

Acanthodians from the Silurian-Devonian boundary beds of Novaya Zemlya Archipelago, Russia

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Abstract

© 2018, © 2018 Geologiska Föreningen. An acanthodian assemblage is reported for the first time from the Silurian-Devonian boundary beds of Novaya Zemlya Archipelago, Russia. The acanthodian scales and rare other vertebrate microremains were in a sample collected from the Reliktovoe Formation of the western coast of Inostantzev Bay, North Island. The assemblage includes *Gomphonchus mediocostatus*, *Gomphonchoporus hoppei* taxa previously described from the Pridoli-Lochkovian of Laurussia, and *Taimyrolepis composita* occurred in the Lochkovian of Siberia. *Gomphonchus mediocostatus* and *Gomphonchoporus hoppei* are widely distributed in the Baltica palaeogeographic province, and *Taimyrolepis* is known from the Siberia province, indicating connection between those provinces.

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Keywords

Acanthodii, *Gomphonchoporus hoppei*, *Gomphonchus mediocostatus*, Novaya Zemlya, Pridoli-Lochkovian, Russia, *Taimyrolepis composita*

References

- [1] Abushik, A.F., & Evdokimova, I.O., 1999: Lagoonal to normal marine Late Silurian-Early Devonian ostracode assemblages of the Eurasian Arctic. *Acta Geologica Polonica* 49(2), 133-143.
- [2] Berg, L.S., 1940: Sistema ryboobraznykh i ryb, nyne zhivushchikh i ickopayemykh [System of recent and fossil agnathans and fishes]. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR* [Transactions of the Zoological Institute of USSR Academy of Sciences] 5, 85-517 [in Russian].
- [3] Blieck, A., Goujet, D., & Janvier, P., 1987: The vertebrate stratigraphy of the Lower Devonian (Red Bay Group and Wood Bay Formation) of Spitsbergen. *Modern Geology* 11, 197-217.
- [4] Bondarev, V.I., & Andreeva, I.A., 1981: Nizhnedevonskie otlozheniya Severnogo ostrova Novoi Zemli [Lower Devonian deposits of the North Island in Novaya Zemlya]. In V.I., Bondarev (ed.): *Paleontologicheskaya osnova stratigraficheskikh shem paleozoya i mezozoika ostrovov Sovetskoi Arktiki*, 5-13. NIIGA, Leningrad [in Russian].
- [5] Burrow, C.J., 2002: Lower Devonian acanthodian faunas and biostratigraphy of south-eastern Australia. *Memoirs of the Association of Australasian Palaeontologists* 27, 75-137.
- [6] Burrow, C.J., Turner, S., Nowlan, G.S., & Denison, R.H., 2013: Vertebrate microremains from the late Silurian of Arisaig, Nova Scotia, Canada. *Journal of Paleontology* 87, 1041-1059. doi:10.1666/12-154.
- [7] Burrow, C.J., Turner, S., & Wang, S.-T., 2000: Devonian microvertebrates from Longmenshan, Sichuan, China: Taxonomic assessment. *Courier Forschungsinstitut Senckenberg* 223, 391-452.
- [8] Cherkesova, S.V., Sobolev, N.N., & Spassky, Ya.N., 2000: Devonian stage boundaries in Novaya Zemlya. *Courier Forschungsinstitut Senckenberg* 225, 319-322.

