

## The marine flora and fauna of the Isles of Scilly: Free-living Plathelminthes ('Turbellaria')

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### Abstract

Hitherto only three turbellarian species have been recorded from the Isles of Scilly, *Oligocladus sanguinolentus* (Quatrefages 1845), *Prostheceraeus vittatus* (Montagu 1815) and *Leptoplana tremellaris* (Müller 1773). A taxonomic collection survey in May 2002 revealed 67 species of Turbellaria. Among these, 46 species are known to science and could be determined because of their sexual maturity. Six species are new to science. The new genus *Scillyvortex* gen. nov. is established within the Provorticidae (Dalyelliida). Two species could only be taxonomically determined to genus level, *Prognathorhynchus* sp. and *Polycystis* sp. (*Polycystis naegelii* group, Kalyptorhynchia). Fifteen species (Proseriata six species, Kalyptorhynchia four species, Dalyelliida two species and Acoela, Macrostomida and Typhloplanida one species) were juveniles and could not be determined to species level. *Pelophila lutheri* is transferred to the family Convolutidae (Acoela) based on the presence of a cirrus of duplex type. *Pelophila pachymorpha* is given the status of type species of the new genus *Pelochildia* gen. nov. Remarks are given for all the known species that display varying degrees of difference from their original description.

**Keywords:** *Plathelminthes*, *Turbellaria*, new genus, new species, taxonomy, distribution, Isles of Scilly

### Introduction

The Isles of Scilly have been selected as one of only six sites through the whole of Europe for the production of an All Taxon Biodiversity Inventory (ATBI) of the marine biota (Warwick et al. 2003), by virtue of the relatively pristine environment and the comprehensive inventories of various components of the biota that are already available. The latter is largely due to the current series of papers published in this journal. The purpose of such an inventory will be to act as a baseline biodiversity standard for undisturbed marine environments in Europe, and to form the basis for calibrating techniques for the rapid assessment of biodiversity. The present paper is a further step towards this goal.

Among the meiobenthos, most attention has usually been paid to the hard-bodied taxa like nematodes, copepods etc. Generally, soft-bodied fauna like Turbellaria have been studied less, especially at the species level, due to the necessity of examining live material

for taxonomic purposes. To date only the macroscopic species *Prostheceraeus vittatus* (Montagu 1815) Lang, 1884 (L. A. Harvey and P. C. Chapman, unpublished list, 1957), *Oligocladus sanguinolentus* (Quatrefages 1845) Lang, 1884 (see Smith and Gault 1983) and *Leptoplana tremellaris* (Müller 1773) Oersted, 1843 (see Faubel 1983) have been recorded from the Isles of Scilly. More extensive studies performed on the neighbouring coasts of the Celtic Sea, Irish Sea and English Channel have been the subject of several taxonomic surveys (Gamble 1893, 1900; Southern 1936; Marine Biological Association of the United Kingdom 1957; Boaden 1963a, 1963b). The present paper deals with the taxonomic determination of free-living Turbellaria of the eu- and sublittoral area, mainly around St Martin's. In total, 67 species could be discerned as valid species. Of these species, however, only 46 could be determined to species level because of their sexual maturity. Six species are new to science and will be described. Fifteen species were sexually immature and could only be determined at higher taxon level (Table I).

### **Material and methods**

For studies on free-living Plathelminthes, sediment and aufwuchs settled on *Laminaria* holdfasts, algae, Porifera and Cnidaria were qualitatively collected from eulittoral and sublittoral areas, mainly from St Martin's and the neighbouring area. Sampling was performed over the period from 12 to 16 May 2002. Sublittoral samples were taken by scuba diving. The freshly collected sediment and aufwuchs were transferred to boxes and plastic bags approximating ambient conditions. The extraction process of sediment samples was carried out using the seawater-ice method after Uhlig (modified by Schmidt 1968). The aufwuchs collections were sorted under a dissecting microscope. Sexually mature specimens of Plathelminthes were studied alive and in squash preparation, i.e. flattened under the increasing pressure of the coverslip as the preparation dried. Measurements of living specimens were made from videotapes of squashed individuals. All other measurements were made from the holotype. These measurements are given in parentheses in the text (m.HT/m.VS=measurement from holotype/voucher specimen). Measurements were made with the imaging analysis software AnalysisPro 3.0 (SIS Münster, Germany).

For detailed information on the histological methods used see Faubel et al. (1994). For preparing whole mounts, specimens were relaxed in 7% MgCl<sub>2</sub> and embedded in polyvinyl-lacto-phenol (PVL). Types (holotype: HT, voucher specimen: VS) are deposited in the Natural History Museum, London, as whole mounts (WM), serial sections in the sagittal plane (SSP) or CD-ROM storages.

The quantity of specimens observed is given as follows: one; two; few specimens=three to five; several specimens=6–10; abundant=more than 10.

### **Localities**

All site names given below conform to those on Admiralty Chart SC 34 (2000).

- Site 1: St Martin's, Lawrence's Bay: eulittoral semi-exposed sandy beach at mid-tide level, medium to coarse sand mixed with shells, sandy flat covered dominantly with the brown algae (*Fucus serratus*, *Fucus vesiculosus*).
- Site 2a: St Martin's, Lawrence's Bay, eulittoral sand flat at mid-tide level, medium sand, with *Arenicola marina* burrows.

Table I. Distribution of 'Turbellaria' collected within the Isles of Scilly.

Table I. (Continued).

Species	Sites																	
	1	2a	2b	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Rogneda hibernica</i>										x								
<i>Polycystis naegelii</i>										x		x		x				
<i>Polycystis</i> sp. ( <i>P. naegelii</i> group)					x										x			
<i>Paulodora riedli</i>							x											
<i>Phonorhynchus helgolandicus</i>						x				x		x		x				
<i>Gyraerix hermaphroditus</i>			x															
<i>Carcharodorhynchus subterraneus</i>			x															
<i>Cheliplanilla caudata</i>	x																	
<i>Polycystididae</i> sp. 1	x			x										x				
<i>Polycystididae</i> sp. 2			x								x							
<i>Balgetia</i> cf. <i>semicirculifera</i>	x			x					x				x					
<i>Haplovedovskya scillensis</i>					x				x									
<i>Scillyvortex phytophilus</i>					x				x									
<i>Dalyelliida</i> sp. 1		x	x							x	x	x	x	x				
<i>Dalyelliida</i> sp. 2						x												

Site 2b: St Martin's, Lawrence's Bay, *Arenicola marina* burrows as above.

Site 3: St Martin's flats, Moth's Ledge, sublittoral, medium to coarse sand with broken shells, about 50 cm depth of water at low tide (site exposed only at extreme low water of spring tides).

Site 4: St Martin's flats, Moth's Ledge, sublittoral fringe at low tide, medium to coarse sand with broken shells.

Site 5: St Martin's Head, eulittoral rockpool, *Gelidium latifolium*, *Corallina* sp.

Site 6: Flat Ledge (off the Day Mark, St Martin's), sublittoral, *Nemertesia*, 28 m water depth.

Site 7: White Island, St Martin's, rockpool at mid-eulittoral, *Cladophora* sp., *Gelidium* sp., *Corallina officinalis*.

Site 8: North Chapel Rocks (off the Day Mark, St Martin's), sublittoral, 20 m water depth, *Cellaria* sp. (Bryozoa) growing on *Eunicella verrucosa* (pink seafan).

Site 9: Men-a-Vaur (NW of Saint Helen's), sublittoral, sand mixed with detritus, 10–13 m water depth in a gully, *Delesseria* sp.

Site 10: Mackerel Rocks (off St Martin's Bay), sublittoral, medium sand, 10–16 m water depth.

Site 11: Tean Sound, sublittoral, coarse sand, 10 m water depth, strong currents.

Site 12: Inner Hard Lewis Rocks (east of St Martin's), sublittoral, water depth 25 m, hydroids and Bryozoa.

Site 13: Flat Ledge (off the Day Mark, St Martin's), sublittoral, rocks with epigrowth of Bryozoa, Hydrozoa and Sponges, 20 m water depth, strong currents.

Site 14: Great High Rock, west Bryher, sublittoral, *Laminaria* holdfasts, 10 m water depth.

Site 15: Block House Point, Old Grimsby, Tresco, sublittoral, fine sand, 5 m water depth.

Site 16: Bar Point, St Mary's (L. A. Harvey and P. C. Chapman, sampled in 1956, unpublished record 1957).

Site 17: Porth Hellick rapids, St Mary's (see Smith and Gault 1983).

### Abbreviations in figures

ac, accessory gland; b, brain; bo, bursal organ; bs, seminal bursa; c, cilia; cg, cement glands; co, caudal organ; d, diatoms; de, ejaculatory duct; e, eye(s); f, frontal organ; gst, glandular stylet; gvt, gerimo-vitellaria; i, intestine; m, mouth; o, ovary; p, pharynx; ps, pseudo-segmentation; pv, prostatic glands; r, retractor muscle; rs, seminal receptacle; rt, rhammite tracks; s, sperm; sc, sensory cilia; sp, sphincter; st, stylet; sta, statocyst; su, sucker; t, testis; te, tentacle; vg, granular vesicle; vs, seminal vesicle; ♂, male gonopore; ♀, female gonopore; ♂♀, common genital pore.

### Taxonomic section

#### Order ACOELA

##### Family CONVOLUTIDAE v. Graff, 1904

###### *Pelophila lutheri* (Westblad 1946) Karling, 1974

*Convoluta lutheri* Westblad, 1940: 2 (*nom. nud.*).

*Aphanostoma lutheri* Westblad, 1946: 40–41, Figures 6, 28, pls I 5–6, II 1–4.

*Mecynostomum lutheri*: Westblad, 1948: 3.

*Praeaphanostoma lutheri*: Dörjes, 1968a: 91.

*Pelophila cavernosa* Dörjes, 1968a: 344–348, Figures 121, 122.

#### Material examined

Site 11: one specimen, in squash preparation, stored on CD-ROM: 2003.6.6.1.

*Geographical distribution.* N Atlantic: Iceland (Eyjafjördur); Norwegian Sea: Norway (Trømsø, Haakøy, Ramfjord, Trondheimfjord); Skagerrak: Norway (Oslofjord: Drøbak, Degerud), Sweden (Gullmarsfjord); Irish Sea: Isle of Man (Port Erin), North Channel (Firth of Clyde: Millport, Loch Striven); North Sea: German Bight (Helgoland), Baltic Sea: Gulf of Finland (Tvaerminne); Mediterranean Sea: Adriatic Sea (Croatia: Dubrovnik) (Riedl 1956; Dörjes 1968a; Karling 1974; Dörjes and Karling 1975).

#### Remarks

Dörjes (1968a) described *Pelophila cavernosa* from the sublittoral area around the Island of Helgoland (North Sea). This species has the status of the type species of the genus *Pelophila* Dörjes, 1968, Childiidae, mainly based on a penis being sclerotized. Karling (1974) synonymized *P. cavernosa* with *Praeaphanostoma lutheri* (Westblad 1946) now naming the species *Pelophila lutheri* (Westblad 1946). Re-investigation of *Pelophila lutheri* proves that there is not a sclerotized penis but a cirrus invaginated into a muscle bulb. The male copulatory bulb is of duplex type with a cirrus internus entered distally by extrabulbous prostatoid glands. Based on that character *Pelophila lutheri* is a member of the family Convolutidae. Based on the characters given by Dörjes, the remaining species *Pelophila pachymorpha* Dörjes, 1968 is furthermore a member of the family Childiidae Dörjes, 1968. The genus name, however, has to be emended to *Pelochildia* gen. nov. *Pelochildia pachymorpha* now achieves the status of the type species. The diagnosis given by Dörjes (1968a) is maintained. The diagnosis of *Pelophila* Dörjes, 1968 is emended as follows: With frontal organ. Genital openings separate. Male copulatory bulb of duplex type with cirrus

internus. With bilateral testes and ovaries. Seminal bursa with anterior cellular insemination apparatuses ('Matrixhörner' after Westblad 1946) and invaginated spermiducal duct directed caudad.

***Aphanostoma album*** Dörjes, 1968

*Material examined*

Sites 1, 2a, 2b, 3: several specimens, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland), North Frisian Islands (Amrum, Jordsand, Sylt); Skagerrak (Gullmarfjord: Fiskebäckskil) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977; Dörjes and Karlung 1975).

***Pseudaphanostoma psammophilum*** Dörjes, 1968

*Material examined*

Sites 1, 3: several specimens, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland), North Frisian Islands (Amrum, Jordsand, Rømø, Sylt) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977; Wellner and Reise 1989).

***Praeconvoluta minor*** Faubel, 1974

*Material examined*

Site 4: few specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt) (Faubel 1974a, 1976a, 1977).

**Family ANTROPOSTHIIDAE** Faubel, 1974  
***Antroposthia unipora*** Faubel, 1974

*Material examined*

Sites 1, 3: several specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Amrum, Jordsand, Sylt) (Faubel 1974a, 1976a, 1977).

**Family SAGITTIFERIDAE** Kostenko and Mamkaev, 1990

*Simsagittifera schultzei* (Schmidt 1852) Kostenko and Mamkaev, 1990

*Convoluta schultzii* Schmidt, 1852: 493, pl. 44: 3-3a.

*Monotus schultzii*: Diesing, 1862: 212.

*Convoluta viridis* Pereyaslavzewa, 1893: 229-230, Figure 7.

*Symsagittifera schultzei*: Mamkaev and Kostenko, 1991: 309.

*Material examined*

Voucher specimens: No. 48079, transversely sectioned specimen, locality: Plymouth Sound, deposited in Swedish Museum of Natural History (SMNH), Stockholm; Nos 48080-81 (SSP), same data.

Sites 10, 11: abundant, in squash preparation, stored on CD-ROM: 2003.6.6.2.

