×63. Orjaku core, depth 117.7 m. Rakvere Stage.

Figure 13. *Unisulcopleura rakverensis* Sidaravičiene, 1992.
Right valve Os 3606, lateral view, ×63. Vinni core, depth 33.4 m. Rakvere Stage.

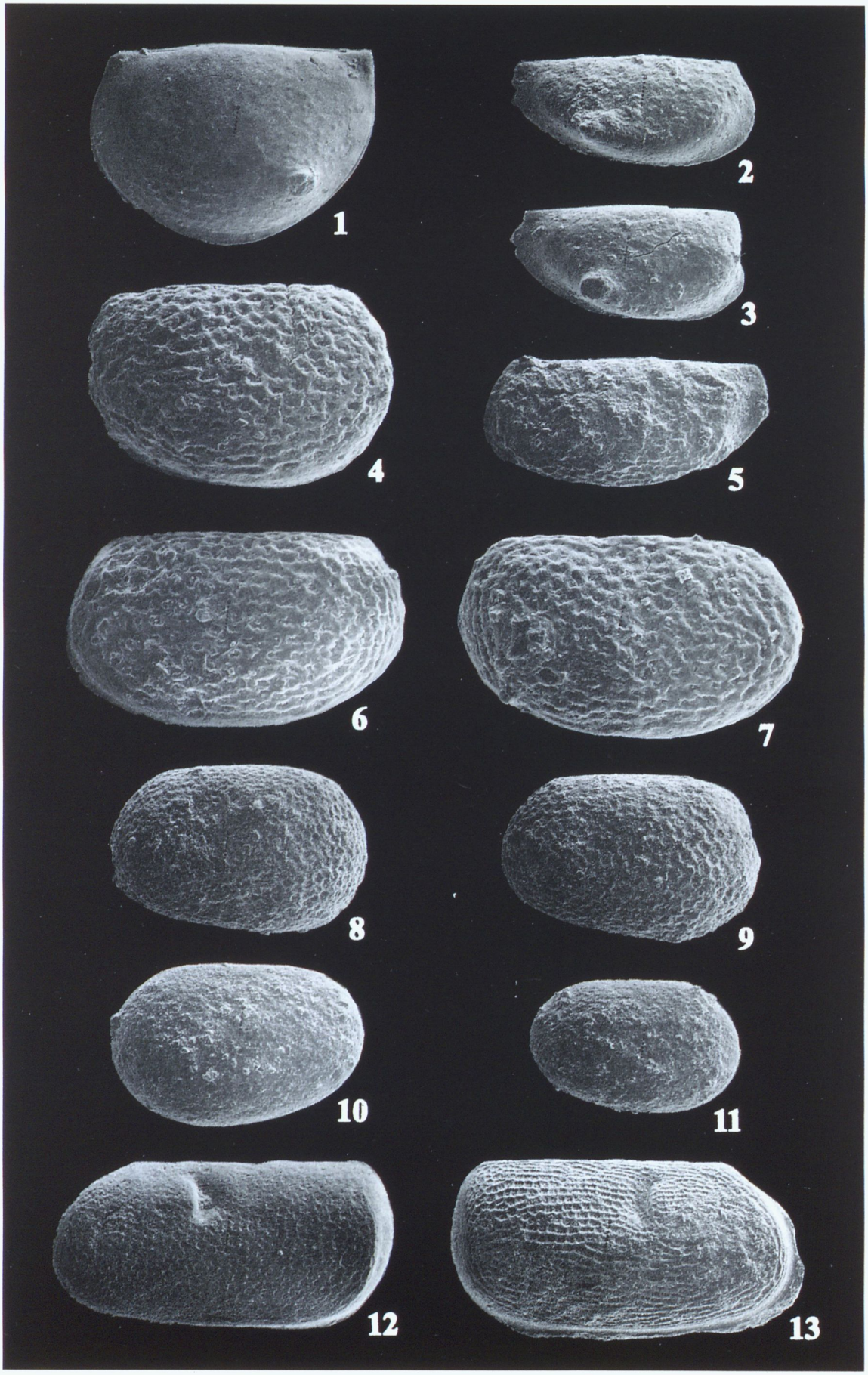

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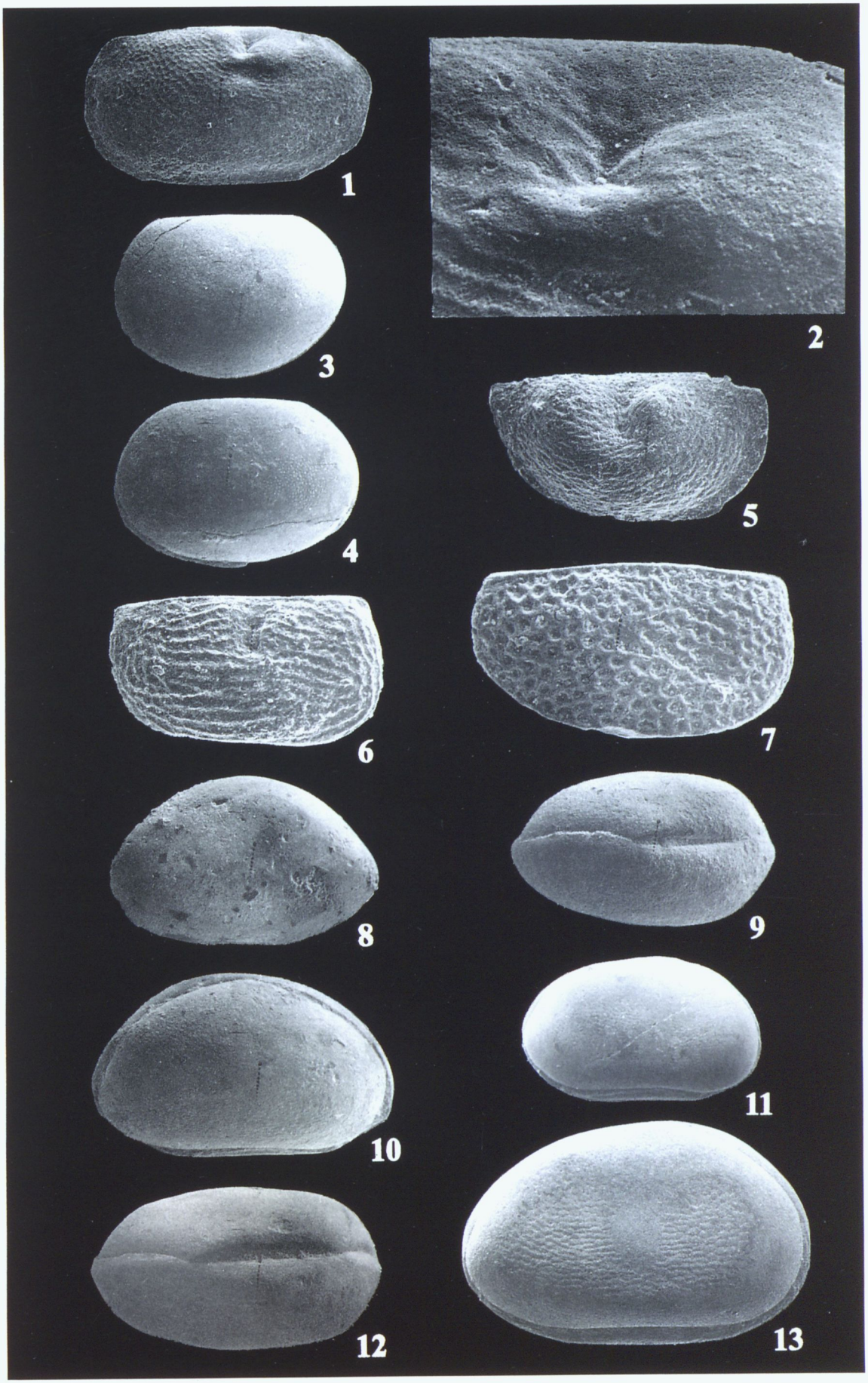
Plate 22



Figures 1–2. *Lilitia* sp. n.
Carapace Os 3607, right view (×63) and detail of the lateral surface with S2 (×370). Förby core, depth 14.3 m. Pirgu Stage.

