

STRATIGRAPHIC DISPERSION OF CONODONTS IN THE LOWER ORDOVICIAN OF THE LENINGRAD PROVINCE¹

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Abstract: Conodonts found in Lower Ordovician deposits of Arenigian age in Leningrad province suggest correlation of these deposits with coeval deposits in Sweden as well as to determine the stratigraphic sequence of the Lower Ordovician in Leningrad province.

In 1856, the Russian scientist Pander [1] described, for the first time, the problematic tooth-like structures known as conodonts, found in rocks of the lower Paleozoic in the vicinity of St. Petersburg and on the Baltic littoral. Since then this interesting group of fossils has been neglected in the Soviet Union.

The present author has attempted to use the conodonts to determine the stratigraphic sequence of the Lower Ordovician deposits in the Leningrad province. This paper is based on field data and a study of some 400 samples containing numerous conodonts collected and examined by the author in 1960 and 1961.

Several main complexes could be distinguished, coinciding with particular stratigraphic subdivisions (Table 1).

Arenigian Stage.

A. *Productorthis obtusa* and *Paurorthis parva* zone (Volkhovian horizon).

1. *Asaphus priscus*, *Megalaspis limbata*, *M. planilimbata* subzone. The first rich find of conodonts was discovered at the bottom of this subzone. The most characteristic are: *Distacodus expansus* (Grav. et Ellis), *D. stola* Lind., *Drepanodus planus* Lind., *D. proteus* Lind., *Oistodus lanceolatus* Pand., *O. forceps* Lind., *O. parallelus* Pand., *Scrolopodus rex* Lind., *Oepicodus smithensis* Lind., *Prioniodina deflexa* Lind., *Prioniodus evae* Lind.

Most of the species in this part of the subzone are known from the Bellinghen horizon in Sweden; the conodonts in the top part of the subzone are known from the Limbata limestone of Sweden.

2. *Asaphus bröggeri* and *Megalaspis hyorhina* subzone. A second rich find of conodonts was discovered here. The characteristic species include: *Oistodus parallelus* Pand., *O. brevisbasis* sp. n., *O. originalis* sp. n., *O. linguatus* var. *complanatus* Lind., *Paltodus volchovensis* sp. n., *Cordylodus perlongus* Lind., *Prioniodus navis* Lind.

The deposits of the middle subzone can be compared with the *Megalaspis limbata* zone in southern and central Sweden and on the island of Öland.

3. *Asaphus lepidurus* and *Megalaspis gibba* subzone. Here the most characteristic conodonts are: *Acondiotus* sp. n., *Scandodus rectus* Lind., *Tetraprioniodus robustus* Lind., *Volchodina densa* (Lind.), *Falodus simplex* sp. n. This complex makes correlation of the top subzone with the *Lepidurus* limestones of Sweden fairly plausible.

B. *Lycophoria nucella* and *Endoceras incognitum* zone (Kunda horizon).

4. *Asaphus lamanskii* and *A. expansus* subzone. The conodonts here are characterized by an impoverished generic and specific composition. The commonest are *Oistodus basovalis* sp. n., *Scandodus gracilis* sp. n., *Ambalodus planus* sp. n. On the basis of the whole conodont complex the deposits in the lower subzone can be tentatively compared with the *Expansus* limestones of Öland.

5. *Asaphus raniceps* subzone. A third rich find of conodonts was noted in this subzone. The characteristic species were: *Scandodus carinatus* sp. n., *Paracordylodus dentatus* sp. n., *Tetraprioniodus minax* sp. n., *Falodus parvidentatus* sp. n., *Prioniodus alatus* Hadd., *P. lindstromi* sp. n., *Ambalodus popovkiensis* sp. n., *Amophognatus variabilis* sp. n.

This complex justifies correlating the deposits of the middle subzone with the Öland *Raniceps* limestones.

