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A NEW CONODONT FROM THE LOWER LLANDOVERY OF ESTONIA

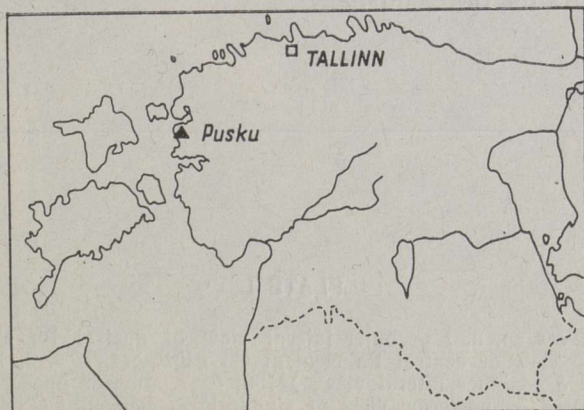
Abstract. A new conodont apparatus *Icriodella cornutus* gen. et sp. nov. is described from the Pusku Quarry section (Western Estonia), corresponding to the uppermost part of the Rhuddanian Stage. The new genus *Icriognathus* is closely related to the lower and middle Llandovery genera *Icriodella* and *Pterospathodus*. Characteristic of the Pa element (diagnostic element for all these apparatuses) of *I. cornutus* is the presence of a pair or two pairs of fang-like lateral denticles at its anterior end.

Conodonts from the lower and middle Llandovery of Estonia were poorly known until recently. The extensive processing of several sections in the last years has allowed us to get a collection of conodonts to characterize this period in Estonia. Conodonts are generally rare here. But in some levels, particularly in the beds of coarse calcarenites in the lower part of the Raikküla Regional Stage, their number is remarkably big.

The Pusku Quarry in Western Estonia, where the beds, corresponding to the uppermost part of the Rhuddanian Stage are exposed (Fig.), appeared to be one of the most productive. This section yielded quite an abundant and variable conodont fauna, containing besides the previously known taxa (*Kockelella manitoulinensis*, *Ozarkodina* aff. *oldhamensis*, *Oulodus*? cf. *kentuckyensis*, *Panderodus unicostatus*) some new ones — *Ozarkodina excavata* ssp. n., gen. et sp. n. and the one described below.

In the present paper a new genus and species *Icriognathus cornutus* gen. et sp. nov. are described.

The collection is deposited in the Institute of Geology of the Estonian Academy of Sciences.



Location of the studied section.

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Genus *Icriognathus* gen. nov.

Derivation of name. *Icriognathus* is a modification of *Icriodella* referring to some similarity of these genera.

Type species. *Icriognathus cornutus* sp. n.

Diagnosis. The apparatus *Icriognathus* consists of Pa, Pb, M, Sc (?), Sb, and Sa elements. The diagnostic Pa element has a pair or two pairs of lateral denticles at the distal end of the anterior process. The Pb element is ambalodiform with three processes and completely excavated triangular base. M, Sb, and Sa elements have tall curved cusps and steeply downwards directed short denticulated processes.

Comparison and remarks. The new genus is closely related to the lower and middle Llandovery genera *Icriodella* and *Pterospathodus*. The M and S elements of these three genera are almost similar (Pl. 1, figs. 4, 11, 13; Nowlan, 1981: Pl. IV, figs. 8, 10; Uyeno and Barnes, 1983: Pls. 1, 2). The S elements of *Icriognathus* show great similarity also to the analogous elements of the apparatus *Pranognathus* (Männik and Aldridge, 1989: Text-fig. 5: N—R). The Pa element is diagnostic in all these different apparatuses. Although according to the Pa element the new genus resembles *Aphelognathus siluricus* s.f. Pollock, Rexroad et Nicoll (= Pa element of the apparatus *Pterospathodus siluricus* sensu Uyeno and Barnes, 1983), the former differs from the latter in having lateral denticles at the distal end of the anterior process of the Pa elements like the *Icriodella* apparatus.

Composition of the genus. Only one species — *Icriognathus cornutus* sp. n. — is known in this genus at present.

Occurrence. Lower Llandovery, lower part of the Raikküla Regional Stage in Estonia.

Icriognathus cornutus sp. n.