*Geographical distribution.* Mediterranean Sea: Gulf of Lion (Étang de Lapalme, Étang de Salses), Ligurian Sea (Villefranche sur mer), Tyrrhenian Sea (Gulf of Naples), Adriatic Sea (Gulf of Trieste: Punta Salvore, Meleda (Lago Grande)); Croatia: Rovinj; Italy: Ancona, Lesina), Sea of Marmara, Black Sea (Crimea: Sevastopol); English Channel: Plymouth Sound; NW Pacific: Japan (?) (v. Graff 1905; Steinböck 1933b; Okugawa 1953(?); Ax 1956b, 1959).

*Remarks*

*Simsagittifera schultzei* was described by Schmidt (1852) only on morphological characters, i.e. outline of body, colour (green pigment, reddish brown rhabdoids) and bilateral testes. Later on, an essentially more informative account was given by von Graff (1905) of the morphology and anatomy of *S. schultzei*. Von Graff described sagittocysts as being 45-50 µm long, and about 20 of them distributed only in the posterior part of the body. The male reproductive system consists of a short penis, ovoid or roundish, and a caudal seminal vesicle. Female organs were not observed. The description given by von Graff agrees well with the morphology and anatomy of the specimens collected. The only exception is von Graff described the presence of red eyes. In our material eyes are absent, just as stated by Schmidt (1852).

In 1975, Dörjes and Karling synonymized three serially sectioned specimens deposited by Westblad in the collection of the Swedish Museum of Natural History (SMNH) with *Sagittifera sagittifera* (Ivanov 1952) on the basis of the structure of the copulatory apparatus. This synonymization is incorrect because the sagittocysts of *Sagittifera sagittifera* are distributed characteristically both in the hind body and around the female opening and, in addition, in the mid-body bilaterally. A re-investigation of the serial sections made by Westblad proves that the three species of the SMNH identified by Dörjes and Karling (1975) are identical with *Simsagittifera schultzei*. The sagittocysts are only arranged lateral and posterior of the male copulatory apparatus. The number of sagittocysts is highly variable. In the section series SMNH 49079 the number runs to about 18 sagittocysts. In the section series SMNH 48080, sagittocysts are not developed though the specimen is sexually mature. The inner anatomy agrees well with the descriptions given by Schmidt (1852) and von Graff (1905), the exception being the presence of eyes mentioned by von Graff. The section series SMNH 48081 is incomplete.

**Family HAPLOPOSTHIIDAE** Westblad, 1948  
***Haplogonaria syltensis*** Dörjes, 1968

*Material examined*

Sites 1, 4: abundant, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt, Rømø), German Bight (Helgoland) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977).

*Remarks*

*Haplogonaria syltensis* is known from habitats of sand mixed with shells in 8 m water depth (Helgoland), and of pure sand in eulittoral and sublittoral areas of the islands of Sylt and Rømø. The latter eulittoral habitats are comparable to the localities at St Martin's. Morphological differences, however, could be observed between the populations of the North Sea areas and populations of St Martin's in the development of rhabdoids. The North Sea populations have weak rhabdoids. Often, the existence of rhabdoids was not easy to ascertain when squashed under a cover glass. On the contrary, the rhabdoids of the St Martin's populations were very clear to discern and, moreover, the rhabdoids were more abundantly distributed over the body surface. All the other morphological characters looked identical, as well as the greenish-tinged central digestive tissue.

***Haplogonaria simplex*** Dörjes, 1968

*Material examined*

Sites 1, 2a, 3: few specimens, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland), North Frisian Islands (Amrum, Rømø, Sylt) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977).

***Haplogonaria arenicolae* sp. nov.**  
(Figure 1)

*Material examined*

HOLOTYPE: Site 2b: one specimen, in squash preparation, within tubes of *Arenicola marina* L., stored on CD-ROM: 2003.5.22.6.

*Etymology*

The specific name refers to the occurrence of the species in tubes of *Arenicola marina* L.

*Description*

Length of body of sexually mature specimen up to 1.2 mm; maximum width anterior to mid-body (Figure 1); posterior body-third tapering to a pointed end. In transmitted light

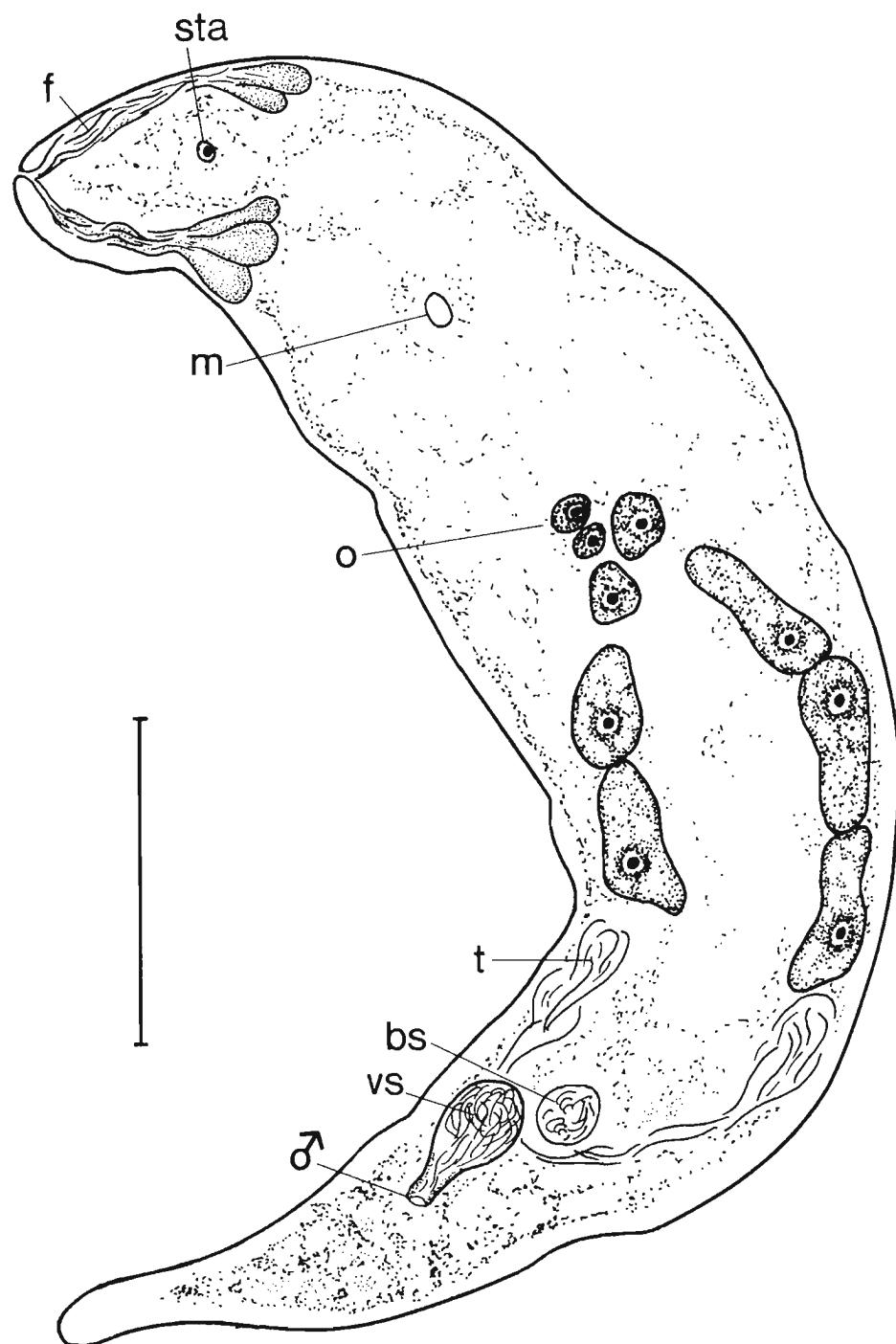


Figure 1. *Haplogonaria arenicola* sp. nov. Dorsal view in squash preparation. Scale bar: 200  $\mu\text{m}$ .

marginal parts of body yellowish grey; digestive parenchyme strongly granulated contrasting dark grey. Frontal organ present; from frontal tip of body prominent coiling glandular ducts run caudad, the glands of which lie postero-lateral of the statocyst. Statocyst 130  $\mu\text{m}$  distant from frontal tip. Rhabdoids and eyes absent. Mouth opening at the transition from first to second body-fourth.

*Reproductive system.* Bilateral testes ventral at transition from second to third body-fourth. Single ovary anterior to mid-body. Maturing oogonia are successively displaced caudad into bilateral rows. The seminal vesicle enters the male atrium proximally via a very short duct. At the beginning of the last body-fourth, the male atrium opens to the exterior (about 290  $\mu\text{m}$  from hind end). Seminal bursa anterior to the male copulatory organ; any insemination apparatuses absent. Genital pores separate.

#### *Discussion*

*Haplogonaria arenicolae* was found only once and could only be observed in squash preparation. Therefore, serial sections or whole mounts could not be prepared. The morphological structures were stored on a CD-ROM on which the following description of the morphology of *H. arenicolae* is based.

Up to now the genus *Haplogonaria* contains 13 valid species and a species *nomen nudum*, *Haplogonaria* sp. 1 Yamasu and Okazaki, 1987. The present species is a valid member of the genus *Haplogonaria* based on the characters of a single ovary, seminal bursa without any insemination apparatuses and lack of a penis or cirrus. With respect to the structure of the seminal bursa, without insemination apparatuses, and absence of rhabdoids, *H. arenicolae* closely resembles *H. elegans* Faubel, 1976. The most conspicuous characters of *H. arenicolae* are the single ovary, generating germ cells which are displaced successively into bilateral rows of oogonia maturing to oocytes, separate gonopores and the much larger body (cf. Faubel 1976b). Both the species *H. elegans* and *H. arenicolae* preferentially inhabit the deeper layers of oxic sediments, particularly in the oxidized layers of tubes of *Arenicola marina* L.

#### *Simplicomorpha gigantorhabditis* Dörjes, 1968

##### *Material examined*

Site 2b: few specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Amrum, Rømø, Sylt) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977).

##### *Remarks*

The rhabdoids of the St Martin's' population are not so distinct as the rhabdoids from the population of the Island of Sylt.

**Family CHILDIIDAE Dörjes, 1968**

*Remarks*

Hooge (2001) revised the family Childiidae Dörjes, 1968, which is now characterized by the new diagnostic character, the presence of a reversed body wall musculature, i.e. with outer longitudinal muscles and inner circular muscles (*Childia* v. Graff, 1911 and *Paraphanostoma* Westblad, 1942). All the other genera of the former Childiidae have been transferred to the new family Actinoposthiidae Hooge, 2001. We prefer to use the diagnosis given by Dörjes (1968a) because we have some evidence (Faubel unpublished) that a partial or total reversal of the body wall musculature is also present in species of other families, and in particular in *Haplogonaria syltensis* Dörjes, 1968 and *Actinoposthia biaculeata* Faubel, 1974. This reversal probably depends on the degree of exposure of the habitats where the species are living.

***Atriofronta polyvacuola* Dörjes, 1968**

*Material examined*

Sites 1, 3, 4: abundant, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland), North Frisian Islands (Amrum, Sylt) (Dörjes 1968a, 1968b; Faubel 1974a, 1976a, 1977).

***Actinoposthia haplovata* Dörjes, 1968**

*Material examined*

Sites 4, 7: two specimens, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland) (Dörjes 1968b).

***Philactinoposthia adenogonaria* Dörjes, 1968**

*Material examined*

Sites 3, 4: few specimens, in squash preparation.

*Geographical distribution.* North Sea: German Bight (Helgoland) (Dörjes 1968b).

**Family OTOCELIDIDAE Westblad, 1948**

***Notocelis gullmarenensis* (Westblad 1946) Dörjes, 1968**

*Otocelis gullmarenensis* Westblad, 1946: 52, Figures 23b, 42.

*Material examined*

Site 7: one specimen, in squash preparation.

*Geographical distribution.* Skagerrak: Gullmarfjord (Bondhålet near Blåbergsholmen); North Sea: East Frisian Islands (Juist); Mediterranean Sea: Gulf of Lion (Étang de Salses) (Ax 1956b; Dörjes 1968a; Dörjes and Karling 1975).

**Family MECYNOSTOMIDAE Dörjes, 1968**

***Mecynostomum auritum*** (Schultze 1851) Van Beneden, 1870

*Macrostomum auritum* Schultze, 1851: 58, pl. 5, Figure 4.

*Aphanostoma auritum*: Westblad, 1946: 42–43, Figures 10, 31, pl. III: 2.

*Material examined*

Site 1: two specimens, in squash preparation.

*Geographical distribution.* Baltic Sea: Gulf of Finland (Tvaerminne area), Greifswalder Bodden, Kiel Bight, Nord-Ostsee Kanal; North Sea: German Bight (estuaries of rivers Weser, Elbe), North Frisian Islands (Rømø, Sylt), England (Tynemouth); English Channel: England (Yealm estuary); Mediterranean Sea: Gulf of Lion (Étangs), Sea of Marmara, Black Sea; Europe: Germany (Lower Saxonia: salt-lake in Harz mountains, Elbe river) (v. Graff 1905; Meixner 1938; Westblad 1946; Ax 1956b, 1959; Luther 1960; Dörjes 1968a, 1968b; Karling 1974; Dörjes and Karling 1975; Den Hartog 1977; Faubel 1977; Düren and Ax 1993).

***Philomecynostomum lapillum* Dörjes, 1968**

*Material examined*

Site 1: several specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Amrum, Jordsand, Sylt) (Dörjes 1968b; Faubel 1974a, 1976a, 1977).

*Remarks*

*Philomecynostomum lapillum* is characterized by numerous hyaline crystals of polygonal shape distributed in the body laterally (Dörjes 1968a; Faubel 1974a). In specimens of the population of the Isles of Scilly, these characteristic polygonal crystals were not developed. Obviously, it seems that these crystals are not so characteristic as documented from the North Sea population. Sometimes, however, small hyaline globular crystals could be discerned which were distributed over the whole body, in other specimens again only over the anterior body-half or only over the hind body part. The question arises as to whether these small globules are homologous with the characteristic polygonal ones of the North Sea specimens. The specimens found in Lawrence's Bay on St Martin's, however, could confidently be determined based on the very characteristic male copulatory organ in combination with a single ovary and simple seminal bursa.