Figure 3. *Leperditella brachynotos* (Schmidt, 1858).
Carapace Os 3608, right view, ×21. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figure 4. *Leperditella prima* Sarv, 1956.
Carapace Os 3609, right view, ×30. Mäetaguse core, depth 21.1 m. Oandu Stage, Tõrremägi Member.

Figure 5. *Fallaticella schaeferi* Schallreuter, 1984.
Right valve Os 3610, lateral view, ×63. Kaugatuma core, depth 393.0 m. Pirgu Stage.

Figure 6. *Ordovizona sulcata* Schallreuter, 1969.
Right tecnomorphic valve Os 3611, lateral view, ×88. Laeva-18 core, depth 224.8 m. Nabala Stage.

Figure 7. *Nonsulcozona praepleta* Schallreuter, 1972.
Carapace Os 3612, right view, ×134. Aidu core, depth 113.0 m. Pirgu Stage.

Figures 8–10. *Olbianella fabacea* (Pranskevičius, 1972).
8 — juvenile carapace Os 3126, left view, ×45. Haapsalu-203 core, depth 27.6 m. Pirgu Stage.
9 — juvenile carapace Os 3128, dorsal view, ×45. Haapsalu-203 core, depth 33.2 m. Pirgu Stage.
10 — carapace Os 3127, right view, ×45. Haapsalu-203 core, depth 33.2 m. Pirgu Stage.

Figures 11–13. *Olbianella* cf. *braderupensis* (Schallreuter, 1980).
11 — carapace Os 3130, right view, ×31. Vinni core, depth 40.0 m. Rakvere Stage.
12 — carapace Os 3131, dorsal view, ×45. Vinni core, depth 40.0 m. Rakvere Stage.
13 — juvenile carapace Os 3133, right view, ×78. Vinni core, depth 40.0 m. Rakvere Stage.

Plate 23

Figures 1–2. *Bairdiocypris indeterminatus* Pranskevičius, 1972.
1 — carapace Os 3613, right view, ×63. Moe excavation (Moe-2). Vormsi Stage.
2 — juvenile carapace Os 3614, dorsal view, ×63. Orjaku core, depth 76.8 m. Pirgu Stage.

Figures 3–4. *Silenis*? *trapeziformis* Abushik et Sarv, 1983.
3 — carapace Os 3615 (anteriorly incomplete), right view, ×88. Puhmu core, depth 137.6 m. Rakvere Stage.
4 — carapace Os 3616, left view, ×88. Puhmu core, depth 136.65 m. Rakvere Stage.

Figure 5. *Silenis*? sp. n.
Carapace Os 2973, right view, ×63. Orjaku core, depth 94.0 m. Vormsi Stage.

Figure 6. *Bulbosclerites unicornis* (Neckaja, 1952).
Carapace Os 3617, right view, ×88. Iida carst cave. Porkuni Stage, Siuge Member.

Figures 7–8. *Bulbosclerites* sp. n.
7 — carapace Os 3618, right view, ×88. Piilse riverside section. Rakvere Stage.
8 — carapace Os 3619, right view, ×88. Puhmu core, depth 130.0 m. Rakvere Stage.

Figure 9. *Uthoernia lunata* Schallreuter, 1986.
Carapace Os 3620, right view, ×134. Haapsalu-203 core, depth 39.0 m. Pirgu Stage.

Figure 10. *Longiscula* cf. *smithii* (Jones, 1887).
Carapace Os 3621, right view, ×45. Laeva-18 core, depth 173.5 m. Lowermost Silurian, Juuru Stage.

Figure 11. *Longiscula obliqua* Abushik et Sarv, 1983.
Carapace Os 3624, right view, ×63. Kohila quarry (Kohila-1). Vormsi Stage.

Figure 12. *Longiscula parrectis*? Neckaja, 1958.
Carapace Os 3622, right view, ×88. Kaugatuma core, depth 414.05 m. Keila Stage.

Figures 13–14. *Longiscula tersa* (Neckaja, 1966).
13 — carapace Os 3623, right view, ×45. Taagepera core, depth 459.4 m. Nabala Stage.
14 — carapace Os 3097, dorsal view, ×45. Rägavere quarry. Rakvere Stage.

