The genus *Sertularella* Gray, 1848 (Cnidaria: Hydroida) along the coasts of Galicia (Spain)

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Species of the genus *Sertularella* from the coasts of Galicia (Atlantic coast of Spain) have been studied and 5 species, *S. gayi* (Lamouroux, 1821), *S. polyzonias* (Linnaeus, 1758), *S. ellisii* (Deshayes & Milne-Edwards, 1836), *S. fusiformis* (Hincks, 1861), and *S. mediterranea* Hartlaub, 1901, are recognized, described, and their synonymy discussed. Notes are added on two species of which the names occur repeatedly in European hydroid literature but that in our opinion belong in the southern Atlantic fauna: *S. gaudichaudi* (Lamouroux, 1824) and *S. picta* (Meyen, 1834).

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Introduction

The genus *Sertularella* is a problematic genus of Hydroida that has given rise to numerous discussions between the various authors that in the course of time have tackled its intricacies.

The first revision of the genus is that by Hartlaub (1901), giving an important enumeration of all species of *Sertularella* described until that date, occasionally with discussions of the validity of certain species. Besides numerous general publications on the taxonomy of hydroids that have appeared since Hartlaub's paper and that contain more or less comprehensive reviews of the genus *Sertularella*, some revisions have been published. Picard's 1956 paper deals with the Mediterranean species and forms of *Sertularella;* Ralph (1961) discusses the family Sertulariidae from New Zealand waters; Cornelius (1979) exhaustively treats Sertulariidae from the seas around the British Isles and those from neighbouring waters, while García-Corrales, Aguirre & González (1980) describe the various species of that family occurring along the coasts of the Iberian Peninsula. All these papers have contributed largely towards our knowledge of the genus but at the same time have afforded new evidence for discussion, because of the different criteria used by the various authors to evaluate the importance of morphological characteristics for the taxonomy of the genus *Sertularella* and their bearing on the complicated synonymy of the genus. Recently two important papers dealing with Sertulariidae have been published. Izquierdo et al. (1990) studied and described the species occurring in the Atlantic bordering the Canary Islands and as far as the Sertulariidae are concerned largely adhere to the criteria established by Cornelius (1979). Medel, García & García-Gómez (1991), in their disccusion of Sertula-

riidae from the Strait of Gibraltar area, basically follow the views expressed by Ramil (1988) for such species as are also treated in the present paper.

During the years 1982-1986 numerous hydroid samples have been taken all along the coasts of Galicia (NW part of the Iberian Peninsula) that have provided an important collection of *Sertularella*-samples, both from the intertidal zone and from infralittoral depths. In the intertidal zone sampling has particularly been done in rocky areas that form a habitat rich in hydroids, preferably during the monthly spring-tides. In the infralittoral zone sampling has been carried out on mobile bottoms by means of various types of dredges and on rocky bottoms by means of scuba diving. The wealth of *Sertularella*-samples in the present collection has enabled us to study in detail the Galician representatives of this genus and to observe, in a large material, their variability in the littoral zone. Also we have been able to compare the Galician material with specimens from the south-eastern Atlantic, present in the collections of the National Museum of Natural History (Nationaal Natuurhistorisch Museum), incorporating the Rijksmuseum van Natuurlijke Historie, Leiden, the Netherlands, and with the schizoholotype of *Sertularella gaudichaudi* from the Falkland Islands, deposited in the Muséum National d'Histoire Naturelle, Paris, France. At the same time bibliographic studies concerning the genus *Sertularella* have been carried out. The results of our efforts are presented below. The material on which the present study is based has largely been deposited in the collections of the National Museum of Natural History (Nationaal Natuurhistorisch Museum), Leiden, the Netherlands; the registration numbers are given in the text (RMNH Coel. no. .....); the slide numbers refer to the list of slides from hydroid material in that collection.

List of collecting localities

Stn 1.— Rinlo, 43°33'25"N-07°06'05"W, rocky intertidal zone, 22.viii.1986.
Stn 2.— Burela, 43°40'30"N-07°22'43"W, rocky intertidal zone, 21.viii.1986.
Stn 3.— San Ciprián, 43°42'10"N-07°26'11"W, rocky intertidal zone, 21.viii.1986.
Stn 4.— Ensenada ('cove') de O Coido (Vilachá), 43°43'36"N-07°32'00"W, 5 m depth, rocky bottom, 21.viii.1986.
Stn 5.— Celeiro (ría de Viveiro), 43°40'59"N-07°35'25"W, rocky intertidal zone, 20.viii.1986.
Stn 6.— San Román, 43°43'06"N-07°37'36"W, rocky intertidal zone, 20.viii.1986.
Stn 7.— Pedra Mea, 43°44'40"N-07°48'00"W, 19 m depth, rocky bottom, 19.viii.1986.
Stn 8.— Os Ourizos (Mazorgán), 43°44'00"N-07°47'45"W, rocky intertidal zone, 28.ix.1984.
Stn 9.— Muelle ('quay') de Espasante, 43°43'18"N-07°48'46"W, 4 m depth, rocky bottom, 13.vi.1983.
Stn 10.— Mexilloeira Longa (Espasante), 43°43'21"N-07°48'42"W, rocky intertidal zone, 19.viii.1986.
Stn 11.— Punta de Espasante, 43°27'57"N-08°20'46'W, 17 m depth, rocky bottom, 30.vi.1985.
Stn 12.— Ensenada ('cove') de Cariño (ría de Ferrol), 43°28'10"N-08°19'01"W, 8-12 m depth, rocky bottom, 24.viii.1986.
Stn 13.— O Pereiro (ría de Ferrol), 43°28'07"N-08°16'10"W, 4-7 m depth, sandy bottom with shell fragments and isolated rocks, 25.viii.1984 and 30.ix.1984.
Stn 14.— A Redonda (ría de Ferrol), 43°27'55"N-08°16'01"W, 9-15 m depth, bottom of shell fragments with isolated rocks, 23.vii.1984, 12.xi.1985, 03.ii.1986 and 23.viii.1986.
Stn 15.— Baixo da Palma (ría de Ferrol), 43°27'59"N-08°16'23"W, 14 m depth, *Amphioxus* sand with isolated rocks, 13.xii.1983, 11.i.1984 and 30.i.1985.
Stn 16.— Punta de San Martiño (ría de Ferrol), 43°27'41"N-08°16'58"W, 12 m depth, rocky bottom, 29.xi.1985.
Stn 17.— Batel (ría de Ferrol), 43°27'25"N-08°17'44"W, 10 m depth, rocky bottom, 08.ix.1986.

Stn 18.— Moa do Segaño (ría de Ferrol), 43°27'26"N-08°18'40"W, 15-18 m depth, rocky bottom, 28.ix.1985 and 20.x.1985.

Stn 19.— Punta Coitelada (ría de Ares-Betanzos), 43°26'40"N-08°19'18"W, 28-33 m depth, rocky bottom, 16.vi.1985.

Stn 20.— Punta Cruz (ría de Ares-Betanzos), 43°25'10"N-08°14'42"W, 6 m depth, rocky bottom, 30.iv.1986.

Stn 21.— Ares (ría de Ares-Betanzos), 43°25'36"N-08°14'30"W, taken from refuge in fishing nets, 30.iv.1986.

Stn 22.— Lorbé (ría de Ares-Betanzos), 43°23'26"N-08°17'26"W, material taken from cultivation ropes ('cuerdas de bateas'), viii.1984.

Stn 23.— Espiñeiro (ría de Coruña), 43°22'52"N-08°20'23"W, material washed on beach, 01.vi.1986.

Stn 24.— Santa Ana (ría de Coruña), 43°22'38"N-08°20'17"W, material washed on beach, 16.ii.1986.

Stn 25.— Isla Portelo (ría de Coruña), 43°22'36"N-08°20'31'W, 9 m depth, rocky bottom, 11.viii.1986.

Stn 26.— Santa Cruz (ría de Coruña), 43°20'57"N-08°20'50"W, material washed on beach, 16.ii.1986.

Stn 27.— Ensenada do Orzán (Coruña), 43°22'23"N-08°24'12"W, material washed on beach, 04.v.1986.

Stn 28.— Suevos, 43°21'33"N-08°29'06"W, rocky intertidal zone, 20.vii.1982.

Stn 29.— Caión, 43°19'22"N-08°36'30"W, rocky intertidal zone, 22.v.1986.

Stn 30.— Malpica, 43°19'30"N-08°48'38"W, rocky intertidal zone, 22.vii.1986.

Stn 31.— Playa de As Cunchas (ría de Corme-Laxe), 43°15'34"N-08°58'22"W, rocky intertidal zone, 21.vii.1986.

Stn 32.— Punta Cabo da Area (ría de Corme-Laxe), 43°13'12"N-08°59'24'W, rocky intertidal zone, 26.ix.1984.

Stn 33.— Ensenada da Besugueira (ría de Corme-Laxe), 43°13'36"N-09°00'14"W, rocky intertidal zone, 24.v.1986.

Stn 34.— Ensenada Lago do Norte (ría de Camariñas), 43°07'52"N-09°11'59"W, rocky intertidal zone, 27.iv.1986.

Stn 35.— Punta dos Corvos (ría de Camariñas), 43°06'34"N-09°12'54"W, rocky intertidal zone, 26.iv.1986.

Stn 36.— Punta Berdullas (Finisterra), 42°54'14"N-09°15'31"W, rocky intertidal zone, 19.ix.1986.

Stn 37.— Punta Lens (ría de Muros-Noia), 42°45'16"N-09°06'57"W, rocky intertidal zone, 20.ix.1986.

Stn 38.— Punta do Castro (ría de Muros-Noia), 42°41'40"N-09°02'03"W, rocky intertidal zone, 24.vii.1986.

Stn 39.— Corrubedo, 42°34'20"N-09°04'15"W, rocky intertidal zone, 25.iv.1986.

Stn 40.— Punta Centoleira (ría de Arousa), 42°30'57"N-09°00'33"W, rocky intertidal zone, 05.v.1985, 27.ii.1986 and 25.iv.1986.

Stn 41.— Punta Cabío (ría de Arousa), 42°35'09"N-08°55'08"W, rocky intertidal zone, 18.ix.1986.

Stn 42.— Dredge no. 1 (ría de Arousa), 42°34'47"N-08°51'24"W, 23 m depth, muddy bottom, 03.iii.1983.

Stn 43.— Punta da Sal (isla de Arousa, ría de Arousa), 42°33'18"N-08°52'20"W, rocky intertidal zone, 28.iii.1986.

Stn 44.— Cambados (ría de Arousa), 42°30'56"N-08°48'58"W, material taken from *Pecten maximus* (Linnaeus, 1758) at fish market, 29.x.1986.

Stn 45.— San Vicente do Mar, 42°27'06"N-08°55'24"W, rocky intertidal zone, 25.ix.1984, 15.x.1985, 27.ii.1986, 25.iii.1986, 24.iv.1986 and 23.v.1986.

Stn 46.— Quay of isla de Ons, 42°22'35"N-08°55'51"W, rocky intertidal zone , 29.iv.1984 and 01.v.1984.

Stn 47.— Ensenada de Caniveliñas (isla de Ons), 42°22'12"N-08°56'39"W, 0-10 m depth, rocky bottom, 03.iii.1984.

Stn 48.— Ensenada de Fedorento (isla de Ons), 42°21'19"N-08°56'26"W, 0-10 m depth, rocky bottom, 29.iv.1984.

Stn 49.— Ensenada de Porto do Sol (isla de Onza), 42°20'34"N-08°56'04"W, 0-10 m depth, rocky bottom, 30.iv.1984.

Stn 50.— Dredge no. 2 (ría de Pontevedra), 42°22'15"N-08°45'18"W, 25 m depth, bottom of sand and shell fragments, 24.v.1985.

Stn 51.— Lapamán (ría de Pontevedra), 42°20'40"N-08°45'09"W, rocky intertidal zone, 03.xii.1983.

Stn 52.— Dredge no. 3 (ría de Pontevedra), 42°20'45"N-08°48'09"W, 22 m depth, muddy bottom with shells, 12.iv.1985.
Stn 53.— Ensenada do Lago (islas Cíes), 42°13'30"N-08°54'25"W, rocky intertidal zone, 07.ix.1986.
Stn 54.— Dredge no. 4 (ría de Vigo), 42°14'42"N-08°48'46"W, 24 m depth, bottom of shell fragments, 02.viii.1985.
Stn 55.— Limens (ría de Vigo), 42°15'33"N-08°48'51"W, from material washed ashore, 24.ii.1986 and 26.iii.1986.
Stn 56.— Dredge no. 5 (ría de Vigo), 42°15'06"N-08°45'50"W, 12 m depth, bottom of shell fragments with algae, 12 m depth, 16.ix.1986.
Stn 57.— Dredge no. 6 (ría de Vigo), 42°14'00"N-08°46'58"W, 44 m depth, muddy bottom, 16.ix.1986.
Stn 58.— Saiáns (ría de Vigo), 42°10'26"N-08°48'53"W, rocky intertidal zone, 16.iii.1984.
Stn 59.— Punta da Madorra (ensenada de Baiona), 42°08'50"N-08°49'36"W, rocky intertidal zone, 27.iii.1986.

Taxonomic report

Sertularella gayi (Lamouroux, 1821)
(figs. 1a, 2, 3)

Sertularia Gayi Lamouroux, 1821: 12, pl. 6 figs. 8-9.
Sertularella Gayi; Hincks, 1868: 237-239, fig. 29, pl. 46 fig. 2; Hartlaub, 1901: 61-62, fig. 9.
Sertularella gayi; Vervoort, 1959: 273-275, figs. 33b, c, 34b; Vervoort, 1966: 127-128, fig. 30; Cornelius, 1979: 284-287, fig. 21; Aguirrezabalaga et al., 1984: 87.

