

A NEW UPPER SILURIAN CONODONT SPECIES FROM ESTONIA

Viive VIIRA

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Abstract. A new conodont species *Ozarkodina roopaensis* sp. n. is described from the Ludlow-age Roopa cliff of the Paadla Formation, corresponding to the uppermost part of the Gorstian Stage. The *O. roopaensis* conodont Zone represents part of the Ludlow nearshore zonation scale in the East Baltic. The new species of *Ozarkodina* is related to *Ozarkodina confluens*, but differs in Pa element having primitive transverse ridges on oral smooth surfaces of denticles. Characteristic is the distribution of white matter.

Key words: taxonomy, conodonts, Silurian, Estonia.

During the study of Silurian conodonts of Saaremaa, Estonia, the author's attention was attracted by big conodonts resembling *Ozarkodina confluens*, which were provisionally named *Ozarkodina* sp. S (Viira, 1982; Männik & Viira, 1990). This paper presents a description of this new conodont species under the name of *Ozarkodina roopaensis* sp. n. The type locality of the new species is the Roopa cliff on the west coast of Saaremaa Island (Fig. 1). The cliff, of about 1.5 m in height, represents a small bioherm, which is surrounded and underlain by brownish coarse skeletal limestone containing big ostracodes *Herrmannina* sp. (L. Sarv, pers. comm.). The bioherm is formed by the stromatoporoid *Syringostromella borealis* (Nicholson) and tabulates *Thecia swindereniana* (Goldfuss), *Favosites pseudoforbesei* Sokolov, and *Subalveolites* sp. (Клааманн, 1970). The rocks of the Roopa cliff are supposed to belong to the Himmist Bed of the Paadla Formation, which correspond to the uppermost part of the Ludlow Gorstian Stage (Клааманн, 1970; Kaljo, 1990). Besides *Ozarkodina roopaensis* sp. n. the coarse skeletal limestone of the Roopa cliff has yielded also the conodonts *Ozarkodina confluens cornidentatus* Viira, *O. excavata* (Branson et Mehl), *O. aff. snajdri crispa* (Walliser), *Oulodus siluricus* (Branson et Mehl), *Panderodus* spp. (Pl. I). This conodont assemblage is also identified in the Karala and Kärla outcrops, and Ohesaare, Riksu, and Kolka borings. These localities are situated in the western part of Saaremaa, except Kolka, which is in northernmost Latvia.

Ozarkodina roopaensis sp. n. has local biostratigraphic significance in the East Baltic Ludlow, where the corresponding conodont zonation was established already in 1982 (Viira, 1982). The *Ozarkodina roopaensis* Zone (= *Ozarkodina* sp. S Zone) represents a part of the nearshore zonation and corresponds to the *Ozarkodina* aff. *snajdri* Zone in the offshore

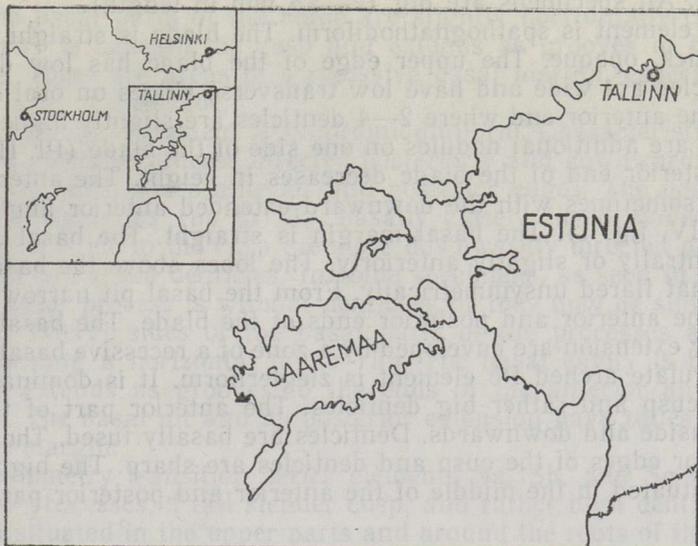


Fig. 1. Location of the Roopa cliff (triangle).

zation (Männik & Viira, 1990). Part of the *O. roopaensis* Zone may be correlated with the *Polygnathoides siluricus* Zone.