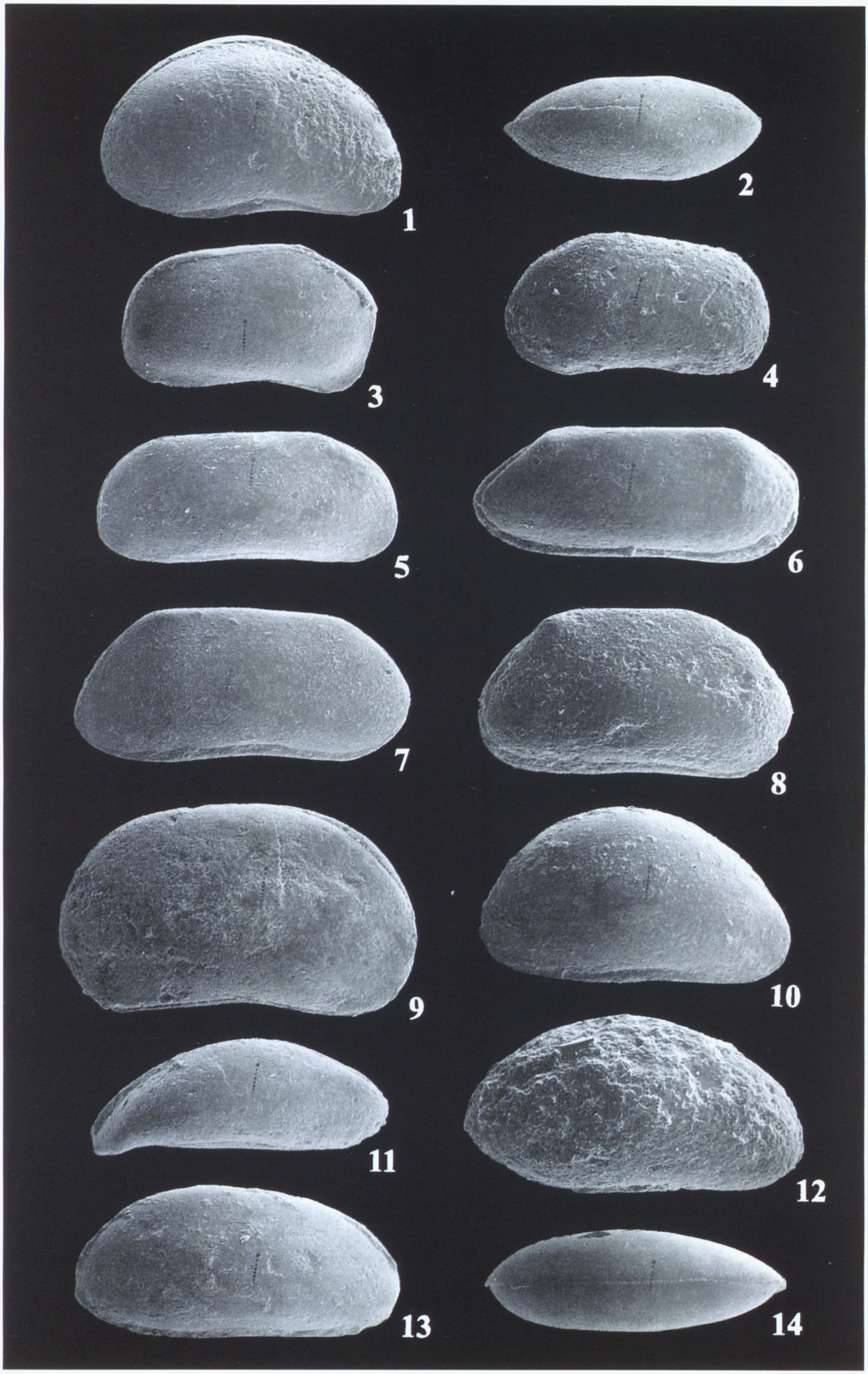

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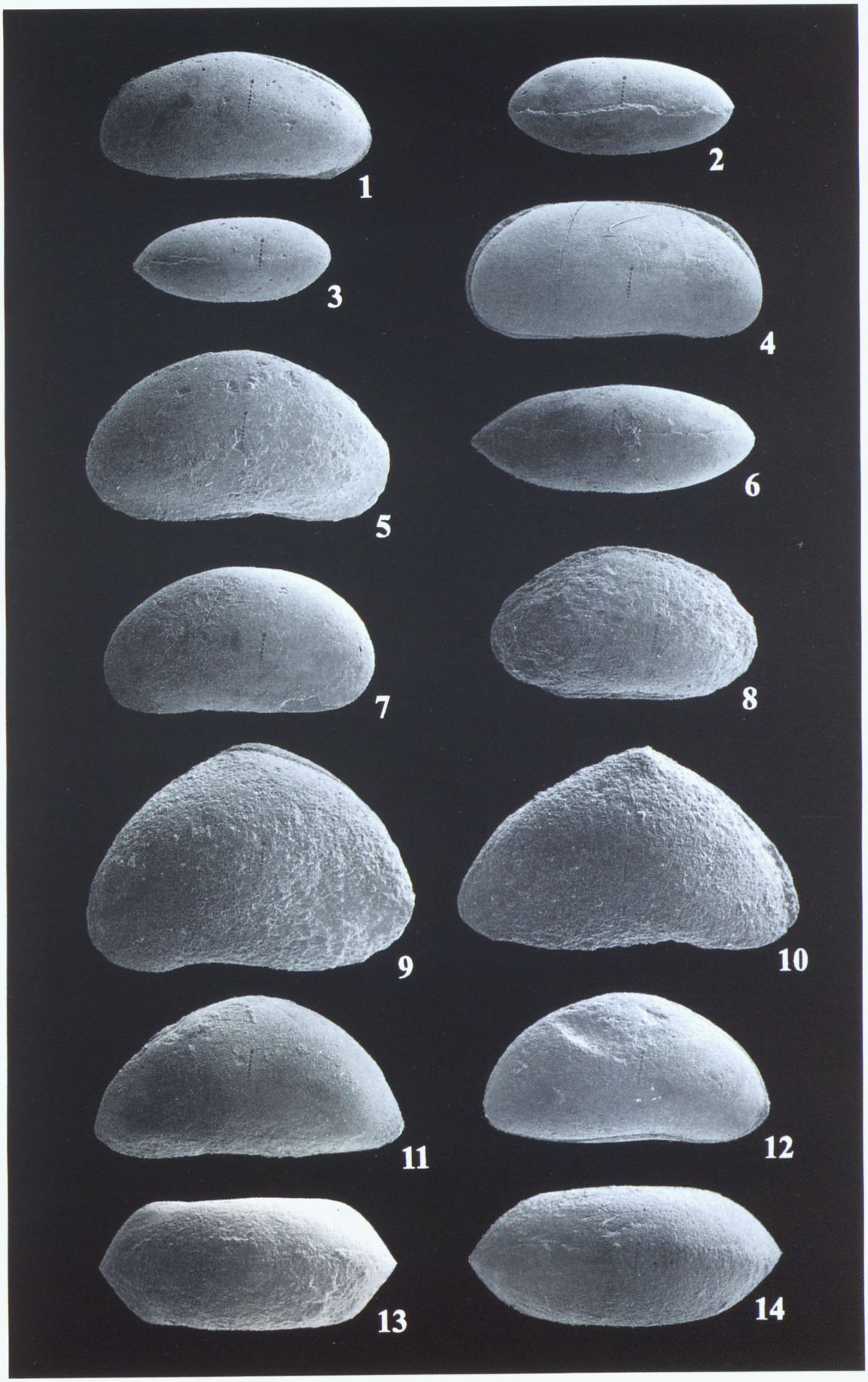
Plate 24



Figures 1–3. *Longiscula perfecta* Meidla, 1993.
1 — holotype, carapace Os 3082, right view, ×30. Põriki quarry. Pirgu Stage.
2 — carapace Os 3083, ventral view, ×30. Põriki quarry. Pirgu Stage.
3 — juvenile carapace Os 3085, dorsal view, ×30. Põriki quarry. Pirgu Stage.

Figure 4. *Longiscula porrecta* Stumbur, 1993.
Carapace Os 3625, right view, ×21. Porkuni quarry. Porkuni Stage.

Figures 5–7. *Longiscula impercepta* sp. n.
5 — holotype, carapace Os 3019, right view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.
6 — carapace Os 3020, dorsal view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.
7 — carapace Os 3021, left view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figure 8. *Longiscula ovata* Neckaja 1966.
Carapace Os 3626, right view, ×45. Paluküla quarry, depth 0.34 m. Pirgu Stage.

Figures 9–10. *Pullvillites rostratus* (Krause, 1891).
9 — carapace Os 3627, left view, ×45. Kaugatuma core, depth 408.05 m. Nabala Stage.
10 — carapace Os 3628, right view, ×45. Kaugatuma core, depth 408.05 m. Nabala Stage.

Figures 11–14. *Pullvillites laevis* Abushik et Sarv, 1983.
11 — carapace Os 3147, left view, ×30. Taagepera core, depth 459.0 m. Nabala Stage.
12 — carapace Os 3629, right view, ×30. Laeva-18 core, depth 229.45 m. Nabala Stage.
13 — carapace Os 3140, dorsal view, ×30. Taagepera core, depth 456.3 m. Nabala Stage.
14 — carapace Os 3141, dorsal view, ×30. Taagepera core, depth 456.3 m. Nabala Stage.

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Figures 1–2. *Pullvillites*? *inornatus* sp. n.
1 — holotype, carapace Os 2952, left view, ×63. Orjaku core, depth 54.8 m. Pirgu Stage.
2 — carapace Os 3118, dorsal view, ×63. Puhmu core, depth 63.7 m. Pirgu Stage.

Figure 3. *Trapezisylthere admirebilis* (Neckaja, 1966).
Carapace Os 3630, right view, ×63. Ruskavere core, depth 93.7 m. Pirgu Stage.

Figures 4–6. *Steusloffina cuneata* (Steusloff, 1895).
4 — carapace Os 3631, right view, ×45. Paluküla quarry, depth 2.27 m. Vormsi Stage.
5 — carapace Os 3632, left view, ×45. Moe quarry. Pirgu Stage.
6 — carapace Os 3633, ventral view, ×45. Moe quarry. Pirgu Stage.

Figure 7. *Steusloffina lintra* Schallreuter, 1968.
Deformed carapace Os 3636, left view, ×45. Aidu core, depth 113.0 m. Pirgu Stage.

Figures 8–9. *Steusloffina aputa* Stumbur, 1956.
8 — carapace Os 3634, right view, ×30. Siuge quarry. Porkuni Stage, Tõrevere Member.
9 — carapace Os 3635, right view. Siuge quarry, ×30. Porkuni Stage, Tõrevere Member.

Figures 10–11. *Steusloffina dilatata* Meidla, 1983.
10 — carapace Os 5 (UT), left view, ×45. Saxby beach exposure. Vormsi Stage.
11 — carapace Os 4 (UT), ventral view, ×45. Saxby beach exposure. Vormsi Stage.

Figures 12–13. *Steusloffina*? sp. 2.
12 — carapace Os 3638, right view, ×45. Iida carst cave. Porkuni Stage, Tõrevere Member.
13 — juvenile carapace Os 3639, dorsal view, ×45. Iida carst cave. Porkuni Stage, Tõrevere Member.