Pl. 1, figs. 1—14; Pl. 2, figs. 1—9

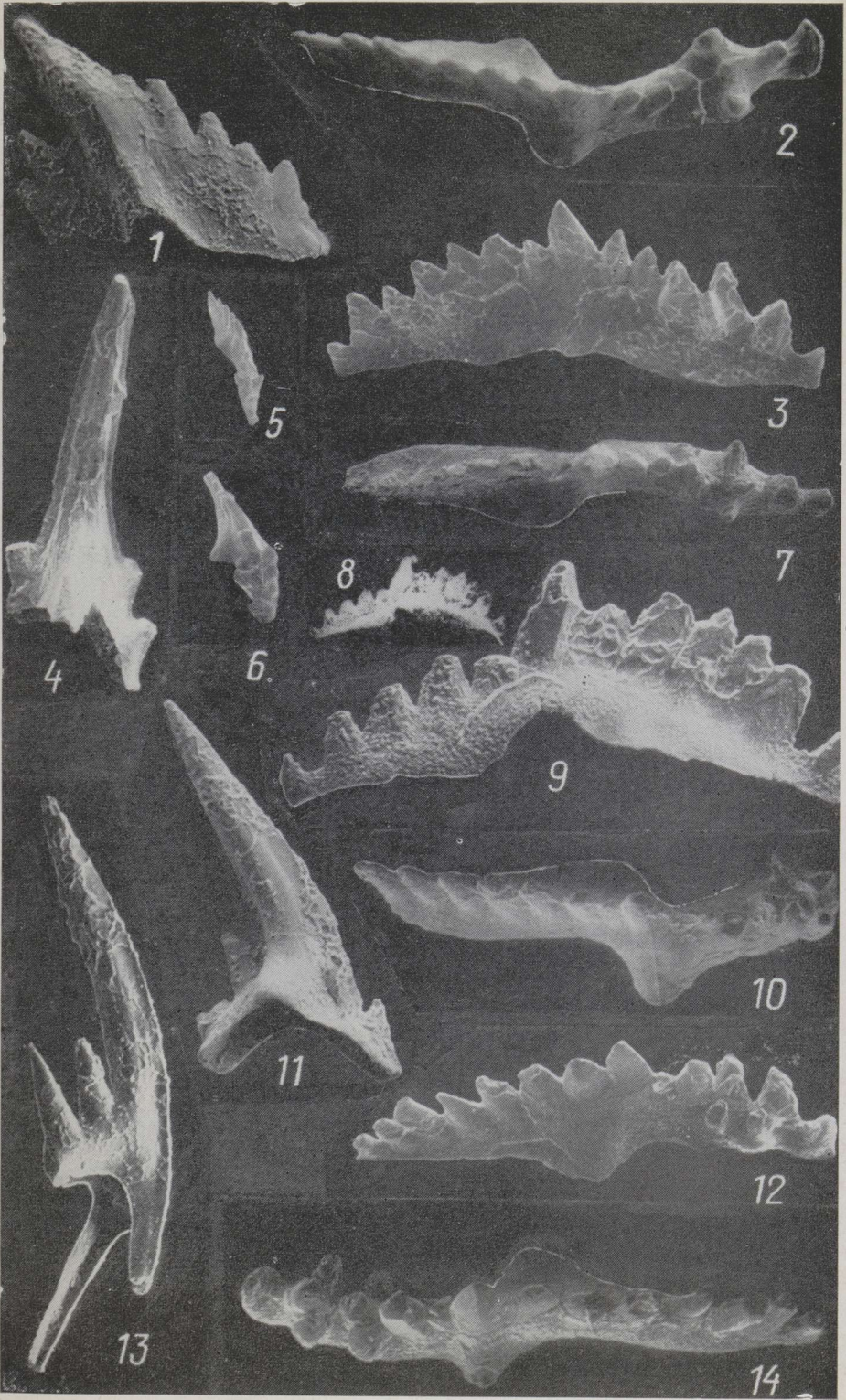
Derivation of name. Latin *cornutus*, meaning horned, refers to the horn-like or fang-like lateral denticles at the distal part of the anterior process of the Pa elements.

