Sabellariidae (Annelida, Polychaeta) from south America

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ABSTRACT

This paper summarizes the present taxonomic knowledge of Sabellariidae Johnston, 1865 from South America. Records of *Idanthyrsus armatus* Kinberg, 1867, *I. pennatus* (Peters, 1854), *Phragmatopoma attenuata* Hartman, 1944, *P. peruensis* Hartman, 1944, *P. virgini* Kinberg, 1867, *P. moerchi* Kinberg, 1867, *P. lapidosa* Kinberg, 1867, *Sabellaria bella* Grube, 1870, *S. bellis* Hansen, 1882, *S. fissidens* Grube, 1870, *S. minuta* Carrasco & Bustos, 1981, *S. nanella* Chamberlin, 1919, and *S. wilsoni* Lana & Gruet, 1989 are included. Regional synonymies, diagnoses, taxonomic remarks, and occurrence information are provided for each species, together with an identification key and distributional maps. Discontinuous distribution patterns of the continental sabellariid fauna may be only partially attributed to incomplete sampling. Many species seem to have restricted distribution ranges. It is hypothesized that the dispersion patterns of sabellariids in South America do not conform to the dispersal paradigm that could be expected from their active larval phases.

RÉSUMÉ

Sabellariidae (Annelida, Polychaeta) d'Amérique du Sud

L'état actuel des connaissances sur les Sabellariidae Johnston, 1865 d'Amérique du Sud est présenté. Les lieux de récoltes de *Idanthyrsus armatus* Kinberg, 1867, *I. pennatus* (Peters, 1854), *Phragmatopoma attenuata* Hartman, 1944, *P. peruensis* Hartman, 1944, *P. virgini* Kinberg, 1867, *P. moerchi* Kinberg, 1867, *P. lapidosa* Kinberg, 1867, *Sabellaria bella* Grube, 1870, *S. bellis* Hansen, 1882, *S. fissidens* Grube, 1870, *S. minuta* Carrasco & Bustos, 1981, *S. nanella* Chamberlin, 1919 et *S. wilsoni* Lana & Gruet, 1989 sont donnés. Les synonymies pour cette région, des diagnoses, des remarques taxonomiques et des informations sur les récoltes de chaque espèce sont fournies. Une clé d'identification des espèces et des cartes de distributions sont également données. La distribution discontinue observée le long des côtes d'Amérique du Sud pourrait être due à l'absence d'observations dans certaines régions. Cependant, beaucoup d'espèces semblent avoir une distribution réduite. L'hypothèse selon laquelle le mode de dispersion des Sabellariidae d'Amérique du Sud n'est pas conforme au modèle correspondant à une vie larvaire active est avancée.

INTRODUCTION

The Sabellariidae Johnston, 1865 currently comprises seven genera and about 65 species of colonial or non-colonial tube-building worms. Some species construct reefs of great extent in temperate or tropical regions.

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Representatives of this family occur from nearshore to oceanic depths (UEBELACKER, 1984).

The present recognized genera are *Phalacostremma* Marenzeller, 1895, *Monorchos* Treadwell, 1926, *Gunnarea* Johansson, 1927, *Lygdamis* Kinberg, 1867, *Idanthyrsus* Kinberg, 1867, *Phragmatopoma* Moerch, 1863, and *Sabellaria* Savigny, 1818, with only the three latter previously reported from South America. The regional sabellariid fauna was hitherto poorly known. Relevant taxonomic literature is widely scattered and the level of consistency in identifications appears to be rather low.

In this paper, we summarize the present taxonomic knowledge of Sabellariidae in South America. We have attempted to include all published records from this area. Synonymies, diagnoses and the known geographic range are provided for each species, together with an identification key and distributional maps.

This work is partially based on literature information, and we have not attempted to resolve disputed taxonomic problems. Some taxonomic assignments are tentative, but can serve as background information for future revisions based upon type-specimens or topotypes. Specific names are cited as listed in the original references.

