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Species of *Schizotricha* Allman, 1883 (Cnidaria: Hydrozoa: Halopterididae) from US Antarctic expeditions with the description of two new species

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Abstract

Twelve species of the genus *Schizotricha* Allman have been studied, two of which are new to science (*Schizotricha heteromera* sp. nov. and *S. trinematheca* sp. nov.). The material studied was collected by several US Antarctic expeditions. Each new species is described and figured, the systematic position amongst allied species discussed and available data concerning autecology and geographical distribution given. The remaining 10 species are considered regarding diagnosis, autecology and geographical distribution. Finally, a general survey of the bathymetrical and biogeographical distribution of the known species of *Schizotricha* is given.

Keywords: *Antarctic Ocean, biogeography, ecology, hydroids, systematics*

Introduction

The present paper deals with the species of *Schizotricha* Allman, 1883 present in the huge Antarctic hydroid collection gathered by several US Antarctic expeditions under the United States Antarctic Program (USAP). The expeditions were carried out with the research vessels *Eltanin*, *Hero*, *Islas Orcadas* and *Pr Siedlecki*, though some samples were taken at coastal stations (e.g. Wilkes Station). The species of *Clathrozoella* Stechow, 1921, *Oswaldella* Stechow, 1919 and *Staurotheca* Allman, 1888 have already been studied (cf. Peña Cantero and Vervoort 1998, 2003, 2004b; Peña Cantero et al., 2003).

Peña Cantero and Vervoort (1999) reviewed the known species of the genus *Schizotricha*, including for each species a list of synonyms, a diagnosis, remarks and autecological data. According to these authors a total of 13 species of the genus is known. Most species have an Antarctic distribution, with only four species known outside the Antarctic area.

The study of the present collection resulted in the identification of a total of 12 species, four of which are considered new to science, raising the number of known species to 17, and further increasing the proportion of Antarctic species. Of these four species, *S. crassa*

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Peña Cantero and Vervoort, 2004 and *S. southgeorgiae* Peña Cantero and Vervoort, 2004 were described in a previous paper (cf. Peña Cantero and Vervoort 2004a), whereas the other two species new to science are here described and figured.

Material and methods

Most of the material is preserved in the collections of the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (USNM). A representative collection is in the National Museum of Natural History, Leiden, The Netherlands (RMNH); some additional material of certain species has been deposited in the Museo Nacional de Ciencias Naturales (MNCN) of Madrid (Spain). The collection numbers of that material are also found in the text.

Peña Cantero and Vervoort (1999) provided for each species a list of synonyms, a diagnosis, remarks and autecological data; we refer here to that paper for synonyms and remarks of the previously described species. However, since the present collection provides new and interesting information concerning autecology and distribution, both these aspects are here discussed for each species.

Station list

- 000AF, Wilkes Station, 9 December 1961, 66°20'05"–66°20'14"S, 110°26'00"–110°26'28"E (N of Wilkes Station, off Budd Coast, Wilkes Land), 91 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 000AG, Wilkes Station, 11 December 1961, 66°17'42"–66°17'52"S, 110°32'03"–110°32'42"E (N of Wilkes Station, off Budd Coast, Wilkes Land), 101 m. ? *Schizotricha southgeorgiae* Peña Cantero and Vervoort, 2004.
- 12/993, *Eltanin*, 3 March 1964, 61°25'S, 56°30'–56°32'W (off Elephant Island, South Shetland Islands), 300 m. *Schizotricha turqueti* Billard, 1906.
- 12/1001, *Eltanin*, 15 March 1964, 62°39'S, 54°46'W (NE of Joinville Island, Antarctic Peninsula), 234 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 12/1002, *Eltanin*, 15 March 1964, 62°40'S, 54°45'–54°44'W (off Elephant Island, South Shetland Islands), 265 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 12/1003, *Eltanin*, 15 March 1964, 62°41'S, 54°43'W (NE of Joinville Island, Antarctic Peninsula), 210–220 m. *Schizotricha crassa* Peña Cantero and Vervoort, 2004; *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 15/1345, *Eltanin*, 7 November 1964, 54°50'–54°51'S, 129°48'–129°46'W (South Pacific Ocean), 914–1152 m. *Schizotricha vervoorti* Peña Cantero, 1998.
- 22/1536, *Eltanin*, 8 February 1966, 54°29'–54°31'S, 39°22'–39°19'W (off west tip of South Georgia, Scotia Sea), 659–686 m. *Schizotricha southgeorgiae* Peña Cantero and Vervoort, 2004.
- 27/1869, *Eltanin*, 13 January 1967, 71°16'S, 171°45'–171°35'E (off Cape Adare, Victoria Land, Ross Sea), 1565–1674 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996; *Schizotricha turqueti* Billard, 1906.
- 27/1896, *Eltanin*, 18 January 1967, 76°10'S, 168°17'E (Franklin Island, Victoria Land, Ross Sea), 70–81 m. *Schizotricha turqueti* Billard, 1906.
- 27/1952, *Eltanin*, 5 February 1967, 66°40'–66°39'S, 162°48'E (Buckle Island, Balleny Islands, Victoria Land), 150–157 m. *Schizotricha trinematotheca* sp. nov.

- 32/1996, *Eltanin*, 10 January 1968, 72°05'S, 172°08'–172°09'E (Moubray Bay, east of Cape Hallett, Victoria Land, Ross Sea), 344–351 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 32/2020, *Eltanin*, 15 January 1968, 74°06'S, 179°11'W (Ross Sea, centre of sea), 256 m. *Schizotricha turqueti* Billard, 1906.
- 32/2054, *Eltanin*, 23 January 1968, 77°09'S, 165°48'E (off Pennell Coast, Victoria Land), 832 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996; *Schizotricha turqueti* Billard, 1906.
- 32/2120, *Eltanin*, 11 February 1968, 73°04'S, 179°03'E (E of Pennell Bank, Ross Sea), 570 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 32/2121, *Eltanin*, 12 February 1968, 72°27'–72°26'S, 177°04'–177°12'E (Cape Adare, Victoria Land, Ross Sea), 1883–1890 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996; *Schizotricha turqueti* Billard, 1906.
- 32/2128, *Eltanin*, 13 February 1968, 71°12'S, 171°24'E (Cape Adare, Victoria Land, Ross Sea), 1610 m. *Schizotricha turqueti* Billard, 1906.
- 575/032, *Islas Orcadas*, 19 May 1975, 54°21.6'S, 35°58.7'W (South Georgia, Scotia Sea), 144–164 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 575/033, *Islas Orcadas*, 19 May 1975, 54°30.7'S, 35°35.9'W (South Georgia, Scotia Sea), 261–267 m. *Schizotricha anderssoni* Jäderholm, 1904; *Schizotricha jaederholmi* Peña Cantero and Vervoort, 1996.
- 575/039, *Islas Orcadas*, 23 May 1975, 57°01.2'S, 26°44.3'W (Candlemas Island, South Sandwich Islands, Scotia Sea), 97–100 m. *Schizotricha multifurcata* Allman, 1883.
- 575/052, *Islas Orcadas*, 26 May 1975, 57°39.4'S, 26°26.7'W (Saunders Island, South Sandwich Islands, Scotia Sea), 415–612 m. *Schizotricha turqueti* Billard, 1906.
- 575/061, *Islas Orcadas*, 30 May 1975, 56°42.3'S, 27°00.4'W (Visokoi Island, South Sandwich Islands, Scotia Sea), 93–121 m. *Schizotricha crassa* Peña Cantero and Vervoort, 2004; *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996; *Schizotricha heteromera* sp. nov.
- 575/067, *Islas Orcadas*, 31 May 1975, 56°44.6'S, 27°02.7'W (Visokoi Island, South Sandwich Islands, Scotia Sea), 137–155 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 575/070, *Islas Orcadas*, 2 June 1975, 56°23.8'S, 27°24.6'W (Visokoi Island, South Sandwich Islands, Scotia Sea), 161–210 m. *Schizotricha crassa* Peña Cantero and Vervoort, 2004; *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 575/071, *Islas Orcadas*, 2 June 1975, 56°22.7'S, 27°22.7'W (Visokoi Island, South Sandwich Islands, Scotia Sea), 130–241 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 575/073, *Islas Orcadas*, 2 June 1975, 56°16.0'S, 27°30.0'W (Zavodovski Island, South Sandwich Islands, Scotia Sea), 208–375 m. *Schizotricha nana* Peña Cantero, Svoboda and Vervoort, 1996.
- 575/074, *Islas Orcadas*, 3 June 1975, 56°12.0'S, 27°23.9'W (Zavodovski Island, South Sandwich Islands, Scotia Sea), 179–238 m. *Schizotricha crassa* Peña Cantero and Vervoort, 2004.
- 575/085, *Islas Orcadas*, 6 June 1975, 54°55.9'S, 35°49.8'W (South Georgia, Scotia Sea), 150–152 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 575/094, *Islas Orcadas*, 9 June 1975, 54°11.8'S, 37°43.0'W (South Georgia, Scotia Sea), 80–90 m. *Schizotricha anderssoni* Jäderholm, 1904.

