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Identification key for Nephtyidae (Polychaeta) of the Eastern Atlantic and the North Polar Basin

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ABSTRACT. The new user-friendly identification key for Nephtyidae of the Eastern Atlantic and the North Polar Basin is proposed.
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KEY WORDS: identification key, Polychaeta, Nephtyidae, Eastern Atlantic, the North Polar Basin.

Ключ для определения Nephtyidae (Polychaeta) Восточной Атлантики и Северного Ледовитого океана

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РЕЗЮМЕ. Составлен новый ключ для определения Nephtyidae Восточной Атлантики и Северного Ледовитого океана. При составлении ключа особое внимание было обращено на лёгкость его использования.
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КЛЮЧЕВЫЕ СЛОВА: определительный ключ, Polychaeta, Nephtyidae, Восточная Атлантика, Северный Ледовитый океан.

Introduction

The key cover the shelf of the Eastern Atlantic (to the north, from the Bay of Biscay) and the North Polar Basin (shelf and deep water) and includes 20 species. Additional general faunistic works treating Nephtyidae in the North East Atlantic and the Arctic include Fauvel (1923), Hartmann-Schröder (1971, 1996), Rainer (1990, 1991), Dnestrovskaya, Jirkov (2001, 2010), Ravara *et al.* (2010).

The nephyid polychaetous are bristle worms of small to medium, seldom large, size. The largest species in a covered area may reach a length of about 10 cm (*A. malmgreni* up to 195 mm), but most species are usually 2–5 cm in length.

Nephyid polychaetes can be found from the intertidal to abyssal depths, in all bottoms, but especially in soft sediments. All of them are burrowing deposit feeders, usually subsurface.

Used terminology is given in Figs. 1 and 2.

Nephyids are rather uniform and often difficult to identify. Shape of parapodial lobe varies along the body. So check you are investigating the parapodia of the correct segment (which is recommended in the key or key pictures). All parapodia and their parts are given in anterior view, unless otherwise stated. Not all characters are developed in juvenils, so it is not possible to identify all worms, only those above certain size, which is different in different species and even places.

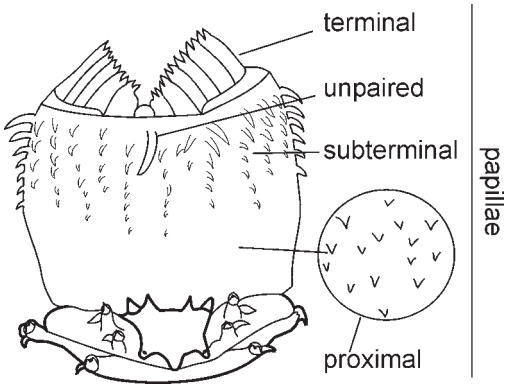


Fig. 1. Explanation of main used terminology of the head and pharynx.
Рис. 1. Объяснение основных использованных терминов переднего конца тела и глотки.

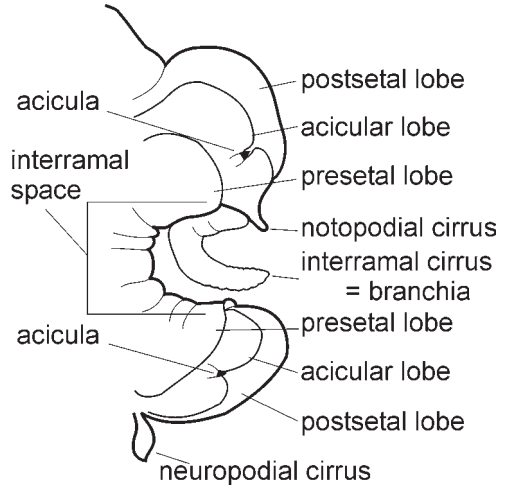


Fig. 2. Explanation of main used parapodial terminology.
Рис. 2. Объяснение основных использованных терминов строения параподии.

Also it is important to mention that the shape of parapodia depends on whether they are investigated using slides or without them. Placing parapodia between sheet of glass (on slides) changes the shape of the lobes and their comparative size, and this change depends on distance between glasses. All descriptions and our drawing given in the present key have been made without preparing slides.

