

Two new species of *Sphaerodoropsis* Hartman & Fauchald, 1971 (Polychaeta: Sphaerodoridae) from Iceland (BIOICE programme)

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Abstract

Two new species of *Sphaerodoropsis* Hartman & Fauchald, 1971 (Polychaeta: Sphaerodoridae), collected during the BIOICE programme on sedimentary bottoms off Iceland, are described. *Sphaerodoropsis gudmunduri* sp. nov. is a shelf species (<400 m) chiefly characterized by having one transverse row of up to 10–12 dorsal macrotubercles per chaetiger ('*Sphaerodoropsis* group 2') and body papillae present only on the prostomium, peristomium, parapodia and ventral surface. It also has up to 7–9 ventral papillae per chaetiger arranged following a non-random pattern and parapodia which bear one digitiform prechaetal lobe, 1–4 papillae and compound unidentate chaetae with blades with thin spinulation along their cutting edge. *Sphaerodoropsis halldori* sp. nov. has been found in deeper waters (>1000 m) and may be distinguished mostly by having up to 13 dorsal macrotubercles arranged in two transverse rows (6–7 macrotubercles, respectively) defining a zig-zag pattern ('group 3') and 7 dorsal papillae per chaetiger, up to 8–10 ventral papillae per chaetiger arranged in a non-random pattern and parapodia which bear one digitiform prechaetal lobe, one antero-lateral papilla and compound unidentate chaetae with blades with thin spinulation along their cutting edge. Both species show sexual dimorphism characterized by different arrangements of modified ventral cirri and/or special ventral structures in some mid-body chaetigers; a brief discussion about the presence of these structures on sphaerodorids and their possible importance on the systematics of the family is provided.

Keywords:

Polychaeta, Sphaerodoridae, *Sphaerodoropsis gudmunduri* sp. nov, *Sphaerodoropsis halldori* sp. nov, Iceland, distribution, sexual dimorphism,

Introduction

The genus *Sphaerodoropsis* Hartman & Fauchald, 1971 is the most speciose within the Sphaerodoridae Malmgren, 1867. (Polychaeta), comprising more than half of all species of the family. The genus is mostly characterized by having compound chaetae and dorsal sessile macrotubercles lacking terminal papillae which are arranged in four or more longitudinal rows (Fauchald 1974; Borowski 1994; Aguado & Rouse 2006). However, *Sphaerodoropsis* is currently considered a heterogeneous assemblage of species. In fact, several groups of species within the genus have tentatively been recognized according to the number and arrangement of dorsal macrotubercles per chaetiger (groups 1–4 according to Borowski 1994) and these may possibly represent several different genera pending description. In addition, the descriptions of some species lack information about such relevant characters as the appearance of prostomial appendages, number and arrangement of body and parapodial papillae and spinulation of the chaetae. SEM examination could be very useful to assess the true morphology of these and other structures but these studies have scarcely been done (but see Desbruyères 1980; Moreira et al. 2004; Aguado & Rouse 2006; Moreira & Parapar 2007, 2011; Böggemann 2009). Furthermore, modified parapodial cirri and other features such as tubercle-like structures have been reported for several *Sphaerodoropsis* species, mostly for those of ‘group 3’ *sensu* Borowski (1994); the type and appearance of these structures also seems to differ among sexes within the same species (Moreira et al. 2004; Reuscher & Fiege 2011). This suggests that a full revision of the genus will be helpful before performing any phylogenetic analyses; the latter will be needed, in turn, to clarify the relationships among the species currently included within this genus and to test whether the genus *Sphaerodoropsis* is a genus-complex consisting of several genera.

The BIOICE (Benthic Invertebrates of Icelandic Waters) expeditions are part of an international and collaborative programme started in 1991, designed to provide extensive knowledge of the marine benthic fauna present in the 200-mile exclusive economic zone of Iceland. The BIOICE sampling area covers a depth range from 20 to 3500 m on both sides of the Greenland–Iceland–Faeroe Ridge (GIF Ridge); the Ridge is less than 500 m deep and constitutes the boundary between the relatively warm North Atlantic Ocean and the much colder Nordic seas of the Arctic Ocean (Weisshappel 2000; Brix & Svavarsson 2010). The study of the polychaete material collected in this project has resulted both in the description of several new taxa and the clarification of the taxonomic status and distribution of some species, genera or families on Icelandic waters, such as the Ampharetidae, Cirratulidae, Glyceridae, Goniadidae, Nereididae, Opheliidae, Oweniidae, Serpulidae and Spionidae (e.g. Kirkegaard 2001; Sanfilippo 2001; Sigvaldadóttir 2002; Chambers & Woodham 2003; Parapar 2003, 2006; Parapar et al. 2011a, 2011b). In this article, two new species of the genus *Sphaerodoropsis* collected during the BIOICE project are described, thereby contributing to and increasing our scarce knowledge about the Sphaerodoridae from Iceland.

Materials and methods

The examined material was collected during the BIOICE expeditions with a modified Rothlisberg–Pearcy epibenthic sled. Details on the sled and sampling procedures may be found in Brattegard & Fosså (1991) and Svavarsson (1997). Specimens were fixed in 10% formalin buffered with borax, and preserved in 70% ethanol. Animals were sorted from samples by the staff at the Sandgerdi Marine Centre (SMC), and then examined by the authors. Observations, drawings and measurements were made with an Olympus BX51 compound microscope connected to a drawing tube. The type series of *Sphaerodoropsis gudmunduri* sp. nov. and *S. halldori* sp. nov. are deposited in the collections of the Icelandic Museum of Natural History (IMNH, Reykjavik); no additional material of each species was available for examination. Data on bottom water temperature, depth and coordinates used here

correspond to the start of tow. Abiotic data of the samples studied from the BIOICE expeditions may be found in the home page of the Icelandic Institute of Natural History (http://utgafa.ni.is/greinar/BIOICE_station_list_91-04_Paper_A2.pdf). The interpretation and nomenclature of the prostomial appendages follows Aguado & Rouse (2006). Specimens bearing tubercle-like structures on the ventral surface near to some mid-body parapodia were considered females while those lacking these structures were considered males, following Moreira et al. (2004), Böggemann (2009) and Reuscher & Fiege (2011). Measurements of body width excluded parapodia. For each species, descriptions correspond to the holotype; intraspecific variation is also described whenever observed. The abbreviations for the structures used in the figures are: cp, copulatory (?) structure; dpp, dorsal parapodial papilla; ic, inflated ventral cirrus; la, lateral antenna; lpp, lateral parapodial papilla; ma, median antenna; pa, palps; pc, peristomial cirrus; prl, prechaetal lobe; tu, tubercle-like structure; vpp, ventral parapodial papilla; vc, ventral cirrus.

