

Revision of the concept of the orthide brachiopod *Cyrtonotella* in the Middle Ordovician of the East Baltic

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Abstract. The two lowermost Darriwilian (Middle Ordovician) brachiopod species that were previously included in the genus *Cyrtonotella* are re-studied and compared with the type species *Cyrtonotella semicircularis* (Eichwald) from the St Petersburg Region. Based on the new data the classification of the important group of orthids, widely distributed in the Sandbian Kukruse to Keila regional stages in the East Baltic, is improved. The lower Darriwilian specimens, previously considered to be *Cyrtonotella semicircularis*, are ascribed to the genus *Leoniorthis* as the new species *Leoniorthis rubeli*, which occurs in the St Petersburg Region and in northern Estonia. The other species *Cyrtonotella pakriensis* Rubel is included in the new genus *Rogorthis*, which is restricted to the sandy limestones of the Pakri Formation (Kunda Stage) in northern Estonia. The type species of the genus *Cyrtonotella*, *C. semicircularis* (Eichwald), probably occurs in the upper Darriwilian Aseri Regional Stage in the St Petersburg Region, and is the first appearance of that genus.

Key words: Orthoidean brachiopods, taxonomy, Darriwilian, Ordovician, East Baltic.

INTRODUCTION

Wysogórski (1900) described the evolutionary trends of the *Orthis calligramma* group and differentiated the concavo-convex brachiopods as a separate lineage with the species *Orthis moneta* Eichwald, 1861, *O. moneta* mut. Wysogórski, 1900, *O. actonia* Sowerby 1839, typ. and *O. actonia* var. Wysogórski, 1900. These species were later included in the genus *Nicolella* (Öpik 1930; Alikhova 1953; Williams in Whittington & Williams 1955; Oraspõld 1959). This lineage has a lateral branch with two species *Orthis semicircularis* (Eichwald, 1829) and an informally identified transitional species *O. semicircularis* mut. Both species differ from *O. moneta* in their fascicostellate ornamentation. The shells of *O. semicircularis* mut. Wysogórski are much smaller than the specimens of *O. semicircularis* typ. (*Terebratula semicircularis* of Eichwald 1829), which occurs stratigraphically at a somewhat higher level.

Schuchert & Cooper (1931) formally introduced the genus *Cyrtonotella* and described it in detail in 1932. This genus contains the Ordovician brachiopods from the East Baltic, which differ from *Orthis* in ‘the character of the ornamentation and the peculiar profile of the shell’ (Schuchert & Cooper 1932, p. 77). *Terebratula semicircularis* Eichwald, 1829 was identified as the type species of the new genus. In addition to the type species, Schuchert & Cooper (1932) included in *Cyrtonotella*

only *Orthis concava* Schmidt (Wysogórski 1900, pl. 8; Alikhova et al. 1959) from the Upper Ordovician Kukruse Stage. However, in plate 2, fig. 14 they figured also a specimen named as *Cyrtonotella* sp. aff. *C. frechi* (Wysogórski). The interpretation of this specimen from the *Echinosphaerites*-limestone (Aseri Stage; Middle Ordovician), is unclear. *Cyrtonotella frechi* itself occurs in much younger strata (Wysogórski 1900; Öpik 1930). Schuchert & Cooper (1932) did not mention any other species described by Öpik (1930) and included by him later (1934) into the genus *Cyrtonotella*, although they were familiar with Öpik’s study since they accepted the genus *Glossorthis* established in his former publication.

Cyrtonotella semicircularis occurs in the ‘Orthoceratite’ Limestone (Eichwald 1861, p. 237; Bock 1869, p. 114). In the Baltic–Ladoga Klint area, most of this limestone is known as the ‘Vaginaten-’ and ‘Echinosphaeriteskalk’ (Schmidt 1958, 1881) and corresponds to the Kunda and Aseri regional stages (Rõõmusoks et al. 1997). However, Schuchert & Cooper (1932) and several later authors (Lesnikova 1949; Alikhova 1951, 1953; Williams & Wright 1965) have recognized *C. semicircularis* from the Middle Ordovician *Echinosphaerites* Limestone, which following Orviku (1940) and Rõõmusoks (1970), belongs to the Aseri Stage.

