Nephtys fabricii sp.n. (Annelida: Nephtyidae), a new species from the Northwest Atlantic

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ABSTRACT: A new species of Nephtyidae is described from the Gulf of Maine and Grand Banks of Newfoundland. This material was previously attributed to *Nephtys caeca* (Fabricius, 1780). The new species is characterized by the presence of branchiae from chaetiger 4, distinctly bilobed acicular lobes with a very deep incision in almost all chaetigers, and well developed postacicular lobes with very broad bases, approximately equal in length in both rami. Comparison with other species of the genus is provided.
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KEY WORDS: Polychaeta, Gulf of Maine off Massachusetts, Grand Bank off Newfoundland, Northeast coast of USA and Canada, North Atlantic, sublittoral, shelf, upper slope.

Nephtys fabricii sp.n. (Annelida: Nephtyidae), новый вид из Северо-Западной Атлантики

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РЕЗЮМЕ: описан новый вид Nephtyidae из залива Мэн и Гранд-Банки Ньюфаундленда. Ранее этот материал был отнесен к *Nephtys caeca* (Fabricius, 1780). Новый вид характеризуется началом жабр с четвертого сегмента, отчетливо двулопастными ацикулярными лопастями с глубокой выемкой практически на всех сегментах и хорошо развитыми постацикулярными лопастями с очень широкими основаниями, приблизительно равными по длине в обеих ветвях параподий. Приведено сравнение с другими видами рода.
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КЛЮЧЕВЫЕ СЛОВА: Polychaeta, залив Мэн у Массачусетса, Гранд-Банка Ньюфаундленд, северо-восточное побережье США и Канады, Северная Атлантика, сублитораль, шельф, верхний склон.

Introduction

The family Nephtyidae includes 4 genera and 147 species. (Dnestrovskaya, Jirkov, 2010; Read, Fauchald, 2025). *Nephtys caeca* (Fabricius, 1780) from West Greenland and *Nephtys ciliata* (Müller, 1788) from the Norwegian Sea were the first species of the family Nephtyidae, being described for the North Atlantic in the 18th century. Later, in the middle of 19th century, the Museum of Comparative Zoology at Harvard University provided E. Ehlers with a collection of New England annelids for research purposes. Ehlers described three new species in the Northwest Atlantic: *N. bucera* Ehlers, 1868; *N. discors* Ehlers, 1868 and *N. picta* Ehlers, 1868. Verrill (1881) enlarged the list of New England nephtyids to ten species: *N. bucera*, *N. caeca*, *N. ciliata*, *N. circinata* (currently accepted as *Aglaophamus circinata* (Verrill in Smith, Harger, 1874)), *N. discors*, *N. incisa* Malmgren, 1865, *N. ingens* Stimpson, 1853 (meanwhile synonimized with *N. caeca*), *N. longosetosa* Örsted, 1842, *N. paradoxa* Malm, 1874, and *N. picta*.

In the 20th century, research spread north and south from the New England coast (Whiteaves 1901; Augener, 1906; Moore, 1909; Kindle, 1917; Chamberlin 1920; Treadwell, 1928). Detailed research on Nephtyidae in the Northwest Atlantic began in the middle of the 20th century. The main results were published as faunistic lists and regional reviews of the polychaete fauna, including descriptions of several new species (Berkeley E., Berkeley C., 1943, 1956; Hartman, 1944, 1945, 1950, 1965; Wesenberg-Lund, 1950, 1953; Pettibone, 1954, 1956, 1963; Hartman, Fauchald, 1971; Blake, Dean, 1973; Day, 1973; Perkins, 1980; Taylor, 1984).

Currently, 14 species of the family Nephtyidae, belonging to the genus *Nephtys*, have been reported from the Northwest Atlantic: *N. bucera, N. caeca*, *N. ciliata*, *N. discors N. hombergii* Savigny in Lamarck, 1818, *N. hudsonica* Chamberlin, 1920, *N. hystricis* McIntosh, 1900, *N. incisa*, *N. longosetosa*, *N. paradoxa*, *N. phyllocirra* Ehlers, 1887, *N. picta*, *N. squamosa* Ehlers, 1887, and *N. yuryi* Dnestrovskaya, 2017.

In this article, a new species of the genus *Nephtys* found in northeastern USA and Canadian waters is described.

ABBREVIATIONS: AM — Australian Museum, Sydney, CA; AMNH — American Museum of Natural History, New York, USA; CoBI-DBUA — Biological Research Collection of the Biology Department of the University of Aveiro, Portugal; CMN — Canadian Museum of Nature, Ottawa, Canada; DGEH MGU — Department of General Ecology and Hydrobiology Lomonosov Moscow State University; IMB — Museum of the Zhirmunsky Institute of Marine Biology, Far Eastern Branch, Russian Academy of Sciences; KGB MGU — Department of Hydrobiology Lomonosov Moscow State University; MCZ — Museum of Comparative Zoology of the Harvard University, Cambridge, MA, USA; MNH (ZMH) — Museum of Nature, Hamburg, Germany; MNHN — Muséum National d'Histoire Naturelle, Paris, France; NHMD (ZMC) — Natural History Museum of Denmark, Copenhagen, Denmark; NHMUK (BMNH) — Natural History Museum, London, UK; TUL — Thomson Unicomarine Ltd., Letchworth, UK; USNM — National Museum of Natural History, Washington, DC, USA; ZIN — Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia; ZM MGU — Zoological Museum of the Moscow State University, Moscow, Russia; ZMBN — Museum of the University of Bergen, Bergen, Norway. C# — chaetiger # (e.g., C1 means chaetiger 1); R/V — research vessel.

Materials and methods

COLLECTION DATA. 60 specimens of *Nephtys fabricii* sp.n. were found and examined in the MCZ (53), AMNH (5) and DGEH MGU (2) collections.