Remarks to key

It is strongly recommended to identify a several specimens together rather than a single individual and several parapodia and better parapodia from both sides of worm rather than a single one. Especially segments where branchiae start should be checked in both sides of worm. Using methyl blue often makes morphological characters more visible. It is reckomended to use strong concentration (dark blue) and made observation in water (not in alcohol). For all characters mentioned in the key is not necessary to prepare slides and use compound microscope. Even geniculate chaetae of *Nephtys cirrosa* usually can be seen under stereomicroscope with some experience, though initially better to check under compound. Given upper/left figures refer to the first part of step, lower/right refer to the second one. If only one figure presents it refers to the first part of step.

All characters mentioned in the first sentence of each split in the key are obligate. Characters mentioned in the second sentence are not obligate, but sometimes can help in identification. Species range is given for each species.

Most figures are original except *Inermonephtys foretmontardoi* (Ravara *et al*., 2010), *N. incisa* S20 (Rainer, 1990), *N. cirrosa* form B (Ravara *et al*., 2010), *N. pulchra* (Rainer, 1991).

Abbreviation: S — segment. Abbreviation with number means this very segment, i.e. S2 means the second segment. All figures are anterior view if otherwise not stated.

No one key is complete and perfect. If you have any difficulties or troubles, do not hesitate to contact us by e-mail or by any other way.

Taxonomic remarks

1. The difference between *Micronephthys* species seems indistinct. However, it is necessary to have in mind that these characters refer to species, not to certain populations in certain places, otherwise misidentification increases. In a case of co-occurrence the difference is clear. For details on Northern Europe see Dnestrovskaya, Jirkov (2010), for British waters and the North Sea the problem needs to be investigated as only two species *M. neotena* and *M. harmannshcroederae* are expected here and the last is known only for two worms.

2. *Bipalponephtys* Ravara et al., 2010 is a junior synonym of *Micronephthys* (see: Dnestrovskaya, Jirkov, 2011; Jirkov, Dnestrovskaya, 2012).

Key to European Nephtyidae

1. Branchiae absent, no more than 49 S. Up to 6.5 mm long ..... ***Micronephthys stammeri***
Lusitanian.

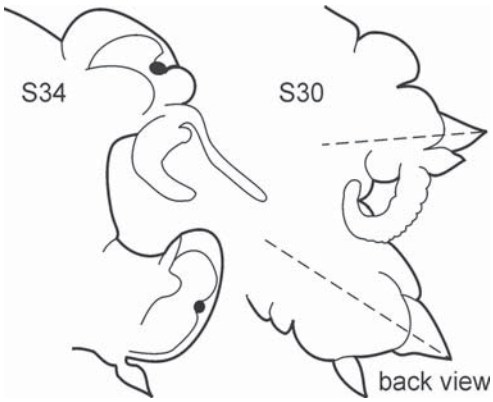
— 5–15 branchopherous segments (from S5–S8 to S10–S19), no more than 34 S (characters worms longer than 3 mm). Up to 16 mm long (usually shorter) ..... ***Micronephthys*** (partim)...2

— Usually several tens branchopherous segments, up to 100 S or more. Up to 200 mm or more ... 3
In juvenils sometimes number of segments can be low, but just before pigidium there is a growing zone with numerous forming segments

2. Branchiae on 5–9 S: from S6–S8 till S10–S14 ..... ***Micronephthys minuta***
Arctic shelf.

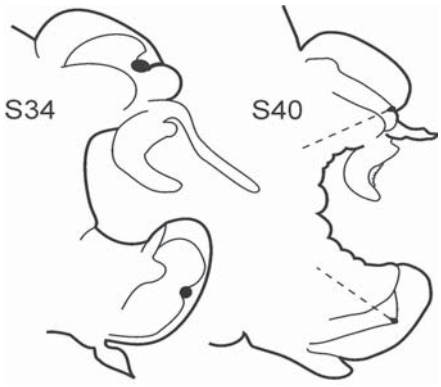
— Branchiae on 8–14 S: from S5–S7 till S12–S18 ..... ***Micronephthys neotena***
High boreal shelf.