- [9] Cocks, L.R.M., & Torsvik, T.H., 2005: Baltica from the late Precambrian to mid-Palaeozoic times: the gain and loss of a terrane's identity. *Earth-Science Reviews* 72, 39–66. doi:10.1016/j.earscirev.2005.04.001.
- [10] Cocks, L.R.M., & Torsvik, T.H., 2016: Earth history and palaeogeography. Devonian, 124–137. Cambridge University Press, Cambridge.
- [11] Gross, W., 1971: Downtonische und Dittonische Acanthodier-Reste des Ostseegebietes. *Palaeontographica Abt A* 136, 1–82.
- [12] Gross, W., 1973: Kleinschuppen, Flossenstacheln und Zähne von Fischen aus europäischen und nordamerikanischen Bonebeds des Devons. *Palaeontographica Abt A* 142, 51–155.
- [13] Guo, L., Schekoldin, R., & Scott, R., 2010: The Devonian succession in northern Novaya Zemlya, Arctic Russia: sedimentology, palaeogeography and hydrocarbon occurrence. *Journal of Petroleum Geology* 33, 105–121. doi:10.1111/jpg.2010.33.issue-2
- [14] Harland, W.B., 1997: The geology of Svalbard. Chapter 16. Devonian history. Geological Society, London, Memoirs 17, 289–309. doi:10.1144/gsl.mem.1997.017.01.16.
- [15] Ilyes, R.R., 1995: Acanthodian scales and worm tubes from the Kapp Kjeldsen Division of the Lower Devonian Wood Bay Formation, Spitsbergen. *Polar Research* 14, 89–92. doi:10.3402/polar.v14i1.6655
- [16] Karatajute-Talimaa, V.N., 2000: Significance of thelodonts (Agnatha) in correlation of the uppermost Ordovician to Lower Devonian of the northern part of Eurasia. *Courier Forschungsinstitut Senckenberg* 223, 69–80.
- [17] Legault, J.A., 1968: Conodonts and fish remains from the Stonehouse Formation, Arisaig, Nova Scotia. Canada Geological Survey Bulletin 165, 3–48.
- [18] Mark-Kurik, E., & Novitskaya, L., 1977: Rannedevonskaya ikhtiofauna na Novoy Zemle [The Early Devonian fish fauna on Novaya Zemlya]. Proceedings of the Academy of Sciences of the Estonian SSR, Chemistry and Geology 26, 143–149 [in Russian, with English abstract].
- [19] Märss, T., 1997: Vertebrates of the Přídolí and Silurian-Devonian boundary beds in Europe. *Modern Geology* 21, 17–41.
- [20] Mark-Kurik, E., Blieck, A., Burrow, C.J., & Turner, S., 2013: Early Devonian fishes from coastal De Long Strait, central Chukotka, Arctic Russia. *Geodiversitas* 35, 545–578. doi:10.5252/g2013n3a3
- [21] Modzalevskaya, T.L., 1985: Brachiopods from the Silurian and Early Devonian of the European Part of the U.S.S.R. Nauka, Moscow. 128 pp. [in Russian].
- [22] Nakrem, H.A., 2007: The 1921 O. Holtedahl Novaya Zemlya collection-geology (illustrated atlas). Part I: Introduction. Natural History Museum, University of Oslo, Oslo. 26 pp.
- [23] Nekhorosheva, L.V., & Patrunov, D.K., 1999: The chief Wenlockian-Lochkovian benthic communities of the Vaigach to southern Novaya Zemlya region. In A.J., Boucot & J.D., Lawson (eds.): Paleocommunities—a case study from the Silurian and Lower Devonian, 488–495. Cambridge University Press, Cambridge.
- [24] Newman, M.J., Burrow, C.J., Davidson, R.G., den Blaauwen, J.L., & Jones, R., 2017: Comparison of the vertebrate faunas of the Lower Old Red Sandstone of the Anglo-Welsh Basin with contemporary faunas in Scotland. *Proceedings of the Geologists' Association* 128, 447–459. doi:10.1016/j.pgeola.2016.12.007.
- [25] Obruchev, D.V., 1973: Znachenije pozvonochnykh dlya korrelyatsii siluriyskikh i nizhne-srednedevonskikh otlozhenij SSSR [Importance of vertebrates for correlation of the Silurian and Lower-Middle Devonian deposits of USSR]. In Trudy III Mezhdunarodnogo simpoziuma po granitse silura i devona i stratigrafií nizhnego i srednego devona [Stratigraphy of the Lower and Middle Devonian. Transactions of the III International Symposium on the Silurian-Devonian Boundary and Stratigraphy of the Lower and Middle Devonian], Vol. II, Nauka, Leningrad, 189–197 [in Russian].
- [26] Ørvig, T., 1957: Notes on some Paleozoic lower vertebrates from Spitsbergen and North America. *Saertrykk av Norsk geologisk tidsskrift* 37, 285–353.
- [27] Ørvig, T., 1969: The vertebrate fauna of the Primaeva Beds of the Frænkelyggen Formation of Vestspitsbergen and its biostratigraphic significance. *Lethaia* 2(3), 219–239.
- [28] Owen, R., 1846: Lectures on the comparative anatomy and physiology of the vertebrate animals delivered at the Royal College of Surgeons, England in 1844 and 1846. Part I, Fishes, i-xi+1–304. Longman, Brown, Green and Longmans, London.
- [29] Pander, C.H., 1856: Monographie der fossilen Fische des silurischen Systems der Russisch-Baltischen Gouvernements. Obersilurische Fische. Buchdruckerei der Kaiserlichen Akademie der Wissenschaften, St. Petersburg. 91 pp.
- [30] Pernègre, V.N., & Blieck, A., 2016: A revised heterostracan-based ichthyostatigraphy of the Wood Bay Formation (Lower Devonian, Spitsbergen), and correlation with Russian Arctic archipelagos. *Geodiversitas* 38, 5–20. doi:10.5252/g2016n1a1.
- [31] Plax, D.P., 2011: Devonian ichthyofauna of the Volyn Monocline. *Lithosphere* 35(2), 12–21.
- [32] Plax, D.P., 2015: Ichthyofauna from the Lower Devonian (Lochkovian) deposits of the southwestern part of Belarus. *Lithosphere* 2(43), 19–36.