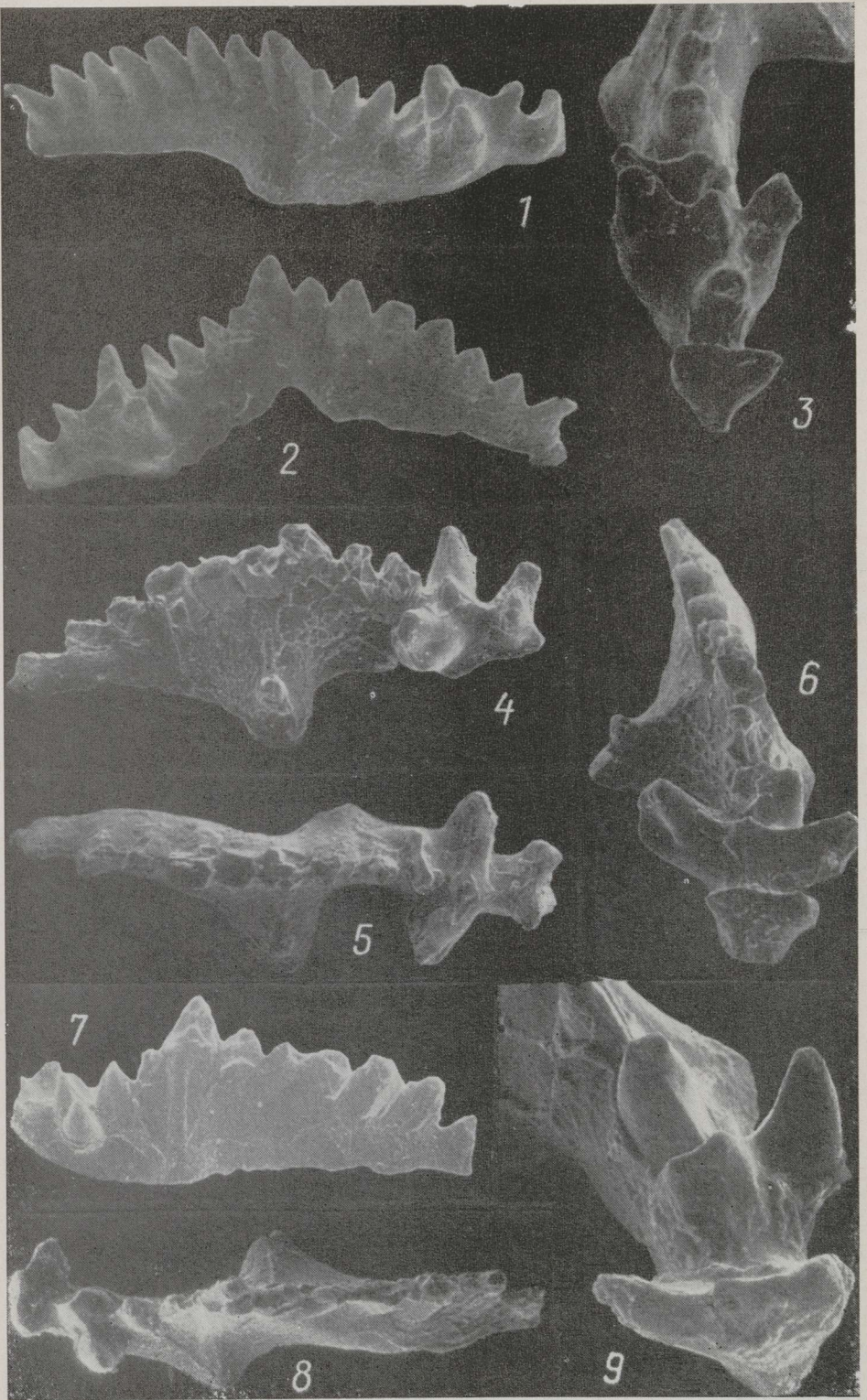
Holotype. Pa element Cn 5401, Pl. 1, fig. 2 and Pl. 2, figs. 1—3, Silurian, lower Llandovery, the lowermost part of the Raikküla Regional Stage, western Estonia, Pusku Quarry, sample M-226.

Diagnosis. As for the genus.