6. *Cyclendoceras cancellatum* and *Asaphus* major subzone. The conodonts here belong mainly to the same species as those of the middle subzone but the species composition is poorer. The complex resembles the *Expansus-Obtusicauda* conodonts of the Swedish limestones, but the presence of *Prioniodus* sp. n. 2 and *Ambalodus* sp. n. 1 in the top subzone, both of which occur in the Llandeilian limestones of Sweden and Poland permit comparison of the top subzone with the *Obtusicauda* limestones of Sweden.

In conclusion, it should be noted that the conodonts found in the Lower Ordovician deposits

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Table 1

Distribution of Conodonts in the Lower Ordovician (Arenigian) deposits of the Leningrad province

Species	Productorthis obtusa, Pauro- rthis parva zone (Volkhovian horizon)		Lycophoria nucella and Endoceras in- cognitum zone (Kunda horizon)				
	Subzone 1		zone 2	Sub- zone 3	Sub- zone 4	Sub- zone 5	Sub- zone 6
	Bottom	Top					
<i>Distacodus stola</i> Lind.	+	-	-	-	-	-	-
<i>D. stola</i> var. <i>lafus</i> Lind.	+	-	-	-	-	-	-
<i>Acontiodus arcuatus</i> Lind.	+	+	+	-	-	+	+
<i>A. rectus</i> Lind.	+	-	-	+	+	+	-
<i>A. rectus</i> var. <i>sulcatus</i> Lind.	-	+	-	-	-	-	-
<i>Drepanodus arcuatus</i> Pand.	+	-	+	+	+	+	-
<i>D. amonoenus</i> Lind.	+	+	-	-	-	-	-
<i>D. homocurvatus</i> Lind.	-	●	+	+	-	+	+
<i>D. planus</i> Lind.	-	●	+	+	+	-	-
<i>D. sculponea</i> Lind.	+	-	+	+	+	+	-
<i>D. aff. sculponea</i> Lind.	-	-	+	+	+	-	-
<i>D. suberectus</i> (Bran. et Mehl.)	-	●	-	-	+	+	+
<i>D. longibasis</i> Lind.	-	+	+	+	-	-	-
<i>D. deltifer</i> Lind.	-	+	-	-	-	-	-
<i>D. sp. n. 3.</i>	-	-	-	+	+	-	-
<i>Oistodus lauceolatus</i> Pand.	●	+	-	-	+	+	+
<i>O. forceps</i> Lind.	●	+	-	-	-	-	-
<i>O. parallelus</i> Pand.	-	+	●	-	-	-	-
<i>O. triangularis</i> Lind.	●	-	-	-	-	-	-
<i>O. delta</i> Lind.	●	-	-	-	-	-	-
<i>O. brevbasis</i> sp. n.	-	+	●	+	-	-	-
<i>O. basovalis</i> sp. n.	-	-	+	+	●	+	-
<i>O. contractus</i> Lind.	-	-	+	+	+	+	-
<i>O. originalis</i> sp. n.	-	+	●	+	-	-	-
<i>O. linguatus</i> Lind.	-	-	+	+	-	-	-
<i>O. linguatus</i> var. <i>compla-</i> <i>natus</i> Lind.	-	-	+	●	+	+	-
<i>O. Longiramis</i> Lind.	-	○	○	○	-	-	-
<i>O. selene</i> Lind.	-	-	○	○	-	-	-
<i>Paltodus variabilis</i> sp. n.	+	-	-	-	-	-	-
<i>P. scolopodiformis</i> sp. n.	-	+	-	-	-	-	-
<i>P. volchovensis</i> sp. n.	-	+	●	+	-	-	-
<i>P. sp. n. № 2</i>	-	-	-	-	-	-	○
<i>Scolopodus striatus</i> Pand.	+	-	-	-	-	-	-
<i>S. semicostatus</i> Pand.	+	-	-	-	-	-	-
<i>S. rex</i> Lind.	+	+	-	-	-	-	-
<i>S. rex</i> var. <i>paltidiformis</i> Lind.	+	-	-	-	-	-	-
<i>S. peselephantis</i> Lind.	+	-	+	-	-	-	-
<i>S. cornuformis</i> sp. n.	+	-	+	+	-	●	+
<i>Scandodus gracilis</i> sp.	-	-	-	-	+	+	+
<i>S. carinatus</i> sp. n.	-	-	-	-	+	●	+
<i>S. aff. carinatus</i> sp. n.	-	-	-	-	+	●	+
<i>S. pipa</i> Lind.	+	-	-	-	+	-	-
<i>S. rectus</i> Lind.	-	+	-	-	+	-	-
<i>Cordylodus perlongus</i> Lind.	-	+	●	●	-	-	+
<i>Paracordylodus dentatus</i> sp. n.	-	-	-	-	+	●	+
<i>Terrapriionodus robustus</i> Lind.	-	+	+	+	+	-	-
<i>T. minax</i> sp. n.	-	-	-	-	+	●	+
<i>T. denticulatus</i> Lind.	-	+	+	+	-	-	-
<i>Trapezognathus quadran-</i> <i>gulum</i> Lind.	-	○	-	-	-	+	●
<i>T. sp. n. 1</i>	-	-	-	-	-	-	-