— Branchiae on 14–15 S: from S5–S6 till S19 ..... ***Micronephthys hartmannschroederae***
?Low boreal shelf.



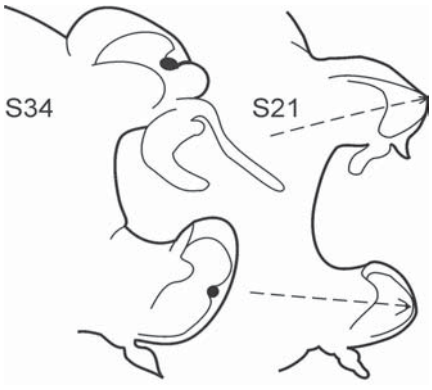
3. Branchiae curved outwards 4

— Branchiae curved inwards (look for undamaged parapodia!) 17



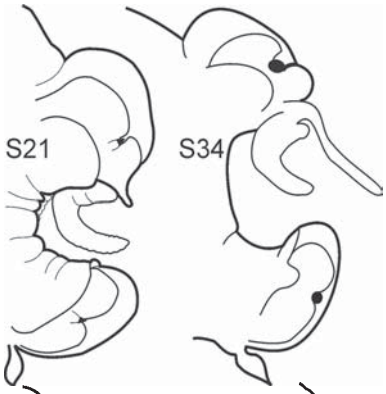
4. Neuropodial postsetal lobes almost equal to acicular ones, at least in middle and posterior segments 5
In *N. hystricis* neuropodial postsetal lobes of anterior segments, especially before S20 distinctly longer than acicular ones!

— Neuropodial postsetal lobes of middle segments (between S30 and S45) distinctly longer than acicular ones 10

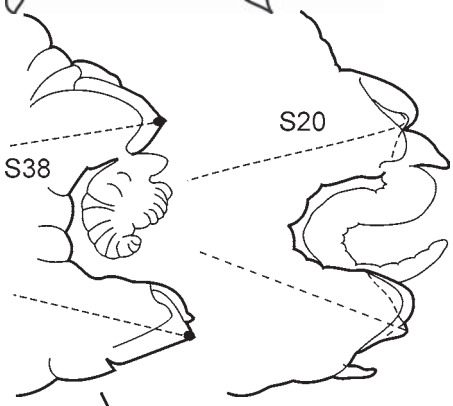


5. In middle part of the body (after S20) acicular lobe distinctly bilobed 6

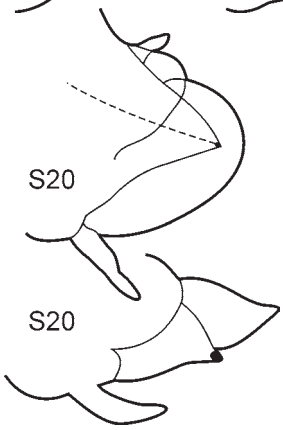
— In middle part of the body (after S20) acicular lobes rounded or conical 7



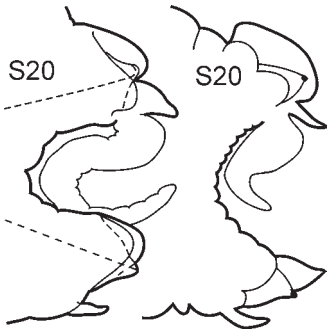
6. Branchiae start from S5 (rarely 6); notopodial cirrus of middle segments short ..... ***Nephtys pente***
Arcto-boreal upper shelf.
— Branchiae start from S8–S12 (rarely S7); notopodial cirrus of middle segments long ..... ***Nephtys ciliata***
Arcto-boreal lower shelf.



