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SHORT COMMUNICATION

First record of a fossil serpulid tube (Polychaeta: Serpulidae) from the Miocene sediments of Sakhalin (NW Pacific)

Первая находка ископаемой трубки серпулиды (Polychaeta: Serpulidae) из миоценовых отложений Сахалина (С.-З. Пацифика)

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Abstract. A fossil tube of a polychaete from the family Serpulidae Rafinesque, 1815 was found during an expedition of the Zoological Institute of the Russian Academy of Sciences in 1998 in the western part of Sakhalin Island. The fossil is dated to the Middle–Late Miocene. There were no previous records of fossil serpulids in the area. Based on the examination of the morphology and microstructure of the tube, it was established that the fossil belongs either to the genus *Chitinopoma* Levinsen 1884 or to *Filogranula* (Langerhans, 1884) and is very similar to the tube of the species *Chitinopoma rzhavskii* (Kupriyanova, 1993) which currently inhabits the northeast of the Pacific Ocean.

Резюме. Ископаемая трубка полихеты, принадлежащей к семейству Serpulidae Rafinesque, 1815, найдена во время экспедиции Зоологического института РАН в 1998 г. на западе Сахалина. Находка датирована средним-верхним миоценом. Ранее какие-либо находки ископаемых серпулид в обозначенном районе не регистрировались. На основании морфологических особенностей трубки и микроструктуры её стенки сделан вывод, что трубка принадлежит либо к роду *Filogranula* Levinsen 1884, либо к *Chitinopoma* Levinsen, 1884 и очень сходна с трубкой вида *Chitinopoma rzhavskii* (Kupriyanova, 1993), ныне обитающим на северо-востоке Тихого Океана.

Key words: fossil tube, Serpulidae, Miocene, western Sakhalin, new record

Ключевые слова: ископаемая трубка, Serpulidae, миоценовые отложения, Западный Сахалин, новая находка

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Serpulids are benthic polychaetes found throughout the world and mainly on the shelf, although some genera live in bathyal and abyssal waters (Rzhavsky et al., 2014). They secrete calcareous tubes and therefore are better preserved in fossil record than most polychaetes. The oldest findings of serpulids date to the latest Paleozoic (Middle to Late Permian, ~260 Ma) (Sanfilippo et al., 2017) and fossil serpulids become widespread from the early Jurassic (~200 Ma) (Ippolitov, 2007; Ippolitov et al., 2014). Although there were no records of fossil serpulids from the west of Sakhalin, members of several other families were found there (Gagaev, 2017; 2018). Insufficient attention to fossil polychaetes among palaeontologists is probably the main reason for the poor study of the group.

During a palaeontological expedition of the Zoological Institute of the Russian Academy of Sciences (ZIN RAS) in 1998, a fossil tube of a polychaete from the family Serpulidae Rafinesque,