Specimens described in this work are housed at the Institute of Geology, Estonian Academy of Sciences (Catalogue Nos. Cn 1381—Cn 1435).

SYSTEMATIC PALEONTOLOGY

Phylum CHORDATA Bateson, 1886

Class CONODONTA Eichenberg, 1930, *sensu* Clark, 1981

Order OZARKODINIDA Dzik, 1976

Family SPATHOGNATHODONTIDAE Hass, 1959

Genus *Ozarkodina* Branson et Mehl, 1933

Type species. *Ozarkodina typica* Branson et Mehl, 1933

Ozarkodina roopaensis sp. n.

Pl. II, figs. 1—9; Pl. III, figs. 1—8; Pl. IV, figs. 1—8;
Fig. 2 A—O

1982 *Ozarkodina* sp. S — Viira, p. 81

1990 «*Ozarkodina*» sp. S — Männik & Viira, p. 88—89

Derivation of name. After Roopa cliff, the type locality of the species.

Holotype. Specimen Cn 1381, Pl. II, fig. 1, from Roopa cliff.

Type stratum. Ludlow Series, Paadla Formation, Himmiste Beds.

Diagnosis. Pa element carminate with fused denticles and primitive transverse ridges on oral surfaces of denticles. Pb element angulate, arched, with anterior blade curved inwardly. Denticles of M and S elements big and long, compressed laterally. Distribution of white matter is around the axes of denticles.

Description. All specimens are big (2—3.5 mm in length).

The Pa element is spathognathodiform. The blade is straight and moderately thick, opaque. The upper edge of the blade has low denticulation. Denticles are wide and have low transverse ridges on oral surfaces, except at the anterior end where 2—4 denticles are slightly higher. Sometimes there are additional nodules on one side of the blade (Pl. II, figs. 4, 5). The posterior end of the blade decreases in height. The anterior edge is upright, sometimes with the downward extended anterior angle (Pl. I, fig. 2; Pl. IV, fig. 1). The basal margin is straight. The basal cavity is situated centrally or slightly anteriorly. The lobes above the basal cavity are somewhat flared unsymmetrically. From the basal pit narrow grooves extend to the anterior and posterior ends of the blade. The basal pit and its posterior extension are enveloped by a zone of a recessive basal margin.

The angulate arched Pb element is ziegleriform. It is dominated by a prominent cusp and rather big denticles. The anterior part of the blade is curved inside and downwards. Denticles are basally fused. The anterior and posterior edges of the cusp and denticles are sharp. The biggest denticles are situated in the middle of the anterior and posterior parts of the