Lesnikova (1949), who redescribed *C. semicircularis*, figured two new specimens (pl. 32, figs 5 and 6) from the *Echinosphaerites*-limestone of the Leningrad (presently

St Petersburg) Region, but without referring to the exact locality. Unfortunately, the collection of brachiopods studied by Lesnikova seems to be lost (T. Modzalevskaya, pers. comm. 2008).

In the monographic study on the Early and Middle Ordovician brachiopods of the Baltic region Rubel (1961) selected the types (holo- or neotypes) for all species described by him. He designated a neotype also for the species *Cyrtonotella semicircularis* (Eichwald). That is a small orthide specimen (GIT 125-93 in Rubel 1961, pl. 17, figs 1–5) from the Kunda Regional Stage of the Putilovo locality (Popov et al. 2005) in the St Petersburg Region. Unfortunately the type and other Darriwilian specimens of *Cyrtonotella semicircularis* noted by Rubel differ essentially in their small size and external ornamentation from Eichwald's *Terebratula semicircularis* described also by Murchison et al. (1845). The neotype, which does not correspond to the original description and published image of *Cyrtonotella semicircularis*, must be regarded as invalid (see ICZN 1999, Article 75.3.5).

The short description of *Terebratula semicircularis* by Eichwald (1829) includes measurements of the shell: width 8.5 lin. (the old measure 'line' or 'liniya' corresponds to 1/10 or 1/12 of the inch), length 7 lin., thickness 3 lin. According to these measurements, the specimens of *C. semicircularis* are rather large and more than 20 mm wide, about 16 mm long and 7 mm thick. A similar size for *C. semicircularis* was mentioned by Murchison et al. (1845, p. 212).

One reason for the later misidentification of *Cyrtonotella semicircularis* is the erroneous magnification (5×) of the specimen figured by Schuchert & Cooper (1932, pl. 4, figs 1, 4, 5 and 11) and later by Williams & Harper (2000, fig. 537, 4a–c). The figured specimen is less than 6 mm wide when calculating the shell size using this magnification. However, the specimen figured by Schuchert & Cooper (1931; YPM IP 000169A, named as hypotype) is 18.8 mm wide, the ventral valve is 16.9 mm long and shell thickness is 7.5 mm (Fig. 1A). One other specimen in the same collection is even 24.9 mm wide. Of similar size are the specimens from Popovka in Naturhistoriska Riksmuseet, Stockholm (RM Br. 131691, Br. 74880, Br. 74374, Br. 74375) (Fig. 1B). Popovka is a locality known to Eichwald (1861) where he recorded several brachiopod species, including *C. semicircularis*. The taxonomy of the genus *Cyrtonotella* requires future clarification and the type species would benefit from an improved description based on specimens housed in different museums. The aim of the present study is to explain the problem with the unsuccessful designation of the neotype for the type species of the genus *Cyrtonotella* and to describe the species which clearly do not belong to that genus.