Material.— Stn 14, 23.viii.1986: 15 colonies 20-90 mm high, no gonothecae (RMNH Coel. no. 25969).– Stn 42, 03.iii.1983: nine colonies 22-90 mm high, one with gonothecae (RMNH Coel. no. 25961, slide no. 1606).– Stn 44, 29.x.1986: two colonies 90 and 150 mm high, without gonothecae, on *Pecten maximus* (Linnaeus, 1758). Collected on fish market (RMNH Coel. no. 25964).– Stn 50, 24.v.1985: three colonies 10-20 mm high, no gonothecae (RMNH Coel. no. 25992).– Stn 52, 12.iv.1985: eight colonies 20-50 mm high, with gonothecae, on polychaete tubes and on *Kirchenpaueria pinnata* (Linnaeus, 1758) (RMNH Coel. no. 25991).– Stn 54, 02.viii.1985: two colonies 8 and 40 mm high, no gonothecae (RMNH Coel. no. 25993).– Stn 56, 16.ix.1986: single colony 120 mm high, no gonothecae.– Stn 57, 16.ix.1986: single colony 30 mm high, no gonothecae (RMNH Coel. no. 25996).

Description.— Colonies composed of erect, strongly polysiphonic hydrocaulus (axis), bearing regularly disposed side-branches alternately directed left and right and in same plane as axis (fig. 1a). Monosiphonic parts of colony distinctly show division of axis into segments separated by oblique nodes and each bearing one distal hydrotheca, alternately directed left or right and in same plane as internodes (figs. 2a, 3). Hydrotheca urn-shaped, slightly widening basally; adcauline hydrothecal wall adnate for about half its length, free part straight or slightly convex, occasionally with perisarcal undulations of varied development, usually best marked in young colonies or on younger parts of adult colonies and there they may develop as shallow transversal ribs and reach abcauline wall of hydrotheca, this wall straight or slightly concave, particularly at distal end, just under hydrothecal rim. Rim of hydrotheca with four marginal cusps of equal development*; hydrothecal operculum composed of four triangular flaps attached in rounded embayments between marginal cusps, closing to form low roof (figs. 2a, 3). No intrathecal cusps present.

*In all species of *Sertularella* discussed here the marginal cusps of the hydrotheca are: 1 adcauline, 1 abcauline and 2 laterals.

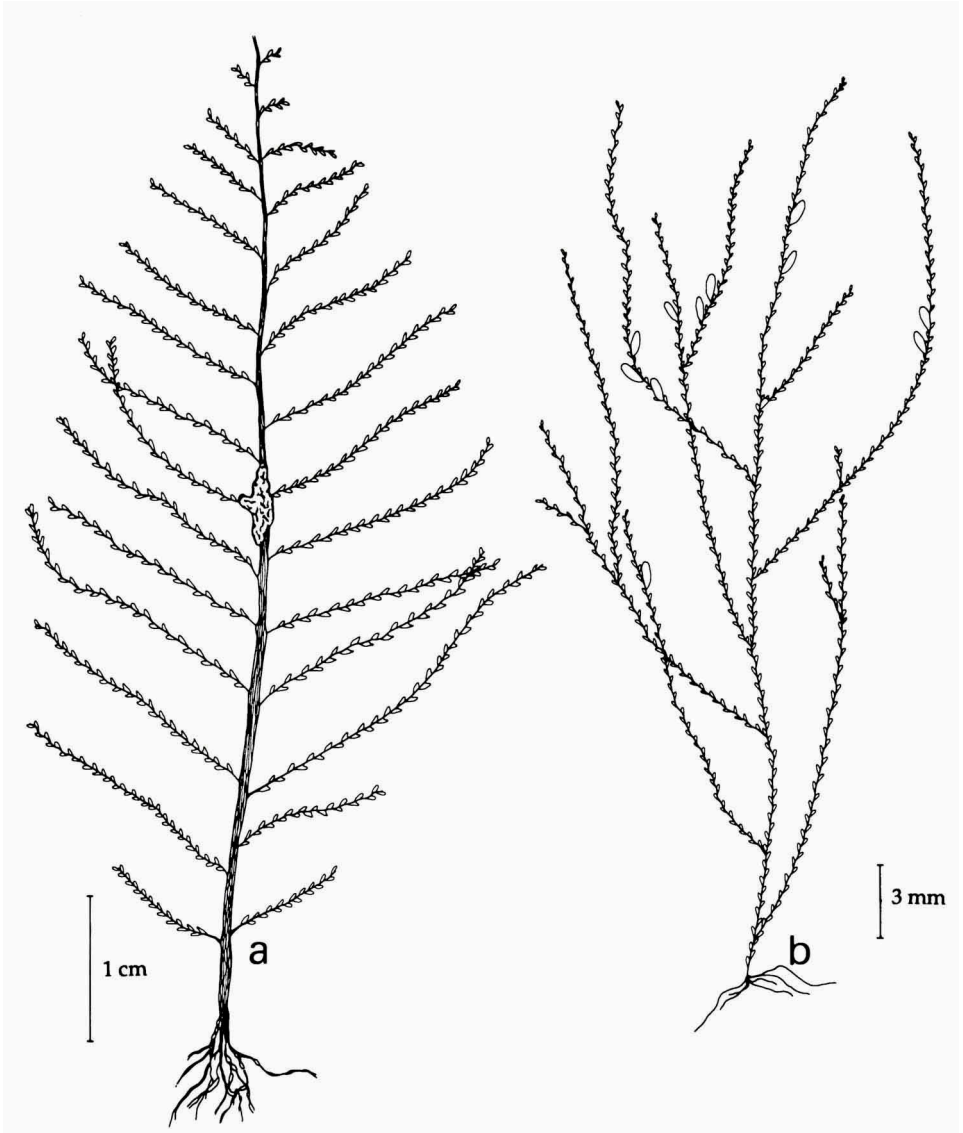

Fig. 1. a, *Sertularella gayi* (Lamouroux, 1821), Stn 42, general aspect of colony. b, *Sertularella polyzonias* (Linnaeus, 1758), Stn 14, general aspect of colony.

Side-branches (hydrocladia) invariably springing from axis just under a hydrotheca; this theca becoming axillary (fig. 3). Axillary hydrothecae in polysiphonic parts of colony usually covered by secondary tubules and hidden from view. Hydrocladia of same structure as axis, occasionally becoming polysiphonic by presence of secondary tubules, occasionally with secondary ramifications of same structure as primaries.

Gonothecae found on both axis and side-branches, inserting just below hydro-

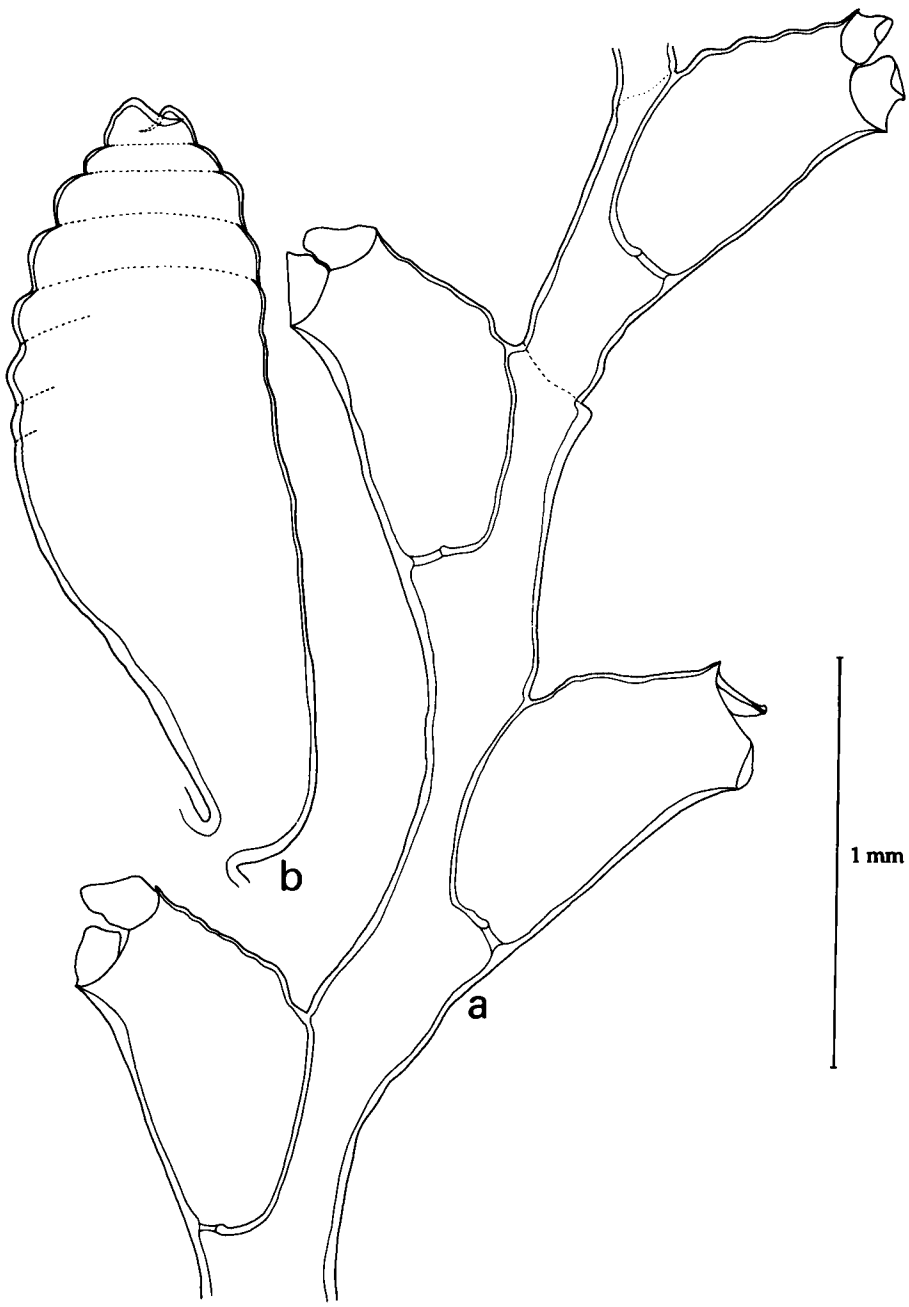

Fig. 2. *Sertularella gayi* (Lamouroux, 1821), Stn 24. a, part of hydrocladium; b, gonotheca.

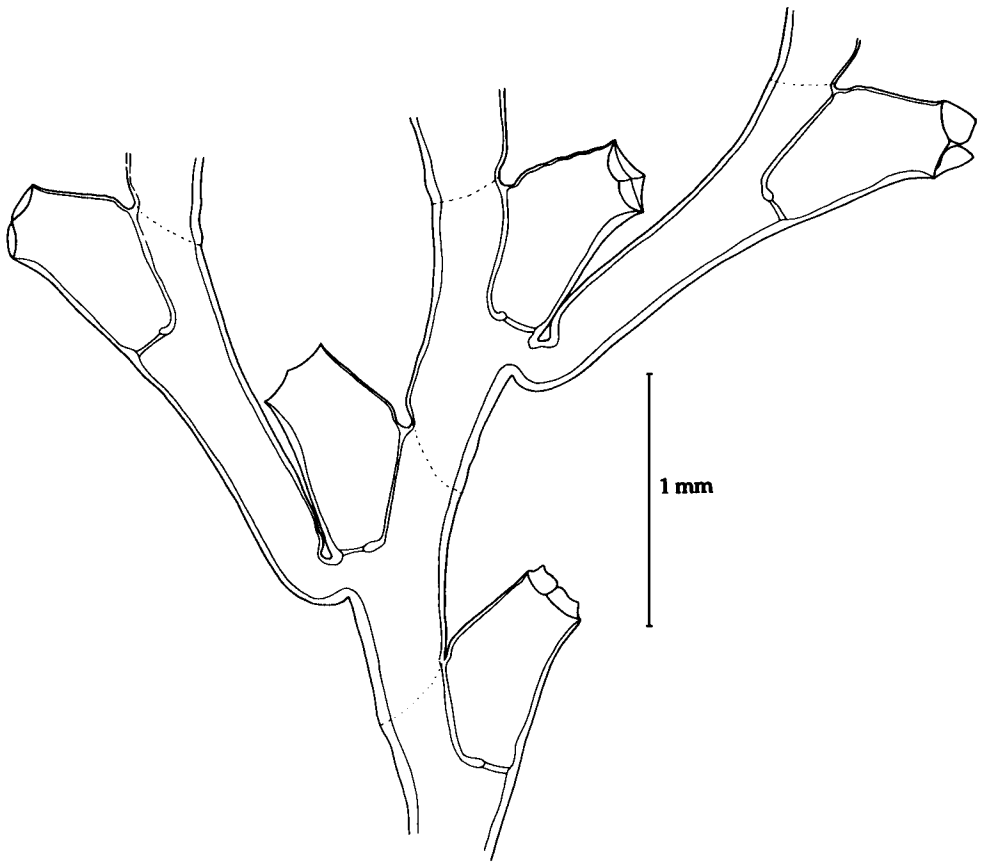

Fig. 3. *Sertularella gayi* (Lamouroux, 1821), Stn 24, detail of ramification.

thecae, large, ovoid, distal half with distinct annulations, gradually disappearing basally or fully absent on basal half (fig. 2b). Gonothecal aperture terminal, with two 'lips' of unequal development; no cusps surrounding gonothecal aperture have been observed.

Occurrence.— Collected between 9 and 44 m depth, on mobile bottoms (sand, shell fragments, marl, mud), usually detached from substratum in dredge hauls, but occasionally attached to shells (*Pecten maximus*), polychaete tubes and the stems of the hydroid *Kirchenpaueria pinnata* (Linnaeus, 1758).

Reproductive period.— Gonothecae observed in March and April.

Distribution.— Widely distributed in the Atlantic; by Ralph (1961) considered to be cosmopolitan. In the eastern Atlantic known to occur from the region of Spitzbergen (Leloup, 1940) and as far south as Gough Island in the South Atlantic (Ritchie, 1907, 1909; Rees & Thursfield, 1965). Recorded also from the Atlantic littoral of the Iberian Peninsula (Allman, 1874; Billard, 1906; Nobre, 1931; Da Cunha, 1944, 1950; Urgorri & Besteiro, 1983; Aguirrezabalaga et al., 1984; Medel et al., 1991).

Discussion.— *Sertularella gayi* and *Sertularella polyzonias* share a number of characters and certainly are closely related; the differences have been summarized by Cornelius (1979: 287, tab. 19). This author doubts the validity of the two species and suggests the possibility of the *"polyzonias"* type representing the juvenile colonies of

Table 1. *Sertularella gayi (Lamouroux,* 1821). Measurements in µm.

