

Received: 31 July 2025 • Accepted: 6 May 2026 • Published: 16 July 2026

Topic editor: Magalie Castelin • Section editor: Nataliya Budaeva • Desk editor: Pepe Fernández

Research article

urn:lsid:zoobank.org:pub:F10332D5-4C66-489D-AC9B-A70D5BB11FE4

Revision of some coastal species of bitentaculate Cirratulidae (Annelida, Cirratulida) from the North-East Atlantic

Maël GROSSE^{1,*}  , Arne NYGREN²   & María CAPA³  

^{1,3}Department of Biology, University of the Balearic Islands, 07122 Palma, Spain.

²Tjärnö Marine Laboratory, Department of Marine Sciences, University of Gothenburg, 45296 Strömstad, Sweden.

³Balearic Biodiversity Centre, University of the Balearic Islands, Palma de Mallorca, Spain.

¹Corresponding author: maelgrosse@gmail.com

²Email: arne.nygren@marine.gu.se

³Email: maria.capa@uib.es

Abstract. The family Cirratulidae is a diverse group of benthic polychaetes with about 400 species described worldwide. Fifty-eight nominal species are recorded in Europe, but recent DNA analyses have revealed that between 83 and 96 additional species inhabit European benthic environments and probably most of them are still undescribed. In this paper, two historical species are re-described due to the lack of details about some relevant morphological characters in the original descriptions: *Aphelochaeta marioni* (Saint-Joseph, 1894) and *Aphelochaeta mcintoshii* (Southern, 1914) comb. nov. Following these redescrptions, three new species of the genera *Aphelochaeta* and *Tharyx* are described: *Aphelochaeta annae* sp. nov., *Aphelochaeta elinorae* sp. nov. and *Tharyx emmae* sp. nov. Finally, new records of *Tharyx maryae* Blake & Göransson, 2015, *Tharyx robustus* Blake & Göransson, 2015 and *Kirkegaardia serrata* (Eliason, 1962) are presented along with a description of the material examined.

Keywords. Integrative taxonomy, North Sea, Norwegian Sea, Skagerrak, Polychaetes.

Grosse M., Nygren A. & Capa M. 2026. Revision of some coastal species of bitentaculate Cirratulidae (Annelida, Cirratulida) from the North-East Atlantic. *European Journal of Taxonomy* 1076: 1–46.
<https://doi.org/10.5852/ejt.2026.1076.3304>

Introduction

The family Cirratulidae Ryckholt, 1851 comprises 16 accepted genera, five of which are informally referred to as bitentaculate due to their characteristic paired palps or dorsal tentacles which are thick appendages arising dorsally on or shortly behind the peristomium and used for feeding. Bitentaculate Cirratulidae gathers members of following genera: *Aphelochaeta* Blake, 1991, *Caulleriella* Chamberlin, 1919, *Chaetozone* Malmgren, 1867, *Kirkegaardia* Blake, 2016 and *Tharyx* Webster & Benedict, 1887. The genus *Chaetocirratulus* Blake, 2018 also possesses two dorsal palps, but phylogenetic analyses of molecular data and certain morphological characteristics have placed it closer to multitentaculate

Cirratulidae. The main diagnostic features distinguishing genera are the type and arrangement of chaetae (Blake & Magalhães 2019). Species of *Aphelochaeta* have only smooth capillaries (simple and thin chaetae); modified chaetae or spines are absent. Species of *Caulleriella* have bidentate spines in well separated neuro- and notopodia. Species of *Chaetozone* have unidentate or knobbed spines arranged in spread fascicles forming cinctures around the body in posterior segments. Species of *Kirkegaardia* have visibly serrated simple capillaries and spines are absent. Species of *Tharyx* have slender spines with an irregular knob-like distal enlargement or sub-bidentate spines with unequal sized teeth, similar in length to capillaries.

Worldwide, bitentaculate Cirratulidae account for the majority of cirratulid species, with 260 species out of a total of 397. Molecular studies have shown that this diversity is greatly underestimated (Grosse *et al.* 2020, 2025c). Indeed, while bitentaculate Cirratulidae are common in soft sediments at all depths, they are often small, easily damaged during collection and present few distinct conspicuous characters to distinguish between species. In addition, most of the species reported from Europe were named and described during the 19th or early 20th century and the descriptions are short and incomplete and are missing some important characters necessary to distinguish between species. This has greatly hindered the improvement of the cirratulid taxonomy in European waters and consequently also local or regional biodiversity assessments and monitoring of benthic environments. A checklist of the European species is needed and re-description of these species including all the morphological details important for the correct identification of specimens (Grosse *et al.* 2025a).

The genus *Chaetozone* has been partly reviewed (Grosse *et al.* 2021) in North-East Atlantic waters. However, members of the genera *Aphelochaeta*, *Kirkegaardia* and *Tharyx*, which form a complex group of similar looking species, have received less attention. Indeed, recent phylogenetic studies have shown that while *Tharyx* is likely monophyletic, the situation surrounding *Kirkegaardia* and *Aphelochaeta* is more complex as phylogenetic relationships are still unresolved and their monophyly has not been demonstrated (Grosse *et al.* 2025c).

The number of bitentaculate species inhabiting north-east Atlantic waters is also unresolved and recent species delimitation analyses based on mitochondrial and nuclear markers (COI, 16S and 28S) have revealed a large number previously neglected species in Europe, many of which may be undescribed (Grosse *et al.* 2025c).

In this paper, we aim at improving the knowledge about the diversity of bitentaculate Cirratulidae present in northern north-east Atlantic waters. For this purpose, specimens from some European collections in natural history museums and newly collected material have been the subject of molecular and morphological analyses. As a result, three new species of *Aphelochaeta* and *Tharyx*, previously recovered as distinct lineages after analyses of DNA sequence (Grosse *et al.* 2025c) and with distinct combinations of morphological characters are described. In addition, two species of previously described Cirratulidae, *Aphelochaeta marioni* (Saint-Joseph, 1894), *Aphelochaeta mcintoshii* (Southern, 1914), are re-described, thus providing new information about their external morphology. These observations include new diagnostic characters, intraspecific variation that help identify diagnostic characters that allow comparison with other species. Finally, we provide new geographic records of *Tharyx maryae* Blake & Göransson, 2015, *Tharyx robustus* Blake & Göransson, 2015 and *Kirkegaardia serrata* (Eliason, 1962).

Material and methods

Study area

This study is based on collections from along the coasts of Norway, Sweden and Iceland, with additional specimens collected from the North Sea, the English Channel and the Bay of Biscay. Specimens were

obtained from the University Museum of Bergen (ZMBN), NTNU University Museum in Trondheim (NTNU-VM), the National Museum of Ireland in Dublin (NMINH) and the Deutsches Zentrum für Marine Biodiversitätsforschung (DZMB), Senckenberg Research Institutes and Natural History Museum, Hamburg. Specimens were either registered in one of these museums, at the Natural History Museum, University of Oslo (NHMO), at Gothenburg Natural History Museum (GNMPOLY) or at the Senckenberg Museum in Frankfurt (SMF). All specimen information and collection data is available in Supp. file 1.

Additionally, type specimens of a few species were examined. These were loaned from the National Natural History Museum in Paris (MNHN), the Evolution Museum in Uppsala (UUZN), and the Swedish Museum of Natural History in Stockholm (SMNH).

Molecular analyses

The species presented in this study follow the results of species delimitation analyses of 2120 sequences from the mitochondrial genes COI and 16S and the nuclear 28S rRNA from 1098 cirratulid specimens from European waters (Grosse *et al.* 2025c). All the specimens examined in the present study, except for type specimens, were the DNA vouchers used by (Grosse *et al.* 2025c). Species delimitation analyses included tree-based methods (PTP, Poisson tree process), mPTP (multi-threshold Poisson tree process), GMYC (General mixed Yule coalescent) and distance-based methods ASAP (Assemble species by automatic partitioning). As a result, between 125–129 lineages compatible with the evolutionary definition of species (Wiley 1981) were identified, 108–110 of these lineages were bitentaculate Cirratulidae, eight of which are dealt with herein (Fig. 1).

Morphological observations

Specimens were examined with a Leica M165 C stereo microscope and an Olympus BX51 compound microscope equipped with planapochromatic objectives and differential interference contrast DIC.

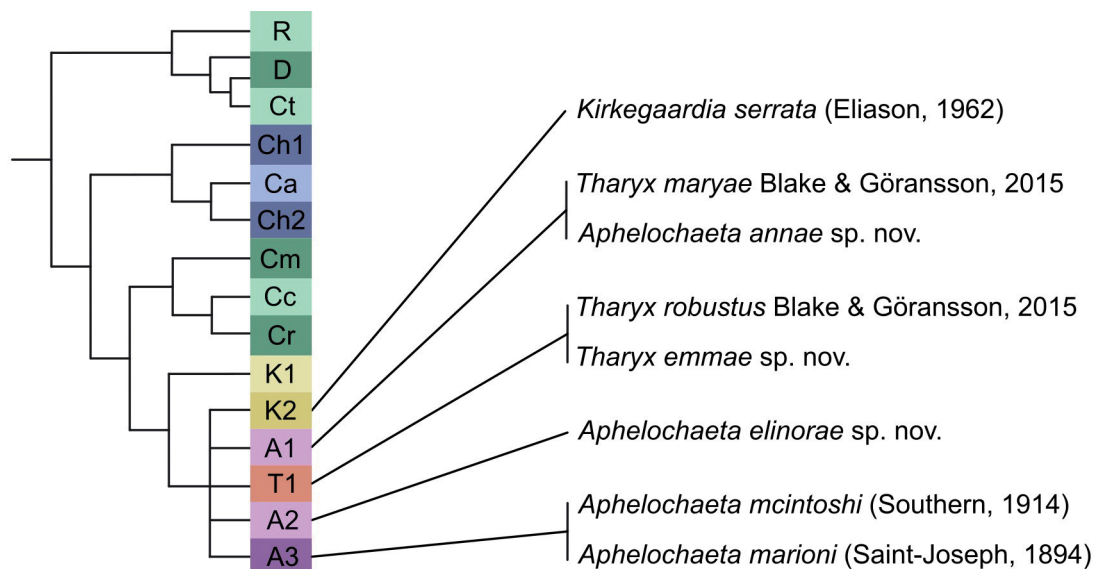


Fig. 1. Summary of the phylogenetic placement of the species presented in this paper. The cladogram is based on the phylogeny of Grosse *et al.* (2025c) which was built using the markers COI, 16S and 28S. Abbreviations: A = *Aphelochaeta* Blake, 1991 (subclades one, two and three); Ca = *Caulleriella* Chamberlin, 1919; Cc = *Chaetocirratulus* Blake, 2018; Ch = *Chaetozone* Malmgren, 1867 (subclades one and two); Cm = *Cirriiformia* Hartman, 1936; Cr = *Cirratulus* Lamarck, 1818; Ct = *Ctenodrilus* Claparède, 1863; D = *Dodecaceria* Örsted, 1843; K = *Kirkegaardia* Blake, 2016 (subclades one and two); R = *Raricirrus* Hartman, 1961; T = *Tharyx* Webster & Benedict, 1887.

Some specimens were stained with a saturated solution of methylene blue in water to reveal potential staining pattern and/or Shirlastain A to increase contrast. Photographs of the specimens were taken with a Canon EOS 5D Mark II camera equipped with a 65 mm macro lens or mounted on the stereo microscope. Microphotographs were taken with a Canon EOS 600D camera mounted on the compound microscope. Specimens selected for scanning electron microscope (SEM) were dehydrated in a series from pure ethanol to pure hexamethyldisilazane (HMDS), air dried and coated in gold/palladium. These specimens were imaged with a HITACHI S-3400N SEM at the University of the Balearic Islands or a Zeiss SUPRA 55VP SEM at the University of Bergen. Stacks of images were assembled using Zerene Stacker ver. 1.04 (<https://www.zerenesystems.com>). Images and plates were edited in GIMP ver. 2.10.30 (<https://www.gimp.org>) and Inkscape ver. 1.2.1 (<https://www.inkscape.org>).

Abbreviations

br1 = first branchia
br2 = second branchia
ch1 = first chaetiger
ch2 = second chaetiger
dCr = dorsal crest
dGr = dorsal groove
dT = dorsal tentacle
MB = methylene blue
mo = mouth
nuO = nuchal organ
per = peristomium
pr = prostomium
pyg = pygidium
vGr = ventral groove

Results

Taxonomy

Phylum Annelida Lamarck, 1809
Class Polychaeta Grube, 1850
Order Cirratulida Dales, 1962
Family Cirratulidae Ryckholdt 1851

Genus *Aphelochaeta* Blake, 1991

Aphelochaeta Blake, 1991: 28.

Type-species

Aphelochaeta monilaris Hartman, 1960. Original designation by Blake (1991).

Diagnosis (after Blake 2018)

Prostomium conical to rounded; peristomium elongate with a pair of grooved dorsal tentacles arising either on or anterior to chaetiger 1. Anterior segments often expanded, sometimes much shorter than wide or high; abdominal segments sometimes beaded or moniliform in appearance; chaetae simple capillaries lacking distinct serrations using light microscopy but distinct fibrils may be visible using SEM; posterior end frequently expanded, tapering to a simple pygidial lobe.

Aphelochaeta mcintoshii (Southern, 1914) comb. nov.

Figs 2–6

Cirratulus mcintoshii Southern, 1914: 110–111.

Cirratulus norvegicus – McIntosh 1911: 171–172, pl. VII fig. 12.

Tharyx mcintoshii – Eliason 1962: 265.

Aphelochaeta spB – Grosse *et al.* 2025a: 3; 2025b: 194; 2025c: 676.

Diagnosis

Body widened and dorsoventrally flattened anterior part. Peristomium square to triangular, with three rings forming two distinct notches around nuchal organs with a narrow crest in between. Dorsal tentacles and first pair of branchiae arising between peristomium and chaetiger 1. Up to 44 capillaries per parapodium. Complex methylene blue pattern with peristomium nearly entirely stained, numerous latero-ventral bands anteriorly and short segmental lateral bands in midbody.

Material examined

Syntypes

IRELAND • 1 spec.; Galway, Bofin; 27 Aug. 1900; 2–7 m deep; NMINH_1908.77.33 • 1 spec.; Galway, Killary Harbour; 22 Aug. 1911; 13 m deep; NMINH_1908.77.32 • 1 spec.; Clew Bay; 16 Aug. 1910; 5 m deep; NMINH_1910.557.5 • 6 specs; Clew Bay; 26 May 1909; 7 m deep; NMINH_1909.151.10.

Other material

NORTH SEA • 1 spec.; 60.206° N, 4.986° E; 166 m deep; 23 Apr. 2014; ZMBN95816 • 1 spec.; 60.2593° N, 5.13703° E; 248 m deep; 13 Jun. 2017; ZMBN116564 • 1 spec.; 60.2883° N, 5.63512° E; 120 m deep; 5 Oct. 2019; ZMBN138604 • 2 specs; 60.1221° N, 5.9286° E; 460 m deep; 29 May 2018; ZMBN139442, ZMBN139462 • 1 spec.; 60.44241° N, 4.93273° E; 112 m deep; 24 Jun. 2020; ZMBN139446 • 1 spec.; 60.22675° N, 5.33616° E; 35–42 m deep; 9 Feb. 2006; ZMBN173382 • 1 spec.; 59.21389° N, 5.77531° E; 168 m deep; 10 Jun. 2014; ZMBN173394.

NORWEGIAN SEA • 2 specs; 61.60182° N, 5.1763° E; 235 m deep; 8 Jan. 2018; ZMBN138601, ZMBN139455 • 1 spec.; 61.46669° N, 7.55726° E; 126 m deep; 18 Nov. 2012; ZMBN173391 • 1 spec.; 61.09854° N, 5.10296° E; 241–254 m deep; 2 Nov. 2011; ZMBN173390 • 1 spec.; 63.68222° N, 9.7835° E; 200 m deep; 25 Oct. 2016; ZMBN173409.

SKAGERRAK • 4 specs; 58.88556° N, 11.08826° E; 126 m deep; 1 May 2021; GNM-POLYC15678, GNM-POLYC15681, GNM-POLYC15674, GNM-POLYC15679 • 2 specs; same data as for preceding; DNA vouchers MG865, MG868 (no repository, specimens used for SEM) • 1 spec.; 58.9115° N, 10.6° E; 200–300 m deep; 17 May 2009; MG1274.

Description

Mostly based on five newly collected complete specimens and one complete syntype. Complete specimens from 25 to 33 mm long, 0.8 to 1 mm wide anteriorly, 0.2 to 0.4 mm wide in midbody, with 199 to 219 segments (Fig. 2). Colour in live specimens orange-red with a dark red heart body along most of anterior half, anterior pale pink to pale yellow, dorsal tentacles white, branchiae yellow, posterior end generally transparent except for gut content (Fig. 3). Colour of ethanol fixed specimens light tan, anterior chaetigers can be darkly pigmented, prostomium, peristomium and venter usually lighter, heart body rarely distinct, best visible anteriorly. Body long and slender with a distinct widened and dorsoventrally flattened anterior part, posterior segments rarely slightly expanded (Fig. 2). Anterior 35–38 segments 12–20 times as wide as long, 6–12 times as high as long, flat oval in cross section. Mid-body segments

3–5 times as wide as long and 2–3 times as wide as long, round to oval in cross section, venter flat. Posterior 30 segments 5–6 times as wide and as high as long, round to oval in cross section, sometimes dorsally expanded. A shallow groove along dorsum of mid-body segments (Fig. 4 A). A wide longitudinal ventral ridge along anterior part, developing into a groove along rest of body (Fig. 4B).

Prostomium as long as 2.5 segments, triangular, slightly dorso-ventrally flattened, wide posteriorly tapering to narrower, round apex, without rings; eyespots absent; nuchal organs as simple slit at posterolateral edge of prostomium (Fig. 5). Peristomium as long as 4–5 segments, square shaped; three rings present, anterior one incomplete dorsally, slightly overlapping with prostomium anteriorly in a narrow crest, middle one incomplete dorsally, overlapping posterior one to end in a V shape between tentacles over chaetiger 1, with longitudinal groove through part of the dorsal side (Fig. 5). Dorsal tentacles arising between peristomium and chaetiger 1, over chaetiger 1, rather close together (Fig. 5). First pair of branchiae arising between peristomium and chaetiger 1, lateral to tentacles, aligned with following branchiae (Fig. 5). Second pair of branchiae arising from chaetiger 1, dorsal and slightly posterior to parapodia (Fig. 5). Subsequent branchiae similarly located, branchiae or branchial scars present on most anterior segments, less frequent in following segments.

Parapodia distinct mounds, higher than dorsum anteriorly forming very distinct shoulders (Figs 5, 6A, C), progressively shifting ventrally and shrinking to a third or a fourth of the height of mid-body segments



Fig. 2. *Aphelochaeta mcintoshi* (Southern, 1914) comb. nov., complete specimens. **A.** ZMBN139442. **B.** ZMBN138604. **C.** ZMBN139455. **D.** ZMBN139462. **E.** GNM-POLYC15678. **F.** Syntype, NMNH_1908.77.33. Scale bar = 2 mm.

and becoming less distinct towards pygidium (Fig. 4C). Twelve to 22 capillary chaetae per each neuro- and notopodium in anterior and midbody segments, notochaetae 1.5–6 times as long as neurochaetae, up to 1.5 times as long as body width, with minute fibrillation along one edge visible with SEM (Fig. 4D–E). Five to seven simple and smooth capillary chaetae per each neuro and notopodium in posterior segments, notochaetae 1.5–6 times as long as neurochaetae, shorter than midbody chaetae, smooth.

Pygidium with terminal anus and small, rounded to triangular ventral lobe (Fig. 3C).

Methylene blue

Specimens retain a complex methylene blue pattern (Fig. 6). The peristomium stains nearly entirely, highlighting the notches it forms around the nuchal organs where the prostomium does not stain. Numerous thin ventrolateral bands stain from chaetiger 1, progressively fading into short lateral bands around the neuropodia only.

Distribution and habitats

This species was first found in Norway and originally described from Ireland. It was found along the coasts of Norway and Sweden, from depths of 35 to 460 m. In Sweden, it was found in one station with soft mud and a lot of *Desmophylum pertusum* (Linnaeus, 1758) rubble.

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Aphelocheata mcintoshi*, as *Aphelocheata* sp. B, belongs to group IV (comprising members of *Aphelocheata*, *Kirkegaardia* and *Tharyx*), clade A3. It was recovered sister species to *Aphelocheata abyssorum* Hansen, 1878.