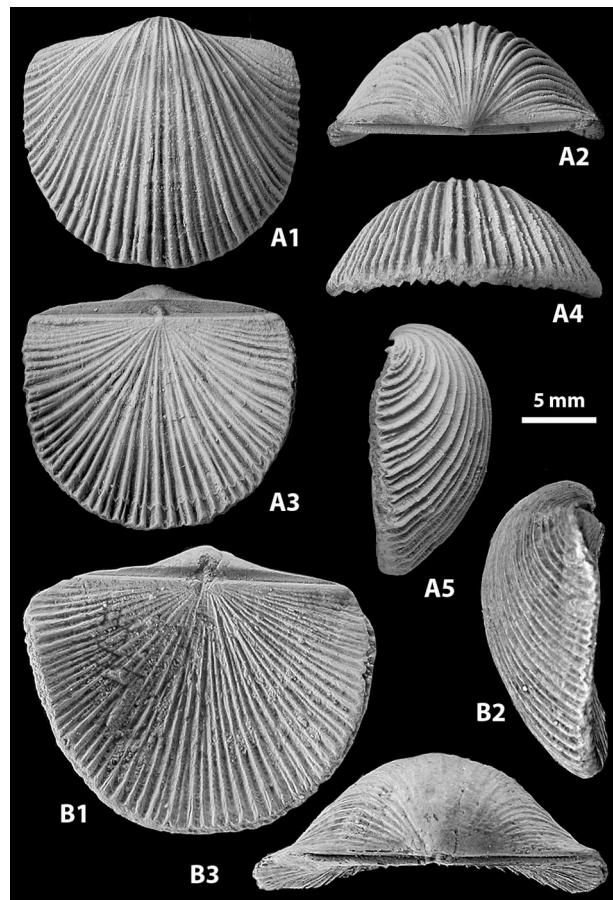


Fig. 1. *Cyrtonotella semicircularis* (Eichwald, 1829), Popovka, St Petersburg Region (see Popov et al. 2005), *Echinosphaerites* Limestone, Aseri Regional Stage, Darriwilian. **A1–A5**, shell YPM IP 000169A (Schuchert & Cooper 1932, pl. 4, figs 1, 4, 5, 11; Williams & Harper 2000, fig. 537, 4a–c), ventral, posterior, dorsal, anterior and lateral views. **B1–B3**, shell RM Br 131691, dorsal, lateral and posterior views. Scale bar corresponds to 5 mm.

The early Darriwilian specimens of '*semicircularis*' with a shell width of 10 to 16 mm described by Rubel (1961) are most similar to Wysogórski's species *O. semicircularis* mut. Wysogórski (1900, fig. 8). Alikhova (1969, p. 22) noted that the brachiopods, described by Rubel (1961) from the Kunda Stage (lowermost Darriwilian) within the genus *Cyrtonotella*, should be excluded from that genus because they essentially differ from the type and all other species of that genus (Öpik 1930; Alikhova 1953). In the current study the specimens of *C. semicircularis* (Wysogórski) *sensu* Rubel are included in the genus *Leoniorthis* as a new species *L. rubeli* and the other species *Cyrtonotella pakriensis*, together with *Apheoorthis?* sp., to a new genus *Rogorthis*.

The studied brachiopods belong to the collections, housed at the Institute of Geology at Tallinn University

of Technology (institutional abbreviation GIT), Estonia, Yale Peabody Museum of Natural History, U.S.A. (YPM) and Naturhistoriska Riksmuseet, Stockholm, Sweden (RM).

SYSTEMATIC PALAEOLOGY

BRACHIOPODA

Order ORTHIDA Schuchert & Cooper, 1932

Superfamily ORTHOIDEA Woodward, 1852

Family ORTHIDAE Woodward, 1852

Genus *Leoniorthis* Egerquist, 2003

1961 *Cyrtonotella* Schuchert & Cooper, 1931; Rubel, p. 180.

2003 *Leoniorthis* gen. nov.; Egerquist, pp. 35, 36.

Type species. *Leoniorthis robusta* Egerquist, 2003, St Petersburg Region and northern Estonia, Billingen and Volkhov stages, uppermost Lower and lower Middle Ordovician.

Leoniorthis rubeli sp. nov.

Figure 2A–D, Table 1

?1900 *Orthis semicircularis* Eichwald, mut.; Wysogórski, pl. 8.

1961 *Cyrtonotella semicircularis* (Eichwald); Rubel, pp. 180–182, pl. 42, figs 1–9 (non *Terebratula semicircularis* Eichwald, 1829).

Derivation of name. In memory of the brachiopod specialist Madis Rubel, who studied Ordovician and Silurian brachiopods of the East Baltic Region.

Holotype. GIT 125-93 (the old number Br 2666a), conjoined valves; Fig. 2A1–A5; from Putilovo quarry, St Petersburg Region, middle part of the Kunda Stage. The same specimen was designated as the neotype of the species *Cyrtonotella semicircularis* (Eichwald) by Rubel (1961, pl. 17, figs 1–5).