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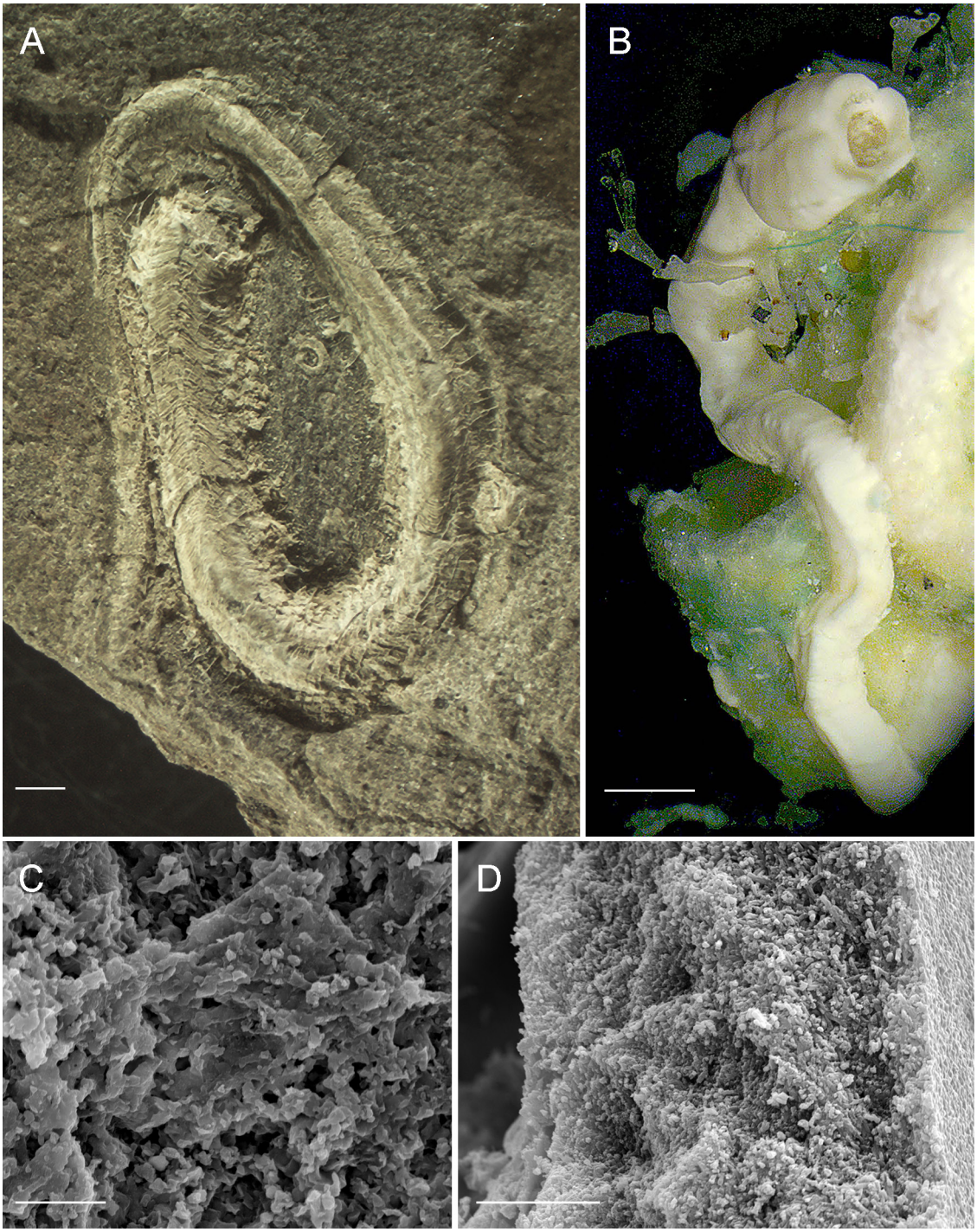


Fig. 1. Fossil serpulid tube from western Sakhalin (A, C) and *Chitinopoma rzhavskii* (Kupriyanova, 1993) (B, D). **A**, **B**, general appearance (B, specimen from Bering Sea, Commander Islands, Mednyy Island, Glinka Bay); **C**, **D**, microstructure of wall. Photos by E.K. Kupriyanova (B) and A. P. Ippolitov (D). Scale bars: 10 mm (A, B), 10 μm (C, D).

1815 was found in the west of Sakhalin, the Agnevo river, by M.V. Nazarkin. The tube is dated to the Middle–Late Miocene, since the layers belong to the Cape Markevich Beds or to the Agnevskaya Formation (Fotianova & Serova, 1987).

The fossil is a white opaque tube (Fig. 1A) with a single keel bearing traces of growth, with a subtriangular shape in cross-section. The tube is coiled into a loop clockwise and attached to the substrate throughout its length. The full length of

the tube is about 30 mm, with a maximum diametre of 1.7 mm in the mouth part, 1.2 mm in the middle, and 0.6 mm near the posterior end, the wall thickness is 0.6 mm, 0.3 mm, and 0.2 mm, respectively. The fossil tube is deposited under the number 1/50766 in the collection of annelids of ZIN RAS. Morphologically, the tube is similar to those of the serpulid genera *Filogranula* Langerhans, 1884 and *Chitinopoma* Levinsen, 1884, and is most similar to the tube of the extant species *Chitinopoma rzhavskii* (Kupriyanova, 1993) (Fig. 1B), which now inhabits the northeast of the Pacific Ocean. Originally, *Ch. rzhavskii* was assigned to the genus *Filogranula* (Langerhans, 1884) first known from the Jurassic (Ippolitov et al., 2014).