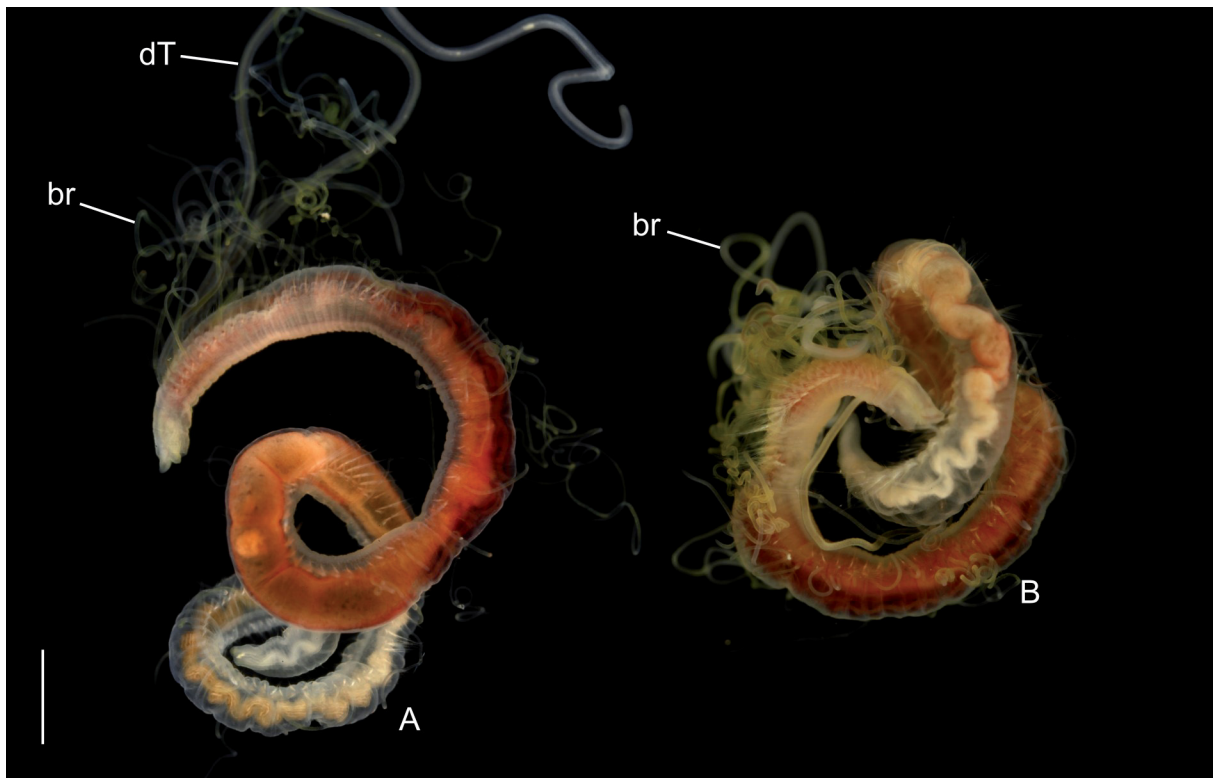


Fig. 3. *Aphelocheata mcintoshi* (Southern, 1914) comb. nov., live animals. **A.** GNM-POLYC15678. **B.** GNM-POLYC15674. Abbreviations: br = branchiae; dT = dorsal tentacles. Scale bar = 1 mm.

Remarks

A description of this species was first given based on specimens from Drøbak (Oslofjord, Norway) as *Cirratulus norvegicus* ? (McIntosh 1911). Southern (1914) considered this as a description of a new species, although the name was preoccupied by *Cirratulus norvegicus* (Quatrefages, 1865), and therefore proposed a replacement name for this species, *Cirratulus mcintoshi* (Southern 1914) based on specimens from McIntosh and new material from Ireland. However, McIntosh did not mean to establish a new species and was only describing material he had identified what Quatrefages called *Cirratulus norvegicus*. Therefore even though Southern meant to only propose a replacement name he did, in fact, describe a new species and the material he examined and that is housed at the National Museum of Ireland in Dublin is considered the type series (Read & Fauchald 2024). The work in which *C. mcintoshi* was moved to *Aphelochaeta* is unknown but the combination is present in Bellan (2001) and Read & Fauchald (2024).

While no original material from McIntosh's descriptions could be found, some of the specimens from Drøbak studied herein agree well with his description and are complemented with further details and

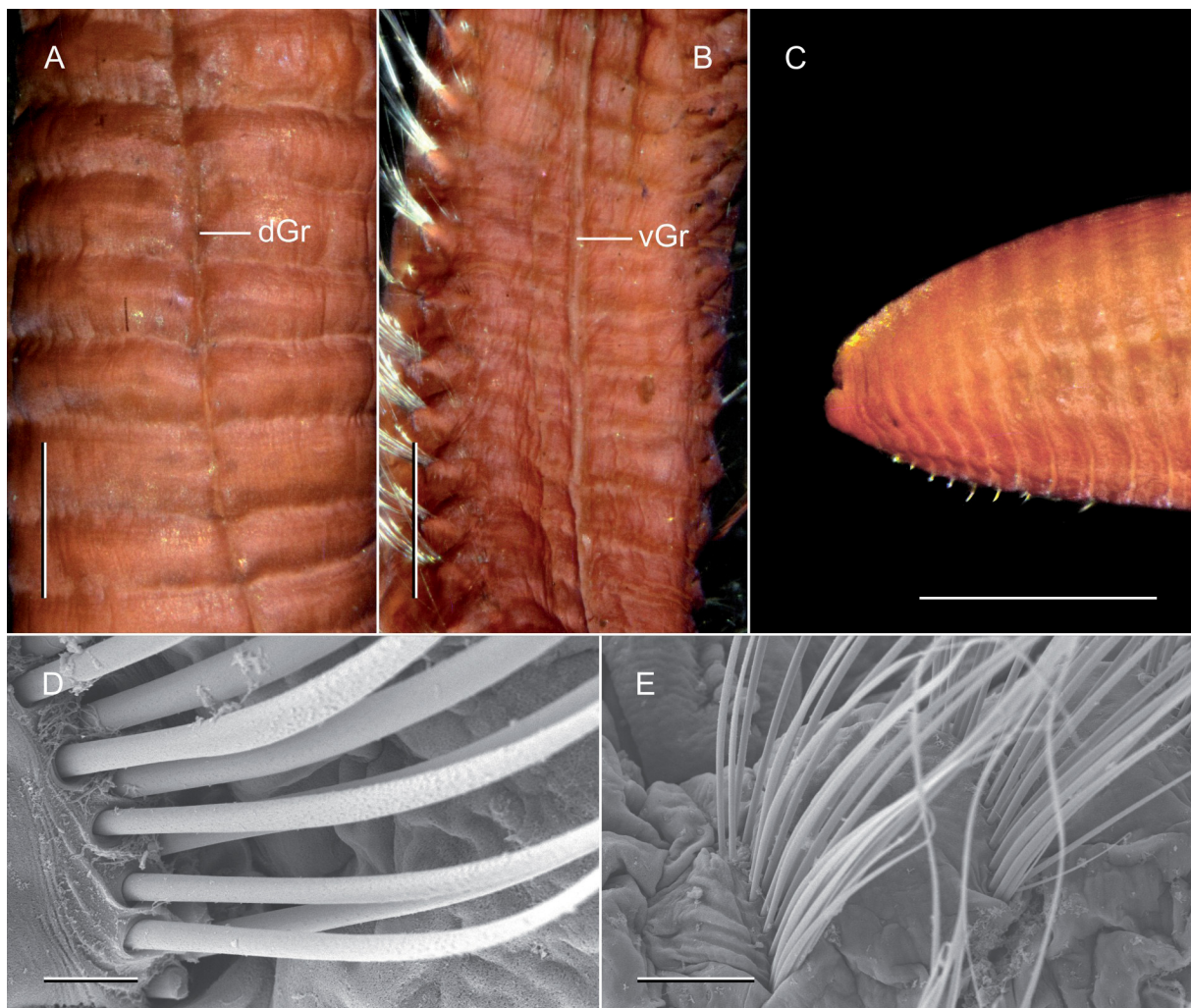


Fig. 4. *Aphelochaeta mcintoshi* (Southern, 1914) comb. nov., morphological details. **A–C.** ZMBN138604. **D–E.** MG865 (no repository, specimen used for SEM). **A.** Midbody segments in dorsal view. **B.** Midbody segments in ventral view. **C.** Pygidium in lateral view. **D.** Anterior neuropodium. **E.** Anterior notopodia. Abbreviations: dGr = dorsal groove; vGr = ventral groove. Scale bars: A–C = 500 µm; D = 10 µm; E = 50 µm.

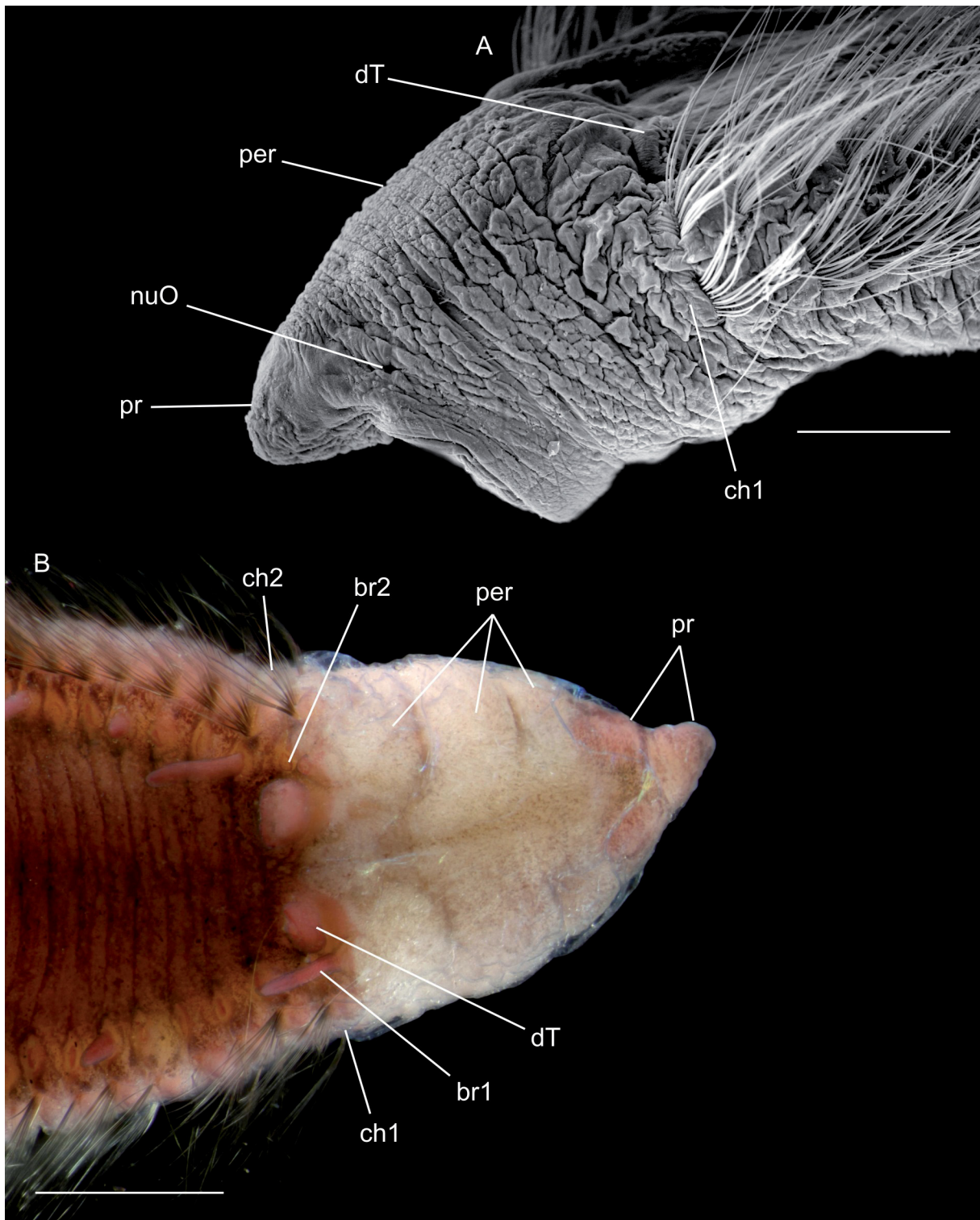


Fig. 5. *Aphelocheata mcintoshi* (Southern, 1914) comb. nov., anterior morphology. **A.** MG865 (no repository, specimen used for SEM), anterior end in lateral view. **B.** ZMBN139455, anterior end in dorsal view. Abbreviations: br1 = first branchiae; br2 = second branchiae; ch1 = first chaetiger; ch2 = second chaetiger; dT = dorsal tentacles; nuO = nuchal organs; per = peristomium; pr = prostomium. Scale bars = 250 µm.

variations between populations. They also agree well with specimens studied by Southern (1914) from Ireland (Fig. 2F) that he compared with the specimens collected by McIntosh (Southern 1914).

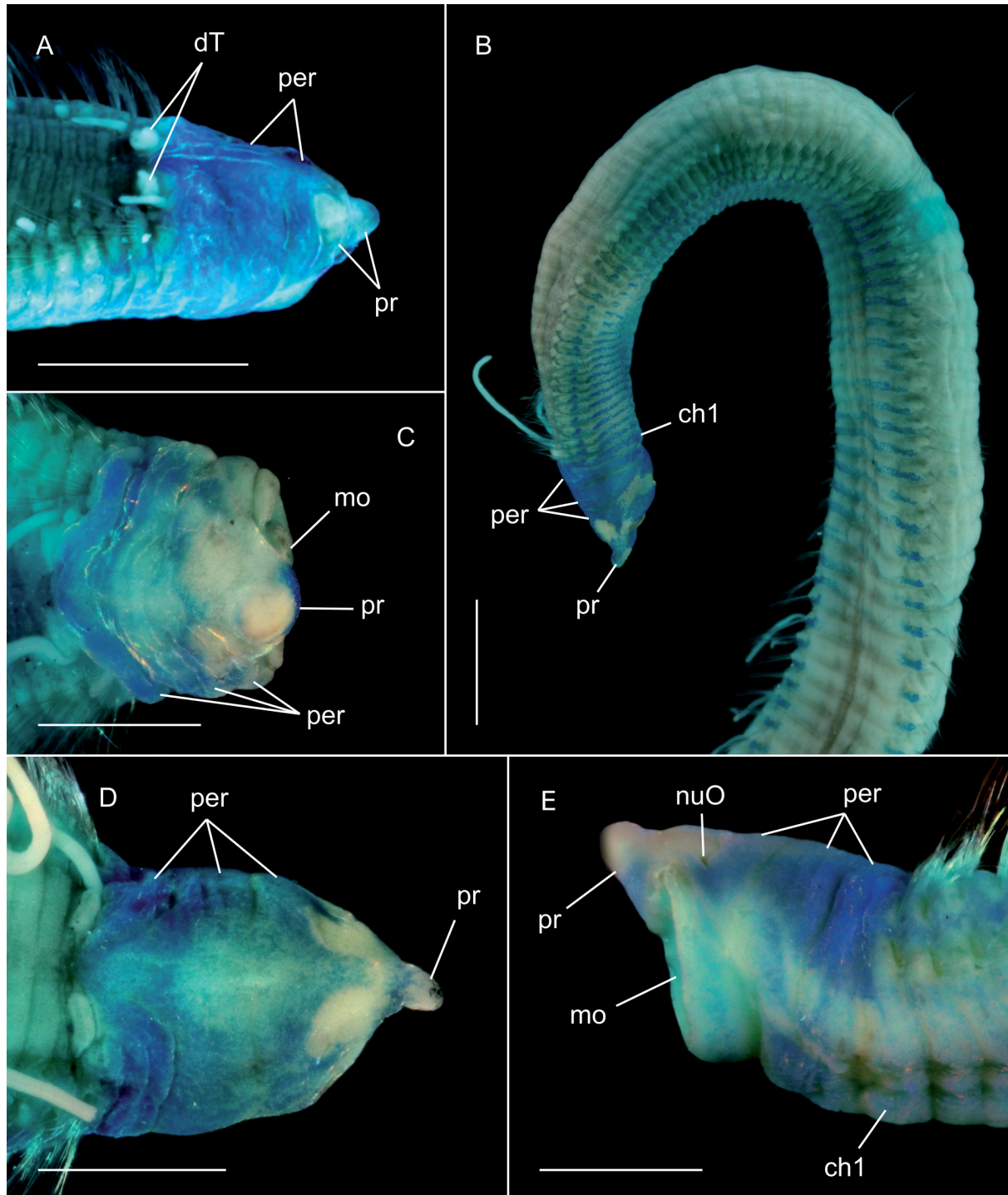


Fig. 6. *Aphelochaeta mcintoshi* (Southern, 1914) comb. nov., methylene blue staining pattern. **A.** ZMBN139455. **B.** ZMBN138604. **C, E.** ZMBN139442. **D.** ZMBN139446. Abbreviations: ch1 = first chaetiger; dT = dorsal tentacles; mo = mouth; nuO = nuchal organs; per = peristomium; pr = prostomium. Scale bars: A–B, D–E = 500 μ m; C = 1 mm.

This species is easily distinguished from other congeners in the area by its distinctive body shape with an enlarged and flattened anterior end, its methylene blue staining pattern that includes numerous ventral bands and small lateral bands (where only a few are present in *Aphelochaeta marioni* and none in *Aphelochaeta elinorae* sp. nov.) and the shape of the peristomial crest forming two circles around the nuchal organs. It mainly differs from *Aphelochaeta annae* sp. nov. by the shape of the prechaetiger area which is notably more fusiform in *A. annae* and the methylene blue staining pattern which includes numerous narrow ventral bands where *A. annae* shows broad stained ventral bands that cover nearly the entire length of anterior segments. Among all described species of *Aphelochaeta*, *A. mcintoshi* is most similar to *A. petersenae* Blake, 1996 from southern California (intertidal to shallow subtidal) with which it shares a similar staining pattern, position of dorsal tentacles and first pair of branchiae, and number and distribution of chaetae.

Aphelochaeta marioni (Saint-Joseph, 1894)

Figs 7–11

Heterocirrus marioni Saint-Joseph, 1894: 56–58, pl. III figs 62–64.

Tharyx marioni – Caullery & Mesnil 1898: 115.

Aphelochaeta marioni – Blake 1991: 28.

Aphelochaeta spN – Grosse *et al.* 2025b: 194; 2025c: 676.

Diagnosis

Anterior end usually slightly wider than midbody. Peristomium long with three rings best visible laterally. Dorsal tentacles and first pair of branchiae arising between last peristomial ring and chaetiger 1. Up to 42 capillary chaetae per parapodium. 5–15 strong ventral bands anteriorly with methylene blue.

Materiel examined

Syntypes

ENGLISH CHANNEL • 1 spec.; Dinard; Jul. 1880; MNHN-IA-TYPE0953 • 1 spec.; Dinard; 11 Jul. 1881; MNHN-IA-TYPE0959 • 1 spec.; Dinard; 19 Jun. 1882; MNHN-IA-TYPE0957 • 1 spec.; Dinard; Aug. 1882; MNHN-IA-TYPE0958 • 2 specs; Dinard; 16 Aug. 1984; MNHN-IA-TYPE0955, MNHN-IA-TYPE0960 • 1 spec.; Dinard; 2 Jul. 1889; MNHN-IA-TYPE0956 • 1 spec.; Dinard; Jul. 1889; MNHN-IA-TYPE0954.

Other material

ENGLISH CHANNEL • 2 specs; 48.71100° N, 3.86602° W; 18 m deep; 7 Sep. 2018; NHMO-IN-10040, MG508 (no repository, specimen used for SEM) • 2 specs; 48.71148° N, 3.8695° W; 18 m deep; 7 Sep. 2018; NHMO-IN-10041, NHMO-IN-10042 • 2 specs; 48.7083° N, 3.8662° W; 18 m deep; 24 Aug. 2021; NHMO-IN-10043, MG894 (no repository, specimen used for SEM) • 1 spec.; 48.7191° N, 3.8665° W; 20 m deep; 24 Aug. 2021; NHMO-IN-10044 • 2 specs; 48.6829° N, 3.9384° W; 17 m deep; 24 Aug. 2021; NHMO-IN-10045.

KATTEGAT • 1 spec.; 56.84203° N, 11.96502° E; 35.2 m deep; 5 May 2020; collected with grab; GNM-POLYC15685.

NORTH SEA • 3 specs; 60.31888° N, 5.25528° E; 48 m deep; 12 Sep. 2019; collected with dredge; NTNU-VM 76397, NTNU-VM 76399, NTNU-VM 76400 • 1 spec.; 60.4085° N, 5.03183° E; 113 m deep; 10 Jan. 2019; ZMBN138600 • 1 spec.; 60.26910° N, 5.11570° E; 98 m deep; 2 May 2006; ZMBN173350 • 1 spec.; 60.33660° N, 5.19405° E; 20–63 m deep; 10 May 2014; ZMBN173353 • 1 spec.; 60.54973° N, 5.22897° E; 37 m deep; 20 Apr. 2017; ZMBN173360 • 1 spec.; 60.22675° N, 5.33616° E; 35–43 m deep; 9 Feb. 2006; ZMBN173349 • 1 spec.; 60.95258° N, 4.78560° E; 44 m deep; 18 Jun. 2020; ZMBN173361.

NORWEGIAN SEA • 1 spec.; 61.1959° N, 4.81285° E; 65 m deep; 3 Oct. 2019; ZMBN138602.

SKAGERRAK • 1 spec.; 59.6607° N, 10.60637° E; 20 m deep; 22 May 2018; collected with dredge; NTNU-VM 76394.

Description

Complete specimens up to 25 mm long, 2 mm wide and 190 segments (Fig. 7). Colour in ethanol light gray to light tan, prostomium, peristomium and venter often lighter than rest of body, heart-body rarely distinct. Body long and slender, anterior region usually slightly wider than midbody region, posterior region generally dorsally and laterally expanded tapering to pygidium. Anterior 30–35 segments up to 7–9 times as wide as long and 6–7 times as high as long, oval in cross section, flat ventrally, tapering towards peristomium. Mid-body segments 4–5 times as wide and as high as long, flat ventrally and round dorsally. Posterior region can be dorsally inflated, tapering towards pygidium, over the last 50–60 segments, segments 8–10 times as wide and as high as long, flat ventrally and round dorsally. A thin longitudinal dorsal groove from segment 1–8 along entire body (Fig. 8B). A more distinct longitudinal ventral groove along entire body.