EXAMINED TYPE MATERIAL. The type material of sixteen species of the genus *Nephtys*, eleven of which have been reported to occur in the Northwest Atlantic, were examined during the present study: *N. bucera* (MCZ IZ ANNa-209 (1), syntype), *N. caeca* (NHMUK MO06 1847.9.15.10 (1), syntype), *N. caecoides* Hartman, 1938 (USNM 20401 (7), paratypes), *N. cirrosa* Ehlers, 1868 (MCZ IZ ANNa-1242, holotype), *N. discors* (MCZ IZ ANNa-700 (1), MCZ IZ 91707 (1), syntypes), *N. hombergii* (NHMUK MO10 1863.9.19.12, holotype; NHMUK AN01 1921.5.1.810–813 (5), NHMUK AN01 1921.5.1.814–815 (1), syntypes), *N. hudsonica* (CMN CMNA 1900–2915, holotype), *N. hystricis* McIntosh, 1900 (NHMUK AN01 1921.5.1.765–766 (3), NHMUK AN01 1921.5.1.767 (1), NHMUK AN01 1921.5.1.768 (2), NHMUK AN01 1921.5.1.769–770 (6), NHMUK AN01 1921.5.1.771–780 (12), NHMUK AN01 1921.5.1.781 (2), NHMUK AN01 1921.5.1.782–783 (3), NHMUK AN01 1921.5.1.784–790 (6), NHMUK AN01 1921.5.1.791–795 (4), syntypes), *N. impressa* Baird, 1871 (NHMUK MO11 1869.6.16.6, holotype), *N. incisa* (NHMUK MO10 1865.9.23.8 (1), syntype), *N. pente* (NHMUK PO01 1983.101 (1), paratype), *N. phyllocirra* (MCZ IZ ANNa-1033 (1), syntype), *N. picta* (MCZ IZ ANNa-830 (1), syntype), *N. sachalinensis* Alalykina et Dnestrovskaya, 2015 (ZM MGU Pl-970,

holotype; AM W.46086 (1), CoBI-DBUA0001838.01 (1), IMB 28694 (4), KGB MGU Pol-001 (2), Pol-002 (1), Pol-003 (1), Pol-004 (2), Pol-005 (1), Pol-006 (1), Pol-007 (1), Pol-008 (1), Pol-010 (1), Pol-011 (1), Pol-012 (1), Pol-013 (1), Pol-014 (1), Pol-015 (1), Pol-016 (2), Pol-017 (2), Pol-018 (1), Pol-019 (1), MCZ IZ 127648 (1), MNHN-IA-TYPE 1810 (1), NHMUK ANEA 2014.5 (1), ZIN 1/50600 (1), ZMBN 94107, ZM MGU Pl-971 (1), paratypes), *N. squamosa* (MCZ IZ ANNa-1202 (1), lectotype; MCZ IZ ANNa-735 (1), MCZ IZ ANNa-740 (1), MCZ IZ ANNa-836 (1), paralectotypes), *N. yuryi* (MCZ IZ 60887, holotype; MCZ IZ 60888 (8), MCZ IZ 60889 (1), AMNH 1147 (1) paratypes).

OTHER MATERIAL EXAMINED: more than 100 specimens from different museums, collected close to their respective type localities were also examined: *N. ciliata* (DGEH MGU, ZMBN), *N. caeca* (AMNH, DGEH MGU, TUL, ZIN), *N. cirrosa* (DGEH MGU, TUL, ZIN), *N. hombergii* (DGEH MGU, NHMUK), *N. hystricis* (DGEH MGU, NHMUK), *N. longosetosa* (DGEH MGU), *N. paradoxa* (DGEH MGU). All specimens were fixed in 10% formaldehyde and then transferred to 70% ethanol.

To increase contrast, specimens were stained with methylene blue (water solution) and examined with a stereomicroscope. Photographs were obtained using a Carton DSZT70 stereomicroscope equipped with a Microscope Digital Camera MDC 320. To study the ultrastructure of chaetae, some chaetigers were dissected, critical point dried, coated with 25 nm Au-Pd and observed using a Cambridge Scanning electron microscope Camscan S-2 (SEM). Accelerating voltage 20 kV. SEI mode. MicroCapture software. Line drawings were prepared by outlining tracing the photographs in CorelDRAW.

Systematics

Family Nephtyidae Grube, 1850
Genus *Nephtys* Cuvier, 1817
Nephtys fabricii Dnestrovskaya **sp.n.**
Figs 1–3.

Nephthys caeca Ehlers, 1868 (partim): 588–617, pl. XXIII, fig. 20 only.

Nephtys caeca Pettibone, 1963 (partim): 201, 203–204, fig. 51b; Ravara *et al.*, 2010 (partim): 33–36, fig. 12D only.

N. ciliata ?Hartman, 1944: pl. 15(47), figs 10, 10a, 10b.

TYPE LOCALITY. Gulf of Maine off Massachusetts, Northwest Atlantic, low water.

TYPE MATERIAL. Holotype: MCZ IZ 170359 (previously identified as *N. caeca*, MCZ IZ 37122), largest specimen of all studied, entire, pharynx semi-everted, Annisquam, Gloucester, Essex, Massachusetts, 42.6584280° N, 70.677268° W (Error radius: 1232 m), low water, 1878, coll. A. Hyatt, B.H. Van Vleck and E.G. Gardiner.

Paratypes: MCZ IZ 170360, 2 entire specimens with fully everted and none-everted pharynxes from same sample as holotype; MCZ IZ 67471 (previously identified as *N. caeca*), 1 incomplete specimen, pharynx semi-everted, Plymouth Harbor, Massachusetts, sandy mud, 41.975103° N, 70.666147° W (Error radius: 647 m), 26 June 1920, coll. S.N.F. Sanford; DGEH MGU-Pol-41, (previously identified as *N. caeca*, without number) 2 incomplete specimens, with none-everted pharynx, Grand Banks of Newfoundland, R/V Persey, cruise 3, st. 15.3527, 47°24′ N, 50° W, 82 m depth, bottom grab, 06 June 1976.

OTHER MATERIAL EXAMINED. AMNH 1824 (previously identified as *N. caeca*), 5 specimens, Canada: Brandy Cove, St. Andrews, New Brunswick, 19 August 1913, coll. R.W. Miner — H. Muller; MCZ IZ 37122 (previously identified as *N. caeca*), 42 specimens, from same sample as holotype; MCZ IZ 37126 (previously identified as *N. caeca*), 7 specimens, Canada: Newfoundland and Labrador, West coast of Newfoundland, 49° N, 56° W (Error radius of 301 m), 1885, Arethusa Collection.

DESCRIPTION. Examined specimens with 93–134 chaetigers (holotype: 134); up to 145 mm in length (holotype: 145), up to 7 mm (holotype: 7) in width (at C10, including parapodia), length of first ten chaetigers up to 8 mm (holotype: 8). Everted pharynx up to 10 mm in length and 5 mm in width (paratype MCZ IZ 170360). Body slightly wider anteriorly, tapered posteriorly. Preserved specimens colorless, possible due to longer storage.

Prostomium of specimens with non-everted pharynx (paratypes DGEH MGU-Pol-41, MCZ IZ 170360) rectangular to subpentagonal, slightly elongated and extended in anterior part, anterior margin straight to convex, sides slightly convex (Fig. 1D, E). Prostomium of specimens with fully (paratype MCZ IZ 170360) or semi-everted pharynx (holotype) subpentagonal, extended (supported ventrally by everted pharynx), width greater than length, with straight anterior margin, sides convex (Fig. 1C, holotype). Antennae broad-triangle, conical or with rounded tips, directed anterolaterally. Palps single, subequal in form and size to antennae, inserted ventrolaterally on prostomium (relatively close to antennae), directed sideward or anterolaterally. Nuchal organs small and rounded, located at posterolateral angles of prostomium (Fig. 1C). Peristomium neither enlarged nor flattened (group II after Ohwada, 1985). Posterior lip of mouth reaching C5. Eyespots not visible.