Axial internode, length	186-1300
diameter at node	274-345
Hydrotheca, length adnate part adcauline wall	520-575
length free part adcauline wall	432-490
length abcauline wall	650-705
diameter at rim	316-345
Gonotheca, maximal height	1860-1920
maximal diameter	610-665

the *"gayi"* type. Along the Galician coasts, however, both species are distinctly separable, those of *Sertularella gayi* being as a rule polysiphonic, with regularly pinnate ramifications, the free part of the adcauline hydrothecal wall usually with undulated perisarc, and the gonothecal aperture provided with two characteristic 'lips'. In *S. polyzonias* the colonies we have studied were always monosiphonic and irregularly ramified; the free part of the adcauline hydrothecal wall being invariably smooth and the gonothecal aperture with four cusps of varied development but never with of the characteristic 'lip'-shape observed in *S. gayi*. At one locality (Stn 14) both species were obtained and were distinctly separable by morphological characters, *S. gayi* being sterile and *S. polyzonias* bearing gonothecae.

Sertularella polyzonias (Linnaeus, 1758)
(figs. 1b, 4, 5)

Sertularia polyzonias Linnaeus, 1758: 813.
Sertularella polyzonias; Hincks, 1868: 235-237, pl. 46 fig. 1; Stechow, 1923: 194, fig. D^1c; Vervoort, 1946: 224-226, fig. 96; Cornelius, 1979: 287-290, fig. 22.
Sertularella gayi; García-Corrales et al., 1980: 33, fig. 11a-f.

Material.— Stn 12, 24.viii.1986: about 25 colonies up to 25 mm high, no gonothecae, epizootic on *Pentapora foliacea* (Ellis & Solander, 1786) (Bryozoa) (RMNH Coel. no. 25989).– Stn 13, 25.viii.1984: three colonies 4-28 mm high (RMNH Coel. no. 25994); 30.ix.1984: numerous colonies between 2 and 80 mm high with gonothecae, on algae (RMNH Coel. no. 25968).– Stn 14, 23.vii.1984: numerous colonies 7-30 mm high, with gonothecae (RMNH Coel. no. 25990); 12.xi.1985: a large number of colonies, 30-80 mm high, with gonothecae, on various invertebrates (RMNH Coel. no. 25966); 03.ii.1986: numerous colonies, 15-60 mm high, with gonothecae, on stones, algae and various invertebrates (RMNH Coel. no. 25967); 23.viii.1986: several colonies up to 90 mm high, with gonothecae, on rocks (RMNH Coel. no. 25962, slide no. 1607).– Stn 15, 13.xii.1983: several colonies 20-30 mm high, without gonothecae, on bivalve shells and balanids; 11.i.1984: several colonies 10-20 mm high, without gonothecae, on stones and mollusc shells (RMNH Coel. no. 25995); 30.i.1985: several colonies up to 25 mm high, without gonothecae, on bottle (RMNH Coel. no. 25999).– Stn 16, 29.xi.1985: five colonies 20-30 mm high on *Venus verrucosa* Linnaeus, 1758 (Mollusca), no gonothecae (RMNH Coel. no. 25988).– Stn 17, 08.ix.1986: numerous colonies 20-60 mm high, some with gonothecae, on rhizoids of *Laminaria* spec. and other algae (RMNH Coel. no. 25963).– Stn 45, 15.x.1985: two colonies 11 and 23 mm, no gonothecae (RMNH Coel. no. 25980).

Description.— Colony with usually erect, monosiphonic, irregularly ramified hydrocaulus (axis), divided into segments by oblique, indistinctly visible nodes, each segment with distal hydrotheca, alternately directed left and right and in same plane with axis (fig. 1b). Adcauline wall hydrotheca adnate for about half its length; free portion convex with smooth perisarc. Abcauline wall hydrotheca more or less straight or slightly convex over lower two-thirds, with concavity in upper third just below hydrothecal rim (figs. 4a, 5). Hydrothecal rim with four cusps of equal development; closing apparatus as in *S. gayi*. There are no intrathecal cusps.

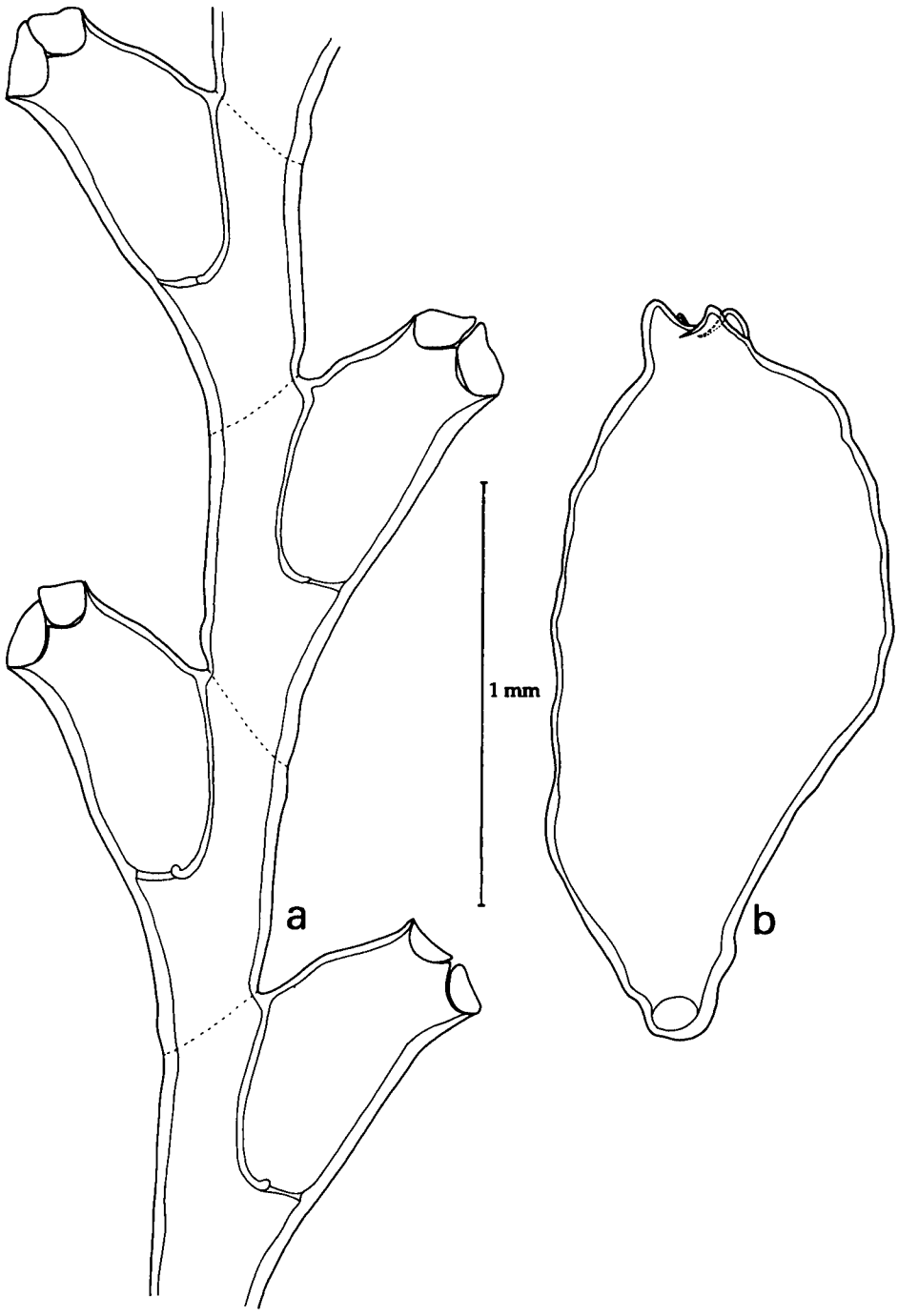

Fig. 4. *Sertularella polyzonias* (Linnaeus, 1758), Stn 14. a, part of stem; b, gonotheca.

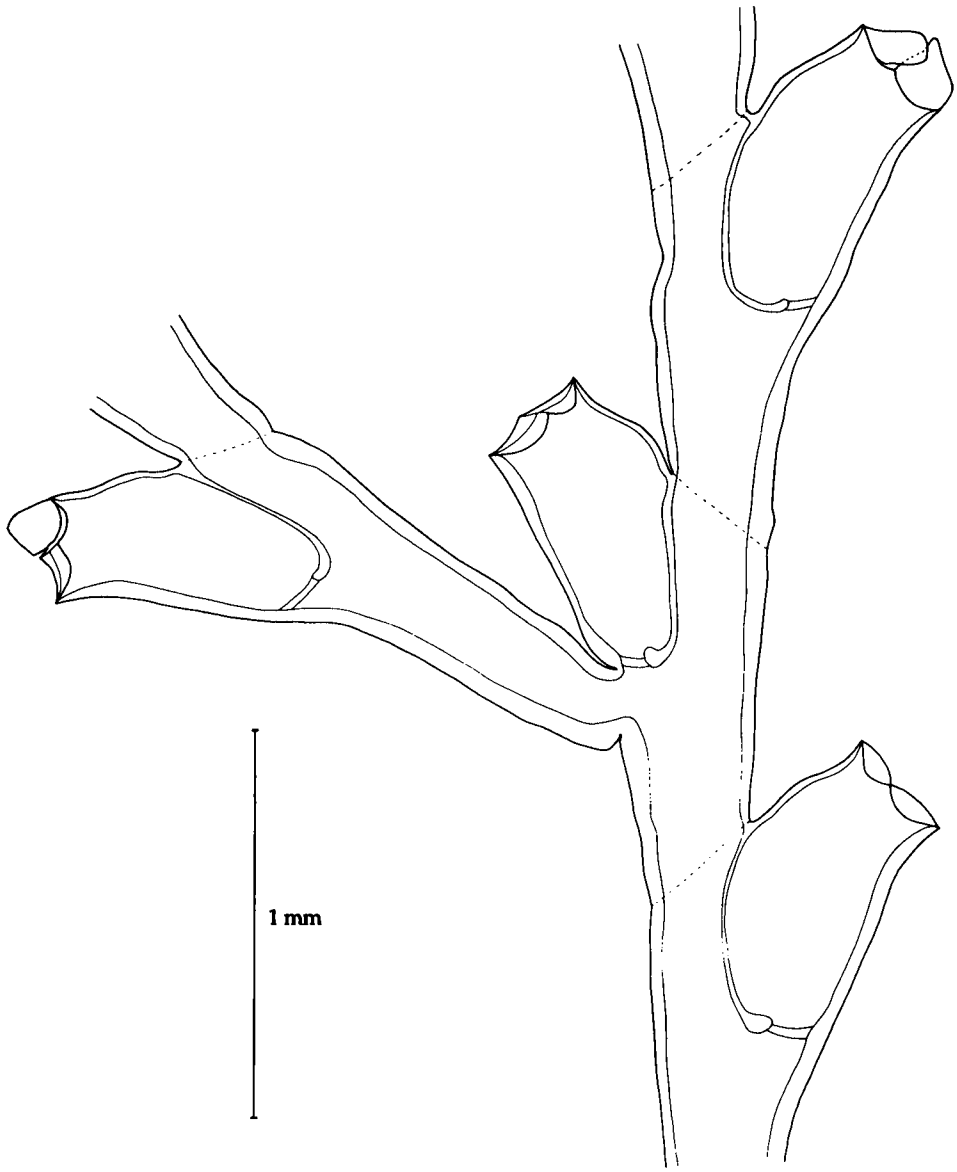

Fig. 5. *Sertularella polyzonias* (Linnaeus, 1758), Stn 14, detail of ramification.

Ramifications less frequent than in *S. gayi*, originating just below axial hydrothecae, in same plane with hydrocaulus, without definite order, in structure similar to axis (fig. 5).

Gonothecae observed on both axis and ramifications, inserting below hydrotheca, ovoid, with perisarc softly undulated over whole length; aperture terminal, surrounded by four conical, well developed cusps (fig. 4b).

In some colonies distal portions of hydrocaulus or hydrocladia develop stolons.

Table 2. *Sertularella polyzonias* (Linnaeus, 1758). Measurements in µm.

Axial and hydrocladial internodes, length	816-912
diameter at node	260-302
Hydrotheca, length adnate part adcauline wall	475-490
length free part adcauline wall	330-375
length abcauline wall	576-605
diameter at aperture	303-345
Gonotheca, maximal height	1770-1950
maximal diameter	740-850

Variability.— In the colonies studied there is considerable variation in diameter of axis and hydrocladia, in thickness of perisarc, and in size of the hydrothecae, all in relation to the development of the colony: in younger colonies the diameter of the internodes is less, the perisarc thinner and the hydrothecae comparatively bigger than in older colonies. There is also variation in the development of the cusps of the gonothecal aperture: occasionally two or three cusps are better developed than the remaining cusp(s).

Occurrence.— Observed between 4 and 15 m depth on rocky bottoms and on mobile bottoms with isolated rocks. Colonies found directly on rock, on algae, on *Eunicella verrucosa* (Pallas, 1766) (Gorgonaria), tubes of polychaetes, mollusc shells, and on *Pentapora foliacea* (Ellis & Solander, 1786) (Bryozoa). Some were obtained from a bottle.

Reproductive period.— Colonies with gonothecae were found in February, July, August and September.

Distribution.— *Sertularella polyzonias* is a cosmopolitan species, recorded from the littoral zone of all Atlantic coasts of the Iberian Peninsula.

Discussion.— For the differences with *Sertularella gayi* we refer to the discussion of the previous species.

Sertularella ellisii (Deshayes & Milne-Edwards, 1836) (figs. 6, 7)

Corallina minus ramosa alterna vice denticulata... Ellis, 1756: 19-20, pl. 2 figs. b, B (part).
Sertularia Ellisii Deshayes & Milne-Edwards, 1836: 142-143.
Sertularella ellisii; Stechow, 1923: 193-194, fig. D¹b.
Sertularella fusiformis f. *glabra* Broch, 1933: 69-73, figs. 27-28.
Sertularella ellisii f. *ellisii*; Picard, 1956: 264-265, figs. 1a, 2a, 3d, e.
Sertularella gaudichaudi p.p. Cornelius, 1979: 282-284, fig. 20.
Sertularella gaudichaudi; García-Corrales, Aguirre y González, 1980: 30-33, fig. 10; García-Carrascosa, 1981: 216, pl.15 figs. a-i; Altuna et al., 1984: 134; Gili, 1986: 127-128, figs. 4.22A-C, 4.57A; Isasi & Saiz, 1986: 70.

