

Species of *Schizotricha* Allman, 1883 (Cnidaria, Hydrozoa) from recent antarctic expeditions with R.V. 'Polarstern', with the description of a new species

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Key words: Cnidaria; Hydrozoa; hydroids; *Schizotricha*; Antarctic; re-description of species; new records; new species.

Five species of the genus *Schizotricha* Allman, 1883, one of which is new to science, have been studied. The material originates from the Weddell Sea region and from off Elephant Island and it was collected during several antarctic expeditions with the R.V. 'Polarstern'. Each species is described and figured and its systematic position among allied species discussed. The type material of *Schizotricha glacialis* (Hickson & Gravely, 1907) and *S. turqueti* Billard, 1906 has been re-examined and is also described and figured.

Se han estudiado cinco especies del género *Schizotricha* Allman, 1883, una de ellas nueva para la ciencia. El material fue recogido en el área del Mar de Weddell e Isla Elefante, durante varias expediciones antárticas con el R.V. "Polarstern". Asimismo, se ha revisado el material tipo de *Schizotricha glacialis* (Hickson & Gravely, 1907) y *S. turqueti* Billard, 1906.

Introduction

The benthic hydroid collection, made by several German and French antarctic expeditions with the R.V. 'Polarstern' between the years 1983 and 1991, is now being studied. This hydroid collection was deposited in the Nationaal Natuurhistorisch Museum (National Museum of Natural History), Leiden, The Netherlands. The present paper deals with the representatives of the genus *Schizotricha* Allman, 1883. Though the number of colonies is limited, a high number of species is represented, one of which proved to be new to science. In trying to identify the various species and to clarify their systematic position, it was necessary to examine the type material of *Schizotricha turqueti* Billard, 1906, and *Plumularia glacialis* Hickson & Gravely, 1907. The results of the study of all that material are presented here.

Material and methods

The material is preserved in 70% ethanol, after fixation either in that medium or in 6% formol. Permanent microslides were made from fragments stained in diluted haemalum Mayer (Merck) and mounted in Malinol (Chroma, Köngen, Germany). The registration numbers (indicated by RMNH Coel. and a number) and the slide

numbers are given in the text. Some additional material has been deposited in the collections of The Natural History Museum, London (NHM) and the Muséum National d'Histoire Naturelle, Paris (MNHN).

Station list

ANT VII-4 (Epos 3) Stn 211, 60°59.8'S 55°12.1'W (off Elephant Island, South Shetland Is), 213 m, 15.i.1989.

Schizotricha turqueti Billard, 1906

ANT VII-4 (Epos 3) Stn 212, 60°50.0'S 55°38.9'W (off Elephant Island, South Shetland Is), 414 m, 15.i.1989.

Schizotricha turqueti Billard, 1906

ANT VII-4 (Epos 3) Stn 261, 74°36.5'S 29°41.2'W (off McDonald Ice Rumples, Caird Coast, Weddell Sea), 799 m, 10.ii.1989.

Schizotricha spec.

ANT VIII-5 Stn 16-405, 76.52°S 52.63°W (off Ronne Ice Shelf, Weddell Sea), 330 m, 07.i.1990. Bottom: mud.

Schizotricha turqueti Billard, 1906

ANT VIII-5 Stn 16-454, 71.08°S 11.69°W (off Cape Norvegia, Princess Martha Coast, Weddell Sea), 240-280 m, 26.i.1990.

Schizotricha nana spec. nov.

ANT VIII-5 Stn 16-481, 74.74°S 61.13°W (off Ronne Ice Shelf, Weddell Sea), 620-640 m, 15.ii.1990.

Schizotricha glacialis (Hickson & Gravely, 1907).

ANT VIII-5 Stn 16-496, 70.63°S 08.08°W (off Atka Iceport, Princess Martha Coast, Weddell Sea), 80 m, 27.ii.1990.

Schizotricha unifurcata Allman, 1888, *Schizotricha nana* spec. nov.

ANT IX-3 Stn 179, 69°59.1'S 08°00.4'E (off Fimbul Ice Shelf, Princess Astrid Coast, Weddell Sea), 181 m, 22.ii.1991.

Schizotricha nana spec. nov.

Results and discussion

Family Halopterididae Millard, 1962

Schizotricha Allman, 1883

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

Diagnosis.— Featherlike, colonial hydroids with branched or unbranched, polysiphonic stem. Hydrocaulus composed of main tube, divided into internodes bearing hydro- and nematothecae, and several undivided (accessory) tubes, provided with nematothecae and accompanying main tube for almost all its length. Stem internodes with alternately arranged apophyses bearing hydrocladia, one hydrotheca at axil between apophysis and internode, and several associated nematothecae: two flanking hydrothecal aperture and one at least under hydrotheca; suprathecal nematothecae occasionally present, as for instance in *S. anderssoni* Jäderholm, 1904. Hydrocladia, except in *S. profunda* (Nutting, 1900), branched once or several times, divided into internodes, either all hydrothecate or also with ahydrothecate internodes. Hydrothecate internodes with one or more hydrothecae and several associated nematothecae: two flanking hydrothecal aperture, at least one infrathecal nematotheca

and, in certain species (e.g. *S. anderssoni*), also with suprathecal nematothecae. Ahydrothecate internodes provided with nematothecae. Hydrotheca cup-shaped, with smooth rim. Nematothecae bithalamic. Colonies dioecious, with sexual dimorphism. Gonothecae inserting on hydrocladia between hydrothecal base and upper infrathecal nematotheca. Cnidome composed of microbasic mastigophores, typically in two size classes.

List of species referred to *Schizotricha*:

Schizotricha anderssoni Jäderholm, 1904

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

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

Schizotricha jaederholmi Peña Cantero & Vervoort, 1996

Schizotricha multifurcata Allman, 1883

Schizotricha nana spec. nov.

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

Schizotricha turqueti Billard, 1906

Schizotricha unifurcata Allman, 1883

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

Remarks.— The genus *Schizotricha* was established by Allman (1883) to include two new subantarctic hydroids, *Schizotricha unifurcata* and *S. multifurcata*. Later Jäderholm (1904), Billard (1906) and Hickson & Gravely (1907) described other species of *Schizotricha* from the antarctic region: *S. anderssoni*, *S. turqueti* and *S. glacialis*, respectively. The taxonomic history of those species is tightly interlaced as many authors have included the three last named species into the first two and have even included *S. multifurcata* in *S. unifurcata*, either because of incomplete information provided by the original descriptions and/or little taxonomic importance given to characters used to differentiate between the species. Billard (1910), who re-examined the type material of Allman's species, kept both species separated, but considered his *S. turqueti* to be conspecific with *S. unifurcata*. Later Stechow (1925), who also kept Allman's species separate, considered *S. anderssoni*, *S. turqueti* and *S. glacialis* conspecific with *S. unifurcata* and the material assigned to *S. turqueti* by Vanhöffen (1910) conspecific with *S. multifurcata*. Totton (1930), however, considered *S. multifurcata* and *S. turqueti* conspecific with *S. unifurcata* and also included *S. glacialis* in this species, though with doubt. Naumov & Stepan'yants (1962; 1972) considered *S. unifurcata* and *S. multifurcata* as conspecific. However, they kept *S. anderssoni* as a valid species and thought *Plumularia glacialis* Hickson & Gravely to be conspecific with it. Blanco (1967) included *S. multifurcata*, *S. turqueti*, *S. glacilis*, and with doubts *S. anderssoni*, into *S. unifurcata*. Blanco & De Miralles (1972) considered *S. multifurcata* conspecific with *S. unifurcata* and also, though with doubts, *S. anderssoni*, *S. turqueti* and *S. glacilis*. Later Stepan'yants (1979) maintained two subspecies: *S. unifurcata unifurcata* and *S. unifurcata turqueti* and included *S. anderssoni* in the first and Billard's *S. turqueti* in the second. Blanco (1984) also considered Allman's species conspecific and, finally, Blanco (1994) again put *S. multifurcata*, *S. anderssoni*, *S. turqueti* and *S. glacialis* into *S. unifurcata*.

After the study of the type series of *Schizotricha anderssoni* by Peña Cantero & Vervoort (1996), the Polarstern material of *Schizotricha* has been studied, the type material of *Schizotricha turqueti* Billard, 1906, and of *Plumularia glacialis* Hickson &

Gravely, 1907, has been re-examined and the relevant literature has been studied in detail. As the result of these investigations we consider the above mentioned, antarctic species of *Schizotricha* as being valid, well characterized and provided with distinct, diagnostic features.

One of the main characters to which we attach importance is the presence of an ahydrothecate internode, provided with nematothecae, following the cauline and/or hydrocladial apophyses. This character has been considered unimportant by several authors. However, after studying many colonies of *Schizotricha* we found it to be a constant feature that can be used to differentiate between the species, though always in combination with other characters. In some species the presence of that intermediate internode is constant (e.g. *S. unifurcata*, *S. multifurcata*, *S. nova* spec. nov.), whereas in others it is completely absent or only occasionally present, in which case it must be considered an anomaly.