- 575/095, *Islas Orcadas*, 9 June 1975, 54°11.8'S, 37°41.1'W (South Georgia, Scotia Sea), 68–100 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 6/410, *Eltanin*, 31 December 1962, 61°18'–61°20'S, 56°09'–56°10'W (W of Elephant Island, South Shetland Islands), 220–240 m. *Schizotricha turqueti* Billard, 1906.
- 6/428, *Eltanin*, 5 January 1963, 62°41'–62°39'S, 57°51'–57°46'W (Penguin Island, Bransfield Strait, Antarctic Peninsula), 662–1120 m. *Schizotricha turqueti* Billard, 1906.
- 6/436, *Eltanin*, 8 January 1963, 63°14'–63°13'S, 58°45'–58°49'W (Astrolabe Island, Bransfield Strait, Antarctic Peninsula), 73 m. *Schizotricha falcata* Peña Cantero, 1998.
- 6/445, *Eltanin*, 12 January 1963, 62°02'–62°00'S, 59°05'–59°08'W (NE of Livingston Island, South Shetland Islands), 101 m. *Schizotricha turqueti* Billard, 1906.
- 601/007, *Pr Siedlecki*, 30 November 1986, 53°27'S, 42°00'W (Shag Rocks, South Georgia, Scotia Sea), 159–183 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/008, *Pr Siedlecki*, 30 November 1986, 53°36'S, 42°06'W (Shag Rocks, South Georgia, Scotia Sea), 142–160 m. *Schizotricha unifurcata* Allman, 1883.
- 601/011, *Pr Siedlecki*, 30 November 1986, 53°48'S, 41°34'W (Shag Rocks, South Georgia, Scotia Sea), 111–175 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/014, *Pr Siedlecki*, 1 December 1986, 53°51'S, 41°15'W (Shag Rocks, South Georgia, Scotia Sea), 194–200 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/057, *Pr Siedlecki*, 7 December 1986, 55°07'S, 35°55'W (South Georgia, Scotia Sea), 152–178 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/065, *Pr Siedlecki*, 9 December 1986, 55°10'S, 34°48'W (South Georgia, Scotia Sea), 107–119 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/074, *Pr Siedlecki*, 10 December 1986, 54°51'S, 35°03'W (South Georgia, Scotia Sea), 168–173 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 601/077, *Pr Siedlecki*, 10 December 1986, 54°47'S, 34°57'W (South Georgia, Scotia Sea), 338–346 m. *Schizotricha anderssoni* Jäderholm, 1904.
- 691/27, *Hero*, 10 February 1969, 63°24'S, 62°14'–62°12'W (S of Low Island, Antarctic Peninsula), 91–95 m. *Schizotricha vervoorti* Peña Cantero, 1998.
- 691/28, *Hero*, 10 February 1969, 63°26'S, 62°10'–62°06'W (S of Low Island, Antarctic Peninsula), 91 m. *Schizotricha vervoorti* Peña Cantero, 1998.
- 691/30, *Hero*, 13 February 1969, 63°04'S, 60°33'–60°35'W (Deception Island, South Shetland Islands, Antarctic Peninsula), 380–457 m. *Schizotricha vervoorti* Peña Cantero, 1998.
- 7/484, *Eltanin*, 16 February 1963, 58°44'–58°54'S, 44°36'–44°31'W (N of South Orkney Islands, Scotia Sea), 952 m. *Schizotricha turqueti* Billard, 1906.
- 7/499, *Eltanin*, 20 February 1963, 62°06'S, 45°08'–45°10'W (S of South Orkney Islands), 485 m. *Schizotricha crassa* Peña Cantero and Vervoort, 2004.
- 702/464, *Hero*, 28 March 1970, 62°58.4'S, 60°50.1'W (Deception Island, South Shetland Islands), 110–137 m. *Schizotricha turqueti* Billard, 1906.
- 702/465, *Hero*, 28 March 1970, 62°56.9'S, 60°50.1'W (Deception Island, South Shetland Islands), 154 m. *Schizotricha turqueti* Billard, 1906.
- 721/704, *Hero*, 21 December 1971, 62°17.5'–62°17.9'S, 58°34.6'W (King George Island, South Shetland Islands), 55–78 m. *Schizotricha turqueti* Billard, 1906; *Schizotricha vervoorti* Peña Cantero, 1998.
- 721/774, *Hero*, 7 January 1972, 64°45.7'S, 64°07.4'W (Anvers Island, Palmer Archipelago, Antarctic Peninsula), 40 m. *Schizotricha turqueti* Billard, 1906.
- 721/775, *Hero*, 8 January 1972, 62°55.40'–62°56.00'S, 60°48.2'–60°48.8'W (Deception Island, South Shetland Islands), 91–109 m. *Schizotricha turqueti* Billard, 1906.

- 721/776, *Hero*, 8 January 1972, 62°56.1'–62°56.7'S, 60°49.0'–60°49.6'W (Deception Island, South Shetland Islands), 109 m. *Schizotricha turqueti* Billard, 1906.
- 721/777, *Hero*, 8 January 1972, 62°56.7'–62°57.5'S, 60°49.6'–60°49.2'W (Deception Island, South Shetland Islands), 109 m. *Schizotricha turqueti* Billard, 1906.
- 721/778, *Hero*, 8 January 1972, 62°57.8'S, 60°48.9'W (Deception Island, South Shetland Islands). *Schizotricha turqueti* Billard, 1906.
- 721/816, *Hero*, 16 January 1972, 62°20.5'–62°20.7'S, 58°45.4'–58°47.2'W (Nelson Island, South Shetland Islands), 50 m. *Schizotricha turqueti* Billard, 1906.
- 731/1944, *Hero*, 11 March 1973, 64°46'28"–64°45'51"S, 63°26.5'–63°24.6'W (Anvers Island, Palmer Archipelago, Antarctic Peninsula), 100–150 m. *Schizotricha falcata* Peña Cantero 1998; *Schizotricha turqueti* Billard, 1906.
- 8/612, *Eltanin*, 9 May 1963, 59°04'S, 26°41'W (Bristol Island, South Sandwich Islands), 101–121 m. *Schizotricha multifurcata* Allman, 1883; *Schizotricha turqueti* Billard, 1906.
- 8/629, *Eltanin*, 18 May 1963, 59°53'–59°52'S, 27°42'–27°44'W (Thule Island, South Sandwich Islands), 1244 m. *Schizotricha multifurcata* Allman, 1883.

Results and discussion

Family HALOPTERIDIDAE Millard, 1962

Genus *Schizotricha* Allman, 1883

Schizotricha Allman 1883, p 28; type, by subsequent designation (Totton 1930, p 229):
Schizotricha unifurcata Allman, 1883.

Remarks. We have here amended the diagnosis of the genus presented by Peña Cantero and Vervoort (1999).

Diagnosis. Featherlike, colonial hydroids with branched or unbranched, polysiphonic stem. Hydrocaulus composed of main tube, divided into internodes bearing hydro- and nematothecae (ahydrothecate internodes also present in *S. heteromera* sp. nov.), and several undivided (accessory) tubes, only provided with nematothecae and accompanying main tube for almost all its length. Hydrothecate cauline internodes with one or more apophyses supporting hydrocladia, one hydrotheca at axil between each apophysis and stem, and several nematothecae associated with each hydrotheca: two flanking hydrothecal apertures and at least one infrathecal nematotheca; suprathecal nematothecae also present in some species. Cauline apophyses alternately arranged. Hydrocladia, except in *S. profunda* (Nutting, 1900), branched once or several times, divided into internodes (with the exception of *S. dichotoma* Nutting, 1900), either all hydrothecate or also with ahydrothecate internodes provided with nematothecae. Branching usually taking place at first internode of previous hydrocladia. Forked hydrocladial internodes with one apophysis, supporting lower-order hydrocladium, one hydrotheca at axil of bifurcation and a variable number of nematothecae: two flanking hydrothecal aperture and at least one infrathecal nematotheca (occasionally also with suprathecal nematothecae). Unforked hydrothecate hydrocladial internodes with one or more hydrothecae and several associated nematothecae; two flanking hydrothecal aperture, at least one infrathecal nematotheca and, in certain species, also with suprathecal nematothecae. Cauline and hydrocladial apophyses usually provided with nematothecae. Hydrotheca cup-shaped, with smooth rim and completely adnate adcauline wall. Nematothecae two-chambered and movable. Colonies dioecious, with sexual dimorphism. Gonothecae inserting on hydrocladia between hydrothecal base and

upper infrathecal nematotheca and provided with nematothecae. Cnidome composed of microbasic mastigophores, normally in two size classes.

The genus presently includes the following species:

Schizotricha anderssoni Jäderholm, 1904

Schizotricha crassa Peña Cantero and Vervoort, 2004

Schizotricha dichotoma Nutting, 1900

Schizotricha falcata Peña Cantero, 1998

Schizotricha frutescens (Ellis and Solander, 1786) (= *Sertularia frutescens* Ellis and Solander, 1786)

Schizotricha glacialis (Hickson and Gravely, 1907) (= *Plumularia glacialis* Hickson and Gravely, 1907)

Schizotricha heteromera sp. nov.

Schizotricha jaederholmi Peña Cantero and Vervoort, 1996

Schizotricha multifurcata Allman, 1883

Schizotricha nana Peña Cantero, Svoboda and Vervoort, 1996

Schizotricha profunda (Nutting, 1900) (= *Plumularia profunda* Nutting, 1900)

Schizotricha southgeorgiae Peña Cantero and Vervoort, 2004

Schizotricha trinematotheca sp. nov.

Schizotricha turqueti Billard, 1906

Schizotricha unifurcata Allman, 1883

Schizotricha variabilis (Bonnievie, 1899) (= *Plumularia variabilis* Bonnievie, 1899)

Schizotricha vervoorti Peña Cantero, 1998

Description of the species

Schizotricha anderssoni Jäderholm, 1904

Schizotricha anderssoni: Peña Cantero and Vervoort 1999, p 356–357 (synonymy).