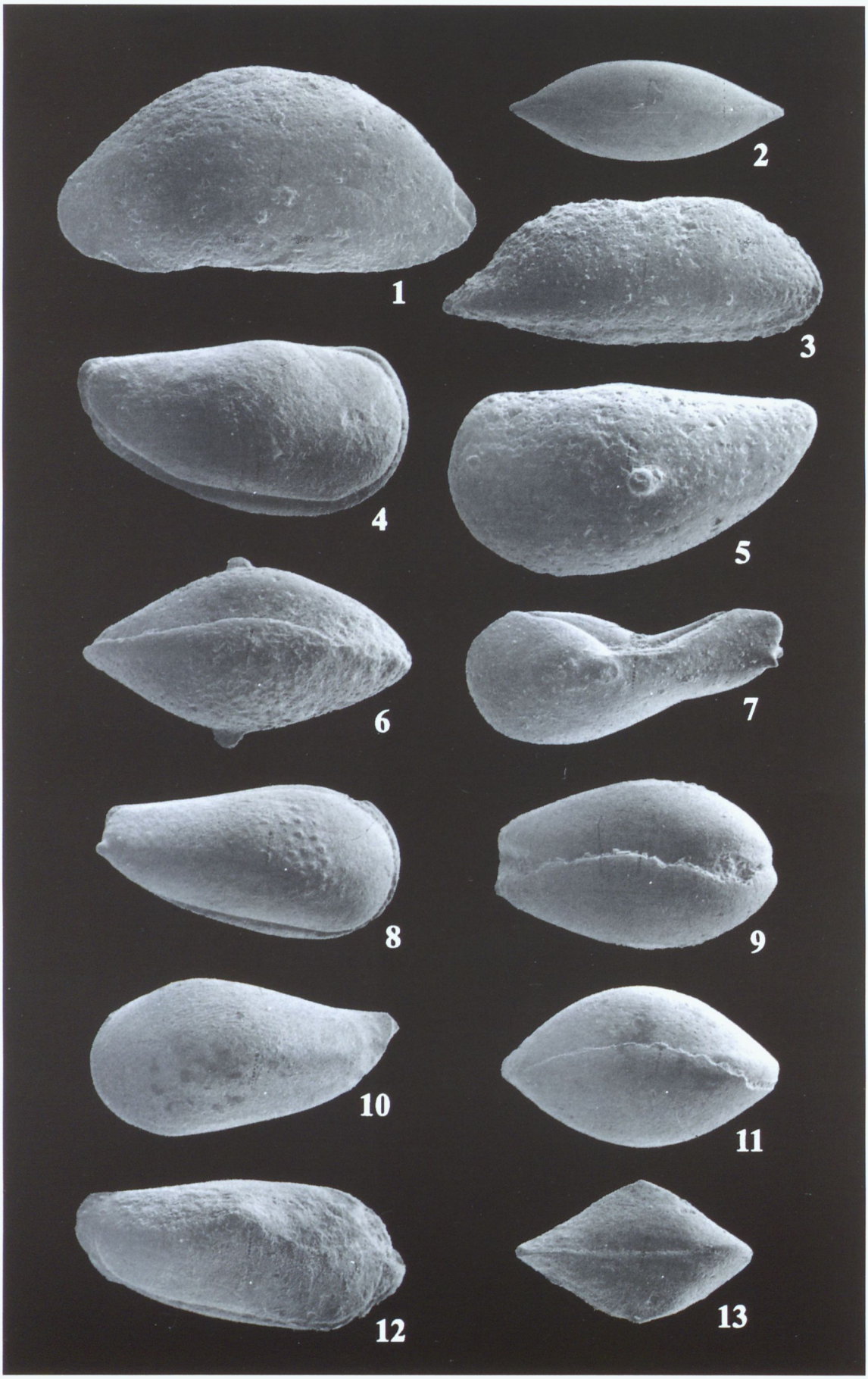
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Plate 26

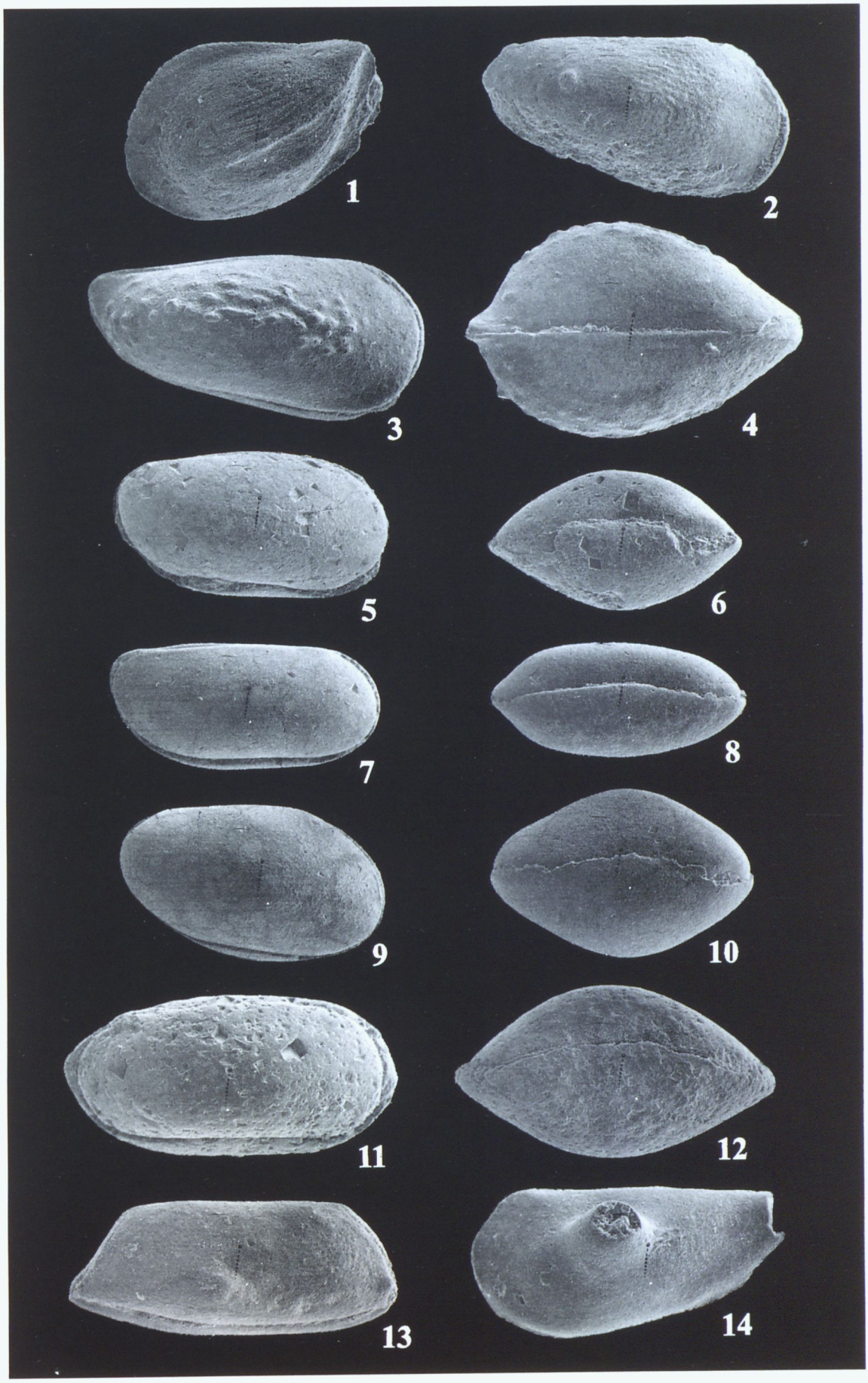


Figure 1. *Duplicristatia asymmetrica* Schallreuter, 1978.
Posteriorly damaged carapace Os 3649, left view, ×88. Puhmu core, depth 33.6 m. Porkuni Stage.

Figure 2. *Steusloffina*? sp. 1.
Carapace Os 3637, right view, ×63. Puhmu core, depth 47.8 m. Pirgu Stage.