Another important character in our opinion, is the number of infrathecal nematothecae on the unforked hydrocladial internodes. That number of nematothecae is also constant (with the exception of *S. anderssoni*). However, several authors [e.g. Stepan'yants (1979)] did not attach importance to this character, considering it to vary intraspecifically. Those authors may have also considered the number of nematothecae on the forked hydrocladial internodes, which number is usually higher than that on the unforked internodes and is variable, probably depending upon the length of the internode, since longer internodes have a higher number of nematothecae. Nevertheless, when only unforked hydrocladial internodes are considered, the number of infrathecal nematothecae is constant. Sometimes the first unforked internode of the hydrocladium of the lowest order has a number of infrathecal nematothecae that is higher than that on the remaining unforked internodes. However, it must be remarked that it is also longer and it is obviously undeveloped: it will become forked in the course of growth and will give rise to a hydrocladium of lower order.

Also the presence of branched or unbranched stems seems to be an important feature. There is distinctly a group of species with branched stems (*Schizotricha unifurcata*, *S. multifurcata*, *S. anderssoni*, *S. nana* spec. nov.) and another group with unbranched stems (*S. turqueti*, *S. glacialis*, *S. jaederholmi*).

Three species of *Schizotricha* are known to occur outside the antarctic region: *S. frutescens* (Ellis & Solander, 1786), *S. variabilis* (Bonnevie, 1899) and *S. profunda* (Nutting, 1900). *Schizotricha frutescens* is a well known species, easily recognizable by the presence of heteromerous hydrothecate internodes bearing up to five hydrothecae per internode. However, *S. variabilis* and *S. profunda* are two poorly known species of which the type material should be re-examined or new facts be published to establish their actual systematic position. Also, there are some doubts whether or not *Schizotricha profunda* belongs to the genus *Schizotricha*, since Nutting put this species into *Plumularia*, characterized by the unforked hydrocladia. Broch (1918) identified as *S. profunda* fertile material with forked hydrocladia and concluded that Nutting's specimens had unforked hydrocladia because they were young, infertile colonies. According to Nutting, however, the material was fertile and the colonies at least eight inches high.

Description

Schizotracha glacialis (Hickson & Gravely, 1907) (fig. 1)

Plumularia glacialis Hickson & Gravely, 1907: 22, pl. 3 figs 23-24.

Material examined.— ANT VIII-5 Stn 16-481, one colony 70 mm high, without gonothecae (RMNH Coel. no. 27753; 1 slide no. 3532).

Description.— Delicate colony, up to 70 mm high, provided with filiform hydro-rhiza of c. 20 mm. Stem polysiphonic over almost its full length. Diameter at base c. 1 mm.

Stem composed of main tube divided into internodes with hydro- and nematothecae, and several secondary, undivided tubes, only provided with nematothecae.

Each stem internode with large apophysis in the middle (provided with nematotheca), one hydrotheca at axil between apophysis and internode and three nematothecae: two flanking hydrothecal aperture, third below hydrotheca (fig. 1c); occasionally with second infrathecal nematotheca. Cauline apophyses supporting hydrocladia (fig. 1b).

Hydrocladia irregularly divided into internodes. Typically, internodes with one hydrotheca and three nematothecae: two flanking hydrothecal aperture and another under hydrotheca (fig. 1b, d-e). Double internodes often present, bearing two hydrothecae, of which each with two nematothecae flanking hydrothecal aperture and another below hydrotheca (fig. 1b).

Hydrocladia either unbranched or with single branching; in this case, secondary hydrocladium arising from first hydrothecate internode of primary hydrocladium. That internode with apophysis, supporting second-order hydrocladium and provided with nematotheca, hydrotheca at axil between internode and apophysis and four nematothecae: two flanking hydrothecal aperture and two under hydrotheca and inserted at different levels; occasionally only one nematotheca present under hydrotheca.

Hydrotheca large (fig. 1d-e), with length increasing along the hydrocladia; for example, length of abcauline wall may be 280 μ m in first unforked internode and 358 μ m in fifteenth. Adcauline hydrothecal wall completely adnate. Abcauline wall straight, slightly directed outwards and longer than adcauline wall; hydrothecal aperture consequently slightly tilted adcaudally.

All nematothecae are two-chambered (fig. 1g-h).

Remarks.— We have had the opportunity to examine the type series of *Plumularia glacialis* Hickson & Gravely, 1907, received on loan from The Natural History Museum, London (no. 1907.8.20.37, several colonies in alcohol and 5 slides, all from "East end of Ice Barrier, McMurdo Bay, Antarctica, Discovery, 29.i.1902"); 1 slide no. 3533 in RMNH, part of the type series) and to confirm that our material belongs to this species.

The type material is composed of several stem fragments without hydrocladia and two fragments, 70 and 47 mm high, with hydrocladia. A basal fragment, 73 mm high, has a small, flattened hydrorhiza. The stem, polisiphonic over almost its whole length, is composed of a tube divided into internodes, bearing hydro- and nemato-

Measurements (in μm)

	Polarstern material	Type material
Hydrothecae		
length abcauline wall (lateral view)	247-358	286-410
diameter at rim (frontal view)	189-208	202-247
Hydrocladial internodes		
length	820-935	771-984
diameter under hydrotheca	213	230-279
length of double internodes	1640-1771	1525-1886
Cauline internodes		
length	787-853	
diameter under apophysis	262-279	
Apophyses		
length	328-361	
diameter	180-213	
Nematothecae flanking hydrothecal rim		
length	117-124	130-137
maximum diameter	68-72	94-98
diameter at diaphragm	42	52-55
Nematocysts		
larger size group	19.6-22.1 \times 4.2-5.3 (21 \pm 0.7 \times 4.7 \pm 0.3)	18.9-21.7 \times 3.9-4.9 (20.6 \pm 0.8 \times 4.4 \pm 0.3) (n = 20)
smaller size group	c. 7.7 \times 2.1	c. 7 \times 1.8-2.1

thecae, and several undivided tubes only carrying nematothecae. Typically, each cauline internode carries one apophysis placed in the middle, a small hydrotheca at the axil between apophysis and internode and three or four nematothecae: two flanking the hydrothecal aperture and one or two under the hydrotheca. However, there are some double, cauline internodes bearing the double number of elements in the same arrangement. The apophyses are always alternately arranged and are provided with one nematotheca. The cauline apophysis gives rise to the hydrocladia that begins with a hydrothecate internode; an intermediate internode being absent. The primary hydrocladium gives rise, in its first internode, to one second-order hydrocladium (fig. 1a). The branched internodes bear one apophysis supporting the next hydrocladium, one hydrotheca at the axil of the bifurcation, and four nematothecae: two flanking the hydrothecal aperture and two under the hydrotheca. There is also another nematotheca on the apophysis supporting the secondary hydrocladium (fig. 1a).

The hydrocladia are divided into heteromerous internodes, because frequently there are double internodes (fig. 1a). The 'normal' internodes carry one hydrotheca and three nematothecae, two flanking the hydrothecal aperture and other below the hydrotheca (fig. 1a). The double internodes carry two hydrothecae, each one with the same number of associated nematothecae (fig. 1f).

The gonothecae arise between the hydrothecal base and the infrathecal nematotheca (fig. 1a). The female gonotheca (fig. 1i) is fusiform, with a subterminal aperture facing to the hydrocladium. There is a basal diaphragm delimiting a basal chamber that bears three nematothecae. The male gonotheca (fig. 1a, j) is also fusiform, though truncated distally and with a distal circular aperture.