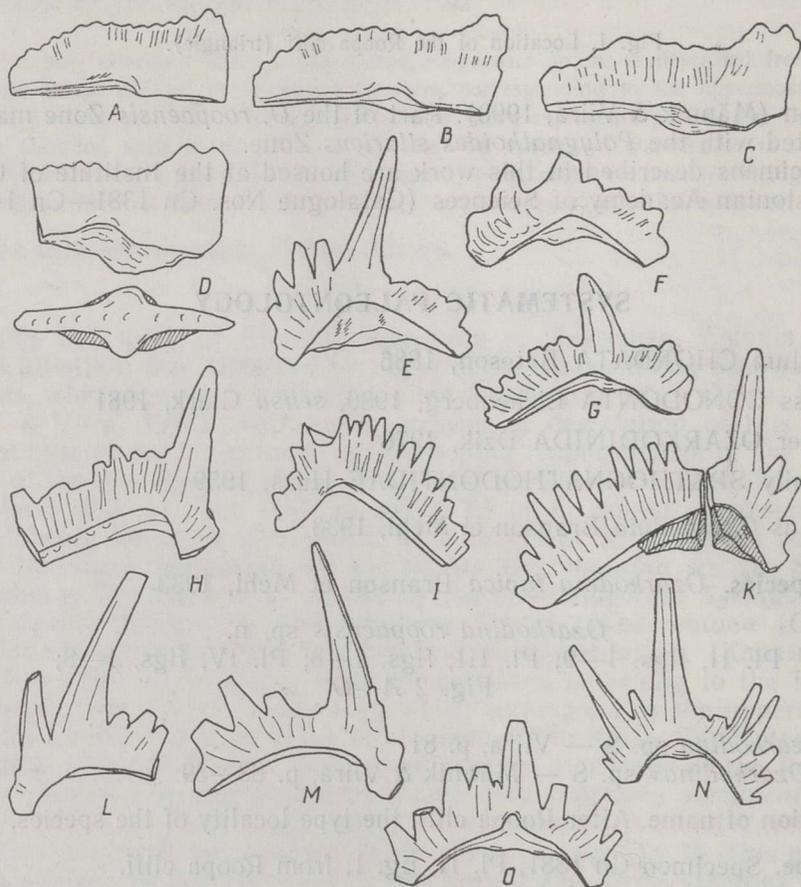


Fig. 2. *Ozarkodina roopaensis* sp. n. Vertical lines show the situation of white matter. A, B, C, D — Pa element Cn 1422—Cn 1425; E, F, G — Pb element Cn 1426—Cn 1428; H, I, K — M element Cn 1429—Cn 1431; L, M — Sc element Cn 1432, Cn 1433; N — Sb element Cn 1434; O — Sa element Cn 1435. Paadla Formation, A, B, D, F—I, M—O — Roopa cliff; C, E, K, L — Ohesaare boring, 115.85 m.

blade. The basal parts of the blade are slightly horizontally convex. The basal cavity is beneath the cusp and extends as grooves to the ends of the blade. There are areas of a recessive basal margin, especially in the posterior part of the blade.

The angulate M element is synprioniodiniform. Characteristic is a long prominent posterior process directed posteriorly and downwards. The cusp is tall, erect, with sharp anterior and posterior edges. The posterior process bears numerous (up to 14), basally closely fused moderately high denticles. Anterior to the cusp the more downwardly directed process may bear up to five fused denticles. In some specimens, as seen in Pl. IV, fig. 6, the anterior process is without denticles, or they may be simply broken. The inner lateral sides of the basal parts of the processes are slightly convex forming a horizontal minor rim. The basal cavity is beneath the cusp and extends as grooves to the ends of the anterior and posterior processes. The basal pit and its posterior extension have zones of a recessive basal margin.

The symmetry transition series elements Sa, Sb, and Sc have moderately low processes, a tall slender cusp, and rather high denticles. White matter is situated in the upper parts and around the roots of the denticles, almost reaching the basal margin. Quite a large part of the process proper has no white matter.

The Sc bipennate ramiform element has a high cusp and a rather short posterior process. Denticles are high and uneven. On the posterior process the biggest denticles are in the middle of or close to the posterior end; on the anterior process, however, near the cusp. There occur up to six denticles on the anterior process and some more on the posterior process. The

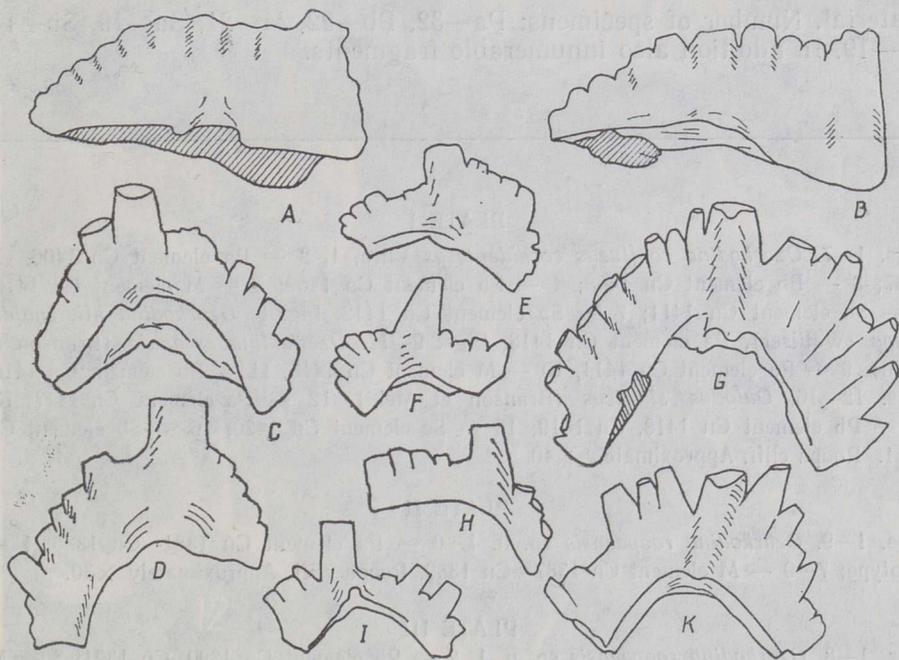


Fig. 3. *Ozarkodina swetlanae* (Mashkova).