Taxonomy

Family Sphaerodoridae Malmgren, 1867

Genus *Sphaerodoropsis* Hartman & Fauchald, 1971

***Sphaerodoropsis gudmunduri* sp. nov.**

(Figures 1A, 23 and 6AC)

Holotype:

IMNH 25916, ♂ (a pair of ventral conical structures between chaetigers 7-8; ventral tubercle-like structures absent), 2.92 mm long, 0.62 mm wide, complete, 20 chaetigers, sample 2156; 66°33'N, 20°00' W, depth 97 m.

Paratypes:

IMNH 25911 ♀ (a pair of ventral tubercle-like structures between chaetigers 7-8), 4.37 mm long, 0.87 mm wide, 25 chaetigers, sample 2947, 65°47' N, 25°38' W, depth 227 m. IMNH 25910, ♂ (a pair of ventral conical structures between chaetigers 7-8; ventral tubercle-like structures absent), 2.87 mm long, 0.57 mm wide, complete, 22 chaetigers, sample 2360, 64°17' N, 10°49' W, depth 391 m, silty sand. IMNH 25907, one specimen (sex not determined; no distinctive structures present), 2.12 mm long, 0.52 mm wide, complete, 21 chaetigers, sample 2170, 66°18'N, 19°12' W, depth 88 m.

Diagnosis

One transverse row of up to 10–12 spherical macrotubercles per chaetiger. Papillae lacking on dorsal and lateral surfaces of chaetigers. Up to 7 (♂) or 9 (♀) ventral spherical papillae per chaetiger, arranged in a non-random pattern. Parapodia with one digitiform prechaetal lobe, 1–4 spherical papillae, postchaetal lobe lacking. Males with a pair of digitiform structures with distal opening, located ventrolaterally between parapodia of chaetigers 7 and 8. Female with a pair of oval, distally open tubercle-like structures located ventrally between parapodia of chaetigers 7 and 8.

Description

Body short, grub-like, lacking pigmentation, transparent–whitish in ethanol (Figure 2A). Tegument with granulated appearance. Prostomium and segments indistinctly separated from each other. Prostomium bluntly rounded. Median antenna, one pair of lateral antennae and one pair of palps, all digitiform, of

similar length and size, smooth, lacking papillary spurs (Figure 2B). Palps inserted ventrally to lateral antennae. Prostomium and peristomium provided with digitiform to spherical papillae; 6 papillae encircled by lateral antennae and palps; 9 frontal papillae between median and lateral antennae; other dorsal and lateral surfaces with up to 15 papillae. One pair of peristomial cirri, digitiform, about same length as prostomial appendages; 10 papillae surrounding mouth opening. Two dark eyes, visible dorsally from prostomium to chaetiger 3, on chaetiger 2 in holotype. Proventricle extending over four chaetigers.

One transversal dorsal row of spherical sessile macrotubercles per chaetiger, ranging from 5 to 9 on anterior and posterior chaetigers and up to 10–12 on mid-body chaetigers (Figure 6A); some lateral macrotubercles slightly smaller, absent in some chaetigers. Macrotubercles of posterior chaetigers smaller than others. Papillae absent between rows of macrotubercles. Ventral portion of each mid-body chaetiger with up to 7 spherical papillae in holotype and male paratype and up to 8–9 in female paratype (Figure 2C, Figure 6B,C); ventral papillae of different sizes, arranged following a non-random pattern (Figure 6C).

Parapodia with wrinkled surface, uniramous, longer than wide (Figure 2D–F); one digitiform prechaetal lobe from chaetigers 3–4, projecting beyond acicular lobe; postchaetal lobe absent. Ventral cirri digitiform, inserted distally, slightly larger than prechaetal lobe, surpassing parapodium distal end. At least one spherical papilla on ventral surface from chaetiger 1; all other parapodia with additional spherical papillae on dorsal/antero-lateral/ventral surfaces, numbering up to four.

Compound falcigerous chaetae numbering 3–8 per fascicle; distal end of shaft inflated with thin spinulation (Figure 2G); blades unidentate with recurved tip and thin spinulation along proximal 2/3 of cutting edge. Blades showing gradation in length within same fascicle (24–33 μm in anterior and mid-body parapodia; 22–30 μm in posterior parapodia).

Holotype and male paratype with a pair of digitiform, distally opened (copulatory?) structures, located ventro-laterally between parapodia of chaetigers 7–8 (Figure 3A). Female paratype with a pair of oval, distally opened tubercle-like structures, located ventro-laterally between parapodia of chaetigers 7–8 (Figure 3B); small oocytes visible through epidermis.

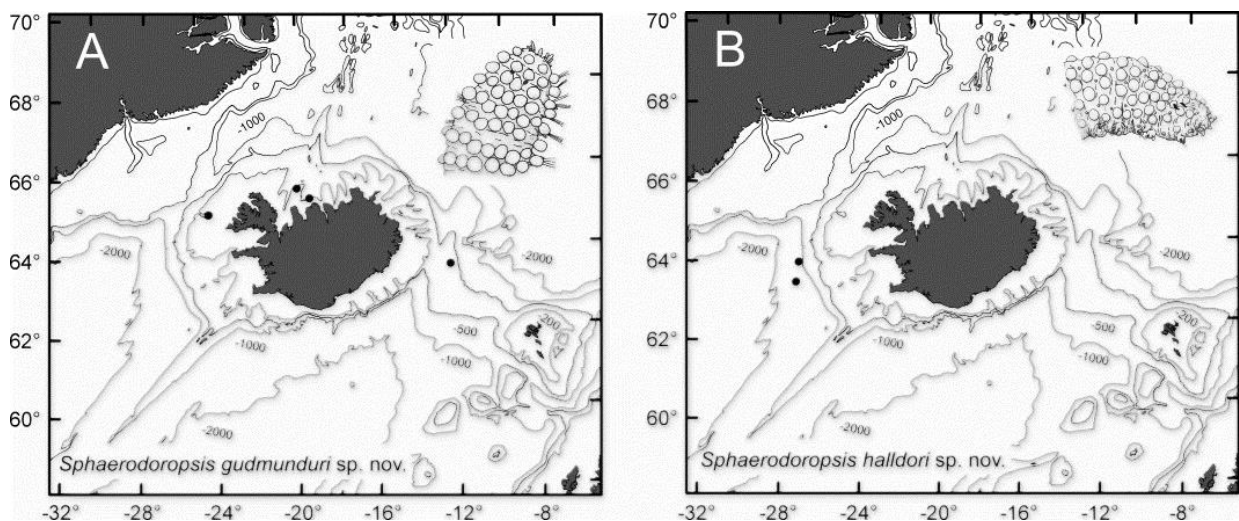


Figure 1. Distribution map of the two new species of *Sphaerodoropsis* in the area surveyed by the expeditions of the BIOICE programme. A, *Sphaerodoropsis gudmunduri* sp. nov.; B, *Sphaerodoropsis halldori* sp. nov.