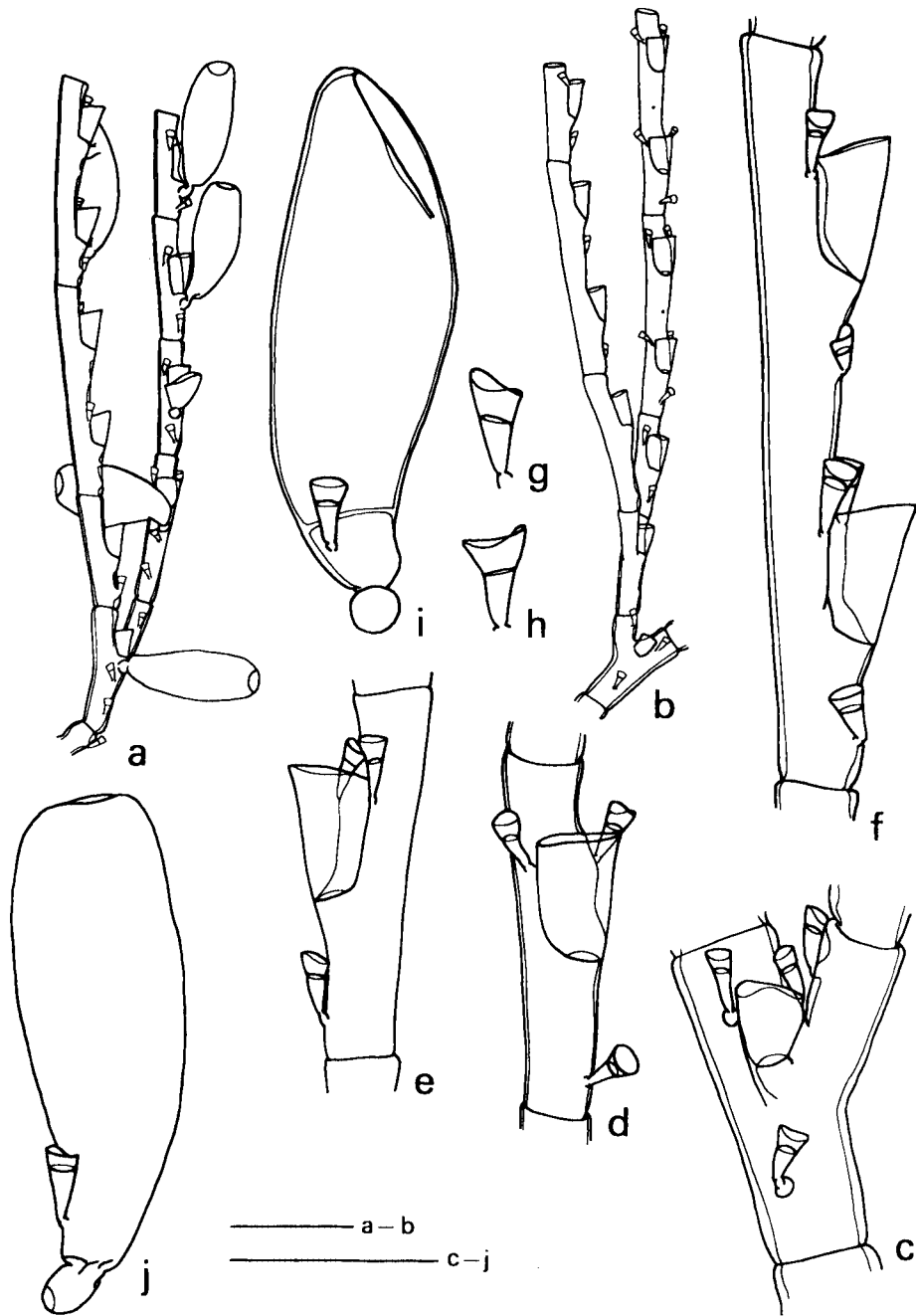


Fig. 1. *Schizotricha glacialis* (Hickson & Gravely, 1907); a-b, hydrocladial branching and hydrothecal disposition (in a with male gonothecae); c, cauline internode showing apophysis, hydrotheca and nematothecae; d-e, simple hydrocladial internodes with hydrotheca and nematothecae; f, double hydrocladial internode; g-h, nematothecae; i, female gonotheca; j, male gonotheca. Scale bars: a-b = 1 mm; c-f, i-j = 500 μ m; g-h = 250 μ m. (a, f, i-j, from type material; b-e, g-h, from ANT VIII-5 Stn 16-481).

After examining the type and Polarstern material we believe that *Schizotricha glacialis* (Hickson & Gravely, 1907) is a valid species, clearly distinguishable from the other species of the genus.

The differences with *Schizotricha turqueti* Billard, 1906, and *Schizotricha unifurcata* Allman, 1883, will be discussed below in the remarks following the description of those species.

Schizotricha multifurcata Allman, 1883, differs from *S. glacialis* by the branched stems, by the presence of an intermediate internode provided with two nematothecae following the cauline and hydrocladial apophyses, by the presence of hydrocladia of a lower order (up to the seventh order), by the presence of four or five infrathecal nematothecae on the forked internodes and by the presence of two infrathecal nematothecae on the unforked hydrocladial internodes.

Schizotricha anderssoni Jäderholm, 1904, after the revision of the type series by Peña Cantero & Vervoort (1996), is now known to share the presence of only secondary hydrocladia with *S. glacialis*. However, they have differences since Jäderholm's species has branched stems, from two to five nematothecae under the hydrotheca on the cauline internodes, typically three (but in some colonies up to six) infrathecal nematothecae on the hydrocladial internodes and, sometimes, two (but occasionally four) nematothecae above the hydrotheca. *Schizotricha anderssoni* also frequently has an intermediate internode at the base of the secondary hydrocladia, bearing two nematothecae, and it lacks the double internodes characterizing *S. glacialis*.

Schizotricha jaederholmi Peña Cantero & Vervoort, 1996, differs from *S. glacialis* in having up to fifth-order hydrocladia, three or four infrathecal nematothecae on the cauline internodes, two nematothecae on the cauline and hydrocladial apophyses and two infrathecal nematothecae on the unforked hydrocladial internodes and placed at different levels.

Ecology and distribution.— The type locality of *Schizotricha glacialis* is the Ross Sea; Hickson & Gravely (1907) recorded it from the 'East end of Barrier' at 180 m depth; the material was collected in January. The Polarstern material comes from 620 to 640 m depth, in the southern part of the Weddell Sea (off Ronne Ice Shelf).

Schizotricha turqueti Billard, 1906
(fig. 2)

Schizotricha turqueti Billard, 1906: 15-17, fig. 5a-c.

? *Schizotricha unifurcata*; Totton, 1930: 231, fig. 65a-f, pl. 3 fig. 4.

Schizotricha sp. 3 Peña Cantero, 1991: 203-205, pls 38, 61, 69 fig. c; Peña Cantero & García Carrascosa, 1994: 127, fig. 10h-k; 1996: 123-126, figs 55a-h, 56a-f, 65d.

Schizotricha sp. 4 Peña Cantero, 1991: 206-208, pls 39, 62, 69 fig. d; Peña Cantero & García Carrascosa, 1994: 127, fig. 9j-m; 1996: 126-129, figs 57a-g, 58a-e, 65e.

Material examined.— ANT VII-4 (Epos 3) Stn 211, four stems and some fragments up to 180 mm high, with gonothecae (RMNH Coel. no. 27755, 2 slides no. 3534; MNHN Hy no. 1186); ANT VII-4 (Epos 3) Stn 212, five stem fragments up to 110 mm high (RMNH Coel. no. 27756, 2 slides no. 3535, MNHN Hy no. 1187); ANT VIII-5 Stn 16-405, five stem fragments up to 110 mm high (RMNH Coel. no. 27757, 1 slide no. 3536; NHM no. 1996.1190).

Description.— Colonies fragmented; basal fragments with strongly developed

filiform hydrorhiza. In spite of fragmental condition stems seem to be unbranched, polysiphonic over almost all length, composed of main tube, divided into internodes and bearing hydro- and nematothecae, and a few undivided secondary tubes, only bearing nematothecae.

Each stem internode (fig. 2c) with apophysis, hydrotheca and nematothecae. Apophyses arising from middle of internodes, alternately arranged in two planes (at an angle of c. 90°) and giving rise to hydrocladia; each apophysis with one nematotheca. Hydrotheca situated at axil between apophysis and internode. Three nematothecae present, two flanking hydrothecal aperture and other under hydrotheca.

Hydrocladia only composed of hydrothecate internodes (fig. 2a). Hydrocladia of the sixth order have been observed; branching taking place at first hydrocladial internodes. Hydrocladium starting with branched internode, provided with long apophysis supporting second-order hydrocladium; first internode of this also branched in the same way, giving rise to tertiary hydrocladium and so on until hydrocladium of sixth order (fig. 2a). Each branched internode with hydrotheca at axil between apophysis and internode and four nematothecae: two flanking hydrothecal aperture and another two under hydrotheca, situated at different levels (the first forked internode occasionally provided with a single infrathecal nematotheca). Apophysis of branched hydrocladial internode longer than remaining internode and usually provided with two nematothecae situated at different levels (one of these at base of apophysis); in material from ANT VIII-5 Strn 16-405 only one nematotheca present.

Each unbranched hydrocladial internode typically with hydrotheca placed in middle of internode and three nematothecae, two flanking hydrothecal aperture and another below hydrotheca (fig. 2a, f-h).

Hydrotheca tubular (fig. 2f-h), length increasing along hydrocladia; for instance length of abcauline wall may be 260 µm in first unforked internode and 358 µm in fourteenth. Adcauline wall completely adnate; abcauline wall straight, though slightly directed outwards. Abcauline wall slightly longer than adcauline wall, consequently hydrothecal aperture tilted adcaudally. Hydrothecal aperture circular; rim even and smooth.

All nematothecae are two-chambered (fig. 2i-j).

Male gonothecae inserted on small apophysis arising at hydrothecal base of hydrocladial internodes. Gonotheca fusiform (fig. 2k), truncated distally and without distinct basal chamber; basal part provided with two nematothecae. Gonothecal aperture circular, situated at distal, truncated part.

Remarks.— We have had the opportunity to examine the type material of *Schizotricha turqueti* Billard, 1906, from Expédition Antarctique Française (1903-1905), Île Wandel, marée basse, type (Muséum National d'Histoire Naturelle, Paris; colony and one slide). The following description concerns this material. The colony, 200 mm high, is composed of an unbranched, polysiphonic stem. The hydrorhiza, little developed, is flattened basally (possibly for the attachment on a hard substrate). The stem is devoid of hydrocladia along the first 120 mm. On the remaining part of the stem nearly all hydrocladia are broken and only some of the first hydrocladial internodes are present.