A — Pa element Cn 1202; B — Pa element Cn 1436; C — M element Cn 1437; D — M element Cn 1220; E, F — Pb element Cn 1210, Cn 1438; G — Sa element Cn 1238; H — Sc element Cn 1213; I, K — Sb element Cn 1439, Cn 1236. Novaya Zemlya, Greben Stage; A, C — Cape Fedotov 7919-12/2; B, G, K — Kuznetsov River 7950-8/6; D, E, F, H, I — Kuznetsov River 7950-7/6.

anterior process is bent downwards and to the inner side forming an almost right angle with the posterior process.

The Sa and Sb alate elements are very similar, though Sa is symmetrical and Sb is unsymmetrical. The Sb element has one shorter process. The denticles located in the middle of this process are the biggest ones. Some specimens have denticles declined posteriorly. All symmetry transition series elements have basal cavities with the pit lying under the cusp. The grooves proceeding from this pit extend to the ends of processes. All elements have also narrow zones of a recessive basal margin.

Variation. All specimens are big, there is no variation in size. The presence of transverse ridges in the Pa element is irregular to some degree. The number of denticles on the anterior processes of the M and Sc elements may also change.

Comparison. The new species differs from *Ozarkodina confluens* (Branson et Mehl) in its Pa element having primitive transverse ridges on oral smooth surfaces of denticles. Also the distribution of white matter is of a different type. *Ozarkodina roopaensis* sp. n. is very close to *Ozarkodina swetlanae* (Mashkova), the apparatus described from the Greben Stage of Novaya Zemlya (Вийра, 1981). The Pa element of *O. roopaensis* sp. n. differs from that of *O. swetlanae* in having a longer blade and smaller thickness (Fig. 3). All elements of *O. swetlanae* are rather stout. The M element of this species has usually more than five denticles on the anterior process.

Occurrence. Roopa and Karala outcrops, Ohesaare 111.10—115.85 m, Riksu 30.3—36.0 m, Kolka 300.6 m borings.

Material. Number of specimens: Pa—32, Pb—22, M—21, Sa—19, Sb—14, Sc—19. In addition also innumerable fragments.

PLATE I

Figs. 1—7. *Ozarkodina confluens cornidentatus* Viira. 1, 2 — Pa element Cn 1406, Cn 1407; 3 — Pb element Cn 1408; 4 — Sb element Cn 1409; 5 — M element Cn 1410; 6 — Sc element Cn 1411; 7 — Sa element Cn 1412. Fig. 8. *Ozarkodina* aff. *snajdri crispera* (Walliser), Pa element Cn 1413. Figs. 9—11. *Ozarkodina excavata* (Branson et Mehl). 9 — Pa element Cn 1414, 10 — M element Cn 1415, 11 — Pb element Cn 1416. Figs. 12—16. *Oulodus siluricus* (Branson et Mehl). 12 — Pa element Cn 1417; 13, 14 — Pb element Cn 1418, Cn 1419; 15 — Sc element Cn 1420; 16 — Sb element Cn 1421. Roopa cliff. Approximately $\times 40$.