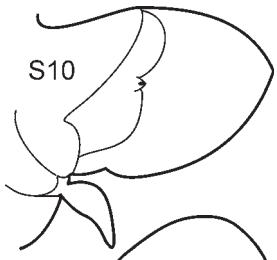
7. Presetal lobes rudimentary; branchiae of middle segments often (not always!) more or less foliaceous ..... ***Nephtys paradoxa***
Arcto-boreal lower shelf.
— Presetal lobes equal to acicular or shorter, but not rudimentary; branchiae cirriform 8



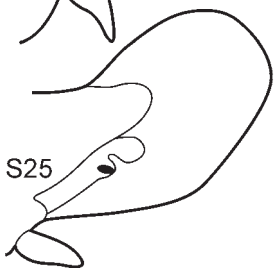
8. Anterior neuropodia with small papilla; notopodial postchaetal lamellae well developed; pharynx with 14 rows of 10–15 subterminal papillae, extending to base of pharynx. Branchiae start from S5–S7 ..... ***Aglaophamus pulcher***
Low boreal and lusitanian, shelf.
— Anterior neuropodia without papilla; pharynx with 22 rows of less than 10 subterminal papillae (usually up to 5–7), at most reaching halfway along the pharynx. Branchiae start from S6–S11 9



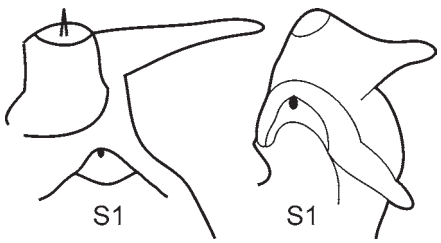
9. Branchiae start from S9–S10 (rarely S8–S11); presetal lobes of middle segments (between S15 and S45) simple; neuropodial postsetal lobes of segments before S20 equal to acicular ones. ..... ***Nephtys incisa***
High boreal lower shelf.
— Branchiae start from S6–S7; presetal lobes of middle segments (between S15 and S45) bilobe; neuropodial postsetal lobes of segments before S20 distinctly longer acicular ones ..... ***Nephtys hystricis***
Boreal upper shelf.



10. At no point is neuropodial presetal lobe longer than or equal to acicular lobe 11



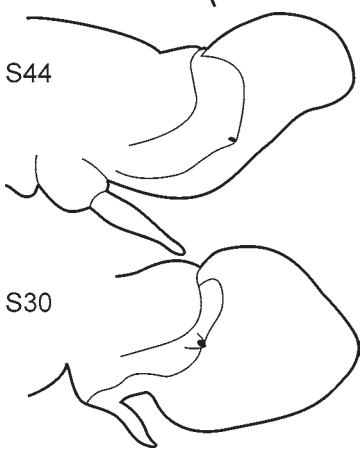
— At any point along its edge (at least above acicula) neuropodial presetal lobe equal to or longer than acicular lobe at least in the middle body 13



11. S1 without dorsal cirri; notopodial cirri in posteror segments as long as branchiae or longer, short geniculate chaetae in posterior noto- and neuropodial rows amongst long chaetae ..... ***Nephtys cirrosa*** form A

Low boreal and lusitanian, upper shelf.

— S1 with long dorsal cirri; geniculate chaetae absent 12

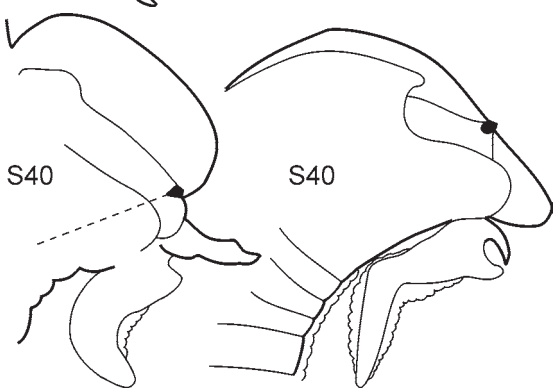


12. Ventral margin of neuropodial postsetal lobes of middle body (near S40) clearly S-shaped; branchiae start from S3 (rarely from S4 — usually in small worms); notopodial postchaetal lamellae of median and posteror segments much shorter than neuropodial ..... ***Nephtys longosetosa***

Boreal and lusitanian, shelf.

