

**D.P. Plax***Belarusian National Technical University, Minsk, Belarus***LATE EMSIAN PLACODERMS OF BELARUS**

Late Emsian placoderms of Belarus are well known from the published lists [Plaksa, 2007; Plax 2008a; 2008b, etc.]. However, the general information on their localities in the territory of the Republic, that is, in what particular borehole and at which exactly depth they were found, so far has hardly been given. This paper is aimed to fill in this gap. By now various skeleton elements of the Late Emsian placoderms are reliably discovered in twelve boreholes within the territory of Belarus. They are: Vilchitsy 1, Berdyzh 1, Rogachev 736, Bobruysk 691/2, Osipovichy 6, Bykhov 151, Chashniki 53, Lepel 1, Latvishi 12, Murovshchina 1, Mstislavl 1 and Buda Dal'naya 35. The first reliable finding of the Late Emsian placoderm was made within the territory of the country more than fifty years ago. The skull roof, trunk shield, a number of separate plates from the trunk shield and endocranium of phlyctaeniid which subsequently received the species name *Kartalaspis belarusica* Mark-Kurik were discovered in the deposits of the Vitebsk Regional Stage. The latter species has existed in literature as a nomen nudum for many years and is spelled in different ways (belorussica, byelorussica and belarussica) [Mark-Kurik, 2002]. This species is interesting in two aspects. Firstly, it was found in two distant localities, namely, in Eastern Belarus and Southeastern Estonia. In the territory of Belarus, *Kartalaspis* remains were found in the Vilchitsy 1 borehole in the Obol (depth 344.5 m) and Lepel (depth 327.6 m) Beds of the Vitebsk Regional Stage of the Upper Emsian Substage of the Lower Devonian. In Southeastern Estonia, this species was found in deposits of the Rēzekne Formation of the Upper Emsian Substage of the Lower Devonian (Raigla 425 borehole, depth 272.2 m) [Mark-Kurik, 2002]. Secondly, it is the only phlyctaeniid from the Baltic area and Belarus with the endocrania preserved, even in two specimens.

During last ten years, the author found several more representatives of the Late Emsian placoderms. So, in the Osipovichy 6 borehole within deposits of the Lepel Beds of the Vitebsk Regional Stage the isolated small fragments of plates, fragment of the left anterior ventral plate, preorbital plates, fragment of the posterior dorso-lateral or posterior lateral plate, fragment of the right paranuchal plate of cf. *Diadsomaspis* (depths 113.5 m, 113.8 m and 118.8 m) (Plate, Fig. 1, 2 and 3), fragment of the right paranuchal plate of Euarthrodira gen. indet. (depth 113.5 m) (Plate, Fig. 4), fragment of the left paranuchal plate of Actinolepididae gen. indet. (depth 113.8 m) (Plate, Fig. 5), small plate fragment of Ptyctodontida gen. indet. (depth 113.5 m) and the left mixilateral plate of Antiarcha gen. nov. Plax (depth 113.8 m) (Plate, Fig. 6) were found. Small fragments of plates of cf. *Diadsomaspis* were also found in the Bobruysk 691/2 borehole (depth 234.5 m). They were confined to deposits of the Lepel Beds of the Vitebsk Regional Stage. From the above mentioned taxa of fish, taxon cf. *Diadsomaspis* is the most interesting, because the plate fragment of this taxon was also found in deposits of the Rēzekne Formation in the territory of Lithuania (Liepkalnis 137 borehole, depth 631.2 m) [Mark-Kurik, 2002].

In deposits of the Lepel Beds of the Vitebsk Regional Stage in the Lepel 1 (depth 274.8 m), Bobruysk 691/2 (depth 233.0 m) and Bykhov 151 (depth range of 240.6-278.0 m) boreholes separate small fragments of plates of armor and small imprints of Phlyctaeniina gen. indet. were found. In the Rogachev 736 (depth 293.0 m) borehole within rocks of the Lepel Beds of the