PLATE 1

Icriognathus cornutus sp. n. 1 — outer lateral view of dextral Pb element Cn 5411, $\times 150$. 2 — upper view of dextral Pa element Cn 5401, $\times 150$. 3, 5, 7 — sinistral Pa element Cn 5406: 3 — inner lateral view, $\times 150$; 5 — anterior upper view, $\times 50$; 7 — upper view, $\times 150$; 4 — posterior view of sinistral Sb element Cn 5418, $\times 150$. 6, 12, 14 — sinistral Pa element Cn 5404: 6 — anterior upper view, $\times 75$; 12 — inner lateral view, $\times 150$; 14 — upper view, $\times 175$. 8, 9 — dextral Pa element Cn 5408 (without the lateral denticles at the distal part of the anterior process): 8 — inner lateral view in translucent light, $\times 50$; 9 — inner lateral view, $\times 150$. 10 — upper view of dextral Pa element Cn 5403, $\times 150$. 11 — inner lateral view of sinistral M element Cn 5414, $\times 150$. 13 — inner (?) lateral view of sinistral Sc (?) element Cn 5417, $\times 150$.





Description. Pa element is straight or slightly curved to one side in upper view (Pl. 1, figs. 2, 3, 7, 10, 12, 14; Pl. 2, figs. 1—9). The sides expand aborally from the narrow denticulate oral margin. The basal cavity is deep and relatively wide. Near the midpoint of the unit each side flares out to form slightly asymmetrically situated expansions (flanges) in the form of half cones. The lateral flanges may bear a ridge which continues onto the basal part of the cusp. Some specimens possess one or two small poorly developed denticles at the distal end of the ridge (Pl. 2, figs. 4—6). The aboral margin of the posterior process is slightly arched in lateral view. The anterior process is straight or slightly turned upward. The posterior process bears five to eight laterally compressed denticles fused in their lowermost parts. The tips of the posteriorly inclined denticles form an arch which decreases steadily in height away from the cusp.

The main denticle row on the anterior process consists of four to seven slightly laterally compressed almost discrete denticles. At the distal part of the process on each side of the main denticle row there appear one or two additional somewhat laterally directed horn-like denticles. They are almost subcircular in cross section or elongated perpendicularly to the axis of the process. These denticles are connected with the central row by low sharp ridges. In this part of the process two or three denticles of the main row are also fused by a ridge. In most cases on one denticle of the central row immediately posterior of the lateral denticles, an outset of additional denticles in the form of a small node or lateral thickening (Pl. 2, figs. 5, 6) may be observed. As a rule, the anterior denticle is totally fused to its lateral denticles. All they are strongly compressed and form a vertical "plate" situated perpendicularly to the axis of the process (Pl. 2, figs. 3, 6, 9).

Pb element. Three merging processes form a nearly pyramidal, completely excavated base, which is surmounted by a stout posteriorly inclined cusp (Pl. 1, fig. 1). It is almost triangular in shape near its base. The anterior and posterior edges of the cusp are continuations of the oral edges of the processes. In aboral view the base of the unit is subtriangular with slightly concave lateral surfaces. The latter are steep and unite orally in a sharp margin. The anterior and posterior processes are inclined at a few degrees. As a rule, the anterior process is somewhat longer than the posterior one. The processes bear small denticles that are fused in their lower parts (Pl. 1, fig. 1). The oral edge of the short outer process, which is directed slightly anteriorly as well as outward, lacks denticles but bears a low, poorly developed keel which may be serrate in its distal part.

PLATE 2

Icriognathus cornutus sp. n. 1, 2, 3 — dextral Pa element Cn 5401: 1 — outer lateral view, $\times 150$; 2 — inner lateral view, $\times 150$; 3 — upper view, $\times 275$. 4, 5, 6 — sinistral Pa element Cn 5401: 4 — inner lateral view, $\times 175$; 5 — upper view, $\times 175$; 6 — upper view of the anterior process, $\times 200$. 7, 8, 9 — sinistral Pa element Cn 5402: 7 — outer lateral view, $\times 175$; 8 — upper view, $\times 200$; 9 — upper view of the anterior process, $\times 500$.

All the figured elements on Pls. 1 and 2 are from the Pusku Quarry, sample M-226.