— Ventral margin of neuropodial postsetal lobes of middle body (near S40) rounded; branchiae start from S4 or later; postchaetal lamellae well developed in notopodia and neuropodia ..... ***Nephtys caeca***

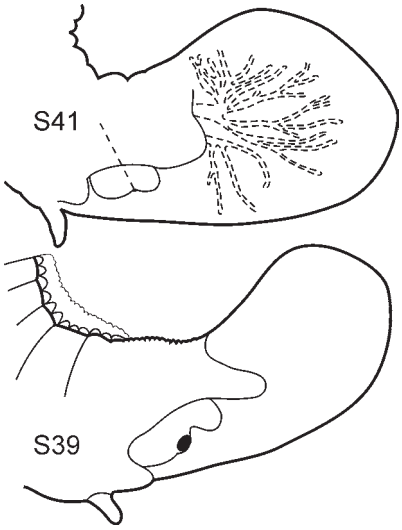
Boreal and lusitanian, upper shelf.



13. Presetal notopodial lobes rudimentary and simple. Notopodial cirri in posteror segments as long as branchiae or longer, short geniculate chaetae in posterior noto- and neuropodial rows amongst long chaetae ..... ***Nephtys cirrosa*** form A

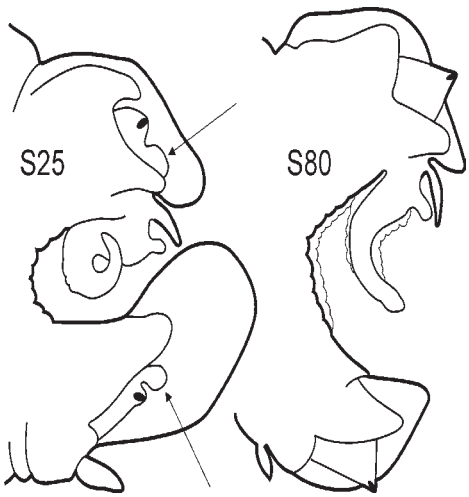
Low boreal and lusitanian, upper shelf.

— Presetal notopodial lobes, at least in middle segments, well developed, more or less bilobed. Notopodial cirri in posteror segments usually much shorter than branchiae 14



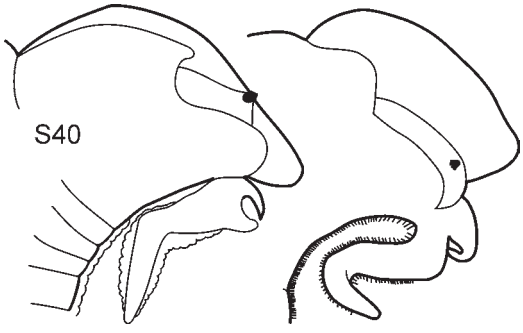
14. Postsetal neuropodial lobes with blood vessels (use methyl blue!) ..... ***Nephtys assimilis***
Low boreal and lusitanian, upper shelf.

— Postsetal neuropodial lobes without blood vessels 15



15. Postsetal neuropodial lobe several times longer than acicular lobe almost up to the pigidium; at least in some anterior segments (near S20), papillae below acicula in notopodia (pointed) and above acicula in neuropodia (pointed), these papillae are large in worms 4 cm long, but in small worms are short and can be hardly visible .... ***Nephtys hombergii***
Papillae can be differently developed in neighbouring segments, so it is nessesary to check several segments, preferably with methyl blue stain. Often papillae are hardly visible in small worms and absent in worms smaller than 2 cm.
Low boreal and lusitanian, upper shelf.

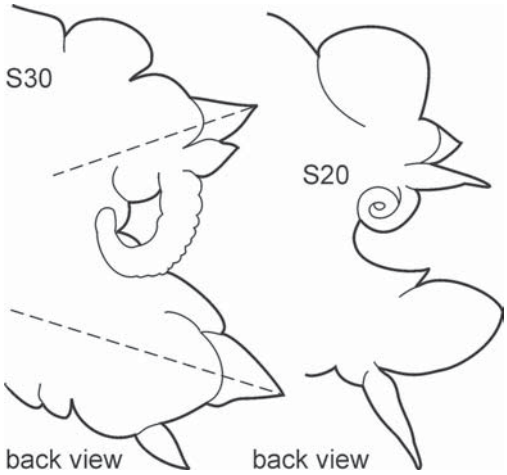
— Postsetal neuropodial lobe in posterior segments only slightly, if at all, longer than acicular lobe; acicular lobes without papillae 16



16. Postsetal notopodial lobes of middle segments (S30–S40) almost equal to acicular lobe; notopodial cirri in posterior segments always several times shorter than branchiae ..... ***Nephtys kersivalensis***
Low boreal and lusitanian, upper shelf.