Fully everted pharynx with 20 bifid terminal papillae and unpaired median dorsal and ventral papillae. Subterminal papillae arranged in 22 rows, 4 (3–5) papillae per row, conical, extending over 1/3 length of pharynx, gradually diminishing in size (Fig. 1A). Middorsal and midventral papillae short, conical, similar in size to largest subterminal ones.

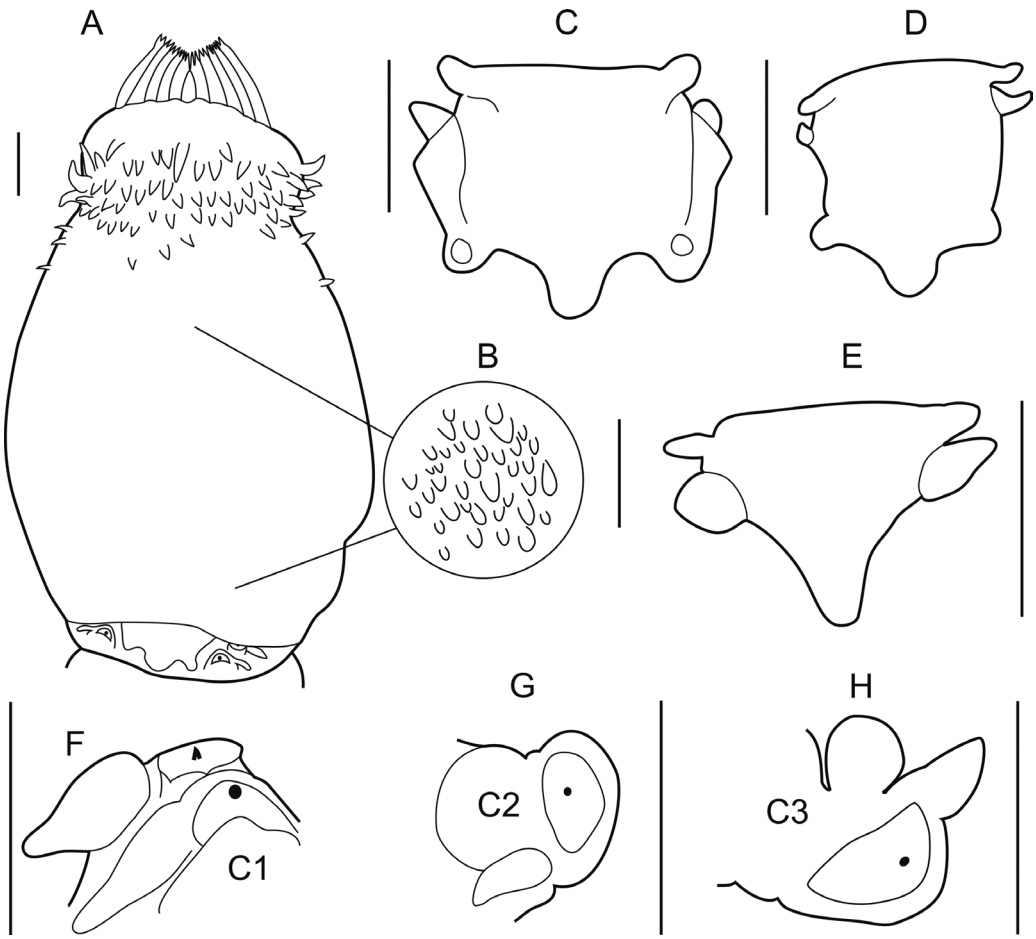

Fig. 1. *Nephtys fabricii* sp.n. (chaetae omitted). A — fully everted pharynx with pharyngeal papillae, first chaetiger and prostomium, dorsal view; B — papillae of middle and proximal parts of pharynx; C — prostomium of a specimen with fully everted pharynx, dorsal view; D — prostomium of a specimen with non-everted pharynx, dorsal view; E — same, ventral view; F — first chaetiger (C1), dorsal view, left side; G — second chaetiger (C2), neuropodium, ventral view, right side; H — third chaetiger (C3), notopodium, left side. A, B, D, E — paratypes MCZ IZ 170360; C, F, G, H — holotype MCZ IZ 170359 (the biggest studied specimen). Scale bars: all 1 mm.

Рис. 1. *Nephtys fabricii* sp.n. (щетинки удалены). A — полностью вывернутая глотка с глоточными папиллами, C1 и простомиумом, дорсально; B — папиллы средней и проксимальной части глотки; C — простомиум червя с полностью вывернутой глоткой, дорсально; D — простомиум червя с невывернутой глоткой, дорсально; E — простомиум червя с невывернутой глоткой вентрально; F — первый щетинконосный сегмент (C1), левая нотоподия, дорсально; G — второй щетинконосный сегмент (C2), правая невроподия, вентрально; H — третий щетинконосный сегмент (C3), левая нотоподия. A, B, D, E — паратипы MCZ IZ 170360; C, F, G, H — голотип MCZ IZ 170359 (самый большой экземпляр из изученных). Масштаб для всех рисунков 1 мм.

Middle and proximal part of pharynx covered with little papillae (Fig. 1B).

Size and shape of parapodia varied along body. Parapodia of C1 shorter than subsequent ones, directed forward, adjacent to prostomium and only slightly protruding above base. Parapodial branches of C1 reduced. Noto- and neuropodial cirri triangular-foliaceous with wide base, apically narrow. Notopodia with small, reduced preacicular lobes; conical-rounded acicular lobes and rounded postacicular lobes about same size. Neuropodia conical with truncated tips. Pre- and postacicular lobes