***Eumecynostomum papillosum*** (Faubel 1974) Faubel and Regier, 1983  
*Pseudmecynostomum papillosum* Faubel, 1974a: 63–66, Figures 26a, b, 27a, b.

*Material examined*

Sites 1, 3: abundant, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt) (Faubel 1976a, 1977).

*Remarks*

From the type locality of the Island of Sylt, specimens attain maximum length of 1.4 mm when they reach the status of senility after the reproduction period. In comparison, specimens of the population of the Isles of Scilly attained lengths of more than 2.0 mm. The colour of the body became very dirty grey, suffering loss of transparency.

**Family SOLENOFILOMORPHIDAE** Dörjes, 1968  
***Oligofilomorpha interstitiophilum*** Faubel, 1974

*Material examined*

Sites 2b, 3: few specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt) (Faubel 1976a, 1977).

**Order MACROSTOMIDA**  
**Family MICROSTOMIDAE** Luther, 1907  
***Microstomum papillosum*** v. Graff, 1882

*Material examined*

Sites 1, 11, 15: several specimens, in squash preparation.

*Geographical distribution.* NE Atlantic: Iceland (Isafjördur); Norwegian Sea: Norway (Tromsø); North Sea: Norway (Herdla off Bergen, Sartor Oe), North Frisian Islands (Sylt); Skagerrak: Gullmarfjord; Baltic Sea: Kieler Bucht; Mediterranean Sea: Gulf of Lion, Tyrrhenian Sea, Adriatic Sea (Trieste), Sea of Marmara, Black Sea (Claparede 1861; Böhming 1889; v. Graff 1913; Meixner 1938; Steinböck 1938; Riedl 1956, 1959a; Ax 1959; Faubel 1974b, 1976a, 1977).

*Remarks*

The determination of *Microstomum papillosum* could be very erroneous if the specimens had not reached full male maturity. In pre-mature specimens the stylet lacks the distal hook-like bend and, therefore, the species could be mistaken for *Microstomum septentrionale* Sabussow, 1899 (cf. Faubel 1974b).

***Microstomum jensei*** Riedel, 1932

*Microstomum tortipenis* Steinböck, 1938: 7, Figure 4a–c.

*Material examined*

Site 15: two specimens, in squash preparation.

*Geographical distribution.* NW Atlantic: Davis Strait (Greenland: Disko Bay); NE Atlantic: Iceland (Isafjördur); North Sea: North Frisian Islands (Sylt), Norway (Herdla off Bergen); Skagerrak: Gullmarfjord (v. Graff 1913; Steinböck 1933a, 1938; Westblad 1953; Faubel 1974b, 1976a, 1977).

*Remarks*

The specimens collected, like the population of the Island of Sylt, did not possess rhabdites. Riedel (1932) and Westblad (1953), however, discerned rhabdites in their material collected from Disko Bay and Gullmarfjord, respectively (cf. Faubel 1974b).

**Family MACROSTOMIDAE Van Beneden, 1870**

***Archimacrostomum sublitorale* sp. nov.**

(Figure 2)

*Material examined*

HOLOTYPE: Site 7: one specimen, in squash preparation stored on CD-ROM: 2003.5.22.2; WM 2003.5.22.2.

*Etymology*

Species name derived from its sublittoral habitat.

*Description*

Length of body of living sexually mature specimen up to 2.54 mm, when squashed under a cover glass; maximum width in mid-body, area of oocyte (Figure 2). Outline of body with characteristic macrostomid-like anterior end; posterior end rounded with several prominent adhesive glands (Figure 2A). Around margin few, very weak sensory hairs of varying length and stiffness present. In transmitted light body greyish translucent with yellowish brown intestine. Frontal glands present reaching anterior level of brain. Glandular ducts open at the frontal tip separately. Lateral to the pores of the glandular ducts, fields with dark granulations of unknown function. Very small eyes present, 270  $\mu\text{m}$  from anterior margin of the body; distance between eyes 306  $\mu\text{m}$ . Anterior margin of crescentic brain 207  $\mu\text{m}$  distant from anterior end. Rhabdites with bundles of three to six rods distributed over the dorsal and ventral body surface. Digestive system with pharynx simplex pierced by extrapharyngeal glands. The intestine fills the median parts between testis and ovary and extends caudad over oocytes, ending up laterally at the level of the male system. Mouth behind brain, 390  $\mu\text{m}$  distant from anterior end. Male and female pore 465  $\mu\text{m}$  distant from each other.

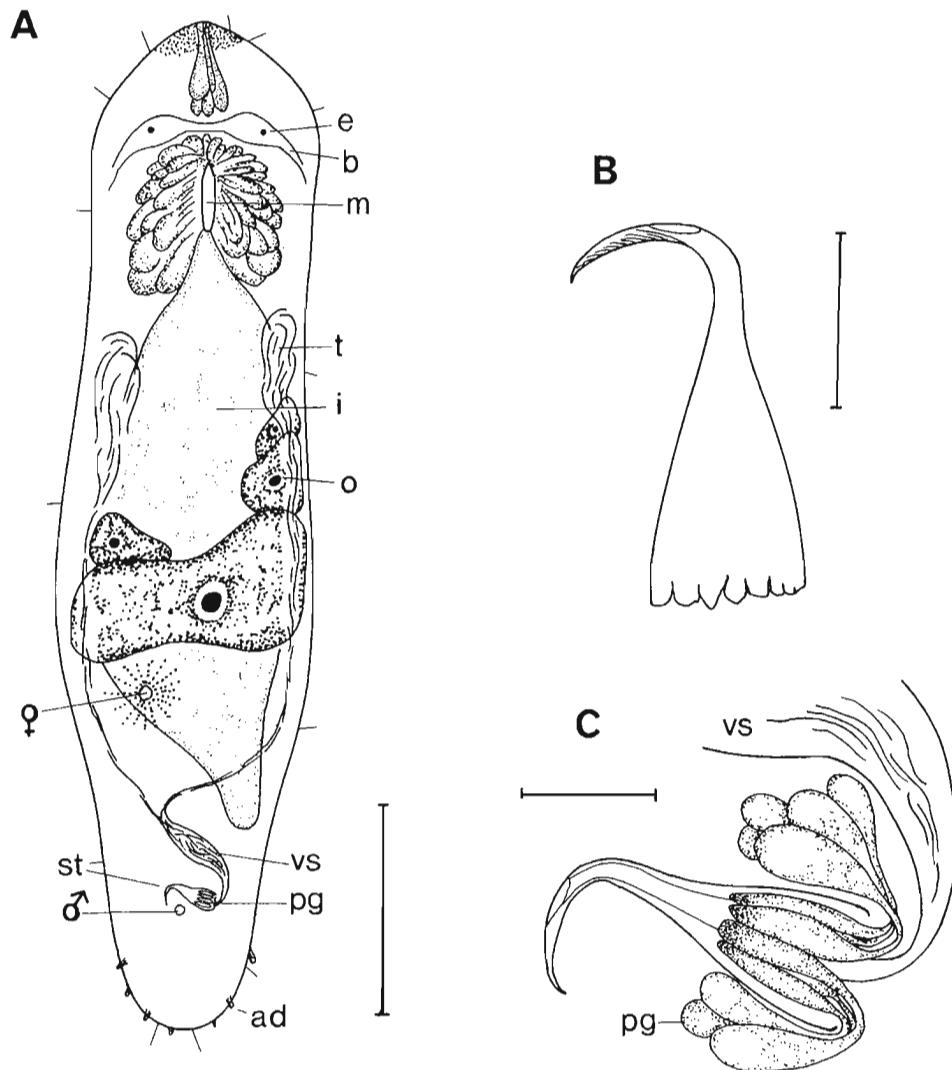


Figure 2. *Archimacrostomum sublitorale* sp. nov. (A) Dorsal view in squash preparation (dorsal gut in area of gonads omitted); (B) male sclerotized stylet; (C) male copulatory apparatus. Scale bars: 500 µm (A); 50 µm (B, C).

*Reproductive system* (Figure 2). The male system is typically macrostomid-like. It consists of ventro-lateral testes, vasa deferentia running caudad lateral of the intestine, a seminal vesicle, a reduced prostatic vesicle and a male stylet which projects into the male gonopore. Prostatic glands surround the proximal part of the stylet, the ampulla-like distal ducts of which are encased by the proximal enlargement of the stylet (Figure 2C) representing the reduced prostatic vesicle. An intravesicular duct joins the prostate part and the seminal vesicle. The measurements of the stylet ( $m.HT$ ) depicted in Figure 2B are  $\alpha > 90$  (Ferguson 1940: Figure 27: angle  $\alpha$  of flexure) and  $ST_w = 45 \mu\text{m}$  and  $ST_L = 105 \mu\text{m}$  (Gehlen and Lochs 1990: Figure 2). The distal opening is subterminal on the convex side of the distal bent part.

The female system could be incomplete in that only the bilateral ovary and the female pore could be discerned. The female pore is surrounded by cement glands. A seminal bursa, not clearly discernible, probably lies immediately caudal close to the oocyte.

#### *Discussion*

Within the Macrostomidae the penis stylet has been recognized among others as a main diagnostic feature. Most of the stylets of the Macrostomidae are bent or flexed. The methods of measurement of the stylets, however, have not always been consistent, and in several cases the validity of a species is often not easy to decide although the stylet is known.

Based only on the outline of the stylet, *Archimacrostomum sublitorale* sp. nov. belongs to the *Macrostomum hystricinum* group (Beklemishev 1951) having flexed stylets (see Rieger 1977: 212–213). However, that group proves not to be a phylogenetic unit. The *M. hystricinum* group represents an accumulation of different forms distributed in freshwater, brackish and marine water habitats. Type of the *M. hystricinum* group is *M. hystricinum hystricinum* Beklemishev, 1951 distributed in freshwater habitats of the palaearctic, near east, oriental and nearctic regions.

In 1954, Ferguson established the genus *Archimacrostomum* for all species having a reduced prostatic vesicle encased by the proximal enlargement of the stylet. Consequently, the species *Macrostomum beaufortensis* Ferguson, 1937, *M. hustedi* Jones, 1944, and *M. pusillum* Ax, 1951, *M. rubrocinctum* Ax, 1951, *M. brasiliense* Marcus, 1952 and *M. peteraxi* Mack-Fira, 1971 had to be transferred to *Archimacrostomum* Ferguson, 1954.

Uncertainty of membership to *Archimacrostomum* remains for *M. hystricinum marinum* Rieger, 1977 because Rieger presents no information as to whether the prostatic vesicle is free or reduced. Because of the reduced prostatic vesicle, the new species *Archimacrostomum sublitorale* represents a member of this genus. All archimacrostomid species live in the marine environment.

Rieger (1977: Figure 3) illustrated stylets of different marine populations from Italy (Fiascherino, area near La Spezia, and Venice) and Croatia (Dubrovnik) with outlines comparable to the stylet of *Archimacrostomum sublitorale*. But because information was not given on the anatomy, in particular of the male system, of the individual populations, an affiliation is impossible to any species or genus.

In comparison with the species of the genus *Archimacrostomum*, *A. sublitorale* stands out through its general body magnitude and stylet measurements.

#### *Bradynectes scilliensis* sp. nov.

(Figure 3)

#### *Material examined*

HOLOTYPE: Sites 2a, 2b: two specimens, in squash preparation, stored on CD-ROM: 2003.5.22.3; WM: 2003.5.22.3.

#### *Etymology*

The specific epithet refers to the Isles of Scilly where it was found.

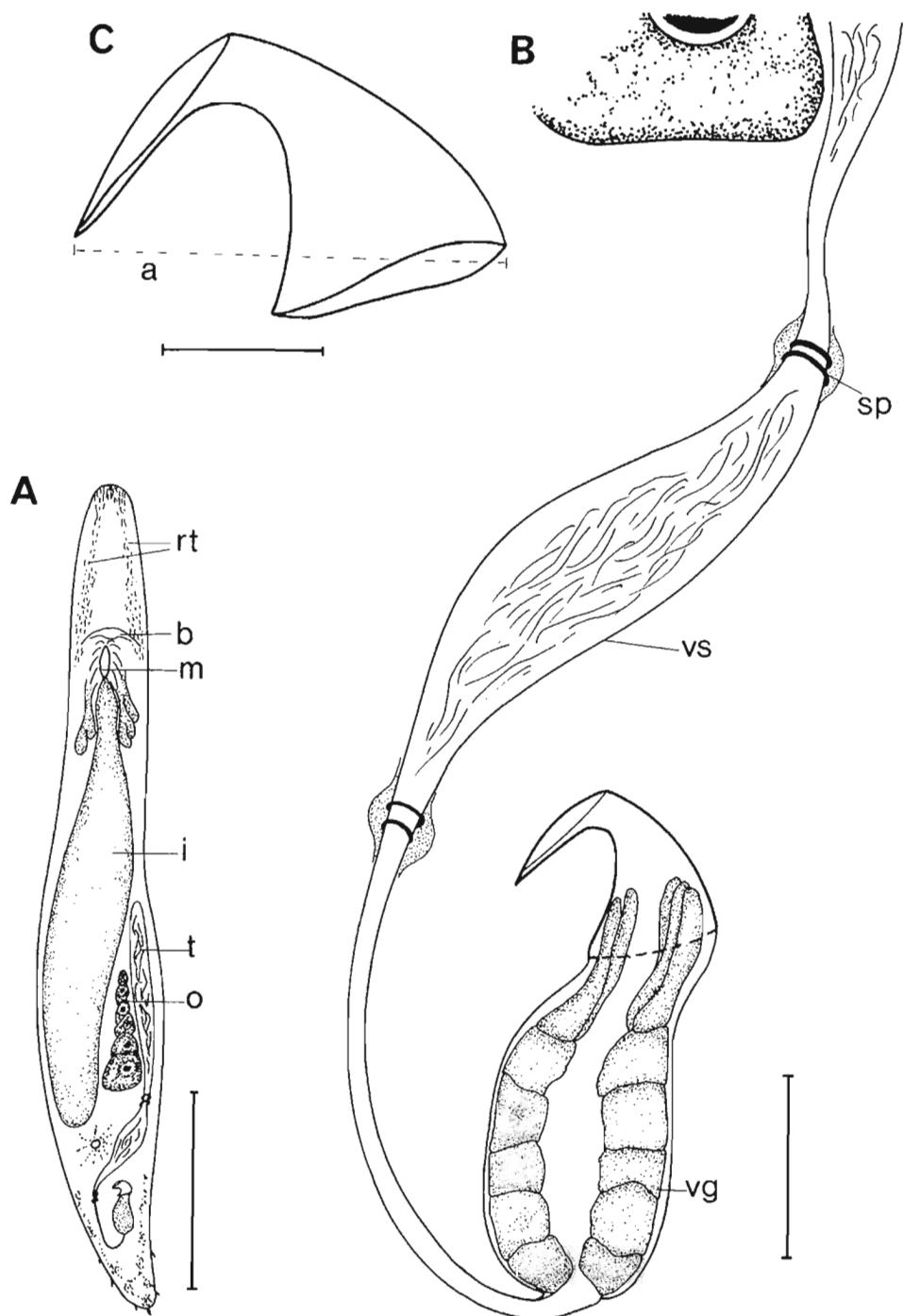


Figure 3. *Bradynectes scillensis* sp. nov. (A) Dorsal view in squash preparation; (B) male copulatory apparatus; (C) male sclerotized stylet. Scale bars: 500 µm (A); 50 µm (B); 20 µm (C).