To confirm this assumption based on morphological data, we examined the microstructure of the fossil tube wall using scanning electron microscopy (SEM). The microstructure is very similar to that of the tubes of *Chitinopoma rzhavskii*: it is single-layered, with the so-called irregularly oriented prismatic structure (Fig. 1C, D). Considering that the differences between the two mentioned genera are hardly noticeable and their separation raises doubts among specialists (E. Kupriyanova & A. Ippolitov, pers. comm.), the microstructural data confirm the assignment of the fossil tube to the genus *Filogranula* or *Chitinopoma* and its probable closeness to the extant species *Ch. rzhavskii*.

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References

Fotianova L.I. & Serova M.J. 1987. Late Miocene climatic optimum of the northwest Pacific province. *Izvestiya Akademii Nauk SSSR. Seriya geologicheskaya*, **5**: 38–51. (In Russian; English translation: *International Geology Review*, 1987, **29**(5): 515–528. https://doi.org/10.1080/00206818709466168).

Gagaev S.Yu. 2017. Fossil impressions of pectinariid tubes (Polychaeta) in Miocene sediments of the Sakhalin Island. *Zoosystematica Rossica*, **26**(2): 212–214. https://doi.org/10.31610/zsr/2017.26.2.212

Gagaev S.Yu. 2018. Fossil impression of a nephtyid polychaete (Polychaeta: Nephtyidae) in the Miocene sediments of Sakhalin (NW Pacifc). *Zoosystematica Rossica*, **27**(2): 200–204. https://doi.org/10.31610/zsr/2018.27.2.200

Ippolitov A.P. 2007. Contribution to the revision of some Late Callovian serpulids (Annelida, Polychaeta) of central Russia: Part 1. *Paleontological Journal*, **41**(3): 260–267. https://doi.org/10.1134/S0031030107030057

Ippolitov A.P., Vinn O., Kupriyanova E.K. & Jäger M. 2014. Written in stone: history of serpulid polychaetes through time. *Memoirs of Museums Victoria*, **71**: 123–159. https://doi.org/10.24199/j.mmv.2014.71.12

Kupriyanova E. K. 1993. Filogranula rzhavskii sp. n. (Polychaeta, Serpulidae) from the Russian Far-Eastern Seas. *Zoologicheskiy Zhurnal*, **72**(1): 142–145. (In Russian). https://doi.org/10.1080/00785326.1993.10429923

Langerhans P. 1884. Die Wurmfauna von Madeira. 4. *Zeitschrift für wissenschaftliche Zoologie*, **40**: 247–285.

Levinsen G.M.R. 1884. Systematisk-geografisk oversigt over de nordiske Annulata, Gephyrea, Chaetognathi, og Balanoglossi. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening I Kjöbenhavn, 1882 og 1883*: 160–251. (In Danish). https://doi.org/10.5962/bhl.title.16117

Nazarkin M.V. 2016. Cenozoic fossil fishes of the extinct alepisauroid family Polymerichthyidae from the Sakhalin Island, Russia. *Acta palaeontologica Polonica*, **61**(4): 829–838. https://doi.org/10.4202/app.00247.2016

Rafinesque C. S. 1815. *Analyse de la nature ou Tableau de l'univers et des corps organisés.* Palermo. 224 p. https://doi.org/10.5962/bhl.title.106607

Rzhavsky A.V., Kupriyanova E.K., Sikorski A.V. & Dahle S. 2014. *Calcareous tubeworms (Polychaeta, Serpulidae) of the Arctic Ocean*. Moscow: KMK Scientific Press. 199 p.

Sanfilippo R., Rosso A., Reitano A. & Insacco G. 2017. First record of sabellid and serpulid polychaetes from the Permian of Sicily. *Acta palaeontologica Polonica*, **62**(1): 25–38. http://dx.doi.org/10.4202/app.00288.2016

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