Figures 3–4. *Steusloffina*? sp. 3.
3 — carapace Os 3640, right view, ×63. Puhmu core, depth 90.7 m. Vormsi Stage.
4 — carapace Os 3641, dorsal view, ×63. Puhmu core, depth 90.7 m. Vormsi Stage.

Figures 5–6. *Medianella aequa* (Stumbur, 1956).
5 — juvenile carapace Os 3642, right view, ×45. Siuge quarry. Porkuni Stage, Tõrevere Member.
6 — juvenile carapace Os 3643, ventral view, ×45. Puhmu core, depth 33.6 m. Porkuni Stage.

Figures 7–8. *Medianella longa* (Stumbur, 1956).
7 — carapace Os 3644, right view, ×30. Siuge quarry. Porkuni Stage, Tõrevere Member.
8 — carapace Os 3645, ventral view, ×30. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figures 9–10. *Medianella intecta* (Stumbur, 1956).
9 — carapace Os 3646, right view, ×30. Siuge quarry. Porkuni Stage, Tõrevere Member.
10 — carapace Os 3647, ventral view, ×30. Siuge quarry. Porkuni stage, Tõrevere Member.

Figures 11–12. *Medianella blidenensis* (Gailīte, 1975).
11 — carapace Os 2936, right view, ×45. Moe quarry. Pirgu Stage.
12 — carapace Os 2937, ventral view, ×45. Moe quarry. Pirgu Stage.

Figure 13. *Kroemmelbeinia spina* Schallreuter, 1969.
Juvenile carapace Os 3648, right view, ×63. Porkuni quarry. Porkuni Stage.

Figure 14. *Crucicornina* sp.
Left valve Os 3650, lateral view, ×88. Puhmu core, depth 90.7 m. Vormsi Stage.

Plate 27

Figures 1–5. *Microcheilinella lubrica* (Stumbur, 1956).

1 — carapace Os 3651, right view, ×63. Paluküla quarry, depth 2.40 m. Vormsi Stage.

2 — carapace Os 3652, right view, ×63. Siuge quarry. Porkuni Stage, Tõrevere Member.

3 — carapace Os 3653, ventral view, ×63. Siuge quarry. Porkuni Stage, Tõrevere Member.

4 — carapace Os 3654, ventral view, ×63. Siuge quarry. Porkuni Stage, Tõrevere Member.

5 — carapace Os 3655, ventral view, ×63. Siuge quarry. Porkuni Stage, Tõrevere Member.

Figures 6–7. *Microcheilinella rozhdestvenskaja* Neckaja, 1966.

Carapace Os 3656, right lateral and lateroventral view, ×63. Laeva-18 core, depth 173.5 m. Lowermost Silurian, Juuru Stage.

Figures 8–9. *Microcheilinella dagoensis* sp. n.

8 — holotype, carapace Os 2930, right view, ×45. Orjaku core, depth 52.55 m. Pirgu Stage.

9 — carapace Os 2931, dorsal view, ×45. Orjaku core, depth 52.55 m. Pirgu Stage.

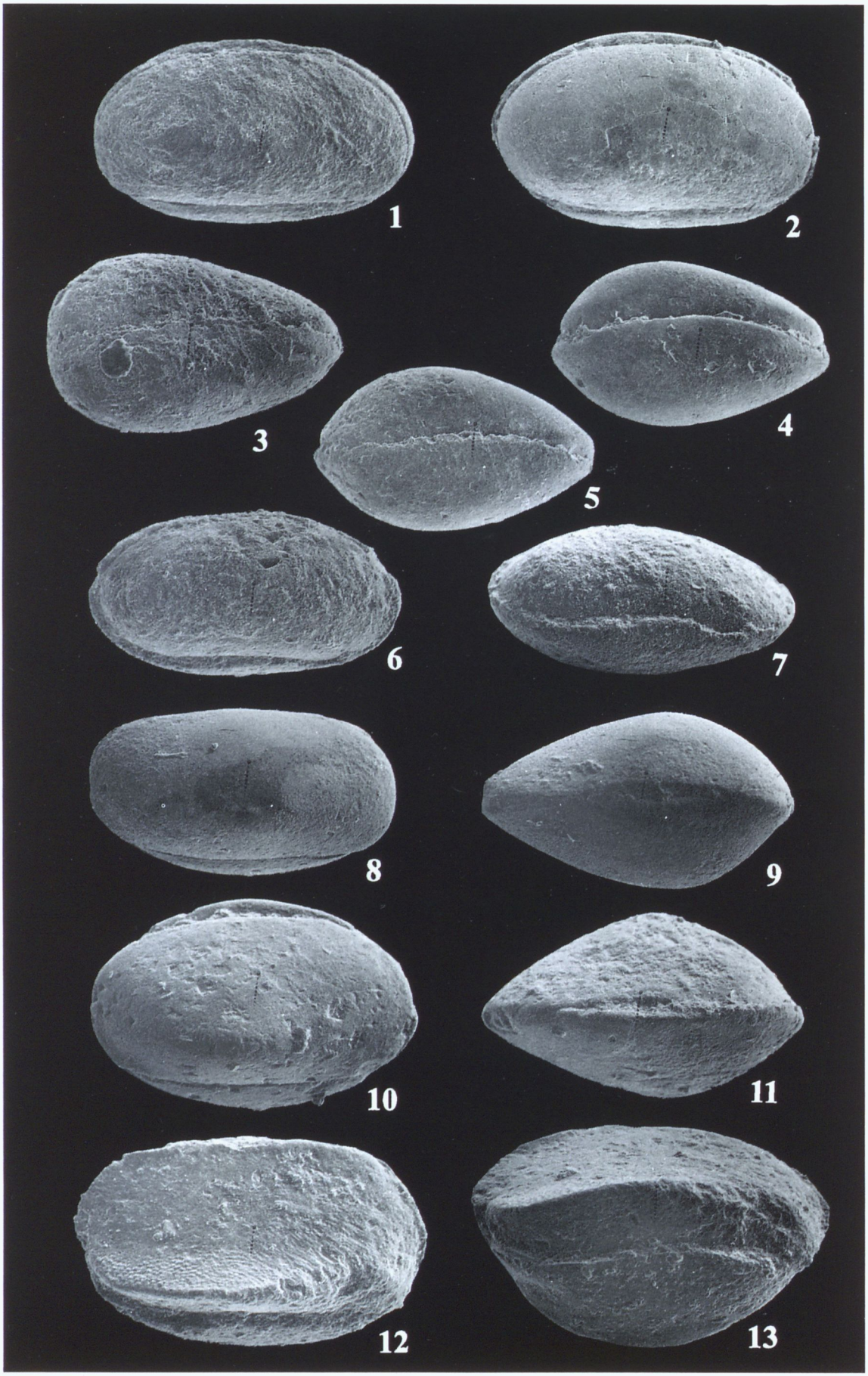
Figures 10–11. *Microcheilinella pirguensis* sp. n.

10 — holotype, carapace Os 2927, right view, ×63. Orjaku core, depth 56.85 m. Pirgu Stage.

11 — carapace Os 2928, dorsal view, ×63. Orjaku core, depth 56.85 m. Pirgu Stage.

Figures 12–13. *Trianguloschmidtella triangulata* Sarv, 1963.