PLATE II

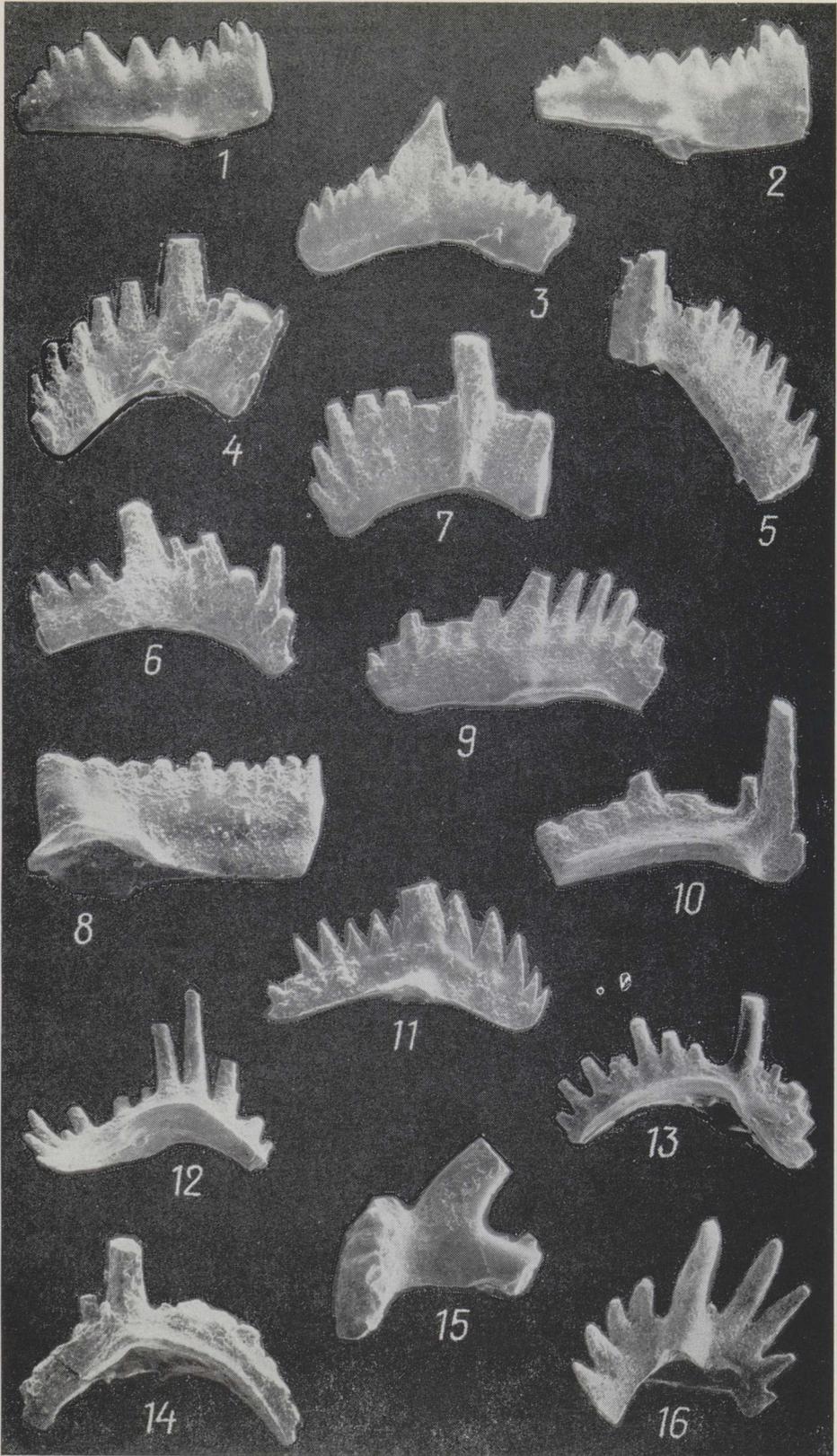
Figs. 1—9. *Ozarkodina roopaensis* sp. n. 1—6 — Pa element Cn 1381—Cn 1386, 1 — holotype; 7—9 — M element Cn 1387—Cn 1389. Roopa cliff. Approximately $\times 30$.