M element. The large sharp-pointed cusp of the element is curved posteriorly and inwards (Pl. 1, fig. 11). The transverse section of the cusp is biconvex, the convexity of the inner surface increasing markedly near the base. The anterior and posterior edges of the cusp are sharp. The anterior edge is extended downwards to form a short process with one or two small denticles. The posterior process is longer and bears laterally compressed denticles, which are fused in their lowermost part. The base of the cusp is deeply excavated and flares remarkably to the inner side of the unit where it forms a wide triangular lobe which narrows steeply toward the processes.

Sb element. The cusp of the element is asymmetrical, recurved and twisted slightly in its top part (Pl. 1, fig. 13). Its transverse section is biconvex, the convexity of the posterior face increasing near the base. The cusp has sharp keel-like lateral edges. The inner anterolateral process is a long, slender, usually undenticulate anticusp, bearing a continuation of the inner anterior keel of the cusp. The keel may be slightly serrate at the distal part of the anticusp. The outer lateral process is inclined posteriorly out and down and bears discrete, sharp denticles compressed on the plane of the process. The denticles are in line with a keel that extends along the outer anterior edge of the cusp. The posterior process is inclined slightly downwards and bears denticles similar to those at the outer lateral process. There is also a weak costa extending along the lowermost part of the posterior face of the cusp. The deep basal cavity extends upward into the cusp and continues as a deep wide groove beneath the processes.

Sa element. This element has a tall posteriorly recurved cusp, which has sharp keels at its lateral edges (Pl. 1, fig. 4). On some specimens the topmost part of the element may be slightly twisted to one side. The transverse section of the cusp is biconvex. The convexity of the posterior face of the cusp increases remarkably near the base. The lateral processes are directed steeply down and bear usually two sharp discrete denticles, compressed on the plane of the processes. The denticles are situated in line with the lateral keels and directed upward parallel to the cusp. The posterior process is directed slightly downwards. It bears denticles similar to those at the lateral processes. A weak costa extends from the posterior process upwards along the lower part of the posterior face of the cusp. The basal cavity is the deepest under the cusp and continues as a deep wide groove beneath the processes.

Variation. Among the described elements of *Icriognathus cornutus* the most variable is the Pa element, particularly the denticulation of its anterior process (Pl. 1, figs. 2, 3, 7, 10, 12, 14; Pl. 2, figs. 1—9). The Pa element may be almost straight or curved remarkably to one side in upper view (Pl. 1, figs. 2, 7, 10, 14; Pl. 2, figs. 5, 8). Although the majority of the specimens of the Pa elements have undenticulated lateral flanges, some of them may possess a single denticle on the outer lateral flange (Pl. 2, figs 4—6). The number of denticles on the processes of M and S elements varies due to the size of the specimens. The anterior process of small M elements usually lacks denticles.

Comparison. As noted above, the Pa element of *Icriognathus cornutus* differs from that of *Aphelognathus siluricus* s.f. Pollock, Rexroad et Nicoll (Pollock et al., 1970, Pl. 114, figs. 1—4), and also from the Pa element of *Pterospathodus siluricus* Uyeno et Barnes (Uyeno and Barnes, 1983, Pl. 1, figs. 9—11) in having some lateral denticles at the distal part of the anterior process (Pl. 1, figs. 2, 3, 7, 10, 12, 14; Pl. 2, figs. 1—9).

According to the Pa elements, *Icriodella* species differ from *Icriognathus cornutus* in having a well-developed anterior platform (Aldridge, 1972, Pl. 1, figs. 1—17; Uyeno and Barnes, 1983, Pl. 4, figs. 7—10; Pollock et al., 1970, Pl. 111, figs. 20, 21, 27—30).

The Pb element of *I. cornutus* is quite similar to the analogous element of *P. siluricus* (Uyeno and Barnes, 1983, Pl. 1, figs. 12, 13) but it differs completely from the Pb element of *Icriodella*-apparatus (Nowlan, 1981, Pl. III, fig. 8, Pl. IV, fig. 9).

The M element of *I. cornutus* (Pl. 1, fig. 11) has shorter processes than its counterparts in the apparatus *P. siluricus* (Uyeno and Barnes, 1983, Pl. 1, figs. 7, 8).