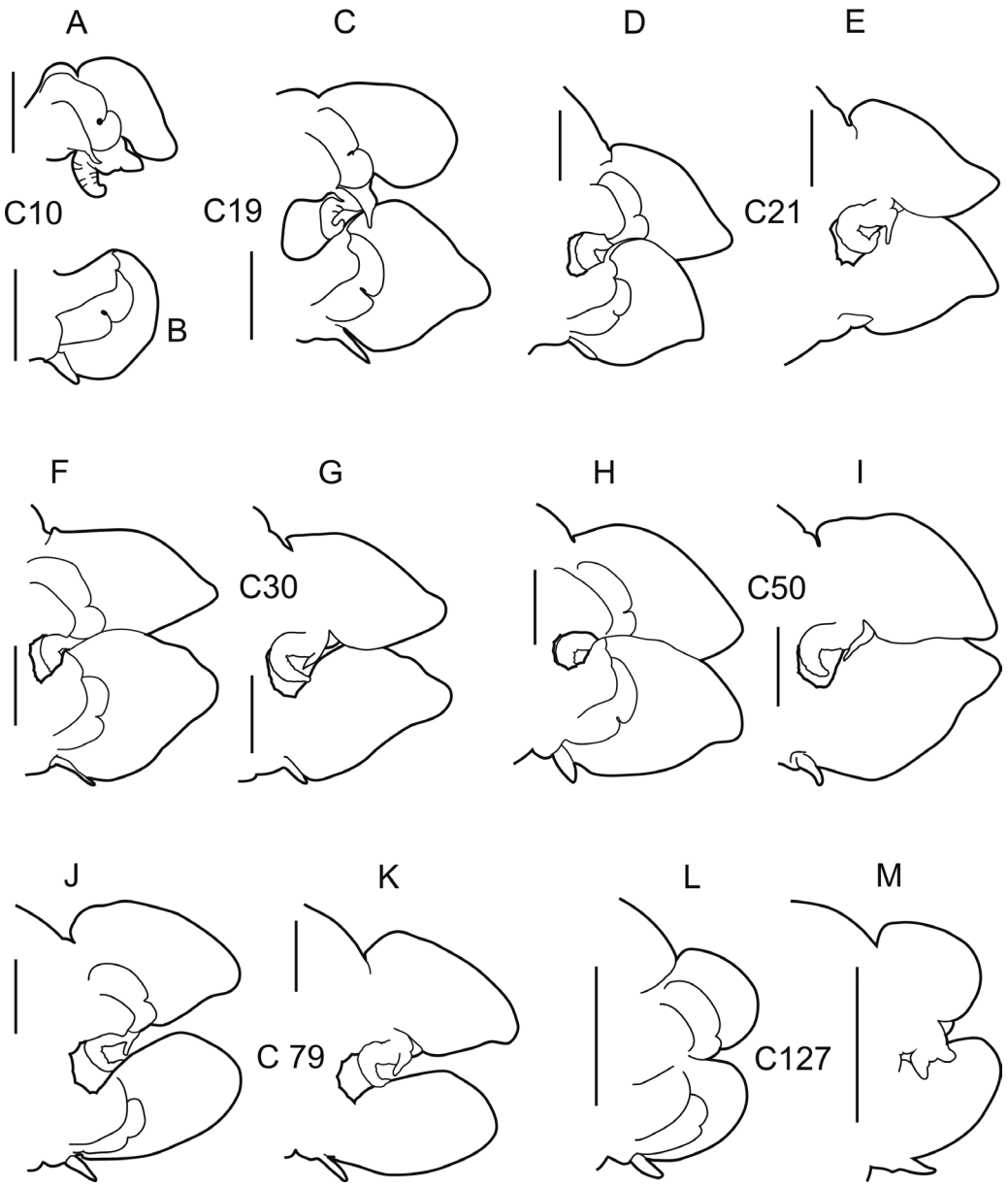

Fig. 2. Parapodia of *Nephtys fabricii* sp.n. (chaetae omitted). All drawings — holotype MCZ IZ 170359 (the biggest studied specimen). Abbreviations: C — chaetiger to which the parapodium belongs (e.g., C10 refers to chaetiger 10). A, C, D, F, H, J, L — anterior view; E, G, I, K, M — posterior view. Scale: 1 mm.
Рис. 2. Параподии *Nephtys fabricii* sp.n. (щетинки удалены). Все рисунки — голотип MCZ IZ 170359 (самый большой экземпляр из изученных). Обозначения: C — щетинконосный сегмент. Аббревиатура C с номером означает именно этот щетинконосный сегмент, то есть C10 означает десятый щетинконосный сегмент. A, C, D, F, H, J, L — вид спереди; E, G, I, K, M — вид сзади. Масштаб для всех рисунков 1 мм.

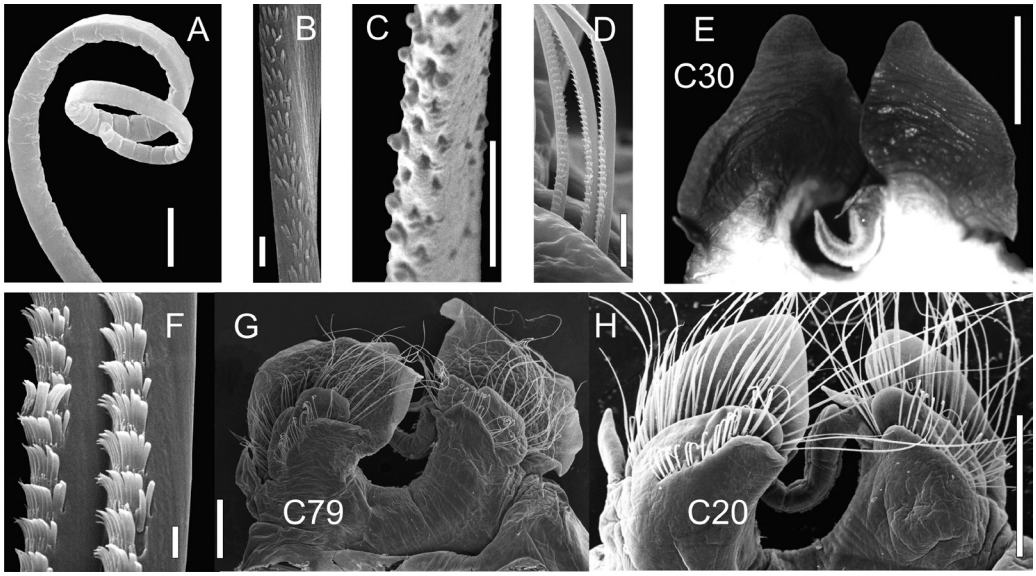

Fig. 3. *Nephtys fabricii* sp.n., SEM images. A–D, F — chaetae: A — barred (preacicular position); B, C — chaetae with small spines scattered along one side (postacicular position); D, F — spinose chaeta with combs (postacicular position). E, G, H — parapodia (E — C30; G — C79; H — C20). A–G — holotype MCZ IZ 170359 (the biggest studied specimen); H — *N. caeca* (east coast of GB, APEM, RECEAS, East Coast REC, HG01-A, cruise 0509, st. 19669, Mini Harmon Grab, 31 May 2009, dep. in DGEH MGU collection). Abbreviations: C# — chaetiger to which the parapodium belongs (e.g., C30 refers to chaetiger 30). Scale bars: A, D — 30 μm; B, C, F — 3 μm; E, G, H — 500 μm.