Pygidium terminal, with midventral digitiform anal cirrus and pair of dorsal anal cirri of similar size and shape as dorsal macrotubercles of posterior chaetigers.

Distribution

From northwest to eastern Iceland (Figure 1A), in silty sand at depths between 88 and 391 m with a range of temperature from 2.56 to 6.20°C.

Etymology

This species is dedicated to our colleague Gudmundur V. Helgason (University of Iceland) for his help during our stays at the SMC.

Remarks

Sphaerodoropsis gudmunduri sp. nov. may be included within the group of *Sphaerodoropsis* species having one transversal row of more than four dorsal macrotubercles per chaetiger ('group 2' according to Borowski 1994). However, *S. gudmunduri* sp. nov. differs from most of the species of *Sphaerodoropsis* group 2 in lacking both postchaetal lobe(s) on the parapodia and dorsal papillae among macrotubercles; dorsal papillae are usually arranged in some other species in more than one transverse row between two consecutive transverse rows of macrotubercles. The species most similar to *S. gudmunduri* sp. nov. is *S. nuda* Ozolin'sh, 1987, from the Sea of Japan, which also lacks the aforementioned papillae and whose parapodia are similar to those of *S. gudmunduri* sp. nov.; *S. nuda* differs from the new species in having a larger body size (> 7 mm in length and up to 33 chaetigers) and a greater number of ventral papillae per chaetiger (18–20). In addition, *S. gudmunduri* sp. nov. also differs from *S. minuta* (Webster & Benedict, 1887), *S. baltica* (Reimers, 1933), *S. octopapillata* (Hartmann-Schröder, 1965), *S. katchemakensis* Kudenov, 1987, *S. uzintunensis* Kudenov, 1987 and *S. amoureuxi* Aguirrezabalaga & Ceberio, 2005 in having prostomial appendages which lack basal papillar spurs.

***Sphaerodoropsis halldori* sp. nov.**

(Figures 1B, 4–5 and 6D–F)

Holotype

IMNH 26259, ♂ (inflated ventral cirri on chaetiger 6; tubercle-like structures absent), 3.12 mm long, 0.35 mm wide, complete, 20 chaetigers, sample 2692; 64°26' N, 28°15' W, depth 1162 m, sand.

Paratypes

IMNH 26258, ♂ (inflated ventral cirri on chaetiger 6; tubercle-like structures absent), 2.75 mm long, 0.35 mm wide, complete, 17 chaetigers, ♀ (a pair of tubercle-like structures present between chaetigers 6 and 7), 2.50 mm long, 3.75 mm wide, complete, 20 chaetigers; sample 2707, 63°55' N, 28°16' W, depth 1407 m, silty sand.

Diagnosis

Two transverse rows of spherical macrotubercles per segment; parapodial row with up to 6 macrotubercles, interparapodial row with up to 7 macrotubercles. Males with up to 7 dorsal and 8

ventral papillae per chaetiger, arranged in a non-random pattern; female with up to 10 ventral papillae on chaetigers 7–9. Parapodia with one digitiform prechaetal lobe, one antero-lateral papilla, postchaetal lobe lacking. Males with parapodia of chaetiger 6 with inflated ventral cirri. Female with one pair of oval, distally opened tubercle-like structures, located ventro-laterally between the parapodia of chaetigers 6 and 7; parapodia of chaetigers 4–7 with inflated ventral cirri.

Description

Body short, grub-like, lacking pigmentation, transparent–whitish in ethanol (Figure 4A). Tegument with granulated appearance. Prostomium and segments indistinctly separated from each other. Prostomium bluntly rounded. Median antenna short, distally blunt. One pair of digitiform lateral antennae, slightly