- [33] Shkarubo, S.I., (ed.), 2013: Obyasnitelnaya zapiska k Gosudarstvennoy geologicheskoy karte Rossiyskoy Federatsii, List T-41-44-Mys Zhelaniya [Explanatory Notes to the State Geological Map of Russian Federation, Sheet T-41-44 -Zhelaniya Cap], St. Petersburg. 200 pp. [in Russian].
- [34] Valiukevičius, J., 1988: Correlation of Lower and Middle Devonian deposits of the USSR with acanthodian assemblages. Canadian Society of Petroleum Geologists Memoirs 14(3), 601-607.
- [35] Valiukevičius, J.J., 1992: First articulated Poracanthodes from the Lower Devonian of Severnaya Zemlya. In E., Mark-Kurik (ed.): Fossil Fishes as Living Animals, 193-214. Academy of Sciences of Estonia, Tallinn.
- [36] Valiukevičius, J.J., 1994: Acanthodians and their stratigraphic significance. In S., Cherkesova, V., Karatajute-Talimaa & R., Matukhin (eds.): Stratigraphy and Fauna of the Lower Devonian of the Tareya Key Section (Taimyr), 131-197, 236-243. Leningrad, Nedra [in Russian].
- [37] Valiukevičius, J.J., 1998: Acanthodians and zonal stratigraphy of Lower and Middle Devonian in East Baltic and Byelorussia. Palaeontographica Abt A 248, 1-53.
- [38] Valiukevičius, J.J., 2000: Acanthodian biostratigraphy and interregional correlations of the Devonian of the Baltic States, Belarus, Ukraine and Russia. Courier Forschungsinstitut Senckenberg 223, 271-289.
- [39] Valiukevičius, J.J., 2003a: Devonian acanthodians from Severnaya Zemlya Archipelago (Russia). Geodiversitas 25, 131-204.
- [40] Valiukevičius, J.J., 2003b: New Late Silurian to Middle Devonian acanthodians of the Timan-Pechora region. Acta Geologica Polonica 53, 209-245.
- [41] Valiukevičius, J., 2004: Silurian succession of the Luzni-4 borehole (Latvia). Acta Universitatis Latviensis 679, 120-147.
- [42] Valiukevičius, J., 2005: Silurian acanthodian biostratigraphy of Lithuania. Geodiversitas 27, 349-380.
- [43] Vergoossen, J.M.J., 1997: Revision of poracanthodid acanthodians. In A., Ivanov, M.V.H., Wilson & A., Zhuravlev (eds.): Circum-Arctic Palaeozoic vertebrates: biological and geological significance, Ichthyolith Issues S.P. 3, 44-46.
- [44] Vergoossen, J.M.J., 1999a: Late Silurian fish microfossils from an East Baltic-derived erratic from Oosterhaule, with a description of new acanthodian taxa. Geologie en Mijnbouw 78, 231-251.10.1023/A:1003803814177
- [45] Vergoossen, J.M.J., 1999b: Siluro-Devonian microfossils of Acanthodii and Chondrichthyes (Pisces) from the Welsh borderland/South Wales. Modern Geology 24, 23-90.
- [46] Vergoossen, J.M.J., 2000: Acanthodian and chondrichthyan microremains in the Siluro-Devonian of the Welsh Borderland, Great Britain, and their biostratigraphical potential. Courier Forschungsinstitut Senckenberg 223, 175-199.
- [47] Wang, N.-Z., 1992: Microremains of agnathans and fishes from Lower Devonian of Central Guangxi with correlation of Lower Devonian between Central Guangxi and Eastern Yunnan, South China. Acta Palaeontologica Sinica 31, 298-307.
- [48] Watson, D.M.S., 1937: The acanthodian fishes. Philosophical Transactions of the Royal Society (B) 228, 49-146.10.1098/rstb.1937.0009
- [49] White, E.I., 1961: The Old Red Sandstone of Brown Clee Hill and the adjacent area, II. Palaeontology. Bulletin of the British Museum (Natural History), Geology 5(7), 243-310.
- [50] Wissak, M., Volohonsky, E., & Blomeier, D., 2004: Acanthodian fish trace fossils from the Early Devonian of Spitsbergen. Acta Palaeontologica Polonica 49, 629-634.
- [51] Woodward, A.S., 1891: Catalogue of the fossil fishes in the British Museum (Natural History). Part II. British Museum (Natural History), London. 567 pp.