Рис. 3. *Nephtys fabricii* sp.n., СЭМ фотографии. A–D, F — щетинки: A — поперечно-исчерченные (предацикулярный ряд; B, C — щетинки с мелкими шипиками, разбросанными по одной стороне щетинки (постацикулярный ряд); D, F — щетинки с шипиками в виде гребенок (постацикулярный ряд). E, G, H — параподии (E — C30; G — C79; H — C20). A–G — holotype MCZ IZ 170359 (самый большой экземпляр из изученных); H — *N. caeca* (восточное побережье Англии APEM, RECEAS, East Coast REC, HG01-A, рейс 0509, ст. 19669, Mini Harmon Grab, 31 May 2009, деп. в коллекции DGEH MGU). Обозначения: аббревиатура C с номером означает именно этот щетинконосный сегмент, то есть C30 означает тридцатый щетинконосный сегмент. Масштаб: A, D — 30 μm; B, C, F — 3 μm; E, G, H — 500 μm.

growing together and forming cylinders around low acicular lobes (Fig. 1F).

Further description based mainly on holotype, largest studied specimen. Parapodia of C2 and C3 directed anterolaterally, subsequent parapodia perpendicular to body. Parapodia of C10–115 well developed, reducing posteriorly. In large specimens, branches of anterior parapodia widely separated, overlapping from C10–20 up to C128 (six chaetigers before pygidium). In medium and small worms parapodia overlap only in median chaetigers.

Preacicular lobes always smaller than acicular lobes, rounded. In neuropodia of well-preserved large specimens, preacicular lobes from C7–9 up to C50 (in about 26–44 chaetigers) may present very small additional interramal outgrowth, absent in posterior chaetigers (Fig. 2A–D, F). Outgrowths not visible in small or poorly preserved specimens.

Acicular lobes always smaller than postacicular lobes, bilobed with deep incision in almost all chaetigers (from C3 in neuropodia and from C4 in notopodia) (Figs 2A–D, F, H, J; 3G). From C115 this incision diminished but clearly visible in notopodia up to 5–10 chaetigers before pygidium and in neuropodia up to 15–20 chaetigers before pygidium (Fig. 2L). Large specimens: acicular lobes rounded only in most posterior chaetigers. Smaller and growing specimens: acicular lobes with deep incision in anterior and median chaetigers; rounded in posterior chaetigers.

Postacicular lobes well developed, large and broad at base, roughly equal in length in noto- and neuropodia. Postacicular lobes well developed from C2 in neuropodia and C3 in notopodia (Fig. 1G, H). Notopodial postacicular lobes of anterior chaetigers (about C10) oblique oval, directed ventrally, up to two times longer than acicular lobes (Fig. 2A); from

C20 triangular-foliaceous, four or almost five times longer than acicular lobes, with elongated rounded tips and wide bases (Figs 2C–K; 3E, G); after C110 reduced (Fig. 2L, M). Neuropodial postacicular lobes of anterior chaetigers (about C10) rounded, nearly two times longer than acicular lobes; from C20 triangular-foliaceous up to five times longer than acicular lobes, with very wide bases and rounded tips (bases of postacicular lobes nearly twice wider than the bases of acicular lobes) (Figs 2A–K; 3E, G); reduced after C115 (Fig. 2L, M).

Branchiae curved outward, digitated, wrinkled, relatively short, without any papillae-like basal projection, occupying up to 50% of interramal space; from C4 to near posterior end (up to C129 branchiae longer than notopodial cirri in holotype). Surface of interramal space slightly rugose. Notopodial cirri flattened, triangular with wide bases and tapered tips, diminishing in size in posterior chaetigers. Neuropodial cirri flattened, foliaceous with wide bases, posteriorly triangular, diminishing in size in posterior chaetigers. Pygidium with anal cirrus inserted ventrally, equal in length to the last eight chaetigers (3 mm).

Chaetae of three types: barred, capillary, and with spines. Capillary chaetae present only in neuropodia of C1. Posteriorly total number of barred chaetae and chaetae with spines gradually reduced. Barred chaetae (Fig. 3A) with smooth bases, only in preacicular fascicles: 21–35 in both branches of C10–C25; 20–37 in neuropodia and 16–22 in notopodia of C30–C40; 22 in neuropodia and 16 in notopodia of C79; 15 in neuropodia of C81; up to 10 in both branches of C127. Barred preacicular chaetae noticeably smaller than postacicular chaetae. Chaetae with spines of two kinds: spinose chaetae with "combs" of up to 12 spines each (Dnestrovskaya, Jirkov, 2011) (Fig. 3F), and chaetae with little spines in regular or irregular rows (Fig. 3B) or chaotically scattered (Fig. 3C). Both kinds of chaetae with spines mixed in postacicular fascicles: 60–75 in neuropodia of C10–C80; 41 in C127; 85 in notopodia of C10; 50–60 in C20– C80; 21 in C127. Only 1–3 spinose chaetae with "combs" in preacicular fascicles of C20–C30. Notopodia with interramal bundles of up to 15 spinose chaetae with "combs" in C21, posteriorly decreasing in number to 4 in C127. Neuropodia with interramal bundles of up to 8 chaetae with scattered little spines.

DIFFERENTIAL DIAGNOSIS. Two of the most significant species-level taxonomic characters in Nephtyidae are the start of the branchiae and the shape of the acicular lobes. *Nephtys fabricii* sp.n. has branchiae starting at C4 and almost all acicular lobes bilobed with a deep incision.

Only 16 species of *Nephtys* have such starting of branchiae or bilobed acicular lobes in some part of the body: *Nephtys bilobatus* Kudenov, 1975, *N. bucera*, *N. caeca*, *N. caecoides*, *N. ciliata*, *N. cirrosa*, *N. discors*, *N. hombergii*, *N. hudsonica*, *N. impressa*, *N. longosetosa*, *N. paradoxa*, *N. pente*, *N. picta*, *N. sachalinensis* and *N. singularis* Hartman, 1950.

Five other species *N. hystricis*, *N. incisa*, *N. phyllocirra*, *N. squamosa* and *N. yuryi* are not included in list above, but they have been reported from the Western Atlantic, therefore I also included them in the differential diagnosis. Thus, 21 species of the genus *Nephtys* are involved in the differential diagnosis for the description of *N. fabricii* sp.n.

The type material of almost all these species were studied during the present work and a comparison with the new species is here provided. An exception goes for *N. singularis* for which only the original description (Hartman, 1950) and later short descriptions (Fauchald, 1973, 1977; Kudenov, 1975) were used. Unfortunately, a lack of material did not allow investigation of age variability of *N. fabricii* sp.n.