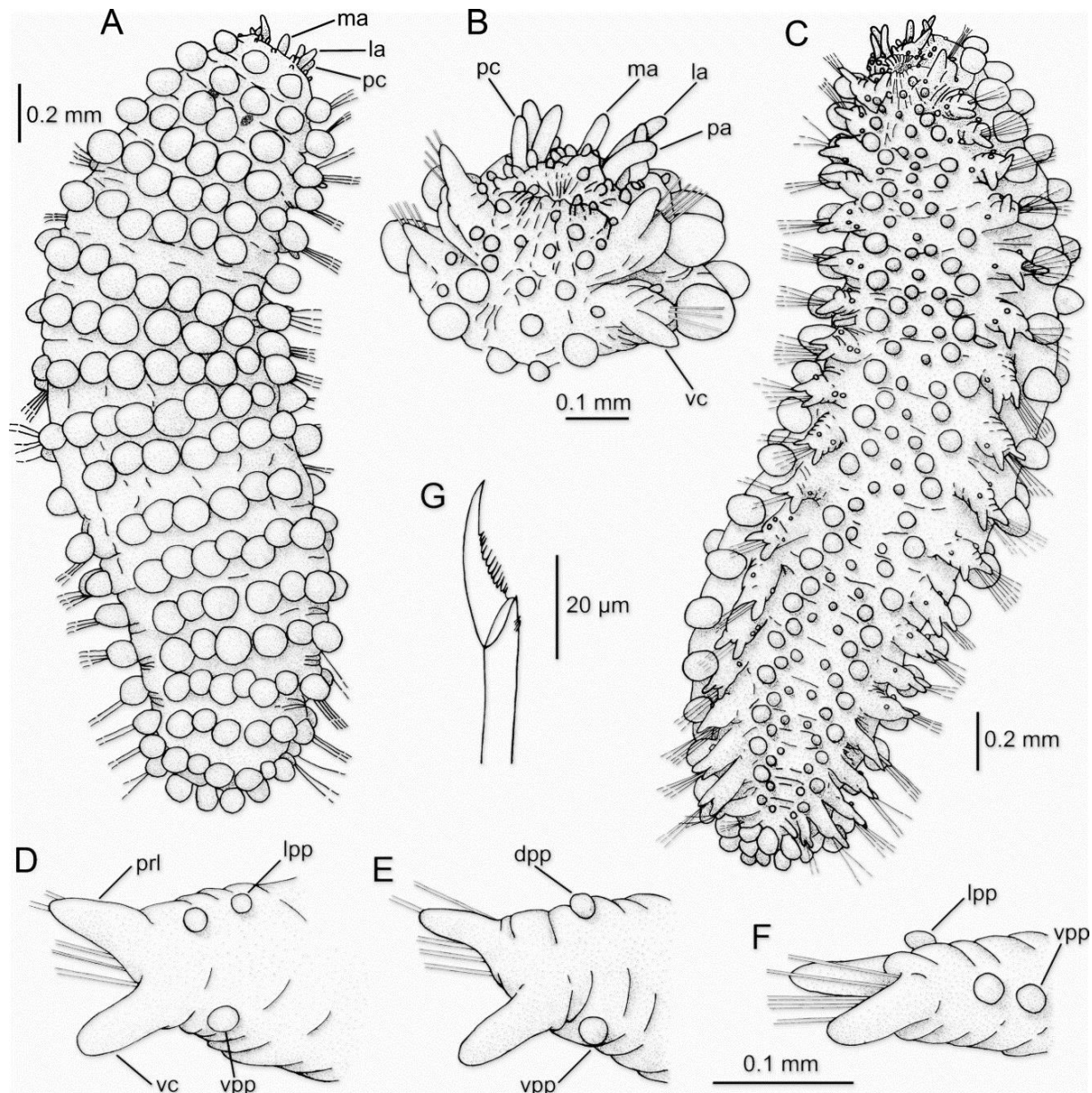


Figure 2. *Sphaerodoropsis gudmunduri* sp. nov. Holotype (IMNH 25916): A, habitus, dorsal view; B, anterior end, ventral view; C, habitus, ventral view; D, chaetiger 12, parapodium, antero-lateral view; E, chaetiger 11, parapodium, antero-lateral view; F, chaetiger 5, parapodium, ventral view; G, compound chaeta. B, D–F: blades of chaetae not illustrated.

longer than median antenna and palps. Palps digitiform, longer than median antenna, inserted ventrally to lateral antennae (Figure 4B). Prostomium and peristomium provided with spherical papillae; 4 papillae encircled by lateral antennae and palps; one papilla close to insertion of each palp. Dorsal and lateral surface of peristomium with one row of 4 papillae and 2 spherical sessile macrotubercles, similar to those of the following segments; 2 additional papillae in front of the macrotubercles. One pair of peristomial cirri, digitiform, shorter than prostomial appendages; 4 papillae surrounding mouth opening. Two dark eyes visible dorsally between peristomium and chaetiger 1. Proventricule extending to chaetigers 2–3.

Chaetigers 1 and 2 with 5 and 6 macrotubercles, respectively, on dorsal parapodial areas, and 4 and 5 macrotubercles, respectively, and 2 lateral spherical papillae (one on each side) on dorsal interparapodial areas (Figure 6D); chaetiger 3 and following chaetigers with 6 and 7 macrotubercles on parapodial and interparapodial areas, respectively, arranged in 13 longitudinal rows forming a defined zig-zag pattern. Lateral-most macrotubercle on each side of interparapodial rows usually smaller than others. Arrangement and appearance of macrotubercles on last 2–3 chaetigers showing a similar pattern to that of first 2 chaetigers. Spherical, distally rounded papillae present between rows of macrotubercles; 2 papillae in chaetiger 1, 5 in chaetiger 2; 7 papillae per segment from chaetiger 3, arranged in 7 longitudinal rows following a non-random pattern. Chaetigers 1–3 with up to 6 ventral small spherical papillae of similar size (4 parapodial, 2 interparapodial); ventral surface of each mid-body chaetiger with 8 papillae, 6 on each parapodial area and 2 on each interparapodial area, arranged in 6 longitudinal rows of papillae (Figure 6E); number of ventral papillae decreasing in last chaetigers (2–6 papillae). Female paratype with two additional larger ventral papillae in each of chaetigers 7–9, one on each side of interparapodial areas (Figure 6F).