Material.— Stn 3, 21.viii.1986: two colonies 5 mm high on algae, no gonothecae (RMNH Coel. no. 25974).– Stn 4, 21.viii.1986: ten colonies 20-30 mm high on sponges and ascidians, no gonothecae (RMNH Coel. no. 26037).– Stn 25, 11.viii.1986: 40 colonies up to 15 mm high on algae, no gonothecae (RMNH Coel. no. 25998).– Stn 40, 25.iv.1986: numerous colonies 4-22 mm high on rocks and algae i.a. of the genus *Corallina*, with gonothecae (RMNH Coel. no. 25965).– Stn 45, 25.ix.1984: numerous colonies 15-30 mm high, with gonothecae, on rocks and algae (RMNH Coel. no. 26049); 15.x.1985: four colonies 10-15 mm, no gonothecae; 25.iii.1986: five colonies up to 10 mm high, with gonothecae, on rhizoids of *Laminaria* spec. washed on beach (RMNH Coel. no. 26039); 24.iv.1986: several colonies 5-10 mm high, without gonothecae, on *Corallina* spec. (RMNH Coel. no. 26029); 23.v.1986: ten colonies 10-20 mm high, with gonothecae, on sponges and rhizoids of *Laminaria* spec. washed on beach (RMNH Coel. no. 26048).– Stn 55, 24.ii.1986: numerous colonies 7-20 mm high, with gonothecae, on rhizoids of

Laminaria spec. washed on beach.– Stn 59, 27.iii.1986: numerous colonies 10-20 mm high, with gonothecae, on *Cystoseira* spec. (RMNH Coel. no. 25997, slide no. 1603).

Description.— Colonies with erect, monosiphonic, seldom ramified axis (hydrocaulus), up to 30 mm high. Axis divided into segments by means of oblique nodes visible as more or less distinct constrictions of perisarc. Each segment distally with single hydrotheca, alternately directed left or right and in same plane with axis(fig. 6a).

Hydrothecae urn-shaped, slightly swollen basally; adcauline wall adnate for about half its length, free portion slightly but distinctly convex in lower two-thirds, concave

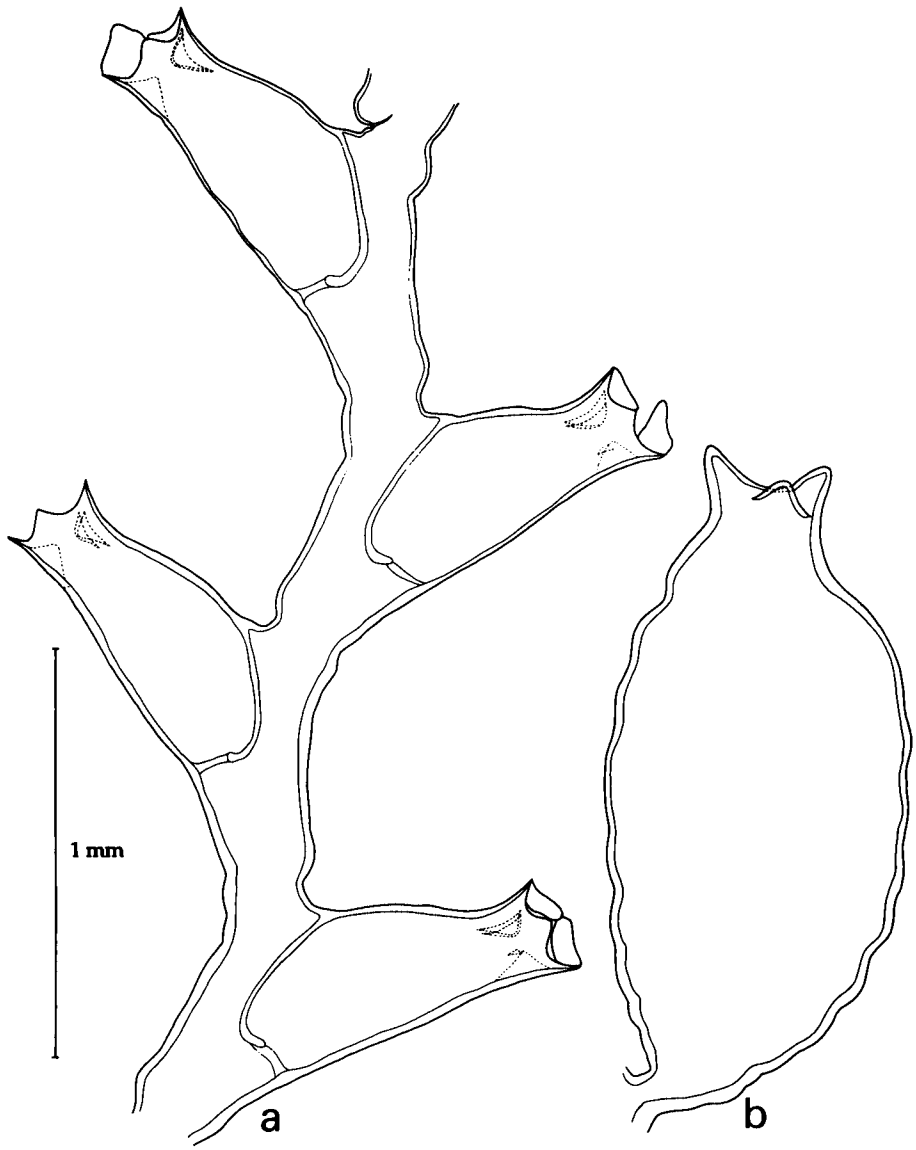

Fig. 6. *Sertularella ellisii* (Deshayes & Milne-Edwards, 1836), Stn 59. a, part of stem; b, gonotheca.

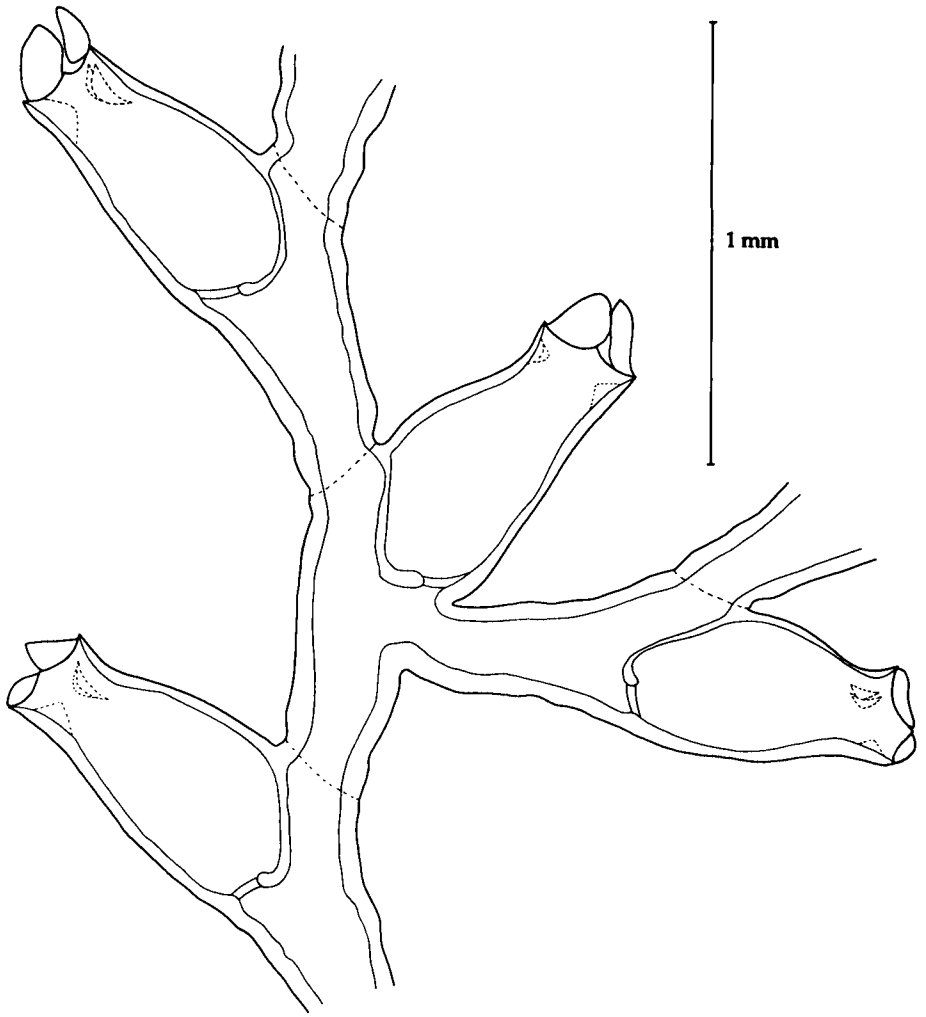

Fig. 7. *Sertularella ellisii* (Deshayes & Milne-Edwards, 1836), Stn 40, detail of ramification.

below hydrothecal rim in upper third. Abcauline wall of hydrotheca straight or slightly convex in lower third, occasionally with minor concavity. Hydrothecal rim with four cusps of equal development; development of hydrothecal operculum as in previous species. There are three intrathecal cusps, two adcauline and one abcauline (fig. 7). A small fourth abcauline cusp may occasionally be observed (fig. 6a).

Ramifications, if present, originating just below axial hydrothecae, in structure identical to that of axis (fig. 7).

Gonothecae inserted at hydrothecal base, globular rather than ovoid, with slightly undulated perisarc over its whole length. Gonothecal aperture terminal, at the end of a short neck, surrounded by three, occasionally four, little developed cusps (fig. 6b).

Occurrence.— Observed in the rocky intertidal and on rocky bottoms between 5 and 9 m depth. Colonies have also been collected from rhizoids of *Laminaria* spec. washed on

Table 3. *Sertularella ellisii* (Deshayes & Milne-Edwards, 1836). Measurements in µm.

Axial and hydrocladial internodes, length	576-792
diameter at node	172-216
Hydrotheca, length adnate part adcauline wall	316-360
length free part adcauline wall	432-475
length abcauline wall	633-705
diameter at rim	230-259

the beach. The preferential substrate is certain species of algae (*Laminaria* spec., *Corallina* spec., *Cystoseira* spec.), but it also occurs directly on rocks, sponges and ascidians.

Reproductive period.— Gonothecae have been observed in February, March, April, May and September.

Distribution.— Only known with certainty from European Atlantic and Mediterranean coasts. In the littoral of the Iberian peninsula this species has so far been recorded from the Basque coasts (Altuna et al., 1984; Isasi & Saiz, 1986; Altuna & García-Carrascosa, 1990, all as *Sertularella gaudichaudi*), from the vicinity of Ribadesella, Asturias (García-Corrales, Aguirre & González, 1980, as *S. gaudichaudi*), and from numerous localities in the Mediterranean littoral (García-Corrales et al., 1980, as *S. gaudichaudi*; García-Carrascosa, 1981; Gili, 1986, as *S. gaudichaudi*).

Discussion.— Cornelius (1979) considers *Sertularella ellisii* (Deshayes & Milne-Edwards, 1836) to be a synonym of *Sertularella polyzonias* (Linnaeus, 1758); the forms listed by Picard (1956) as *S. ellisii*, as well as *Sertularella fusiformis* (Hincks, 1861) and *Sertularella mediterranea* Hartlaub, 1901, are placed in the synonymy of *Sertularella gaudichaudi* (Lamouroux, 1824). This point of view has not been accepted by García-Corrales, Aguirre & González (1980); these authors consider that Cornelius (1979), under the name *Sertularella gaudichaudi*, has included three different species: *S. fusiformis*, *S. gaudichaudi* and *Sertularella picta* (Meyen, 1834). Though we share their opinion that Cornelius has brought together three different species under the name *S. gaudichaudi*, we differ, with the exception of *S. fusiformis*, in the specific designation. We recognize *S. ellisii* in the *S. gaudichaudi* described by García-Corrales, Aguirre & González (1980), corresponding with *S. ellisii* f. *ellisii* of Picard (1956). In our opinion this species differs completely from *Sertularella gaudichaudi* (sensu stricto), the latter having a profusely ramified colony with a thick, polysiphonic axis; the hydrothecae are not in one plane with the internodes, the abcauline cusp at the hydrothecal rim is more developed than the remaining three and there appear to be no intrathecal cusps. The distal half of the gonotheca is strongly annulated and its aperture is not at the end of a short neck and has four cusps (for further details see discussion of *S. gaudichaudi* at pages 518-520). *S. ellisii*, on the contrary, is rarely ramified, the hydrothecae are in one plane with the internodes, and the four cusps of the hydrothecal rim are equally developed. The gonotheca is lightly undulated; the aperture is situated at the end of a short neck and surrounded by three or four cusps.

The validity of the binomen *Sertularella ellisii* for the species described above has been subject of many discussions. The name *Sertularia ellisii* has been proposed by Deshayes & Milne-Edwards (1836) (in Lamarck, 1836: 142-143, footnote) to differentiate between two species that in their opinion have been included by Ellis (1756) in his *Sertularia polyzonias*, viz. the 'true' *Sertularella polyzonias* (pl. 2 figs. A, a, pl. 38 fig. A) and a second species (pl. 2 figs. B, b), for which the name *Sertularia ellisii* is proposed. Johnston (1847) has not accepted this conclusion and included *S. ellisii* in the synonymy of *S. polyzonias*, followed in this respect by Hartlaub (1901), Vervoort

(1946), Cornelius (1979) et al.; others (Stechow, 1923; Picard, 1956) admitting the validity of *S. ellisii*. Hincks (1868) at first adhered to Johnston's opinion but later on (Hincks, 1872) admitted the validity of *S. ellisii*, though proposing the use of that name for the *S. polyzonias* of Deshayes & Milne-Edwards and suggesting the use of the name of *S. polyzonias* for the species that in his opinion is the more common of the two and for which Deshayes & Milne-Edwards propose the name *S. ellisii*.