Carapace Os 3657, right lateral and lateroventral view, ×63. Orjaku core, depth 134.7 m. Keila Stage.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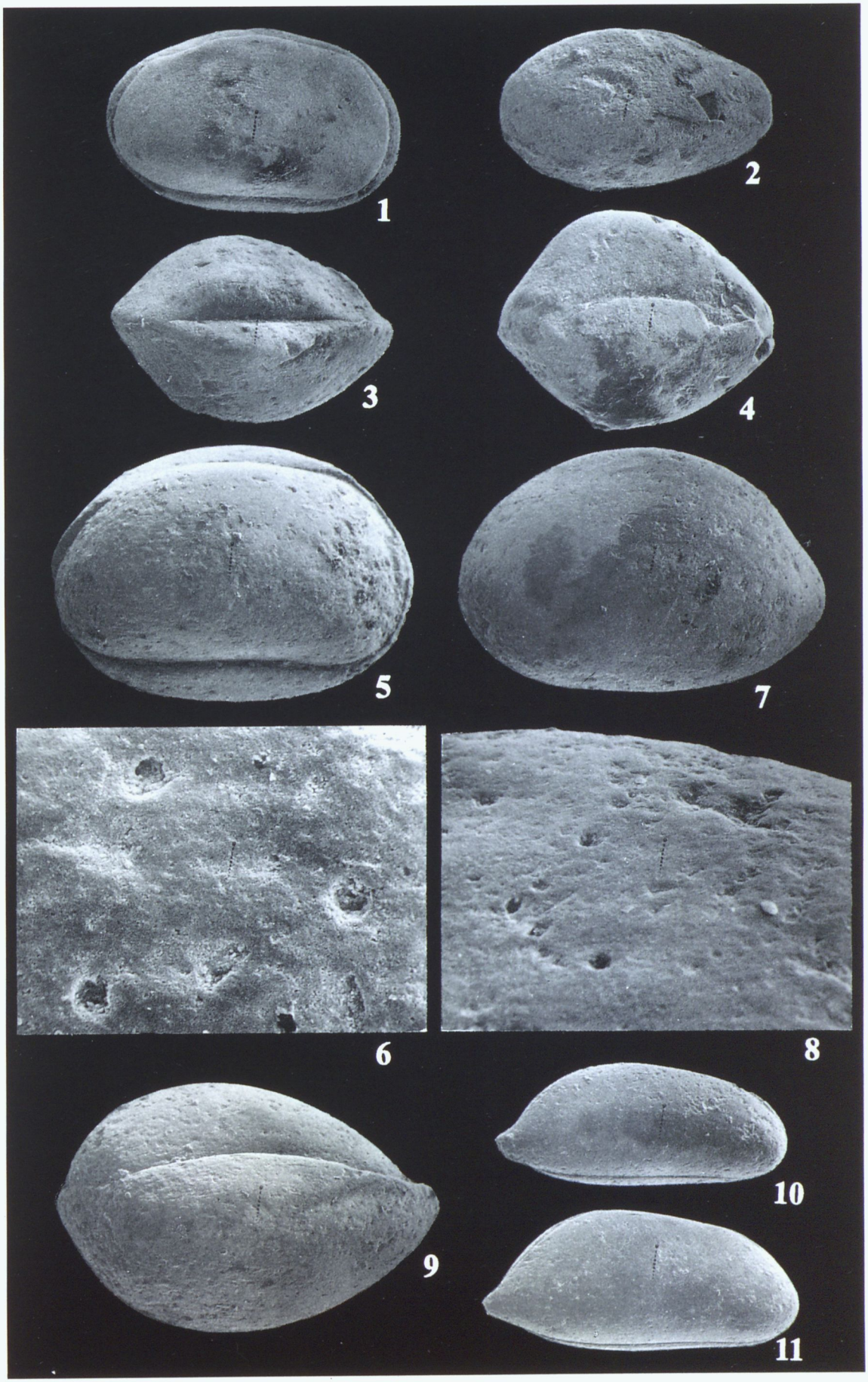


Figures 1–4. *Daleiella admiranda* (Sidaravičiene, in coll.).

1 — holotype, carapace Os 3167, right view, ×63. Paekna quarry, depth 2.24–2.31 m. Rakvere Stage.

2 — carapace Os 3189, left view, ×63. Vinni core, depth 31.7 m. Rakvere Stage.

3 — carapace Os 3188, dorsal view, ×63. Vinni core, depth 31.7 m. Rakvere Stage.

4 — carapace Os 3187, ventral view, ×63. Vinni core, depth 31.7 m. Rakvere Stage.

Figures 5–9. *Daleiella rotundata* sp. n.

5–6 — holotype, carapace Os 3168, right view (×63) and detail of the lateral surface (×630). Pärnu core, depth 243.6 m. Pirgu Stage.

7–8 — left valve Os 3190, lateral view (×63) and detail of the lateral surface (×470). Pärnu core, depth 243.6 m. Pirgu Stage.

9 — carapace Os 3193, ventral view, ×63. Pärnu core, depth 243.6 m. Pirgu Stage.

Figure 10. *Krausella calvini* (Kay).

Right view of a carapace, ×30. North America, Oklahoma, Rock Crossing of Hickory Creek. Ordovician, Bromide Formation, Pooleville Member.

Figure 11. *Krausella* sp.

Right view of a carapace, ×30. North America, Oklahoma, Rock Crossing. Ordovician, Simpson Group, Mohawkian Stage.

Plate 29

Figures 1–3. *Krausella* sp. n.
1–2 — carapace Os 3658, right view (ventral area damaged, ×30) and posteroventral part of the right valve (×335). Haapsalu-203 core, depth 37.4 m. Pirgu Stage.
3 — juvenile carapace Os 3659, right view, ×30. Förby core, depth 21.7 m. Vormsi Stage.

Figures 4–7. *Reversocypris*? *nabalaensis* sp. n.
4–5 — holotype, carapace Os 3114, left lateral and lateroventral view, ×30. Puhmu core, depth 93.9 m. Nabala Stage.
6–7 — juvenile carapace Os 3115, right and anterior view, ×30. Puhmu core, depth 93.9 m. Nabala Stage.

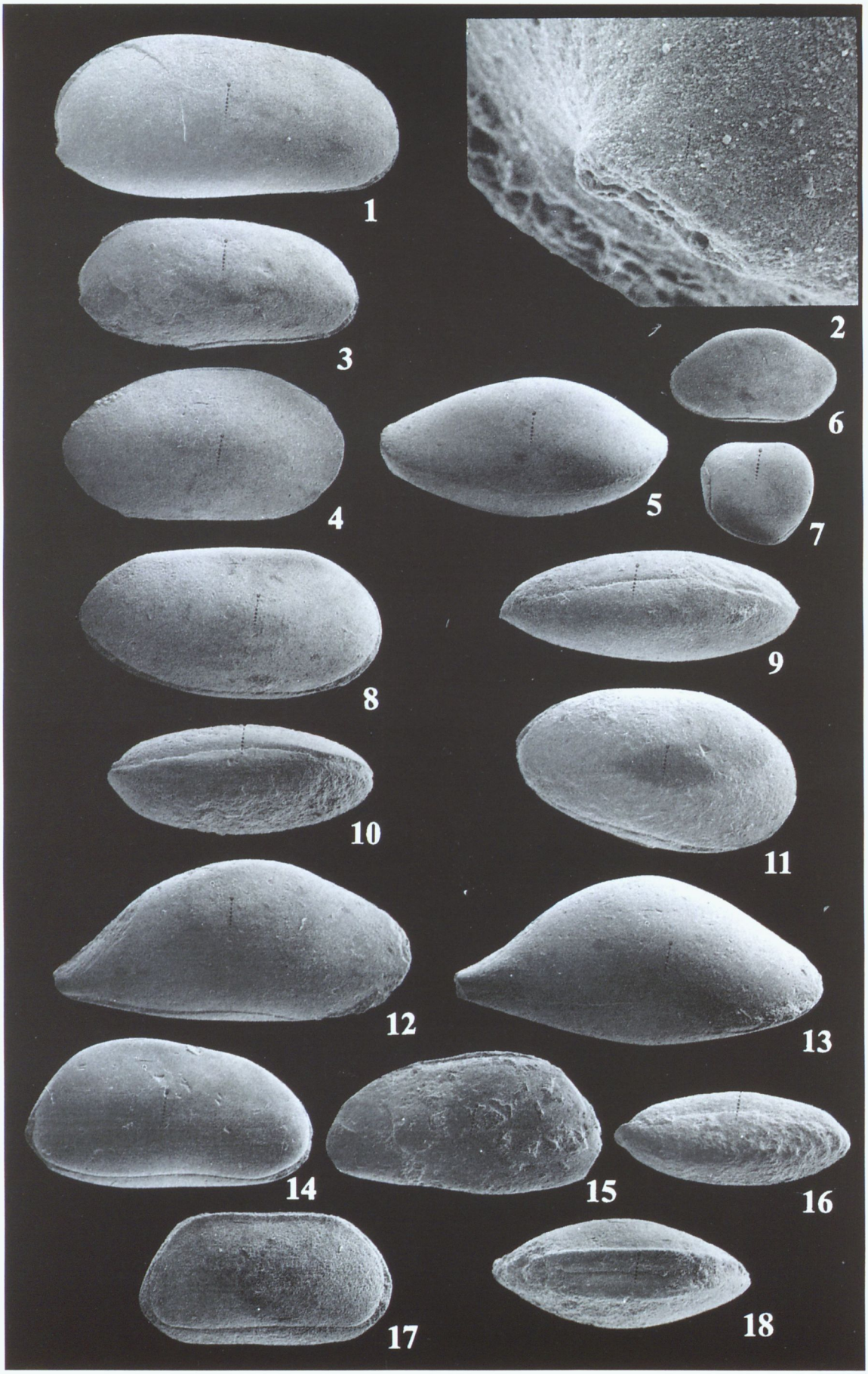
Figures 8–9. *Pseudorayella concinna* Neckaja, 1960.
8 — carapace Os 3002, right view, ×63. Piilse riverside section. Rakvere Stage.
9 — carapace Os 3003, ventral view, ×63. Vinni core, depth 27.2 m. Rakvere Stage.