Prostomium short, as long as half of peristomium, conical, pointed to rounded; without rings; eyespots absent; nuchal organs as simple slits on posterolateral margin (Fig. 9). Peristomium as long as 3–5 anterior segments; wide, trapezium-shaped, tapering towards prostomium, 3 rings of similar size, best visible laterally, middle ring overlapping anterior ring and posterior ring dorsally, ending in a V or U shape between dorsal tentacles (Fig. 9). Dorsal tentacles arising between last peristomial ring and chaetiger 1, partially to well above chaetiger 1, close together (Fig. 9). First pair of branchiae arising between last peristomial ring and chaetiger 1, close to dorsal tentacles (Fig. 9). Second pair of branchiae

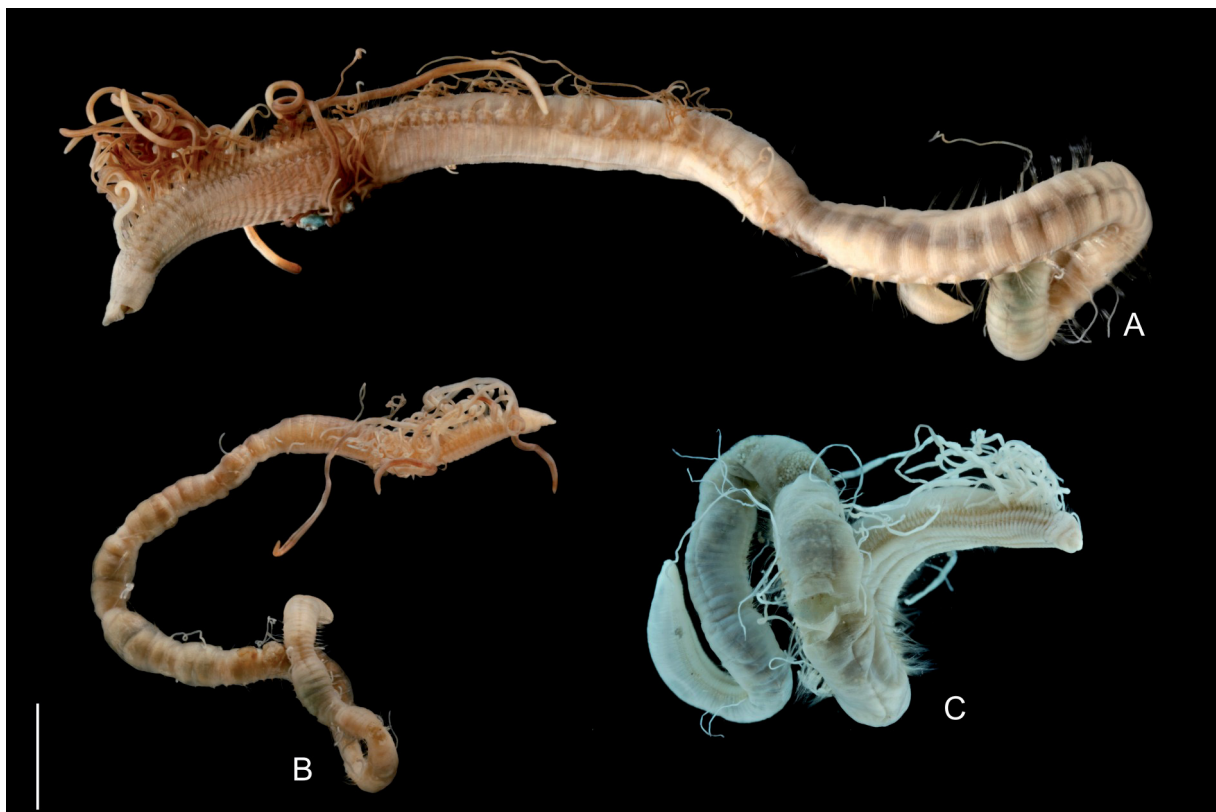


Fig. 7. *Aphelochaeta marioni* (Saint-Joseph, 1894), complete specimens. A. NHMO-IN-10043. B. NHMO-IN-10044. C. ZMBN138600. Scale bar = 2 mm.

arising from chaetiger 1, dorsal and slightly posterior to parapodia (Fig. 9). Subsequent branchiae similarly located, branchiae or branchial scars present on most anterior segments, less frequent in following segments.

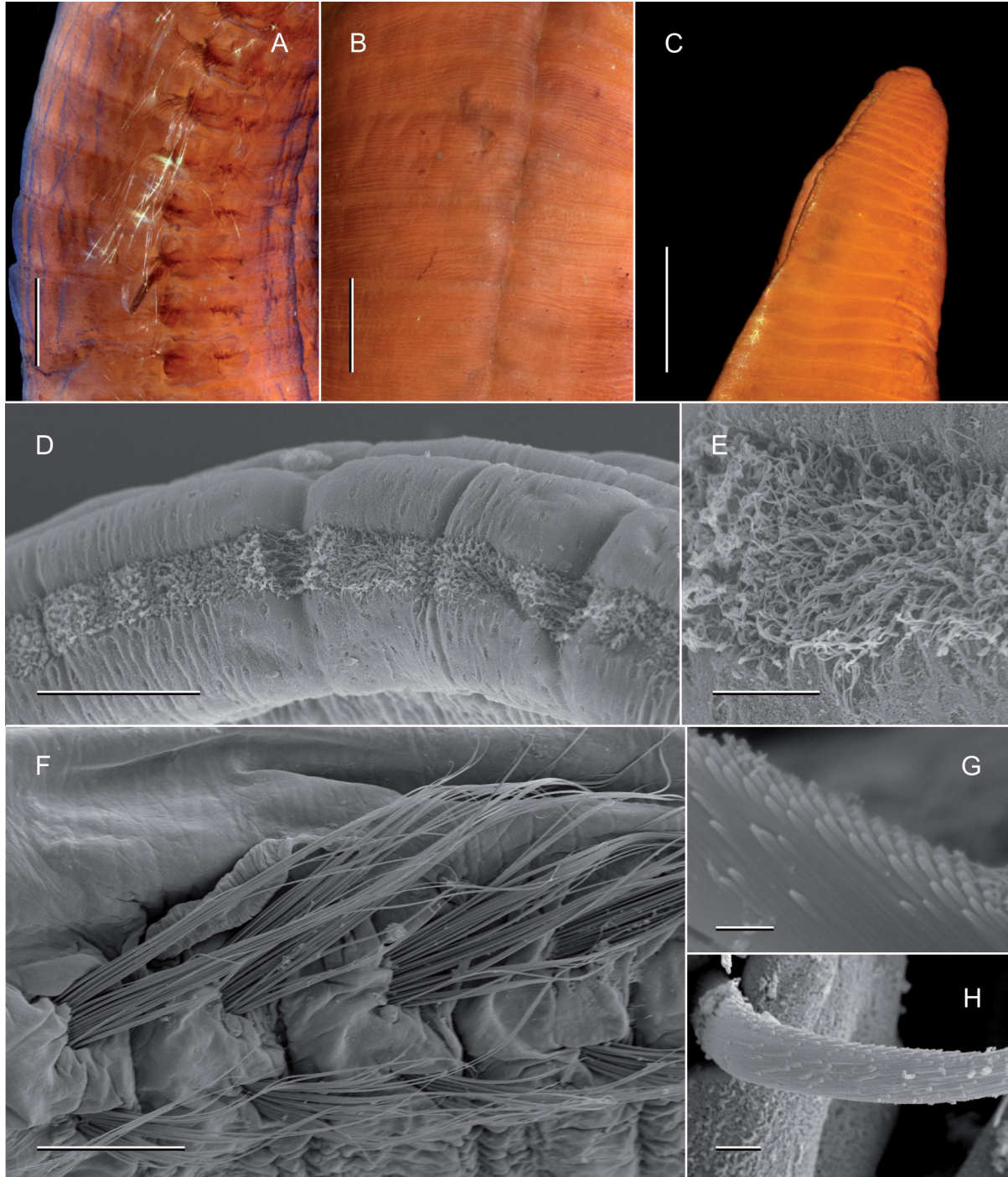


Fig. 8. *Aphelochaeta marioni* (Saint-Joseph, 1894), morphological details. **A, D–F.** MG508 (no repository, specimen used for SEM). **B–C.** ZMBN138600. **G–H.** NTNU-VM 76397. **A, F.** Mid-body parapodia in lateral view. **B.** Dorsal groove. **C.** Pygidium in lateral view. **D–E.** Detail of branchiae with ciliated band. **G–H.** Detail of neurochaetae. Scale bars: A–C = 500 μ m; D = 50 μ m; E = 10 μ m; F = 250 μ m; G = 1.5 μ m; H = 2.5 μ m.

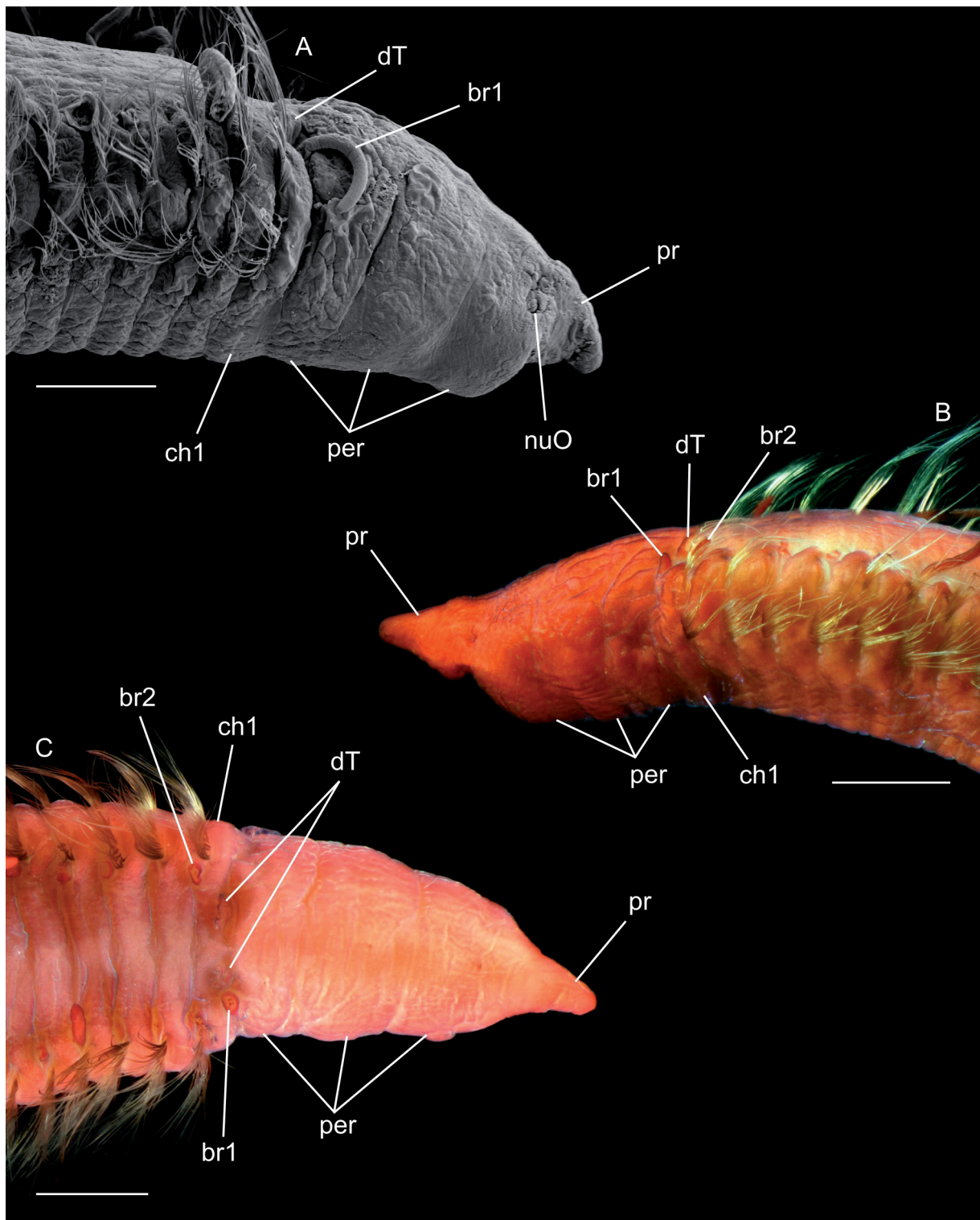


Fig. 9. *Aphelochaeta marioni* (Saint-Joseph, 1894), anterior morphology. **A.** MG508 (no repository, specimen used for SEM). **B.** NHMO-IN-10040. **C.** MG882 (no repository, specimen used for SEM). **A–B.** Lateral view. **C.** Dorsal view. Abbreviations: br1 = first branchiae; br2 = second branchiae; ch1 = first chaetiger; ch2 = second chaetiger; dT = dorsal tentacles; nuO = nuchal organs; per = peristomium; pr = prostomium. Scale bars = 500 μ m.

Parapodia low mounds, distinct and covering most of the height of the first 10–20 segments (Fig. 9A–B), forming low shoulders, progressively shrinking down to a third or a fourth of height of mid-body segments (Fig. 8A) and becoming less distinct towards pygidium (Fig. 8C), always placed ventrally. 15–21 capillary chaetae per each neuro- and notopodium in anterior segments and mid-body segments; notochaetae 1.5–6 times as long as neurochaetae, slightly shorter than body width, smooth (Fig. 8F–G). 5–7 capillary chaetae per each neuro- and notopodium in posterior end; notochaetae 1.5–6 times as long as neurochaetae, shorter than midbody chaetae, smooth; neurochaetae slightly curved basally and with minute fibrillation along the concave edge (Fig. 8H).

Pygidium terminal, with a very reduced round ventral lobe (Fig. 8C).

Methylene blue

Five to 15 conspicuous dark bands on venter of segments 13–19 to 17–29, depending on specimen size (Fig. 10). Pygidium of some specimens also stains. With stronger (longer) staining, peristomium and

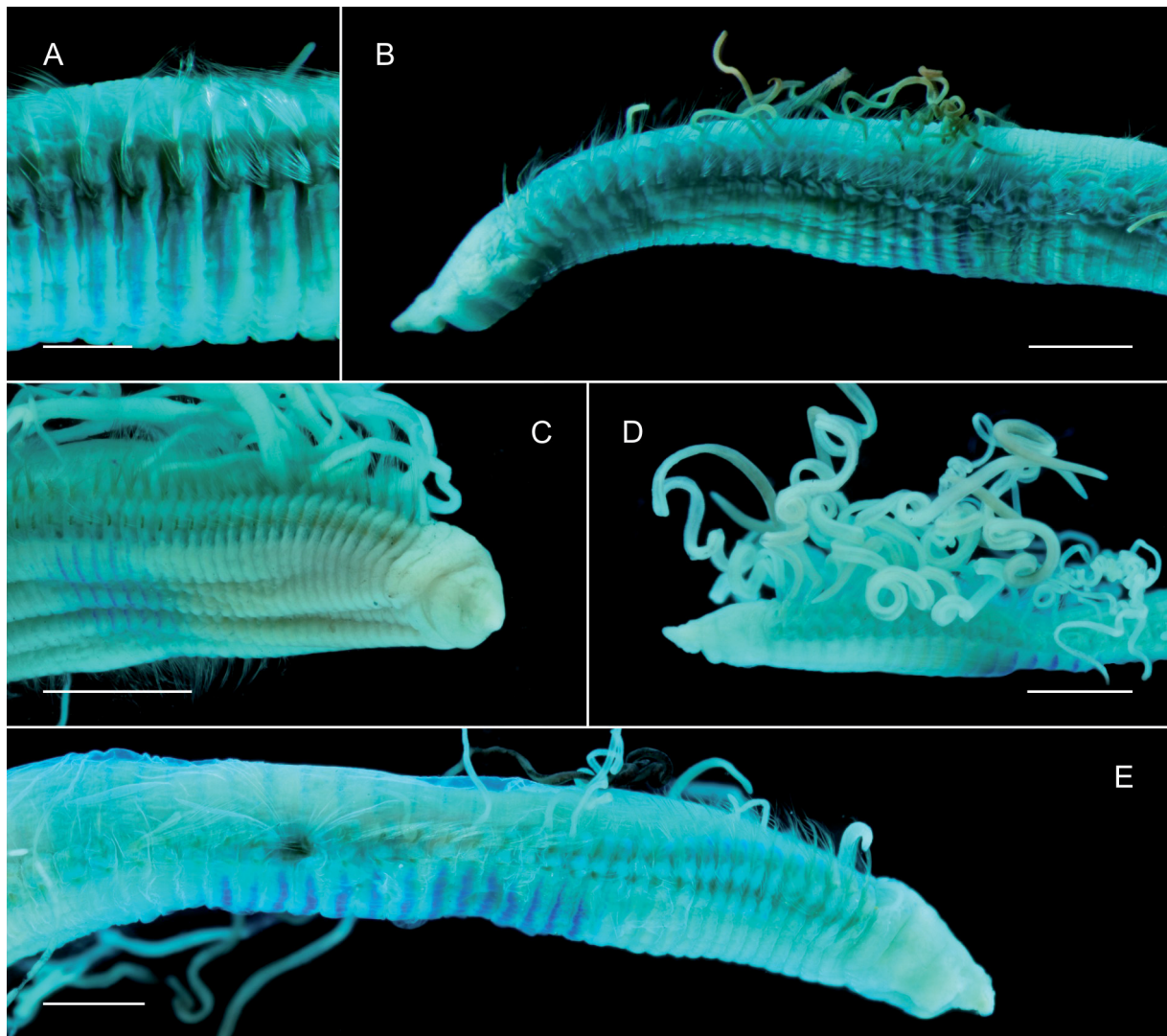


Fig. 10. *Aphelochaeta marioni* (Saint-Joseph, 1894), methylene blue staining pattern. **A.** MG882 (no repository, specimen used for SEM). **B.** NHMO-IN-10043. **C.** ZMBN138600. **D.** NHMO-IN-10040. **E.** MG508 (no repository, specimen used for SEM). Scale bars: A = 500 µm; B, D–E = 1 mm; C = 2 mm.

prostomium of some specimens retain a light stain and light lateroventral bands appear on all anterior segments as well as intersegmental bands in posteriormost segments.

Distribution and habitat

Apelochaeta marioni has been found along the coasts of Norway, Sweden and France (English Channel) from depths of 15 to 113 m.

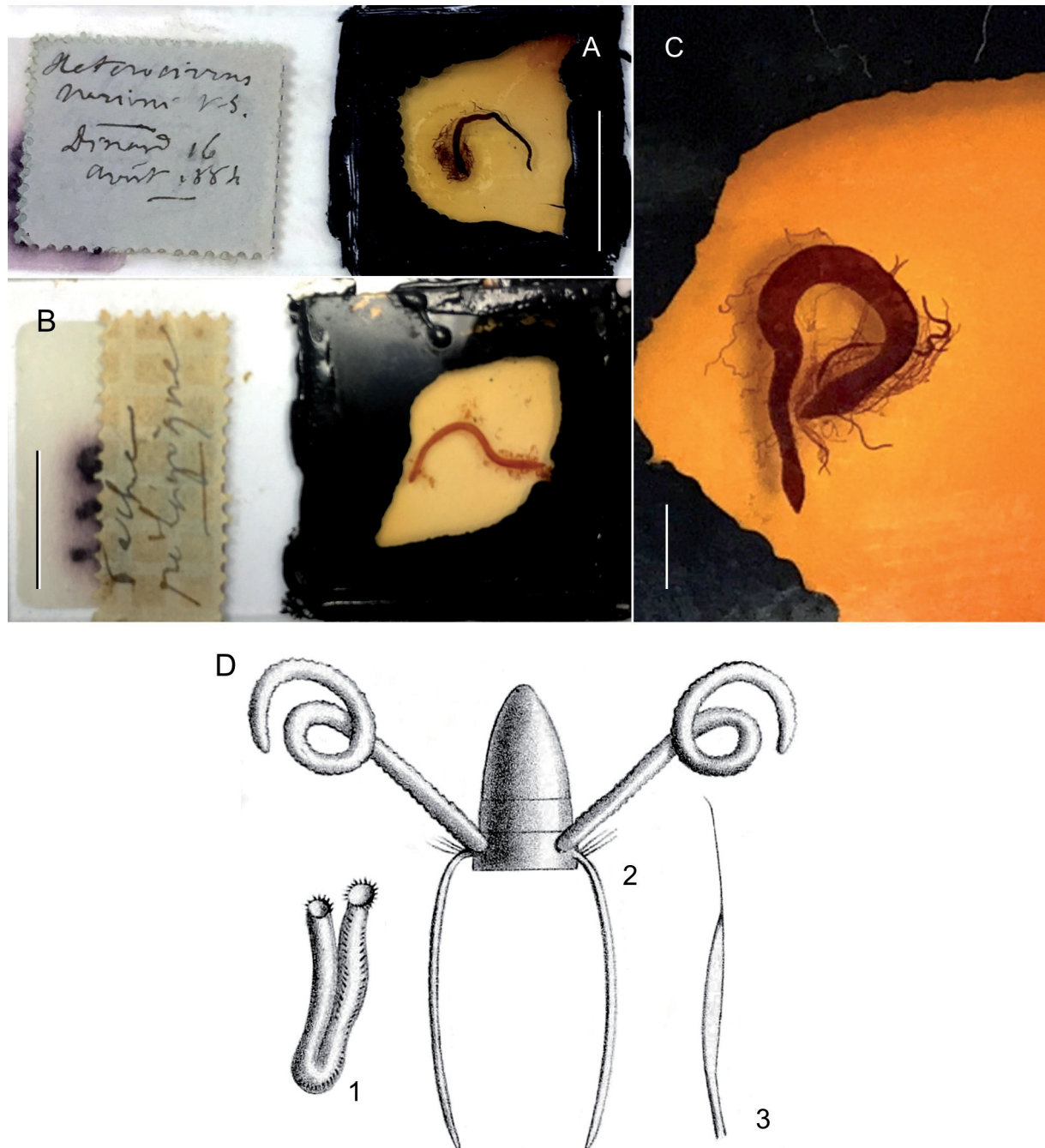


Fig. 11. *Apelochaeta marioni* (Saint-Joseph, 1894), syntypes and original illustrations. **A.** MNHN-IA-TYPE0960. **B.** MNHN-IA-TYPE0956. **C.** MNHN-IA-TYPE0954. **D.** Original illustrations (1 segmental organ, 2 anterior region, 3 neurochaeta), modified from original publication. Scale bars: A–B = 1 mm; C = 200 µm.