Unlike *N. picta* and *N. bucera* the peristomium in *N. fabricii* sp.n. is not increased and not flattened (group II, Ohwada, 1985), and spinose chaetae in postacicular rows have spines with "combs" or transversal rows instead of serrated chaetae with one lateral row of spines and large 5–7 coarser pointed teeth, near basal part (Ehlers, 1868; McIntosh, 1900; Hartman, 1950; Pettibone, 1963; Taylor, 1984; our data).

Nuchal organs of *N. fabricii* sp.n. are small and not prominent in contrast to nuchal papillae of *N. caecoides*; prostomium and first anterior chaetigers without any pigmentation while *N. caecoides* have variable pigmentation on prostomium and first few chaetigers (Hartman, 1938, 1940, 1968; Hilbig, 1997; our data).

Pharynx of *N. fabricii* sp.n. has subterminal papillae arranged in 22 rows, 4 (3–5) papillae per row, middorsal papilla similar in size to largest subterminal ones, middle and proximal part of the pharynx covered with little conical papillae, whereas the subterminal papillae of *N. yuryi* are arranged in 18 rows (16 in median and proximal region); *N. bucera*, *N. cirrosa*, *N. phyllocirra*, *N. singularis* have six or more subterminal papillae per row; *N. bilobatus*, *N. bucera*, *N. caecoides*, *N. ciliata*, *N. hombergii*, *N. hudsonica*, *N. hystricis*, *N. impressa*, *N. incisa*, *N. pente*, *N. picta*, *N. squamosa* have long middorsal subterminal papilla; proximal part of the pharynx of *N. bilobatus*, *N. bucera*, *N. caecoides*, *N. cirrosa*, *N. hombergii*, *N. hystricis*, *N. impressa*, *N. incisa*, *N. phyllocirra*, *N. picta*, *N. singularis*, *N. squamosa*, *N. yuryi* is smooth (Baird, 1871; Ehlers, 1868; Hartman, 1950; Pettibone, 1963; Nonato, Luna, 1970; Taylor, 1984; Ohwada, 1989; Rainer, 1991; Lovell, 1997; Dnestrovskaya, Jirkov, 2001; Ravara *et al*., 2010; Dnestrovskaya, 2017; our data).

Preacicular lobes of *N. fabricii* sp.n. in neuropodia are smaller than the acicular lobes and rounded. Large worms may have very small additional outgrowth in interramal part of preacicular lobes disposed from C7–9 up to C50. Whereas preacicular lobes of neuropodia in *N. bilobatus* have two small coni-

cal projections and in *N. hombergii*, *N. hystricis*, *N. impressa*, *N. singularis*, and *N. yuryi* they are deeply bilobed. Preacicular lobes of anterior chaetigers (up to C17, our data) of *N. squamosa* are slightly bilobed.

Nephtys fabricii sp.n. has no superior lobes in neuro- and notopodia while *N. impressa*, *N. squamosa*, and *N. yuryi* have obvious superior neuropodial lobes in median chaetigers and *N. singularis* in anterior chaetigers. *Nephtys squamosa* also has superior notopodial lobes foliaceous and imbricated, resembling scales (Baird, 1871; Hartman, 1950; Pettibone, 1963; Fauchald, 1963, 1973, 1977; Kudenov, 1975; Taylor, 1984; Ohwada, 1989; Rainer, 1990, 1991; Hartmann-Schröder, 1996; Dnestrovskaya, Jirkov, 2001; Ravara *et al*., 2010; Dnestrovskaya, 2017, our data).

Acicular lobes of *N. fabricii* sp.n. are always smaller than postacicular lobes, bilobed with deep incision throughout the body almost in all chaetigers, whereas the acicular lobes of *N. bilobatus*, *N. bucera*, *N. caeca*, *N. caecoides*, *N. ciliata*, *N. cirrosa*, *N. discors*, *N. hombergii*, *N. hudsonica*, *N. hystricis*, *N. incisa*, *N. longosetosa*, *N. paradoxa*, *N. phyllocirra*, *N. picta*, *N. singularis*, *N. squamosal* and *N. yuryi* are rounded, or conical, or slightly incised or even deep incised but in only some part of the body or only on one branch of parapodia. Acicular lobes of *N. hombergii* have a distinct papilliform outgrowth on interramal side of aciculae, and interramal parts of acicular lobes of *N. sachalinensis* are stretched and expanded to form rounded protuberances projecting over the external parts of acicular lobes (Chamberlin, 1920; Hartman, 1950, 1968; Fauchald, 1963, 1973, 1977; Pettibone, 1963; Banse, 1972; Kudenov, 1975; Taylor, 1984; Ohwada 1989; Hilbig, 1997; Rainer, 1990, 1991; Hartmann-Schröder 1996; Dnestrovskaya, Jirkov, 2001, 2012; Ravara, 2010; Ravara *et al*., 2010; Alalykina, Dnestrovskaya, 2015; Alalykina *et al*. 2017, Dnestrovskaya, 2017, our data).

The beginning of well-developed postacicular lobes is a significant taxonomic character. Postacicular lobes of *N. fabricii* sp.n. are well developed from C2 in neuropodia and from C3 in notopodia, whereas in *N. hystricis* and *N. yuryi* they are well developed from C3 in neuropodia and from C5 in notopodia; postacicular lobes of *N. hombergii* are well developed from C3 in neuropodia and from C4 in notopodia (Dnestrovskaya, 2013, 2017; our data).

Postacicular lobes of *N. fabricii* sp.n. are well developed, large and broad at base roughly equal in length in both rami; from C20 they are triangular-foliaceous and in four or five times longer than acicular lobes, with elongated rounded tips and wide bases. Whereas in *N. ciliata*, *N. cirrosa*, *N. hudsonica*, *N. hystricis*, *N. incisa*, *N. impressa*, *N. paradoxa*, *N. pente*, *N. phyllocirra* and *N. yuryi* the postacicular lobes in both rami are distally blunt, and not more than two times longer than acicular lobes. In *N. caeca*, *N. hombergii*, *N. longosetosa*, *N. picta,* and *N. sachalinensis* the postacicular lobes of notopodia are rounded and noticeably smaller than postacicular lobes of neuropodia (Ehlers, 1887; Chamberlin, 1920; Pettibone 1963; Taylor, 1984; Rainer, 1984, 1990, 1991; Dnestrovskaya, Jirkov, 2001; Ravara, 2010; Ravara *et al*., 2010; Alalykina, Dnestrovskaya, 2015; Dnestrovskaya, 2017).