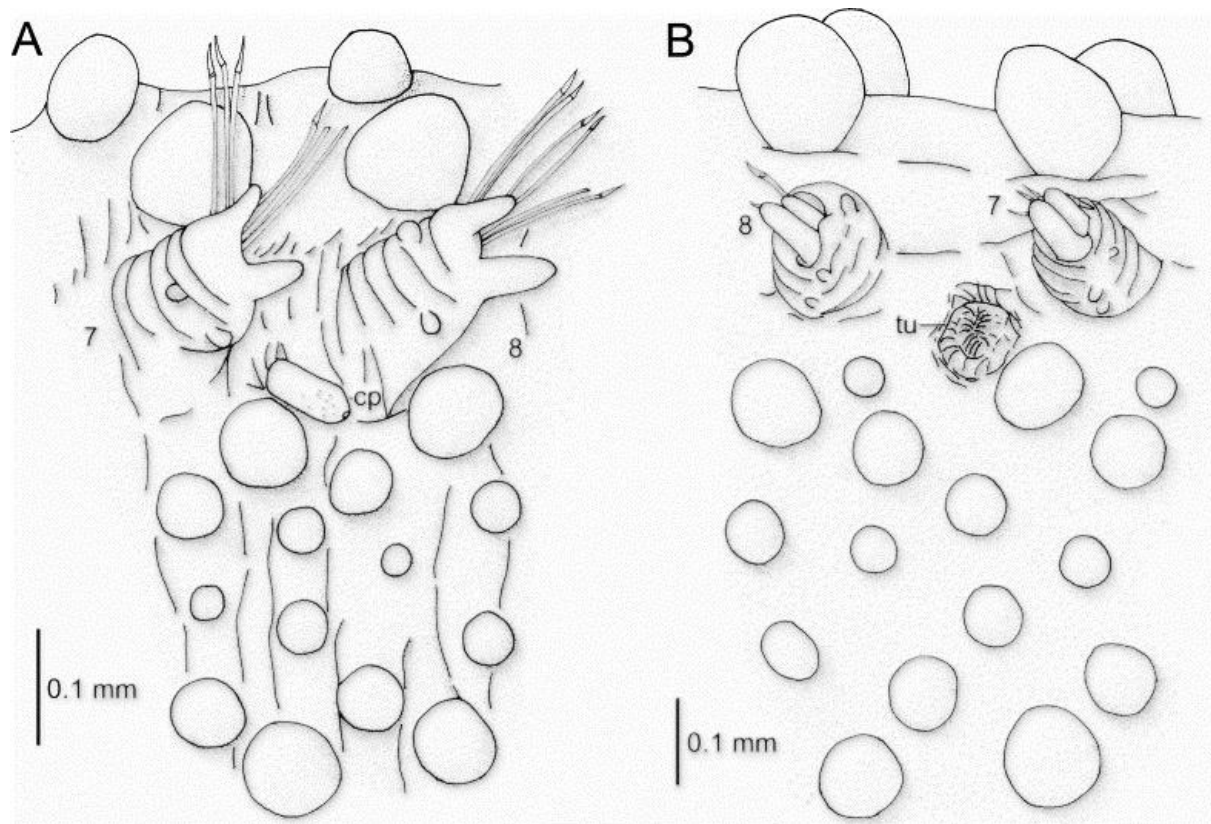


Figure 3. *Sphaerodoropsis gudmunduri* sp. nov.: A, ♂, chaetigers 7–8, paratype (IMNH 25910); B, ♀, chaetigers 7–8, paratype (IMNH 25911).

Parapodia with wrinkled surface, uniramous, longer than wide (Figure 4C); one digitiform prechaetal lobe from chaetigers 1 to 2, projecting beyond tip of parapodium; postchaetal lobe absent. Ventral cirri digitiform, inserted at mid-length, as long as or longer than prechaetal lobe, surpassing acicular lobe tip. One spherical papilla on anterior parapodial surface from chaetiger 3.

Compound falcigerous chaetae numbering 4–8 per fascicle; distal end of shaft inflated with thin spinulation (Figure 4D); blades unidentate with recurved tip and thin spinulation along cutting edge. Blades showing gradation in length within same fascicle (15–20 μm).

Holotype male body filled with sperm. Parapodia of chaetiger 6 in holotype and male paratype with large, basally inflated ventral cirrus with numerous pori on ventral surface (Figure 5B). Female paratype with a pair of oval, distally opened tubercle-like structures located ventro-laterally to parapodia of chaetigers 6–7 (Figure 5A); ventral cirri of chaetigers 4–7 basally inflated with ventral pori.

Pygidium terminal, with midventral digitiform anal cirrus and pair of dorsal anal cirri, somewhat smaller than dorsal macrotubercles (Figure 4E).

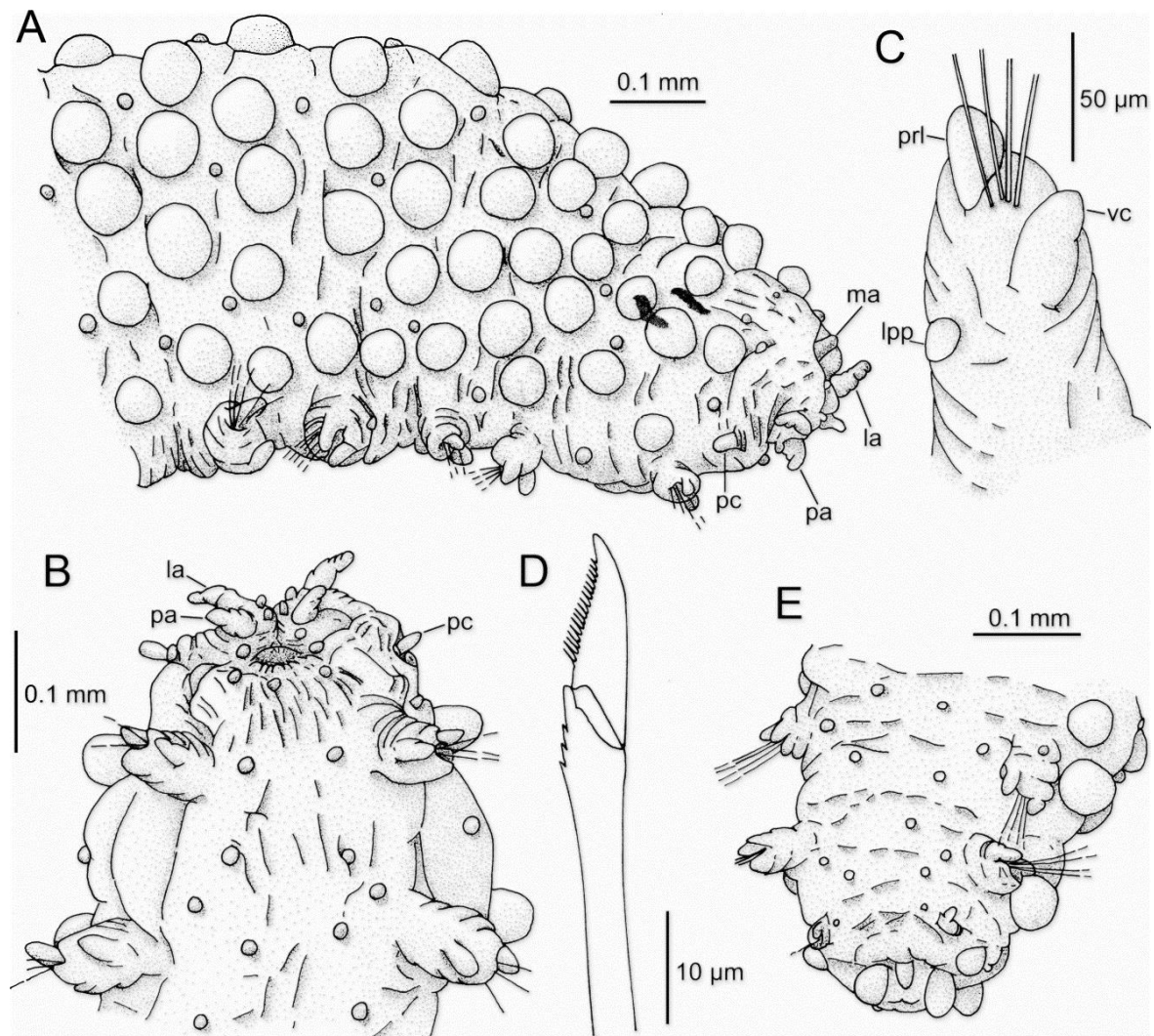


Figure 4. *Sphaerodoropsis halldori* sp. nov. Holotype (IMNH 26259): A, anterior end, lateral view; B, anterior end, ventral view; C, mid-body parapodium, ventro-lateral view (blades of chaetae not illustrated); D, compound chaeta; E, posterior end, ventral view.