Each cauline internode carries one apophysis, which gives rise to the hydrocladi-

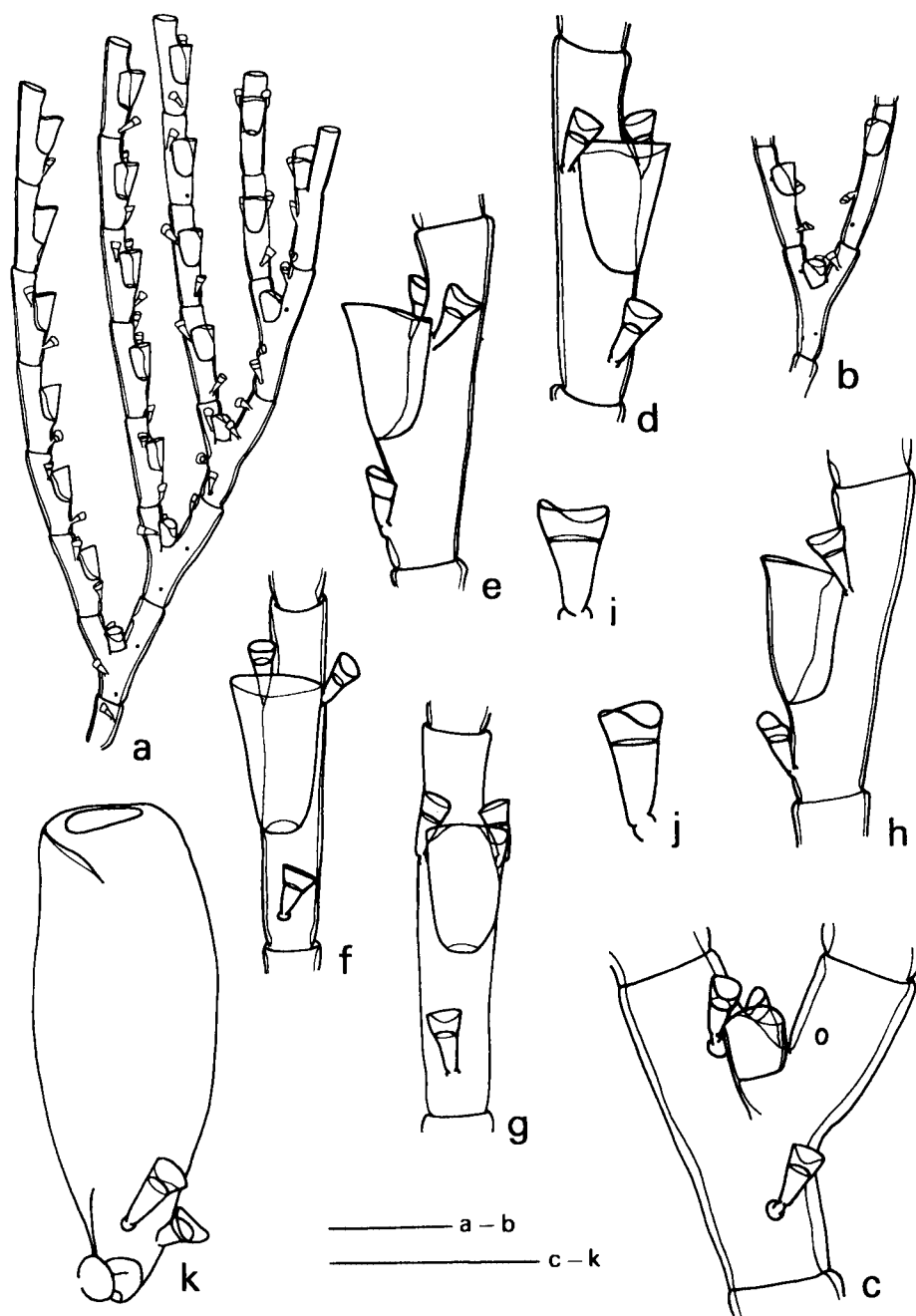


Fig. 2. *Schizotricha turqueti* Billard, 1906; a-b, hydrocladial branching and hydrothecal disposition; c, cauline internode showing apophysis, hydrotheca and nematotheca; d-h, hydrocladial internodes with hydrotheca and nematotheca; i-j, nematothecae; k, male gonotheca. Scale bars: a-b = 1 mm; c-h, k = 500 μ m; i-j = 250 μ m. (a, g-h, from ANT VII-4 (Epos 3) Stn 212; b, d-e, from type specimen; c, k, from ANT VII-4 (Epos 3) Stn 211; f, from ANT VIII-5 Stn 16-405).

Measurements (in μm)

	Polarstern material	Type material
Hydrothecae		
length abcauline wall (lateral view)	208-358	273-358
diameter at rim (frontal view)	195-221	195-228
Hydrocladial internodes		
length	672-722	656-836
diameter under hydrotheca	246	180-230
Cauline internodes		
length	787-820	
diameter under apophysis	279	
Apophyses		
length	328	
diameter	230-246	
Nematothecae flanking hydrothecal rim		
length	137	137-143
maximum diameter	91-94	88-94
diameter at diaphragm	55-59	49-52
Gonothecae		
length	948-1148	
maximum diameter	410-459	
diameter at aperture	164-180	
Nematocysts		
larger size group	21-22.1 \times 4.6-5.3 (21.5 \pm 0.4 \times 4.8 \pm 0.2)	21.7-25.2 \times 4.6-4.9 (23.7 \pm 1 \times 4.8 \pm 0.1) (n = 20)
smaller size group	c. 6.7-7 \times 2.1	c. 6.7-7 \times 1.8-2.1

um, a small hydrotheca and three or four nematothecae: two flanking the hydrothecal aperture and one or two under the hydrotheca.

The cauline apophyses bear one nematotheca and support the hydrocladia. The first hydrocladial internode is forked; there is no intermediate internode as was stated by Billard (1906). That first internode carries an apophysis provided with a nematotheca and bearing the secondary hydrocladium; a small hydrotheca occurs at the axil of the bifurcation and there are three or four nematothecae: two flanking the hydrothecal aperture and one or two below the hydrotheca (fig. 2b). Twice second-order hydrocladia give rise to a third-order hydrocladium at their first internode. The first internode of the primary hydrocladium may carry one infrathecal nematotheca, whereas the first internode of the secondary hydrocladium is longer and always carries two nematothecae, indicating that possibly it may give rise to a tertiary hydrocladium, as it has been observed on two occasions.

The characteristic, unforked hydrocladial internodes (fig. 2d-e) bear a hydrotheca and three nematothecae: two flanking the hydrothecal aperture and a single infrathecal nematotheca. The hydrotheca is deep (fig. 2d-e), with the adcauline wall completely adnate and the abcauline wall slightly directed outwards.

Billard (1906) mentioned the presence of an intermediate internode, provided with a nematotheca, following the hydrocladial apophyses. However, we have not observed any intermediate internode following the cauline or hydrocladial apophy-

ses. The hydrocladia have numerous repaired internodes (up to three times consecutively), some with a nematotheca. Billard may have confused one of these internodes with the characteristic intermediate internode present in other species of *Schizotricha* (e.g. *S. unifurcata* Allman, 1883). Examination of the available type material leaves no doubt that there is no intermediate internode. When the basal part of a secondary hydrocladia is present, the first internode is a normal one, provided with a hydrotheca. If an ahydrothecate internode occurs this is clearly repaired or repairing internode; the type colony is characterized by the high number of those internodes.

The study of the type material of *Schizotricha turqueti* Billard, 1906, demonstrates no distinct differences between that species and the Polarstern material described above and we consider it to belong to Billard's species. The few differences concern the constant presence of a single infrathecal nematotheca on the cauline internodes and hydrocladia up to the sixth order in the Polarstern material, whereas in Billard's species there are one or two nematothecae and up to third-order hydrocladia.

Schizotricha glacialis (Hickson & Gravely, 1907) is allied to *S. turqueti*, though differences occur in the presence of double internodes in the stem and hydrocladia of *S. glacialis*; in that species there are only second-order hydrocladia and the largest nematocysts are smaller ($18.9\text{--}21.7 \times 3.9\text{--}4.9 \mu\text{m}$). Though the differences between both species are few we prefer to maintain them, the presence of double internodes being considered an important character.

Schizotricha turqueti differs from *S. unifurcata* Allman, 1883, *S. multifurcata* Allman, 1883, and *S. anderssoni* Jäderholm, 1904, by the absence of an intermediate internode following the cauline and hydrocladial apophysis. Those species also have branched stems. Moreover, *S. multifurcata* and *S. anderssoni* have more than one infrathecal nematotheca in the unforked hydrocladial internodes. Whereas in *S. turqueti* there are one or two infrathecal nematothecae on the cauline internodes, there are two or three nematothecae in *S. unifurcata*, from two to five in *S. anderssoni* and four or five in *S. multifurcata*.

Schizotricha jaederholmi Peña Cantero & Vervoort, 1996, differs from *S. turqueti* by the presence of two infrathecal nematothecae arranged at different levels on the unforked hydrocladial internodes, three or four infrathecal nematothecae on the cauline internodes and two nematothecae on the cauline and hydrocladial apophyses.

Totton (1930) assigned to *Schizotricha unifurcata* a species agreeing with Allman's species in the presence of a single infrathecal nematotheca on the unforked hydrocladial internodes, but differing by the absence of the intermediate internode. Both characters are also present in the colonies of *S. turqueti*. Totton's material is also allied with *S. turqueti* by the frequent presence of one or two nematothecae on the hydrocladial apophysis and the typical presence of two infrathecal nematothecae on the forked hydrocladial internodes: Totton pointed out that typically there is a nematotheca on the proximal part of the apophyses, but 'it being quite usual to find a second one on the distal part of the apophysis of the basal articles' (Totton, 1930: 232). He also said that there are two infrathecal nematothecae on the forked hydrocladial internodes, though on the proximal and older regions of a branch one or two additional infrathecal nematothecae may be present. They also share the presence of a large number of lower-order hydrocladia. It seems likely that Totton's material belongs to *S. turqueti*. Unfortunately, Totton did not give a description of the cauline

internodes and we therefore consider its conspecificity with Billard's species doubtful.