### Description

Length of body of living sexually mature specimen up to 2.1 mm, when squashed under a cover glass (Figure 3). Outline, colour, arrangement of rhabdites and rhammites, and posterior adhesive papillae of the body correspond to the descriptions of the phena of *Bradynectes sterreri* given by Rieger (1971) and Faubel (1974b). Eyes, tactile cilia and adhesive glands along the lateral sides and head are absent. Pharynx, pharyngeal glands and gut disposed as in the phena described by Rieger (1971), Faubel (1974b) and Martens and Schockaert (1981).

*Reproductive system.* The single testis extends from the posterior part of the first body-half caudad and turns via a short vas deferens (80 µm long) into the seminal vesicle. Distally and proximally to the seminal vesicle, strong sphincters are present. The intervesicular duct enters the prostatic vesicle from behind. The distal part of the prostatic vesicle is encased in the proximal part of the stylet. The dimensions of the stylet of *M. scilliensis* (Figure 3B) are as follows (m.HT): convex side=43 µm, concave side=50.5 µm, length of distal oval opening=31.5 µm, diameter of proximal opening 31 µm, longitudinal axis (Figure 3C: dashed line a)=56 µm. The longitudinal axis of the Sylt form is 43 µm.

### Discussion

Rieger (1971) discerned three different subspecies of *Bradynectes sterreri* according to the place of collection: Kristineberg form, Carolina form and Robin Hood's Bay form. Faubel (1974b) added a fourth form, the Sylt form. From the Scheldt estuary Martens and Schockaert (1981) discerned a fifth form, the Scheldt form. Both latter forms differ distinctly from the forms discerned by Rieger (1971) based on stylet shape and location of ovary between testis and intestine. Because of the constant location of the ovary between testis and gut, the forms of Faubel (1974b) and Martens and Schockaert (1981) represent true species: *Bradynectes sylensis* Faubel, 1974 and *Bradynectes scheldensis* Martens and Schockaert, 1981. *Bradynectes scheldensis* differs essentially from *B. sylensis* through the absence of a sphincter around the vas deferens and the shape and dimensions of the stylet. *Bradynectes scilliensis* found in a rockpool at White Island is identical with *B. sylensis* with regard to the presence of sphincters around the vas deferens. In *B. sylensis*, the seminal vesicle has only a proximal spincter but the seminal vesicle of *B. scilliensis* is provided with a proximal and distal spincter. The male stylet (Figure 3C) resembles that of *B. sylensis*, but with essential differences in shape and dimensions. Measurements of the length of the axis of the other forms were not given by the authors.

### Family DOLICHOMACROSTOMIDAE Rieger, 1971

#### Subfamily Dolichomacrostominae Rieger, 1971

##### *Paromalostomum scilliensis* sp. nov.

(Figure 4)

### Material examined

HOLOTYPE: Site 3: few specimens, in squash preparation, stored on CD-ROM: 2003.5.22.1, WM: 2003.5.22.1.

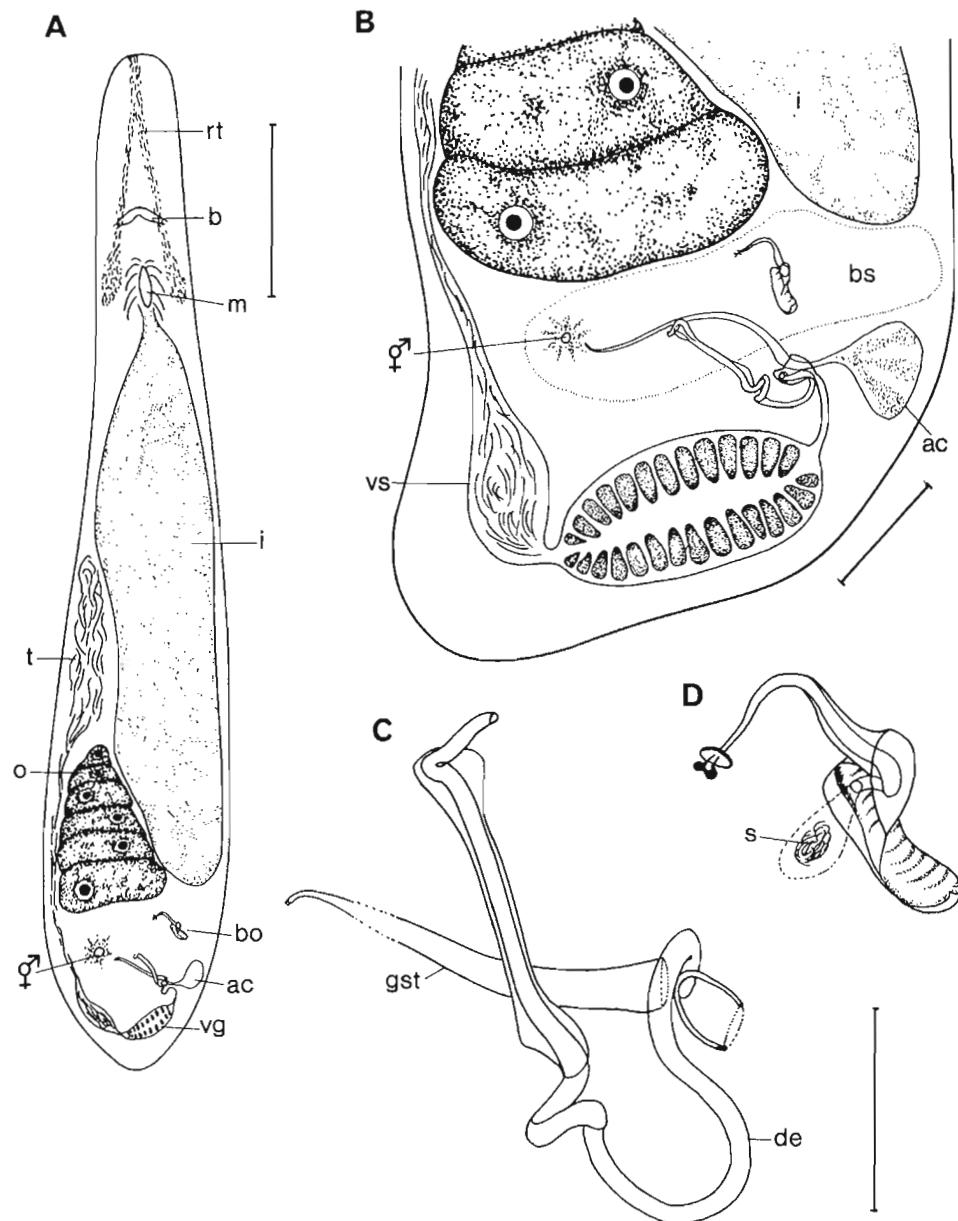


Figure 4. *Paromalostomum scillensis* sp. nov. (A) Dorsal view in squash preparation; (B) genital complex in squash preparation; (C) male sclerotized stylet and glandular stylet (latter not drawn in full length); (D) sclerotized bursal organs. Scale bars: 500 µm (A); 100 µm (B); 50 µm (C, D).

*Etymology*

The specific epithet refers to the Isles of Scilly where it was found.

*Description*

Length of body of living sexually mature specimen up to 2.9 mm, when squashed under a cover glass. Body ends rounded but rear body end somewhat pointed. Colour greyish with darkly contrasting gut and ovary. Intestine taking on yellowish brown coloration when diatoms ingested. Eyes, rhabdites, adhesive glands and tactile cilia absent around margin of body. Rhammite tracks running from anterior tip of body to the level of pharynx bilaterally. The species feeds on small nematodes, nauplii of harpacticoids, diatoms and detritus particles.

*Reproductive system.* Single testis and ovary on the left side of body. Testis anterior to ovary. Seminal vesicle small, joined via a short intervesicular duct with the oval prostatic vesicle (198  $\mu\text{m}$  long). Male stylet apparatus (Figure 4B,C) consisting of penis stylet and glandular stylet. Penis stylet (m.HT) 172  $\mu\text{m}$  long, the twisted proximal part of which is 85  $\mu\text{m}$  long and distal straight tube 87  $\mu\text{m}$  long; the glandular stylet is 182  $\mu\text{m}$  long (m.HT). The glandular stylet is joined with a single accessory gland; the penis stylet joins the 198  $\mu\text{m}$  long prostatic vesicle. The bursal sclerotized organ (Figure 4B,C) consists of a midpiece (42  $\mu\text{m}$  long, m.HT) and a mouthpiece (56  $\mu\text{m}$  long, m.HT). The midpiece looks like a clog; the mouthpiece bears distally a disc-shaped terminal thickening (Figure 4C). Sperm tubes absent. A pyriform vesicle containing sperm opens into the proximal part of the mouthpiece.

*Discussion*

To date the genus *Paromalostomum* contains nine valid species. With the exception of *P. subflavum* Sopott-Ehlers and Schmidt, 1974, all of them have been recorded from the North Atlantic and its marginal seas. Based on the sclerotized elements of the male organs (penis stylet, glandular tube) and female organs (mouth piece, midpiece), *P. scilliensis* proves to be a member of the genus *Paromalostomum* Meixner in Ax, 1951. According to the arrangement of details of the sclerotized elements, *P. scilliensis* displays closer relationships to *P. dubium* (de Beauchamp 1927). Main differences from *P. dubium* are the absence of sperm tubes, much longer mouthpiece and diverging construction of the clog-shaped midpiece. With respect to the penial stylets, differences lie mainly in the greater length of the stylets of *P. scilliensis*. The male stylet looks more or less identical with that of *P. dubium* but the glandular tube is S-shaped (Figure 4B). In contrast to *P. dubium*, *P. scilliensis* lacks rhabdites, tactile cilia at anterior and posterior body end, and the characteristic adhesive glands at the rear body end.

**Order HAPLOPHARYNGIDA Karling, 1974****Family HAPLOPHARYNGIDAE Meixner, 1938*****Haplopharynx rostratus* Meixner, 1938***Material examined*

Site 3: one specimen in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt), Norway (Korsfjorden, Håkonsund, Bondisholmen), Netherlands (Scheldt estuary: Oosterschelde); Baltic Sea: Kiel Bight (Karling 1965; Pawlak 1969; Faubel 1974b; Martens and Schockaert 1981).

**Order POLYCLADIDA** Lang, 1884

**Suborder ACOTYLEA** Lang, 1884

**Superfamily LEPTOPLANOIDEA** Faubel, 1984

**Family LEPTOPLANIDAE** Stimpson, 1857

***Leptoplana tremellaris*** (Müller 1773) Oersted, 1843

*Fasciola tremellaris* Müller, 1773: 72.

*Planaria tremellaris*: Müller, 1776: 223.

*Planaria pellucida* Bosc, 1803: 63.

*Planaria flexilis* Dalyell, 1814: 5–23, Figures 1, 2.

*Leptoplana hyalina* Ehrenberg, 1831: pl. V: 6.

*Polycelis levigatus* Quatrefages, 1845: 130, 134–135, pls IV: 2a, b, VI: 11, VIII: 6, 9, 10.

*Leptoplana tremellaris taurica* Jacubova, 1909: 21–23, Figures 9, 10, pl. I: 5.

*Material examined*

Site 8: one specimen in squash preparation.

*Geographical distribution.* NE Atlantic: Ireland, Orkneys, Shetlands; Outer Hebrides; Irish Sea: Ireland, Isle of Man, England (Wales); North Channel: Belfast Bay; Celtic Sea: Ireland; English Channel: England (Plymouth Sound, Guernsey), France (Brittany); North Sea; Skagerrak: Sweden (Gullmarsfjord, Marstrandsfjord), Norway (Oslofjord); Kattegat: Denmark (Århus Bugt); White Sea; Mediterranean Sea: Morocco; Tyrrhenian Sea; Black Sea; Adriatic Sea: Gulf of Trieste; Levantian Sea: Egypt (Port Said); Red Sea: Ethiopia (Tor) (Lang 1884; Gamble 1893; Hallez 1893; Micoletzky 1910; Bock 1913; Southern 1936; Prudhoe 1982; Faubel 1983).

**Suborder COTYLEA** Lang, 1884

**Superfamily EURYLEPTOIDEA** Faubel, 1984

**Family EURYLEPTIDAE** Stimpson, 1857

***Prostheceraeus vittatus*** (Montagu 1815) Lang, 1884

(Figure 5)

*Proceros cristatus* Quatrefages, 1845: 139, pl. III: 7.

*Eurylepta vittata*: Diesing, 1850: 209.