Distribution

West Iceland (Figure 1B), between depths of 1162 and 1407 m, in sandy sediments, with a temperature of 3.71–3.72°C.

Etymology

This species is dedicated to the Icelandic researcher Halldór P. Halldórsson (University of Iceland) for his hospitality during our stays at the SMC.

Remarks

Sphaerodoropsis halldori sp. nov. belongs to the group of *Sphaerodoropsis* species having two transversal rows of dorsal macrotubercles per chaetiger ('group 3'; Borowski 1994). Within this group the most similar species to *S. halldori* sp. nov. are *S. bisphaeroserialis* (Hartmann-Schröder, 1974), *S. chardyi* Desbruyères, 1980, *S. arctowskyensis* Hartmann-Schröder & Rosenfeldt, 1988 and *S. garciaalvarezii* Moreira, Cacabelos & Troncoso, 2004 in having ventral papillae arranged in a non-random pattern, a parapodium which is provided with only one anterior papilla and in lacking ventral macrotubercles. *Sphaerodoropsis halldori* sp. nov. mostly differs from the aforementioned species in the arrangement and number of dorsal and ventral papillae (Desbruyères 1980; Moreira et al. 2004; Böggemann 2009). In addition, in *S. chardyi* the zig-zag arrangement of dorsal macrotubercles is less defined and the median macrotubercles seem to show some variation in number and size (cfr. Pl. 4A in Desbruyères 1980). This species was originally described without prechaetal lobes (Desbruyères 1980); Böggemann (2009) reports, however, the presence of one prechaetal lobe per parapodium, which is triangular to conical rather than digitiform as in *S. halldori* sp. nov. In addition, *S. halldori* sp. nov. differs from *S. spissum* (Benham, 1921), *S. fauchaldi* Hartmann-Schröder, 1979 and *S. solis* Reuscher & Fiege, 2011 in lacking ventral macrotubercles or large papillae; *S. disticha* Eliason, 1962 lacks ventral

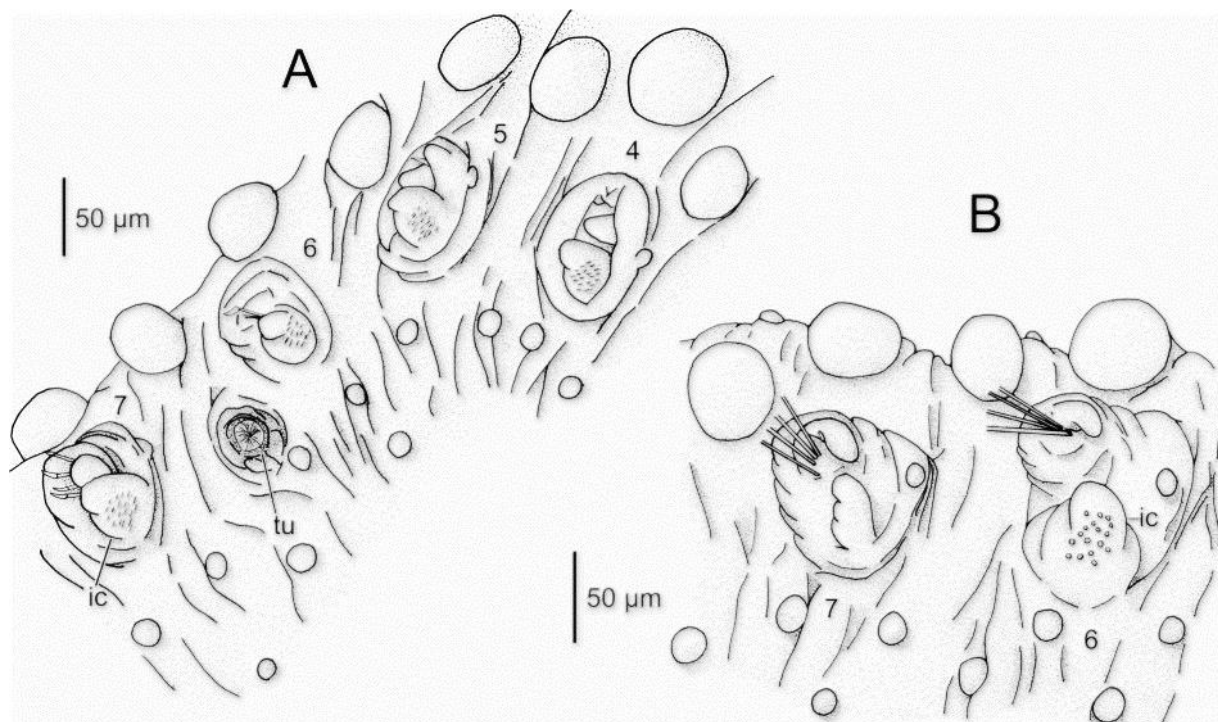


Figure 5. *Sphaerodoropsis halldori* sp. nov.: A, ♀, chaetigers 4–7, paratype (IMNH 26258); B, ♂, chaetigers 5–6, holotype (IMNH 26259).

papillae, *S. macrotuberculata* has larger macrotubercles and lacks parapodial papillae, *S. paracapense* (Hartmann-Schröder, 1974) has up to 18–20 macrotubercles per transverse row instead of 6–7, *S. oculata* Fauchald, 1974 and *S. sexantenella* Kudenov, 1993 have a parapodium which bears more papillae (4 and 3, respectively), *S. pycnos* Fauchald, 1974 has a large foliose prechaetal lobe in each parapodium, and *S. translucida* Borowski, 1994 and *S. rosehipiformis* Böggemann, 2009. Polychaetes (Annelida) of the abyssal SE Atlantic. *Organisms, Diversity and Evolution*, 9:251–428. may be distinguished from *S. halldori* sp. nov. by having dorsal macrotubercles which have a small cap-like terminal structure.