SYSTEMATICS

Idanthyrsus Kinberg, 1867

Type-species: *Idanthyrsus armatus* Kinberg, 1867

Idanthyrsus armatus Kinberg, 1867

Idanthyrsus armatus Kinberg, 1867: 349. — JOHANSSON, 1927: 90. — MONRO, 1930: 177, fig. 73. — MONRO, 1933: 1066, fig. 14. — MONRO, 1936: 172. — HARTMAN, 1944: 336, pl. 31, fig. 36. — HARTMAN, 1953: 10. — HARTMAN, 1966: 73, pl. 24, figs 2-6. — HARTMAN, 1967: 150. — RINGUELET, 1969: 212. — FAUCHALD, 1972: 530, pl. 55, figs h-j. — ORENSANZ, 1974: 55. — FAUCHALD, 1977: 54. — RULLIER & AMOUREUX, 1979: 188. — CARRASCO & BUSTOS, 1981: 170, figs 8-11. — HARTMANN-SCHRÖDER, 1983: 271. — LAVERDE-C, 1986: 128.

Pallasia sexungula — Ehlers, 1897: 125, pl. 8, figs 194-202. — EHLERS, 1900: 220. — EHLERS, 1901a: 267.

Pallasia armata — EHLERS, 1901b: 195.

Sabellaria macropalea — PRATT, 1901: 13, *pro parte*

Pallasia pennata — FAUVEL, 1941: 291.

Diagnosis — External paleae directed outward and plumelike, serrated, with a nearly straight shaft; spinelets widely separated and curved outward (Fig. 1a). Inner paleae smooth hooks with narrow transverse striae. Uncini with a double lateral row of 8 teeth, in addition to one median tooth at superior end. 2-4 pairs of nuchal hooks. Maximum reported length 59 mm.

Distribution — South America: Pacific coast of Colombia; Valparaiso, Concepcion, and other sites of Central Chile; Magellan Strait; Beagle Channel; Cape Horn; Malvinas-Falkland Islands; South Georgia Island; continental shelf off Patagonia and northern Argentina. Other records: Western Mexico; British Columbia; Alaska; Australia; Japan.

Remarks — *I. armatus* has been usually reported from cold waters in the southern and northern sectors of the Pacific and in the southern West Atlantic. The range of the closely related *I. pennatus* (Peters, 1854) appears to be circumtropical, extending northward or southward from that of *I. armatus*. The zones of overlapping are few and have been reported by MONRO (1933), RIOJA (1962), FAUCHALD (1977), and LAVERDE-CASTILLO (1986) for the Pacific coasts of Mexico, Panama and Colombia. However, records of *I. armatus* from Panama are doubtful, since Gorgona Island, cited in the literature as a Panamian locality (MONRO, 1933; FAUCHALD, 1977) is in fact off the Colombian coast, about 600 km south of the Canal Zone. In addition, MONRO's illustration of an external opercular palea (1933, p. 1065) clearly differs from those later provided by HARTMAN (1944) or DAY (1967).

Neither *I. armatus* nor *I. pennatus* have been recorded from the extensive tropical and subtropical Brazilian coast. The northern range of *I. armatus* along the Western Atlantic is clearly conditioned by the Subtropical Convergence, north of La Plata River, where the colder waters of the Malvinas-Falklands Current meet the more saline and warmer waters of the Brazil Current.

I. armatus and *I. pennatus* are known to differ only in minor details of the outer paleae dentation, tapering in the first and slender in the second. Besides that, shafts of the outer paleae are curved in *I. pennatus* and straighter in *I. armatus*. Temperature dependent variation in the morphology of polychaete hard parts has been previously

described by REISH (1977). A careful analysis of this problem should be undertaken in order to clarify the taxonomic relationships of those species.

Idanthyrsus pennatus (Peters, 1854)

Sabellaria (Pallasia) pennata Peters, 1854: 613.
Idanthyrsus regalis — Chamberlin, 1919: 487, pl. 74, figs 1-8.
Idanthyrsus pennatus — JOHANSSON, 1927: 88. — MONRO, 1930: 176. — MONRO, 1933: 1065, fig. 13. — HARTMAN, 1939: 19. — FAUCHALD & REIMER, 1975: 90. — FAUCHALD, 1977: 54. — LAVERDE-CASTILLO, 1986: 128.