Diagnosis. Small orthides with suboval shell, 0.8–0.9 as long as wide, with plano- to weakly concave dorsal

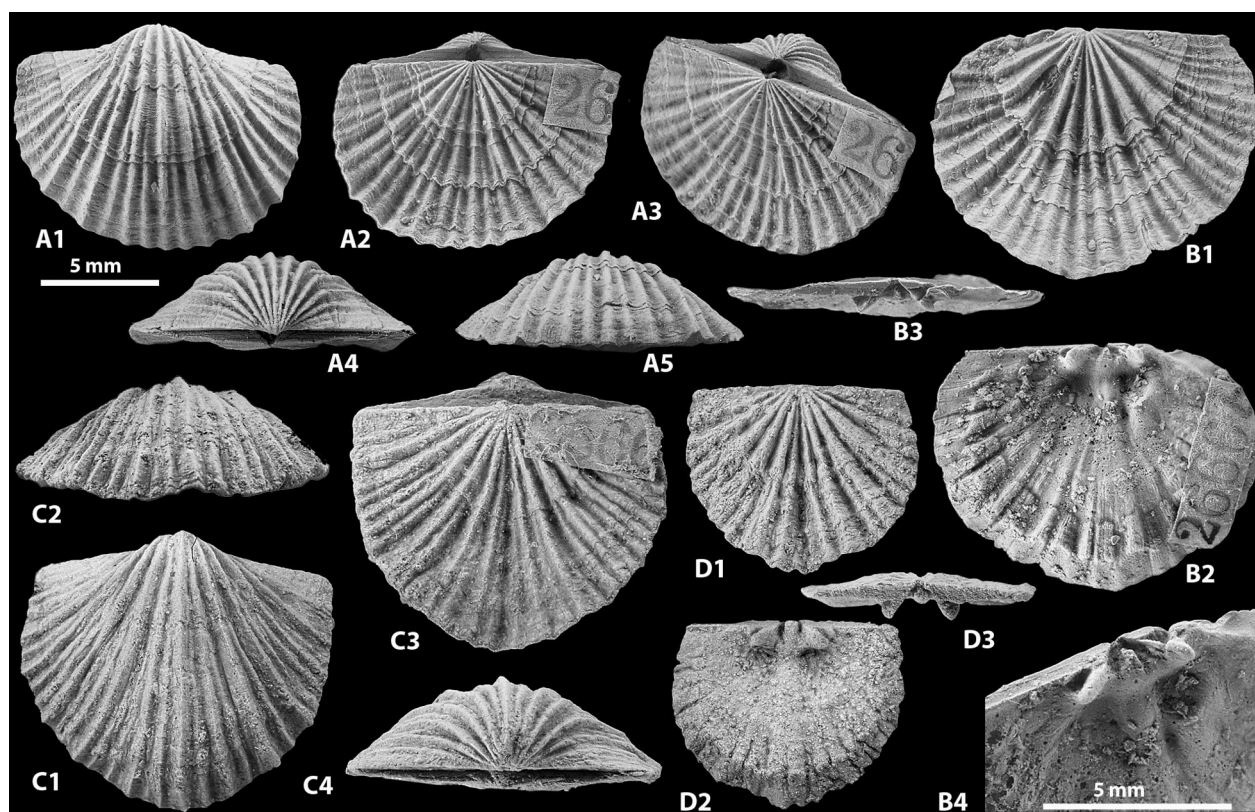


Fig. 2. *Leoniorthis rubeli* sp. nov., middle part of the Kunda Stage (lowermost Darriwilian). **A1–A5**, conjoined valves, holotype, GIT 125-93 (old number Br 2666a), (Rubel 1961, pl. 17, figs 1–5), ventral, dorsal, dorso-lateral, posterior and anterior views. St Petersburg Region, Putilovo old quarry (for location see Popov et al. 2005). **B1–B4**, dorsal valve GIT 125-94 (Br 2666b), (Rubel 1961, pl. 17, figs 6, 7), exterior, interior, posterior and antero-lateral views. St Petersburg District, Putilovo old quarry. On the exterior view the left part of the interarea and cardinal angle have been recovered after an injury during the lifetime. **C1–C4**, conjoined valves, GIT 125-96 (Br 2566), ventral, anterior, dorsal and posterior views. Northeastern Estonia, Saka. **D1–D3**, dorsal valve GIT 125-95 (Br 2567), interior, exterior and posterior views. Northeastern Estonia, Saka. Scale bar corresponds to 5 mm.