Material examined. 575/032, several stems up to 170 mm high, with gonothecae (USNM 1025562; RMNH-Coel. 30948; MNCN 2.03/315); 575/033, numerous stem fragments (up to 290 mm long), with gonothecae (USNM 1025563; RMNH-Coel. 30949; MNCN 2.03/316); 575/085, one fragmented stem, at least 130 mm high (USNM 1025564; RMNH-Coel. 30956; MNCN 2.03/317); 575/094, several stem fragments up to 70 mm long (USNM 1025565); 575/095, a few fragments up to 70 mm long (USNM 1025566); 601/007, one stem ca 280 mm high, with gonothecae (USNM 1025567; RMNH-Coel. 30958; MNCN 2.03/318); 601/011, two distal stem fragments up to 17 mm long, with gonothecae (in slide) (USNM 1025568); 601/014, one stem ca 190 mm high, with gonothecae (USNM 1025569); 601/057, one fragmented stem (largest fragment ca 95 mm), with immature gonothecae (USNM 1025570; RMNH-Coel. 30960; MNCN 2.03/319); 601/065, one stem ca 170 mm high, with gonothecae (USNM 1025571; RMNH-Coel. 30961); 601/074, one stem ca 50 mm high (USNM 1025572); 601/077, one stem at least 260 mm high, with gonothecae (USNM 1025573; RMNH-Coel. 30962; MNCN 2.03/320).

Diagnosis. Colonies with branched stems. Main cauline tube divided into simple hydrothecate internodes with two to five infrathecal nematothecae (occasionally also with one or

two suprathecal nematothecae). Cauline apophysis with one nematotheca. Hydrocladia up to second order present. Frequently, apophysis supporting secondary hydrocladia followed by an ahydrothecate intermediate internode provided with two nematothecae. Hydrocladia regularly divided into internodes. Unforked hydrocladial internodes with three to six infrathecal nematothecae (occasionally also with one or two suprathecal nematothecae). Hydrotheca deep. Forked hydrocladial internodes with three or four infrathecal nematothecae (occasionally also with one or two suprathecal nematothecae). Hydrocladial apophyses with one nematotheca.

Remarks. *Schizotricha anderssoni* has much branched stems; indeed, there is continuous branching of the stem. Moreover, this species usually lacks branched hydrocladia. When branched, hydrocladia are either merely bifurcated or they become lower-order stems. *Schizotricha anderssoni* usually lacks intermediate ahydrothecate internodes in the hydrocladia, except in those becoming lower-order stems.

Ecology and distribution. *Schizotricha anderssoni* is a shelf species (Peña Cantero and Vervoort 1999), having been collected at depths from 75 (Jäderholm 1904) to 800 m (Naumov and Stepan'yants 1962) on stony bottoms (Peña Cantero and García Carrascosa 1995). Our material comes from depths between 68 and 346 m. Colonies with gonothecae were found in May (Jäderholm 1904) and in December (Peña Cantero and García Carrascosa 1995); our fertile colonies were collected in May, November and December. This species also serves as a substratum for other hydroids (*Lafoea* sp., *Sertularella* sp. and *Symplectoscyphus* sp.).

Schizotricha anderssoni seems to have a circum-Antarctic distribution (Peña Cantero and Vervoort 1999). It is known to occur off South Georgia (Jäderholm 1904; Peña Cantero and García Carrascosa 1995; present material), in West Antarctica, and in the Ross Sea (Naumov and Stepan'yants 1962) in East Antarctica.

***Schizotricha crassa* Peña Cantero and Vervoort, 2004**

Schizotricha crassa Peña Cantero and Vervoort 2004a, p 30–32, Figure 1.

Material examined. 12/1003, one stem fragment ca 50 mm long, with gonothecae (USNM 1012901); 575/061, numerous unbranched stems up to 220 mm high, with gonothecae (USNM 1012902, RMNH-Coel. 30915, MNCN 2.03/313); 575/070, two broken stems (largest fragment ca 130 mm long), with gonothecae (holotype, USNM 1012900; paratype, RMNH-Coel. 30916); 575/074, one basally truncated stem ca 150 mm high (USNM 1012903); 7/499, several stem fragments up to 105 mm long, with gonothecae (USNM 1012904, RMNH-Coel. 30917).

Diagnosis. Colonies with unbranched stems. Main cauline tube with single hydrothecate internodes with two to five infrathecal nematothecae and occasionally with extra suprathecal nematotheca. Without node between cauline apophyses and hydrocladia; occasionally, however, present and then cauline apophyses with two or three nematothecae. Hydrocladia up to 12th order. Hydrocladia divided into hydrothecate internodes. Unforked hydrocladial internode with one or two infrathecal nematothecae at approximately same level. Hydrotheca deep. Forked hydrocladial internodes with one to three infrathecal nematothecae; hydrocladial apophyses with two or three nematothecae.

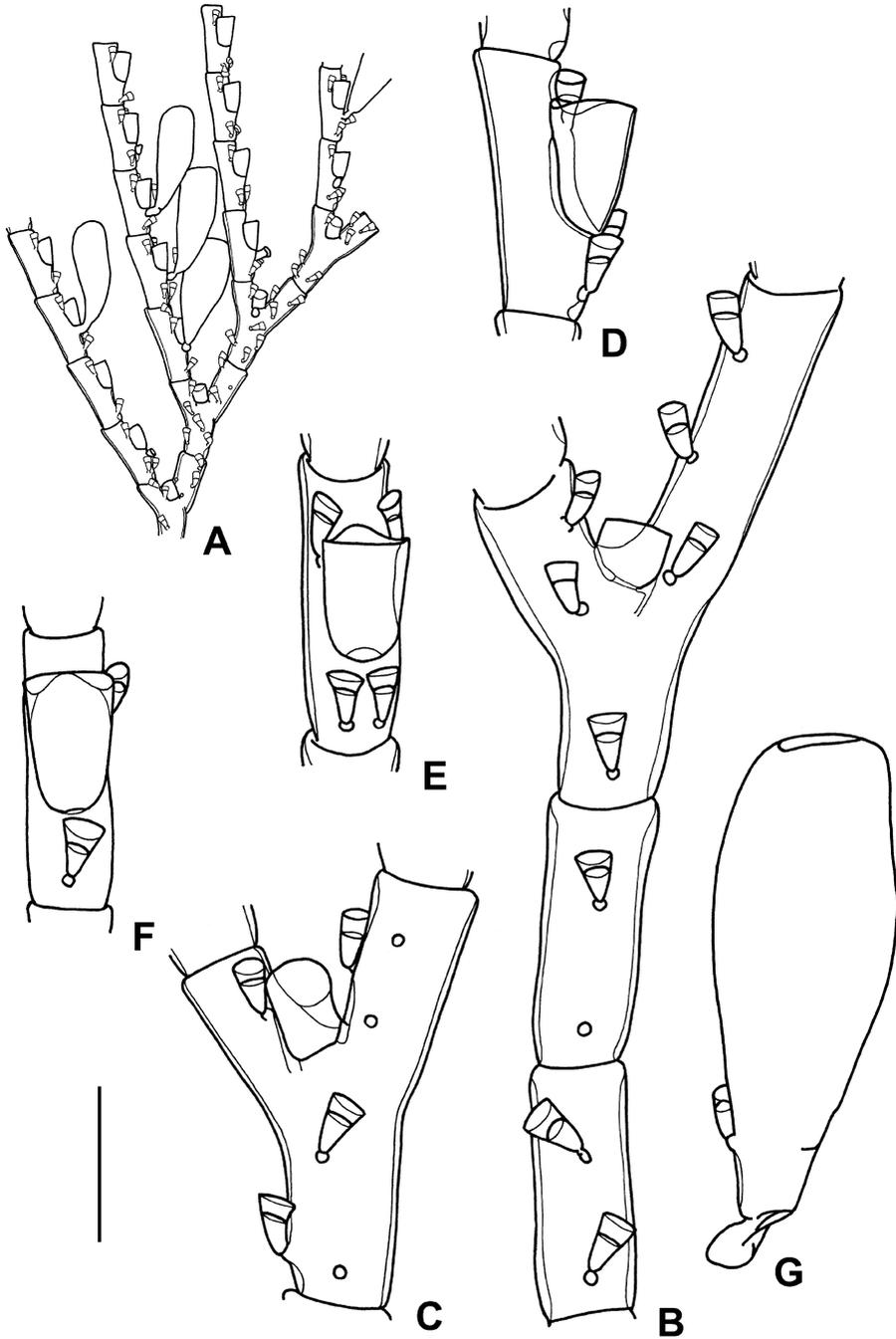


Figure 1. *Schizotricha heteromera* sp. nov. (A) Hydrocladial branching and hydrothecal and gonothecal disposition; (B) hydrothecate and ahydrothecate cauline internodes, showing hydrotheca and nematotheca; (C) forked hydrocladial internode with apophysis supporting lower-order hydrocladium, hydrotheca and nematotheca; (D–F) unforked hydrocladial internodes with hydrothecae and nematothecae; (G) gonotheca (all drawings from the holotype). Scale bar: 2 mm (A); 450 μ m (B–G).

Remarks. The material of this species was previously described and figured by Peña Cantero and Vervoort (2004a). *Schizotricha crassa* is characterized by the usual absence of a node between cauline apophyses and hydrocladia, the strong development of perisarc, the angle of ca 90° formed by the cauline apophyses, the high degree of hydrocladial branching, the strongly arched structure of the hydrocladia which, due also to the acute angle formed by the cauline apophyses, stand on the same side of the stem, and the characteristic shape of the male gonothecae, which have a relatively long and thin basal chamber.

Sometimes double hydrocladial internodes are present, provided with two hydrothecae, each with the typical set of nematothecae.

Ecology and distribution. *Schizotricha crassa* was collected at depths from 93 to 238 m. Fertile colonies were found in March, May and June. It is used as a substratum by *Sertularella* sp. *Schizotricha crassa* seems to be endemic in West Antarctica, having been collected NE of Joinville Island, in the Antarctic Peninsula area, south of the South Orkney Islands, and off Visokoi and Zavodovski Islands, in the South Sandwich Archipelago (cf. Peña Cantero and Vervoort 2004a).