*Prostheceraeus cristatus*: Schmarda, 1859: 30.

*Material examined*

Voucher specimen: site 6, one specimen; site 17: L. A. Harvey and P. C. Chapman, unpublished.

*Geographical distribution.* NE Atlantic: Ireland (Co. Mayo: Clew Bay, Westport Channel, Blacksod Bay, Co. Galway: Ballynakill Harbour, Co. Kerry: Valentia Harbour); Irish Sea: Ireland (Co. Down (Strangford Lough), Co. Dublin (Dalkey Sound)); Celtic Sea: Ireland

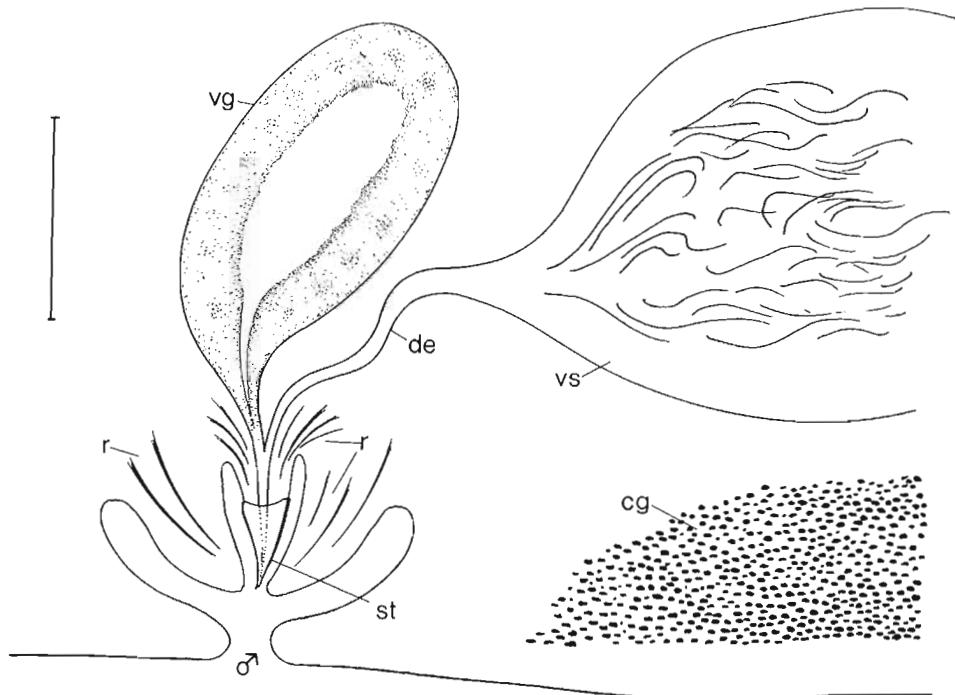


Figure 5. *Prostheceraeus vittatus*. Diagrammatic sagittal reconstruction of the male copulatory apparatus. Scale bar: 300  $\mu\text{m}$ .

(Co. Cork: Lough Hyne), Bristol Channel (South Wales); English Channel: England (Yealm River, Falmouth, Kingsbridge Estuary: Salcombe, Plymouth Sound, Dorset: Lundy Island, Channel Islands), France (Saint-Vaast-la-Hougue, Concarneau); North Sea: Norway (Bergen, Florø); Skagerrak: Norway (Brederigen, Mandal), Sweden (Gullmarfjord, Bohuslän, Gasö, Löken); Mediterranean Sea: Gulf of Naples (Lang 1884; Gamble 1900; Bock 1913; Prudhoe 1982; Faubel 1984).

#### Remarks

The most comprehensive description of *Prostheceraeus vittatus* was made by Lang (1884). Later on, more valuable data were given by Bock (1913) and Prudhoe (1985) on the morphology, anatomy and the geographical distribution. The discovery of *P. vittatus* at site 6 on the Isles of Scilly offers the opportunity to study the anatomical structures again. This re-investigation reveals some new aspects to the anatomy of the species. Eyes are present as follows: cerebral eye clusters arranged in two elongate rows dorsal of the brain, tentacular eyes being less numerous almost exclusively distributed at the tentacular basis and the tentacles in between, and ventral eye clusters abundantly arranged halfway between anterior tip and brain. The relatively short plicate cylindrical pharynx, orientated horizontally in the pharyngeal cavity, is bell-shaped, i.e. the pharynx becomes wider distad. The reproductive apparatus matches that of *P. albocinctus* Lang, 1884 as presented by Prudhoe (1985: 142, Figure 129B). It is very obvious that the reproductive system of the species of Euryleptidae look anatomically very similar. The same is known for the species of Pseudocerotidae. The male atrium of *Prostheceraeus vittatus* is strongly provided with

muscles and is subdivided into a ciliated outer and inner cavity. The inner one houses the ejaculatory duct which is distally armed with a pointed stylet. The distally tapering stylet is 135 µm long and 74 µm in diameter at its base (m.VS) (Figure 5). At a distance of 72 µm (m.VS) proximad from the base of the stylet, the prostatic duct branches off from the ejaculatory duct. The prostatic vesicle is enclosed in a 12 µm (m.VS) thick muscle wall. The glandular inner lining is smooth; the maximum thickness 76 µm (m.VS). The longitudinal axis is 530 µm (m.VS). Extravesicular glands are not present. The measurements were made from serial sections.

***Oligocladus sanguinolentus*** (Quatrefages 1845) Lang, 1884

*Proceros sanguinolentus* Quatrefages, 1845: 138–139, pls IV: 4, VI: 5, 7, 13, VIII: 3.  
*Eurylepta pulchra* Oersted, 1845: 415–416.  
*Eurylepta sanguinolenta*: Diesing, 1850: 209–210.

*Material*

Site 16, see Smith and Gault (1983).

*Geographical distribution.* Mediterranean Sea: Tyrrhenian Sea (Gulf of Naples); NE Atlantic: Ireland (Co. Donegal: Lough Swilly, Co. Mayo: Clew Bay, Co. Kerry: Valentia Harbour); Irish Sea: Ireland (Co. Wexford: east of Coninbeg), North Channel (Firth of Clyde); English Channel: England (Plymouth Sound, Yealm River estuary, Channel Islands), France (St Malo); Skagerrak: Swedish west coast; CE Atlantic: Cape Verde Islands (Gamble 1893; Lang 1894; Steinböck 1933a; Hendelberg 1974; Prudhoe 1982).

***Stylostomum ellipse*** (Dalyell 1853) Lang, 1884

(Figure 6)

*Planaria ellipsis* Dalyell, 1853: 101–102, pl. XIV: 9–16.  
*Stylochus roseus* M. Sars in Jensen, 1878: 75, pl. VIII: 1–3.  
*Stylostomum variabile* Lang, 1884: 585–588, pl. 8: 3, 4, 6.  
*Stylostomum sanguineum* Hallez, 1893: 180–182, pls III: 10, IV: 12–14.  
*Stylostomum antarcticum* Hallez, 1905: 126.  
*Stylostomum punctatum* Hallez, 1905: 126.

*Material examined*

Voucher specimen: site 8, one specimen, sagittally sectioned series of a sexually immature specimen. Same specimen in live observation stored on CD-ROM: 2003.6.6.4.

*Geographical distribution.* Arctic Ocean: Norway (Spitzbergen: Eisfjord); North Sea: Scotland (Firth of Forth: St Andrews); Skagerrak: Norway (Oslofjord: Hallangspollen), Sweden (Gullmarfjord, Halse Fjord); English Channel: England (Plymouth Sound, Falmouth); Irish Sea: Isle of Man (Port Erin), Ireland (Co. Dublin: Malahide shore); NE Atlantic: Ireland (Co. Donegal: Lough Swilly, Co. Mayo: Clew Bay, Co. Galway, Co. Kerry: Valentia Harbour); SE Atlantic: South Africa (Cape Town); SW Atlantic: Falkland Islands (Port William, Berkeley Sund), Tierra del Fuego (Cape Virgenes, Ushuaia); Mediterranean Sea: Tyrrhenian Sea: Gulf of Naples; Adriatic Sea: Gulf of Trieste (Lang

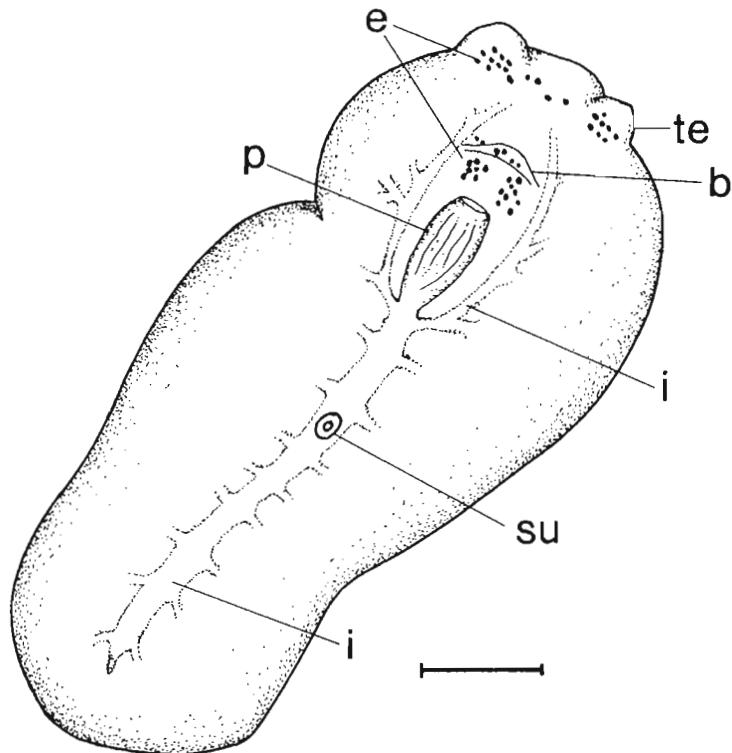


Figure 6. *Stylostomum ellipse*. Dorsal view in squash preparation. Scale bar: 500  $\mu\text{m}$ .

1884; Plehn 1896; Micoletzky 1910; Bock 1913; Marine Biological Association of the United Kingdom 1957; Faubel 1984).

#### Description

Length of body 3.4 mm, width 1.4 mm; terminal ends broadly rounded, tapering slightly anteriorly, with smooth dorsal surface (Figure 6). Colour yellowish white in incident light; in transmitted light, margins transparent but central body dark yellowish brown when gut diverticula full of food. Marginal tentacles less prominent forming mere blunt projections of the margin, with eye clusters at their base (8–10) and a few eyes (four) in between. Cerebral eyes in bilateral clusters above brain, each with 9–11 eyes (Figure 6). Two characteristic pairs of eyes at the posterior margin of brain. Cylindrical pharynx immediately behind brain; intestinal trunk extending from proximal pharynx to hind end with nine pairs of intestinal lateral branches; frontal median branch of intestine extends dorsally of the pharynx to the anterior end (not drawn in Figure 6). Sucker in mid-body. Specimen not sexually mature.

#### Remarks

To date five valid species of the genus *Stylostomum* are known. Of these only *Stylostomum ellipse* is known from European Seas. All the other species were recorded from the Southern Ocean (Iles de Kerguelen: *S. frigidum* Bock, 1931) and Pacific Ocean. *S. ellipse* is obviously highly variable in colour depending on uptake of food. That variability led Lang (1884) to

describe *S. variabilis* as a synonym of *S. ellipse*. The characteristic determination features of *S. ellipse* are the frontal branch of the intestine, the typical arrangement of eyes, especially the two characteristic pairs of eyes at the posterior margin of the brain (Lang 1884), and the tentacles formed as blunt marginal projections. In these characters the juvenile polyclad specimen recorded at site 8 agrees well with *S. ellipse*.

**Order PROLECITHOPHORA** Karling, 1940

**Suborder SEPARATA** Reisinger, 1924

**Family PLAGIOSTOMIDAE** v. Graff, 1908

*Vorticeros auriculatus* (Müller 1784) v. Graff, 1882

*Planaria auriculata* Müller, 1784: 37, pl. LXVIII: 16–17.

*Vorticeros pulchellum* Schmidt, 1852: 499, pl. III: 11.

*Eurylepta auriculata*: Diesing, 1850: 211.

*Vorticeros schmidti* Hallez, 1879: 11, 58, 72, 74, 170–173, pl. IV: 10–17.

*Material examined*

Voucher specimen: sites 7, 9, 10, 12: several specimens, in squash preparation; sagittally sectioned series of a sexually immature specimen.

*Geographical distribution.* NE Atlantic: Faroe Islands, Ireland (Co. Kerry: Valentia); North Sea: Norway (Bergen), German Bight (Helgoland); Skagerrak: Sweden (Gullmarfjord); English Channel: England (Plymouth Sound, Yealm estuary); Strait of Dover: France (Côte Boulonnaise: Wimereux); Irish Sea: Isle of Man (Port Erin), North Channel (Firth of Clyde); Mediterranean Sea: France (Villefranche sur mer), Tyrrhenian Sea: Gulf of Naples, Strait of Messina: Sicily (Messina); Adriatic Sea: Italy (Ancona, Lesina, Parenzo, Gulf of Trieste), Croatia (Rovinj) (v. Graff 1913; Jameson 1897; Steinböck 1933b; Southern 1936; Westblad 1956).

***Acmostomum dioicum*** Mecznikow, 1865

*Plagiostomum dioicum*: v. Graff, 1882: 387.

*Material examined*

Site 11: one specimen; in squash preparation.

*Geographical distribution.* NW Atlantic: Davis Strait (Greenland); Faroe Islands, Ireland, English Channel: France (Concarneau); North Sea: Norway (Herdla), Skagerrak: Sweden; Mediterranean Sea: Adriatic Sea (Gulf of Trieste), Black Sea (v. Graff 1913; Steinböck 1933b; An Der Lan 1936; Karling 1940; Westblad 1954, 1956).

***Plagiostomum striatum*** Westblad, 1956

*Material examined*

Site 13: one specimen, in squash preparation.