The specimens assigned to the Sb element of the new species (Pl. 1, fig. 13) are almost identical to those described as Sb elements of *P. posteritenuis* by Uyeno and Barnes (1983, Pl. 2, figs. 15—17) and of *Pranognathus tenuis* by Männik and Aldridge (1989, Text-fig. 5: P).

The Sa element of *I. cornutus* (Pl. 1, fig. 4) differs from those of *Pterospathodus posteritenuis* and of *Pranognathus tenuis* in having remarkably shorter lateral processes (Uyeno and Barnes, 1983, Pl. 2, figs. 14, 18; Männik and Aldridge, 1989, Text-fig. 5: N, O).

Remarks. The elements of *I. cornutus* are small and fragile. Their number in the samples, as a rule, is very low. At the present time they are known only from the section of the Pusku Quarry.

Together with the elements of *I. cornutus* about 20 specimens were found differing from the Pa elements of this species only in lacking the lateral denticles at the distal part of the anterior process (Pl. 1, figs. 8, 9). They are very similar to the specimens described as *Aphelognathus siluricus* s. f. and illustrated by Pollock et al. (1970, Pl. 114, figs. 1—4), although the elements from Estonia seem to be more pyramidal in lateral profile (Pl. 1, figs. 8, 9). The last feature makes them also different from the Pa elements of *P. siluricus*, described by Uyeno and Barnes from the Jupiter Formation on Anticosti Island (1983, Pl. 1, figs. 9—11). Moreover, the Pa elements of *P. siluricus* from Anticosti Island have well-developed short lateral processes which are lacking on the elements from Estonia. The lateral process is present also on the Pa elements of *Llandoverygnathus siluricus* (Cooper, 1977, Pl. 1, figs. 3, 10), which are quite similar to the described elements. As the considered material is rather poor and the other elements (Pb, M, and S) seem to be represented only by one type, these specimens are assumed to be modifications of the Pa elements of the *Icriognathus cornutus*.

Occurrence. As for the genus.

- Material.** Pa — 21 typical specimens and 20 specimens without lateral denticles on the anterior process;
Pb — 19 specimens;
M — 5 specimens;
Sb — 5 specimens;
Sa — 22 specimens.

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REFERENCES

- Aldridge, R. J. 1972. Llandovery conodonts from the Welsh Borderland. — Bull. British Mus. Nat. Hist. (Geol.), 22, 2, 125—231.
- Cooper, P. J. 1977. Toward a familial classification of Silurian conodonts. — J. Paleont., 51, 1057—1071.
- Männik, P. and Aldridge, R. J. 1989. Evolution, taxonomy and relationships of the Silurian genus *Pterospirifer*. — Paleont., 32, 4, 893—906.
- Nowlan, G. S. 1981. Early Silurian conodont biostratigraphy of the Gaspé Peninsula — a preliminary report. — In: P. J. Lesperance (ed.). Subcommission on Silurian Stratigraphy, Ordovician—Silurian Boundary working group. Field meeting, Anticosti—Gaspé, Quebec 1981, Vol. II: Stratigraphy and Paleontology, 257—291.
- Pollock, C. A., Rexroad, C. D. and Nicoll, R. S. 1970. Lower Silurian conodonts from Northern Michigan and Ontario. — J. Paleont., 44, 4, 743—764.
- Uyeno, T. T. and Barnes, C. R. 1983. Conodonts from the Jupiter and Chicotte Formations (Lower Silurian), Anticosti Island, Quebec. — Geol. Surv. Canada Bull., 355.

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UUS KONODONT EESTI ALAM-LLANDOVERYST

On esitatud Eesti Alam-Llandovery kihtidest Pusku karjääri läbilõikest leitud uue konodontide perekonna *Icriognathus* ja selle seni ainukese esindaja *Icriognathus cornutus*'e kirjeldus.

Пэеп МЯННИК

НОВЫЙ КОНОДОНТ ИЗ ЛЛАНДОВЕРИ ЭСТОНИИ

Описаны новый конодонтовый род *Icriognathus* и пока единственный в этом роде вид *Icriognathus cornutus* из нижнелландоверийских отложений обнажения Пуску (Западная Эстония).