Peña Cantero (1991) described as *Schizotricha* sp. 3 and *Schizotricha* sp. 4 two species that we consider conspecific with *S. turqueti*, agreeing in all features: unbranched stem, one infrathecal nematotheca on the unforked hydrocladial internodes and on the cauline internodes, absence of intermediate internode, one or two infrathecal nematothecae on the forked hydrocladial internodes, one or two nematothecae on the hydrocladial apophyses and a great number of lower-order hydrocladia (up to the sixth-order). Also the size of the largest nematocysts ($21\text{--}21.7 \times 4.2\text{--}4.9 \mu\text{m}$) is similar to that found in the Polarstern material.

Ecology and distribution.— *Schizotricha turqueti* seems to be a shelf species. It had been recorded from the intertidal zone (Billard, 1906) to a depth of 261 m (Peña Cantero, 1991). The Polarstern material was collected from 213 to 330 m depth. It has been found on bottoms of gravel and pebbles with mud (Peña Cantero, 1991) and on muddy bottoms (present material). *Schizotricha turqueti* has been found with gonothecae in January (Peña Cantero, 1991; Polarstern material).

The type locality of *Schizotricha turqueti* is Booth-Wandel Island (Billard, 1906). Peña Cantero (1991) recorded it off Elephant Island (South Shetland Islands). Our material also comes from off Elephant Island and from the southern part of the Weddell Sea (off Ronne Ice Shelf).

Schizotricha unifurcata Allman, 1883
(fig. 3)

Schizotricha unifurcata Allman, 1883: 28, pl. 8 figs 1-3.

Polyplumaria unifurcata Billard, 1910: 41, fig. 18.

Schizotricha unifurcata; Stechow, 1925: 498-499; Naumov & Stepan'jants, 1962: 102; 1972: 54, fig. 15b; Millard, 1977: 43.

Not *Schizotricha unifurcata*; Totton, 1930: 231, fig. 65a-f, pl. 3 fig. 4 (= ? *Schizotricha turqueti* Billard, 1906).

Not *Schizotricha unifurcata* var. *turqueti*; Briggs, 1938: 42 (= *Schizotricha nana* spec. nov.).

Not *Schizotricha unifurcata*; Blanco, 1967: 282, pl. 5 figs 1-7, pl. 6 figs. 1-3; 1984: 48, pl. 43 fig. 101, pl. 44 figs 102-103, pl. 45 figs 104-105, pl. 46 figs 106-107, pl. 47 figs 108-109; Blanco & De Miralles, 1972: 21, pl. 5 figs 34-40.

Not *Schizotricha unifurcata*; Peña Cantero, 1991: 187-196, pl. 35 figs a-h, pl. 68 fig. d; Peña Cantero & García Carrascosa, 1994: 126, fig. 9a-d; 1996: 111-116, figs 50a-h, 65a (= *Schizotricha multifurcata* Allman, 1883).

Material examined.— ANT VIII-5 Stn 16-496, one fragmented colony ca 400 mm high, with gonothecae (RMNH Coel. no. 27759, 3 slides no. 3538).

Description.— Colony fragmented, strongly polysiphonic over almost all its length and c. 400 mm high. Colour of stem and hydrocladia brown, though stem darker. Largest fragment c. 200 mm high, corresponding to basal part of colony, and provided with little developed filiform hydrorhiza consisting of thin stolons. A further fragment, c. 70 mm high, has distal branching.

Stem composed of axial main tube, divided into thecate internodes bearing hydrothecae and nematothecae, and several undivided tubes growing upwards

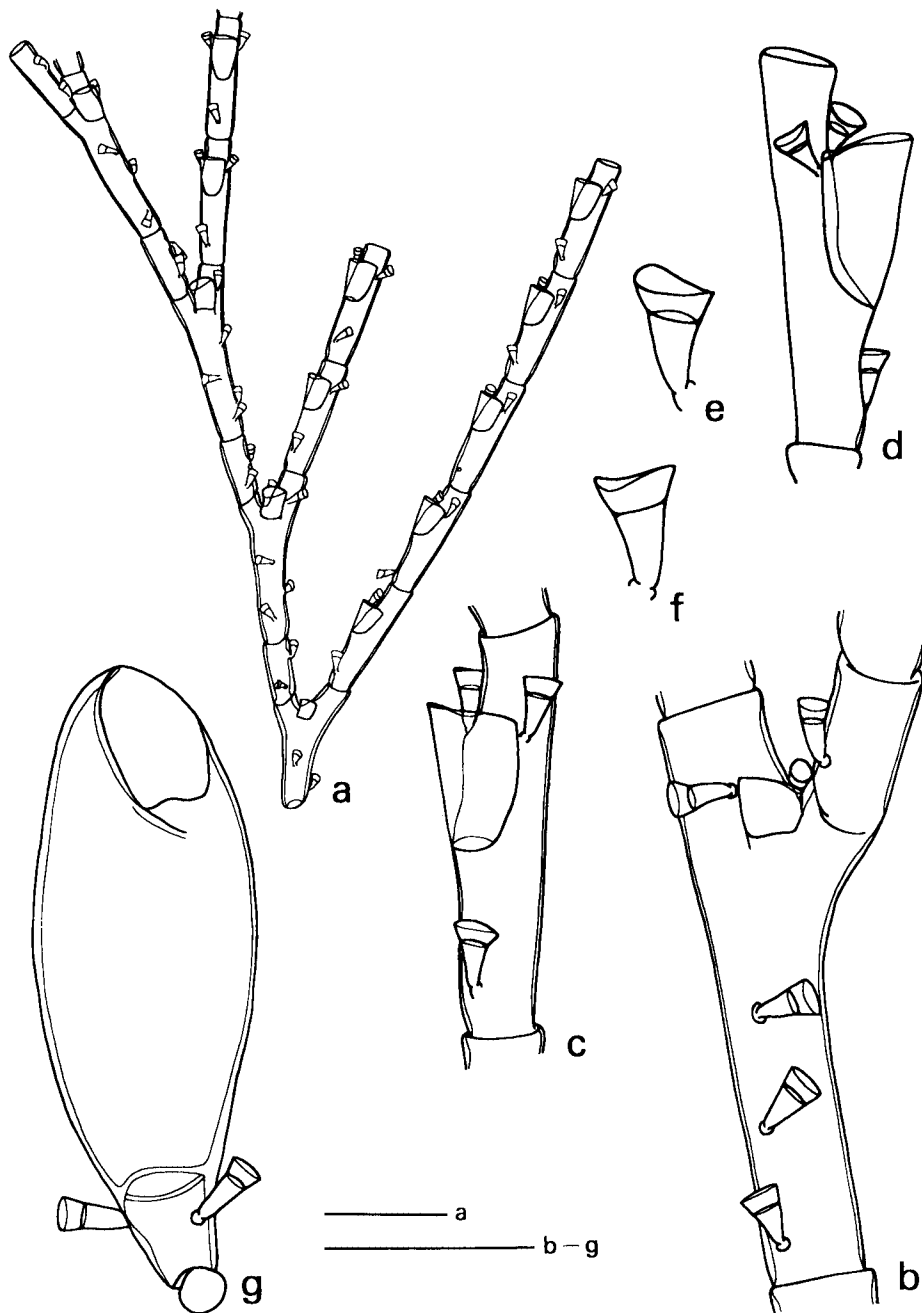


Fig. 3. *Schizotricha unifurcata* Allman, 1883; a, hydrocladial branching and hydrothecal disposition; b, cauline internode showing apophysis, hydrotheca, nematothecae and intermediate internode; c-d, hydrocladial internodes with hydrotheca and nematothecae; e-f, nematothecae; g, female gonotheca. Scale bars: a = 1 mm; b-d, g = 500 µm; e-f = 250 µm. (All drawings from ANT VIII-5 Stn 16- 496).

Measurements (in μm)

Hydrothecae		
length abcauline wall (lateral view)		195-390
diameter at rim (frontal view)		189-273
Hydrocladial internodes		
length		820-951
diameter under hydrotheca		262
Cauline internodes		
length		1017-1443
diameter under apophysis		246-295
Apophyses		
length		131
diameter		164
Nematothecae flanking hydrothecal rim		
length		130
maximum diameter		81-85
diameter at diaphragm		55-59
Gonothecae		
length		1345-1410
maximum diameter		426-508
diameter at aperture		295-328
diameter at diaphragm		230-246
length basal chamber		246-262
Nematocysts		
larger size group	22.4-24.5 \times 4.2-5.6	(23.4 \pm 0.8 \times 4.8 \pm 0.3) (n = 20)
smaller size group		c. 7-7.7 \times 2.1

along main tube and only provided with nematothecae.

Stem internodes long (fig. 3b), typically with short apophysis at distal third, small hydrotheca at axil between apophysis and internode and four or five nematothecae: two flanking hydrothecal aperture, one on each side, and two or three below hydrotheca.

Apophyses alternately arranged in two planes forming an obtuse angle. Apophyses supporting hydrocladia, these beginning with short ahydrothecate internode provided with two nematothecae situated at different levels (fig. 3b). Second hydrocladial internode hydrothecate and branched, with short apophysis giving rise to secondary hydrocladium. Second-order hydrocladium also starting with short ahydrothecate internode with two nematothecae. Further branchings occurring in same way (fig. 3a); up to seventh-order hydrocladia observed.

Branched hydrocladial internodes with hydrotheca at axil between apophysis and internode and four to six nematothecae: two flanking hydrothecal aperture and two to four under hydrotheca at different levels (fig. 3a).

Unbranched hydrocladial internodes typically with hydrotheca and three nematothecae: two flanking hydrothecal aperture, one on each side, and third below hydrotheca (fig. 3a, c-d).