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Aphelochaeta marioni* belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade A3.

Remarks on the original description and type material

Aphelochaeta marioni was originally described from Dinard (Saint-Joseph 1894) with little detail and rather poor illustrations (Fig. 11D). The original description mentions that the dorsal tentacles and the first pair of branchiae arise from the first chaetiger. However, these characters can be difficult to observe and interpret, even with modern equipment and today's understanding of annelid morphology. The second notable character detailed in this description is the fact that only capillary chaetae are present. Notochaetae are straight, thin, and as long as the body width. Neurochaetae are anteriorly similar to notochaetae but progressively become shorter and slightly curved.

Although they were believed lost for a long time (Blake 1996), a type series is available at the Natural History Museum in Paris (Solís-Weiss *et al.* 2004). These specimens are small and mounted on slide (Fig. 11A–C). They are unlikely to be fully representative of the material originally studied by Saint-Joseph as his descriptions mention specimens from 35 to 70 mm (Saint-Joseph 1894). Moreover, the preservation quality is very variable as some specimens are still transparent while some others have turned completely black. Nevertheless, some information could be gathered from this material. Enlarged anterior and posterior parts are visible in some specimens. Segments in midbody are sometimes elongated but never longer than wide or beaded. The prostomium is generally short and varies from pointed to more rounded. The peristomium is generally three to four times as long as the prostomium, with none to three rings visible. The position of the dorsal tentacles and first pair of branchiae could not be observed. Around ten capillaries are visible in the notopodia and at least five in neuropodia. Details of the capillaries could not be observed, except for some of the shorter ones in neuropodia that are often thicker at the base.

Overall, the material examined in this study agrees (or perhaps simply does not disagree) with the scarce information present in the original description and the type material. As this is the only species of *Aphelochaeta* collected in the vicinity of Dinard (Roscoff), we propose that this species is *Aphelochaeta marioni*.

Aphelochaeta marioni is best distinguished from other species of *Aphelochaeta* in the area by its methylene blue staining pattern which reveals only ventral bands, while that of *Aphelochaeta mcintoshi* and *A. annae* sp. nov. are more complex and *A. elinorae* sp. nov. has no pattern. It is distinguished from *Tharyx maryae* by the shape of the peristomium, of which the second ring overlaps dorsally the third ring and ends between the tentacles, by the position of the dorsal tentacles on the posterior margin of the peristomium and by the presence of a dorsal groove.

Aphelochaeta annae sp. nov.

urn:lsid:zoobank.org:act:890EBCF0-2B8E-4B11-BE95-DB7C80B9BB14

Figs 12–16

Aphelochaeta spD – Grosse *et al.* 2025c: 676.

Diagnosis

Fusiform anterior end; short triangular prechaetiger area, three peristomial rings, posterior one incomplete bearing dorsal tentacles and branchiae. Dorsal tentacles arising from third peristomial ring, first pair of branchiae arising from posterior margin of peristomium. Up to 55 chaetae per parapodium in anterior end. Posterior of peristomium, anterior and posterior parapodia stain strongly with methylene blue, few broad and long anterior ventral bands.



Fig. 12. *Aphelochaeta annae* sp. nov., complete specimens. **A.** Holotype, ZMBN139441. **B.** Paratype, ZMBN139461. **C.** DNA voucher MG696 (no repository, specimen used for SEM). **D.** DNA voucher MG1188 (no repository, specimen used for SEM). **E.** Paratype, ZMBN138603. Scale bar = 1 mm.

Etymology

This species is named after Anne Elliot, one of the main characters of the novel *Persuasion* by Jane Austen.

Material examined

Holotype

NORTH SEA • Nordfjord; 61.90826° N, 5.54251° E; 575 m deep; 30 Mar. 2020; ZMBN139441.

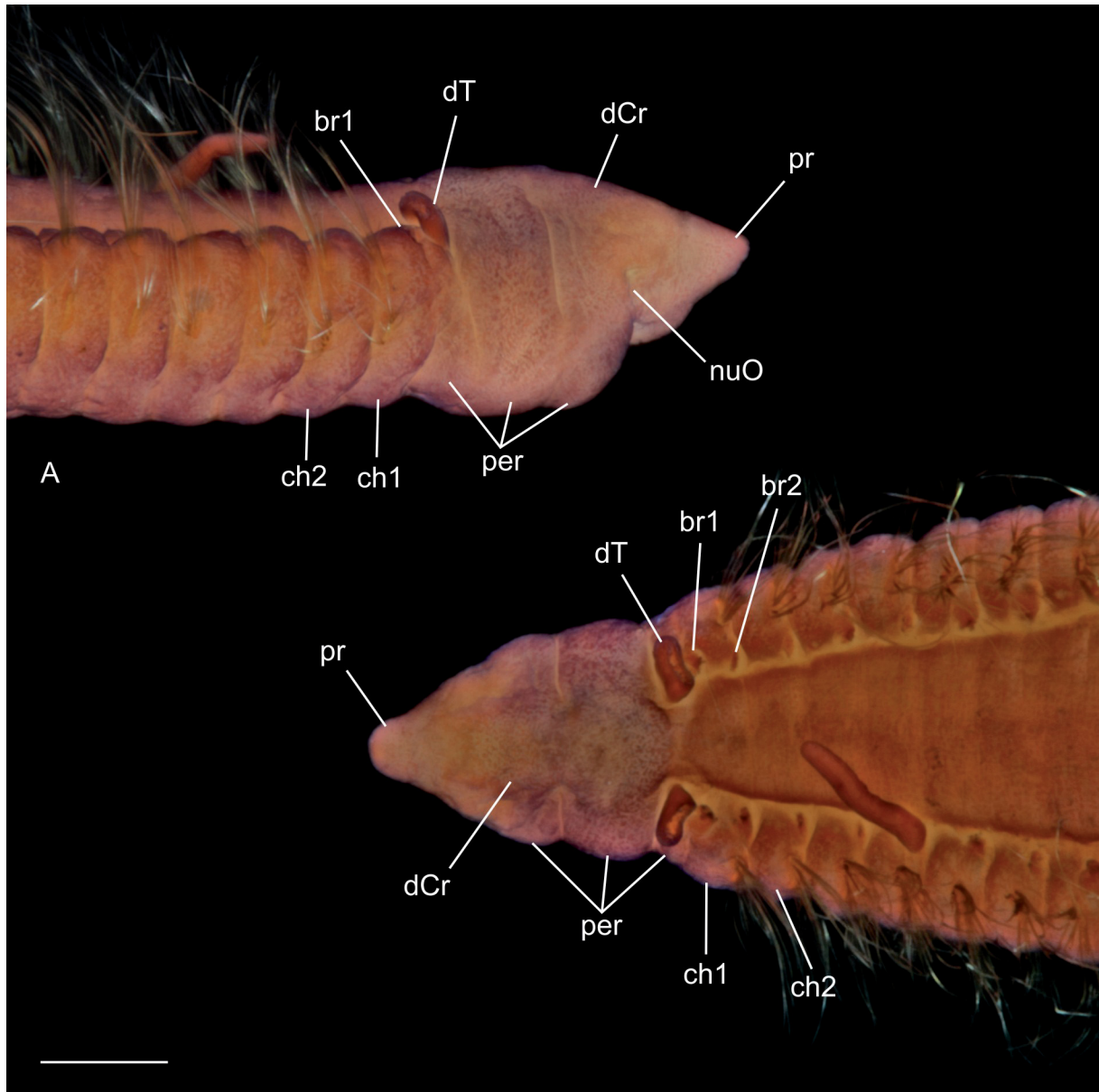


Fig. 13. *Aphelochaeta annae* sp. nov., details of anterior end. **A–B.** Paratype, ZMBN173454. **A.** Anterior end in lateral view, stained with Shirlastain A. **B.** Anterior end in dorsal view, stained with Shirlastain A. Abbreviations: br1 = first branchiae; br2 = second branchiae; ch1 = chaetiger 1; ch2 = second chaetiger; dCr = dorsal crest; dT = dorsal tentacles; nuO = nuchal organ; per = peristomium; pr = prostomium. Scale bar = 200 μ m.

Paratypes

NORWEGIAN SEA • 2 specs; same data as for holotype; ZMBN139461, MG696 • 2 specs; 59.998367° N, 5.876067° E; 609 m deep; 9 Oct. 2020; ZMBN138603, ZMBN139457 • 3 specs; 61.12629° N, 5.17834° E; 573–621 m deep; 14 Jul. 2015; ZMBN173454 to ZMBN173456 • 1 spec.; 61.14478° N, 7.19684° E; 100–400 m deep; 18 Nov. 2012; ZMBN173452 • 1 spec.; 65.50056° N, 6.26848° E; 396 m deep; 23 Jun. 2013; ZMBN173462 • 1 spec.; 61.38362° N, 2.12090° E; 280 m deep; 29 May 2011; ZMBN173489 • 1 spec.; 66.94977° N, 12.40812° E; 280 m deep; 22 May 2011; ZMBN173471 • 1 spec.; 61.04° N, 3.6° E; 400 m deep; 30 May 2019; MG1188 (no repository, specimens used for SEM).

NORTH SEA • 1 spec.; 60.13° N, 3.55° E; 400 m deep; 30 May 2019; MG1185 (no repository, specimens used for SEM) • 1 spec.; 60.79° N, 3.41° E; 300 m deep; 22 May 2019; MG1190 (no repository, specimens used for SEM) • 1 spec.; 60.26883° N, 5.14800° E; 240 m deep; 14 Apr. 2005; MG1202 (no repository, specimens used for SEM) • 1 spec.; 60.13656° N, 4.80873° E; 327 m deep; 27 Apr. 2017; ZMBN173481.

Description

Holotype complete, 25 mm long (complete paratypes: 15–28 mm), 0.5 mm wide (complete paratypes: 0.5–1 mm), 205 segments (complete paratypes: 145–205 segments) (Fig. 12). Colour of ethanol preserved specimens light tan to light brown, prechaetiger area and venter usually lighter than dorsum; dark heart body usually visible dorsally along anterior half, a checkered pattern with dark outline visible dorsally along nearly entire body of mature females due to presence of large eggs in body cavity (Fig. 12). Body long and slender, distinct short fusiform anterior region slightly widened and dorsoventrally flattened, long cylindrical mid-body region and a short expanded posterior end, tapering towards pygidium. Anterior 30 segments 5–6 times as wide as long and 3–4 times as high as long, oval in cross section. Mid-body segments 2–2.5 times as wide as long, round in cross section. Posterior 30 segments up to eight times as wide as long and up to 10 times as high as long, dorsally expanded, venter flat. A thin longitudinal dorsal groove along posterior part. A wide longitudinal ventral ridge formed by segmental

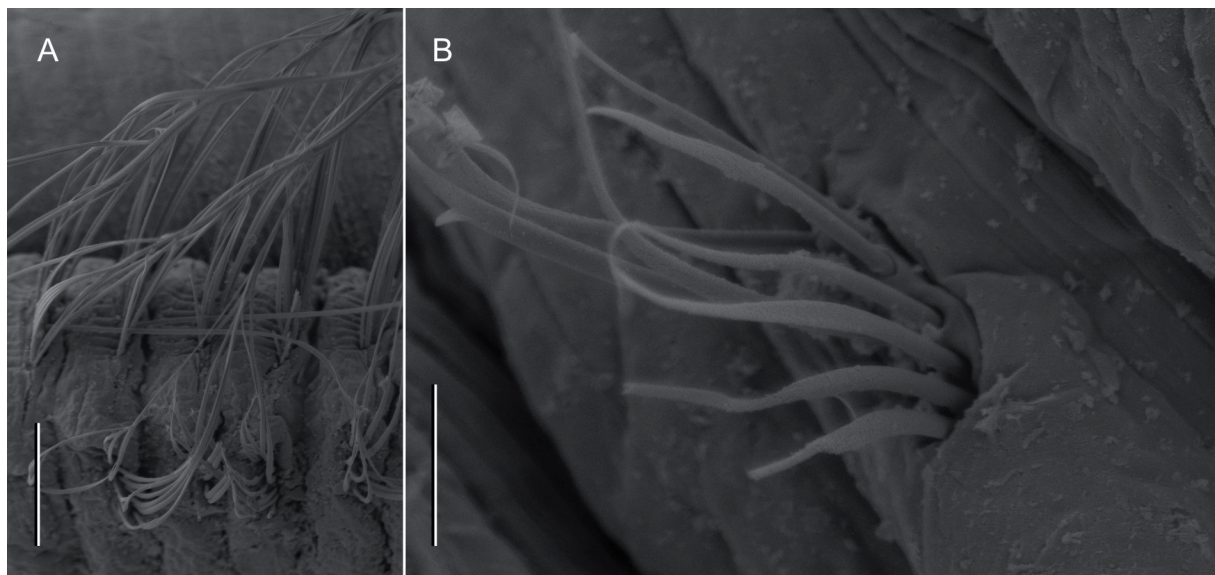


Fig. 14. *Aphelochaeta annae* sp. nov., detail of chaetae, DNA voucher MG1188 (no repository, specimen used for SEM). **A.** Anterior parapodia. **B.** Detail of anterior neuropodium. Scale bars: A = 100 μ m; B = 25 μ m.

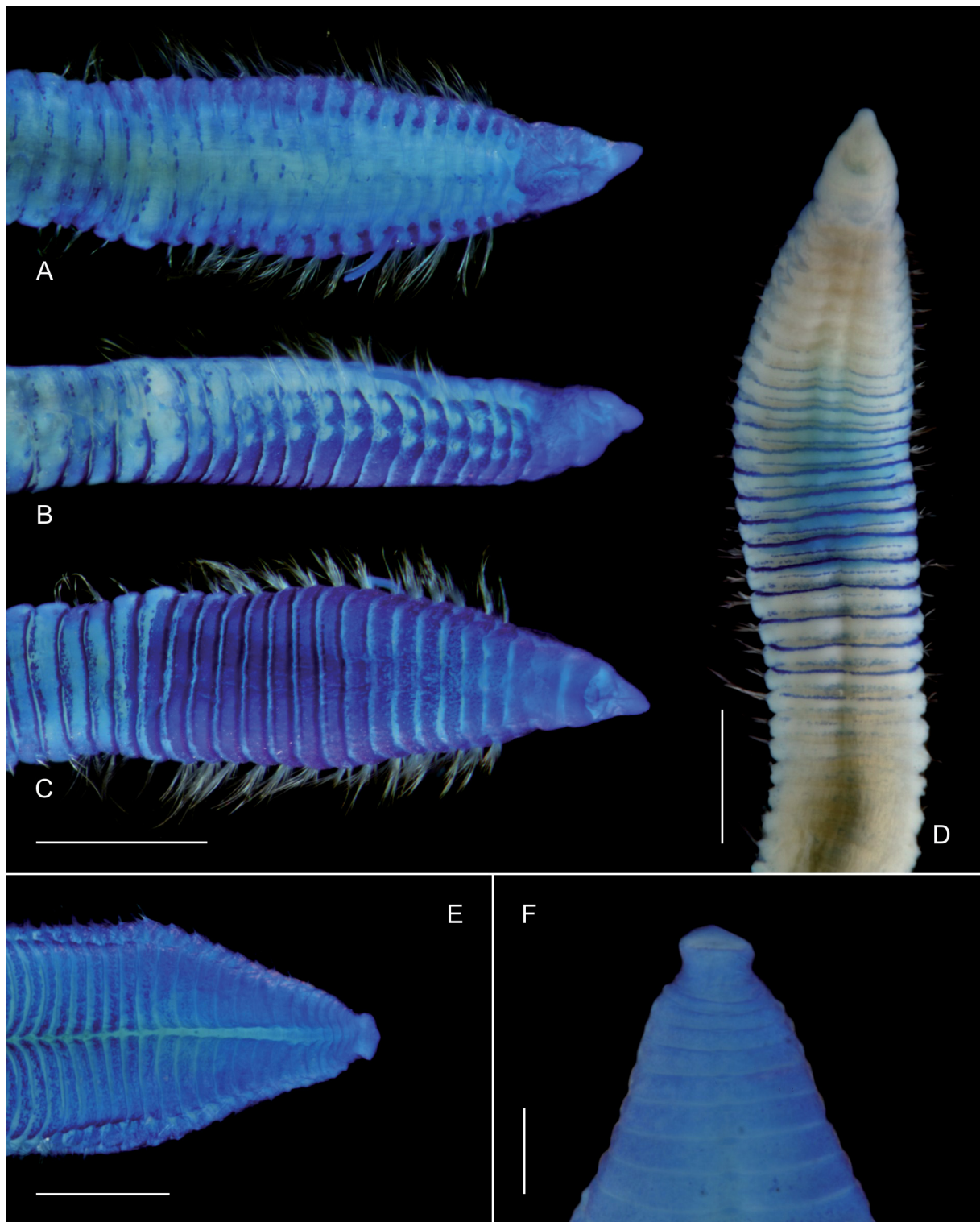


Fig. 15. *Aphelochaeta annae* sp. nov., methylene blue pattern and posterior end. **A–C.** ZMBN173455. **D–F.** Paratype, ZMBN173454. **A.** Anterior end in dorsal view. **B.** Anterior end in lateral view. **C–D.** Anterior end in ventral view. **E.** Posterior end in ventral view. **F.** Pygidium in dorsal view. Scale bars: A–E = 500 µm; F = 200 µm.

pads along midbody and posterior segments, sometimes hidden in a groove due to the contraction of ventral pads under parapodia in some specimens.

Prostomium as long as half of peristomium, triangular, broad, sides and dorsum rounded; nuchal organs as long slits on posterolateral margins (Fig. 13). Peristomium as long as 3–4 segments, slightly longer than wide and high, three rings best visible laterally, middle one twice longer than flanking ones with a short round posterior extension, posterior one fused with middle one ventrally and incomplete dorsally; dorsal crest broad and well developed, overlapping half of prostomium anteriorly (Fig. 13). Dorsal tentacles arising from third peristomial ring, well separated (Fig. 13). First pair of branchiae arising from posterior margin of peristomium, aligned with tentacles and following branchiae (Fig. 13). Second pair of branchiae arising from chaetiger 1, dorsolateral to notopodia (Fig. 13). Subsequent branchiae similarly located, present in most anterior segments, less frequent in following segments.

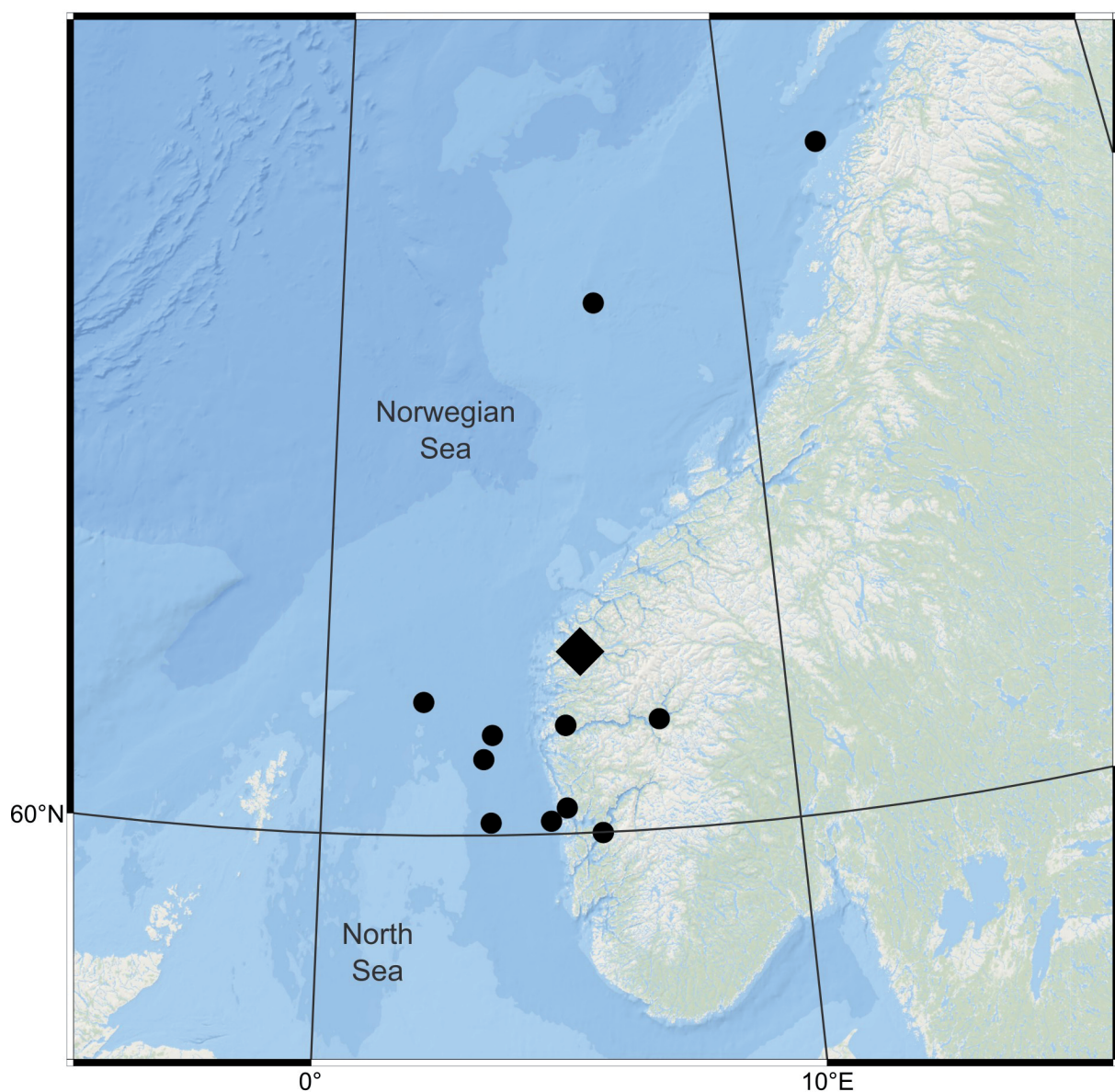


Fig. 16. *Aphelochaeta annae* sp. nov., distribution. Black dots indicates stations where *A. annae* was found. The black diamond indicates the type locality.