We are of the opinion that Ellis's figures do not permit a proper distinction between both species but suggest to conserve the name *Sertularella ellisii* for the species that agrees with the description given above, continuing in this respect usage of that name by a large number of authors.

Sertularella fusiformis (Hincks, 1861)
(figs. 8-10)

Sertularia fusiformis Hincks, 1861: 253, pl. 6 figs. 7-8.
Sertularella fusiformis; Hincks, 1868: 243, pl. 47 fig. 4; Stechow, 1919: 84-86, fig. B[1]; García-Corrales et al., 1980: 29-30, fig. 9; Gili, 1986: 128-129, fig. 4.24A-C; Isasi & Saiz, 1986: 70.
Sertularella gaudichaudi p.p. Cornelius, 1979: 282, 284, fig. 20.
?*Sertularella robusta*; García-Corrales et al., 1980: 43-44, fig. 14.
?*Sertularella simplex*; García-Corrales et al., 1980: 45-46, fig. 15.

Material.— Stn 1, 22.viii.1986: five colonies c. 5 mm high on sponges, no gonothecae (RMNH Coel. no. 25983).– Stn 5, 20.viii.1986: 25 colonies 7-12 mm high, on sponges and barnacles, with gonothecae (RMNH Coel. no. 26032).– Stn 8, 28.ix.1984: several colonies 1-4 mm high on algae, no gonothecae.– Stn 10, 19.viii.1986: 8 colonies 10-12 mm high on sponges, no gonothecae (RMNH Coel. no. 26035).– Stn 29, 22.v.1986: numerous colonies 5-15 mm high on algae and various invertebrates, with gonothecae (RMNH Coel. no. 26038, slide no. 1605).– Stn 30, 22.vii.1986: several colonies c. 10 mm high on sponges and barnacles, no gonothecae (RMNH Coel. no. 26026, slide no. 1604).– Stn 37, 20.ix.1986: several colonies 3-10 mm high, on sponges and barnacles, with gonothecae (RMNH Coel. no. 26023).– Stn 39, 25.iv.1986: several colonies c. 5 mm high on sponge, no gonothecae (RMNH Coel. no. 26044).– Stn 45, 15.x.1985: seven colonies 5-10 mm high in tidal pools, no gonothecae (RMNH Coel. no. 25987); 27.ii.1986: numerous colonies 3-10 mm high on rhizoids of *Laminaria* spec. and various invertebrates, no gonothecae (RMNH Coel. no. 26018); 25.iii.1986: numerous colonies 3-5 mm high, some with gonothecae, on sponges, barnacles and ascidians (RMNH Coel. no. 26050); 24.iv.1986: many colonies 4-10 mm high on rhizoids of *Laminaria* spec. and sponges, no gonothecae (RMNH Coel. no. 26024); 23.v.1986: ten colonies 2-10 mm high on rhizoids of *Laminaria* spec. and sponges, 2 colonies with gonothecae (RMNH Coel. no. 26033).– Stn 46, 29.iv.1984: several colonies c. 3 mm high on barnacles, no gonothecae (RMNH Coel. no. 26045); 01.v.1984: numerous colonies c. 3 mm high on barnacles, with gonothecae.– Stn 47, 03.iii.1984: several colonies up to 5 mm high on rhizoids of *Laminaria* spec., no gonothecae (RMNH Coel. no. 26031).– Stn 49, 30.iv.1984: five colonies 2-10 mm high on sponges and on *Tubularia larynx* Ellis & Solander, 1786 (Hydroida), no gonothecae.– Stn 58, 16.iii.1986: several colonies c. 10 mm high on barnacles, no gonothecae.

Description.— Small, monosiphonic colonies with erect, geniculate hydrocaulus (axis) and only rarely ramified. Axis divided into segments by means of several well marked, oblique annular constrictions of perisarc. Segments basally narrowed, gradually widening distally towards insertion of hydrotheca (figs. 8a, b, 9a, 10). Hydrothecae alternately directed left and right and in same plane with axis (figs. 8b, 9a, 10), though occasionally slightly frontally inclined (fig. 8a), urn-shaped, basal portion distinctly widened, distally distinctly contracted. Adcauline wall of hydrotheca adnate for about half its length, free part initially convex but constricted under

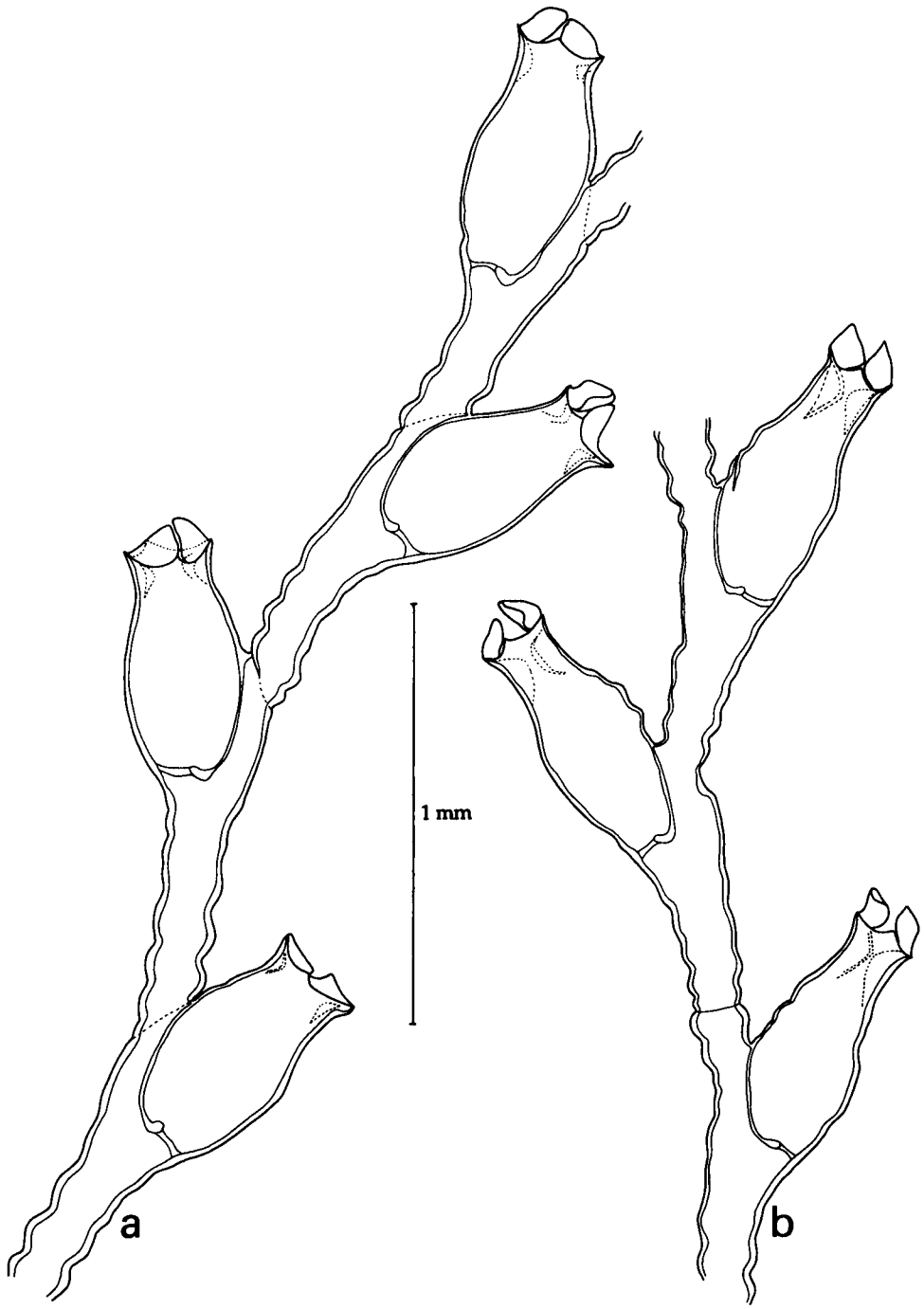

Fig. 8. *Sertularella fusiformis* (Hincks, 1861), Stn 30. a, b, part of stem.

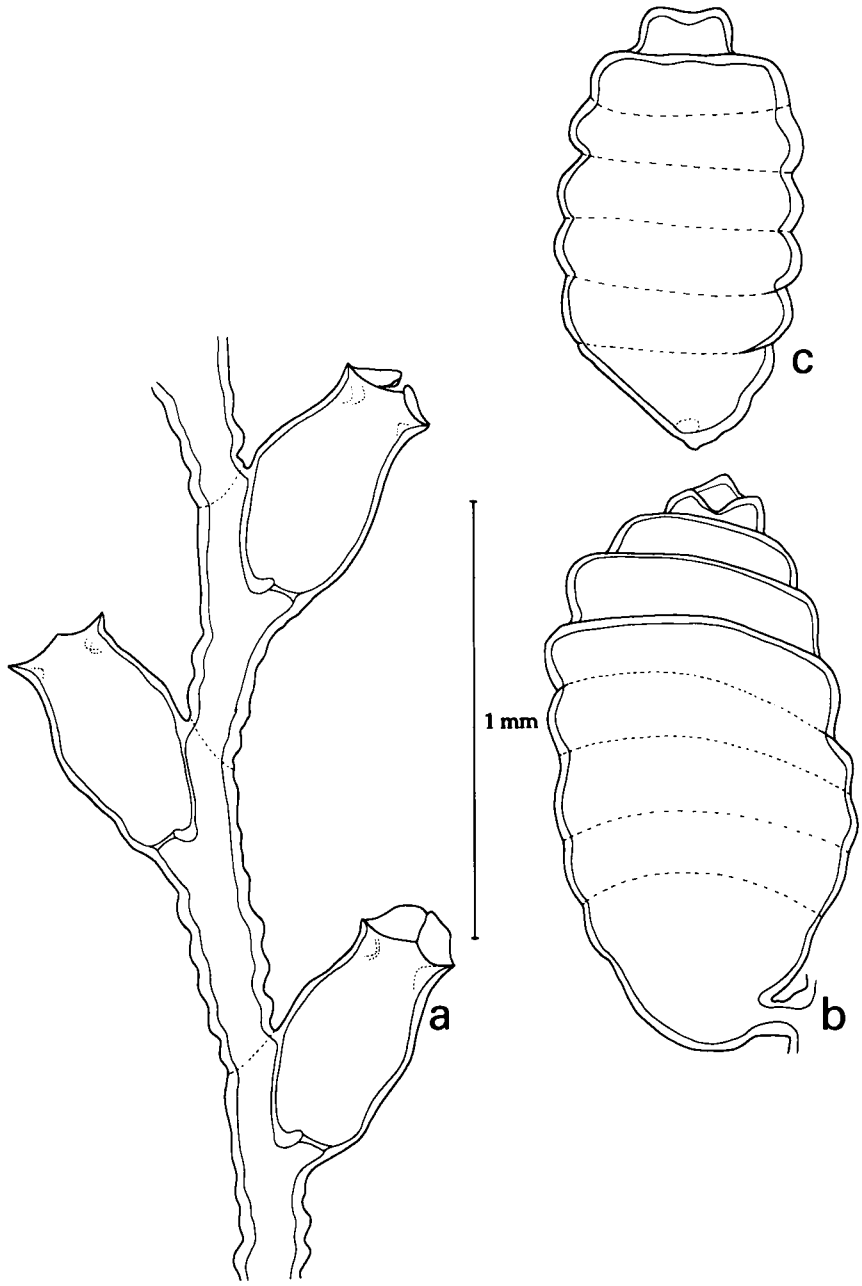

Fig. 9. *Sertularella fusiformis* (Hincks, 1861), Stn 37. a, part of stem; b, c, gonotheca.

hydrothecal rim and there forming slight concavity (figs. 8a, 9a, 10). Perisarc of adcauline wall occasionally with some shallow undulations (fig. 8b). Abcauline wall as free portion adcauline wall, viz. initially slightly convex, constricted under hydrothecal rim and there with minor cavity. Constrictions under hydrothecal rim

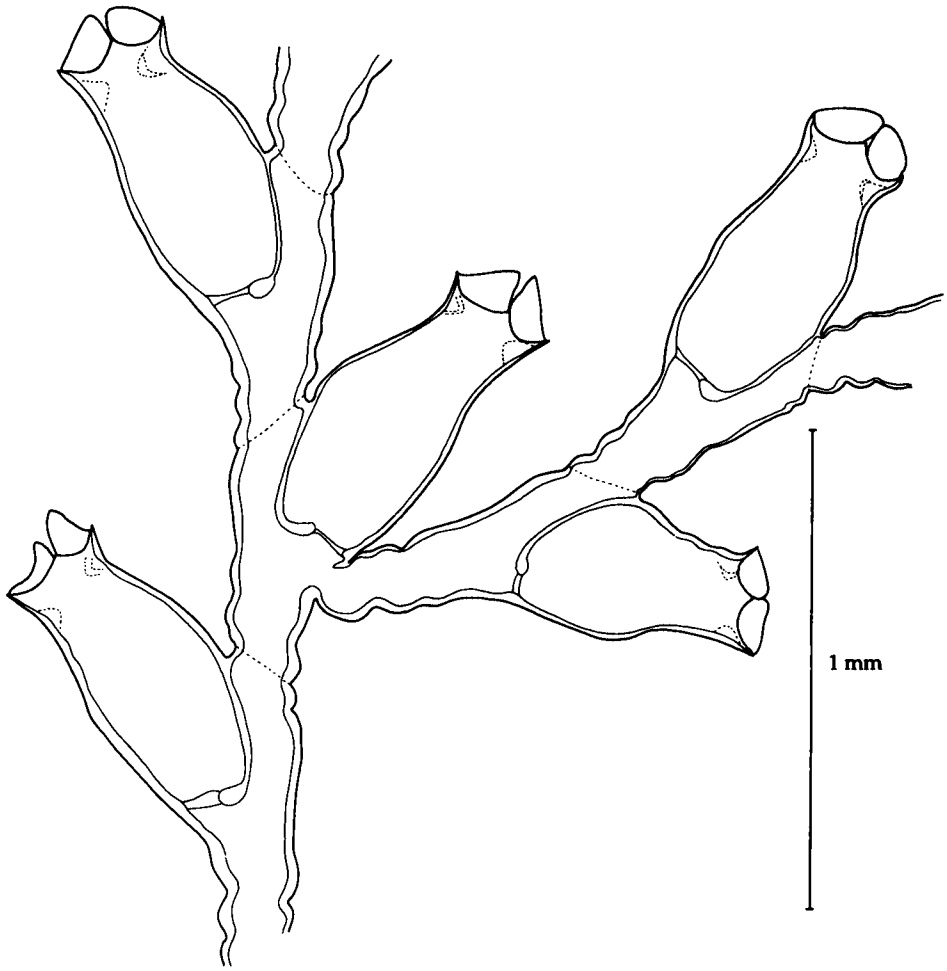

Fig. 10. *Sertularella fusiformis* (Hincks, 1861), Stn 30, detail of ramification.

give hydrotheca a characteristic appearance with swollen basal portion and neck-shaped distal part. Hydrothecal rim perpendicular to hydrothecal length axis, with four equally developed marginal cusps; closing apparatus as in previously described species. Three well developed intrathecal cusps present: two on adcauline side, one at abcauline wall (figs. 8a, b, 9a, 10).