Hydrotheca large and deep (fig. 3c-d) with length increasing along hydrocladium; for example length of abcauline wall may be 254 μm in first unforked internode and 377 μm in twenty-third. Adcauline wall completely adnate. Abcauline wall

straight and slightly directed outward. Abcauline wall longer than adcauline one, consequently hydrothecal aperture slightly tilted adcaudally.

Number of infrathecal nematothecae on branched hydrocladial internodes probably related to length of internode: four nematothecae present on the longest internodes, two on the shortest. All nematothecae two-chambered (fig. 3e-f).

Gonothecae inserted on short apophysis arising from hydrocladial internodes below hydrotheca. Female gonotheca (fig. 3g) fusiform with subterminal, kidney-shaped aperture and basal chamber delimited by circular diaphragm situated at basal fifth. Two or three nematothecae on basal chamber. Typically one gonotheca per internode, but frequently two.

Remarks.— *Schizotricha unifurcata* has been considered a variable species by many authors that have synonymized it with other antarctic species of *Schizotricha*. As stated above we now consider *Schizotricha* to include several antarctic species that present constant diagnostic features and are easily recognizable.

Schizotricha multifurcata Allman, 1883, is closely related to *S. unifurcata*. They share the branched stems, the presence of an intermediate internode following the cauline and hydrocladial apophysis, and the repeatedly forked hydrocladia. They differ by the constant presence of a single infrathecal nematotheca on the unforked hydrocladial internodes in *S. unifurcata* (in *S. multifurcata* there are two arranged at different levels) and by the presence of a higher number (four or five) of infrathecal nematothecae on the forked hydrocladial internodes in *S. multifurcata*.

Schizotricha anderssoni Jäderholm, 1904, shares with *S. unifurcata* the presence of branched stems, but Jäderholm's species mainly differs from *S. unifurcata* by the presence of three to six infrathecal nematothecae and up to four suprathecal nematothecae on the unforked hydrocladial internodes, by the presence of secondary hydrocladia only and by the absence of the intermediate internode following the cauline apophysis, though it may be present at the base of the secondary hydrocladia.

Schizotricha turqueti Billard, 1906, shares with *S. unifurcata* the presence of a single infrathecal nematotheca on the unforked hydrocladial internodes. Nonetheless there are large differences, since in *S. turqueti* the stem is unbranched and there is no intermediate internode following the cauline and hydrocladial apophyses. Also, in *S. turqueti* there are only one or two infrathecal nematothecae on the cauline internodes, whereas in *S. unifurcata* there are two or three.

Schizotricha glacialis (Hickson & Gravely, 1907) shares with *S. unifurcata* the presence of one infrathecal nematotheca on the unforked hydrocladial internodes. However, in *S. glacialis* the stem is unbranched, there are only secondary hydrocladia, there is no intermediate internode following the cauline and hydrocladial apophyses and there are only one or two infrathecal nematothecae on the cauline and forked hydrocladial internodes. They also differ in the size of the nematocysts which are smaller in *S. glacialis* [$18.9\text{--}21.7 \times 3.9\text{--}4.9$ ($20.6 \pm 0.8 \times 4.4 \pm 0.3$)].

Schizotricha jaderholmi Peña Cantero & Vervoort, 1996, differs from *S. unifurcata* by the unbranched stems, the absence of intermediate internode and the presence of two infrathecal nematothecae on the unforked hydrocladial internodes.

We believe that the material described as *Schizotricha unifurcata* by Blanco (1967; 1984) and Blanco & De Miralles (1972) does not belong to Allman's species, since it

presents considerable differences as for instance the lack of an intermediate internode following the cauline and/or hydrocladial apophyses. It is impossible, however, to evaluate the exact taxonomic position of this material without its re-examination or the study of a more comprehensive material.

Ecology and distribution.— *Schizotricha unifurcata* had been collected from 15 m (Millard, 1975) to 567 m depth (Stechow, 1925). The Polarstern material was collected at 80 m depth. Allman (1883) found it on volcanic mud. He found fertile colonies in January, Stechow (1925) in November and Millard (1977) in April; our material was collected in February.

The type locality is Kerguelen Island (Allman, 1883). Later it has been recorded from several subantarctic localities: Stechow (1925) found it off Bouvet Island (54°29'S 03°30'W), Naumov & Stepan'yants (1962) off Kerguelen Island and Millard (1977) off Hear, McDonald and Kerguelen Islands. Our material comes from the eastern part of the Weddell Sea (off Atka Iceport).

Schizotricha nana spec. nov.
(figs 4, 5)

Schizotricha turqueti; Vanhöffen, 1910: 337, fig. 49a-b; Stepan'yants, 1972: 73, fig. 18; Naumov & Stepan'yants, 1972: 73, fig. 18.

Schizotricha unifurcata turqueti Stepan'yants, 1979: 116, pl. 22 fig. 1.

? *Schizotricha unifurcata* var. *turqueti*; Briggs, 1938: 42.

Material examined.— ANT VIII-5 Stn 16-454, strongly fragmented colony, up to 170 mm high, with gonothecae (holotype, RMNH Coel. no. 27760, 3 slides no. 3539; NHM no. 1996.1191, part of the type series); ANT VIII-5 Stn 16-496, one colony up to 110 mm high, with gonothecae (paratype, RMNH Coel. no. 27761, 2 slides no. 3540); ANT IX-3 Stn 179, five fragments up to 70 mm high (RMNH Coel. no. 27762, 2 slides no. 3541; MNHN Hy no. 1188).

Description.— Branched colonies (fig. 5), of dark brown colour and strongly polysiphonic over almost all its length; basal diameter c. 3 mm. Colony repeatedly branched more or less in one plane (fig. 5); at least with third-order stems. All colonies truncated basally, without remains of hydrorhiza.

Stems composed of axial tube, divided into thecate internodes, bearing hydrothecae and nematothecae and several undivided secondary tubes growing upwards around main tube and only provided with nematothecae. Secondary tubes decreasing in number towards top of colonies leaving main tube alone.

Each stem internode (fig. 4b) with short apophysis near distal end supporting hydrocladium; apophyses alternately arranged in two planes, with an angle of c. 90°. Small hydrotheca present at axil between apophysis and internode; two nematothecae flank hydrothecal aperture, one on each side. One, occasionally two, nematothecae occur below hydrotheca (fig. 4b).

Hydrocladia short, scarcely developed; typically with single branching or unbranched. Hydrocladia inserted on cauline apophyses and divided into internodes. First internode short, without hydrotheca but provided with a nematotheca (fig. 4a-b). Next internode hydrothecate and with short apophysis at distal third supporting secondary hydrocladium. Branched internodes with small hydrotheca at axil

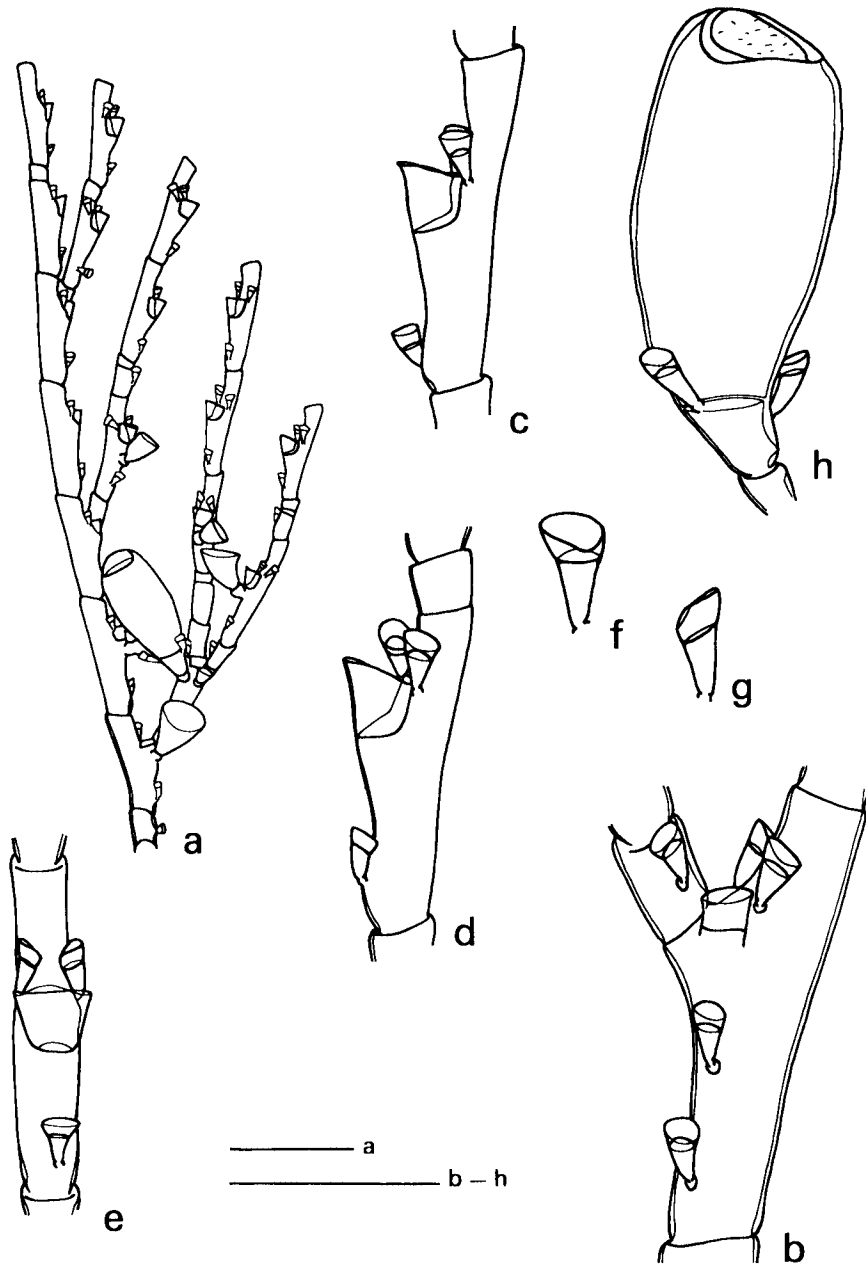


Fig. 4. *Schizotricha nana* spec. nov.; a, hydrocladium becoming a secondary stem (with male gonothecae); b, cauline internode showing apophysis, hydrotheca, nematothecae and intermediate internode; c-e, hydrocladial internodes with hydrotheca and nematothecae; f-g, nematothecae; h, female gonotheca. Scale bars: a = 1 mm; b-e, h = 500 µm; f-g = 250 µm. (a-b, d-h, from ANT VIII-5 Stn 16-454, holotype; c, from ANT VIII-5 Stn 16-496, paratype).