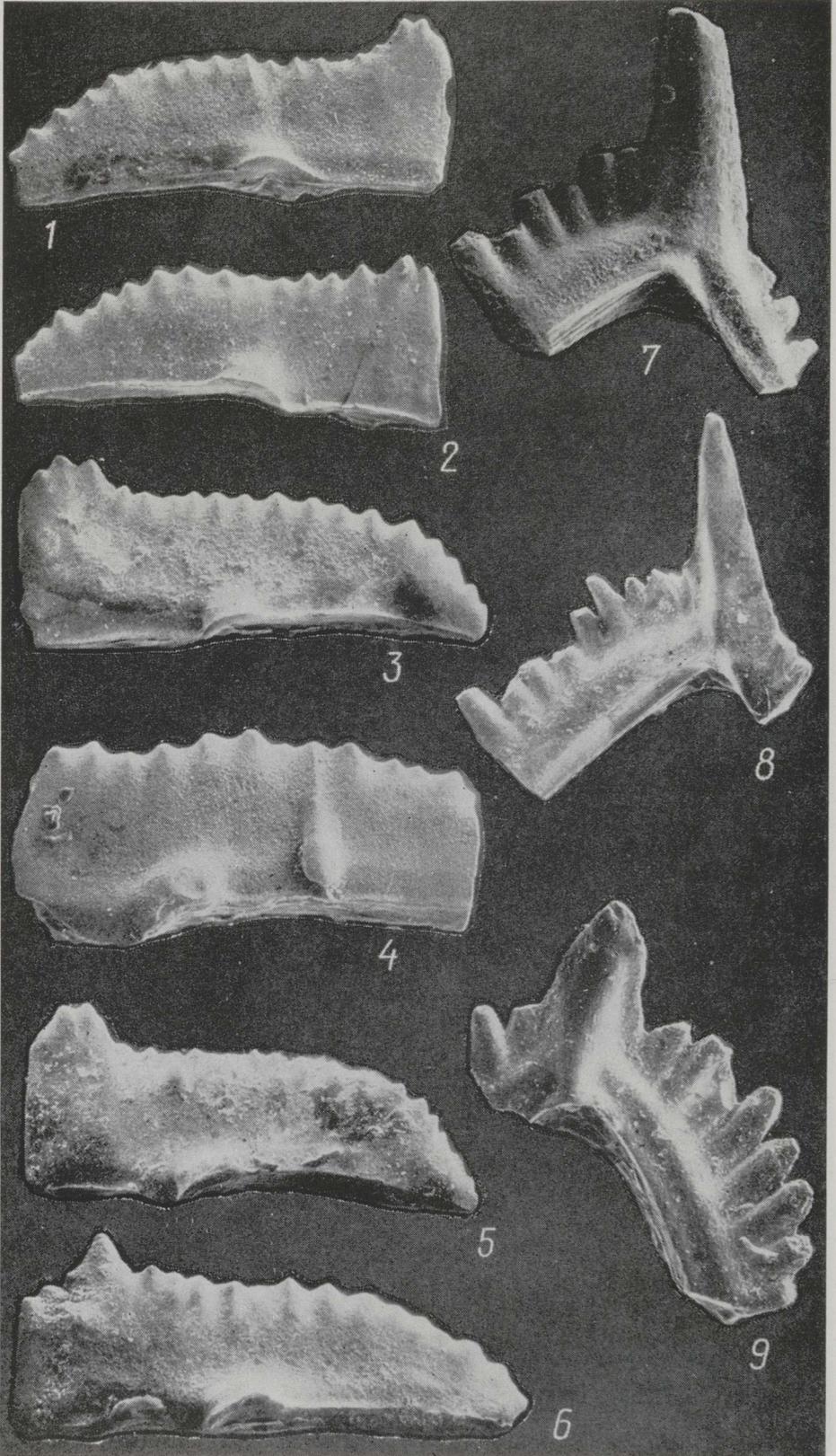
PLATE III

Figs. 1—8. *Ozarkodina roopaensis* sp. n. 1, 2 — Pb element Cn 1390, Cn 1391; 3 — M element Cn 1392; 4, 5 — Sc element Cn 1393, Cn 1394; 6, 7 — Sa element Cn 1395, Cn 1396; 8 — Sb element Cn 1397. Roopa cliff. Approximately $\times 35$.