Branchia of *N. fabricii* sp.n. are wrinkled and digitated, without any papillae-like basal projection, start at C4 and continue almost to the posterior end of body. Whereas branchiae of *N. longosetosa* start at C3 (very rarely in small worms at C4 in one side of the worm) and of *N. squamosa* start at C2/3. Branchia of *N. ciliata*, *N. discors*, *N. hudsonica*, *N. hystricis*, *N. incisa*, *N. paradoxa*, *N. pente*, *N. phyllocirra*, and *N. yuryi* start only after the fourth segment (Fauchald, 1963; Rainer, 1984, 1990, 1991; Pettibone, 1963; Ohwada, 1989; Hartman, 1950; Hartmann-Schröder, 1996; Rowe, 1921; Dnestrovskaya, Jirkov, 2001; Ravara *et al*., 2010; Dnestrovskaya, 2017; our data). In addition, branchia of *N. ciliata*, *N. discors*, *N. hudsonica*, *N. hystricis*, *N. paradoxa*, and *N. yuryi* are absent or rudimentary in the last 20–30 chaetigers (Chamberlin, 1920; Hartman, 1950; Pettibone, 1963; Rainer, 1990; Dnestrovskaya, Jirkov, 2001; Ravara *et al*., 2010; Dnestrovskaya, 2017; our data). Furthermore, branchia of *N. bucera*, *N. picta* and *N. hombergii* have papilliform basal process; and branchia of *N. paradoxa* are more or less foliaceous and rounded-fleshy in the middle chaetigers (McIntosh, 1900; Pettibone, 1963; Taylor, 1984; Rainer, 1991; Dnestrovskaya, Jirkov, 2001; Ravara, 2010; Ravara *et al*. 2010; our data).

Dorsal cirri of *N. fabricii* sp.n. in all chaetigers are flattened, triangular with wide bases and tapered tips, whereas in *N. ciliata*, *N. hudsonica* and *N. sachalinensis* dorsal cirri are elongated and even subulate at least in median and posterior chaetigers; dorsal cirri in C1 of *N. cirrosa* and *N. bucera* are rudimentary or even absent (Chamberlin, 1920; Pettibone, 1963; Rainer, 1991; Dnestrovskaya, Jirkov, 2001; Ravara, 2010; Ravara *et al*., 2010; our data).

Barred chaetae of *N. fabricii* sp.n. are located in preacicular rows. They are noticeably smaller than postacicular chaetae, whereas in *N. singularis* barred chaetae of the first four chaetigers are much longer than the postacicular chaetae (Hartman, 1950; Kudenov, 1975).

Postacicular chaetae of *N. fabricii* sp.n. are spinose with combs, while in *N. bucera, N. hombergii, N. hystricis, N. picta* and *N. yuryi*, postacicular chaetae are serrated (Dnestrovskaya, Jirkov, 2011; Dnestrovskaya, 2017). In addition, in *N. bucera* and *N. picta* the spinose chaetae have 5–7 coarse spines along basal portion of the chaetae, resembling large hooks (Hartman 1950; Pettibone 1963; Taylor 1984; our data). The chaetae on postacicular position of *N. incisa* and *N. cirrosa* are finely spinulated, some chaetae of *N. cirrosa* are

geniculated (Pettibone, 1963; Rainer, 1990, 1991; Dnestrovskaya, Jirkov, 2001; Ravara *et al*., 2010; our data) and of *N. phyllocirra* are smooth, without any spines (Hartman 1950; our data).

DISCUSSION. *Nephtys fabricii* sp.n. is the closest and possibly sympatric species to *N. caeca.* There are two significant differences between these two species, relating to the shape and size of the acicular and postacicular lobes. *Nephtys fabricii* sp.n. has bilobed acicular lobes with deep incision throughout the body in almost all chaetigers (Fig. 3G), whereas such incision in the acicular lobes of *N. caeca* is only present in the most anterior chaetigers (Dnestrovskaya, Jirkov 2001; see also C20 without any incision in Fig. 3H). The postacicular lobes of *N. fabricii* sp.n. are well developed, large and broad at the base, and approximately equal in length in notopodia and neuropodia. From C20 they are four–five times longer than the acicular lobes and triangular-foliaceous in shape, with elongated rounded tips and wide bases (Figs 2C–M; 3E, G). According to Rainer (1991), and as also observed in the specimens examined in the present study (Fig. 3H), the postacicular lobes of *N. caeca* in the notopodia are nearly twice as long as acicular lobes and obliquely oval in shape, while in the neuropodia they are much longer than the acicular lobes and triangular-rounded in shape.

The original description and drawings by Fabricius (1780) are not sufficiently informative to characterize *N. caeca* sensu stricto. The type material of *N. caeca* (collected by Fabricius) has been lost. The type locality of *N. caeca* is West Greenland. Rainer (1991) studied *N. caeca* from Greenland (BMNH: ZK 1921.5.1.704; ZMC: 6.10.1855; ZMH: PE-542.1866) and this material can be accepted as the topotypes of *N. caeca*. Studied syntype of *Nephthys margaritacea* Johnston, 1835 (NHMUK MO06 1847.9.15.10) conforms to Rainer's description of *N. caeca.* Later Johnston (1865) accepted *N. margaritacea* as a junior synonym of *N. caeca* and I support this conclusion.

Some mixture of the above characteristics, denoting the presence of both species (*N. caeca* and *N. fabricii* sp.n.), can be found in the literature. Ehlers (1868: 592), wrote: "Jeder Ast ist in der Richtung von vorn nach hinten schwach zusammengedrückt und endet mit einer vertikal stehenden Firste, welche durch einen tiefen Einschnitt in zwei lappenartige Hälften zerlegt ist; in diesem Einschnitte liegt die Spitze der Acicula." (Each branch is slightly compressed in the direction from front to back and ends with a vertical ridge, which is divided into two lobe-like halves by a deep incision; the tip of the acicula lies in this incision (translated by DeepL)). In C73 such a deep incision is evident, as well as the broadly triangular shape of the postacicular lobes (pl. XXIII, Fig. 20). Thus, there is a very high probability that this specimen belongs to *N. fabricii* sp.n. However, it should be taken into account that two of Ehlers specimens were collected in the Gulf of Georgia, the Northeast Pacific, while the others are from the Northeast and Northwest Atlantic.

Hartman (1944, pl. 15, fig. 10A, B) depicted a specimen of *N. ciliata* from New England as having bilobed acicular lobes in C20, C70 and C100. These drawings can't refer to *N. ciliata* because the postacicular lobes extend well beyond acicular lobes and the dorsal cirri are triangular, whereas in *N. ciliata* postacicular lobes are equal to acicular lobes and dorsal cirri in well-developed chatigers are cirriform or subulated. These drawings can't refer to *N. caeca* also because the postacicular lobes are large and broad at base roughly equal in length, and acicular lobes have a deep incision in C70 and C100 (middle and possibly posterior chaetigers). Therefore, these drawings are very likely to refer to *N. fabricii* sp.n.