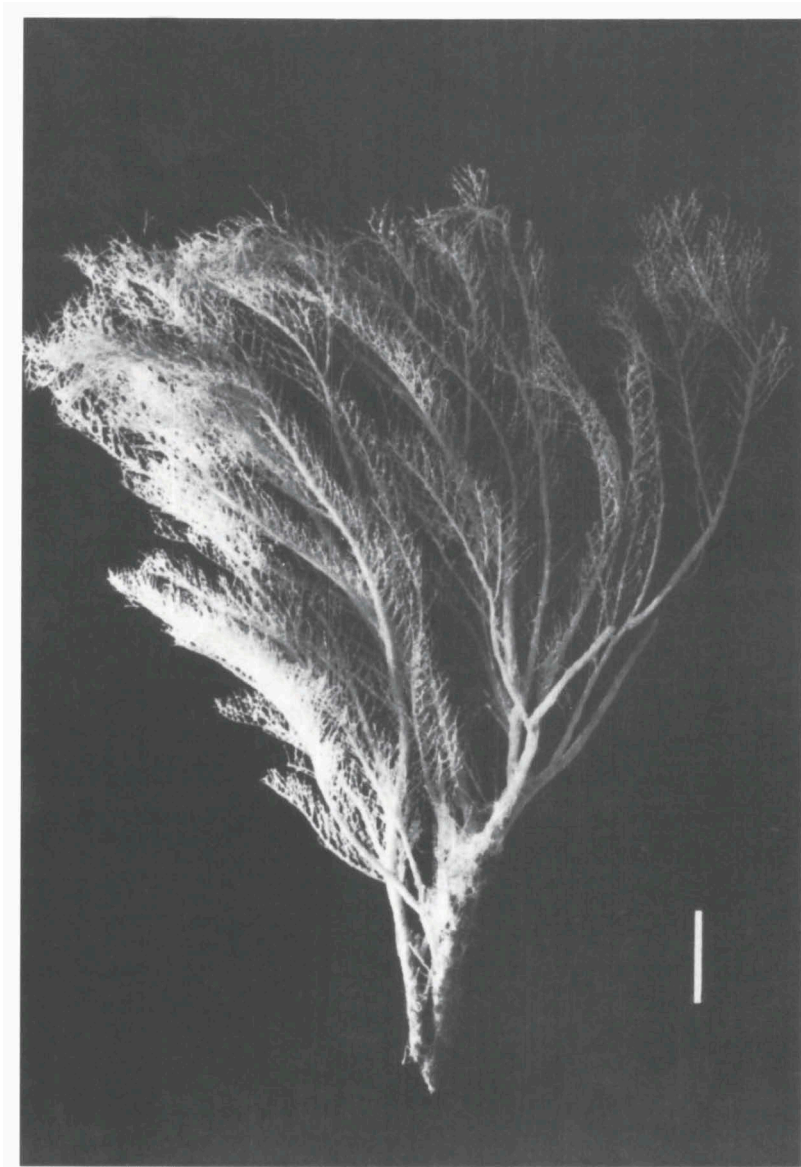


Fig. 5. *Schizotricha nana* spec. nov., paratype, Polarstern ANT VIII-5 Stn 16-496, general view of the colony. Scale bar: 10 mm.

between apophysis and internode, two nematothecae flanking hydrothecal aperture, one on each side, and one nematotheca below hydrotheca. Secondary hydrocladium, as first one, beginning with short ahydrothecate internode provided with nematotheca. Sometimes second-order hydrocladium originating a tertiary hydrocladium at its first hydrothecate internode (fig. 4a).

Often primary hydrocladium becoming stem of lower order by increasing its length, becoming polysiphonic, and giving rise to other secondary hydrocladia, first

Measurements (in μm)

Hydrothecae		
length abcauline wall (lateral view)		85-169
diameter at rim (frontal view)		163-202
Hydrocladial internodes		
length		804-886
diameter under hydrotheca		197-279
Cauline internodes		
length		853-918
diameter under apophysis		213-230
Intermediate internode		
length		246-279
diameter		148-164
Nematothecae flanking hydrothecal rim		
length		111-114
maximum diameter		81-88
diameter at diaphragm		39-49
Gonothecae		
length		1099-1148
maximum diameter		426-476
diameter at aperture		295-328
diameter at diaphragm		215-241
length basal chamber		182-228
Nematocysts		
larger size group	16.1-20.3 \times 4.2-5.6	(18.3 \pm 1.2 \times 4.8 \pm 0.3) (n = 20)
smaller size group		c. 7-7.7 \times 1.8-2.1

at uneven hydrothecate internodes, but later also at even ones. In this way, secondary hydrocladia become primary hydrocladia of new stems and give rise to new second-order hydrocladia (fig. 4a).

Unbranched hydrocladial internodes typically with hydrotheca and three nematothecae: two flanking hydrothecal aperture, one on each side; third below hydrotheca (fig. 4c-e). Hydrotheca low and normally situated on distal half of internode; length slightly increasing along hydrocladia (for example length of abcauline wall may be 117 μm in first, unforked internode and 163 μm in sixth). Abcauline wall straight, but slightly directed outwards, longer than adcauline wall, hydrothecal aperture consequently slightly directed adcaudally (fig. 4c-d).

All nematothecae are two-chambered (fig. 4f-g).

Gonothecae inserted on short apophysis arising from hydrocladial internodes below hydrotheca (fig. 4a). Female gonotheca (fig. 4h) pear-shaped with distal aperture and basal chamber delimited by circular diaphragm situated at basal fifth. Aperture circular and closed by one-valved, circular operculum. Two or three nematothecae present on basal chamber.

Remarks.— Vanhöffen (1910) assigned to *Schizotricha turqueti* Billard, 1906, a few fragments of a species having much smaller hydrothecae than those of Billard's species.

Briggs (1938) also found a species that he considered conspecific with that found by Vanhöffen, though he presented neither description nor measurements that allow

us to determine its actual systematic position. However, Briggs stated that the shape of the hydrothecae and their dimensions were in exact agreement with Vanhöffen's specimens.

Later Stepan'yants (1972) and Naumov & Stepan'yants (1972) assigned to Billard's species new material, also characterized by small hydrothecae (and the presence of intermediate internodes). Naumov & Stepan'yants also indicated that the stem is branched and that some hydrocladia may give rise to secondary branches. Finally, Stepan'yants (1979), described as *S. unifurcata turqueti* the same material.

During the study of the Polarstern material we found several colonies of a species that differs completely from the remaining species of the genus. These colonies are described here as a new species, *Schizotricha nana* spec. nov. We believe that the above-mentioned material referred to *S. turqueti* Billard, 1906, by Vanhöffen (1910), Briggs (1938), Naumov & Stepan'yants (1972) and Stepan'yants (1972; 1979) must also be brought to this new species.

Schizotricha nana spec. nov. is clearly distinguishable from the other species of the genus by the small hydrothecae. Moreover, it has other differences.

It shares with *S. unifurcata* Allman, 1883, *S. multifurcata* Allman, 1883, and *S. anderssoni* Jäderholm, 1904, the presence of branched stems. It also shares with the two first named species the constant presence of an intermediate internode following the cauline and hydrocladial apophysis, though in *S. nana* spec. nov. this internode is shorter and is provided with a single nematotheca. *Schizotricha anderssoni* may have an intermediate internode at the base of the secondary hydrocladia. Nevertheless, *S. nana* spec. nov. differs from those species by the hydrothecal size and the number of nematothecae on the unforked hydrocladial internodes, since *S. multifurcata* has two infrathecal nematothecae and *S. anderssoni* has three to six infrathecal and up to four suprathecal nematothecae (*S. unifurcata* only presents one infrathecal nematotheca).

From the other species [*Schizotricha turqueti* Billard, 1906, *S. glacialis* (Hickson & Gravely, 1907) and *S. jaderholmi* Peña Cantero & Vervoort, 1996] the differences are even larger, since they have unbranched stems and lack the intermediate internode following the cauline and hydrocladial apophysis.

