



Fossil impression of a nephtyid polychaete (Polychaeta: Nephtyidae) in the Miocene sediments of Sakhalin (NW Pacific)

Фоссильный отпечаток нефтииды (Polycheta: Nephtyidae) в миоценовых отложениях Сахалина (С.-З. Пацифика)

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Abstract. During the expedition of the Zoological Institute of the Russian Academy of Sciences (ZIN RAS) in 1998, a fossil impression of a polychaete worm belonging to the family Nephtyidae Grube, 1850, containing fragments of jaws, was found in the west of Sakhalin. The find is dated to the Middle and Upper Miocene. There are no published records of any finds of fossil nephtyids in the area. Based on the analysis of the jaw shape, it is concluded that the nephtyid impression may belong to the genus *Nephtys* Cuvier 1817 or the genus *Aglaophamus* Kinberg, 1865.

Резюме. Ископаемый отпечаток полихеты, принадлежащий к семейству Nephtyidae Grube, 1850 и содержащий фрагменты челюстей, найден во время экспедиции Зоологического института РАН в 1998 г. на западе Сахалина. Находка датирована средним и верхним Миоценом. Упоминания в литературе о каких-либо находках ископаемых нефтиид в обозначенном районе отсутствуют. На основании анализа формы челюстей сделан вывод, что отпечаток нефтииды принадлежит к роду *Nephtys*, Cuvier 1817 или к роду *Aglaophamus* Kinberg, 1865.

Key words: fossil impression, Miocene sediments, West Sakhalin, nephtyid jaws, Nephtyidae

Ключевые слова: фоссильный отпечаток, миоценовые отложения, Западный Сахалин, челюсти нефтииды, Nephtyidae

ZooBank Article LSID: urn:lsid:zoobank.org:pub:2F1B3EF7-63B1-43CB-B041-2C444304E8CF

During the expedition of the Zoological Institute of the Russian Academy of Sciences (ZIN RAS) in 1998, a fossil impression of a polychaete worm belonging to the family Nephtyidae Grube, 1850, containing fragments of jaws, was found by M.V. Nazarkin in the west of Sakhalin. The find is dated to the Middle and Upper Miocene: the layers of Cape Markevich or the Agnevskaia Formation (Fotianova & Serova, 1987) (Fig. 1). In the middle of the Middle Miocene, a significant,

rapid and prolonged cooling occurred, followed by a short-term return to higher mid-annual temperatures in the middle of the Late Miocene. The Agnevskaia Formation was deposited during extensive Cenozoic marine transgressions and typically comprises galeite, diatomite siltstone and tuffaceous diatomite (Nazarkin, 2016). A Late Miocene fossil polychaete of the family Pectinariidae Quatrefages, 1865 was found on Sakhalin earlier (Gagaev, 2017). Although fossil polychaete

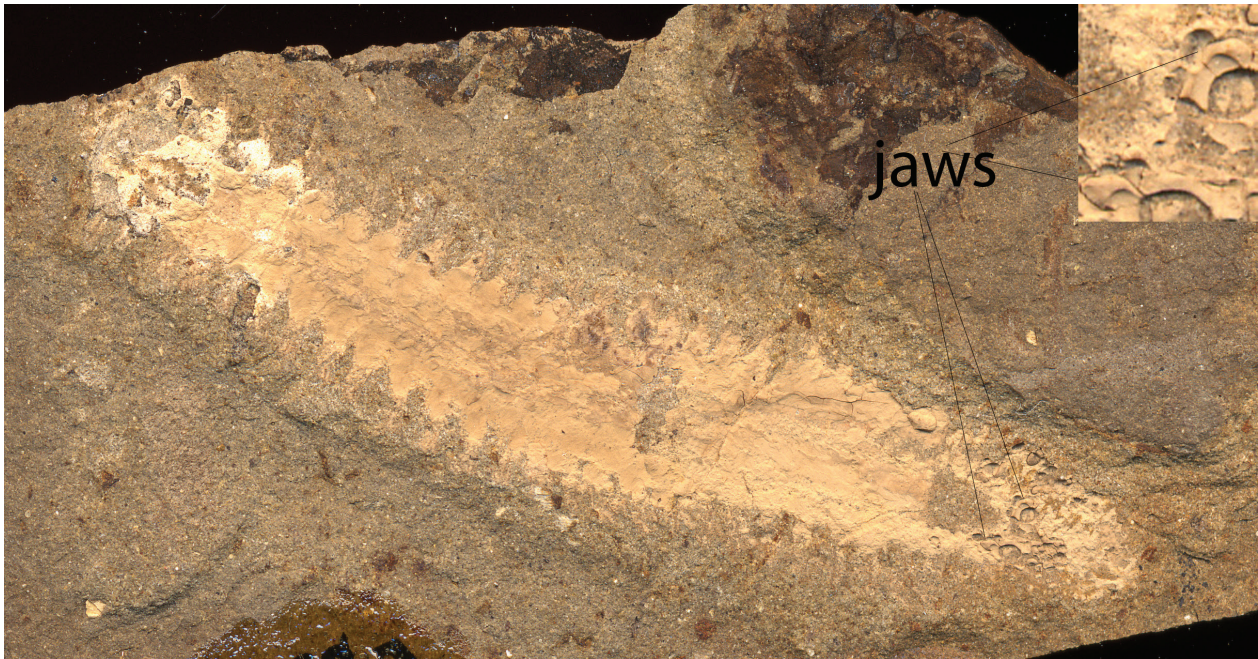


Fig. 1. Impression of a nephtyid polychaete from Sakhalin. Photo by M.V. Nazarkin.