Vitebsk Regional Stage, several small and one large fragment of plate of Holonematidae gen. indet. (Plate, Fig. 7) were found. Small fragments of plates of distal part of the pectoral fin of *Antiarcha* gen. indet. (depth 407.0 m) and isolated tubercles of *Acanthothoraci* gen. indet. (depth 410.0 m) were found in the Lepel Beds of the Vitebsk Regional Stage of the Berdyzh 1 borehole. In the Buda Dal'nyaya 35 (depth 233.2 m) borehole small fragments of posterior ventro-lateral plate, two anterior dorso-lateral plates of *Coccosteidae* gen. indet. (Plate, Figs. 8 and 9), which come from the Lepel Beds of the Vitebsk Regional Stage, were found. Interesting skeleton material on placoderms comes from deposits of the Lepel Beds of the Vitebsk Regional Stage of the Chashniki 53 (depth range of 291.0 - 294.4 m), Lepel 1 (depth 271.0 m) and Latvishi 12 (depth 254.0 m) boreholes. In these boreholes the left anterior lateral plate, the right interlateral plate, one anterior ventro-lateral plate and spinal plate of *Ptyctodontida* gen. nov. *Plax* (Plate, Figs. 10, 11 and 12) were found, as well as several fragments of plates which relative position on the body of the fish cannot be identified.

According to J. Valiukevičius, V. Karatajūtė-Talimaa and S. Kruczek [Valiukevicius, Talimaa, Kruczek, 1995] in the Mstislavl 1 (depth range of 491.0 - 523.0 m) borehole in deposits of the Lepel Beds of the Vitebsk Regional Stage the species *Millerosteus orvikui* (Gross) was found. However, now this species is a junior synonym of *Coccosteus cuspidatus* Miller ex Agassiz, which comes from deposits of the Upper Eifelian (for example, the Kostyukovich Regional Stage of Belarus or the Kernavė Regional Substage of the Baltic States), and true genus *Millerosteus* is known from the Givetian Stage of the Middle Devonian. Taking into consideration this fact it is possible to conclude that they made a mistake and the found skeleton material belongs to a different genus of placoderms.

In conclusion, it should be noted that the findings of skeleton elements of the Late Emsian placoderms listed here are very important for the understanding of the completeness of ichthyofauna assemblages of the time interval under consideration. It is encouraging that all known in Belarus the Late Emsian placoderms are given as the open nomenclature, which makes it difficult to use them for the purposes of stratigraphy. It is related on the one hand with their insufficient studying, and on the other hand with fragmented and sporadic nature of findings of their skeleton elements. The studying of the Vitebsk deposits within the territory of the country is possible only in boreholes but deep drilling is currently very limited, due to the lack of funding. Thus, it is unreal to hope to find massive skeletal material. That is why it is necessary to study in a more detailed way the available skeletal material, to re-examine the preserved palaeontological collections of the Vitebsk Regional Stage in the Enterprise "Research and Production Center for Geology" so as to find there fish remains and purposefully explore the core material of those not yet liquidated cores of boreholes which expose the deposits of the Vitebsk Regional Stage. Then it is necessary to study in details and describe placoderms which skeleton elements are well represented, and to publish these results.

#### References

*Plaksa D.P.* Devonian (Late-Emsian – Frasnian) fish fauna of Belarus and its stratigraphic importance. – Candidate Thesis. Institute of Geochemistry and Geophysics of the National Academy of Sciences of Belarus. - Minsk, 2007. 23 p. (in Russian with Belarusian and English summary).

*Plax D.P.* Late Emsian ichthyofauna of Belarus // Geobiosphere events and the history of the organic world. Proceedings of the LIV Session of the Palaeontological Society of the Russian

Academy of Sciences (St. Petersburg, April, 7-11, 2008). – St. Petersburg, 2008a. – P. 136-137 (in Russian).

Plax D.P. Devonian fish fauna of Belarus // Lithosphere. 2008b. – No. 2 (29). – P. 66-92 (in Russian).

Mark-Kurik E. *Kartalaspis* and other Early Devonian arthrodires and their stratigraphic significance / The Fifth Baltic Stratigraphical Conference. Basin stratigraphy // Modern methods and problems. – Vilnius. 2002. - P. 117-119.

Valiukevičius J., Talimaa V., Kruchek S. Complexes of vertebrate microremains and correlation of terrigenous Devonian deposits of Belarus and adjacent territories // Ichthyolith Issues. Special Publication 1. Socorro, New Mexico, 1995. - P. 53-59.

*Plate* – Placoderm plates from the Rogachev 736, Osipovichi 6, Buda Dal'nyaya 35, Lepel 1 and Chashniki 53 boreholes. The skeleton elements of placoderms from the Upper Emsian Substage, Lower Devonian. Scale bar of 8 mm for Fig. 7; 5 mm for Figs. 1, 4, 5 and 6; 4 mm for Fig. 10; 3.5 mm for Fig. 2; 3 mm for Figs. 8 and 11; 2.5 mm for Fig. 3; 2 mm for Figs. 9 and 12.