Ramifications, if present, springing from axis directly under hydrotheca, of same structure as axis and also in same plane (fig. 10).

Gonothecae inserted at hydrothecal base, egg-shaped, large, strongly annulated over whole length. Aperture terminal, at end of short neck or collar, surrounded by two to four cusps of varied development (fig. 9b, c).

Occurrence.— Common in the intertidal zone of rocky coasts, usually inside small caves and in rock fissures; also on rocky bottoms at 0-10 m depth. Usually found on sponges and barnacles covering rocky surfaces, but also on rhizoids of

Table 4. *Sertularella fusiformis* (Hincks, 1861). Measurements in µm.

Axial segments, length	605-720
diameter	130-173
Hydrotheca, length adnate part adcauline wall	288-331
length free part adcauline wall	360-432
length abcauline wall	560-576
diameter at rim	216-245
Gonotheca, maximal length	1000-1300
maximal width	520-740

Laminaria spec., on the hydroid *Tubularia larynx* Ellis & Solander, 1786, on *Mytilus* spec. and on the tunica of ascidians.

Reproductive period.— Gonothecae have been observed in March, May and August.

Distribution.— Well distributed in temperate and subtropical parts of the Atlantic as well as in the Mediterranean. Dispersed records are from the Indian Ocean coast of South Africa (Millard, 1975) and from the Californian Pacific coast (Fraser, 1911). At the Iberian Peninsula the species has been recorded from the Basque coasts (Isasi & Saiz, 1986; Altuna & García-Carrascosa, 1990), from the littoral of the Portuguese coast at Galé (Da Cunha, 1950), from the vicinity of Altea, Alicante (García-Corrales, Aguirre & González, 1980) and from the littoral of the Catalan coast (Gili, 1986).

Discussion.— Picard (1956) considers *Sertularella fusiformis* to be an extreme, Atlantic form of *Sertularella ellisii*; it is included by Cornelius (1979) in the synonymy of *Sertularella gaudichaudi* (Lamouroux, 1824). We have followed García-Corrales, Aguirre & González (1980) in considering *S. fusiformis* a valid species, characterized by its strongly geniculate hydrocaulus (axis), internodes that widen from a narrowed base, and fusiform hydrothecae with convex basal parts of ad- and abcauline hydrothecal walls, forming a short 'neck' in the distal part of the hydrotheca, characters also mentioned by Hincks (1861). Furthermore, the gonothecae are large and strongly annulated over the whole length.

Hartlaub (1901) includes *Sertularella simplex* (Hutton, 1873) in the synonymy of *S. fusiformis*, but Bale (1924) and Ralph (1961) consider the former to be a separate species which should be kept separate from *S. fusiformis*. The records of *Sertularella simplex* and *Sertularella robusta* Coughtrey, 1876, from the Iberian coast (García-Corrales, Aguirre & González, 1980) probably refer to *S. fusiformis*; for a definite conclusion the material upon which these records are based should be inspected.

Sertularella mediterranea Hartlaub, 1901
(figs. 11-14)

Sertularella mediterranea Hartlaub, 1901: 86-87, pl. 5 figs. 10, 11, 15, 16; Billard, 1922: 107-111, figs. 3A-C, 4; Stechow, 1923: 189-192, figs. C^1, D^1a; García-Carrascosa, 1981: 213, pl. 14 figs. d-j, pl. 35 fig. d; Gili, 1986: 124-125, figs. 4.24D, E, 4.56e; Medel et al., 1991: 528-531, fig. 11.

Sertularella gaudichaudi; Billard, 1912: 464; Altuna et al., 1984: 134.

Sertularella gaudichaudi f. *mediterranea*; Boero & Fresi, 1986: 146; Aguirrezabalaga et al., 1987: 114-116, figs. 4-5.

Sertularella ellisii f. *mediterranea*; Picard, 1956: 264, fig. 3b.

Sertularella gaudichaudi p.p. Cornelius, 1979: 282-284, fig. 20.

Sertularella picta; García-Corrales, Aguirre & González, 1980: 37-40, fig. 12; Isasi & Saiz, 1986: 70.

Sertularella sp. Aguirrezabalaga et al., 1987: 116, fig. 6.

Material.— Stn 1, 22.viii.1986: c. 30 colonies 4-12 mm high, some with gonothecae, on rocks, algae and sponges (RMNH Coel. no. 25982).– Stn 2, 21.viii.1986: five colonies 4-9 mm high on rocks, no gonothecae (RMNH Coel. no. 26003).– Stn 3, 21.viii.1986: eight colonies c. 8 mm high, one with gonothecae, on

algae (RMNH Coel. no. 25979).– Stn 4, 21.viii.1986: several colonies 10-15 mm high, with gonothecae, on sponges and ascidians (RMNH Coel. no. 26051).– Stn 5, 20.viii.1986: c. 60 colonies 10-20 mm high, one with gonothecae, on rocks and sponges (RMNH Coel. no. 26041).– Stn 6, 20.viii.1986: single 9 mm high colony on algae, no gonothecae (RMNH Coel. no. 26001).– Stn 7, 19.viii.1986: c. 20 colonies 10-20 mm high on algae, no gonothecae (RMNH Coel. no. 25975).– Stn 9, 13.vi.1983: four colonies 7-11 mm high on rocks, no gonothecae (RMNH Coel. no. 25971).– Stn 10, 19.viii.1986: c. 20 colonies 8-20 mm high on sponges, no gonothecae (RMNH Coel. no. 26040).– Stn 11, 30.vi.1985: several colonies 5-20 mm high on sponges, no gonothecae (RMNH Coel. no. 25973).– Stn 18, 28.ix.1985: four colonies 15 mm high on algae, no gonothecae (RMNH Coel. no. 25985); 20.x.1985: ten colonies 3-15 mm high, with gonothecae, on rocks and on *Lophogorgia* spec. (RMNH Coel. no. 26008).– Stn 19, 16.vi.1985: c. 20 colonies 3-10 mm high on algae, no gonothecae (RMNH Coel. no. 25981).– Stn 20, 30.iv.1986: c. 50 colonies 10-25 mm high, with gonothecae, on algae and sponges (RMNH Coel. no. 26012).– Stn 21, 30.iv.1986: c. 40 colonies up to 10 mm high, with gonothecae, on algae (RMNH Coel. no. 26022).– Stn 22, viii.1984: numerous colonies c. 30 mm high, with gonothecae, on algae (RMNH Coel. no. 26002).– Stn 23, 01.vi.1986: nine colonies 2-13 mm high on rhizoid of *Laminaria* spec. washed ashore, no gonothecae (RMNH Coel. no. 26006).– Stn 24, 16.02.1986: four colonies 5-8 mm high on rhizoid of *Laminaria* spec. washed ashore, no gonothecae (RMNH Coel. no. 26007).– Stn 26, 16.ii.1986: three colonies up to 5 mm high on rhizoid of *Laminaria* spec. washed ashore, no gonothecae (RMNH Coel. no. 26016).– Stn. 27, 04.v.1986: seven colonies 5-7 mm high, with gonothecae, on rhizoid of *Laminaria* spec. washed ashore (RMNH Coel. no. 25986).– Stn 28, 20.vii.1982: numerous colonies c. 15 mm high on algae, no gonothecae (RMNH Coel. no. 26017).– Stn 29, 22.v.1986: several colonies 7-20 mm high, with gonothecae, on algae and invertebrates (RMNH Coel. no. 26036).– Stn 30, 22.vii.1986: numerous colonies 5-20 mm high, with gonothecae, on algae, sponges and barnacles (RMNH Coel. no. 26021, slide no. 1602).– Stn 31, 21.vii.1986: c. 40 colonies 4-12 mm high, on sponges, no gonothecae (RMNH Coel. no. 26000).– Stn 32, 26.ix.1984: 13 colonies 10-20 mm high on sponges and ascidians, no gonothecae (RMNH Coel. no. 26009).– Stn 33, 24.v.1986: c. 50 colonies 10-15 mm high, on rocks, no gonothecae (RMNH Coel. no. 25978).– Stn 34, 27.iv.1986: numerous colonies 5-20 mm high, with gonothecae, on sponges (RMNH Coel. no. 26025).– Stn 35, 26.iv.1986: numerous colonies 5-20 mm high, some with gonothecae, on rhizoids of *Laminaria* spec. and on sponges (RMNH Coel. no. 26011).– Stn 36, 19.ix.1986: numerous colonies 10-20 mm high, on rocks and sponges; no gonothecae (RMNH Coel. no. 26013).– Stn 37, 20.ix.1986: 20 colonies 5-15 mm high, with gonothecae, on sponges (RMNH Coel. no. 26015).– Stn 38, 24.vii.1986: c. 50 colonies 2-15 mm high on rocks and sponges, no gonothecae (RMNH Coel. no. 26005).– Stn 39, 25.iv.1986: numerous colonies 10-20 mm high, some with gonothecae on sponges (RMNH Coel. no. 26042).– Stn 40, 05.v.1985: three colonies 15-20 mm high on algae, no gonothecae; 27.ii.1986: numerous colonies 5-20 mm high, with gonothecae, on algae, sponges and barnacles (RMNH Coel. no. 25970); 25.iv.1986: 14 colonies 7-13 mm high on rocks, no gonothecae (RMNH Coel. no. 26046).– Stn 41, 18.ix.1986: several colonies 2-10 mm high on rocks in a tidal pool, no gonothecae (RMNH Coel. no. 25976).– Stn 43, 28.iii.1986: c. 25 colonies 2-10 mm high, with gonothecae, on rhizoids of *Laminaria* spec. (RMNH Coel. no. 26004).– Stn 45, 15.x.1985: several colonies 6-20 mm high on rocks in a tidal pool, no gonothecae (RMNH Coel. no. 25977); 27.ii.1986: six colonies 5-15 mm high, one with gonothecae, on rhizoid of *Laminaria* spec. and on sponge (RMNH Coel. no. 26020); 25.iii.1986: numerous colonies 2-20 mm high, with gonothecae, on sponges, barnacles and ascidians (RMNH Coel. no. 26047); 24.iv.1986: seven colonies c. 10 mm high, with gonothecae, on sponges, barnacles and ascidians (RMNH Coel. no. 26014); 23.v.1986: numerous colonies 5-13 mm high, with gonothecae, on sponges and barnacles (RMNH Coel. no. 26043).– Stn 47, 03.iii.1984: three colonies 5-10 mm high, on sponge, no gonothecae (RMNH Coel. no. 26019).– Stn 48, 29.iv.1984: 17 colonies 10-15 mm high, with gonothecae, on sponges (RMNH Coel. no. 26030).– Stn 49, 30.iv.1984: numerous colonies 10-20 mm high, with gonothecae, on rhizoids of *Laminaria* spec., sponges and barnacles (RMNH Coel. no. 26028, slide no. 1601).– Stn 51, 03.xii,1983: several colonies c. 15 mm high, with gonothecae, on barnacles (RMNH Coel. no. 26010).– Stn 53, 07.ix.1986: several colonies 5-8 mm high on rocks, no gonothecae (RMNH Coel. no. 25972).– Stn 55, 26.iii.1986: numerous colonies 10-20 mm high. with gonothecae, on barnacles (RMNH Coel. no. 25984).– Stn 58, 16.iii.1984: numerous colonies 2-10 mm high on sponges, barnacles and ascidians, no gonothecae (RMNH Coel. no. 26027).– Stn 59, 27.iii.1986: numerous colonies 2-9 mm high, with gonothecae, on various invertebrates (RMNH Coel. no. 26034).

Description.— Colonies with erect, monosiphonic hydrocaulus (axis), rarely ramified, in young colonies occasionally with a few annulations basally. Hydrocaulus

not or scarcely geniculate, divided into segments by means of indistinct, oblique peridermal constrictions (nodes), each segment with a hydrotheca in distal portion (figs. 11a, b, 12a).

Hydrothecae alternately directed left and right and in same plane with axis. Adcauline wall of hydrotheca adnate for about half its length, free part of adcauline wall basally with distinct convexity; distal part, just under hydrothecal rim, concave. Abcauline wall of convexity occasionally lightly undulated. Hydrothecal rim slightly tilted in adcauline direction, with four marginal cusps, of which abcauline cusp is more strongly developed than remaining three. Opercular apparatus formed of four triangular opercular plates as in other species of genus. Three well developed intrathecal cusps present of which one on abcauline and two on adcauline side of hydrotheca figs. 11a, b, 12a, 13, 14).

Ramifications, if present, originating from axis just under hydrotheca (fig. 13). Ramifications of a dichotomous type have also been observed, though sporadically (fig. 14). Structure of ramification as that of axis.

Gonothecae ovoid, springing from axis and/or ramifications at base of hydrotheca; perisarc annulated in distal two-thirds. Aperture of gonotheca at end of short neck, surrounded by four cusps of varied development (fig. 12b, c). A gonotheca with a distinct, external acrocyst has also been observed.