***Schizotricha falcata* Peña Cantero, 1998**

Schizotricha falcata: Peña Cantero and Vervoort 1999, p 361–362 (synonymy).

Material examined. 6/436, several stem fragments up to 100 mm long, only one with a couple of hydrocladia (USNM 1025574); 731/1944, one stem ca 165 mm high and one incipient stem ca 30 mm high (USNM 1025575; RMNH-Coel. 30971).

Diagnosis. Colonies with unbranched stems. Main cauline tube divided into single hydrothecate internodes with two or three infrathecal nematothecae at different levels; cauline apophyses with one nematotheca. Hydrocladia strongly branched (hydrocladia up to seventh order reported). Normally, primary hydrocladium giving rise to secondary hydrocladia in its first, fourth and eighth internodes; secondary hydrocladium also giving third-order hydrocladia in its first, fourth and eighth internodes; first tertiary hydrocladium giving rise to fourth-order hydrocladia in its first and fifth internodes; finally, fifth-, sixth- and seventh-order hydrocladia forming from the first internodes of previous series. Hydrocladia divided into single hydrothecate internodes. Unforked hydrocladial internodes with a single infrathecal nematotheca. Hydrotheca low. Forked hydrocladial internodes with two or three infrathecal nematothecae at different levels; hydrocladial apophyses with one nematotheca. Gonothecae sickle-shaped.

Ecology and distribution. *Schizotricha falcata* is a shelf species, probably with a circalittoral distribution (Peña Cantero and Vervoort 1999). It had been recorded from depths of 90 (Blanco 1984) to 154 m (Peña Cantero 1998); our material was collected between 73 and 150 m. Fertile colonies were found in January (Peña Cantero 1998).

Schizotricha falcata seems to be endemic in West Antarctica (Peña Cantero and Vervoort 1999), being known only off Low Island (Blanco 1984) and King George Island (Peña Cantero 1998), in the South Shetland Islands area, off Astrolabe Island, Antarctic Peninsula, and off Anvers Island, Palmer Archipelago (present material).

Schizotricha heteromera sp. nov.

(Figure 1)

Material examined. 575/061, one stem ca 165 mm high, with gonothecae (holotype, USNM 1025576).

Diagnosis. Colony with unbranched stem. Main cauline tube heteromerously divided into ahydrothecate and hydrothecate internodes. Hydrothecate internodes with two to eight infrathecal nematothecae and up to two suprathecal nematothecae; cauline apophyses with one nematotheca. Cauline ahydrothecate internodes with two to six nematothecae. Hydrocladia up to 11th order. Hydrocladia regularly divided into hydrothecate internodes. Unforked hydrocladial internodes with two infrathecal nematothecae at approximately same level (occasionally only one). Hydrotheca deep. Forked hydrocladial internodes with three or four infrathecal nematothecae; hydrocladial apophyses with three or four nematothecae.

Description. Colony composed of a polysiphonic, unbranched stem ca 165 mm high. Stem consisting of a main tube divided into heteromeric internodes, with hydrothecate and ahydrothecate internodes, and several undivided tubes carrying only nematothecae. Main tube usually with an alternate series of hydrothecate and ahydrothecate internodes; the presence of two shorter ahydrothecate internodes between two hydrothecate ones (Figure 1B) is also common.

Each cauline hydrothecate internode (Figure 1B) with an apophysis supporting first-order hydrocladium and provided with one nematotheca, one hydrotheca at axil between apophysis and internode, and from six to 12 nematothecae: two flanking hydrothecal aperture, from two to eight below hydrotheca and up to two suprathecal nematothecae. Cauline ahydrothecate internodes provided with two to six nematothecae (Figure 1B).

Cauline apophyses alternately arranged in two planes; distinct node between cauline apophyses and hydrocladia.

Hydrocladia up to 11th order present. Branching taking place at first internode of previous hydrocladium (Figure 1A). Hydrocladia divided into hydrothecate internodes only, and with up to 21 hydrothecae.

Cauline apophyses, and consequently hydrocladia, well separated due to the presence of ahydrothecate cauline internodes; distance between successive cauline apophyses, however, more or less constant. Consequently, length and number of nematothecae in hydrothecate cauline internodes depending on length and number of ahydrothecate cauline internodes.

Forked hydrocladial internodes (Figure 1C) provided with one apophysis supporting lower-order hydrocladia and with three, sometimes four nematothecae, one small hydrotheca at axil of branching, and from five to six nematothecae: two flanking hydrothecal aperture and three to four below hydrotheca.

Unforked hydrocladial internodes (Figure 1D–F) provided with hydrotheca at half its length and four nematothecae: two flanking hydrothecal aperture and two below hydrotheca at approximately same level (occasionally only one); sporadically also with one suprathecal nematotheca.

Hydrotheca cup-shaped, deep and wide (Figure 1A, D–F). Length increasing along hydrocladia; for example, length of abcauline wall may be 320 μm in first unforked hydrocladial internode and ca 400 μm in 11th. Adcauline wall completely adnate to internode. Abcauline wall slightly convex in lateral view (Figure 1D).

Gonothecae inserted on hydrocladial internodes at small apophysis between hydrotheca and infrathecal nematothecae (Figure 1A). Gonotheca fusiform (ca 1300 μm length and 500 μm maximum diameter), provided with a distal, circular aperture and a basal chamber delimited by an inconspicuous circular diaphragm; with two nematothecae (Figure 1A, G).

Remarks. *Schizotricha heteromera* sp. nov. is clearly distinguishable from the remaining species of the genus by the heteromerous division of the cauline main tube (Table I). As shown above, this tube is divided into an alternate series of hydrothecate and ahydrothecate internodes, though the presence of two shorter ahydrothecate internodes between two hydrothecate ones is not uncommon. *Schizotricha glacialis*, *S. frutescens* and *S. profunda* also have a heteromerous division of the cauline main tube, but in these species all the internodes are hydrothecate, the heteromerous condition referring to the presence of internodes bearing either one or two hydrothecae (even three or more in *S. frutescens*); moreover, this heteromerous division is also found in the hydrocladia.

Schizotricha heteromera sp. nov. is also characterized by the high number of nematothecae present in the cauline hydrothecate internodes, having up to eight infrathecal and up to two suprathecal nematothecae (Table I). In this character, *S. heteromera* sp. nov. is allied to *S. anderssoni* and *S. multifurcata* which also have a high number of infrathecal nematothecae (two to five in *S. anderssoni* and four to five in *S. multifurcata*); *S. anderssoni* may also have up to two suprathecal nematothecae. Nevertheless, apart from the heteromerous division of the stem *S. heteromera* sp. nov. clearly differs from both species in having unbranched stems and a stronger hydrocladial branching (hydrocladia up to 11th order have been observed). In this last character *S. heteromera* sp. nov. also differs from the remaining species of the genus except *S. crassa*, since only *S. falcata*, *S. multifurcata*, *S. turqueti*, and *S. unifurcata* are close with up to seventh-order hydrocladia reported (Table I).

Schizotricha heteromera sp. nov. is also characterized by a higher number of nematothecae in the hydrocladial apophyses (three to four); only *S. vervoorti* with two to three nematothecae approaches *S. heteromera* sp. nov. in this respect, though the two species differ in many features, such as the presence of branched stems in *S. vervoorti*.

Ecology and distribution. *Schizotricha heteromera* sp. nov. was collected in May at a depth between 93 and 121 m off Visokoi Island, in the South Sandwich Archipelago (Scotia Sea).

Etymology. The specific name *heteromera* refers to the heteromerous division of the main cauline tube.

***Schizotricha jaederholmi* Peña Cantero and Vervoort, 1996**

Schizotricha jaederholmi: Peña Cantero and Vervoort 1999, p 365 (synonymy).

Material examined. 575/033, several stems up to 220 mm high (USNM 1025577; RMNH-Coel. 30950; MNCN 2.03/321).

Diagnosis. Colonies with unbranched stems. Main cauline tube with single hydrothecate internodes with three or four infrathecal nematothecae; cauline apophyses with two nematothecae. Hydrocladia up to fifth order. Hydrocladia regularly divided into hydrothecate

Table I. Major features of the known species of *Schizotricha* Allman, 1883.

	Branched stem	Hydrotheca per internode	Intermediate internode	Nematothecae on intermediate internode	Infracaulal nematothecae on unforked hydrocladial internode	Supracaulal nematothecae on unforked hydrocladial internode	Infracaulal nematothecae on forked hydrocladial internode	Infracaulal nematothecae on cauline internode	Maximal order of hydrocladia	Nematothecae on cauline apophyses	Nematothecae on hydrocladial apophyses	Node between apophysis and hydrocladia	Heteromorous division of stem	
<i>S. anderssoni</i>	Yes	High	1	No ^a	2	3–6	0–2	3–4	2–5	2nd	1	1	Yes	No
<i>S. crassa</i>	No	High	1 ^b	No	–	1–2	0	2–3 ^c	2–5	12th	– ^d	2–3	No	No
<i>S. dichotoma</i>	No	High	–	No ^a	1	–	–	–	1–2	4th	1	–	Yes	No
<i>S. falcata</i>	No	Low	1	No	–	1	0	2–3	2–3	7th	1	1	Yes	No
<i>S. frutescens</i>	Yes	High	1–5	No	–	1	0	1–2	1–2	3rd	– ^c	1	No	No
<i>S. glacialis</i>	No	High	1–2	No	–	1	0	1–2	1–2	2nd	1	1	Yes	No
<i>S. heteromera</i> sp. nov.	No	High	1	No	–	1–2	0–2	3–4	2–8	11th	1	3–4	Yes	Yes
<i>S. jaederholmi</i>	No	High	1	No	–	2	0	2–3	3–4	5th	2	2	Yes	No
<i>S. multifurcata</i>	Yes	High	1	Yes	2	2	0	4–5	4–5	7th	0	1	Yes	No
<i>S. nana</i>	Yes	Low	1	Yes	1	1	0	1	1–2	2nd	0	0	Yes	No
<i>S. profunda</i>	Yes	High	1–2	No	–	1	0	–	?	1st	1	–	Yes	No
<i>S. southgeorgiae</i>	No	High	1	Yes	1	1	0	2	2–5	4th	0	0	Yes	No
<i>S. trinematheca</i> sp. nov.	No	High	1–2	Yes	2–4	2	1–2	5–7	4–6	3rd	1	1	Yes	No
<i>S. turqueti</i>	No	High	1	No	–	1	0	1–2	1–2	6th	1	1–2	Yes	No
<i>S. unifurcata</i>	Yes	High	1	Yes	2	1	0	2–4	2–3	7th	0	0	Yes	No
<i>S. variabilis</i>	No	High	1	No	–	1	0	1	1	3rd	1	1	Yes	No
<i>S. verwoorti</i>	Yes	High	1	No	–	1–2	0	2–4	3	4th	2	2–3	Yes	No