Table 1. Dimensions (in millimetres) of *Leoniorthis rubeli* sp. nov. Ratios of measurements in brackets

Specimen, in brackets the number in Rubel (1961)	Ventral (Lv)/dorsal (Ld) valve length	Width (W)	Ratio Lv: W	Ratio Ld: W	Length of hinge line (Lhl) (Lhl: W)	Thickness of shell (T) (T: Lv)	Number of costae at umbo/along commissure
GIT 125-93 (Br 2666a), shell; holotype	9.8/8.6	12.4	0.79	0.70	11.5 (0.93)	4.4 (0.45)	12/24
GIT 125-94 (Br 2666b), dorsal valve	–/10.9	14.4	–	0.76	?	–	10/30
GIT 125-95 (Br 2567), dorsal valve	–/9.5	10.4	–	0.91	9.4 (0.90)	–	10/26
GIT 125-96, (Br 2566), shell	12.3/11.0	13.9	0.88	0.80	13.0 (0.94)	5.0 (0.41)	9/28
GIT 125-100 (Br 2562), incomplete shell	9.6/8.5	12.4	0.77	0.67	ca 10 (ca 0.81)	4.8 (0.50)	11/25
GIT 125-97 (Br 2565), compressed shell	12.1/10.9	15.9	0.76	0.73	13.5 (0.85)	4+	9/28

valve. Radial ornamentation fascicostellate, with two median primary costae on dorsal valve having up to eight second- and third-order costellae. Brachioophores widely divergent, cardinal process stout.

Description. Suboval plano- to concavo-convex, slightly sulcate shell with maximum width at the hinge line at earlier growth stages and at about mid-length in adult specimens. Cardinal extremities acute to obtuse; anterior commissure rectimarginate or weakly sulcate. Radial ornament fascicostellate, with 10–12 primary costae, increasing in number by bifurcation up to 25. The second- and third-order costellae form bundles, the two median costae on the dorsal valve have up to eight costellae, two of which bifurcate close to the umbo. Lateral bundles consist of 3–4 costae and costellae. Growth lines mark the allometric growth of the shell at later growth stages; filae, 7–10 in one mm, are well developed.

Ventral valve 0.8–0.9 as long as wide, moderately convex, with the maximum height at the mid-length. Interarea concave, 0.81–0.94 as wide as maximum shell width. Delthyrium triangular, open. Teeth small, with parallel dental plates. Muscle field is not defined anteriorly.

Dorsal valve almost flat, with weakly convex posterior and weakly sulcate anterior half. Interarea flat, anacline; notothyrium open, partly filled by the cardinal process. Brachioophores stout, divergent laterally and thickened by secondary shell material forming oblique dental sockets. Cardinal process stout or wedged, narrowing towards the umbo; notothyrial platform continues anteriorly as wide median ridge up to the thickened and crenulated anterior margin. Dorsal adductor muscle field weakly impressed, situated at the mid-valve.

Discussion. In size and external ornamentation the described species has some similarity to the specimen

figured by Wysogórski (1900, table 8) as the variety *Orthis semicircularis* mut. This similarity may have been a reason why initially (Rubel 1961) the brachiopods, described in this paper, were included in the genus *Cyrtonotella*. Wysogórski's *Orthis semicircularis* mut. is probably conspecific with the described species *Leoniorthis rubeli*.

The new species *Leoniorthis rubeli* differs from *Cyrtonotella semicircularis* and from all other Upper Ordovician species assigned to the genus *Cyrtonotella* in its essentially smaller size, fascicostellate radial ornament and the features of dorsal interior (the brachioophores are less divergent, the cardinal process is stout or wedged).

The species *Leoniorthis rubeli* differs from *Leoniorthis robusta* Egerquist, the type species of the genus, in being double the size (see Egerquist 2003, p. 34), a more transverse shell outline (ratios of ventral valve length to shell width up to 0.88 and 0.72, respectively), stronger convexity of the ventral valve and a well-developed notothyrial platform with the wedge-like cardinal process. Besides the differences in shell morphology, *L. rubeli* and *L. robusta* apparently occur in the rocks laid down in different environments. The majority of specimens of *L. robusta* are from the clayey mud mounds (Egerquist 2003; Tolmacheva et al. 2003). *Leoniorthis rubeli* occurs in lithologically different more or less glauconitic carbonates with marl or clay interlayers (Meidla 1997). However, some exceptional variation in shell form and ornamentation of *L. robusta* is considered as intraspecific (Egerquist 2003).