Discussion

Traditionally, females and males in sphaerodorids can be distinguished by the presence of either oocytes or spermatocytes/spermatozoa (Fauchald 1974; Christie 1984). Furthermore, fertilization had been believed to be external (Christie 1984) because copulatory organs have only been described recently (Moreira et al. 2004; Böggemann 2009; Reuscher & Fiege 2011). These authors have described a sexual dimorphism, which includes the shape of the parapodia of several mid-body parapodia, and specialized structures close to those parapodia, mostly in species of *Sphaerodoropsis* ‘group 3’,

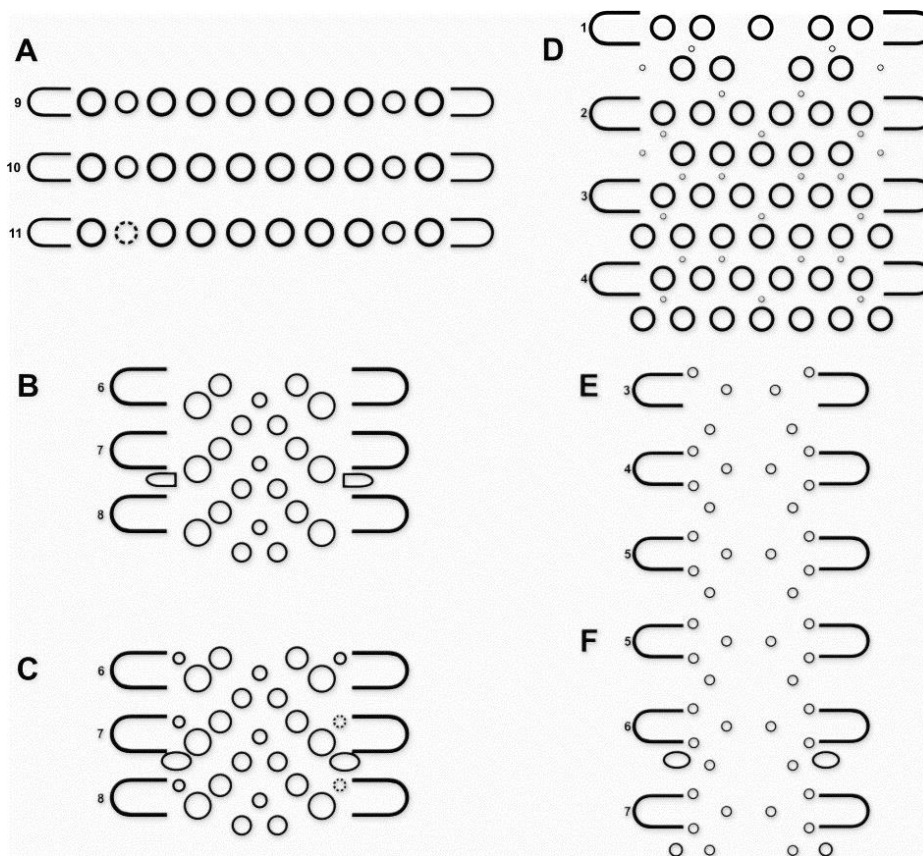


Figure 6. *Sphaerodoropsis gudmunduri* sp. nov.: A, distribution of dorsal macrotubercles, chaetigers 9–11; B, ♂, distribution of ventral papillae, chaetigers 6–8; C, ♀, distribution of ventral papillae, chaetigers 6–8. *Sphaerodoropsis halldori* sp. nov.: D, distribution of dorsal macrotubercles and papillae, chaetigers 1–4; E, ♂, distribution of ventral papillae, chaetigers 3–5; F, ♀, distribution of ventral papillae, chaetigers 5–7. Symbols: large circle (A, D): macrotubercles; small circle (D): dorsal and lateral papillae; circles (B,C, E,F): ventral papillae; digitiform structure (B): male ventral (copulatory?) structure; oval structure (C, F): female ventral tubercle-like structure; dashed circles (A, C): macrotubercle/papilla absent.

namely *S. bisphaeroserialis*, *S. arctowskyensis*, *S. translucida*, *S. garciaalvarezii*, *S. macrotubercula*, *S. rosehipiformis*, *S. solis* and *S. halldori* sp. nov. Thus, in male specimens the parapodia of the sixth chaetiger bear a ventral cirrus which is basally expanded, inflated and larger than those of other chaetigers, filled with glandular-like tissue (Böggemann 2009); males of *S. translucida* have modified parapodial ventral cirri on chaetigers 4–6 (Böggemann 2009). In females, the sixth chaetiger has a pair of large, distally opened tubercle-like structures, located latero-ventrally to the parapodia (Moreira et al. 2004; Reuscher & Fiege 2011); in addition, in females of *S. garciaalvarezii* and *S. halldori* sp. nov. the ventral parapodial cirri of chaetigers 4–7 are inflated and their ventral surface has numerous pori (Moreira et al. 2004). Sexual dimorphism of sphaerodorids that do not belong to *Sphaerodoropsis* ‘group 3’ has been described in *Sphaerodoropsis longianalpapilla* Böggemann, 2009 (group 1), *S. gudmunduri* sp. nov. (group 2) and *Sphaerodoridium campanulata* Borowski, 1994 (Böggemann 2009.). Males of the two aforementioned *Sphaerodoropsis* species differ from those of group 3 in bearing a pair of additional ventral conical structures between chaetigers 7–8.

These structures are believed to play a role in reproduction (Moreira et al. 2004; Böggemann 2009) for example, the inflated cirri and the special structures of *S. gudmunduri* sp. nov. may represent copulatory structures because they are present in specimens carrying sperm. However, in other species, females may also have inflated cirri and therefore a different function cannot be discounted. In fact, Reuscher & Fiege (2011) reported that in one male of *S. arctowskyensis* nephridia open into the inflated ventral cirri of the sixth chaetiger. It is likely that the sexual dimorphism across sphaerodorids may be more common than has been reported. The presence and arrangement of these structures need to be re-examined in the remaining species of Sphaerodoridae for a future phylogenetic analysis, and in order to address the question of whether *Sphaerodoropsis* is a genus complex that needs to be subdivided into distinct genera.

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References

- Aguado MT, Rouse GW. 2006. First record of Sphaerodoridae (Phyllodocida: Annelida) from hydrothermal vents. *Zootaxa* 1383:1-21.
- Aguirrezabalaga F, Ceberio A. 2005. *Sphaerodoropsis amoureuksi* and *S. stellifer*, two new species of Sphaerodoridae (Polychaeta) from the Capbreton Canyon (Bay of Biscay, NE Atlantic). *Cahiers de Biologie Marine* 46:9-20.
- Benham WB. 1921. Polychaeta. Australasian Antarctic Expedition 1911-14 under the leadership of Sir Douglas Mawson, D.Sc. B.E. Scientific Reports Series C - Zoology and Botany 6:1-128.