^aCharacter may be the reverse. ^bOccasionally with double hydrothecate internodes. ^cOccasionally with a single infracaulal nematotheca. ^dOccasionally there is a node between cauline apophyses and hydrocladia; when that occurs, cauline apophyses are provided with two to three nematothecae. ^eThere is no separation between cauline apophyses and hydrocladia; however, there is one nematotheca on what should be considered the cauline apophysis.

internodes. Unforked hydrocladial internodes with two nematothecae below hydrotheca at different levels. Hydrotheca deep. Forked hydrocladial internodes with two or three infrathecal nematothecae; hydrocladial apophyses with two nematothecae.

Remarks. This constitutes the second record of the species. From the previous description, the present material differs in the presence of up to seven infrathecal nematothecae in the cauline internodes and in the occasional presence of a single infrathecal nematotheca in the most distal hydrocladial internodes.

Ecology and distribution. *Schizotricha jaederholmi* is endemic to the South Georgia area, where it was previously reported from depths of 252 to 310 m (Peña Cantero and Vervoort 1996); the present material was collected at 261–267 m.

***Schizotricha multifurcata* Allman, 1883**

Schizotricha multifurcata: Peña Cantero and Vervoort 1999, p 365–366 (synonymy).

Material examined. 575/039, two stems up to 170 mm high, with gonothecae (USNM 1025578; RMNH-Coel. 30951; MNCN 2.03/322); 8/612, numerous fragments up to 85 mm long, belonging to several colonies, with gonothecae (USNM 1025579; RMNH-Coel. 30973; MNCN 2.03/323); 8/629, one hydrocladial fragment (in slide) (USNM 1025580).

Diagnosis. Colonies with branched stems. Main cauline tube with single hydrothecate internodes with four or five infrathecal nematothecae. Hydrocladia up to seventh order recorded. Hydrocladia heteromerously divided into internodes; with ahydrothecate internode, provided with two nematothecae, following cauline and hydrocladial apophyses. Unforked hydrocladial internodes with two infrathecal nematothecae at different levels. Hydrotheca deep. Forked hydrocladial internodes with four or five infrathecal nematothecae; hydrocladial apophyses with one nematotheca.

Remarks. One of the two infrathecal nematothecae of the unforked hydrocladial internodes may be absent, especially in the distalmost internodes. The apophyses of the forked hydrocladial internodes are relatively long and provided with one nematotheca.

Ecology and distribution. *Schizotricha multifurcata* is a eurybathic species (Peña Cantero and Vervoort 1999), having been reported from depths between 100 (Peña Cantero 1991) and 960 m (El Beshbeeshy 1991) on bottoms of mud (Allman 1883) and stones (Peña Cantero and García Carrascosa 1995). Our material was collected at depths from 97 to 1244 m. Colonies with gonothecae were found in February (Allman 1883), May (present material), November (Stechow 1925) and December (Peña Cantero and García Carrascosa 1995).

Schizotricha multifurcata occurs mainly in the sub-Antarctic Region (Peña Cantero and Vervoort 1999), being unknown from High Antarctica. It has been found off the Patagonian coast (El Beshbeeshy 1991), off Bouvet (Stechow 1925) and Heard Islands (Allman 1883), both at the borders of the Antarctic Region, and off Bristol (Peña Cantero and García Carrascosa 1995; present material), Thule and Candlemas islands (present material), in the South Sandwich Archipelago.

Schizotricha nana Peña Cantero, Svoboda and Vervoort, 1996

Schizotricha nana: Peña Cantero and Vervoort 1999, p 367 (synonymy).

Material examined. 000AF, one incipient stem ca 11 mm long (USNM 1025581); 12/1001, one stem ca 175 mm high, with gonothecae (USNM 1025582; RMNH-Coel. 30945; MNCN 2.03/324); 12/1002, one hydrocladium (USNM 1025583); 12/1003, one fragmented stem (largest fragment ca 110 mm long), with gonothecae (USNM 1025584; RMNH-Coel. 30946; MNCN 2.03/325); 27/1869, a few stem fragments up to 60 mm long (USNM 1025585); 32/1996, one distal fragment ca 6 mm long (USNM 1025586); 32/2054, one stem fragment composed of only two cauline internodes (in slide) (USNM 1025587); 32/2120, several fragments and stems up to 95 high (USNM 1025588; RMNH-Coel. 30947; MNCN 2.03/326); 32/2121, seven stem fragments up to 43 mm long (USNM 1025589); 575/061, one fragmented and branched stem (largest fragment ca 130 mm long), with gonothecae (USNM 1025590; RMNH-Coel. 30974; MNCN 2.03/327); 575/067, one fragmented stem at least 150 mm high (USNM 1025591; RMNH-Coel. 30953; MNCN 2.03/328); 575/070, numerous fragments up to 165 mm long, with gonothecae (USNM 1025592; RMNH-Coel. 30954; MNCN 2.03/329); 575/071, several fragments and stems up to 220 mm high (USNM 1025593; RMNH-Coel. 30955; MNCN 2.03/330); 575/073, several stem fragments up to 90 mm long, almost without hydrocladia (USNM 1025594).

Diagnosis. Colonies with branched stems. Main cauline tube with single hydrothecate internodes with one or two infrathecal nematothecae. Hydrocladia up to second order. Hydrocladia heteromerously divided into internodes; with ahydrothecate internode, provided with one nematotheca, following cauline and hydrocladial apophyses. Unforked hydrocladial internodes with one infrathecal nematotheca. Hydrotheca low. Forked hydrocladial internodes with one infrathecal nematotheca.

Ecology and distribution. *Schizotricha nana* had previously been considered a shelf species (Peña Cantero et al. 1996), being known from depths between 43 (Stepan'yants 1972) and 385 m (Vanhöffen 1910) on sandy, stony and rocky bottoms (Stepan'yants 1979). Our present material comes from 91 to 1890 m, once occurring on gravel, considerably increasing the bathymetric range which now reaches bathyal depths. Peña Cantero et al. (1996) reported fertile colonies in January and February, whereas we observed gonothecae in colonies collected in March, May and June. We found colonies of *Billardia* sp., *Campanularia* sp., *Clytia* sp., *Eudendrium* sp., *Halecium* sp., *Lafoea* sp. and *Symplectoscyphus* sp. epibiotic on *S. nana*.

Schizotricha nana has a circum-Antarctic distribution (Peña Cantero et al. 1996), being known from both East and West Antarctica. In the former it has been recorded at Gauss Station (65°21'S–86°06'E) (Vanhöffen 1910), in the Davis Sea (Briggs 1938; Stepan'yants 1972) and off Adélie Coast (Naumov and Stepan'yants 1972). In West Antarctica it has been reported from the eastern part of the Weddell Sea (Peña Cantero et al. 1996) and in the South Shetland Islands area (cf. Peña Cantero and Vervoort 1999). Our material comes from off Budd Coast (Wilkes Land), Cape Adare and Pennell Coast (Victoria Land), and from Moubray Bay (Ross Sea), in East Antarctica, and from NE of Joinville Island (Antarctic Peninsula), off Elephant Island (South Shetland Islands), and off Visokoi and Zavodovski Islands (South Sandwich Islands), in West Antarctica.

Schizotricha southgeorgiae Peña Cantero and Vervoort, 2004*Schizotricha southgeorgiae* Peña Cantero and Vervoort 2004a, 32–35, Figure 2.

Material examined. ? 000AG, one distal stem fragment ca 21 mm long (USNM 1025595); 22/1536, five stem fragments (largest ca 380 mm long); possibly belonging to two stems (holotype, USNM 1012905; paratype, RMNH-Coel. 30918).

Diagnosis. Colonies with unbranched stems. Main cauline tube with single hydrothecate internodes with two to five infrathecal nematothecae. Hydrocladia up to fourth order. Hydrocladia heteromerously divided into internodes; with ahydrothecate internode, provided with one nematotheca, following cauline and hydrocladial apophyses. Unforked hydrocladial internodes with one infrathecal nematotheca. Hydrotheca deep. Forked hydrocladial internodes with two infrathecal nematothecae.

Remarks. The material of this species was previously described and figured by Peña Cantero and Vervoort (2004a). The identity of material from Sta. 000AG is slightly doubtful since it differs from *S. southgeorgiae* in a few characters. Primarily, the occasional presence of one suprathecal nematotheca in the cauline internodes, usually when the following internode is shorter and provided with only two infrathecal nematothecae. Secondly, hydrocladia were unbranched, but note that this material consists of a single distal stem fragment. Thirdly, two infrathecal nematothecae occurred at different levels in the first hydrocladial internodes. Those internodes could be considered homologous to the first forked internodes of *S. southgeorgiae* that have two infrathecal nematothecae. In the remaining hydrocladial internodes with two infrathecal nematothecae, with a single exception, there is always an indication of reconstruction.