*Geographical distribution.* Skagerrak: Sweden (Gullmarfjord: Blåbergsholmen), Norway (Oslofjord: Drøbak); English Channel: England (Plymouth: Cawsand Bay); Mediterranean Sea: Adriatic Sea (Croatia: Rovinj) (Westblad 1956).

*Remarks*

Differences from the description of Westblad (1956) include the dark brown pigment streaks, eyes, pharynx and seminal vesicle. In the specimen recorded from the Isles of Scilly, the pigment streaks are not very distinct and mainly developed in the area of the brain and pharynx. Only a very weak streak is seen extending backwards. There are two eye spots at each side but very close to each other simulating a single one. The pharynx does not contrast very distinctly from the surrounding tissue. In the male system the seminal vesicle is much more developed than reported by Westblad. It takes up almost the whole part of the second body-third, being frontal of the male penis sack.

***Monoophorum tubiferum* (Westblad 1955) Karling, 1993**

*Cylindrostoma* sp. (*C. tubiferum* sp. nov.?) Westblad, 1955: 509–510, Figure 16.

*Material examined*

Site 12: one specimen, in squash preparation.

*Geographical distribution.* North Sea: Norway (Bergen); Skagerrak: Sweden (Bonden) (Karling 1993).

*Remarks*

Differences to the descriptions of Westblad (1955) and Karling (1993) include the length of body (1.3 mm long), length of copulatory organ (304 µm long) and two pairs of eyes.

**Order SERIATA** Bresslau, 1928–33

**Suborder PROSERIATA** Meixner, 1938

**Family MONOCELIDIDAE** Hofsten, 1907

**Subfamily MONOCELIDINAE** Hofsten, 1907

***Monocelis lineata*** (Müller 1773) Ehrenberg, 1831

*Fasciola lineata* Müller, 1773: 60.

*Planaria lineata*: Müller, 1776: 222.

*Monocelis agilis* Schultze, 1851: 31, 37, pl. II: 1.

*Monotus lineatus*: v. Graff, 1882: 418–421, pl. XX: 17–19.

*Material examined*

Sites 7, 10: two specimens, in squash preparation.

*Geographical distribution.* NW Atlantic: USA (Maine: Casco Bay), Canada (New Brunswick: Passamaquoddy Bay, St Andrews), Davis Strait: Disko Bay (Greenland: Godthaab, Egedesminde); NE Atlantic: Iceland (Isafjördur), Faroe Islands (Østerø), Hebrides, Ireland (Co. Mayo: Clare Island, Co. Kerry: Valentia Harbour), Northern Ireland (Co. Londonderry:

Portstewart); Irish Sea: Isle of Man (Port Erin), Ireland (Co. Dublin: Balscadden Bay); North Channel (Firth of Clyde: Great Cumbrae Island, Millport); Celtic Sea: Ireland (Co. Cork: Crookhaven); English Channel: England (Plymouth Sound), France (Roscoff, Concarneau); North Sea: Belgium (Ostende), Netherlands (Scheldt estuary), German Bight (Helgoland, Elbe estuary), North Frisian Islands (Sylt), Scotland (St Andrews), Norway; Skagerrak: Oslofjord (Drøbak); Øresund (Nivå Bay); Baltic Sea: Kieler Bucht, Fehmarnsund, Lübecker Bucht, Mecklenburger Bucht (Wismarbucht, Warnemünde), Greifswald; Norwegian Sea: Norway (Tromsø); White Sea (Solovetsk Islands); CE Atlantic: Madeira, Canary Islands (Tenerife); Mediterranean Sea: Gulf of Lion; Ligurian Sea; Tyrrhenian Sea (Gulf of Naples); Strait of Messina: Sicily (Messina); Adriatic Sea: Gulf of Trieste, Gulf of Venice (Croatia: Rovinj); Sea of Marmara: Turkey (Tuzla, Florya); Bosphorus: Turkey (Baltaliman); Black Sea: Bulgaria (Varna), Ukraine (Odessa, Crimea: Sevastopol, Yalta), Russia (Novorossiysk), Georgia (Sukhumi); Levantine Sea: Israel (v. Graff 1913; Southern 1936; Steinböck 1938; Ax 1959; Den Hartog 1964, 1977; Sopott 1972; Ax and Armonies 1987; Curini-Galletti and Mura 1998).

**Subfamily ARCHILOINAE** Faubel and Rohde, 1998

*Monocelopsis cf. septentrionalis* (Sopott 1972) Martens and Curini-Galletti, 1994

*Mesoda septentrionalis* Sopott, 1972: 174–181, Figures 1–4.

*Material examined*

Sites 1, 2b: one specimen, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt).

*Remarks*

The cirrus of the species from Sylt bears fewer hooks. The testes vesicles are more numerous than in the Sylt specimens.

**Family OTOPLANIDAE** Hallez, 1894

**Subfamily ARCHOTOPLANINAE** Ax, 1955

*Archotoplana holotricha* Ax, 1955

*Material examined*

Site 3: few specimens, in squash preparation.

*Geographical distribution.* Mediterranean Sea: Gulf of Lion (Banyuls sur mer); North Sea: North Frisian Islands (Sylt) (Ax 1955; Wehrenberg and Reise 1985).

**Subfamily PAROTOPLANINAE** Ax, 1955

*Parotoplana multispinosa* Ax, 1955

*Material examined*

Site 4: two specimens in squash preparation, stored.

*Geographical distribution.* Mediterranean Sea: Gulf of Lion (Banyuls sur mer) (Ax 1955).

***Parotoplana capitata* Meixner, 1938**

*Material examined*

Site 1: few specimens in squash preparation.

*Geographical distribution.* North Sea: Netherlands (Western Scheldt), German Bight (Helgoland), North Frisian Island (Sylt), Denmark (Esbjerg: Skallingen, Langli 5 m); Bay of Biscay: France (Arcachon); Baltic Sea: Kieler Bucht (down to 12 m) (Ax 1955; Sopott 1972).

*Remarks*

About 16 needles in a half circle enclosing five longer needles, three lateral stronger needles obliquely arranged to the 16 needles.

**Order RHABDOCOELA Ehrenberg, 1831**

**Suborder TYPHLOPLANIDA v. Graff, 1905**

**Family PROMESOSTOMIDAE den Hartog, 1964**

***Litucivis serpens* Ax and Heller, 1970**

*Material examined*

Site 3: two specimens, in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt), German Bight (Helgoland); Baltic Sea: Hohwachter Bucht (Ehlers 1974; Hellwig-Armonies 1988; Wellner and Reise 1989).

***Promesostoma cochleare* Karling, 1935**

*Material examined*

Sites 1, 2a: two specimens in squash preparation.

*Geographical distribution.* North Sea: North Frisian Islands (Sylt), Norwegian Sea: Norway (Tromsø: Grindø); Bay of Biscay: France (Arcachon); Baltic Sea: Gulf of Finland (Hangö, Henriksberg, Tvaerminne), Baltic Proper: Sweden (Stockholm: Sandhamn, Torö, Nynäshamn); Kieler Bucht, Hohwachter Bucht; Kattegat: Sweden (Halmstad: Laxvik); NW Atlantic: Canada: Quoddy Region (Deer Island, Baie des Chaleurs: Elmtree River); Mediterranean Sea: Gulf of Lion (Étang de Salses, Étang de Canet) (Ax 1951, 1956a, 1956b; Schmidt 1972; Ehlers 1974; Ax and Armonies 1987).

***Promesostoma meixneri* Ax, 1951**

*Material examined*

Site 11: one specimen in squash preparation.

*Geographical distribution.* Baltic Sea: Kieler Bucht; North Sea: North Frisian Islands (Sylt, Amrum, Jordsand); Norwegian Sea: Norway (Tromsø: Grindø); Irish Sea: Anglesey (Menai Bridge); Bay of Biscay: France (Arcachon); Canada: Quoddy Region (St Andrews: Pagan Point) (Ax 1956a; Boaden 1963a; Schmidt 1972; Ehlers 1974; Ax and Armonies 1987).

*Remarks*

*Promesostoma meixneri* is characterized by a male stylet having three turns proximally and a characteristic distal tip. In our specimens the distal tip of the stylet was found to be straight, with a terminal pore, with no differentiations. Because it is known that during the course of development of reproductive organs the distal tip of the stylet is developed last, it is impossible to ascertain what subspecies was found. To date there are three subspecies known: *Promesostoma meixneri meixneri* Ax, 1951, *P. meixneri roscoffensis* Ehlers, 1980 and *P. meixneri ericae* Faubel, 1980.

***Maehrenthaliella intermedia* (v. Graff 1882) Karling, 1985**

*Byrsophlebs intermedia* v. Graff, 1882: 276; pl. VII: 15–20.

*Maehrenthalia intermedia*: v. Graff, 1913: 97.

*Material examined*

Site 12: one specimen in squash preparation.

*Geographical distribution.* NE Atlantic: Ireland (Co. Mayo); Irish Sea: Ireland (Co. Dublin), North Channel (Firth of Clyde: Great Cumbrae Island, Millport); North Sea: Norway (Bergen, Biol. Station Herdla) (v. Graff 1913; Luther 1936; Karling 1985).

*Remarks*

During squeezing the animal was burst. The determination of the species is based on characters as follows: with two eyes, pharynx behind mid-body, germar lateral beside pharynx, bilateral testes, sclerotized stylet tubular, with a distal bend of an angle of about 90°, pointed.

**Family TRIGONOSTOMIDAE v. Graff, 1905**

**Subfamily TRIGONOSTOMINAE Luther, 1948**

***Trigonostomum penicillatum* (Schmidt 1857) Micoletzki, 1910**

*Vortex penicillatus* Schmidt, 1857: 352, pl. I: 3.

*Hyporhynchus penicillatus*: v. Graff, 1882: 341–342, pl. IX: 15–20.

*Material examined*

Site 15: one specimen in squash preparation.

*Geographical distribution.* NE Atlantic: Ireland (Co. Mayo, Co. Kerry: Valentia Harbour); North Sea: Norway (Bergen: Biol. Station of Herdla), Skagerrak; Sweden (Gullmarfjord: Bohuslän), English Channel: England (Plymouth Sound), France (Concarneau), Bay of Biscay: France (Arcachon); Mediterranean Sea: Thyrrenian Sea (Gulf of Naples); Strait of Messina (Sicily: Messina); Adriatic Sea: Italy (Parenzo, Barcola, Gulf of Trieste) (v. Graff 1913; Southern 1936; Westblad 1954; Ax 1971).

**Suborder KALYPTORHYNCHIA** v. Graff, 1905

**Section EUKALYPTORHYNCHIA** Meixner, 1938

**Family GNATHORHYNCHIDAE** Meixner, 1929

*Prognathorhynchus* sp.

(Figure 7)

*Material examined*

Site 1: one specimen in squash preparation stored on CD-ROM: 2003.6.6.3.

*Description*

Juvenile specimen with body length of 1.0 mm; without eyes; proboscis with a pair of hook organs on a basal muscular plate, oval to roundish (diameter of the oval side 43 µm). Each hook organ consists of three pointed spines the bases of which are rounded and swollen (Figure 7). The median spine of the hook organ 35 µm long, the inner spine 15 µm long and the outer one 16.5 µm long. Distance between both hook organs 118 µm (distance measured between bases of median spines).

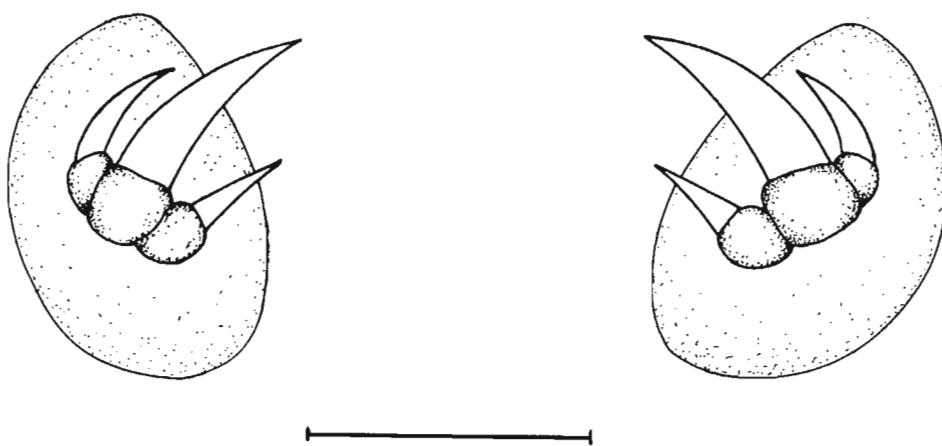


Figure 7. *Prognathorhynchus* sp. Hook organs of the proboscis on basal muscular plates. Scale bar: 50 µm.

*Discussion*

To date the genus *Prognathorhynchus* comprises 13 species. Of these species two are *nomina nuda*, *P. bacescui* Mack-Fira, 1973 and *P. sp.* Ax and Armonies, 1987. Because of sexual immaturity information on the genital apparatus could not be presented. Based on the outline of the hook organs *Prognathorhynchus* sp. resembles with *Prognathorhynchus dubius* Meixner, 1929 (according to Evdonin 1977: 193, Figure 88v).

**Family POLYCYSTIDIDAE** v. Graff, 1905

**Subfamily ROGNEDINAE** Evdonin, 1977

*Rogneda hibernica* (Southern 1936) Karling, 1953

*Polycystis hibernica* Southern, 1936: 59–61, Figures 2–5.

*Material examined*

Site 11: two specimens, specimen in squash preparation, WM, voucher specimen.

*Geographical distribution.* NE Atlantic: Ireland (Co. Kerry: Valentia Harbour); Celtic Sea: Ireland (Co. Cork: Kinsale Harbour); Irish Sea: Isle of Man (Port Erin), North Channel (Firth of Clyde: Great Cumbrae Island, Millport); English Channel: England (Plymouth Sound: Cawsand Bay); North Sea: The Netherlands (lake Grevelingen), Scheldt Estuary (Karling 1953; Martens and Schockaert 1981).