Parapodia as low mounds in anterior segments (Fig. 13), progressively shifting to a lateral position as the dorsum gets rounder and becoming simple low and small ridges in midbody (Fig. 12). Chaetae all capillary, short, smooth, neurochaetae generally enlarged and slightly flattened basally, becoming thinner distally, shorter than notochaetae; 12–25 chaetae per neuropodium and 15–20 chaetae per notopodium in anterior segments, arranged in two vertical rows, decreasing to 2–3 chaetae per neuropodium and notopodium in posterior segments (Fig. 14).

Pygidium with terminal anus and small triangular ventral lobe (Fig. 15E–F).

Methylene blue

A complex, distinct pattern (Fig. 15). Posterior half of peristomium stain with dense concentration of dark spots dorsally, rest of peristomium stains lightly except the part that overlaps prostomium. Long and wide lateroventral bands completely colour the venter and parapodia from segments 1 to 14–15. Thin ventral bands can remain long after differentiation (Fig. 15D).

Distribution and habitats

This species has been found along the coast of Norway, from depths of 226 to 621 m (Fig. 16).

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Aphelochaeta annae* sp. nov., as *A.* spD belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade A1.

Remarks

Aphelochaeta annae sp. nov. can be distinguished from other similar species in the area by its fusiform anterior end with a pointed prostomium and by its methylene blue staining pattern which reveals broad ventral bands on anterior segments colouring most of the venter in dark blue where ventral bands in other species, when present, are always narrow and well separated. Similar staining patterns to that of *A. annae* have been observed in *Aphelochaeta tigrina* Blake, 1996 from California (USA) and *Aphelochaeta zebra* Dean & Blake, 2009 from the Pacific coast of Costa Rica, from which *A. annae* differs in particular in the absence of dorsal crest or projection.

Aphelochaeta elinorae sp. nov.

urn:lsid:zoobank.org:act:AA4B6EC1-768C-453D-A65E-A092E7A93C4E

Figs 17–21

Aphelochaeta spI – Grosse *et al.* 2025c: 676.

Diagnosis

Bulbous anterior end with three peristomial ring covered by large dorsal crest. Dorsal tentacles and first pair of branchiae arising between peristomium and chaetiger 1. Numerous capillary chaetae with up to 50 notochaetae per anterior parapodium giving the worm a fluffy appearance. No methylene blue staining pattern.

Etymology

Aphelochaeta elinorae sp. nov. is named after Elinor Dashwood, one of the main characters of the novel *Sense and Sensibility* by Jane Austen.

Material examined

Holotype

NORWEGIAN SEA • Eikefjorden; 61.58232° N, 5.35332° E; 52 m deep; 19 Aug. 2020; ZMBN139436.

Paratypes

NORTH ATLANTIC • 1 spec.; 63.09146° N, 24.54128° E; 234 m deep; 5 May 2018; SMF33145.

NORTH SEA • 1 spec.; 60.2° N, 5.041° E; 60 m deep; 23 Apr. 2014; ZMBN95780 • 1 spec.; 59.31002° N, 6.15833° E; 321 m deep; 12 Jul. 2019; ZMBN138598 • 1 spec.; 60.19905° N, 6.09565° E; 120 m deep; 15 May 2018; ZMBN138599 • 1 spec.; 60.46928° N, 5.22811° E; 68 m deep; 9 Jul. 2020; ZMBN139434 • 1 spec.; 60.47278° N, 5.23398° E; 155 m deep; 9 Jul. 2020; ZMBN139435 • 1 spec.; 60.18085° N, 5.9594° E; 130 m deep; 27 May 2020; ZMBN139437 • 1 spec.; 59.7267° N, 5.7851° E; 228 m deep; 13 Aug. 2020; ZMBN139443 • 1 spec.; 60.44241° N, 4.93273° E; 112 m deep; 24 Jun. 2020; ZMBN139466 • 2 specs; 60.19905° N, 4.93273° E; 120 m deep; 15 May 2018; MG692, MG693 (no repository, specimens used for SEM) • 1 spec.; 60.17536° N, 5.96353° E; 182 m deep; 27 May 2020; MG694 (no repository, specimens used for SEM) • 1 spec.; 60.21465° N, 5.34720° E; 25–47 m deep; 28 Jun. 2017; ZMBN173500 • 1 spec.; 60.26910° N, 5.11570° E; 98 m deep; 2 May 2006; ZMBN173498 • 1 spec.; 60.22675° N, 5.33616° E; 35–42 m deep; 9 Feb. 2006; ZMBN173497.

NORWEGIAN SEA • 1 spec.; 63.703° N, 9.417° E; 60 m deep; 10 Feb. 2014; ZMBN68704 • 1 spec.; 60.284° N, 5.201° E; ZMBN95880 • 1 spec.; 61.58503° N, 5.34268° E; 42 m deep; 19 Aug. 2020; ZMBN139463 • 1 spec.; 63.68222° N, 9.7835° E; 200 m deep; 25 Oct. 2016; ZMBN173522.



Fig. 17. *Aphelochaeta elinorae* sp. nov., holotype, ZMBN139436. Scale bar = 2 mm.

SKAGERRAK • 1 spec.; 58.8° N, 11.1° E; 1 May 2021; GNM-POLYC15677 • 1 spec.; 58.8856° N, 11.08826° E; 126 m deep; 6 Jun. 2021; MG858 (no repository, specimens used for SEM).

Description

Holotype complete, in six fragments (Fig. 17), approximately 80 mm long (paratypes up to 30 mm long, but all incomplete), 15 mm wide anteriorly (paratypes: 0.6–2 mm), 1 mm wide in midbody (paratypes: 0.4–1.5 mm), 174 segments. Colour of live specimens pink to red, head cream to yellow with distinct blood vessels (Fig. 18). Colour of ethanol fixed specimens white to light tan, rarely yellow, venter usually lighter than rest of body. Anterior region enlarged and slightly dorsoventrally flattened, tapering softly towards peristomium and midbody, with short, crowded segments; mid-body region elongated, nearly round in cross section, segments always wider and higher than long; short posterior region slightly enlarged with very short segments. Anterior 31 (30–50) segments 10–20 times as wide and 7 times as high as long, oval in cross section, venter flat, dorsum slightly rounded. Mid-body segments 4–5 times as wide and as high as long, round in cross section, venter flat. Last 30–40 segments up to 12 times as wide and 8 times as high as long, oval in cross section, venter flat, dorsum rounded. A thin longitudinal dorsal groove from segment 15 and along entire body, sometimes indistinct. Distinct longitudinal ventral groove along entire body separating two wide, flat ridges marked by ventral groove and parapodia in midbody (Fig. 19A–B).

Prostomium as long as a third to a half of peristomium, conical, rounded, without rings; eyespots absent; nuchal organs as oval pits, on posterolateral margins of prostomium (Fig. 20). Peristomium as long as



Fig. 18. *Aphelochaeta elinorae* sp. nov., live specimens. **A.** Paratype, GNM-POLYC15677. **B.** DNA voucher MG858 (no repository, specimen used for DNA). Scale bar = 1 mm.

4–5 segments, square to trapezium-shaped, 3 rings best visible laterally, large dorsal crest covering entire peristomium, overlapping prostomium anteriorly, overlapping chaetiger 1 posteriorly (Fig. 20). Dorsal tentacles arising between peristomium and chaetiger 1, over chaetiger 1, well separated (Fig. 20). First pair of branchiae arising between peristomium and chaetiger 1, lateral and slightly anterior to dorsal tentacles, usually not aligned with following branchiae (Fig. 20). Second pair of branchiae arising from

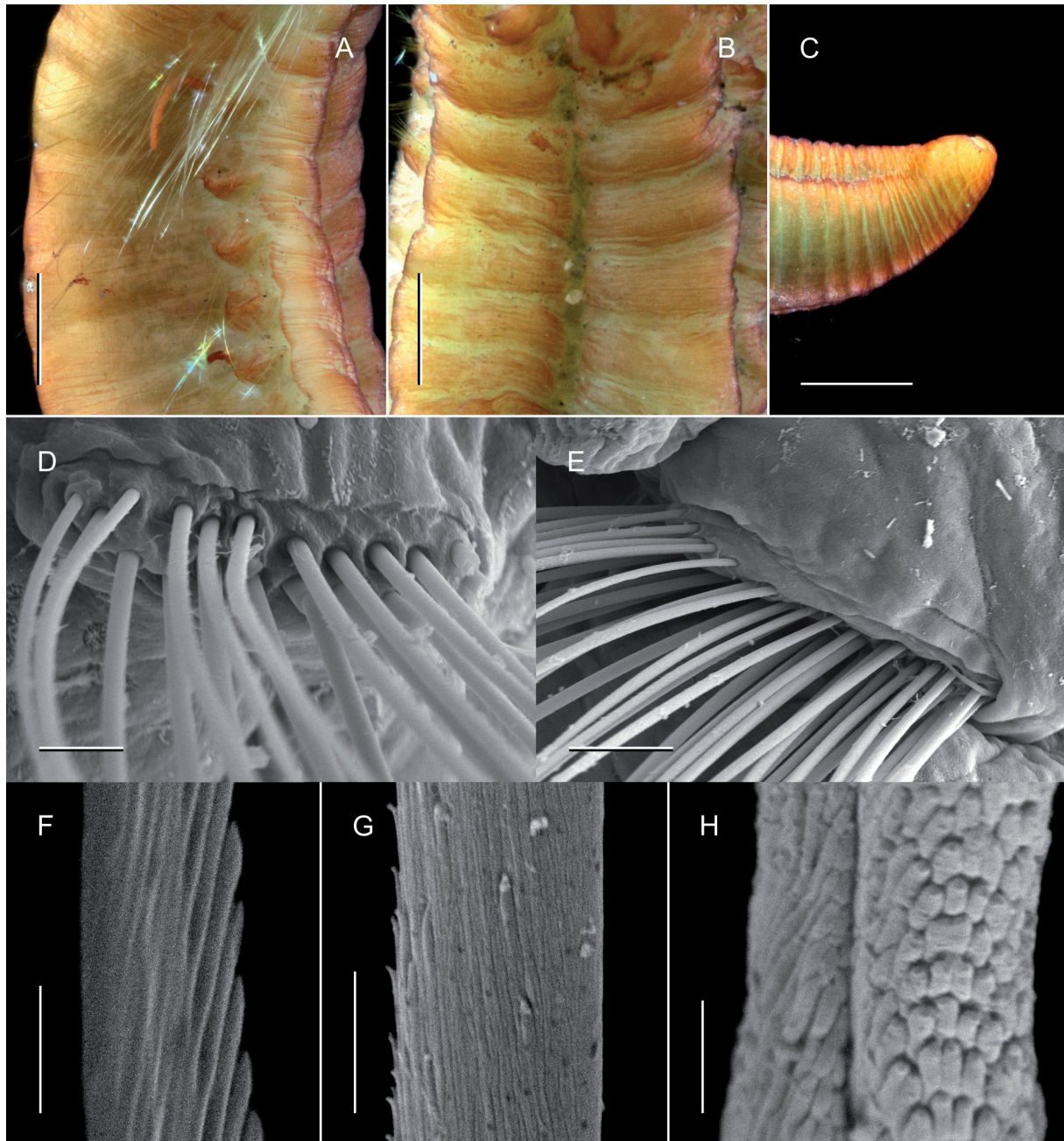


Fig. 19. *Aphelochaeta elinorae* sp. nov., morphological details. **A–C, G–H.** Holotype, ZMBN139436. **D–F.** DNA voucher MG858 (no repository, specimen used for SEM). **A.** Midbody in lateral view. **B.** Midbody in ventral view. **C.** Pygidium in lateral view. **D.** Detail of notopodium. **E.** Detail of first notopodium. **F.** Detail of neurochaeta. **G.** Detail of neurochaeta. **H.** Detail of posterior neurochaetae. Scale bars: A–C = 500 µm; D = 10 µm; E = 25 µm; F = 1.5 µm; G = 2.5 µm; H = 1 µm.

chaetiger 1, dorsal and slightly posterior to parapodia (Fig. 20). Subsequent branchiae similarly located, branchiae or branchial scars present on most anterior segments, less frequent in following segments.

Parapodia low mounds, making slight shoulders lower than dorsum in anterior segments (Fig. 20) and shifting to a ventral position around middle of anterior region (Fig. 19A), staying distinct along entire body. Chaetae all capillaries, short, neurochaetae and notochaetae of similar length in anterior region,

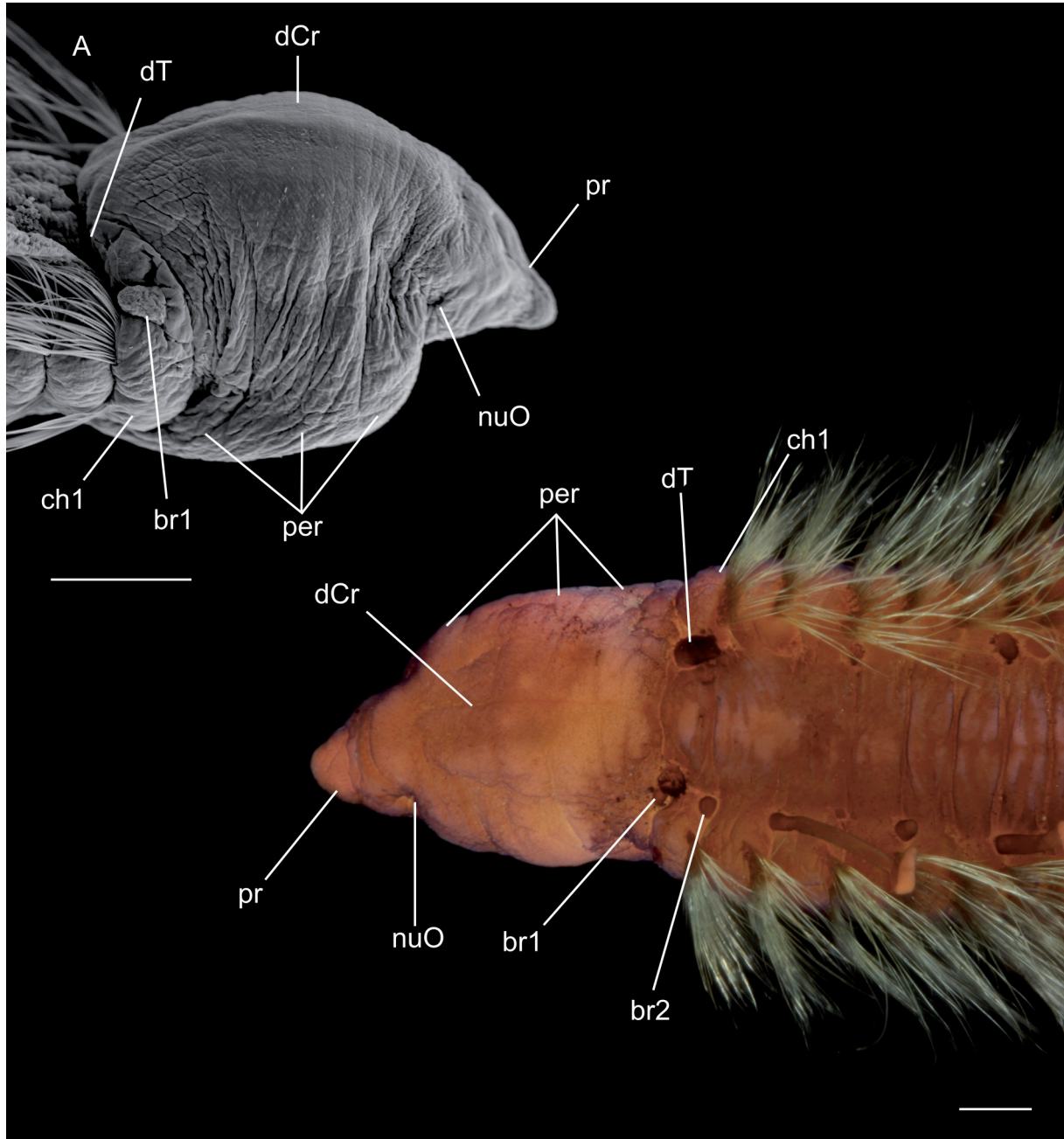


Fig. 20. *Aphelochaeta elinorae* sp. nov., anterior morphology. **A.** DNA voucher MG858 (no repository, specimen used for SEM), lateral view. **B.** Paratype, ZMBN139463, dorsal view, stained with Shirlastain A. Abbreviations: br1 = first branchiae; br2 = second branchiae; ch1 = first chaetiger; dC = dorsal crest; dT = dorsal tentacles; nuO = nuchal organs; per = peristomium; pr = prostomium. Scale bars: A = 250 μ m; B = 300 μ m.

notochaetae longer than neurochaetae in midbody; chaetae mostly smooth, some neurochaetae with finely serrated edge or protruding fibrils from midbody visible with SEM (Fig. 19F–H); up to 50 chaetae in neuropodium and notopodium in anterior segments (Fig. 19D–H), extending laterally and giving a fluffy appearance to the specimens (Fig. 20B), decreasing to about 20 chaetae per neuropodium and notopodium in mid-body segments.

Methylene blue

No pattern.

Distribution and habitats

Aphelocheata elinorae sp. nov. has been found along the coasts of Norway and Sweden as well as offshore Iceland from depths of 35 to 366 m (Fig. 21).

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Aphelocheata elinorae* sp. nov., as *Aphelocheata*. spI, belongs to group IV (comprising members of *Aphelocheata*, *Kirkegaardia* and *Tharyx*), clade A2.

Remarks

Aphelocheata elinorae sp. nov. can be distinguished from other species in the area by its bulbous head, the numerous capillary chaetae present in anterior segments (two to four times more than in other species) giving it a fluffy appearance and the lack of a methylene blue staining pattern. Among all described species of *Aphelocheata*, *A. elinorae* is most similar to *Aphelocheata bulbata* Doner & Blake, 2009 from California (USA) in the shape of the peristomium from which it mainly differs in the larger number of chaetae and the lack of methylene blue staining pattern.

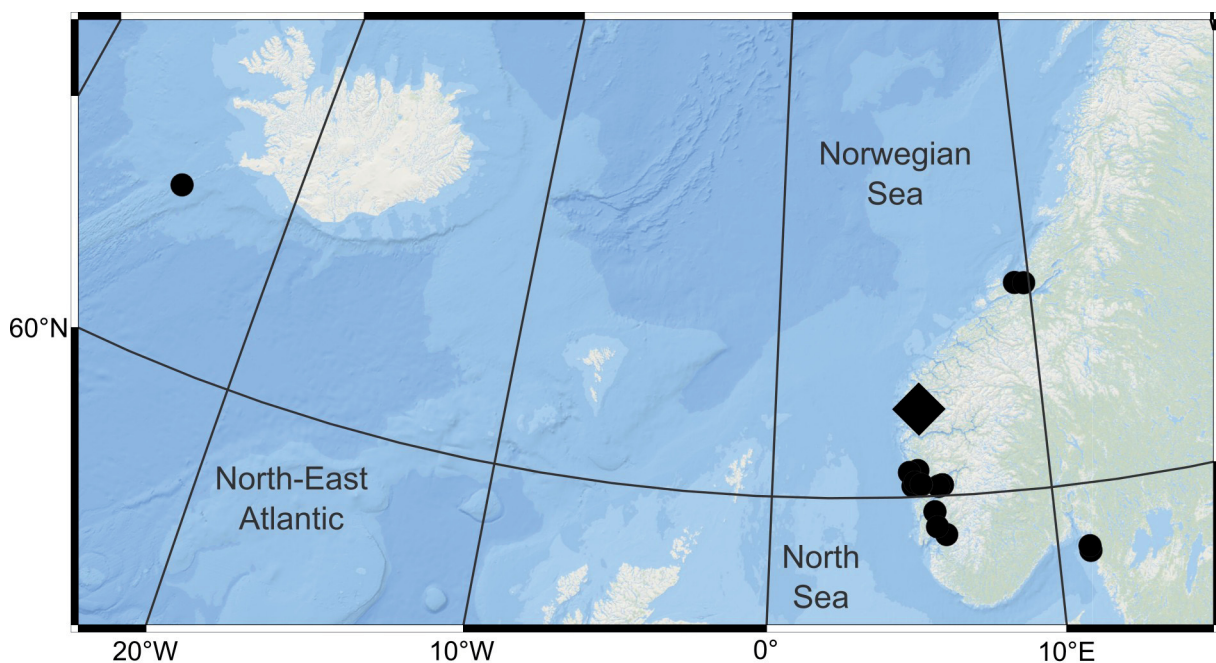


Fig. 21. *Aphelocheata elinorae* sp. nov., distribution. Black dots indicates stations where *A. elinorae* was found. The black diamond indicates the type locality.

Genus *Kirkegaardia* Blake, 2016

Kirkegaardia Blake, 2016: 5.

Type species

Monticellina heterochaeta Laubier, 1961. Original designation by Blake (2016).