Diagnosis (modified from DAY, 1967) — Opercular crown with two rows of long paleae. External paleae with curved shafts and slender denticles (Fig. 1b). Inner paleae smooth with tapering tips. 1-2 pairs of stout nuchal hooks.

Distribution — South America: Pacific coast of Colombia and Ecuador; Galapagos Islands. Other records: Western Panama and Mexico; Mossambique; South Africa; Tropical Indo-West Pacific from Madagascar to Japan.

Remarks — Taxonomic affinities and distribution range of *I. pennatus* and *I. armatus* were discussed above.

Phragmatopoma Moerch, 1863

Type-species: *Phragmatopoma caudata* Moerch, 1863

Phragmatopoma attenuata Hartman, 1944

Phragmatopoma attenuata Hartman, 1944: 352, pl. 38, figs 90-96, pl. 39, figs 100-101. — FAUCHALD, 1977: 54. — LAVERDE-CASTILLO, 1986: 128.
Sabellaria (Phragmatopoma) virgini — MONRO, 1933: 1062, fig. 11.

Diagnosis (modified from HARTMAN, 1944) — Opercular crown slender, prolonged and asymetrical in lateral view. External opercular paleae with a unique distal appendage, consisting of a palmately filamentous membrane, directed nearly at right angles to the main shaft. Shaft with a recurved tooth on the ventral-facing side and weakly scabrous on the upper surface (Fig. 1c).

Distribution — South America: Ecuador, Pacific coast of Colombia. Other records: Pacific side of Panama.

Remarks — As far as we know, there were no additional records of *P. attenuata* since Hartman's original description, based upon material collected by the Allan Hancock Pacific Expeditions along the Pacific coast of Colombia and Ecuador.

Material from Perlas Islands (Pacific side of Panama), originally referred to *Sabellaria (Phragmatopoma) virgini* by MONRO (1933), was correctly ascribed to *P. attenuata* by HARTMAN (1944). The original drawing of an external palea by MONRO (1933, p. 1063) was shown to be slightly misleading by FAUCHALD (1977), who re-examined the material from Perlas Islands and noticed the presence of two distinct teeth on either side of the distal plumes.

Phragmatopoma peruensis Hartman, 1944

Phragmatopoma peruensis Hartman, 1944: 353, pl. 37, figs 84-85, pl. 39, fig. 99, pl. 41, fig. 104.

Diagnosis (modified from HARTMAN, 1944) — Very small size, less than 10 mm long. Shaft of external paleae with long, spatulate, distally rounded terminal membrane, strongly curved inward (Fig. 1d). Middle paleae with a conspicuous shoulder at their external edge.

Distribution — Peru.

Remarks — As *P. attenuata*, *P. peruensis* seems to be known only from through HARTMAN's original description.

Phragmatopoma virgini Kinberg, 1867

Phragmatopoma virgini Kinberg, 1867: 349. — KINBERG, 1910: 70, pl. 27, fig. 4. — JOHANSSON, 1926: 2, fig. 1(1a-b). — JOHANSSON, 1927: 100. — HARTMAN, 1944: 351, pl. 35, figs 77-78. — HARTMANN-SCHRÖDER, 1962: 155, fig. 202 (as *Phragmatopoma* c.f. *virgini* — HARTMAN, 1966: 75, pl. 24, figs 6-8. — RINGUELET, 1969: 213.- ORENSANZ, 1974: 55, *pro parte*.

Sabellaria macropalea — PRATT, 1901: 13, *pro parte*.

Diagnosis — Opercular crown subcircular. External opercular palea with only two main teeth along outer margins, without any process between them (Fig. 1e). Middle paleae smooth, very fine and terminating in a hook. Abdominal uncini with 6 teeth. Maximum reported length 25 mm.

Distribution — Buket Island, San Nicolas Bay, Southern Chile (also spelt Bucket Island by earlier authors, this site is probably Sanchez Island, according to HARTMAN, 1966, p. 1); Ramuncho, near Concepcion, Central Chile; Malvinas-Falkland Islands.