**Subfamily POLYCYSTIDINAE** Schockaert and Karling, 1970

*Polycystis naegelii* Kölliker, 1845

*Material examined*

Sites 11, 14: two specimens, in squash preparation.

*Geographical distribution.* NE Atlantic: Ireland (Co. Kerry: Valentia); Irish Sea: Isle of Man (Port Erin); North Channel (Firth of Clyde: Millport); English Channel: England (Plymouth Sound), France (St Malo, St-Vaast-la-Houque, Concarneau); North Sea: Norway (Bergen); Danish Seas (Kattegat, Bælt); Baltic Sea: Gulf of Finland; Mediterranean Sea: Ligurian Sea (Livorno); Adriatic Sea: Italy (Gulf of Trieste, Lesina, Ancona); Bosphorus; Black Sea: Ukraine (Crimea: Sevastopol, Yalta), Georgia (Sukhumi); CE Atlantic: Madeira, Canary Islands (Tenerife: Puerto Orotava); CW Atlantic: Bermuda (v. Graff 1913; Southern 1936; Mack-Fira 1968, 1974; Evdonin 1977).

*Polycystis* sp. (*P. naegelii* group)  
(Figure 8C)

*Material examined*

Sites 5, 15: two specimens, in squash preparation.

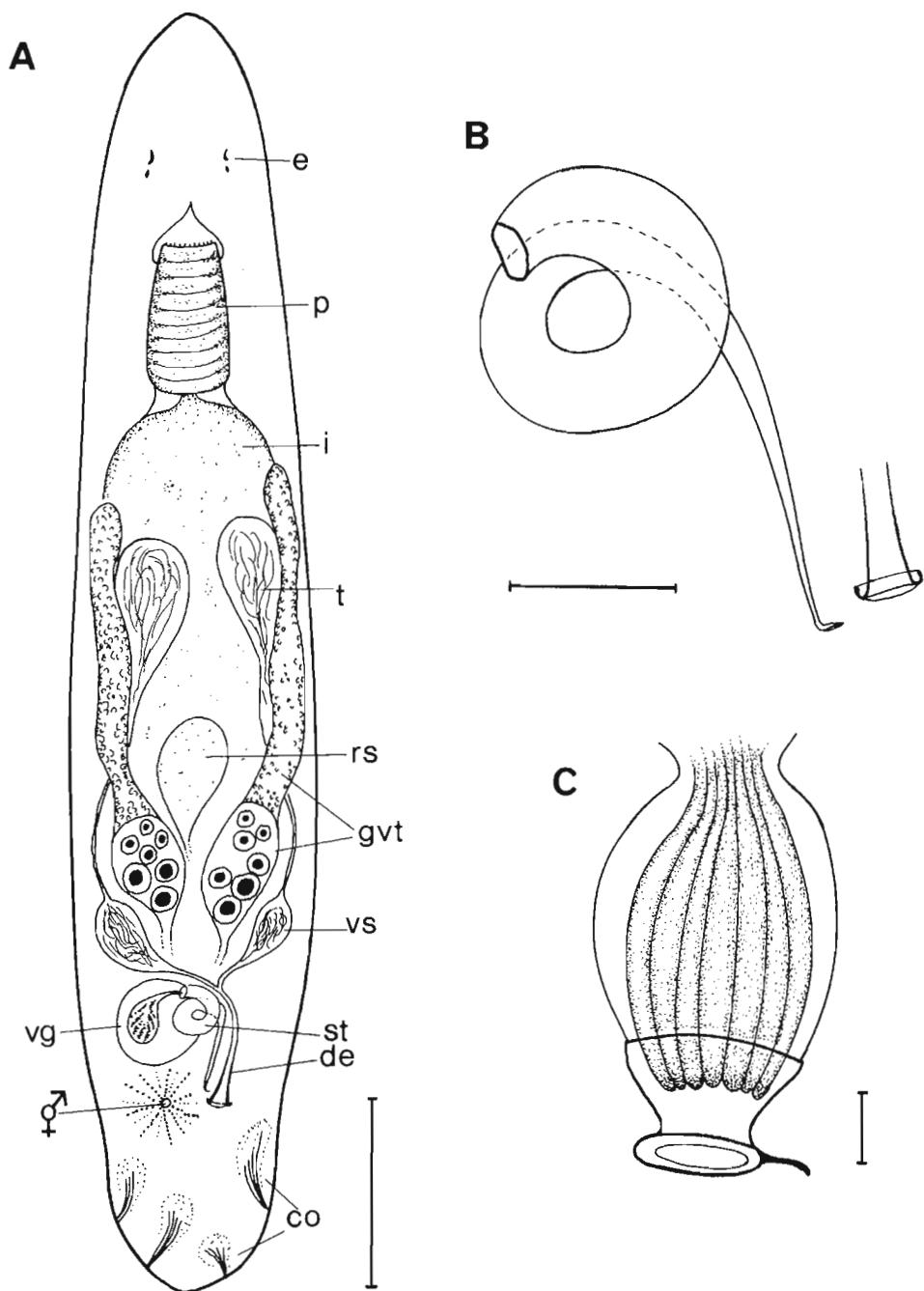


Figure 8. *Scillivortex phytophilus* gen. et sp. nov. (A) Dorsal view in squash preparation; (B) sclerotized male stylet. *Polycystis* sp. (C) sclerotized male stylet. Scale bars: 250  $\mu\text{m}$  (A); 50  $\mu\text{m}$  (B); 10  $\mu\text{m}$  (C).

#### Description

Length of body in squash preparation 1.0 mm. Two pairs of eyes, i.e. two crescent eyes at each side being very far from each other. Mid-dorsally, band of pigmented dark red-brown

reticulated lines running from anterior end to rear end. The pigmented band broad anteriorly, becomes smaller caudad. Colour of body dirty grey. Pharynx behind proboscis in horizontal plane. A sclerotized stylet marks the transition of the distal part of the prostatic vesicle into the atrium. The stylet looks like a bottleneck with a thick-ended collar and a lateral pointed projection; teeth absent (Figure 8C). The measurements of the stylet are: diameter of distal opening 17.8  $\mu\text{m}$ , diameter of proximal opening 25.8  $\mu\text{m}$ , distance between distal and proximal opening 12.5  $\mu\text{m}$  and length of lateral projection 6.5  $\mu\text{m}$ .

#### Remarks

In total, four specimens of the *Polycystis naegelii* group (Karling 1986) were found, two specimens of which could definitely be determined as *Polycystis naegelii* Kölliker based on the following characters given by Evdonin (1977) and Karling (1986): body length up to 3.5 mm, two eyes, colour dirty greyish black, and stylet with single flagellum directed caudad. Both the other specimens differ in the following characters: length of body of sexually mature specimens 1.0 mm, two bilateral pairs of eyes, band of dark red-brown reticulated lines dorsally, and stylet with a short projection directed laterad. Evdonin (1977) stated that *Polycystis naegelii* has stylets with either a smooth collar, with teeth along the collar, or with one or two flagella of different size at the collar. The authors are convinced that these different forms of the stylets represent different species, as do the present species. But the authors must desist from the establishment of a new species within the *Polycystis naegelii* group because the sagittally sectioned series is damaged so that the reconstruction of the genital system is impossible.

***Paulodora riedli*** (Karling 1956) Artois and Schockaert, 1998  
*Polycystis riedli* Karling, 1956: 230–233, Figures 40–44, 51–52.

#### Material examined

Site 7: one specimen in squash preparation.

*Geographical distribution.* Mediterranean Sea: Gulf of Lion, Ligurian Sea, Tyrrhenian Sea, Adriatic Sea (Riedl 1959b; Brunet 1965).

#### Subfamily PORROCYSTIDINAE Evdonin, 1977

***Phonorhynchus helgolandicus*** (Mecznikow 1865) v. Graff, 1913

*Prostomum helgolandicum* Mecznikov, 1865: 176–177, pl. IV: 3.

*Prostomum boreale* Mereschkowsky, 1878: 43–47, pl.: IV: 3.

*Prostomum giardi* Hallez, 1879: 20, 28–30, 50, 52–53, 68, 164–169, pl. III: 1–4.

*Macrorhynchus helgolandicus*: v. Graff, 1882: 328–331, Figure 9G, pl. IX: 22–30.

#### Material examined

Sites 7, 11, 14: few specimens, in squash preparation.

*Geographical distribution.* NW Atlantic: Canada (New Brunswick: St Andrews, Pocologan), USA (Massachusetts: Woods Hole), Davis Strait: Greenland (Holstenborg, Jakobshavn,

Disko Bay); NE Atlantic: Denmark Strait (Greenland: Scoresbysund), White Sea (Solovetsz Islands), Faroe Islands (Suderø, Østerø); Ireland (Co. Kerry: Valentia, Co. Mayo, Co. Galway); North Sea: North Frisian Islands (Sylt), German Bight (Helgoland), Norway (Bergen, Strudshavn); Irish Sea: Ireland (Co. Dublin), Isle of Man (Port Erin, Port St Mary), North Channel (Firth of Clyde: Great Cumbrae Island); English Channel (England: Plymouth Sound); France (Concarneau, Wimereux); Baltic Sea: Gulf of Finland; Mediterranean Sea: Adriatic Sea (Gulf of Venice: Rovinj; Italy: Lesina); NE Pacific: Bering Sea, Gulf of Alaska, USA (Oregon, California) (Gamble 1893; Hallez 1893; Southern 1912, 1936; v. Graff 1913; Steinböck 1933a, 1938; Schilke 1970; Karling 1982; Ax and Armonies 1987, 1990).

#### *Remarks*

Two specimens were collected, one sexually mature and the other a male that was not completely sexually mature. Length of the former specimen was 1.24 mm in squash preparation. The excitator stylet, based on the accessory secretory bulb, was obviously not fully developed and measures 42 µm in length. The stylet is straight, evenly tapering to a distally pointed end; proximally, a funnel-shaped opening (12 µm in diameter) encases the accessory secretory bulb. The excitator stylet is directed anteriad.

#### **Subfamily GYRATRICINAE** v. Graff, 1905 *Gyratrix hermaphroditus* Ehrenberg, 1831

#### *Material examined*

Site 3: one specimen, in squash preparation.

*Geographical distribution* (cosmopolitan). Marine areas: NW Atlantic: USA; NE Atlantic: Ireland (Clare Island: Blacksod Bay); North Sea: Norway (Herdla); Skagerrak: Sweden (Hållö, Bonden), German Bight (Helgoland); Baltic Sea: Gulf of Finland; CE Atlantic: Madeira; Mediterranean Sea: Gulf of Lion (Étangs); Adriatic Sea: Slovenia; Black Sea: Ukraine (Crimea: Sevastopol); W Indian Ocean: Red Sea, Kenya, Somalia; NE Pacific; SE Pacific; SW Pacific: Australia (NSW, North Stradbroke Island: Dunwich, Adam's Beach); Antarctica.

Freshwater areas (European countries given as international country codes): European Palaearctic: A, BG, CH, CZ, D, DK (Faroe Islands), EE, E, FI, FR, GB, HU, I, IE, LV, MK, NL, N, PL, RO, RU, SE, UA (Crimea: Sevastopol); Nearctic region: New York, Virginia (Norfolk); Neotropical region: Colombia (2580 alt.), Jamaica, Surinam, Brazil; Afro-tropical region: Kenya, Tanzania (Lake Victoria); East Palaearctic region: Siberia (Tomsk, Lake Baikal), China, Japan; Near East region: Caspian Sea, Aral Sea; Oriental Region: Indonesia (Java); Australian region: Australia (NSW), New Zealand (v. Graff 1913; Nasonov 1924; Southern 1936; Marcus 1946; Ferguson and Jones 1949; Beklemishev 1953; Valkanov 1955; Rixen 1961; Karling 1963; Kraus 1965; Mack-Fira 1968; Young 1976; Den Hartog 1977; Heitkamp 1979; Gamo and Noreña-Janssen 1998; Therriault and Kolasa 1999; Artois and Schockaert 2000).

**Section SCHIZORHYNCHIA** Meixner, 1938  
**Family SCHIZORHYNCHIDAE** v. Graff, 1905  
*Carcharodorhynchus subterraneus* Meixner, 1938

*Material examined*

Site 4: few specimens, in squash preparation.

*Geographical distribution.* Irish Sea: North Wales, North Sea: North Frisian Islands (Sylt, Amrum), North Frisland (Westerhever Sand); Kattegat: Sweden (Halmstadt: Tylösand); Baltic Sea: Kiel Bight, Hohwachter Bucht, Kaliningrad Oblast (Kurskiy Zaliv), Gulf of Finland (Hangö, Tulludden), Sweden (Torö, Herrhamra); Mediterranean Sea: Gulf of Marseille, Tyrrhenian Sea; Black Sea: Bulgaria (Varna); CE Pacific: USA (California: Pacific Grove) (Ax 1951; Boaden 1963b; Karling 1963, 1992; Brunet 1965; Schilke 1970; Den Hartog 1977).

)  
**Family KARKINORHYNCHIDAE** Meixner, 1928  
*Cheiplanilla caudata* Meixner, 1938

*Material examined*

Site 1: two specimens, in squash preparation.

*Geographical distribution.* Irish Sea: North Wales (Anglesey); North Sea: Denmark (Esbjerg), North Frisian Islands (Sylt, Amrum), Netherlands (Scheldt estuary), Belgium (Mariakerke); Baltic Sea: Kieler Bucht, Kaliningrad Oblast (Kurskiy Zaliv, Vislinskiy Zaliv), Sweden (Åhus, Gotland), Gulf of Finland; Mediterranean Sea: Adriatic Sea (Karling 1956; Riedl 1970; Schilke 1970; Straarup 1970; Karling 1974; Martens and Schockaert 1981).

)  
**Suborder DALYELLIIDA** Meixner, 1924  
**Family PROVORTICIDAE** Beklemischev, 1927  
*Scillyvortex* gen. nov.

*Diagnosis*

Provorticidae with bilateral testes and germovitellaria; vitelline part of germovitellaria anterior to germarium part; common genital opening in the caudal body-half. Male organ with paired seminal vesicles, the common duct of which with distal sclerotized walls. Prostatic vesicle provided with sclerotized stylet, opens independently from the ejaculatory duct into the common genital atrium. Free-living, marine.