Diagnosis (after Blake 2016)

Bitentaculate cirratulids with distinct body regions and all setae distally pointed. Pre-chaetigerous area typically elongate, cylindrical, with short, blunt prostomium and long peristomium with zero to many weakly developed annulations; dorsal tentacles arising on posterior margin of peristomium, anterior to chaetiger 1. Thoracic notopodia often shifted dorsally, elevated, producing distinct dorsal groove along thoracic region; other species with thoracic parapodia more lateral, leaving broad elevated dorsum; parapodia of middle and posterior region lateral. Middle body segments longer than wide, frequently bead-like; posterior segments wider than long, somewhat crowded, with posterior most segments usually expanded or enlarged. chaetae include simple capillaries with fibrils observed under SEM and denticulated capillaries with distinct denticles present along one edge of chaetae; denticles visible at 400–1000 $\times$; blades usually basally expanded.

Kirkegaardia serrata (Eliason, 1962)

Figs 22–23

Caulleriella (?) *serrata* Eliason, 1962: 267–269, fig. 17.

Material examined

Holotype

SKAGERRAK • 58.8° N, 10.7° E; 295 m deep; 27 Jun. 1933; UUZM POLYCHAETA type #193-a.

Paratype

SKAGERRAK • 1 spec.; same data as for holotype; UUZM POLYCHAETA type #193-b.

Other material

NORTH SEA • 1 spec.; 59.998367° N, 5.876067° E, 609 m deep; 9 Jan. 2020; ZMBN138607 • 1 spec.; 60.15192° N, 5.0991° E; 616 m deep; 26 Apr. 2017; ZMBN173990.

NORWEGIAN SEA • 2 specs; 61.05009° N, 5.40054° E; 1236 m deep; 3 May 2017; ZMBN144622, ZMBN173974 • 1 spec.; 61.14350° N, 5.82935° E; 1259 m deep; 4 May 2017; ZMBN144584 • 1 spec.; 61.1553° N, 7.26546° E; 882 m deep; 4 May 2017; ZMBN117832 • 1 spec.; 61.1872° N, 6.58259° E; 880 m deep; 5 May 2017; ZMBN117880 • 4 specs; Norway; MG1085 to MG1088 (no repository, specimens used for SEM) • 2 specs; 61.04687° N, 5.42164° E; 1236 m deep; 3 May 2017; ZMBN173975, ZMBN173976 • 3 specs; 61.18718° N, 6.58259° E; 880 m deep; 5 May 2017; ZMBN173978 to 173980 • 1 spec.; 64.280478° N, 8.409652° E; 357 m deep; 21 Apr 2020; ZMBN173983 • 1 spec.; 59.86505° N, 5.66967° E; 490–499 m deep; 23 Sep. 2008; collected by sledge; ZMBN173973.

Diagnosis

Thin, elongate body, often curled, middle segments often darkly coloured. Three peristomial rings; dorsal tentacles arising from posterior margin peristomium; first pair of branchiae arising from chaetiger 1. Posterior chaetae with widened concave base and distinct serrated edge.

Description

Description based on newly collected material, not on type material. Colour of ethanol fixed specimens light tan to dark purple or brown (Fig. 22). Body thin and elongate, often curled and convoluted. First 8–12 segments forming a distinct anterior region, where segments are more continuous and slightly dorsoventrally flattened. Segments twice as high as long, 2.5 times as wide as long. Mid-body segments often beaded, slightly elongated in the posterior part. A distinct posterior region of approximately 10–21 segments progressively shortening and tapering towards pygidium. Dorsal groove or ridge absent. Ventral groove or ridge absent.

Prostomium short, at most as long as half of peristomium; nuchal organs as simple slits on posterolateral margins; eyes absent (Fig. 23A–B). Peristomium short, as long as two to three segments, rather rounded

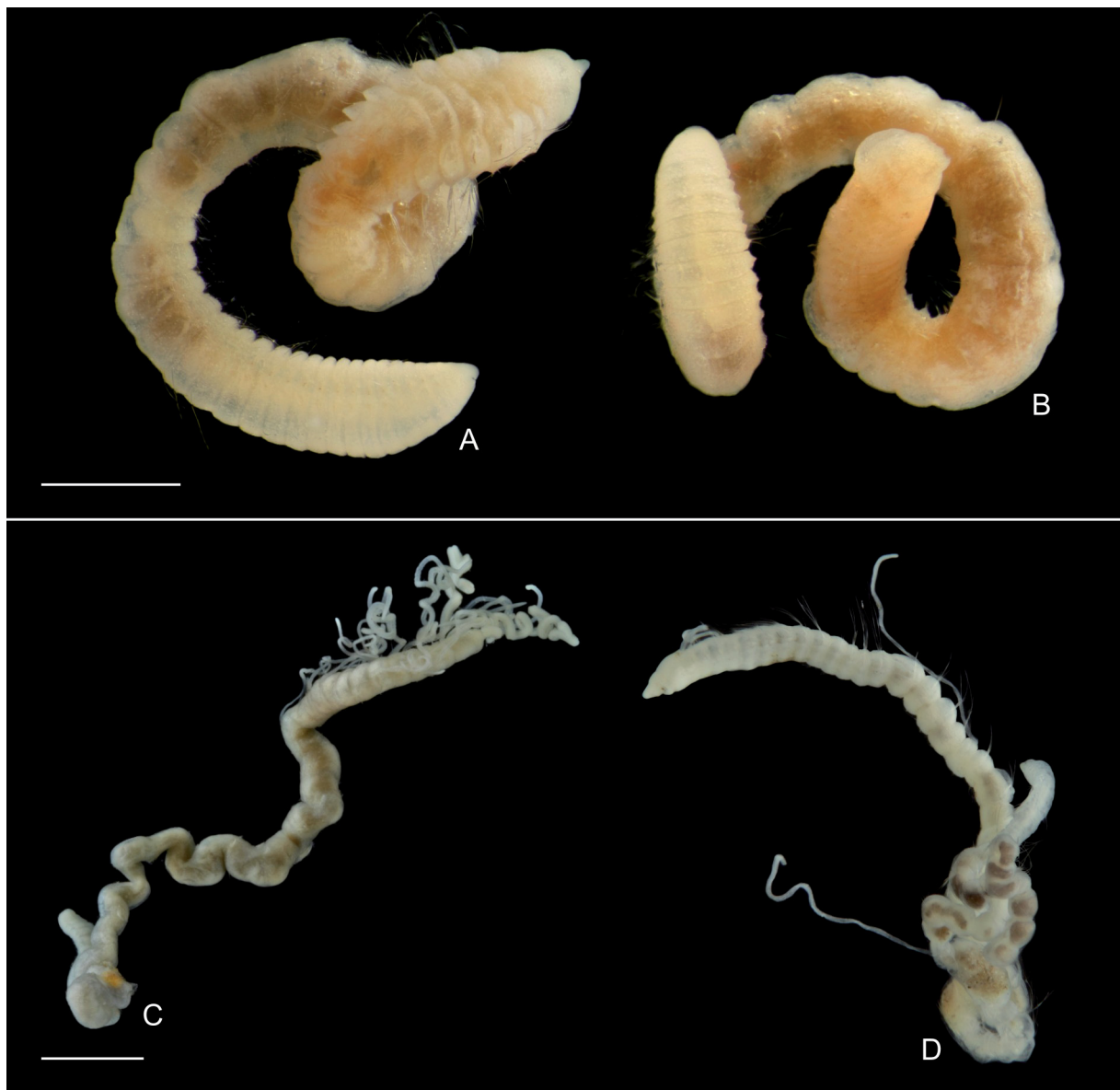


Fig. 22. *Kirkegaardia serrata* (Eliason, 1962), type material and complete specimens. **A.** Holotype, UUZM POLYCHAETA type #193-a. **B.** Paratype, UUZM POLYCHAETA type #193-b. **C.** MG1087 (no repository, specimen used for SEM). **D.** ZMBN173974. Scale bars: A–B = 500 μ m; C–D = 1 mm.

with 3 rings best visible laterally. Dorsal tentacles arising from posterior margin of peristomium (Fig. 23A–B). first pair of branchiae arising from chaetiger 1 (Fig. 23A–B). Second pair of branchiae arising from chaetiger 2, dorsal and slightly posterior to parapodia.

Parapodia sometimes forming low shoulders anteriorly (Fig. 22A), becoming inconspicuous ridges in midbody and posterior segments. Parapodia are situated in the middle of the segment throughout most of the body, and progressively shift towards the posterior of the segments towards the end of the body. Chaetae smooth and serrated capillaries. In anterior segments, up to 10–12 chaetae per neuropodium and 15–17 chaetae per notopodium, decreasing in posterior segments, smooth. Serrated chaetae developing progressively after expanded anterior region; base of the blade widened, tapering to a fine capillary after a short, finely serrated concave edge (Fig. 23C–E).

Pygidium with 5–6 small dorsal lobes and short rounded ventral lobe.

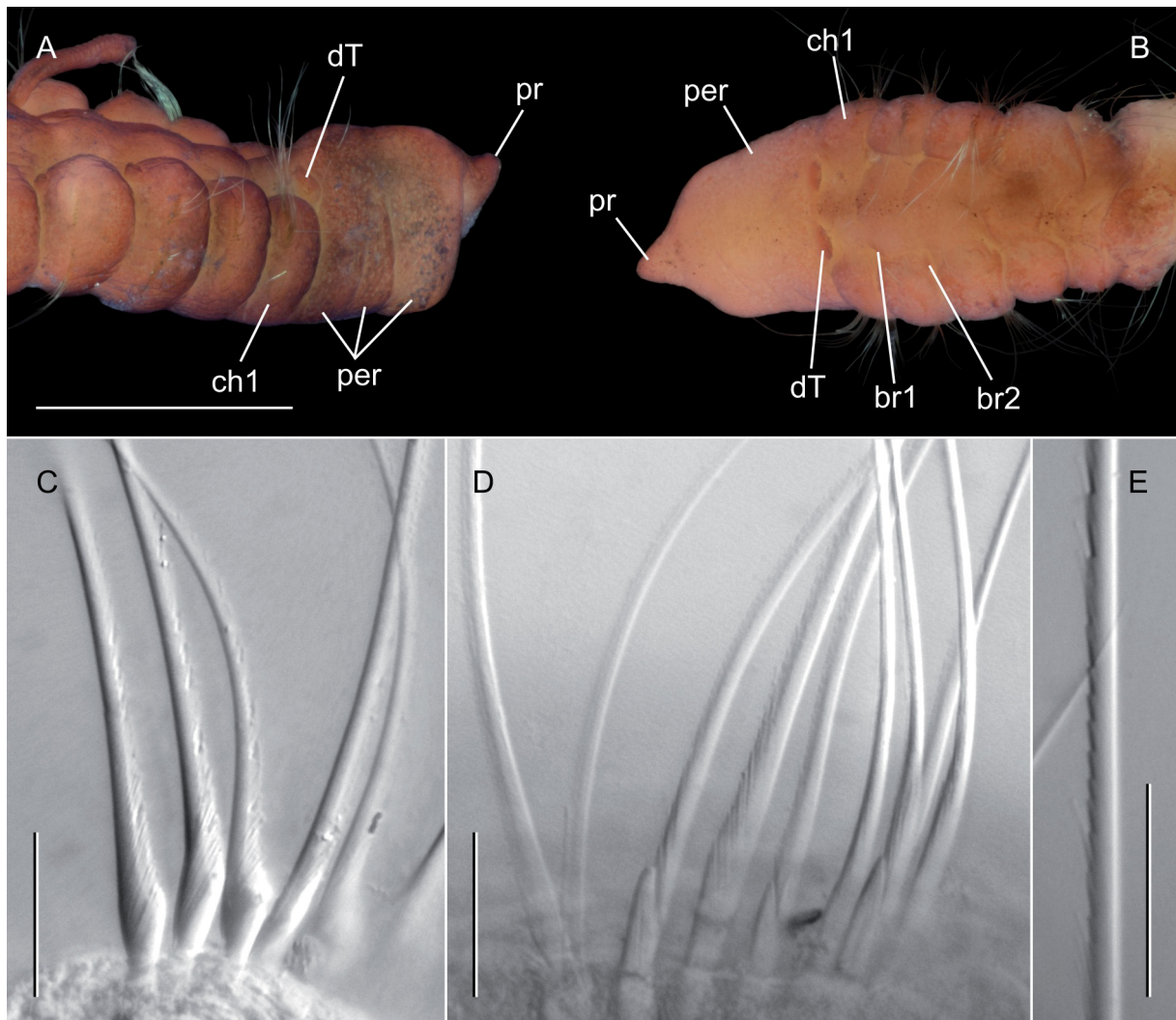


Fig. 23. *Kirkegaardia serrata* (Eliason, 1962), chaetae. **A.** ZMBN173976. **B.** ZMBN173979. **C–E.** MG1087 (no repository, specimen used for SEM). **A.** Anterior end in lateral view, stained with Shirlastain A. **B.** Anterior end in dorsal view, stained with Shirlastain A. **C–E.** Details of serrated capillaries. Scale bars: A–B = 500 µm; C–E = 20 µm.

Methylene blue

Prostomium usually retains a dark stain except around nuchal organs. The first and third peristomial rings retain a dark stain in all specimens, the second peristomial ring only retain some stain in some specimens. Some staining can be retained ventrally as lateral or and, more rarely, ventral bands of dots or around parapodia for a few anterior segments.

Distribution and habitat

The material examined here has been collected along the coasts of Norway from 357 to 1259 m deep. The type locality is in the Skagerrak at a depth of 295 m.

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Kirkegaardia serrata* belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade K2.

Remarks

The material examined agrees well with the original description, in particular with regards to the chaetae illustrated by Eliason (1962).

Kirkegaardia serrata is so far the only species of *Kirkegaardia* we have recorded in Norway. Other species of *Kirkegaardia* recorded in Europe include *K. heterochaeta* (Laubier, 1961), *K. marypetersenae* (Lezzi, Çinar & Giangrande, 2016), *K. dorsobranchialis* (Kirkegaard, 1959), *K. sp A* (Blake 2016) and *K. setosa* (Dean & Blake, 2009). *Kirkegaardia heterochaeta* and *K. marypetersenae* were described from the Mediterranean Sea (France and Italy, respectively) and *K. dorsobranchialis* was described from Angola. *Kirkegaardia serrata* can be distinguished from the other species by the serration of its chaetae with dense, straight and pointed teeth, whereas the teeth on the chaetae of *K. dorsobranchialis* are rounded and the ones on the chaetae of *K. heterochaeta* are distinctly pointing downwards (Lezzi *et al.* 2016). *Kirkegaardia sp. A* has been found in the Mediterranean coast of France and in the eastern Mediterranean but more specimens are needed to understand this species. *Kirkegaardia setosa* was described from the Pacific coast of Costa Rica and recently reported from the Mediterranean Sea (Borghese *et al.* 2023), although the large geographic distance to the type locality may indicate that it is in fact a different, potentially new species.

Genus *Tharyx* Webster & Benedict, 1887. Emended, Blake 1991

Tharyx Webster & Benedict, 1887: 741–742.

Type species

Tharyx acutus Webster & Benedict, 1887.

Diagnosis (after Blake 2018)

Prostomium conical; peristomium elongate, with pair of grooved dorsal tentacles arising on posterior margin; first pair of branchiae typically arising immediately posterior to dorsal tentacles either on posterior margin of peristomium or on chaetiger 1; abdominal segments sometimes bead-like. Noto- and neurochaetae arising close to one another, not widely separated. Chaetae include simple capillaries in anterior and middle chaetigers, acicular spines present in posterior chaetigers either in both noto- and neuropodia or only in neuropodia. Long, natatory-like chaetae present or absent. Spines typically short, curved, sometimes geniculate or sickle-shaped, narrowing to rounded irregularly notched or sub-bidentate tip; tips with pair of stunted or rounded knobs but not with two distinct teeth. Capillaries may accompany posterior spines or are absent, not alternating with spines when present. Pygidium with

terminal anus and small ventral lobe or disk. Several species with black pigment markings on posterior lateral margin of peristomium.

Tharyx maryae Blake & Göransson, 2015

Fig. 24

Tharyx maryae Blake & Göransson, 2015: 505–508, figs 2A–G, 3A–C.

Tharyx spO – Grosse *et al.* 2025c: 676.

Diagnosis

Body elongate with laterally extended anterior region and expanded posterior region; peristomium with three rings, dark pigments sometimes present laterally on the third ring; dorsal tentacles arising from third peristomial ring, first pair of branchiae arising from posterior margin of peristomium. Blunt or knobby spines may be present in posteriormost segments. Ventral bands on segments 7–22 and small lateral bands up to segment 22 with methylene blue.

Material examined

Holotype

KATTEGAT • 57.11501° N, 12.22611° E; 0.3–1.7 m deep; 3 Aug. 2012; leg. P. Göransson; SMNH 8754.

Paratypes

KATTEGAT • 4 specs; same data as for holotype; SMNH 8755.

Other material

KATTEGAT • 1 spec.; 57.78723° N, 11.6903° E; 12.8 m deep; 11 May 2020; collected by grab; GNM-POLYC15680 • 2 specs; 56.608683° N, 12.6708018° E; 19.8 m deep; 7 May 2020; collected by grab; GNM-POLYC15687, GNM-POLYC15683 • 3 specs; same data as for preceding; DNA vouchers: MG719, MG723, MG724 (no repository, specimens used for SEM) • 9 specs; 56.347502° N, 12.669992° E; 18 m deep; collected by grab; GNM-POLYC15684, GNM-POLYC15686, GNM-POLYC15688 to GNM-POLYC15694.

NORTH SEA • 2 specs; 60.39591° N, 5.32489° E; 6 m deep; 10 Sep. 2018; collected by grab; NTNU-VM 76395, NTNU-VM 76396 • 1 spec.; 58.12533° N, 7.97237° E; 3 m deep; 23 Aug. 2019; ZMBN139454.

NORWEGIAN SEA • 1 spec.; 63.44401° N, 10.41591° E; deep 10 m; 7 Sep. 2018; NTNU-VM 82837 • 2 specs; 63.44123° N, 10.50564° E; 5 m deep; collected by grab; NTNU-VM 76391, NTNU-VM 76393 • 3 specs; 63.44346° N, 10.40821° E; 11 m deep; collected by dredge; NTNU-VM 76415, NTNU-VM 76416, NTNU-VM 84515 • 1 spec.; 63.43234° N, 10.37914° E; 4 m deep; 5 Sep. 2018; NTNU-VM 85417 • 1 spec.; 63.43234° N, 10.37914° N; 4 m deep; 5 Sep. 2018; NTNU-VM 76417.

Description

Description based on newly collected material, not on type material. Complete specimens from 8.5 to 10.5 mm long, 0.3 to 0.4 mm wide and 80 to 134 segments. Colour of ethanol fixed specimens white. Small, rounded, elongated worm without any distinct enlargement. Anterior 11–16 segments 3–4 times as wide and as high as long, oval to round in cross section. Mid-body segments 1–2 times as wide and as high as long, round in cross section, sometimes beaded. Posterior 15 segments 6–10 times as wide and as high as long, dorsum rounded, venter flat. Dorsal groove or ridge absent. A distinct longitudinal ventral ridge along entire body.

Prostomium as long as a third to half of peristomium, triangular, tip rounded, weakly biannulate ventrally and rounded dorsally; eyespots absent; nuchal organs simple slits at posterolateral margins (Fig. 24A–B). Peristomium short, as long as 2–4 segments, rounded, slightly higher than long, 2–3 weak rings, best visible laterally, a weak dorsal crest slightly overlapping prostomium anteriorly and ending between tentacles posteriorly (Fig. 24A–B). Dorsal tentacles arising from posterior margin of peristomium. First pair of branchiae arising between peristomium and chaetiger 1, posterior to tentacles, above chaetiger 1 (Fig. 24A–B). Second pair of branchiae arising from chaetiger 1, dorsal and slightly posterior to parapodia (Fig. 24A–B). Subsequent branchiae similarly located, branchiae or branchial scars present on most anterior segments, mostly absent in following segments.

Parapodia, low mounds, forming slight shoulders anteriorly, becoming indistinct afterwards, always arising ventrally. 10–16 capillary chaetae per neuropodium 10–12 per notopodium along most of the body, decreasing in posterior segments, arranged on two rows, chaetae on anterior row twice as long as chaetae on posterior one, neurochaetae as long as notochaetae anteriorly, smooth. Modified chaetae (spines) not observed in examined material but present in type material on the last five chaetigers.

Pygidium with terminal anus, dorsoventrally flattened, with small round ventral lobe.

Methylene blue

Ventral bands appear on segments 7 to 12. In addition some more or less dense dots appear on anterior parts of parapodia until about segment 22.

Distribution and habitats

The material examined here has been found along the coasts of Norway and Sweden, from depths of 3 to 18 m. In Norwegian harbours and marinas, it co-occurs with *Tharyx robustus*, and both species were originally described from the same sample at the type locality near Varberg in Sweden.

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Tharyx maryae* belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade A1.

Remarks

As the original material was described in detail, only the newly collected material is described here. This species was identified as *Tharyx maryae* in Grosse *et al.* (2025c), but no description of the material sequenced and examined was given. The material examined generally agrees well with the original description except on three points. The first difference concerns the presence of pigmentation on the peristomium of the type specimens, which are absent in the material examined here. However, Blake & Göransson (2015) state that this pigmentation is “faded or not apparent” on some specimens. The second difference concerns the number of peristomial rings as only two are described in the original description, but three are illustrated. In our material, two to three rings can be observed depending on the condition of the specimen. The third difference concerns the chaetae. Indeed, no spines were observed in the material examined here, while some neurospines were present in the five posteriormost segments of the holotype. These spines were observed only in the very last segments of a single specimen, slightly larger than the specimens examined here.

As some of the specimens examined here were collected relatively close to the type locality, and in similar environments to that of the type specimens, we do not consider the small differences observed between our material and the original description enough to consider our material as a different species.