- Böggemann M. 2009. Polychaetes (Annelida) of the abyssal SE Atlantic. *Organisms, Diversity and Evolution* 9:251-428.
- Borowski C. 1994. Three new deep-sea species of Sphaerodoridae (Annelida, Polychaeta) from the eastern tropical South Pacific. *Zoologica Scripta* 23:193-203.
- Brattegard T, Fosså JH. 1991. Replicability of an epibenthic sampler. *Journal of the Marine Biological Association of the United Kingdom* 71:153-66.
- Brix S, Svavarsson J. 2010. Distribution and diversity of desmosomatid and nannoniscid isopods (Crustacea) on the Greenland-Iceland_Faeroe Ridge. *Polar Biology* 33:515-30.
- Chambers SJ, Woodham A. 2003. A new species of Chaetozone (Polychaeta: Cirratulidae) from deep water in the northeast Atlantic, with comments on the diversity of the genus in cold northern waters. *Hydrobiologia* 496:41-48.
- Christie G. 1984. The reproductive biology of a Northumberland population of *Sphaerodorum gracilis* (Rahtke, 1863) (Polychaeta, Sphaerodoridae). *Sarsia* 69:117-21.
- Desbruyères D. 1980. Sphaerodoridae (Annélides Polychètes) profonds du Nord-Est Atlantique. *Bulletin du Muséum national d'Histoire naturelle, Paris, 4è sér., 2, Sect. A(1)*:109-28.
- Eliason A. 1962. Die Polychaeten der Skagerak-Expedition 1933. *Zoologiska bidrag från Uppsala* 33:207-93.
- Fauchald K. 1974. Sphaerodoridae (Polychaeta: Errantia) from world-wide areas. *Journal of Natural History* 8:257-89.
- Hartman O, Fauchald K. 1971. Deep-water benthic polychaetous annelids off New England to Bermuda and other north Atlantic areas. Part II. Allan Hancock Monographs in Marine Biology 2:1-387.
- Hartmann-Schröder G. 1965. Die Polychaeten des Sublitorals. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 62:59-305.
- Hartmann-Schröder G. 1974. Zur Polychaetenfauna von Natal (Südafrika). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 71:35-73.
- Hartmann-Schröder G. 1979. Die Polychaeten der tropischen Nordwestküste Australiens (zwischen Derby im Norden und Port Hedland im Süden). Teil 2. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 76:77-218.
- Hartmann-Schröder G., Rosenfeldt P. 1988. Die Polychaeten der 'Polarstern'-Reise ANTIII/2 in die Antarktis 1984. Teil 1: Euphrosinidae bis Chaetopteridae. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 85:25-72.
- Kirkegaard JB. 2001. Polychaetes of the families Glyceridae, Goniadidae, and Nereididae from the North Atlantic around Iceland. *Sarsia* 86:13-20.
- Kudenov JD. 1987. Four species of Sphaerodoridae (Annelida: Polychaeta) including one new genus and three new species from Alaska. *Proceedings of the Biological Society of Washington* 100:917-26.
- Kudenov JD. 1993. A new species of Sphaerodoridae (Annelida Polychaeta) from Southern California. *Proceedings of the Biological Society of Washington* 106:582-86.
- Malmgren AJ. 1867. Spetsbergens, Grönlands, Islands och den Skandinaviska halföns hittis kända Annulata Polychaeta. *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar* 1867 1:1-126.
- Moreira J, Cacabelos E, Troncoso JS. 2004. A new species of *Sphaerodoropsis* (Polychaeta: Sphaerodoridae) from north-east Atlantic, with comments on other species of the genus. *Journal of the Marine Biological Association of the United Kingdom* 84:995-1000.

- Moreira J, Parapar J. 2007. Sphaerodoridae (Annelida: Polychaeta) from the DIVA-Artabria I project (2002 cruise) with description of a new species from the Ártabro Gulf (NW Iberian Peninsula). *Cahiers de Biologie Marine* 48:373-79.
- Moreira J, Parapar J. 2011. Sphaerodoridae (Annelida: Polychaeta) from the Bellingshausen Sea (Antarctica) with the description of two new species. *Polar Biology* 34:193-204.
- Ozolin'sh AV. 1987. New polychaetes of the family Sphaerodoridae from the Far Eastern seas of the USSR. *Zoologicheskii Zhurnal* 66:1252_55 (in Russian).
- Parapar J. 2003. Oweniidae (Annelida, Polychaeta) from Icelandic waters, collected by the BIOICE project, with the description of *Myrioglobula islandica* n. sp. *Sarsia* 69:274-90.
- Parapar J. 2006. The genera *Myriochele* and *Myrioglobula* (Polychaeta, Oweniidae) in Icelandic waters with the revision of type material of *Myriochele heeri* Malmgren, 1867, and the description of a new species. *Journal of Natural History* 40:523-47.
- Parapar J, Helgason GV, Jirkov I, Moreira J. 2011a. Taxonomy and distribution of the genus *Amphicteis* (Polychaeta: Ampharetidae) collected by the BIOICE project in Icelandic waters. *Journal of Natural History* 45:1477-99.
- Parapar J, Moreira J, Helgason GV. 2011b. Distribution and diversity of the Opheliidae (Annelida, Polychaeta) on the continental shelf and slope of Iceland, with a review of the genus *Ophelina* in northeast Atlantic waters and description of two new species. *Organisms, Diversity and Evolution* 11:83-105.
- Reimers H. 1933. Morphologie der Polychaetengattung *Sphaerodorum*. Monographie. *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere* 64:41-110.
- Reuscher M, Fiege D. 2011. Sphaerodoridae (Annelida: Polychaeta) from the deep south-west Pacific, with the description of a new species of *Sphaerodoropsis*. *Journal of the Marine Biological Association of the United Kingdom* 91:439-45.
- Sanfilippo R. 2001. *Bathyvermilia islandica* (Polychaeta, Serpulidae): New species from the southern Icelandic Sea. *Sarsia* 86:177-82.
- Sigvaldadóttir E. 2002. Polychaetes of the genera *Prionospio* and *Aurospio* (Spionidae, Polychaeta) from Icelandic waters. *Sarsia* 87:207-15.
- Svavarsson J. 1997. Diversity of isopods (Crustacea): New data from the Arctic and Atlantic Oceans. *Biodiversity and Conservation* 6:1571-79.
- Webster HE, Benedict JE. 1887. The Annelida Chaetopoda, from Eastport, Maine. *Annual Report of the United States Commission of Fish and Fisheries, Washington*, 1885:707-58.
- Weisshappel JB. 2000. Distribution and diversity of the hyperbenthic amphipod family Eusiridae in the different seas around the Greenland_Iceland_Faeroe Ridge. *Sarsia* 85:227-36.

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