Pettibone (1963) described the acicular lobes of specimens of *N. caeca* (from the Northwest Atlantic and the Northeast Pacific, Washington) as "…bilobed to rounded…" (p. 204). Probably there was more than one species of *Nephtys* in the Pettibone's material, which affected the description, because in Fig. 51B (p. 201), the bilobed acicular lobes with the deep incision are also present. This drawing was made from one of the anterior chaetigers. I found only few drawings of the anterior parapodia of *N. caeca* (Ravara *et al.,* 2010, fig 12B, Dnestrovskaya, Jirkov, 2001 fig. 19(6 and 7) and Fig. 3H of this article). All these drawings are different from fig. 51B (p. 201). I don't know whether such deep incisions of acicular lobes are also presented in the middle chaetigers, so I cannot firmly state to which species (*N. caeca* or *N. fabricii* sp. nov.) the specimen from fig. 51B (p. 201) belongs. However, the prominent notopodial and neuropodial postacicular lobes and the broadly triangular shape of the postacicular lobe of the notopodia raise the possibility that this specimen belongs to *N. fabricii* sp.n.

Ravara *et al.* (2010) described acicular lobes of *N. caeca* as "…distinctly bilobed in larger specimens…" (p. 35). Bilobed acicular lobes and large wide postacicular lobes on the median parapodia represented in fig. 12D (p. 36) give ground for the suggestion that this particular specimen also belongs to *N. fabricii* sp.n. Though, it should be taken into account that the specimen from which this drawing was made was collected in the Pacific Ocean: Canada, Nanaimo River flats, Vancouver Island, Strait of Georgia, British Columbia (Ravara, pers. comm.). Two other specimens referred in the examined material of *N. caeca* in Ravara *et al.* (2010), one from Greenland and another from Massachusetts, present this kind of parapodia, while the remaining specimens have parapodia with rounded to slightly bilobed acicular lobes (Ravara, pers. comm.).

It should be noted that some descriptions and drawings available in the literature characterize *N. caeca* as having slightly bilobed acicular lobes in both or only one ramus of parapodia. I list these articles below.

Malmgren (1865: 104–105, pl. 12, fig. 18B) depicted the notopodial acicular lobe as slightly bilobed, but there are no records in his description of *N. caeca* concerning this character.

Saint-Joseph (1894: 17, pl. I, fig. 14) wrote: "…La rame supérieure (fig. 14) se compose... d'un mamelon pédieux bilobé avec acicule... " (…The upper row consists of … a bilobed pediose nipple with acicula (translated by DeepL)) and figured in fig. 14 bilobed acicular lobe in the notopodia.

McIntosh (1908: 13–14): there are no records of bilobed acicular lobes in the description of *Nephtys caeca* but the acicular lobe of the notopodium is slightly bilobed in the drawing of *Nephtys caeca* var. *ciliata* (pl. LXVI, fig. 3).

Augener (1913: 191–193, pl. 6, figs 24–25) figured in fig. 24 a slightly bilobed acicular lobe of the notopodium; in fig. 25 both acicular lobes are slightly bilobed (no records in the description).

Fauvel (1923) wrote: "Mamelons pédieux larges, arrondis, simples, ou souvent plus ou moins nettement biIobés, surtout à la rame dorsale, avec pointe de l'acicule dans l'échancrure." (p. 365–366) (pedal nipples wide, rounded, simple, or often more or less clearly bilobed, especially on the dorsal part, with the tip of the acicle in the notch (translated by DeepL)), and in Fig. 142B there is slightly bilobed acicular lobe in notopodia of middle chaetiger.

Fauchald (1963, p. 11,) wrote: "From setigers 20–25 the parapodia are fully developed. Notopodial acicular lobe distinctly bilobed, the ventral part longer and evenly rounded, the dorsal part somewhat shorter and obliquely rounded. Neuropodial acicular lobe more rounded than the notopodial one; the bilobation being very slight… Neuropodial acicular lobe more rounded than the notopodial one; the bilobation being very slight" and the drawing (Fig. 3D) confirms it.

Hartmann-Schroder (1971: 220–221, fig. 72B; 1996: 220–221, fig. 95B) wrote: "Acicula Lappen einfach gerundet bis mehr oder weniger deutlich zweilappig, dorsal manchmal deutlicher als ventral… "(acicular lobes simply rounded to more or less distinctly bilobed, sometimes more distinct dorsally than ventrally (translated by DeepL)), but there is no any bilobed acicular lobe in the drawings.

Rainer (1991: 69) wrote: "Acicular lobes simple, rounded, or more-or-less distinctly bilobed, particularly in notopodia" but there is no bilobed acicular lobe in the drawing (Fig. 3C).

Kirkegaard (1992: 331, fig. 161) wrote: "Acikulærlapperne er afrundede…" (Acicular lobes are rounded (translated by DeepL)), but there is a slightly bilobed acicular lobe in the notopodia's drawing.

Garwood & Olive (1981) put an end to all doubts. They wrote (p. 196, fig. 3): "…the neuropodial acicular lobe … of *N. caeca* were found to vary between being evenly rounded and distinctly bilobed…, although the notopodial lobe of this species was always recognizably bilobed…". One can see slightly bilobed acicular lobes in noto- and neuropodia from three specimens of *N. caeca* of various sizes. They also asserted (p.196–197): "Such differences in the shapes of the acicular lobes may well be due to differences in fixation technique, influencing the degree of retraction of the acicula. In neither species was there any evidence that this type of variation might be linked to the size of the animal, or that there were any constant inter-population differences".

Fgi. 4. Otto Fabricius (1744–1822).
Рис. 4. Отто Фабрициус (Фабриций) (1744–1822).

I completely agree with these statements and can only add that in parapodia the shape of lobes often greatly depends on the degree of pressure of the cover glass. It would be better to investigate these lobes without any cover glass, only with stain. As to *N. caeca* var. *ciliata*, I also agree with Garwood & Olive (1981) that "…this form represents a reproductive dispersive or migratory phase. Observation show that this form is not a separate species or sub-species but is a stage in the life cycle of *N. caeca*" (p. 200).

DISTRIBUTION. *N. fabricii* sp.n. is amphiboreal species (Northwest Atlantic, may be expected in Northeast Pacific). I have only two mention of depth (low water and 82 m), so it is probably a shelf species.

ETYMOLOGY. The species is named in honor of Otto Fabricius (1744–1822), a famous zoologist, priest, and missioner (Fig. 4), the author of "Fauna Groenlandica" and of the first known species of family Nephtyidae: *Nephtys caeca* (Fabricius, 1780).

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Compliance with ethical standards

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