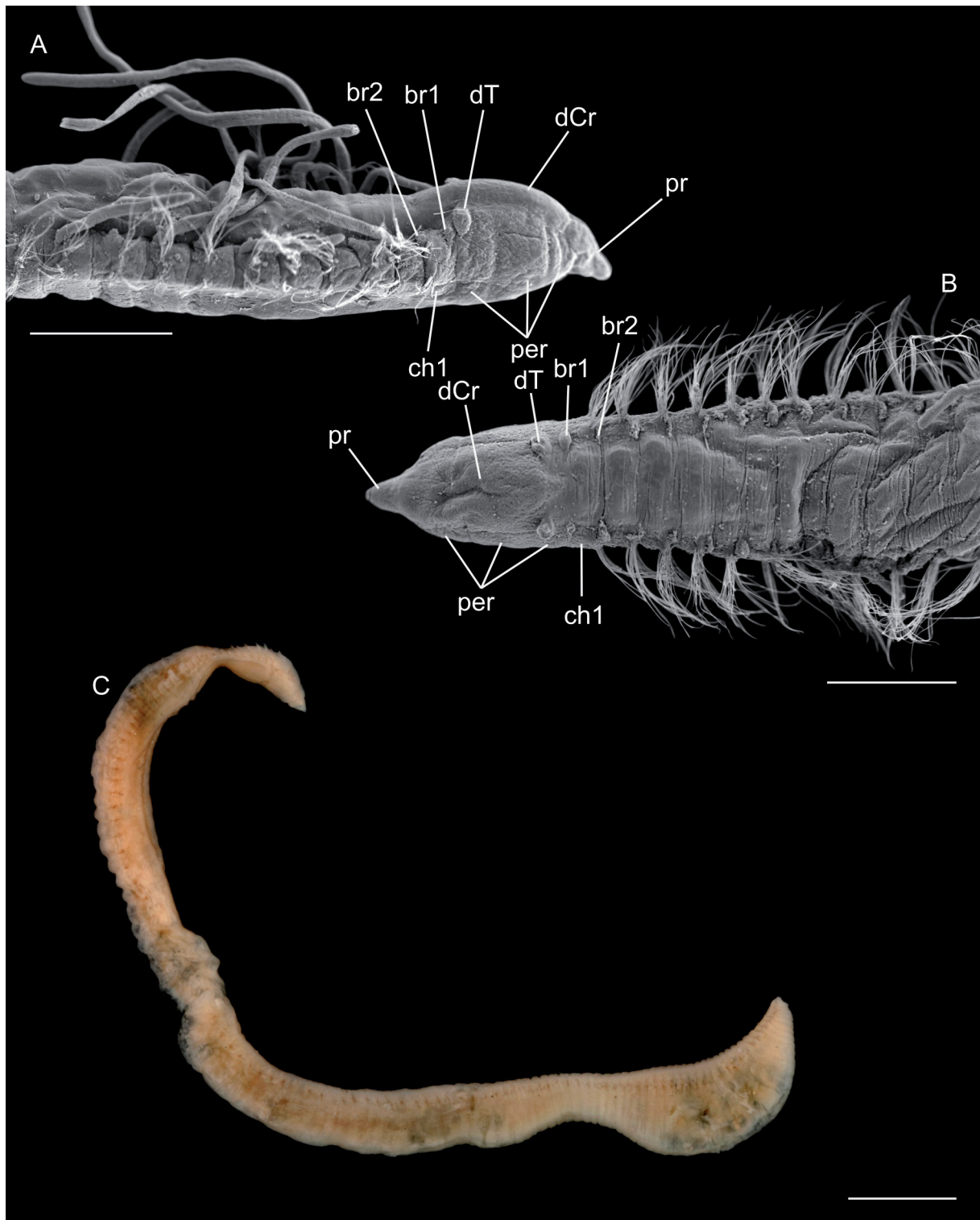


Fig. 24. *Tharyx maryae* Blake & Göransson, 2015. **A.** DNA voucher MG724 (no repository, specimen used for SEM). **B.** DNA voucher MG723 (no repository, specimen used for SEM). **C.** Holotype, SMNH 8754. **A.** Anterior end in lateral view. **B.** Anterior end in lateral view. Abbreviations: br1 = first branchiae; br2 = second branchiae; ch1 = first chaetiger; dCr = dorsal crest; dT = dorsal tentacles; per = peristomium; pr = prostomium. Scale bars: A–B = 500 µm; C = 1 mm.

This species is most similar to *Aphelochaeta marioni*, having a similar body shape and the same number of peristomial rings. They can be differentiated by the shape of the peristomial ring, the position of the dorsal tentacles and the first pair of branchiae and the presence of a dorsal groove in *Aphelochaeta marioni*. In *Aphelochaeta marioni*, the second peristomial ring extends dorsally over the third and between the dorsal tentacles. In *Tharyx maryae*, a dorsal crest is present over all rings. In *Aphelochaeta marioni*, the dorsal tentacles arise from the posterior margin of the peristomium, while they arise from the third peristomial ring in *Tharyx maryae*.

***Tharyx robustus* Blake & Göransson, 2015**

Fig. 25

Tharyx robustus Blake & Göransson, 2015: 508–510, figs 3d, 4a–j.

Tharyx spP – Grosse *et al.* 2025c: 676.

Diagnosis

Body usually stout with short segments, often dorso-ventrally flattened at least in anterior and/or posterior regions. Three peristomial rings covered by narrow dorsal crest; dorsal tentacles and first branchiae arising from posterior margin of peristomium. Transition chaetae from capillaries to spines are serrated spines. No methylene blue pattern.

Material examined

Holotype

KATTEGAT • 57.11501° N, 12.22611° E; 0.3–1.7 m deep; 3 Aug. 2012; leg. P. Göransson; SMNH 8756.

Paratypes

KATTEGAT • 6 specs; same data as for holotype; SMNH 8757.

Other material

KATTEGAT • 1 spec.; 57.96808° N, 11.52028° E; 16.5 m deep; 29 May 2022; collected by grab; GNM-POLYC15682.

NORWEGIAN SEA • 1 spec.; 63.439001° N, 10.50548° E; 3 m deep; 6 Sep. 2018; collected by grab; NTNU-VM 76387 • 2 specs; 63.43979° N, 10.39854° E; 4 m deep; 5 Sep. 2018; collected by grab; NTNU-VM 76388, NTNU-VM 76389 • 1 spec.; 63.43781° N, 10.50624° E; 4 m deep; 4 Sep. 2018; NTNU-VM 76418 • 4 specs; 63.43234° N, 10.37914° E; 4 m deep; 5 Sep. 2018; NTNU-VM 76419, NTNU-VM 76420, NTNU-VM 85413, NTNU-VM 85414.

Description

Description based on the new material, not on the type material. One complete specimen 4.5 mm long, 0.2–0.3 mm wide, 72 segments. Colour of ethanol fixed specimens white to light tan. Spindle shaped, oval to flat in cross section, without any conspicuous enlargements. Anterior 15–20 segments 3–4 times as wide and as high as long, of approximately the same length as midbody segments up to 2–3 times shorter. Mid-body segments 3–4 times as wide and as high as long, sometimes with deep grooves between them dorsally. Posterior 18–24 segments dorsally slightly expanded, tapering towards pygidium. Dorsal groove or ridge absent. A longitudinal ventral ridge as a series of segmental bumps along entire body, sometimes appearing inside a groove as specimens fold longitudinally.

Prostomium as long as half of peristomium, triangular, without rings; nuchal organs as simple slits on postero-lateral margins (Fig. 25B–C). Peristomium as long as 3–4 segments, venter flat, dorsum rounded, 3 rings, sometimes indistinct or only two visible, narrow dorsal crest slightly overlapping prostomium

anteriorly (Fig. 25B–C). Dorsal tentacles arising from posterior margin of peristomium, close together (Fig. 25B–C). First pair of branchiae arising from posterior margin of peristomium, just behind and slightly lateral to tentacles (Fig. 25B–C). Second pair of branchiae arising from chaetiger 1, dorsal and slightly posterior to parapodia (Fig. 25B–C). Subsequent branchiae similarly placed, branchiae or branchial scars present on nearly all segments along anterior half of body, less frequent afterwards.

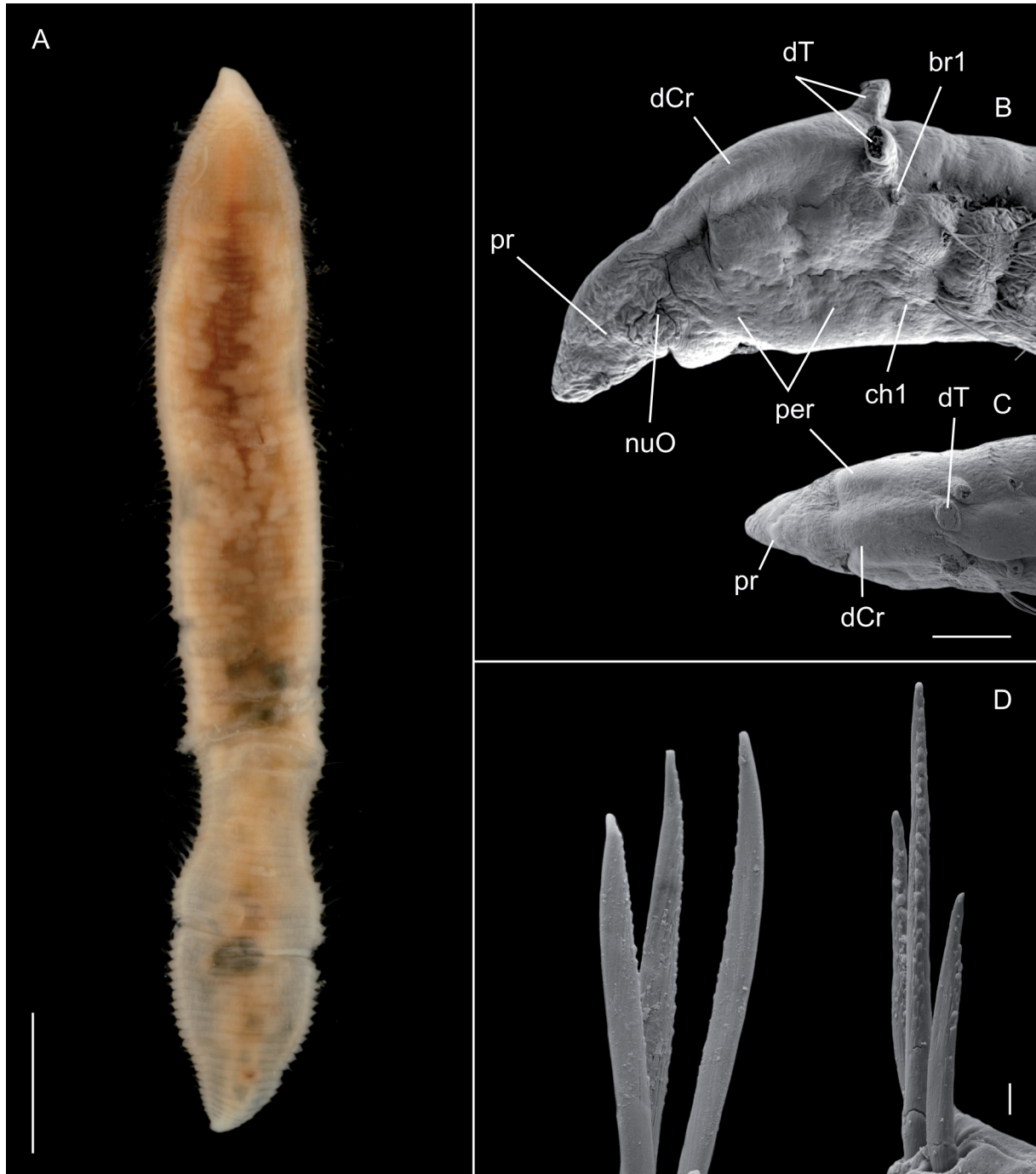


Fig. 25. *Tharyx robustus* Blake & Göransson, 2015. **A.** Holotype, SMNH 8576. **B.** NTNU-VM 76419. **C.** NTNU-VM 76388. **D.** NTNU-VM 76387. **A.** Entire specimen in dorsal view. **B.** Anterior end in lateral view. **C.** Anterior end in dorsal view. **D.** Chaetae. Scale bars: A = 1 mm; B–C = 100 µm; D = 2 µm.

Parapodia low mounds, distinct but barely forming shoulders anteriorly, less distinct afterwards, always placed ventrally. Chaetae capillaries and spines. 8–10 capillaries per neuro and notopodium anteriorly, short, with thin fibrils visible with SEM. Spines with serrated edge, difficult to observe in light microscopy, and blunt tip or thinning to a capillary tip (Fig. 25D). Spines with knob-like tip not observed.

Pygidium with terminal anus and small, rounded ventral lobe.

Methylene blue

No pattern.

Distribution and habitats

The material examined here was found along the coasts of Norway and Sweden, from depths of 3 to 16.5 m. In Norwegian harbours and marinas, it co-occurs with *Tharyx maryae*, and both species were originally described from the same sample from the type locality near Varberg in Sweden.

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Tharyx robustus*, as *Tharyx* sp. P, belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade T1.

Remarks

As the original material was described in detail, only the newly collected material is described here. While the characteristic spines of *Tharyx* were not observed in the material examined, all specimens examined were much smaller than the specimens used in the original descriptions. In addition, the material examined for this study was generally in poor to moderate condition, with many broken chaetae. Therefore, it is possible that the knob-like spines were not present in our material, but they may also not have been observed. However, the serrated transition spines figured in the original description could be observed and are illustrated here with SEM pictures. The specimens also present the typical thin and elongated body shape and head region of *Tharyx*. One specimen, GNM-POLYC15682, was collected about 150 km north of the type locality in Sweden adding credit to the hypothesis that this species is indeed *T. robustus* as described by Blake & Göransson (2015).

This species is distinguished from other species by the presence of serrated transition spines, that are absent in *Tharyx killariensis*, *T. maryae* and *T. emmae* sp. nov. as well as by the absence of long or beaded mid-body segments.

***Tharyx emmae* sp. nov.**

urn:lsid:zoobank.org:act:6012D42A-2263-4112-A4D5-83CBA6946248

Figs 26–29

Tharyx spL – Grosse *et al.* 2025c: 676.

Diagnosis

Thin, sometimes thread-like body with enlarged, bulgy venter around segments 9–20. Three peristomial rings covered by a narrow dorsal crest; dorsal tentacles and first branchiae arising from last peristomial ring. Up to seven sub-bidentate spines per neuro and notopodium posteriorly. Clear ventral bands on posterior half of enlarged anterior venter with methylene blue.

Etymology

Tharyx emmae sp. nov. is named after Emma Woodhouse, one of the main characters of the novel *Emma* by Jane Austen.

Material examined

Holotype

NORTH ATLANTIC • Reykjanes Ridge, northern end; 63.33333° N, 23.16666° W; 305.3 m deep; 4 Sep. 2011; collected with box corer; SMF33092.

Paratypes

NORTH ATLANTIC • 3 specs; same data as for holotype; SMF33104, SMF33095, SMF33082 • 1 spec.; 63.31466° N, 23.16016° W; 293.6 m deep; 4 Sep. 2011; collected with epibenthic sledge; SMF33102.



Fig. 26. *Tharyx emmae* sp. nov., complete specimens. A. SMF33092. B. SMF33082. C. ZMBN174091. D. ZMBN174094. E. ZMBN174088. F. ZMBN174095. Scale bar = 1 mm.

NORTH SEA • 1 spec.; 60.396° N, 5.149° E; 172 m deep; 30 Mar. 2014; ZMBN95791 • 1 spec.; 59.55444° N, 5.22245° E; 179 m deep; 28 Apr. 2017; ZMBN125833 • 1 spec.; Hissfjorden; 60.17536° N, 5.96353° E; 182 m deep; 27 May 2020; ZMBN139445 • 1 spec.; 60.39538° N, 5.15493° E; 172 m deep; 23 May 2018; ZMBN174089 • 1 spec.; 60.39598° N, 5.14948° E; 172 m deep; 31 Mar. 2014; ZMBN174088 • 1 spec.; 59.56729° N, 5.21568° E; 328 m deep; ZMBN174095.

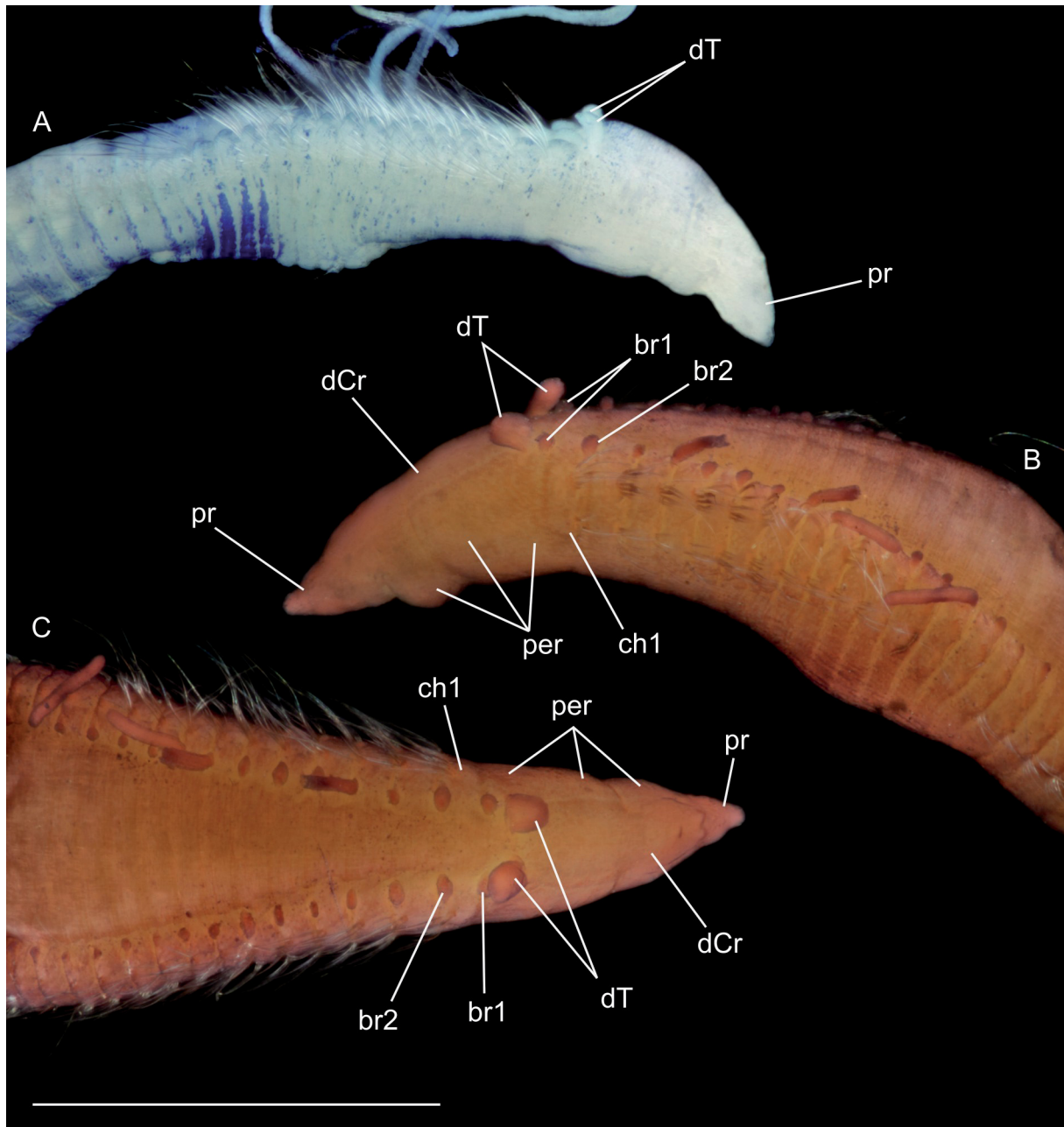


Fig. 27. *Tharyx emmae* sp. nov., anterior morphology. **A.** ZMBN174095. **B–C.** SMF33095. **A.** Anterior end in lateral view, stained with methylene blue. **B.** Anterior end in lateral view, stained with Shirlastain A. **C.** Anterior end in dorsal view, stained with Shirlastain A. Abbreviations: br1: first branchiae; br2 = second branchiae; ch1 = first chaetiger; dCr = dorsal crest; dT = dorsal tentacles; per = peristomium; pr = prostomium. Scale bar = 500 μ m.

NORWEGIAN SEA • 1 spec.; 61.17016° N, 7.24997° E; 146 m deep; 4 May 2017; ZMBN174091 • 1 spec.; 63.67833° N, 9.79612° E; 120 m deep; 25 Oct. 2016; ZMBN174094.

Description

A small species. Holotype complete, 9 mm long (complete paratypes: 6–9 mm), 0.4 mm wide (complete paratypes: 0.2–0.4 mm), 106 segments (complete paratypes: 80–113 segments). Colour in ethanol light tan or gray to brown (Fig. 26). Body thin, sometimes thread-like, with a short, distinct expanded anterior region and sometimes a similar posterior region. Anterior 20–30 segments 6–8 times as wide and as high as long, round in cross section, venter expanded around segments 9–20 (Figs 26A, C, 27A–B). Following segments generally 3 times as wide and as high as long but in some specimens becoming up to as long as wide and high, round to oval in cross section. Posterior 20–30 segments 3–4 times as high as long and 3–6 times as wide as long. Dorsal groove or ridge absent. Longitudinal ventral ridge present along entire body (Fig. 26F).