Fig. 2. Recent polychaete worm *Aglaophamus macroura* (Shmarda, 1861) from East Antarctica. Photo by B.I. Sirenko.

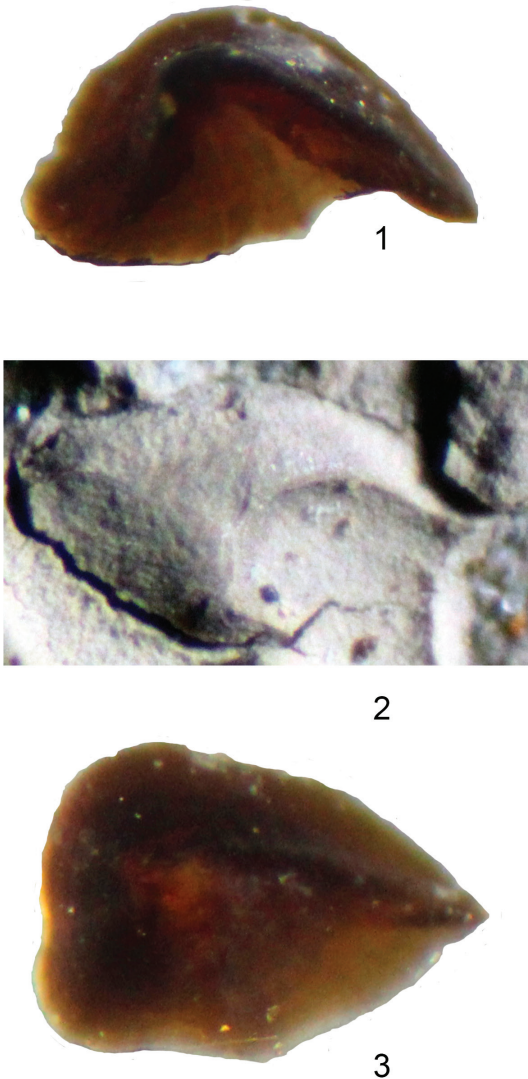


Fig. 3. Jaws of fossil and recent nephtyids. **1,** *Nephtys paradoxa* Malmgren, 1874 from Barents Sea, length 0.9 mm; **2,** fossil nephtyid from Sakhalin, length 0.7 mm; **3,** *Aglaophamus malmgreni* (Théel, 1879) from Barents Sea, length 1.2 mm.

worms belonging to the family Nephtyidae are known from earlier (Carboniferous) deposits (Rouse & Pleijel, 2001), there are no published records of any findings of fossil nephtyids in the region. Impressions of worms of this family are comparatively rare because they do not build tubes and their bodies are formed mainly of soft tissue that is poorly preserved in the ground; therefore such findings deserve close attention (Mierzejewska & Mierzejewski, 1978). A single impression of

the anterior half of a worm, split in two longitudinally, is deposited under number 1/50625 at the Annelids collection of the ZIN RAS. It should be emphasized that this impression is practically indistinguishable from the living polychaetes of this family (Fig. 2).

Nephtyids are benthic polychaetes occurring worldwide from the intertidal to abyssal depths and mainly inhabiting soft sediments. Most of them are actively burrowing predators but several species may be subsurface deposit feeders (Jumars et al., 2015). The smallest species are less than 10 mm long while others can be rather large. The largest species from the Sea of Okhotsk may grow up to 300 mm long (Alalykina et al., 2017). The family Nephtyidae includes approximately 140 species united in the four or five genera: *Aglaophamus* Kinberg, 1865, *Bipalponephtys* Ravara, Wiklund, Cunha, Pleijel, 2010, *Inermonephtys* Fauchald, 1968, *Micronephtys* Friedrich, 1939 and *Nephtys* Cuvier, 1817 (Read & Fauchald, 2018); some authors consider *Bipalponephtys* as a junior synonym of *Micronephtys* (Dnestrovskaya & Jirkov, 2010; Jirkov & Dnestrovskaya, 2012). More than 90 species are known to occur in the Pacific waters (Hartman, 1938; 1950, Hilbig, 1997; Buzhinskaja, 2013; Murray et al., 2015).

The nephtyid impression studied herein belongs to the genus *Nephtys* or to the genus *Aglaophamus*. This conclusion is based on the works of Fauchald (1968) and Ravara et al. (2018), in which the presence of conical jaws in the pharynx was considered among the main features distinguishing these two genera from others. The jaws are located inside the pharynx and can only be examined by dissection, which is why they are frequently overlooked. However, Fauchald (1968) regarded the jaw shape as a good generic and specific diagnostic character and described differences between the jaws of the genera *Nephtys*, *Aglaophamus*, *Micronephtys* and *Inermonephtys*. The jaws of *Nephtys* have a roughly triangular base with a spur on the posterior edge and a recurved tip. The jaws of *Aglaophamus* have the same general shape but differ in the presence of an inner supportive ridge. The triangular base is clearly visible in the impression but the other features are indistinguishable (Fig. 3). Unfortunately, a more precise identification of the available impression is impos-

sible. The morphological feature most frequently used to differentiate the two genera, namely the outward or inward direction of the apex of the branchiae (Dnestrovskaya & Jirkov, 2001, 2010), cannot be discerned in the impression.

Acknowledgements

The author expresses his deepest gratitude to M.V. Nazarkin (senior staff scientist, ZIN RAS) for the material and to N.Yu. Dnestrovskaya (senior staff scientist of the Faculty of biology, Lomonosov Moscow State University) for her assistance in working with the material and article, and to V.V. Potin (chief custodian of the Annelids collection, ZIN RAS) for his technical support.

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Received 12 September 2018 / Accepted 4 November 2018. Editorial responsibility: D.A. Gapon