Fig. 1 – cf. *Diadsomaspis*. Specimen № 44/1-21. Osipovichi 6 borehole, depth 118.8 m, fragment of the right paranuchal plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 2 – cf. *Diadsomaspis*. Specimen № 44/1-6. Osipovichi 6 borehole, depth 113.5 m, fragment of the left anterior ventral plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 3 – cf. *Diadsomaspis*. Specimen № 44/1-6a. Osipovichi 6 borehole, depth 113.5 m, plate fragment in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 4 – *Euarthrodira* gen. indet. Specimen № 44/1-7a. Osipovichi 6 borehole, depth 113.5 m, fragment of the right paranuchal plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 5 – *Actinolepididae* gen. indet. Specimen № 44/2-1. Osipovichi 6 borehole, depth 113.8 m, fragment of the left paranuchal plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 6 – *Antiarcha* gen. nov. Plax. Specimen № 44/2-2. Osipovichi 6 borehole, depth 113.8 m, fragment of the left mixilateral plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 7 – *Holonematidae* gen. indet. Specimen № 6/1-1. Rogachev 736 borehole, depth 293.0 m, plate fragment in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 8 – *Coccosteidae* gen. indet. Specimen № 51/2-2a. Buda Dal'nyaya 35 borehole, depth 233.2 m, fragment of anterior dorso-lateral plate in internal view, Vitebsk Regional Stage, Lepel Beds.

Fig. 9 – *Coccosteidae* gen. indet. Specimen № 51/2-2. Buda Dal'nyaya 35 borehole, depth 233.2 m, fragment of the left anterior dorso-lateral plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 10 - *Ptyctodontida* gen. nov. Plax. Specimen №43/16-1. Chashniki 53 borehole, depth range of 291.0 - 294.4 m, anterior ventro-lateral plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 11 - *Ptyctodontida* gen. nov. Plax. Specimen №43/16-2. Chashniki 53 borehole, depth range of 291.0 - 294.4 m, left anterior lateral plate in external view, Vitebsk Regional Stage, Lepel Beds.

Fig. 12 - *Ptyctodontida* gen. nov. Plax. Specimen №47/71-7. Lepel 1 borehole, depth 271.0 m, spinal plate in external view, Vitebsk Regional Stage, Lepel Beds.

Plate



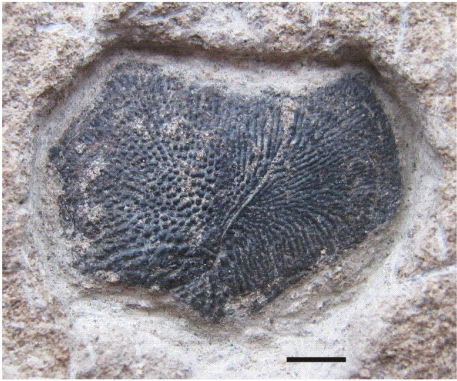
1



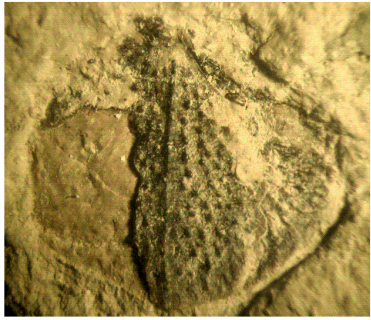
2



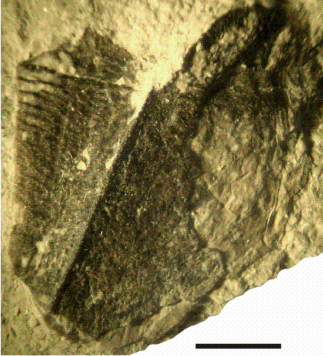
3



4



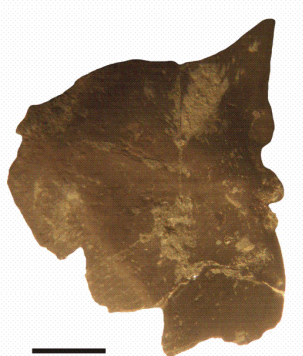
5



6



7



8



9



10



11



12