Figures 10–11. *Pseudorayella kaufmanni* Schallreuter, 1975.
10 — carapace Os 3661, ventral view, ×45. Puhmu core, depth 47.8 m. Pirgu Stage.
11 — carapace Os 3660, right view, ×45. Iida carst cave. Porkuni Stage, Siuge Member.

Figures 12–13. *Cadmea* sp.
Carapace Os 2977, right lateral and ventrolateral view, ×30. Kohila temporary exposure (Kohila-2). Vormsi Stage.

Figures 14–16. *Krauselloides peregrinus* gen. et sp. n.
14 — holotype, carapace Os 3094, right view, ×45. Vinni core, depth 43.25 m. Oandu Stage.
15 — juvenile carapace Os 3664, left view, ×45. Tõrremägi trench. Oandu Stage.
16 — juvenile carapace Os 3665, ventral view, ×45. Tõrremägi trench. Oandu stage.

Figures 17–18. *Krauselloides*? sp. n.
17 — carapace Os 2983, right view, ×63. Paluküla quarry, depth 2.27 m. Vormsi Stage.
18 — carapace Os 3666, dorsal view, ×63. Paluküla quarry, depth 1.69 m. Vormsi Stage.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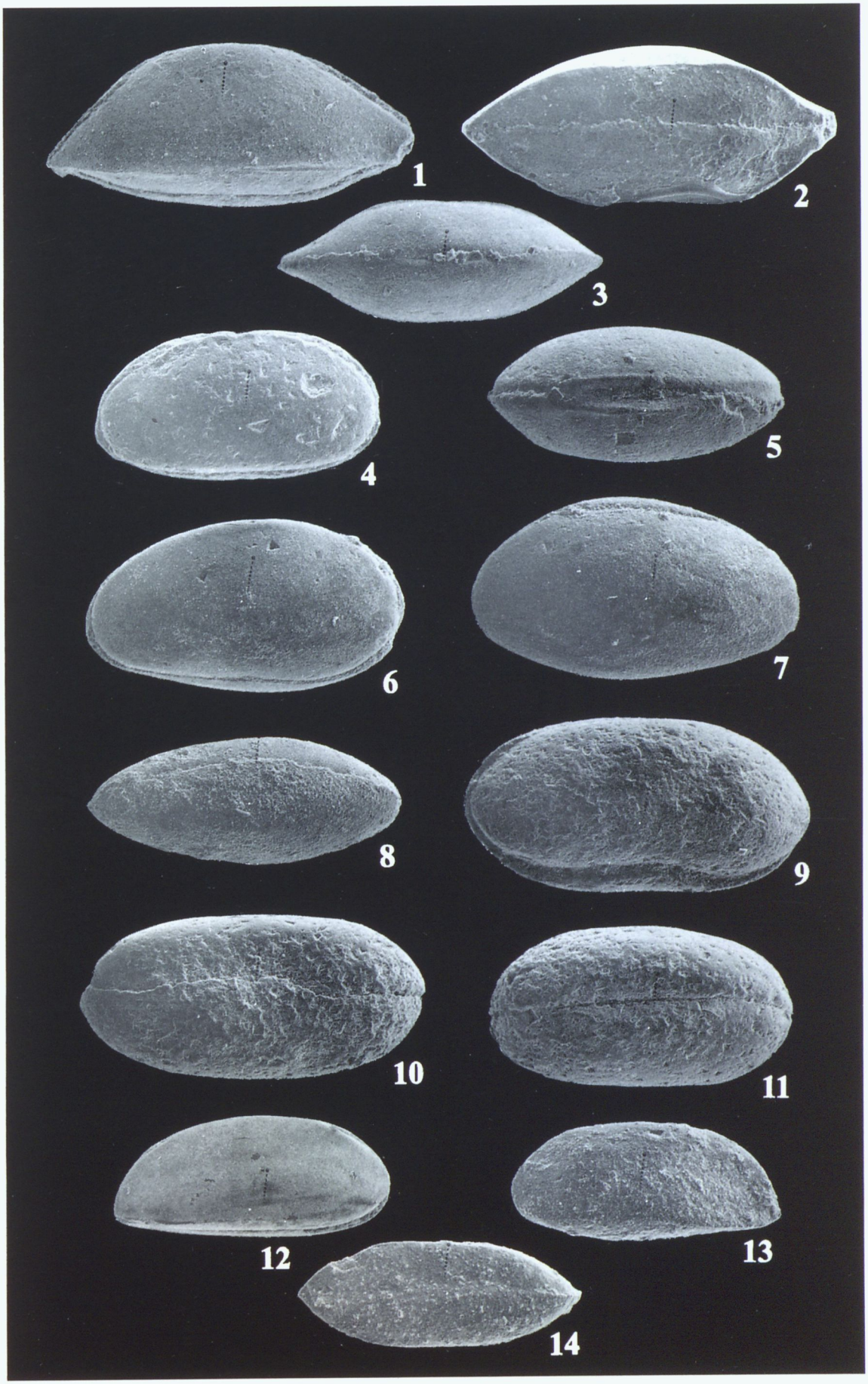

Figures 1–3. *Revisylthere breviclaustrum* (Schallreuter, 1968).
1–2 — carapace Os 3662, right lateral and lateroventral view, ×88. Kaugatuma core, depth 353.9 m. Pirgu Stage.
3 — juvenile carapace Os 3663, dorsal view, ×88. Kaugatuma core, depth 353.9 m. Pirgu Stage.

Figures 4–5. *Dagoerayella sulcata* gen. et sp. n.
4 — holotype, carapace Os 2978, right view, ×63. Orjaku core, depth 56.85 m. Pirgu Stage.
5 — carapace Os 3670, dorsal view, ×63. Puhmu core, depth 33.6 m. Porkuni Stage.

Figures 6–8. *Dagoerayella elongata* (Meidla, 1983).
6 — carapace Os 3667, right view, ×88. Förby core, depth 14.3 m. Pirgu Stage.
7 — carapace Os 3668, left view, ×88. Förby core, depth 14.3 m. Pirgu Stage.
8 — carapace Os 3669, ventral view, ×88. Förby core, depth 14.3 m. Pirgu Stage.

Figures 9–11. *Rectella romboformis* Neckaja, 1966.
9 — carapace Os 3677, right view, ×63. Moe quarry. Pirgu Stage.
10 — carapace Os 3678, ventral view, ×63. Moe quarry. Pirgu Stage.
11 — carapace Os 3679, dorsal view, ×63. Moe quarry. Pirgu Stage.