Table 1 (Continued)

Species	<u>Productorthis obtusa, Paurothis parva zone (Volkhovian horizon)</u>				<u>Lycophoria nucella and Endoceras incognitum zone (Kunda horizon)</u>		
	Subzone 1		Sub-zone 2	Sub-zone 3	Sub-zone 4	Sub-zone 5	Sub-zone 6
	Bottom	Top					
<u>Oepicodus smithensis</u> Lind.	●	—	—	—	—	—	—
<u>O. crassulus</u> Lind.	●	—	—	—	—	—	—
<u>Trichonodella flabellum</u> Lind.	+	●	+	—	—	—	—
<u>T. alae</u> Lind.	—	+	+	+	—	—	—
<u>T. irregularis</u> Lind.	—	+	●	+	—	—	—
<u>T. longa</u> Lind.	—	—	+	+	—	—	—
<u>Prioniodina flabellum</u> Lind.	—	+	○	+	—	—	—
<u>P. inflata</u> Lind.	+	+	+	+	—	—	—
<u>P. deflexa</u> Lind.	●	—	—	—	—	—	—
<u>P. aff. deflexa</u> Lind.	●	—	—	—	—	—	—
<u>Volchodina densa</u> Lind.	—	+	+	●	—	—	—
<u>V. costulata</u> sp. n.	—	+	+	+	—	+	—
<u>Falodus extenuatus</u> Lind.	—	○	—	—	—	—	—
<u>F. prodentatus</u> (Grav. et Ellis.)	—	○	—	—	—	—	—
<u>F. simplex</u> sp. n.	—	+	+	●	+	—	—
<u>Lenodus falodiformis</u> sp. n.	—	+	+	+	—	+	—
<u>L. clarus</u> sp. n.	—	—	—	—	●	+	+
<u>Prioniodus evae</u> Lind.	○	—	—	—	—	—	—
<u>P. navis</u> Lind.	—	+	●	+	—	—	—
<u>P. alatus</u> Hadd.	—	—	—	+	+	●	●
<u>P. lindstromi</u> -sp. n.	—	—	—	+	+	—	+
<u>P. sp. n. 2</u>	—	—	—	—	—	—	●
<u>Ambalodus popovkiensis</u> sp. n.	—	—	—	—	—	●	+
<u>A. planus</u> sp. n.	—	—	—	+	●	+	—
<u>A. sp. n. 1</u>	—	—	—	—	—	+	+
<u>Amorphognatus variabilis</u> sp. n.	—	—	—	—	—	●	+
<u>Lonchodus</u> sp. n. 1	—	—	+	+	—	+	—

Notes: 1) Subzones are numbered as in text, 2) For subzone 1 the stratigraphic distribution of the conodonts in the top and bottom parts is given, 3) key: ● conodonts characteristic of the given layers; + conodonts found in several zones; ○ rare conodonts.

of the Leningrad province not only permit them to be integrated into the stratigraphic system of the territory studied but also permit correlation of the deposits containing them with the corresponding deposits on Sweden.

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