Prostomium elongated, as long as two thirds of peristomium, conical, without rings; eyespots absent; nuchal organs simple slits on posterolateral margins (Fig. 27). Peristomium as long as 6–7 anterior segments, three rings of similar size, anterior one extending dorsally, overlapping prostomium; thin dorsal crest along entire length, often ending in a bidentate tip anteriorly (Fig. 27). Dorsal tentacles arising from last peristomial ring, close together. First pair of branchiae arising from last peristomial ring, posterior to dorsal tentacles (Fig. 27). Second pair of branchiae arising from chaetiger 1, dorsal to and

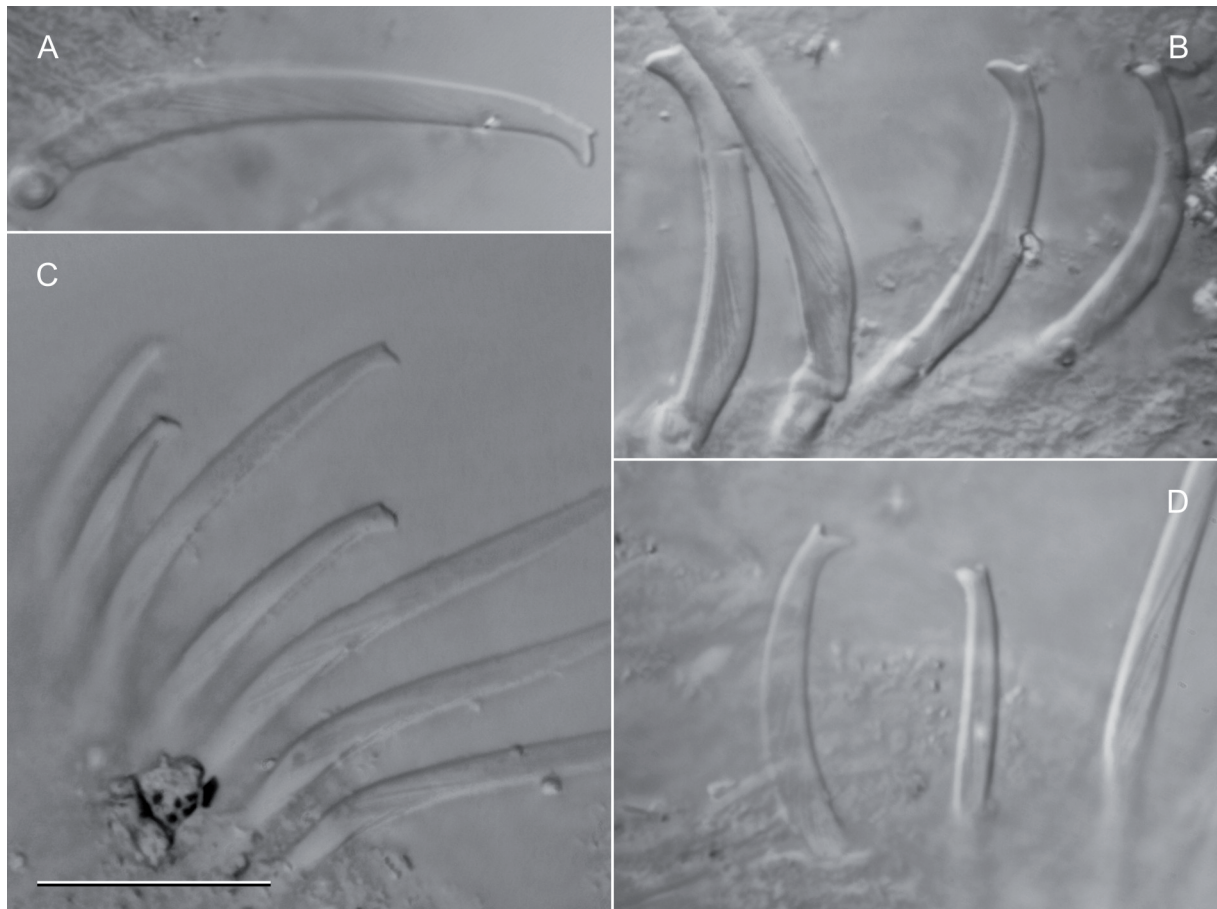


Fig. 28. *Tharyx emmae* sp. nov., chaetae. **A–B, D.** SMF33095. **C.** SMF33092. Scale bar = 20 μ m.

slightly posterior to parapodia (Fig. 27). Subsequent branchiae similarly placed, branchiae and branchial scars present along most anterior segments, less frequent afterwards.

Parapodia biramous, placed dorsally, forming distinct shoulders anteriorly (Fig. 27), shifting to median position in midbody and a more ventral position posteriorly. Chaetae capillaries and spines; with 7–10 capillary chaetae per each neuro- and notopodium anteriorly, capillaries of midbody, short, smooth. Up to 7 sub-bidentate spines per each neuro- and notopodium in posterior half of the body, long, thin and slightly curved (Fig. 28), companion capillary chaetae lacking.

Pygidium with terminal anus and small, rounded ventral lobe.

Methylene blue

The venter stains a light blue colour anteriorly, except for segments 9 to 13 (Fig. 27A). Segments 14 to 18 retain dark ventral bands even after the rest of the stain has faded. Intersegmental lines and a longitudinal line may stain on the dorsum. The tip of the prostomium and the top of the third peristomial ring may retain a dark colour.

Distribution and habitats

The material examined here has been collected in the North Atlantic south of Iceland on the northern end of the Reykjanes ridge as well as along the Norwegian coast from depths of 120 to 305 m (Fig. 29).

Phylogenetic placement

In the phylogeny of Grosse *et al.* (2025c), *Tharyx emmae* sp. nov., as *Tharyx* sp. L, belongs to group IV (comprising members of *Aphelochaeta*, *Kirkegaardia* and *Tharyx*), clade T1. It is sister the clade comprising *Tharyx killariensis* and another unnamed species of *Tharyx*.

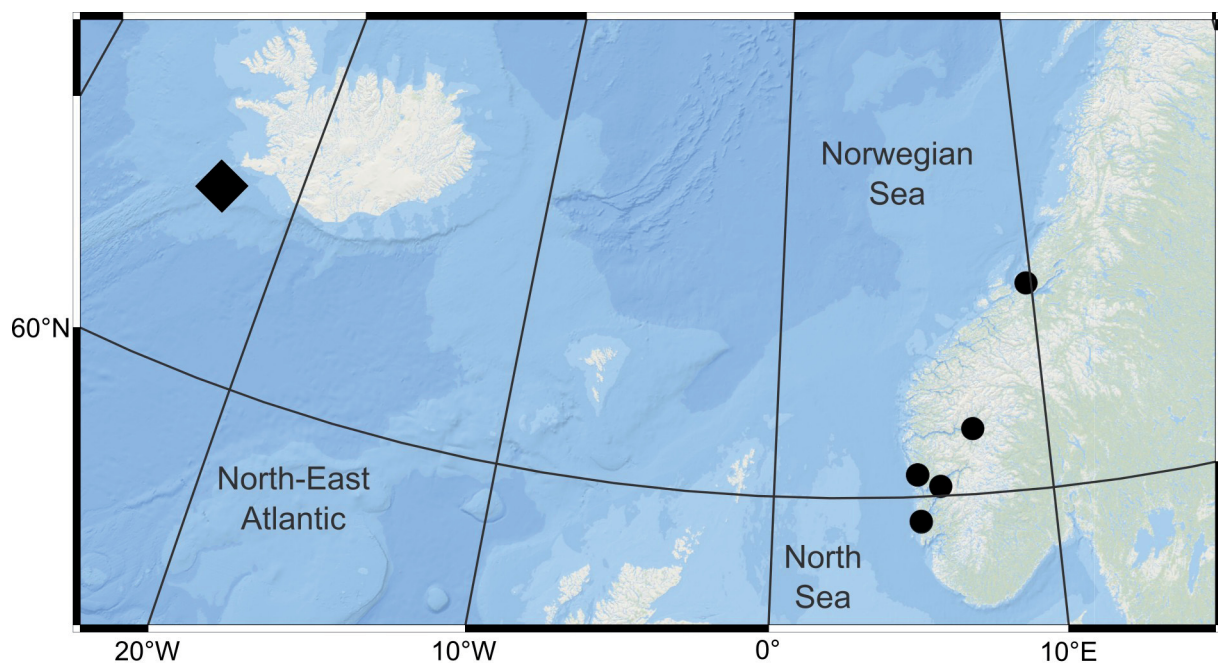


Fig. 29. *Tharyx emmae* sp. nov., distribution. Black dots indicates stations where *T. emmae* was found. The black diamond indicates the type locality.

Comparative remarks

Tharyx emmae sp. nov. is different from all other described species of *Tharyx* by its enlarged and expanded venter anteriorly, a high number of spines in posterior segments (up to seven per neuro and notopodium vs, e.g., up to four in *T. killariensis*) as well as its unique methylene blue staining pattern that reveals several ventral bands in anterior segments.

Discussion

In this paper, two new species of *Aphelochaeta* and one new species of *Tharyx* are described: *Aphelochaeta annae* sp. nov., *A. elinorae* sp. nov. and *Tharyx emmae* sp. nov. These species present a similar distribution along the Norwegian coast and *A. elinorae* and *T. emmae* are also present on the Icelandic shelf, suggesting a possibly broader distribution in the sub-Arctic waters of the north-east Atlantic. Their bathymetric ranges are overlapping, although *A. elinorae* can be found in shallower waters (from 35 to 366 meters deep) and *A. annae* in deeper waters (from 226 to 621 meters deep) than *T. emmae* (120 to 305 meters deep). Yet, more records may extend both the geographic and bathymetric range of these species. Both *A. elinorae* and *A. annae* can be easily distinguished from other species in the area by their distinctive methylene blue staining patterns. In the case of *A. elinorae*, the lack of staining pattern is also a distinctive feature.

Two species of bitentaculate Cirratulidae, *Aphelochaeta marioni* and *Aphelochaeta mcintoshii*, are re-described and illustrated in this work based on newly collected material. *Aphelochaeta marioni* was described from the French coast of the English Channel in 1894 and was then reported from nearly all oceans, even at latitudes and depths very different from those of the type locality (Gil 2011) under the assumption that most polychaete species are cosmopolitan (Hutchings & Kupriyanova 2018). Many studies have now revealed that polychaete distribution patterns are often more complex and restricted over depth gradients (Oug *et al.* 2017) and geographical areas (Hutchings & Kupriyanova 2018). For these two species, the DNA sequences provided by Grosse *et al.* (2025c) and the new descriptions provided here were important to sort out these records and identify new species previously misidentified.

Two other species of European Cirratulidae in the genus *Aphelochaeta* are in a similar situation and in need of re-description. *Aphelochaeta filiformis* (Keferstein, 1862) was also described from the French coasts of the English Channel. No type material exists, the description is succinct, and the illustrations suggest that this species may belong to the genus *Kirkegaardia* (João Gil pers. com.). *Aphelochaeta multibranchis* (Grube, 1863) was described from the Mediterranean Sea, also lacking type material, and with description providing limited diagnostic information. To fully clarify the taxonomy of European Cirratulidae, it will in the future be necessary to obtain and sequence specimens from the type localities of these two species.

These re-descriptions or new descriptions and illustrations of all the species presented in this paper are helpful for better characterizing the annelid fauna of northern Europe, and will be particularly relevant for environmental monitoring of benthic communities. In addition, the reference DNA sequences for each species included in this paper and available in Grosse *et al.* (2025c) provide reliable tools for DNA based biodiversity studies using eDNA and metabarcoding.

Acknowledgments

We greatly appreciate the help of many colleagues who donated specimens, loaned specimens from Museum of institutional collections and/or helped with curation: Karin Meißner (Deutsches Zentrum für Marine Biodiversitätsforschung (DZMB), Senckenberg Research Institutes and Natural History Museum), Jon Anders Kongsrud (UiB), Tom Alvestad (UiB), Torkild Bakken (NTNU), Karstein Hårsaker (NTNU), Ann-Helén Rønning (NHMO), Céline Houbin (Sorbonne Université: Station Biologique de

Roscoff), Amy Geraghty (NMINH), Ekin Tiliç (SMF), Marie-Louise Trizt (SMF) and Kennet Lundin (GNM). We are grateful to Ferran Hierro (SCT, UIB), Antoni Busquets (SCT, UIB), Katrine Kongshavn (ZMBN) and Irene Heggstad (ELMILAB, University of Bergen) for help with SEM imaging.

The study was supported by the Norwegian Biodiversity Information Center funded projects: Polychaetes in Norwegian Ports (project number 26-17-70184238) and Cirratulid polychaetes in Norwegian waters: a museum based approach to species diversity and distribution (project number 15-22-70184245). This work was also supported by Havs och Vatten Myndigheten, Länsstyrelsen Västra Götaland and Bohuskustens Vattenvårdsförbund under Grant number 53–21.

References

- Bellan G. 2001. Annelida Polychaeta. In: Costello M.J., Emblow C.S. & White R. (eds) *European Register of Marine Species: A check-list of the marine species in Europe and a bibliography of guides to their identification*: 214–231. Patrimoines Naturels 50. Publications Scientifiques du MNHN.
- Blake J.A. 1991. Revision of some genera and species of Cirratulidae (Polychaeta) from the western North Atlantic. *Ophelia Supplement* 5: 17–30. https://doi.org/10.1163/9789004629745_005
- Blake J.A. 1996. Family Cirratulidae Ryckholdt, 1851. Including a revision of the genera and species from the eastern North Pacific. In: Blake J.A., Hilbig B. & Scott P.H. (eds) *Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel. 6 – The Annelida Part 3. Polychaeta: Orbiniidae to Cossuridae*. Santa Barbara Museum of Natural History. Santa Barbara.
- Blake J.A. 2016. *Kirkegaardia* (Polychaeta, Cirratulidae), new name for *Monticellina* Laubier, preoccupied in the *Rhabdocoela*, together with new records and descriptions of eight previously known and sixteen new species from the Atlantic, Pacific, and Southern Oceans. *Zootaxa* 4166 (1): 1–93. <https://doi.org/10.11646/zootaxa.4166.1>.
- Blake J.A. 2018. Bitentaculate Cirratulidae (Annelida, Polychaeta) collected chiefly during cruises of the R/V *Anton Bruun*, USNS *Eltanin*, USCG *Glacier*, R/V *Hero*, RVIB *Nathaniel B. Palmer*, and R/V *Polarstern* from the Southern Ocean, Antarctica, and off Western South America. *Zootaxa* 4537 (1): 1–130. <https://doi.org/10.11646/zootaxa.4537.1.1>
- Blake J.A. & Göransson P. 2015. Redescription of *Tharyx killariensis* (Southern) from Ireland and description of two new species of *Tharyx* from the Kattegat, Sweden (Polychaeta, Cirratulidae). *Zootaxa* 4039 (4): 501–515. <https://doi.org/10.11646/zootaxa.4039.4.1>
- Blake J.A. & Magalhães W.F. 2019. Family Cirratulidae Ryckholt, 1851. In: Westheide W. & Purschke G. (eds) *Handbook of Zoology, a Natural History of the Phyla of the Animal Kingdom. Vol. 1 Annelida Basal Groups and Pleistoannelida, Sedentaria I*: 339–391, De Gruyter Brill.
- Borghese J., Musco L., Arduini D., Tamburello L., Del Pasqua M. & Giangrande A. 2023. A comparative approach to detect macrobenthic response to the conversion of an inshore mariculture plant into an IMTA system in the Mar Grande of Taranto (Mediterranean Sea, Italy). *Water* 15 (1): 68. <https://doi.org/10.3390/w15010068>
- Caullery M. & Mesnil F. 1898. Les formes épitoques et l'évolution des cirratuliens. *Annales de l'Université de Lyon* 39: 1–200. Available from <https://www.biodiversitylibrary.org/page/49056295> [accessed 11 Jul. 2024].
- Eliason A. 1962. Die Polychaeten der Skagerak-Expedition 1933. *Zoologiska bidrag från Uppsala* 33: 207–293.
- Gil J. 2011. *The European Fauna of Annelida Polychaeta*. PhD Thesis, University of Lisbon, Portugal.

- Grosse M., Bakken T., Nygren A., Kongsrud J.A. & Capa M. 2020. Species delimitation analyses of NE Atlantic *Chaetozone* (Annelida, Cirratulidae) reveals hidden diversity among a common and abundant marine annelid. *Molecular Phylogenetics and Evolution* 149: e106852. <https://doi.org/10.1016/j.ympev.2020.106852>
- Grosse M., Capa M. & Bakken T. 2021. Describing the hidden species diversity of *Chaetozone* (Annelida, Cirratulidae) in the Norwegian Sea using morphological and molecular diagnostics. *ZooKeys* 1039: 139–176. <https://doi.org/10.3897/zookeys.1039.61098>
- Grosse M., Kongsrud J.A., Alvestad T., Eilertsen M.H. & Budaeva N. 2025a. A new species and a new record of Cirratulidae (Annelida, Cirratulida) from Loki's Castle vent field. *European Journal of Taxonomy* 987: 1–25. <https://doi.org/10.5852/ejt.2025.987.2855>
- Grosse M., Alvestad T., Nygren A. & Kongsrud J.A. 2025b. Phylogenetic analyses elucidate the identity and distribution of two species of Arctic Cirratulidae (Annelida, Sedentaria). *European Journal of Taxonomy* 987: 189–220. <https://doi.org/10.5852/ejt.2025.987.2869>
- Grosse M., Nygren A., Meißner K., Struck T., Kongsrud J.A., Alvestad T., Bakken T., Pons J. & Capa M. 2025c. Molecular investigation of Cirratulidae (Annelida) doubles the number of known species in European waters. *Zoologica Scripta* 54: 672–683. <https://doi.org/10.1111/zsc.12729>
- Hutchings P. & Kupriyanova E. 2018. Cosmopolitan polychaetes – fact or fiction? Personal and historical perspectives. *Invertebrate Systematics* 32 (1): 1–9. <https://doi.org/10.1071/IS17035>
- Lezzi M., Çinar M.E. & Giangrande A. 2016. Two new species of Cirratulidae (Annelida: Polychaeta) from the southern coast of Italy. *Marine Biodiversity* 46: 681–686. <https://doi.org/10.1007/s12526-015-0418-5>
- McIntosh W.C. 1911. Notes from the Gatty Marine Laboratory, St. Andrews. No. XXXII. 1. On the American *Syllides verrilli*, Percy Moore, from Woods Hole, Mass. 2. On *Nevaya whiteavesi*, a form with certain relationships to *Sclerocheilus*, Grube, from Canada. 3. On the British Cirratulidae. 4. On the Cirratulidae dredged by the H.M.S. 'Porcupine' in 1869 and 1870. 5. On the Cirratulidae dredged in the Gulf of St. Lawrence, Canada, by Dr. Whiteaves. 6. On the Cirratulidae dredged in Norway by Canon Norman, D.C.L., F.R.S. *The Annals and Magazine of Natural History. Series 8* 7 (38): 145–173. <https://doi.org/10.1080/00222931108692919>
- Oug E., Bakken T., Kongsrud J.A. & Alvestad T. 2017. Polychaetous annelids in the deep Nordic Seas: Strong bathymetric gradients, low diversity and underdeveloped taxonomy. *Deep Sea Research Part II: Topical Studies in Oceanography* 137: 102–112. <https://doi.org/10.1016/j.dsr2.2016.06.016>
- Read G. & Fauchald K. 2024. WoRMS. World Polychaeta Database. Cirratulidae Ryckholt, 1851. Available from <https://www.marinespecies.org/aphia.php?p=taxdetails&id=919> [accessed 11 Jul. 2024].
- Ryckholt P. 1851. Mélanges paléontologiques. Part 1. *Mémoires Couronnes et Mémoires des Savants étrangers de l'Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique* 24: 1–176. Available from <https://www.biodiversitylibrary.org/page/2718124> [accessed 11 Jul. 2024].
- Saint-Joseph A.A. 1894. Les Annélides polychètes des côtes de Dinard. Troisième Partie. *Annales des Sciences naturelles, Zoologie et Paléontologie, Série 7* 17: 1–395. Available from <https://www.biodiversitylibrary.org/page/35662416> [accessed 11 Jul. 2024].
- Solis-Weiss V., Bertrand Y., Helléouet M.-N. & Pleijel F. 2004. Types of polychaetous annelids at the Muséum national d'Histoire naturelle, Paris. *Zoosystema* 26 (3): 377–384.
- Southern R. 1914. Clare Island Survey. Archiannelida and Polychaeta. *Proceedings of the Royal Irish Academy* 31 (47): 1–160. Available from <https://www.biodiversitylibrary.org/page/34773787> [accessed 11 Jul. 2024].

Webster H.E & Benedict J.E. 1887. The Annelida Chaetopoda, from Eastport, Maine. *U.S. Commission of Fish & Fisheries. Report of the United States Commissioner of Fisheries* 1885 part 13, II. Appendix to report of commissioner, D.22: 707–758.

Wiley E.O. 1981. Remarks on Willis' species concept. *Systematic Biology* 30: 86–87.

<https://doi.org/10.1093/sysbio/30.1.86>

Printed versions of all papers are deposited in the libraries of two of the institutes that are members of the *EJT* consortium: Muséum national d'Histoire naturelle, Paris, France and Royal Museum for Central Africa, Tervuren, Belgium. The other members of the consortium are: Royal Belgian Institute of Natural Sciences, Brussels, Belgium; Meise Botanic Garden, Meise, Belgium; Natural History Museum of Denmark, Copenhagen, Denmark; Naturalis Biodiversity Center, Leiden, the Netherlands; Museo Nacional de Ciencias Naturales-CSIC, Madrid, Spain; Leibniz Institute for the Analysis of Biodiversity Change, Bonn – Hamburg, Germany; National Museum of the Czech Republic, Prague, Czech Republic; The Steinhardt Museum of Natural History, Tel Aviv, Israël.

Supplementary file

Supp. file 1. Voucher information for all the material examined including museum repository, BOLD accession numbers and collection data. <https://doi.org/10.5852/ejt.2026.1076.3304.14543>