Ecology and distribution. *Schizotricha southgeorgiae* is known only from off South Georgia, where it was collected between 659 and 686 m depth in February (Peña Cantero and Vervoort 2004a).

Schizotricha trinematheca sp. nov.

(Figure 2)

Material examined. 27/1952, one basally broken stem ca 85 mm high, with gonothecae (holotype, USNM 1025596).

Diagnosis. Colony with unbranched stem. Main cauline tube with single hydrothecate internodes with four to six infrathecal nematothecae; cauline apophysis with one nematotheca. Hydrocladia up to third order. Hydrocladia heteromerously divided into internodes; with single and double hydrothecate internodes and with ahydrothecate internode, provided with two to four nematothecae, following cauline and hydrocladial apophyses. Single unforked hydrocladial internodes with two infrathecal nematothecae at different levels and one or two suprathecal nematothecae; double internodes with two infrathecal nematothecae at different levels under first hydrotheca, three between both hydrothecae, and one suprathecal nematotheca above second hydrotheca. Hydrotheca deep. Forked hydrocladial internodes with five to seven infrathecal nematothecae; hydrocladial apophyses with one nematotheca.

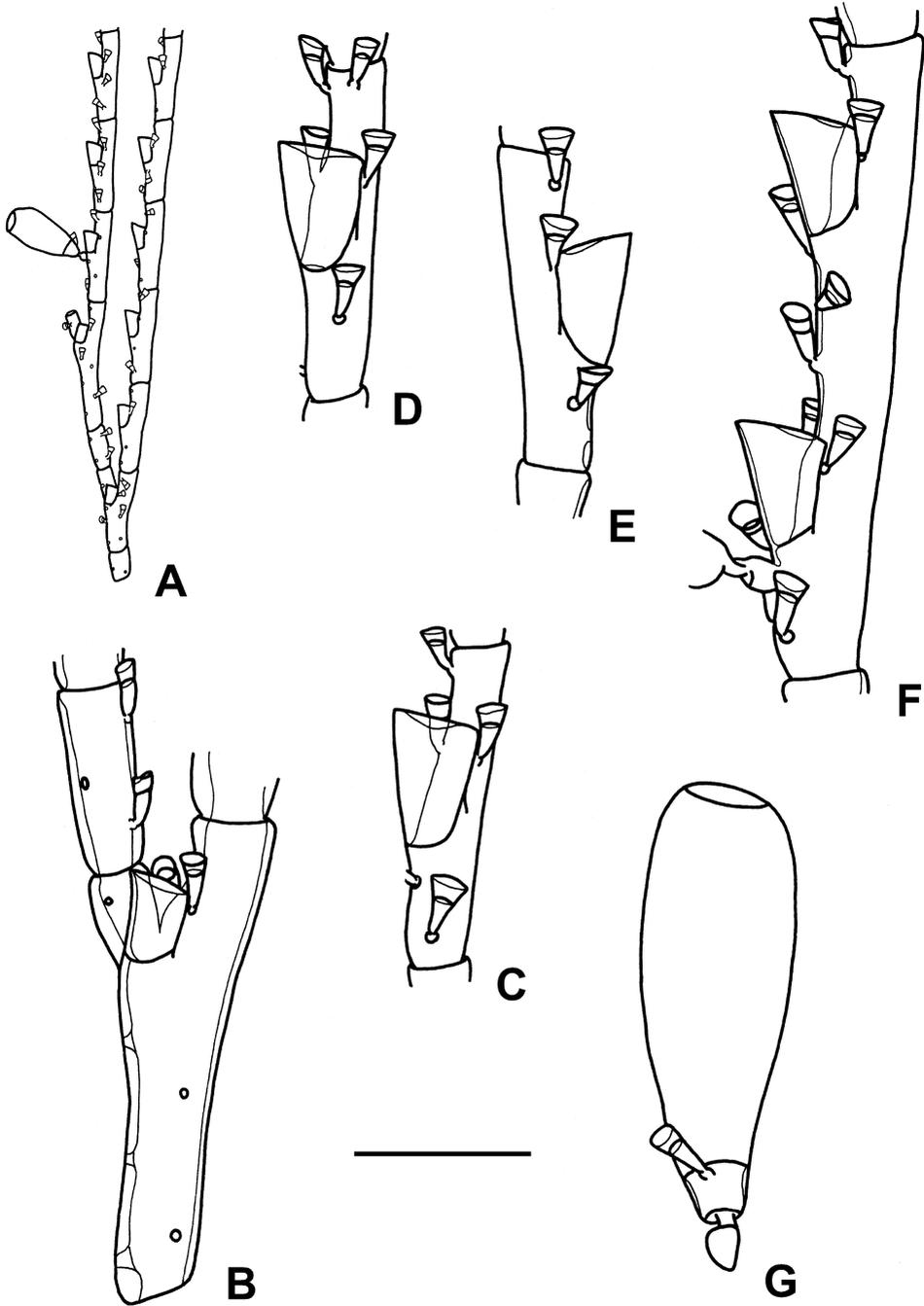


Figure 2. *Schizotricha trinematheca* sp. nov. (A) Hydrocladial branching and hydrothecal and gonothecal arrangement; (B) forked hydrocladial internode with apophysis supporting lower-order hydrocladium, hydrotheca, nematothecae, and intermediate ahydrothecate internode; (C–E) single unforked hydrocladial internodes with hydrothecae and nematothecae; (F) double unforked hydrocladial internode; (G) gonotheca (all drawings from the holotype). Scale bar: 2 mm (A); 450 μ m (B–G).

Description. Colony composed of polysiphonic, unbranched stem 85 mm high. Stem consisting of a main tube divided into internodes provided with hydrothecae and nematothecae, and several undivided accessory tubes carrying only nematothecae.

Each stem internode provided with a long apophysis with one nematotheca, a small hydrotheca at axil between apophysis and internode, and from six to eight nematothecae: two flanking hydrothecal aperture and four to six infrathecal nematothecae.

Cauline apophyses alternately arranged in two planes, making an obtuse angle and supporting hydrocladia. A distinct node present between cauline apophyses and hydrocladia (Figure 2B).

Hydrocladia divided into heteromerous internodes, with single and double hydrothecate internodes. Up to third-order hydrocladia present (Figure 2A). Branching taking place at first hydrothecate internode of successive hydrocladia. First hydrocladial internode deprived of hydrotheca, but provided with two or three nematothecae (Figure 2A). Hydrocladia long, with up to 29 hydrothecae.

Forked hydrocladial internodes (Figure 2B) provided with a short apophysis with one nematotheca, a small axillary hydrotheca, and seven to nine nematothecae: two flanking hydrothecal aperture and five to seven infrathecal nematothecae.

Apophyses of forked hydrocladial internodes followed by an intermediate ahydrothecate internode provided with three or four nematothecae (Figure 2B).

Single unforked hydrocladial internodes (Figure 2C–E) with hydrotheca at half their length, and five to six nematothecae: two flanking hydrothecal aperture, two below hydrotheca at different levels, and one or two suprathecal nematothecae.

Double unforked hydrocladial internodes (Figure 2F) with two hydrothecae and 10 nematothecae, two flanking each hydrothecal aperture, two or occasionally three nematothecae when a gonotheca is present at different levels under first hydrotheca, three nematothecae at different levels between both hydrothecae, and one suprathecal nematotheca distal to second hydrotheca.

Hydrotheca deep, cup-shaped (Figure 2C–F). Length increasing along hydrocladia; e.g. length of abcauline wall may be 264 μm in first unforked hydrocladial internode and ca 344 μm in 13th. Adcauline wall completely adnate to internode. Abcauline wall strongly abcaudally directed (Figure 2F).

Gonothecae inserted on small apophyses between infrathecal nematothecae in hydrocladial internodes (Figure 2A). Usually one gonotheca per internode; sometimes two. Gonotheca fusiform (ca 1000 μm length and 320 μm maximum diameter), provided with a terminal, circular aperture and a basal chamber delimited by a circular diaphragm; provided with two nematothecae (Figure 2G).

Remarks. *Schizotricha trinematotheca* sp. nov. is allied to *S. anderssoni*, *S. multifurcata*, *S. nana*, *S. unifurcata* and *S. southgeorgiae* in having intermediate ahydrothecate internodes following the cauline and hydrocladial apophyses. With *S. multifurcata* it also shares the presence of one nematotheca on the hydrocladial apophyses. *Schizotricha trinematotheca* sp. nov. differs, however, from all those species in the number of nematothecae present in the intermediate internodes, there being a single nematotheca in *S. nana* and *S. southgeorgiae* and two nematothecae in *S. anderssoni*, *S. multifurcata* and *S. unifurcata*, whereas in *S. trinematotheca* sp. nov. there are two to four. *Schizotricha trinematotheca* sp. nov. also differs from all those species, with the exception of *S. southgeorgiae*, in having unbranched stems. From *S. nana* it also differs in having deep instead of low hydrothecae. *Schizotricha trinematotheca* sp. nov. differs from all of those species in having single and double

hydrothecate hydrocladial internodes. In this character it approaches *S. glacialis*. Nevertheless, this last species differs from *S. trinematotheca* sp. nov. in the absence of ahydrothecate intermediate internodes and in the presence of a single infrathecal nematotheca in the unforked hydrocladial internodes. In having suprathecal nematothecae *S. trinematotheca* sp. nov. also differs from all the above-mentioned species except *S. anderssoni*.