The genus *Leoniorthis* differs from the Early and Middle Ordovician orthid brachiopods *Paralenorthis*, *Orthambonites*, *Sulevorthis* and *Sivorthis* (see Egerquist 2003) in the characters of radial ornament. The species

of *Leoniorthis* have fascicostellate external ornamentation, but other mentioned orthids have costate and capillate ornamentation.

Material. Ten specimens; see the Estonian geocollection database, collection GIT 125 (<http://sarv.gi.ee/>).

Distribution. (See Rubel 1961). Lowermost Darriwilian; in the St Petersburg Region: the uppermost Volkhov, lower and middle parts of the Kunda Stage; in northern Estonia: the middle and upper parts of the Kunda Stage.

Genus *Rogorthis* gen. nov.
Figure 3

1961 *Cyrtonotella* Schuchert & Cooper; Rubel, p. 182.

Type species. *Cyrtonotella pakriensis* Rubel, 1961, from the calcareous sandstone of the Pakri Formation, middle part of the Kunda Stage in northern Estonia, Middle Ordovician, lowermost Darriwilian.

Derivation of name. From the historical Swedish name Rogö for the Island of Pakri in northwestern Estonia.

Diagnosis. Medium-sized orthide with planoconvex shell; ornament fascicostellate, with 12–14 coarse primary costae branching on anterior half of valves. Cardinal process stout on elevated notothyrial platform. Subparallel *vascula media* divergent anteriorly; thickened rim along interior margins of the valves.

Comparison. Brachiopods of the new genus show some similarity with the East Baltic Middle Ordovician genera *Orthambonites*, *Paralenorthis* and *Orthis* in shell outline, general features of radial ornamentation (coarse costae, occurrence of filae and capillae) and triangular anterior outline of the ventral muscle field. *Rogorthis* differs from the first two genera in a flat dorsal valve, rib bifurcation, stout cardinal process and the position of the *vascula media*. In *Orthambonites* the *vascula media* are parallel, whereas in *Paralenorthis* they are divergent immediately in front of the muscle field (Jaanusson & Bassett 1993). The new genus is most similar to *Orthis* in its plano-convex shell and the *vascula media*, which

are parallel in front of the muscle field and then diverging anteriorly. *Rogorthis* differs from *Orthis* in the small size of the shell, stout cardinal process and bifurcating ribs.

Occurrence. The middle and upper parts of the Kunda Stage, northern Estonia (lowermost Darriwilian).

Rogorthis pakriensis (Rubel, 1961)
Figure 3A–D, Table 2

1961 *Cyrtonotella pakriensis* sp. n.; Rubel, pp. 182, 183, pl. 18, figs 1–4.

1961 *Apheoorthis* sp.?.; Rubel, pp. 148, 149, pl. 1, fig. 3.

Holotype. GIT 125-102 (old number Br 2570), ventral valve, Text-fig. 10A–F (Rubel 1961, pl. 18, fig. 4). Island of Väike-Pakri, northwestern Estonia, Middle Ordovician, Pakri Formation of the middle Kunda Stage, lowermost Darriwilian.

Diagnosis. As for genus.

Description. Planoconvex suboval shell, 0.7–0.9 as long as wide. Cardinal extremities obtuse. Interarea 0.79 and 0.81 as long as shell width in two specimens. Ornament with 12–14 rounded first-order coarse costae bifurcating (or branching) in the anterior half of the valve into two or three; interspaces between costae are narrow. Filae weakly developed, occur along the crests of costae. Capillae very fine, up to 10 in 1 mm. Ventral valve lateral profile evenly convex, with the highest point in the middle; interarea short, orthocline; delthyrium open, forms together with semicircular foramen? a wide subtriangular opening in the apex of the valve. Teeth small, triangular, dental plates convergent, bordering the suboval muscle field laterally; crural fossettes small. Adductor and diductor muscle scars weakly differentiated. *Vascula media* subparallel posteriorly, divergent anteriorly. Dorsal valve flat, interarea 0.5 mm high, anacline; notothyrium open, triangular, almost completely filled by the cardinal process. Notothyrial platform with a thickened floor and stout cardinal process, triangular in posterior view; together with a short median septum brachiophores and cardinal process form a thick crest-like structure in the posterior part

Table 2. Dimensions (in millimetres) of *Rogorthis pakriensis* (Rubel, 1961). Ratios of measurements in brackets

Specimen, in brackets the number in Rubel (1961)	Length of ventral valve (L)	Width (W) (L : W)	Length of hinge line (Lhl) (Lhl : W)	Thick-ness	Number of costae at umbo/along commissure
GIT 125-102 (Br 2570), ventral valve, holotype	14.7	17.1 (0.86)	14.0 (0.82)	4.5	13/20
GIT 125-98 (Br 2564), ventral valve	14.2	15.6 (0.91)	12.5 (0.80)	6.1	12/?