Occurrence.— *Sertularella mediterranea* frequents the intertidal zone of rocky shores and has been observed to a depth of 33 m at rocky bottoms. The species has also been obtained from material washed ashore on beaches. It prefers various species of algae, sponges and barnacles that cover the surface of rocks, but has also been seen to grow directly on rocks and various invertebrates as for instance hydroids, gorgonids and molluscs.

Reproductive period.— Gonothecae have been found in February, March, May, September, October and December.

Distribution.— Well distributed in the Mediterranean and the eastern Atlantic, where it occurs from the vicinity of Spitzbergen (Leloup, 1940, as *Sertularella polyzonias* var. *mediterranea*) southwards till the coasts of South Africa (Millard, 1975). It has also been observed at the Indian Ocean coast of South Africa (Natal, Millard, 1975) and from the vicinity of Madagascar (Billard, 1907). Millard (1975) also includes Australasia in the area of distribution of this species; we have been unable to verify this statement. Along the coasts of the Iberian Peninsula the species is now known from various localities along the Basque coasts (Altuna et al., 1984, as *Sertularella gaudichaudi*; Isasi & Saiz, 1986; Altuna & García Carrascosa, 1990, as *Sertularella picta*; Aguirrezabalaga et al., 1987, as *Sertularella gaudichaudi* f. *mediterranea*), from various localities along the Portuguese coast (Da Cunha, 1944, 1950), from the region of the Strait of Gibraltar (Medel, García & García-Gómez, 1991) and from numerous Mediterranean localities

Table 4. *Sertularella mediterranea* Hartlaub, 1901. Measurements in µm.

Axial segment, length	504-561
diameter at node	160-230
Hydrotheca, length adnate part adcauline wall	317-360
length free part adcauline wall	375-432
length abcauline wall	590-662
diameter at rim	260-288
Gonotheca, maximal length	1390-1780
maximal diameter	680-870

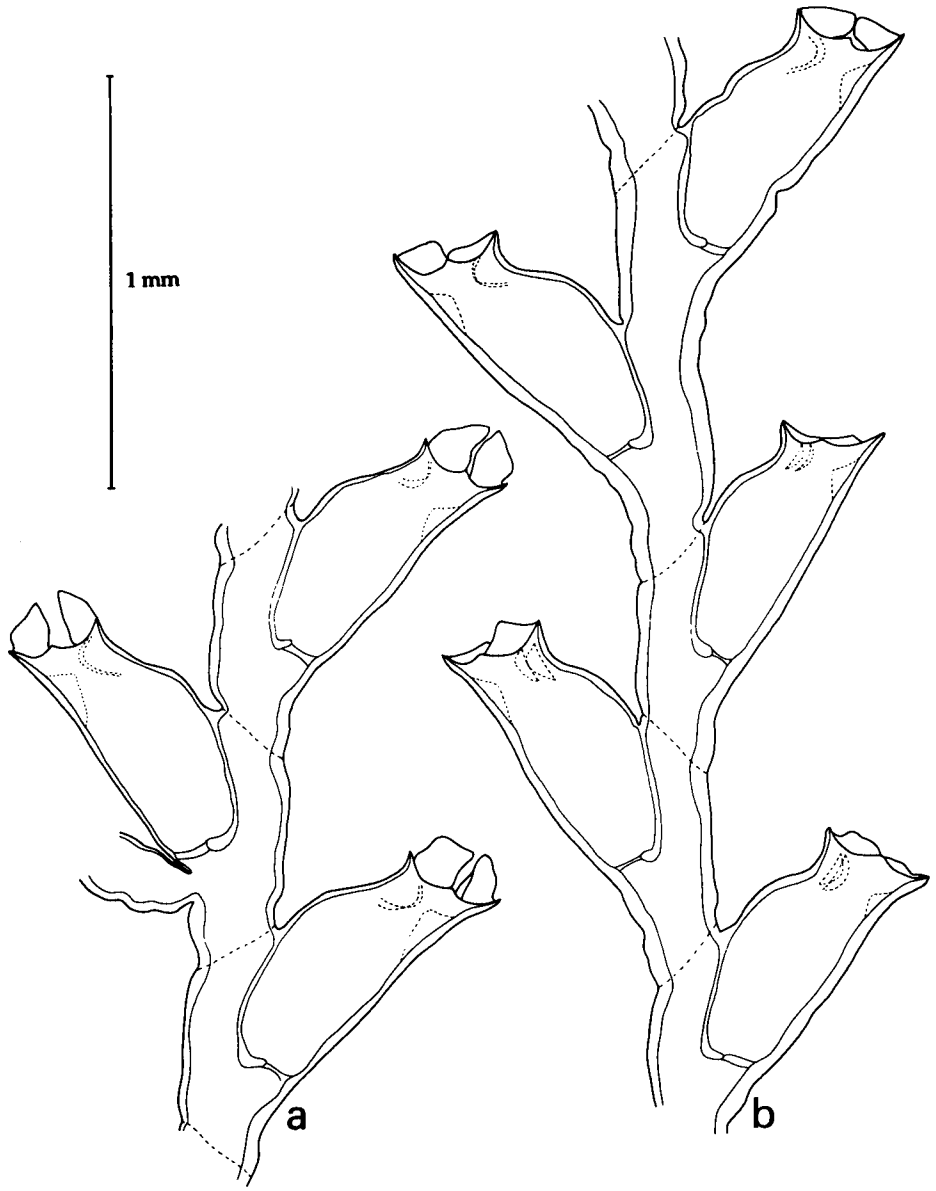

Fig. 11. *Sertularella mediterranea* Hartlaub, 1901. a, Stn 30, part of stem with ramification. b, Stn 49, part of stem.

(García-Corrales, Aguirre & González, 1980, as *S. picta*; García-Carrascosa, 1981; Gili, 1986).

Discussion.— *Sertularella mediterranea* was described by Hartlaub (1901) after specimens from Rovigno (Rovinj), indicating at the same time that the distribution of this species also extended to the remaining Mediterranean area. Billard (1909), in his redescription of *Sertularella gaudichaudi* (Lamouroux, 1824), included *S. mediterranea* in the synonymy of the former but later on Billard (1922), after the study of colonies

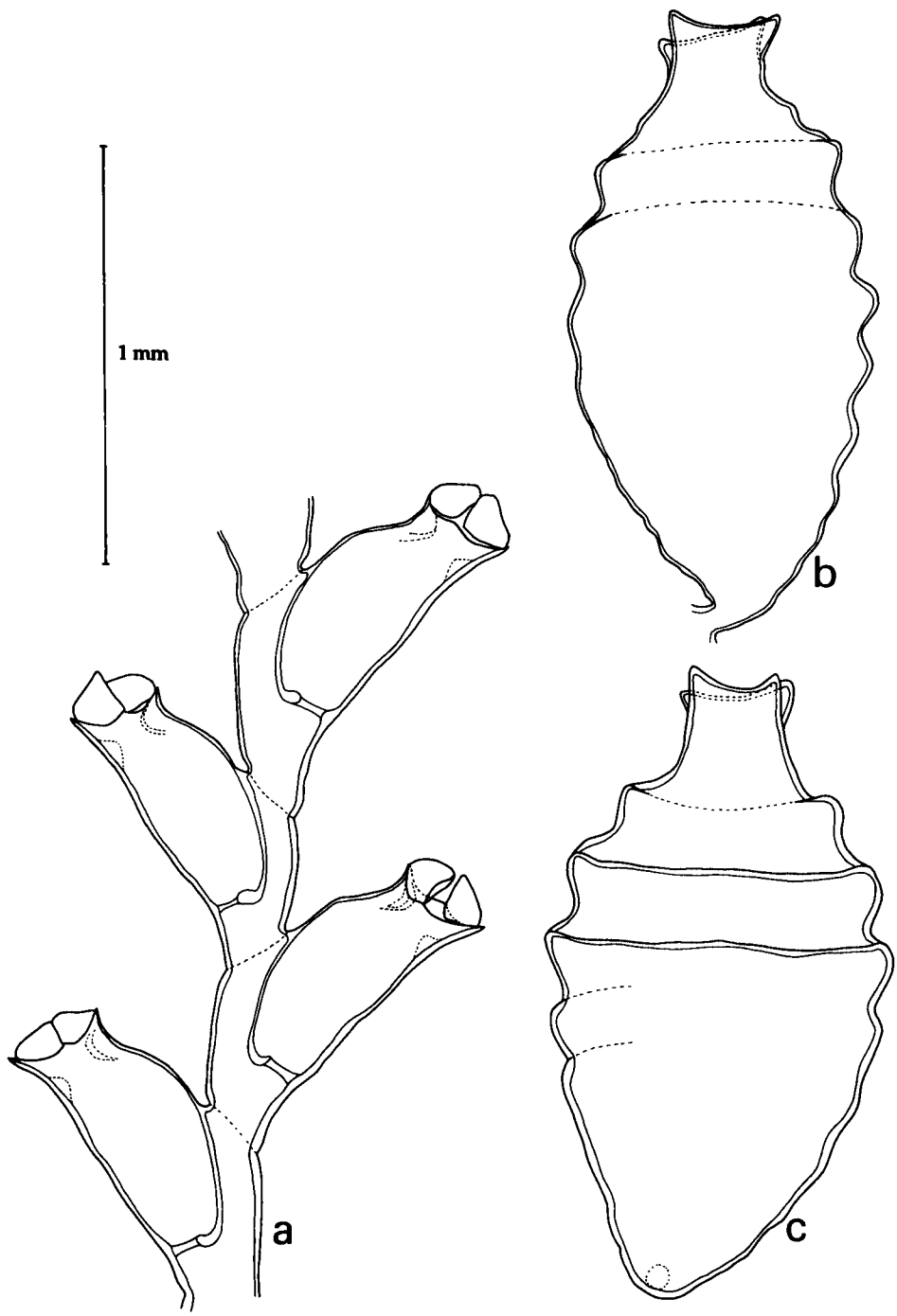

Fig. 12. *Sertularella mediterranea* Hartlaub, 1901, Stn 49. a, part of stem; b, c, gonotheca.

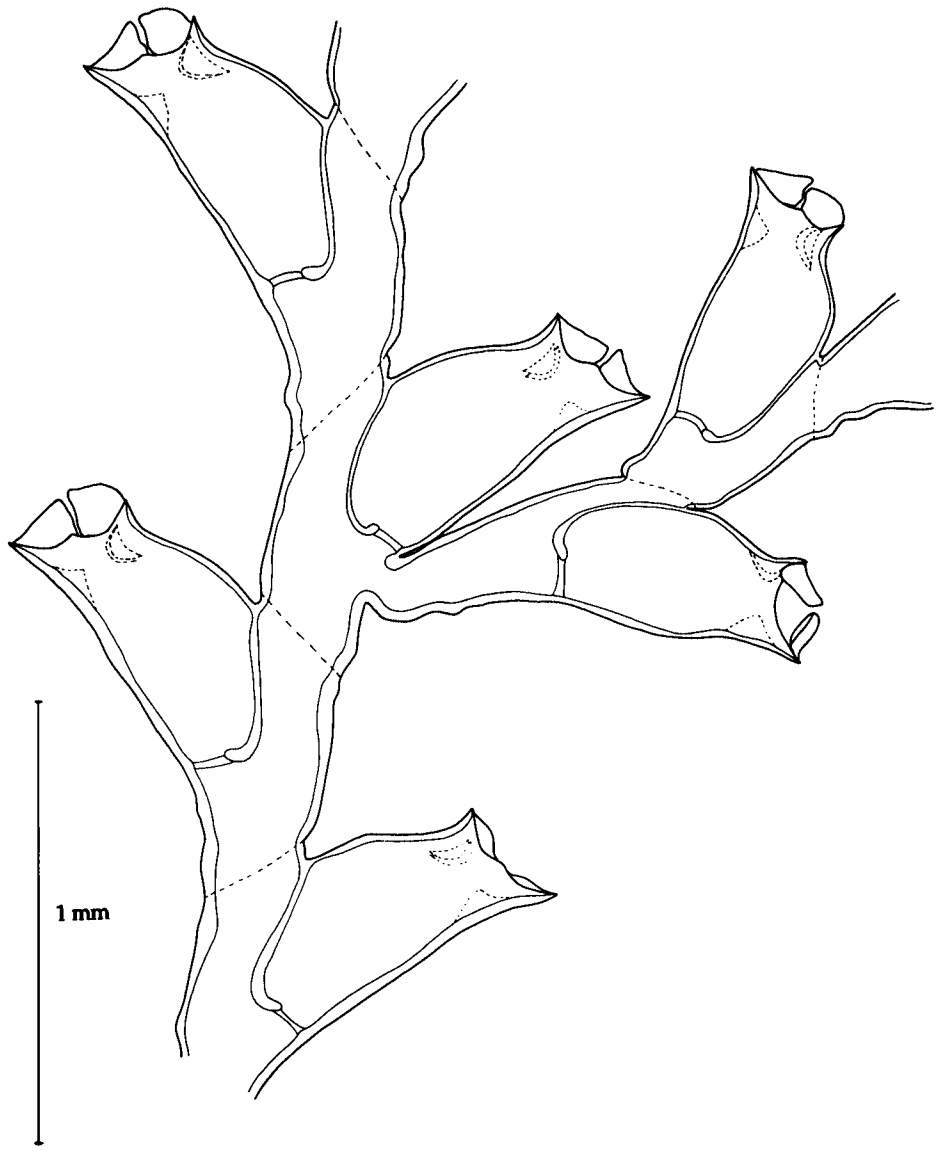

Fig. 13. *Sertularella mediterranea* Hartlaub, 1901, Stn 49, detail of ramification.

of *S. mediterranea* from various European and West African localities, a re-study of the type of *S. gaudichaudi* and the inspection of colonies of *Sertularella picta* (Meyen, 1834) from Cape Horn, reached the conclusion that three different species were involved. At the same time he stated that his record of *S. gaudichaudi* from Roscoff, France, in reality concerned *S. mediterranea*, representing the first Atlantic record of that species. Mediterranean species and forms of *Sertularella* were later on studied by Picard (1956), who concluded that a "forma *mediterranea*" could indeed be distinguished, which he considered to represent an ecological variety of *Sertularella ellisii*

Fig. 14. *Sertularella mediterranea* Hartlaub, 1901, Stn 49, detail of dichotomous branching.