Figures 12–14. *Estoniosylthere longata* gen. et sp. n.
12 — holotype, carapace Os 3201, right view, ×63. Vajangu core, depth 125.5 m. Rakvere Stage.
13 — juvenile carapace Os 3672, left view, ×63. Puhmu core, depth 136.55 m. Rakvere Stage.
14 — carapace Os 3673, ventral view, ×63. Puhmu core, depth 136.55 m. Rakvere Stage.

Plate 31

Figures 1–3. *Rectella carinaspinata* Schallreuter, 1972.
1 — carapace Os 3680, right view, ×63. Moe excavation. Vormsi Stage.
2 — juvenile carapace Os 2954, ventral view, ×63. Moe quarry. Pirgu Stage.
3 — carapace Os 3681, dorsal view, ×63. Paope quarry. Vormsi Stage.

Figures 4–5. *Rectella sturiensis* Gailīte, 1975.
Carapace Os 3682, right lateral and lateroventral view, ×63. Taagepera core, depth 419.0 m. Porkuni Stage.

Figures 6–8. *Rectella explanata* sp. n.
6 — holotype, carapace Os 3170, right view, ×88. Laeva-18 core, depth 198.65 m. Pirgu Stage.
7 — left valve Os 3194, lateral view, ×88. Laeva-18 core, depth 198.65 m. Pirgu Stage.
8 — right valve Os 3195, internal view, ×88. Laeva-18 core, depth 198.65 m. Pirgu Stage.

Figures 9–11. *Rectella composita* sp. n.
9 — holotype, carapace Os 3196, right view, ×63. Taagepera core, depth 420.9 m. Porkuni Stage.
10 — carapace Os 3197, ventral view, ×63. Taagepera core, depth 420.9 m. Porkuni Stage.
11 — carapace Os 3199, dorsal view, ×63. Aidu core, depth 107.2 m. Porkuni Stage.

Figures 12–14. *Rectella nais* Neckaja, 1958.
12 — carapace Os 3676, ventral view, ×63. Moe quarry. Pirgu Stage.
13 — carapace Os 3674, right view, ×63. Paluküla quarry, depth 2.27 m. Vormsi Stage.
14 — carapace Os 3675, dorsal view. ×63. Paluküla quarry, depth 2.27 m. Vormsi Stage.


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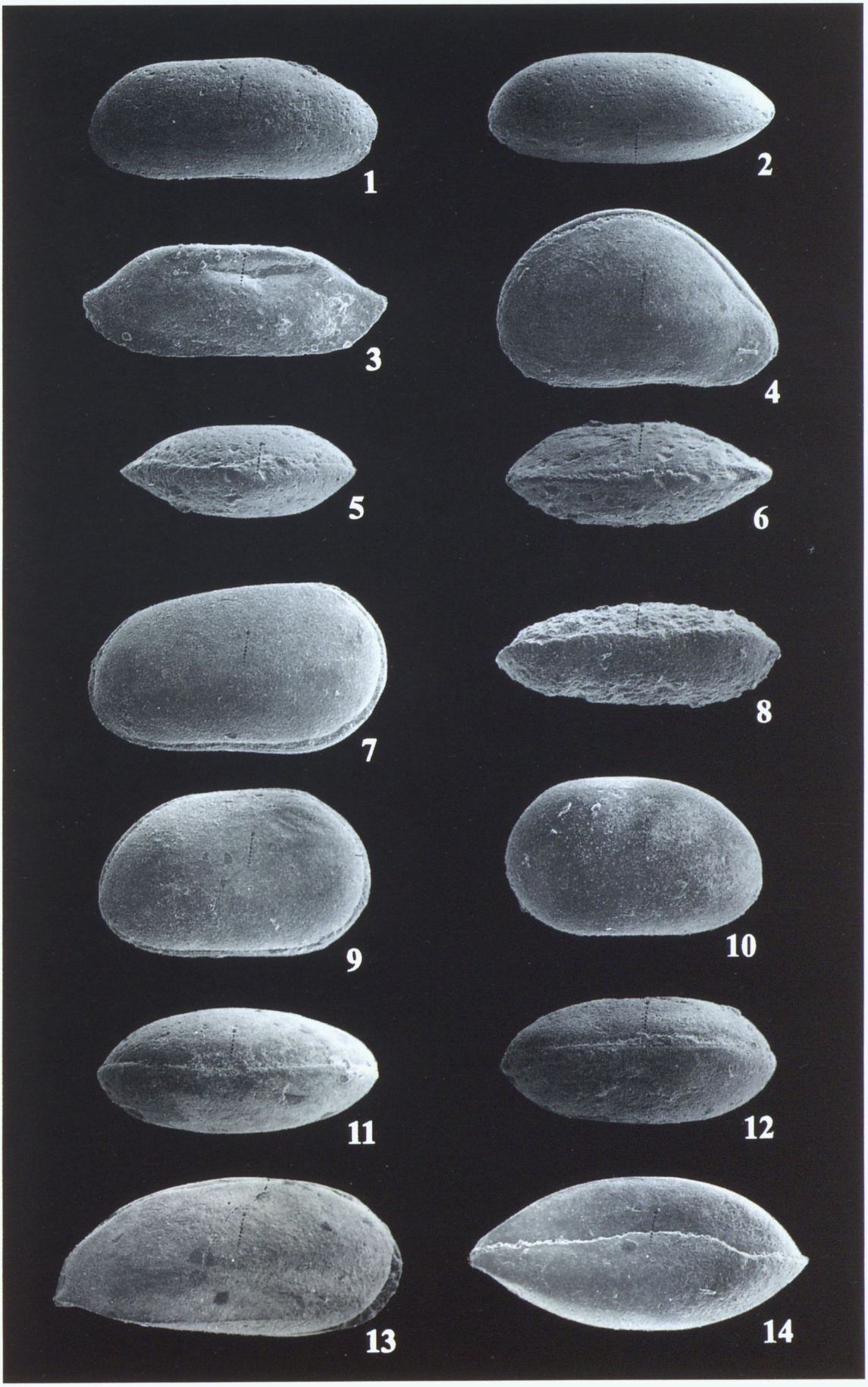
Plate 32



Figures 1–2. *Rectella*? *proposita* Abushik et Sarv, 1983.
Carapace Os 3683, right lateral and lateroventral view, ×45. Prillimäe exposure. Pirgu Stage.

Figure 3. *Bairdia*? *iocus* Schallreuter, 1987.
Deformed carapace Os 3684, left view, ×63. Kaugatuma core, depth 345.38 m. Porkuni Stage.

Figures 4–6. *Adamczakia holosolenica* Schallreuter, 1986.
4 — carapace Os 2959, right view, ×63. Orjaku core, depth 47.90 m. Pirgu Stage.
5 — carapace Os 2960, dorsal view, ×63. Orjaku core, depth 58.30 m. Pirgu Stage.
6 — carapace Os 2961, ventral view, ×63. Orjaku core, depth 56.85 m. Pirgu Stage.

Figures 7–8. *Brevantia antis* gen. et sp. n.
7 — holotype, carapace Os 3185, left view, ×88. Vinni core, depth 36.8 m. Rakvere Stage.
8 — juvenile carapace Os 3685, ventral view, ×88. Rägavere quarry. Rakvere Stage.

Figures 9–12. *Brevantia brevis* gen. et sp. n.
9 — holotype, carapace Os 3009, left view, ×88. Piilse riverside section. Rakvere Stage.
10 — carapace Os 3078, right view, ×88. Vinni core, depth 38.5 m. Rakvere Stage.
11 — carapace Os 3079, dorsal view, ×88. Vinni core, depth 38.5 m. Rakvere Stage.
12 — carapace Os 3080, ventral view, ×88. Vinni core, depth 38.5 m. Rakvere Stage.

Figures 13–14. *Estoniosylthere cristata* gen. et sp. n.
13 — holotype, carapace Os 2982, right view, ×88. Orjaku core, depth 76.8 m. Pirgu Stage.
14 — carapace Os 3671, ventral view, ×88. Paope quarry, depth 1.20 m. Vormsi Stage.

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