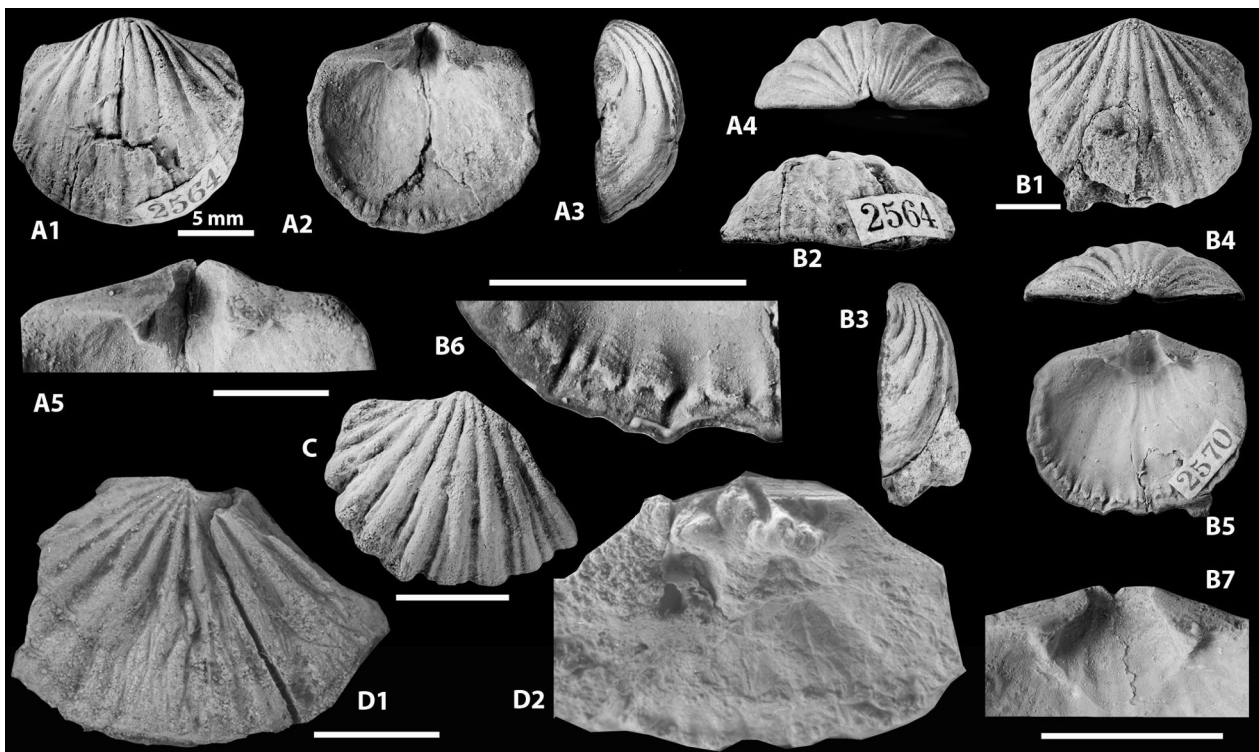


Fig. 3. *Rogorthis pakriensis* (Rubel, 1961), middle part of the Kunda Stage, Pakri Formation (lowermost Darriwilian). **A1–A5**, ventral valve GIT 125-98 (old number Br 2564), (Rubel 1961, p. 181); exterior, interior, lateral, posterior and anterior views; A5, view of the interarea and teeth. Northwestern Estonia, Island of Väike-Pakri. **B1–B7**, ventral valve, holotype, GIT 125-102 (Br 2570), (Rubel 1961, pl. 17, fig. 4), northwestern Estonia, Island of Väike-Pakri. B1–B5, ventral, interior, lateral and posterior views, and view of the posterior part of the ventral interior; B6, view of the ribbing along the interior margin; B7, view of the posterior part of the interior. **C**, exterior view of ventral valve GIT 125-103 (Br 2571), (Rubel 1961, pl. 18, fig. 1). Locality unknown. **D1, D2**, exterior and interior of incomplete dorsal valve GIT 125-104 (Br 2572), (Rubel 1961, pl. 18, figs 2, 3). Northern Estonia, Jägala. Scale bars correspond to 5 mm.

of the dorsal valve. The edge of valve interior is marked by a narrow two-step peripheral rim of short grooves.