— Postsetal notopodial lobes of middle segments (S30–S40) distinctly longer than acicular lobe; notopodial cirri in posterior (in small worms only near pigidium) segments at least as long as branchiae .... ***Nephtys cirrosa*** form B

17. Prostomium with antennae .... ***Aglaophamus*** (partim)...18
— Prostomium without antennae .... ***Inermonephtys foretmontardoi***
Lusitanian.



18. Branchiae are from S9–S23 and until S21–S47, upper and lower part of notopodial postsetal lobes equal ..... ***Aglaophamus malmgreni***
Arcto-boreal lower shelf, slope and deeper.
— Branchiae from S2 to the end of body; upper part of notopodial postsetal lobes much bigger than lower part ..... ***Aglaophamus agilis***
Low boreal and lusitanian, upper shelf.

Acknowledgement

We'd like to thank MES Ltd. team for very fruitful discussions of this key. Also we thank all people who tested this key and made remarks, which allows to highly improve the final key: David Hall and Tim Worsfold (Thomson Unicomarine Ltd.) and all participants of Workshop in Newcastle in 2008, Barbara La Porta ISPRA (Institute for Environmental Protection and Research, Roma, Italy) and A.G.M. Engelberts Ing. (Nederlands Instituut voor Ecologisch Onderzoek) tested keys at workshop in MES Ltd. in 2011.

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Responsible editor K.G. Mikhailov

Appendix. List of Nephtyidae of the Eastern Atlantic and the North Polar Basin

Synonymy is limited mainly to Fauvel (1923), Hartmann-Schröder (1971, 1996), Rainer (1990, 1991), Dnestrovskaya, Jirkov (2001, 2010), Ravara *et al.* (2010), and Jirkov, Dnestrovskaya (2012).

Only valid binomens are numbered.

Authors are given only for junior synonyms, not for the rejected here combinations.

Aglaophamus Kinberg, 1865

1. *Aglaophamus agilis* (Langerhans, 1880)
2. *Aglaophamus malmgreni* (Théel, 1879)

Aglaophamus neotenus see *Micronephthys neotena*

3. *Aglaophamus pulcher* (Rainer, 1991)

Aglaophamus rubellus (Michaelsen, 1896) see *Aglaophamus agilis*

Bipalponephtys Ravara, Wiklund, Cunha, Pleijel, 2010 see *Micronephthys*

4. *Bipalponephtys neotena* see *Micronephthys neotena*

Inermonephtys Fauchald, 1968

5. *Inermonephtys foretmontardoi* Ravara, Cunha, Pleijel, 2010

Micronephthys Friedrich, 1939

6. *Micronephthys hartmannschroederae* Jirkov, Dnestrovskaya, 2001
7. *Micronephthys minuta* (Théel, 1879)
8. *Micronephthys neotena* (Noyes, 1980)
9. *Micronephthys stammeri* (Augener, 1932)

Nephthys auct. wrong spelling for *Nephtys*

Nephtys Cuvier, 1817

10. *Nephtys assimilis* Örsted, 1843
11. *Nephtys caeca* (Fabricius, 1780)
12. *Nephtys ciliata* (Müller, 1788)
13. *Nephtys cirrosa* (Ehlers, 1868)
14. *Nephtys hombergii* Savigny in Lamarck, 1818
15. *Nephtys hystricis* McIntosh, 1900
16. *Nephtys incisa* Malmgren, 1865
17. *Nephtys kersivalensis* McIntosh, 1908
18. *Nephtys longosetosa* Örsted, 1842
19. *Nephtys paradoxa* Malm, 1874
20. *Nephtys pente* Rainer, 1984

Nephtys pulchra see *Aglaophamus pulcher*

Nephtys zatsepini Jirkov, 1986 see *Nephtys pente*