Type of the genus: *Scillyvortex phytophilus* sp. nov.

*Etymology*

The generic name is composed of the former dalyelliid genus *Vortex* and the place found, i.e. Isles of Scilly.

***Scillivortex phytophilus* gen. et sp. nov.**  
 (Figure 8A, B)

*Material examined*

HOLOTYPE: Site 7: two specimens in squash preparation, stored on CD-ROM: 2003.5.22.5; whole mount slightly squashed WM: 2003.5.22.5.

*Etymology*

The specific epithet refers to the phytal habitat in which specimens were living (from Greek, *phyton*=plant and *philos*=specially favoured).

*Description*

Length of body squashed 1.7 mm, fore-end slightly tapering to a pointed tip, rear end rounded. Colour dark dirty grey with transparent areas marking the locations of the pharynx and genital organs. With a pair of crescentic eyes; lateral eyes very close to each other. Eyes 204 µm distant from anterior margin. Epidermis with numerous small rhabdites. Pharynx doliiformis small, 290 µm long, mouth of pharynx 100 µm caudal to eyes, distal pharynx bordered with tiny papillae. Hind body end provided with four very large caudal glands with inner thread-like structure up to 120 µm long.

*Reproductive system.* Common gonopore in rear body leading into a voluminous genital atrium. Gonopore and distal atrium surrounded by cement glands. Testes paired, behind pharynx. Vasa deferentia join testes with paired seminal vesicles. The male copulatory apparatus consists of paired seminal vesicles and a prostatic vesicle bearing a coiled stylet. The prostatic duct and the ejaculatory duct openings obviously independent from each other but very close to each other in the genital atrium. The paired seminal vesicles combine to a common ejaculatory duct; the distal part of which increases gradually in sclerotization of the walls forming distally a collar-like border. The spherical prostatic vesicle, 140 µm in diameter and provided with a thick muscular wall, opens distally into a proximally coiled stylet making one and a third turns. The stylet is tapering distad starting at the end of the first proximal third of the twisted part. The distal part of the stylet is straight, about 100 µm long and provided with a short distal hook-like bend at an angle of about 90°. The stylet resembles the penis stylet of *Pogaina annulata* Ax, 1970.

The female gonads are paired germovitellaria. The vitellogenous part is located dorso-laterally and extends from somewhat anterior of the testes to the level caudal of the seminal receptacle. The distal ovarian parts lie immediately in front of the seminal vesicle. Female ducts, i.e. oviduct and uterus, could not be discerned and traced to the common genital atrium.

*Discussion*

According to Luther (1962), the characters of paired gonads and common genital atrium in the caudal body-half refer *Scillivortex phytophilus* to the family Provorticidae. The Provorticidae are additionally characterized by a more or less combined seminal and prostatic vesicle. The family is subdivided into the subfamilies Provorticinae Meixner, 1926 (paired vitellaria, seminal and prostatic vesicle side by side), Kirgisellinae Luther, 1962

(paired vitellaria, seminal vesicle proximal of prostatic vesicle) and Haplovejdovskyinae Luther, 1962 (single testis and germovitellar, paired vasa deferentia). Based on the characters given, *Scillivortex phytophilus* differs from the known species of the subfamilies of the Provorticidae in the character combination of paired germovitellaria and separate seminal and prostatic vesicle with excreting ducts which separately open into the common genital atrium. A special feature is that both ducts are provided with sclerotized elements and enter independently from each other into the genital atrium. This character combination is unique within the Provorticidae and the other families of the order. Consequently, we have to establish a new family or at least a new subfamily within the Provorticidae. However, we must desist from this because of the absence of serial sections for the final resolution of the exact relations of the male ducts and their entrance into the genital atrium.

**Subfamily KIRGISELLINAE Luther, 1962**

*Balgetia cf. semicirculifera* Karling in Luther, 1962

(Figure 9C)

*Material examined*

Sites 3, 7: several specimens, in squash preparation.

*Geographical distribution.* Baltic Sea: Gulf of Finland (Tvaerminne: Henriksberg, Balget), Sweden (Östergötland: St Anna, Vrangö); Øresund (Nivå Bay); North Sea: Norway, North Frisian Islands (Sylt) (Luther 1962; Straarup 1970; Hellwig-Armonies 1988).

*Remarks*

The species was found in fully marine habitats. To date *Balgetia semicirculifera* has only been found in oligohaline habitats of the Baltic Sea (Luther 1962) and in saltmarshes of the Island of Sylt (Armonies 1987). The stylet of the Scilly form looks rather different: the proximal and median part is straight and only the distal part is curved (Figure 9C) (cf. Luther 1962: 33, Figure 12D, E).

**Subfamily HAPLOVEJDOSKYINAE Luther, 1962**

*Haplovejdovskyia scilliensis* sp. nov.

(Figure 9A, B)

*Material examined*

HOLOTYPE: Site 7: two specimens in squash preparation, stored on CD-ROM: 2003.5.22.4; whole mount slightly squashed WM: 2003.5.22.4.

*Description*

Length of body of squashed specimen 1.2 mm; frontal end broadly rounded, tapering slightly anteriad; hind end variably tapering, distally tail-like. In transmitted light body yellowish transparent; intestinal tract contrasts dark grey with transparent areas marking

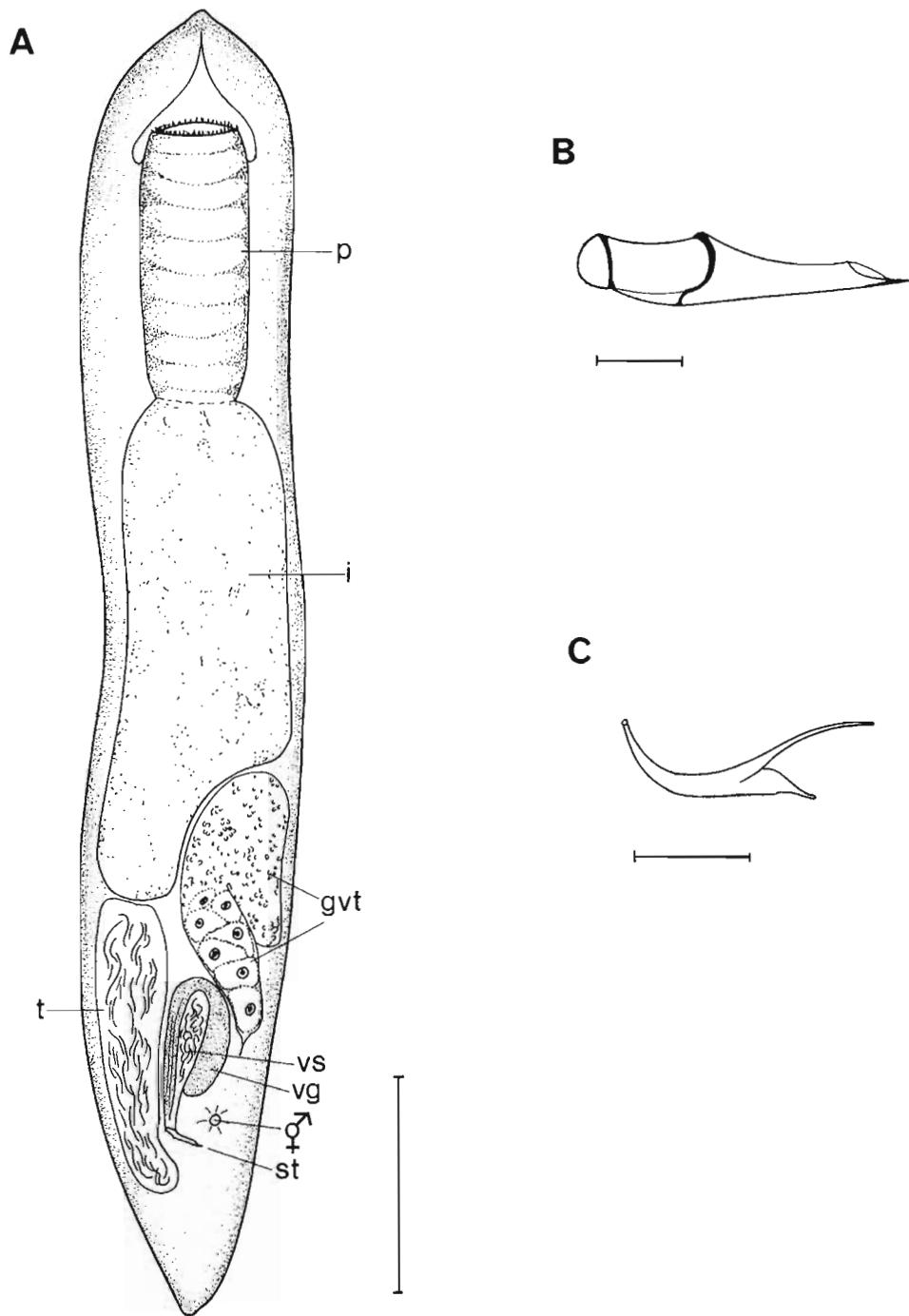


Figure 9. *Haplovejdovskya scilliensis* sp. nov. (A) Dorsal view in squash preparation; (B) sclerotized male stylet. *Balgetia* cf. *semicirculifera* (C) sclerotized male stylet. Scale bars: 200  $\mu\text{m}$  (A); 10  $\mu\text{m}$  (B); 20  $\mu\text{m}$  (C).

the locations of the genital organs. Eyes absent. Pharynx 256  $\mu\text{m}$  long, 102  $\mu\text{m}$  distant from anterior end.

*Reproductive system.* Testis left in posterior part of body. The longish muscular copulatory bulb consists of a voluminous seminal vesicle and a small prostatic section, the glands of which are located extravesicular. The seminal-prostatic bulb is distally encased in the proximal penis stylet, being 38.6  $\mu\text{m}$  long. The germovitellar is located on the right side in

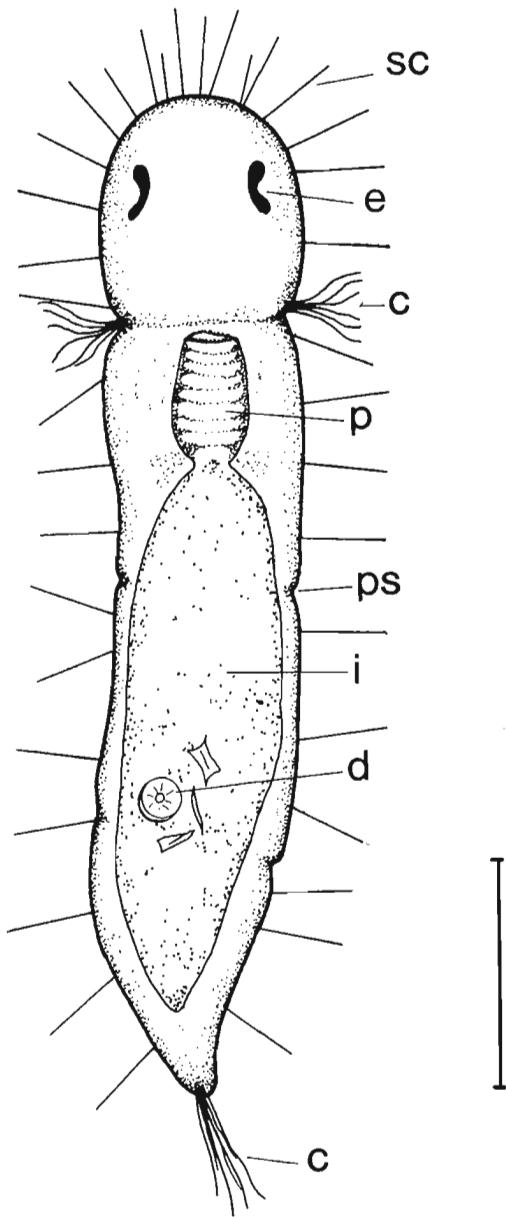


Figure 10. *Dalyelliida* sp., dorsal view in squash preparation. Scale bar: 250  $\mu\text{m}$ .

the posterior body. The vitellogenous part extends frontad to the level of the mid-body. The distal ovarian part is connected with the common genital atrium. Common genital pore present.

#### *Discussion*

The monotypic subfamily Haplovejdovskyinae Luther, 1962 was established for *Haplovejdovskyia subterranea* Ax, 1954, based on the characters of a single germovitellar and testis located in the posterior part of the body. In this respect *Haplovejdovskyia scilliensis* agrees well with the diagnosis given. Essential differences from *H. subterranea* exist in the shape of the stylet. The stylet of *H. subterranea* is longer, 110 µm, twisted and distally hooked as against the stylet of *H. scilliensis* being 38.6 µm long, straight and distally pointed. Furthermore, *H. scilliensis* and *H. subterranea* live in different habitats. *H. subterranea* is a typical brackish water species (Ax 1956c) and *H. scilliensis* was found in a euhaline habitat.

### DALYELLIIDA sp. 1 (Figure 10)

#### *Material examined*

Sites 6, 7, 13, 14, 15: abundant; several specimens in squash preparation.

#### *Morphology*

Length of body in squash preparation up to 1.1 mm; outline of body with characteristic head, 0.26 mm long, broadly rounded, separated from mid-body by a slight incision forming a circular groove; at each side, groove marked with bundles of 76 µm long cilia. Posterior body end tapering to a blunt point provided with a bundle of up to 130 µm long cilia. From time to time mid and posterior body exhibits very slight incisions (Figure 10) simulating pseudo-segmentations. Around head and margin sensory cilia, 93 µm long, present in more or less close serial sequence. Epidermis with 39 µm long cilia, rhabdites absent. Colour yellow-red-brown. Head with two crescentic eyes, 64 µm long and 125 µm distant from each other. Pharynx doliiformis 132 µm long, opens immediately behind ventral groove. Intestine with ingested diatoms.

*Reproductive system.* Specimens were sexually immature.

#### **Acknowledgement**

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