Schizotricha dichotoma, a non-Antarctic species of the genus, may also have intermediate internodes, but differs in having a completely different hydrocladial structure, lacking internodes, and much larger hydrothecae.

Schizotricha frutescens and *S. profunda*, two other non-Antarctic species of the genus, may also have more than one hydrotheca per internode, but they differ mainly in having branched stems, in lacking ahydrothecate intermediate internodes, and in having a single infrathecal nematotheca in the unforked hydrocladial internodes. Moreover, *S. frutescens* lacks a node between the cauline apophyses and the hydrocladia, and *S. profunda* has unbranched hydrocladia.

Ecology and distribution. *Schizotricha trinematotheca* sp. nov. was found in February at a depth between 150 and 157 m off Buckle Island, in the Balleny Islands (Victoria Land).

Etymology. The specific name *trinematotheca* refers to the number of nematothecae present between both hydrothecae in the double, unforked hydrocladial internodes.

***Schizotricha turqueti* Billard, 1906**

Schizotricha turqueti: Peña Cantero and Vervoort 1999, p 371–372 (synonymy).

Material examined. 12/993, one fragmented stem (largest fragment ca 160 mm long) (USNM 1025597); 27/1869, three stem fragments up to 80 mm long, with immature gonothecae (USNM 1025598); 27/1896, five stem fragments up to 85 mm long, with gonothecae (USNM 1025599); 32/2020, two distally broken stems without hydrocladia up to 75 mm long and one distal stem fragment ca 50 mm long (USNM 1025600); 32/2054, one hydrocladium (in slide) (USNM 1025601); 32/2121, three stem fragments up to 40 mm long, with immature gonothecae (USNM 1025602); 32/2128, one stem ca 150 mm high and three stem fragments up to 90 mm long (USNM 1025603); 575/052, five stems up to 215 mm high, with gonothecae (USNM 1025604; RMNH-Coel. 30952; MNCN 2.03/331); 6/410, one stem fragment ca 25 mm long, with gonothecae (USNM 1025605); 6/428, a few hydrocladia with gonothecae (on slide) (USNM 1025606); 6/445, one fragmented stem (fragments up to 180 mm long), with gonothecae (USNM 1025607; RMNH-Coel. 30957); 7/484, one stem ca 210 mm high, with gonothecae (USNM 1025608); 702/464, four stems up to 210 mm high, with gonothecae (USNM 1025609; RMNH-Coel. 30965; MNCN 2.03/332); 702/465, numerous stems up to 380 mm high, with male and female gonothecae (USNM 1025610; RMNH-Coel. 30966; MNCN 2.03/333); 721/704, one stem ca 210 mm high, with gonothecae (USNM 1025611); 721/774, two stems ca 250 and 55 mm high, with gonothecae (USNM 1025612; RMNH-Coel. 30967); 721/775, four stems up to 230 mm high, with gonothecae (USNM 1025613; RMNH-Coel. 30968; MNCN 2.03/334); 721/776, numerous stems up to 280 mm high, with gonothecae (USNM 1025614; RMNH-Coel. 30969; MNCN 2.03/335); 721/777, several stems up to 280 mm high, with gonothecae (USNM 1025615; RMNH-Coel.

30970; MNCN 2.03/336); 721/778, one stem ca 220 mm high, with gonothecae (USNM 1025616); 721/816, one stem ca 60 mm high (USNM 1025617); 731/1944, six stems up to 145 mm high, with gonothecae (USNM 1025618; RMNH-Coel. 30972; MNCN 2.03/337); 8/612, several stem fragments up to 120 mm long, with female gonothecae (USNM 1025619).

Diagnosis. Colonies with unbranched stems. Main cauline tube with single hydrothecate internodes, with one or two infrathecal nematothecae; cauline apophyses with one nematotheca. Hydrocladia up to sixth order. Hydrocladia regularly divided into hydrothecate internodes. Unforked hydrocladial internode with a single infrathecal nematotheca. Hydrotheca deep. Forked hydrocladial internodes with one or two infrathecal nematothecae; hydrocladial apophyses with one or two nematothecae.

Remarks. Occasionally in this species it is possible to find stems with false branching, due to previous fracture of the original stem. This is corroborated by the fact that the main stem is bifurcated, giving rise to two equally developed secondary stems; this does not constitute the branching pattern found in the typically branched species of *Schizotricha*.

The unforked hydrocladial internodes are typically provided with a single infrathecal nematotheca, though in the material from Sta. 721/704 there is occasionally a second infrathecal nematotheca in the first and sometimes in the second internode following the forked hydrocladial internodes.

The material from Sta. 32/2020, Sta. 721/775 and Sta. 731/1944 resembles *Schizotricha glacialis* (Hickson and Gravely, 1907) in the frequent presence of double internodes. However, in the remaining features that material is closer to *S. turqueti* since up to sixth-order hydrocladia are present, whereas in *S. glacialis* only secondary hydrocladia have been reported. Moreover, only one nematotheca has been reported on the hydrocladial apophyses in *S. glacialis*, whereas one or two are present in *S. turqueti*, as also occurs in the material under discussion. Therefore, we conclude that double internodes sometimes occur in *S. turqueti*, so that this feature is not restricted to *S. glacialis*. In fact, double internodes also occur in *S. crassa* and *S. trinematotheca* sp. nov. For the moment, however, *S. glacialis* and *S. turqueti* are kept separate because in *S. glacialis* the hydrocladia are either unforked or have but a single ramification, even in fertile material (cf. Hickson and Gravely 1907; Peña Cantero et al. 1996).

Ecology and distribution. *Schizotricha turqueti* is a eurybathic species. It has been recorded from the intertidal level (Billard 1906) to a depth of 330 m (Peña Cantero et al. 1996) on bottoms of gravel and pebbles with mud (Peña Cantero and García Carrascosa 1995) and on muddy bottoms (Peña Cantero et al. 1996); our material was collected at depths from 40 to 1890 m, considerably increasing its bathymetric range, sometimes on pebbles. Fertile colonies have been reported previously only in January (Peña Cantero and García Carrascosa 1995; Peña Cantero et al. 1996), whereas we observed gonothecae in colonies collected in January, February, March, May, and December. We found colonies of *Antarctoscyphus* sp., *Clytia* sp., *Campanularia* sp., and *Lafoea* sp. using *S. turqueti* as a substratum.

Previous to the present study, *Schizotricha turqueti* seemed to be endemic to West Antarctica, having been reported from Booth-Wandel Island by Billard (1906), off Elephant Island (South Shetland Islands) by Peña Cantero and García Carrascosa (1995) and Peña Cantero et al. (1996), and from the southern part of the Weddell Sea by Peña

Cantero et al. (1996). However, our present material originates from both East and West Antarctica. In East Antarctica it has been found in the Ross Sea and off Victoria Land (off Franklin Island, Pennell Coast and Cape Adare). In West Antarctica, *S. turqueti* was collected off Anvers Island (Palmer Archipelago), Penguin Island (Antarctic Peninsula), Deception, King George, Livingston and Nelson islands (South Shetland Islands), Elephant Island, north of the South Orkney Islands, and off Bristol and Saunders islands (South Sandwich Archipelago).

***Schizotricha unifurcata* Allman, 1883**

Schizotricha unifurcata: Peña Cantero and Vervoort 1999, p 372–373 (synonymy).

Material examined. 601/008, two incipient stems 25 and 20 mm high, and one distal stem fragment ca 30 mm long (USNM 1025620; RMNH-Coel. 30959).

Diagnosis. Colonies with branched stems. Main cauline tube with single hydrothecate internodes with two or three infrathecal nematothecae. Hydrocladia up to seventh order recorded. Hydrocladia heteromerously divided into internodes; with ahydrothecate internode, provided with two nematothecae, following cauline and hydrocladial apophyses. Unforked hydrocladial internodes with a single infrathecal nematotheca. Hydrotheca deep. Forked hydrocladial internodes with two to four infrathecal nematothecae.

Remarks. The material studied, composed of juvenile stems, is unbranched. The unforked hydrocladial internodes are provided with a single infrathecal nematotheca, though a second infrathecal nematotheca may be present in the two basalmost unforked hydrocladial internodes.

Ecology and distribution. *Schizotricha unifurcata* is a eurybathic species (Peña Cantero and Vervoort 1999). It has been collected at depths from 15 (Millard 1977) to 567 m (Stechow 1925) on muddy bottoms (Allman 1883); our present material comes from depths of 142–160 m. Colonies with gonothecae were collected in January (Allman 1883), February (Peña Cantero et al. 1996), April (Millard 1977), and November (Stechow 1925).

Schizotricha unifurcata has an Antarctic-Kerguelen distribution (Peña Cantero 1998). In sub-Antarctic waters, it has been reported from off Kerguelen (Allman 1883; Naumov and Stepan'yants 1962; Millard 1977) and off Heard and McDonald Islands (Millard 1977). In Antarctic waters it has been found off Bouvet Island (Stechow 1925), at the limits of the Antarctic region, off Adélie Coast (Naumov and Stepan'yants 1972), in East Antarctica, and in the eastern part of the Weddell Sea (Peña Cantero et al. 1996). The present material was obtained off Shag Rocks in the South Georgia area, West Antarctica.

***Schizotricha vervoorti* Peña Cantero, 1998**

Schizotricha vervoorti: Peña Cantero and Vervoort 1999, p 377–379 (synonymy).

Material examined. 15/1345, one distal stem fragment ca 40 mm long, with gonothecae (USNM 1025621); 691/27, a few stems up to 240 mm high, with male and female gonothecae (USNM 1025622; RMNH-Coel. 30963; MNCN 2.03/338); 691/28, at least

two stems up to 220 mm high, with gonothecae (USNM 1025623; RMNH-Coel. 30964; MNCN 2.03/339); 691/30, one stem ca 55 mm high (USNM 1025624); 721/704, one stem ca 250 mm high (USNM 1025625).