There are also differences in the size of the larger size group nematocysts: whereas they measure $17.5\text{--}18.2 \times 4.9\text{--}5.6 \mu\text{m}$ in *Schizotricha nana* spec. nov., they measure $22.4\text{--}24.5 \times 4.2\text{--}5.3 \mu\text{m}$ in *S. unifurcata*, $18.9\text{--}21.7 \times 3.9\text{--}4.9 \mu\text{m}$ in *S. glacialis* and $21.7\text{--}25.2 \times 4.6\text{--}4.9 \mu\text{m}$ in *S. turqueti*.

Ecology and distribution.— *Schizotricha nana* spec. nov. seems to be a shelf species. It has been collected from 43 m (Stepan'yants, 1972) to 385 m depth (Vanhöffen, 1910). The Polarstern material was collected from 80 to 280 m depth. Stepan'yants (1979) indicated that the colonies were found on sandy, stony and rocky bottoms. Vanhöffen (1910) found fertile material, though he did not specify the period. In the Polarstern material fertile colonies were collected in January and February.

Schizotricha nana spec. nov. seems to have a circumantarctic distribution. It had been recorded by Vanhöffen (1910) from Gauss Station ($65^{\circ}21'S$ $86^{\circ}06'E$), by Briggs (1938) from the Davis Sea ($65^{\circ}42'S$ $92^{\circ}10'E$), by Stepan'yants (1972) also from the Davis Sea and by Naumov & Stepan'yants (1972) from off Adélie Coast. Our material comes from the eastern part of the Weddell Sea (off Cape Norvegia, Atka Iceport and Fimbul Ice Shelf).

Etymology.— The specific name *nana* has been taken from the latin adjective 'nanus' meaning little, and refers to the small size of the hydrothecae.

Schizotricha spec.
(fig. 6)

Material examined.— ANT VII-4 (Epos 3) Stn 261, three stem fragments up to 125 mm high (RMNH Coel. no. 27763, 1 slide no. 3542; MNHN no. 1189).

Description.— One stem fragment provided with small, disk-shaped hydrorhiza. Fragments with only a few hydrocladia.

Stem polysiphonic, composed of main tube, divided into internodes bearing hydro- and nematothecae and several secondary tubes, undivided and bearing nematothecae.

Each stem internode (fig. 6b) provided with apophysis, hydrotheca and three nematothecae. Apophyses alternately arranged in two planes (angle slightly larger than 90°), long, with nematotheca and giving rise to hydrocladia. Hydrotheca situated at axil between apophysis and internode. Two nematothecae flanking hydrothecal aperture, another under hydrotheca.

Hydrocladia divided into hydrothecate internodes; no intermediate internodes (fig. 6a). Up to fourth-order hydrocladia present. Cauline apophysis followed by first internode of primary hydrocladium; this internode branched, provided with apophysis bearing secondary hydrocladium, hydrotheca situated at axil between apophysis and internode, and three or four nematothecae, two flanking hydrothecal aperture and one or two below hydrotheca at different levels. Lower-order hydrocladia arising in the same way from first internode of preceding hydrocladia.

Each unbranched hydrocladial internode with hydrotheca and three nematothecae: two flanking hydrothecal aperture and another under hydrotheca (fig. 6c-f).

Hydrotheca tubular, long and thin, situated on distal half of internode. Length increasing along hydrocladia; for instance length of abcauline wall may be 325 µm in first unforked internode and 384 µm in tenth. Abcauline wall straight, though directed outwards. Hydrothecal aperture circular and perpendicular to longitudinal axis of internode; rim even and smooth (fig. 6c-f).

All nematothecae are two-chambered (fig. 6g-h).

Remarks.— *Schizotricha* spec. is allied to *Schizotricha turqueti* Billard, 1906, by the unbranched stem, by the presence of a single infrathecal nematotheca in the unforked hydrocladial internodes and by the presence of several lower-order hydrocladia. They differ, however, by the shape and size of the hydrothecae, being larger in *Schizotricha* spec. (in this species the length of the abcauline hydrothecal wall of the first unforked internode may be 325 µm, whereas in *S. turqueti* it may be 260 µm). Both species might be conspecific, but the available material is scarce and the larger size of the hydrothecae and the unknown structure of the gonothecae currently prevent us from including it in *S. turqueti*.

The differences with the remaining species of the genus are larger. It differs from *S. unifurcata* Allman, 1883, *S. multifurcata* Allman, 1883, *S. anderssoni* Jäderholm, 1904, and *S. nana* spec. nov. by the unbranched stem and the absence of an intermediate

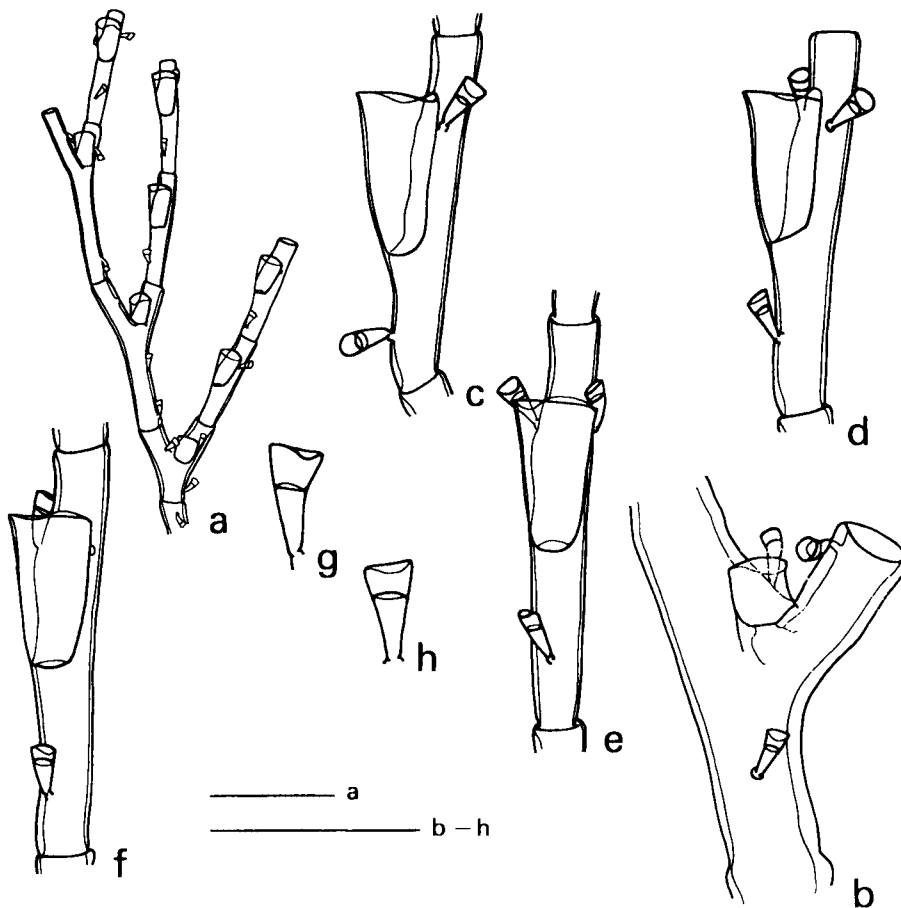


Fig. 6. *Schizotricha* spec.; a, hydrocladial branching and hydrothecal disposition; b, cauline internode showing apophysis, hydrotheca and nematotheca; c-f, hydrocladial internodes with hydrotheca and nematotheca; g-h, nematothecae. Scale bars: a = 1 mm; b-f = 500 μ m; g-h = 250 μ m. (All drawings from ANT VII-4 Stn 261).

internode following the cauline and/or hydrocladial apophyses. Also, *S. multifurcata* and *S. anderssoni* differ by the greater number of nematothecae. *Schizotricha nana* spec. nov. also presents a completely different hydrothecal morphology, having short hydrothecae. *Schizotricha* spec. shares with *S. unifurcata* the presence of a single infrathecal nematotheca in the unforked hydrocladial internodes and the size of the nematocysts ($22.4\text{--}24.5 \times 4.2\text{--}5.3 \mu\text{m}$ in *S. unifurcata*).

Schizotricha spec. differs from *S. glacialis* (Hickson & Gravely, 1907) by the presence of double internodes and only secondary hydrocladia in *S. glacialis*. The size of the nematocysts is also different, being smaller in *S. glacialis* ($18.9\text{--}21.7 \times 3.9\text{--}4.9 \mu\text{m}$).

Schizotricha jaederholmi Peña Cantero & Vervoort, 1996 differs from *Schizotricha* spec. by the presence of two infrathecal nematothecae in the unforked hydrocladial

Measurements (in μm)

Hydrothecae		
length abcauline wall (lateral view)		247-384
diameter at rim (frontal view)		195-215
Hydrocladial internodes		
length		754-918
diameter under hydrotheca		148-164
Cauline internodes		
length		820-1017
diameter under apophysis		230
Apophyses		
length		328-361
diameter		180-197
Nematothecae flanking hydrothecal rim		
length		114-130
maximum diameter		59-65
diameter at diaphragm		39-42
Nematocysts		
larger size group	21-23.8 \times 5.3-5.6	(22.6 \pm 1 \times 5.5 \pm 0.2) (n = 20)
smaller size group		c. 6.3 \times 2.1

internodes, three or four infrathecal nematothecae in the cauline internodes and two nematothecae in the cauline and hydrocladial apophyses.

Ecology and distribution.— The colony of *Schizotricha* spec. was collected at 799 m depth in the eastern part of the Weddell Sea (off McDonald Ice Rumples).

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