Comparison. *Rogorthis pakriensis* is most similar to *Orthis callactis*, however, it differs from that species in its smaller shell size, stout cardinal process and bifurcating costae. The ribbing on the rim of the interior valve margins of *R. pakriensis* is similar to *Sulevorthis lyckholmiensis* (Wysogórski) (Jaanusson & Bassett 1993). A specimen (GIT 125-3) from the oolitic limestones of the Napa Formation of the Kunda Stage, which Rubel (1961) included with some doubt in the genus *Apheoorthina*, is considered here as conspecific with *Rogorthis pakriensis*. It has a deformed ventral valve with coarse costae branching in the anterior part. This specimen presumably has filae. Filae are not seen on the badly preserved specimens from the Pakri sandstones.

All described specimens have thick valves, presumably due to adaptation to high-energy environments or grainy deposits (calcareous sandstone or limestone with iron oolites) and high water energy.

Material. Seven specimens; see the Estonian geocollection database, collection GIT 125 (<http://sarv.gi.ee/>).

Occurrence. Lowermost Darriwilian; calcareous sandstone of the Pakri Formation and the limestone with iron ooids of the Napa Member of the Kandle Formation in the middle and upper parts of the Kunda Stage.

CONCLUSIONS

The results of this work and revision of previous data on the stratigraphical range of the genus *Cyrtonotella* can be summarized as follows: the first appearance of the genus *Cyrtonotella* does not fall into the early Darriwilian Volkhov Stage. Two species occurring in the Kunda and Volkhov stages, which were assigned to *Cyrtonotella* by Rubel (1961), are excluded from that genus and placed into *Leoniorthis* Egerquist, 2003 and the new genus *Rogorthis*. Brachiopods of the genus *Cyrtonotella* appear in the East Baltic in the mid-Darriwilian Aseri Regional

Stage (*Eoplacognathus suecicus* conodont Biozone in the Baltic area; Nölvak et al. 2007).

The early Darriwilian new species *Leoniorthis rubeli* from the Kunda Regional Stage extends the stratigraphic range of the genus *Leoniorthis*, identified earlier as from the uppermost Floian and Dapingian stages (Billingen to Volkhov stages; Egerquist 2003).

The total stratigraphical range of *Leoniorthis* from the Billingen to Kunda stages embraces carbonate strata with varying contents of glauconite grains and faunas rich in Baltic endemics (Jaanusson 1979; Hints & Harper 2003; Tolmacheva et al. 2003). The species *Rogorthis pakriensis* (Rubel) seems to be distributed mainly in shallow-water carbonate sandstones and oolitic limestones of the Kunda Stage (early Darriwilian), emphasizing the endemicity of brachiopod fauna in those rocks.

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Baltikumi Kesk-Ordoviitsiumi ortiidse brahhiopoodi *Cyrtonotella* kontseptsiooni revisjon

Linda Hints

On revideeritud varem perekonda *Cyrtonotella* kuulunud kahe brahhiopoodiliigi taksonoomiat. Nende liikide võrdlus perekonna tüüpiliigiga *C. semicircularis* (Eichwald) ja võimalike lähedaste liikidega võimaldas määrata ühe liigi (*C. semicircularis sensu* Rubel 1961) kuuluvaks perekonda *Leoniorthis*, kus ta esindab uut liiki *L. rubeli*. See liik esineb Põhja-Eestis ja Leningradi oblastis Kunda lademes. Teine liik *C. pakriensis* Rubel koos üksikute eksemplaridega perekonnast *Apheoorthis* on arvatud uude perekonda *Rogorthis* kui liik *R. pakriensis* (Rubel), mille levik piirdub ilmselt Kunda lademe Pakri kihistuga Põhja-Eestis.