Diagnosis. Colonies with branched stems. Main cauline tube with single hydrothecate internodes with three infrathecal nematothecae; cauline apophyses with two nematothecae. Hydrocladia up to fourth order. Hydrocladia regularly divided into hydrothecate internodes. Unforked hydrocladial internodes with two infrathecal nematothecae at same level (occasionally only one in the most distal internodes). Hydrotheca deep. Forked hydrocladial internodes with two to four infrathecal nematothecae; hydrocladial apophyses with two or three nematothecae.

Ecology and distribution. *Schizotricha verwoorti* is a eurybathic species. It has previously been found at depths from 50 to 149 m (Peña Cantero 1998). The material discussed here comes from depths between 91 and 1152 m, considerably extending its bathymetric range. It is used as a substratum by colonies of other hydroids (*Lafoea* sp., *Oswaldella verwoorti* Peña Cantero and García Carrascosa 1998, *Symplectoscyphus* sp.). Colonies with gonothecae have been found in January (Peña Cantero 1998) and in February and November (present material).

Schizotricha verwoorti is known mainly from West Antarctica, having been reported off Peter I Island in the Bellingshausen Sea (Blanco and Bellusci de Miralles 1972), off Low Island (Blanco 1984) and King George Island (Peña Cantero 1998), both in the South Shetland Islands area, and off Coronation Island, South Orkney Islands (Peña Cantero 1998). We found it both in the South Shetland Islands area (off Low Island, King George Island and Deception Island) and at 54°50'–54°51'S, 129°48'–129°46'W (South Pacific Ocean), far from the previously known area of distribution.

Bathymetrical and biogeographical remarks

The genus *Schizotricha* consists of 17 known species, four of which are found far from Antarctic or sub-Antarctic waters. These species are *S. dichotoma* and *S. profunda*, which seem to be restricted to deep waters of the tropical West Atlantic, *S. frutescens*, found in the north-east Atlantic and living in shelf and deep waters, and *S. variabilis*, a boreal Atlantic species also dwelling on deep bottoms.

The remaining 13 species are found either in Antarctic and sub-Antarctic waters or exclusively in Antarctic waters (Figure 3). Only two of those species, *S. multifurcata* and *S. unifurcata*, are found in sub-Antarctic waters. Of those two the first should be considered a sub-Antarctic species found in the Antarctic region only at its limits (at the South Sandwich Islands and off Bouvet Island), but never in high Antarctica. Conversely, *S. unifurcata* is widely distributed in Antarctic waters and reaches sub-Antarctic waters only in the Kerguelen area, thus having an Antarctic-Kerguelen distribution.

The remaining 11 species are endemic to the Antarctic region. Of those, four (*S. anderssoni*, *S. glacialis*, *S. nana*, and *S. turqueti*) are circum-Antarctic species, i.e. they are found in both East and West Antarctica. Of the remaining seven species, *S. trinematheca* sp. nov. is from present evidence endemic to East Antarctica, whereas the remainder are endemic to West Antarctica (*S. crassa*, *S. falcata*, *S. heteromera* sp. nov., *S. jaederholmi*, *S. southgeorgiae*, and *S. verwoorti*). Two species (*S. jaederholmi* and *S. southgeorgiae*) are endemic to South Georgia, the marine fauna of which has many

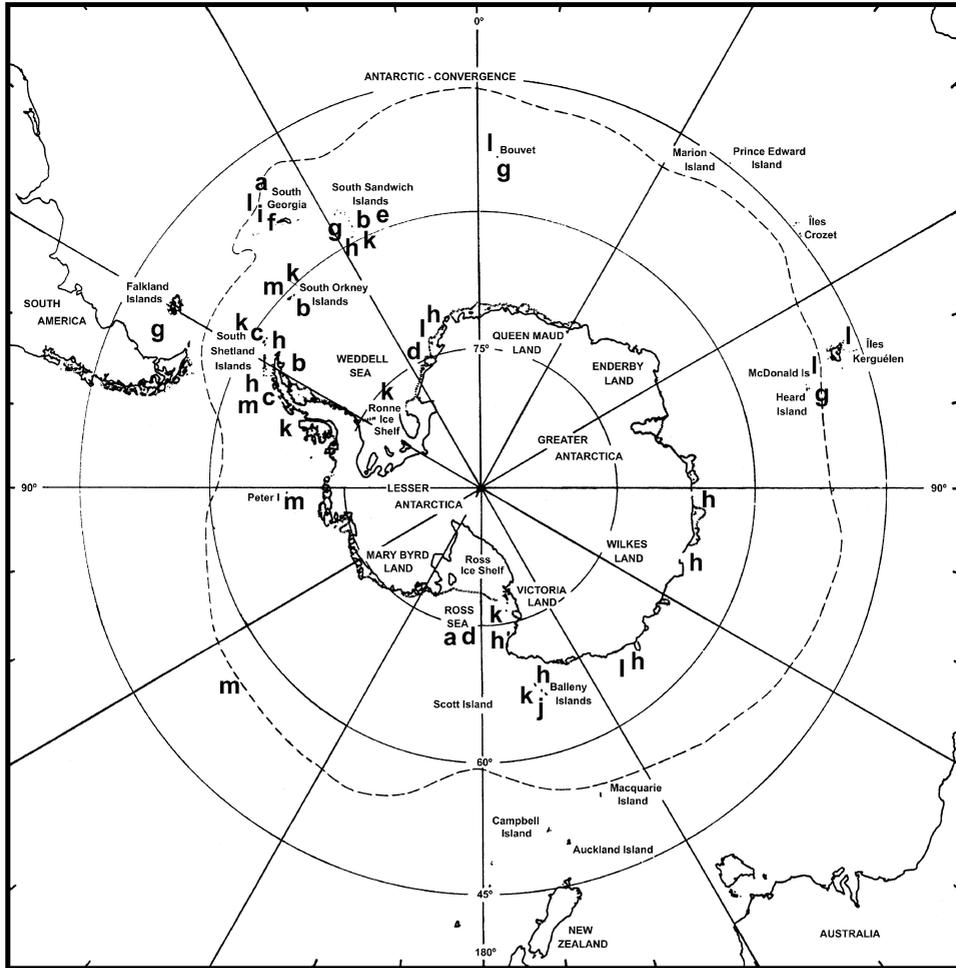
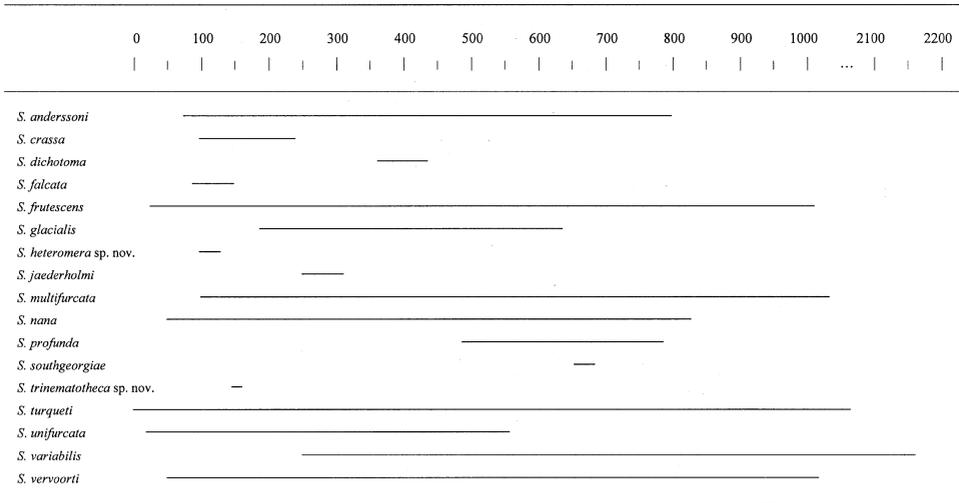


Figure 3. Geographical distribution of the known Antarctic and sub-Antarctic species of *Schizotricha* Allman 1883. (a) *S. anderssoni*; (b) *S. crassa*; (c) *S. falcata*; (d) *S. glacialis*; (e) *S. heteromera* sp. nov.; (f) *S. jaederholmi*; (g) *S. multifurcata*; (h) *S. nana*; (i) *S. southgeorgiae*; (j) *S. trinematheca* sp. nov.; (k) *S. turqueti*; (l) *S. unifurcata*; (m) *S. vervoorti*.

peculiarities, being considered as a district of the Antarctic region by several authors. It seems to be closer to the Patagonian area in its shallow-water fauna, but closer to the Antarctic region as far as the deep-water fauna is considered.

Table II shows the bathymetrical distribution of the known species of *Schizotricha*. Most of the species have a wide bathymetric range. However, of the 13 known species inhabiting Antarctic waters, only *S. turqueti* must be considered a eurybathic species, extending from the shallowest levels of the continental shelf to bathyal depths. Most species are shelf species, i.e. species inhabiting bottoms of the continental shelf which in the Antarctic has the shelf-break two to four times deeper than in other oceanic regions. These shelf species are *S. crassa*, *S. falcata*, *S. heteromera* sp. nov., *S. jaederholmi*, and *S. trinematheca* sp. nov. They are absent from the shallowest levels of the continental shelf, impacted by different manifestations of ice. Another group of species is that constituted by species extending

Table II. Bathymetric distribution of the known species of *Schizotricha* Allman, 1883 (in metres).

beyond the limit of the continental shelf-break, reaching bathyal depths (*S. anderssoni*, *S. multifurcata*, *S. nana*, *S. unifurcata*, and *S. vervoorti*). Finally, *S. southgeorgiae* can be considered, at least for the present, as a deep-water species.

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