(Deshayes & Milne-Edwards, 1836). Cornelius (1979) includes *S. mediterranea* in the synonymy of *S. gaudichaudi*. García-Corrales, Aguirre & González (1980) again separate *S. mediterranea* from *S. gaudichaudi*, but consider the former a synonym of *S. picta* which name is used to indicate the species described above. Boero & Fresi (1986), though referring to Cornelius's opinion concerning the synonymy of *S. mediterranea* and *S. gaudichaudi*, state that Picard's (1956) distinction of the Mediterranean forms is valid, but distinguish the present species as *Sertularella gaudichaudi* f. *mediterranea*.

After the study of an abundant material from the Galician coasts and elsewhere we have reached the conclusion that the opinion expressed by García-Corrales, Aguirre & González (1980) concerning the present species, named *Sertularella picta* in their descriptions, is correct; it is in our opinion a valid species and distinctly differentiated from *S. fusiformis* (Hincks, 1861) and *S. ellisii* (Deshayes & Milne-Edwards, 1836) (= *S. gaudichaudi* sensu García-Corrales, Aguirre & González, 1980). It is characterized by the small size of the monosiphonic colonies, that are rarely branched, have a practically straight hydrocaulus (without geniculations), and the hydrothecae in the same plane with the axis. At the hydrothecal rim the abcauline cusp is stronger than the remaining three; the hydrothecal aperture, consequently, is slightly tilted in adcauline direction.

At Stn 4 we have found colonies of *S. mediterranea* and *S. ellisi* growing together

on sponges and ascidians; at Stn 45 (27.02.1986) *S. mediterranea* and *S. fusiformis* were observed growing together on the same rhizoid of *Laminaria* spec. and on a sponge. In each case the species concerned demonstrated the distinctive characters discussed here that made it possible to separate the various species without any reasonable doubt.

Sertularella mediterranea is here considered to be specifically different from *Sertularella gaudichaudi* (Lamouroux, 1824) and *Sertularella picta* (Meyen, 1834), the last two species having a subantarctic distribution. We have compared *S. mediterranea* with type material of *S. gaudichaudi* in the collections of the Muséum National d'Histoire Naturelle, Paris*, and have found it to be quite different. The original description of *S. picta* (Meyen, 1834) and re-descriptions of the holotype by Hartlaub (1901) and Stechow (1923) lead to the conclusion that here too we are dealing with a species different from *S. mediterranea.*

Finally we want to draw attention to the fact that *Sertularella mediterranea asymmetrica* Millard, 1958 resembles *Sertularella antarctica* Hartlaub, 1901, both in the tendency of the hydrothecae to shift anteriorly and in the strong development of the adcauline marginal cusp of the hydrothecae; we hesitate to include such forms in *S. mediterranea.*

Sertularella gaudichaudi (Lamouroux, 1824)
(fig. 15)

Sertularia Gaudichaudi Lamouroux, 1824: 615, pl. 90 figs. 4-5.
Sertularella Gaudichaudi; Hartlaub, 1901: 78, fig. 51; Billard, 1909: 317-319, figs. 5-6.
Sertularella gaudichaudi; Hartlaub, 1905: 644-645, fig. k[4]; Billard, 1922: 103-106, figs. 1, 2A; 1924: 60-61; Van Praët, 1979: 901, fig. 47.

Discussion.— Lamouroux's (1824) description of this species is based on material from the Falkland Islands region. Hartlaub (1901), when revising the species of *Sertularella*, suggested the possible synonymy of *Sertularella picta* with Lamouroux's species, but recognized the necessity of studying the type of *S. gaudichaudi* before reaching such a conclusion. In a later paper (Hartlaub, 1905) Lamouroux' original description is repeated and one of the figures reproduced; the possible synonymy with *S. picta* is still considered questionable.

Billard (1909), when revising the Lamouroux type collection in Caen, concluded that one of samples in this collection, labelled "*Sertularia Quoyi* (Freycinet et Leach, îles Malouines, Indes)" corresponds with the type of *Sertularia gaudichaudi.* In reaching this conclusion Billard has based himself on the comparison of a fragment of "*Sertularia Quoyi*" with Lamouroux' figures of *Sertularia gaudichaudi* (1824, pl. 90 figs. 4-5), which he found to be in complete agreement. Moreover, according to the label with Lamouroux' specimen it originates from the Falkland Islands region ("îles Malouines"); Freycinet, also mentioned on the label, was the commander of the

* Cornelius (1979) mentions the destruction of the holotype of *Sertularella gaudichaudi*, while Redier (1967) does not include the species in his paper on the Lamouroux types in the collection of the Muséum National d'Histoire Naturelle, Paris. In the slide collection of the Paris Muséum there are two schizoholotype slides made by Billard (cf. Van Praët, 1989: 901).

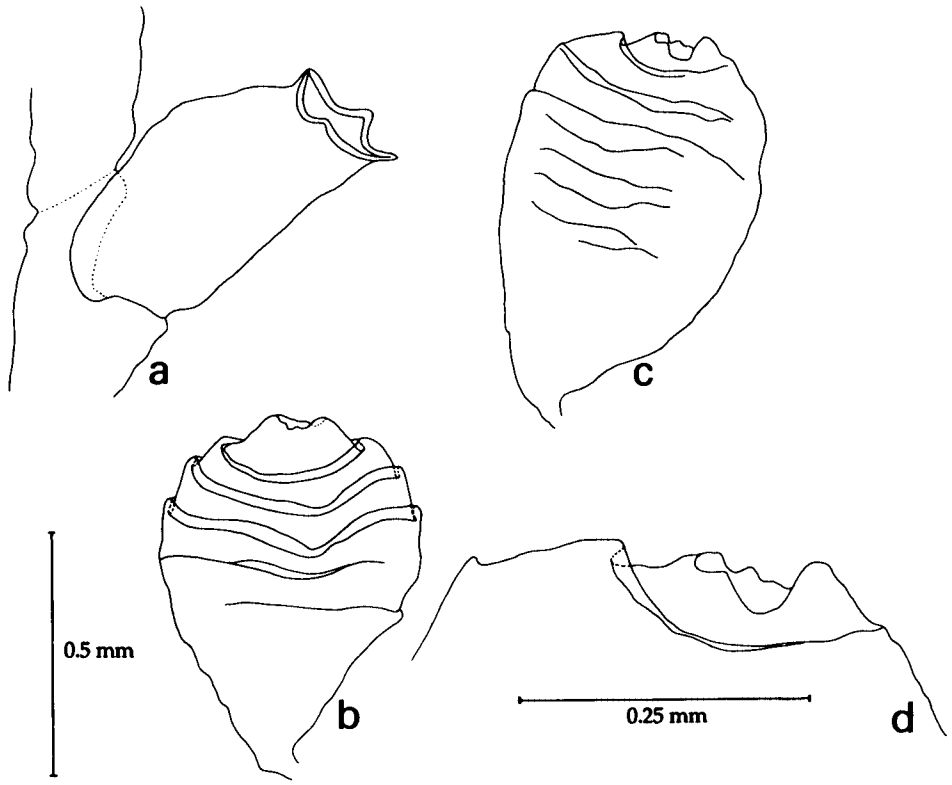

Fig. 15. *Sertularella gaudichaudi* (Lamouroux, 1824), from schizoholotype slide in Muséum National d'Histoire Naturelle, Paris, Falkland Islands. a, hydrotheca, lateral view; b, c, gonotheca; d, top part of gonotheca. Gonothecae compressed by pressure of cover glass. a-c, scale 0.5 mm; d, scale 0.25 mm.

expedition with the vessels "Uranie" and "Physicienne" during which the specimen was collected. Billard could not provide an explanation for Leach's name on the label. If Billard's conclusions are accepted and his data (Billard, 1909, 1922) correctly interpreted *Sertularella gaudichaudi* appears as a species up to 65 mm high, bushy and with a polysiphonic, densely ramified axis. The hydrothecae are arranged in two planes, that at the base of the branches make an angle of c. 90°, the angle widening gradually along the branches to become 180° (hydrothecae alternate and in one plane) at the end of some branches. The abcauline cusp at the hydrothecal rim is only slightly better developed than the remaining three (fig. 15a), the mature gonotheca is globular, with the distal portion strongly annulated (fig. 15b, c); the aperture is surrounded by four acute cusps (fig. 15d). In Billard's fore named descriptions three intrathecal cusps are mentioned. In a later paper (Billard, 1924) he concludes that such intrathecal cusps are not present in all hydrothecae and that in such cases where intrathecal cusps appear to be present they represent folds caused by the dried condition of the material. In the same paper Billard considers *Sertularella allmani* Hartlaub, 1901, *Sertularella secunda* Allman, 1888, and *Sertularella antarctica* Hartlaub, 1901, to be identical with *S. gaudichaudi*, a conclusion we do not share, the

three species agreeing better with *Sertularella picta* (vide infra). In his 1909 paper Billard suggests the possible synonymy of *S. gaudichaudi* with *S. picta*, a conclusion we do not endorse. Also he suggests the synonymy of *S. mediterranea* with *S. gaudichaudi*, a conclusion later on withdrawn (vide supra: 514).

The geographical distribution of *S. gaudichaudi* is restricted to the Falklands Islands region of the SW Atlantic. European records of *S. gaudichaudi* sensu Cornelius (1979) refer to *Sertularella ellisii* (Deshayes & Milne-Edwards, 1836), *S. fusiformis* (Hincks, 1861) and *S. mediterranea* Hartlaub, 1901; those of *S. gaudichaudi* sensu García-Corrales, Aguirre & González (1980) refer to *S. ellisii*.

Sertularella picta (Meyen, 1834)

Sertularia picta Meyen, 1834: 201-202, pl. 34 figs. 1-3.
Sertularella picta; Hartlaub, 1901: 77-79, pl. 5 fig. 14, pl. 6 figs. 17-18, 20; 1905: 645-647, fig. b[4]; Billard, 1922: 106-107, fig. 2b; Stechow, 1923: 187-189, fig. B[1]; Blanco, 1963: 175-177, figs. 3-4; Blanco, 1967: 112-115, pl. 3 figs. 1-6; Vervoort, 1972: 111-116, figs. 34-35.

Discussion.— *Sertularella picta* was described by Meyen (1834) after specimens from the east coast of Tierra del Fuego and the Falkland Islands region. The type specimens have later on been studied by Hartlaub (1901, 1905) and Stechow (1923), who provided additional information. According to the original and additional descriptions *S. picta* appears to be a species with a basally polysiphonic axis, an exuberant ramification that reminds of that of *Obelia longissima* (Pallas, 1766) with hydrothecae that are not in one plane, a strongly developed abcauline cusp at the hydrothecal rim (almost as found in *Amphisbetia*), with three more or less developed intrathecal cusps and a gonothecae with undulated to annulated walls, the aperture being provided with four cusps of varied development.

The possible synonymy of this species with *Sertularella gaudichaudi*, suggested by Hartlaub (1901, 1905) and Billard (1909), has already been discussed. Billard (1922), after re-study of Lamouroux' type (of *S. gaudichaudi*) and colonies of *S. picta* from Cape Horn, concluded that the two species are different, a conclusion shared by Stechow (1923) after the comparison of Meyen's type of *S. picta* with Billard's (1909) description of *S. gaudichaudi*.

Hartlaub (1901), however, considered the following species to be closely related: *Sertularella protecta* Hartlaub, 1901, *Sertularella allmani* Hartlaub, 1901 (nom. nov. for *Sertularia secunda* Allman, 1888 = *Sertularia unilateralis* Allman, 1888), *Sertularella antarctica* Hartlaub, 1901 (nom. nov. for *Sertularella unilateralis* Allman, 1876), *Sertularella contorta* Kirchenpauer, 1884, and *S. picta*. Consequently, in the description of *S. protecta* he mentions that this species comes close to *S. contorta*, *S. picta* and particularly *S. allmani* and may in the future turn out to be synonymous with one of these species. *S. allmani* is considered very similar to or probably identical with *S. protecta* and *S. antarctica* ; *S. antarctica* is listed with a query in the synonymy of *S. contorta*.

Nutting (1904) included in *S. allmani* both *S. unilateralis* Allman, 1876 and *Sertularia secunda* Allman, 1888 (= *Sertularia unilateralis* Allman, 1888); in his opinion *S. antarctica* could be different from *S. allmani*. Also he considers *S. contorta* a valid species and includes *S. protecta* in its synonymy.

Vervoort (1972), after the study of colonies of *S. antarctica* from the Magellan region

and the inspection of the type of *Sertularia secunda* Allman, 1888 (= *S. allmani*) from the Kerguelen region, reached the conclusion that one single species is involved, which he suggest to indicate as *Sertularella antarctica* Hartlaub, 1901, with as synonyms *Sertularella unilateralis* Allman, 1876, *Sertularia secunda* Allman, 1888 (= *Sertularia unilateralis* Allman, 1888), and *Sertularella allmani* Hartlaub, 1901.

Blanco (1963, 1967) has redescribed *S. picta* after colonies from the Argentine Atlantic coast. These colonies have a spurious ramification, resembling the type also met with in *Obelia longissima*, the secondary ramifications being turned in the same direction and with a considerable variability in the length of the hydrothecate internodes (hydrocladia), those of the distal ramifications being shorter. The hydrothecae of the principal branches may be turned frontally. All these characters are also observed in *S. antarctica*. The strong development of the abcauline cusp at the hydrothecal border in *S. picta* described by Billard (1922) and Stechow (1923) is also observed in *Sertularia secunda* (Allman, 1888) (fide Vervoort, 1972). All this strengthens the possible synonymy of *S. picta* with a species of the *S. antarctica* group.

Vervoort (1972), as *S. picta*, described certain colonies that are arboriform, with the hydrothecae set in two planes intersecting at an angle of more than 90°, and with globular gonothecae, with annulated distal part and four more or less equally developed cusps at the hydrothecal rim. Particularly in the shape of the gonothecae this material comes near to *Sertularella gaudichaudi* (Lamouroux, 1824).

The confusion exsisting with regard to the subantarctic and antarctic species of *Sertularella*, which appears clearly from the discussion presented above, can only be solved by a study of a comprehensive material from that area, along with a redescription, as far as feasible, of the types.

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