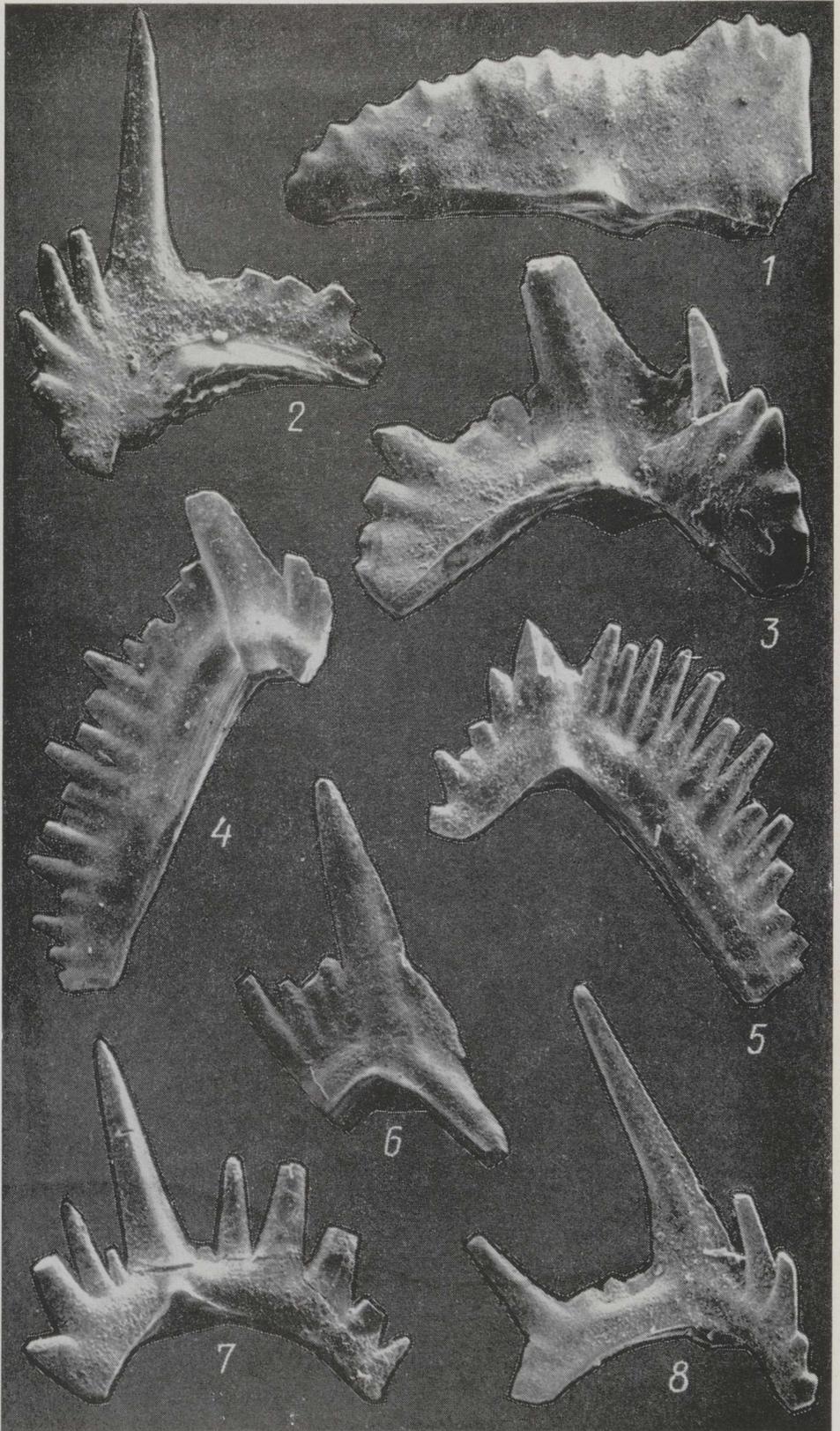
PLATE IV

Figs. 1—8. *Ozarkodina roopaensis* sp. n. 1 — Pa element Cn 1398; 2, 3 — Pb element Cn 1399, Cn 1400; 4—6 — M element Cn 1401—Cn 1403; 7 — Sb element Cn 1404; 8 — Sc element Cn 1405. Karala outcrop. Approximately $\times 30$.









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UUS ÜLEMSILURI KONODONDILIIK EESTIST

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On antud Paadla lademe kihtidest Lääne-Saaremaalt Roopa pangalt leitud uue konodondiliigi *Ozarkodina roopaensis* sp. n. kirjeldus. *O. roopaensis*'e tsoon on Baltikumi rannalähedase tsonaalsuse Ludlow'-ealine konodonditsoon.

НОВЫЙ ВЕРХНЕСИЛУРИЙСКИЙ КОНОДОНТОВЫЙ ВИД ИЗ ЭСТОНИИ

Вийве ВИЙРА

Описан новый конодонтовый вид *Ozarkodina roopaensis* sp. n. из паадлаского горизонта, найденный в обнажении Роопа на западе о-ва Сааремаа. Зона *O. roopaensis* является зоной лудловского возраста согласно прибрежной зональной схеме Прибалтики.

METHODS AND RESULTS

In all these samples the ratio of K-feldspar to quartz was estimated and the plagioclase admixture was determined on the basis of 3.19 Å reflection using the diffractometer DROM-20. It should be noted that plagioclase was recorded only in 50%