Remarks — *P. virgini* was originally described from the Strait of Magellan, near Buket Island (= Sanchez Island), southern Chile. KINBERG (1867) referred to the number and aspect of external paleae ("externae 66 truncate, spina elongata armatae...") but provided no drawings. EHLERS (1901b) re-examined the type material and considered his species *Hermella orbifera* (Ehlers, 1901a) a synonym of *Sabellaria virgini* (Kinberg), since he did not recognize the name *Phragmatopoma*. However, in the redescription carried out with complementary specimens from southern Chile, EHLERS (1901b) figured external opercular paleae with sulcate median processes (pl. XXIII, fig. 11). The type specimen of *P. virgini* was posteriorly studied by JOHANSSON (1926) and HARTMAN (1944). Both described external paleae with only two main teeth along their outer, distal margins, without dentations or a flange between them. HARTMAN (1944) explicitly remarked that there was no indication of an attached flange or other structure along the concave edge. So, the presence of a median process in the external paleae can be considered a useful diagnostic character to distinguish *P. virgini* and *P. moerchi*. Consequently, the material that EHLERS (1901b) referred to *S. virgini* belongs in fact to *P. moerchi*, as already suggested by HARTMAN (1944). ORENSANZ (1974) mentioned *P. virgini* in a list of magellanic species, but according to the provided synonymy he also included earlier findings (EHLERS, 1901a; MONRO, 1936) which in fact correspond to *P. moerchi*.*P. virgini* is an intertidal species, known mainly from southern and central Chile. The Malvinas-Falkland Islands citation (PRATT, 1901; HARTMAN, 1944) represents its unique record from the Atlantic ocean.

Phragmatopoma moerchi Kinberg, 1867

Phragmatopoma moerchi Kinberg, 1867: 349. — HARTMAN, 1944: 350,pl. 35, fig. 76, pl. 36, figs 80-83, pl. 39, figs 97-98. — HARTMANN-SCHRÖDER, 1960: 38. — HARTMANN-SCHRÖDER, 1962: 154, fig. 201. — HARTMANN-SCHRÖDER, 1965: 304.

Phragmatopoma morchii — JOHANSSON, 1926:4, fig. 1(2-8). — JOHANSSON, 1927: 101.

Hermella orbifera — Ehlers, 1901a: 267.

Sabellaria virgini — EHLERS, 1901b: 199, pl. 23, figs 1-4, 7-12, pl. 24, figs 1-5, *pro parte* (*non* KINBERG, 1867).

? *Sabellaria (Phragmatopoma) moerchi* — MONRO, 1936: 171.

Phragmatopoma virgini — ORENSANZ, 1974: 55, *pro parte*.

Diagnosis — Opercular crown flat and subcircular. External opercular paleae with a rectangular flange, frayed at the distal end (Fig. 1f). Middle paleae transversely rugose and slightly roughened on the outer side, terminating in a hook. Maximum reported length 50 mm.

Distribution — South America: Peru; northern and central coasts of Chile; Patagonia (?). Other records: Hawaii.

Remarks — *P. moerchi* is an intertidal and subtidal species, known from Peru to Chile and west to Hawaii. *Sabellaria (Phragmatopoma) moerchi* described by MONRO (1936) from 43°50' S - 65°01' 51" W (near Dos Bahias Cape, off Patagonia) could be referred to *P. moerchi*, since this author found " ... large comb-like processes ..." in the external opercular paleae. This would be the only record of the species in the Atlantic Ocean. However, MONRO (1936, p. 15) remarked that he could " ... find nothing significant to distinguish this species from JOHANSSON's account of KINBERG's *Phragmatopoma lapidosa*". We think that this material should be reviewed before the distribution range of *P. moerchi* is extended to the Atlantic.

Phragmatopoma lapidosa Kinberg, 1867

Phragmatopoma lapidosa Kinberg, 1867: 349. — JOHANSSON, 1926: 2. — JOHANSSON, 1927: 99. — HARTMAN, 1944: 348, pl. 35, figs 73-75, pl. 36, fig. 79, pl. 40, figs 102-103. — AMARAL, 1987: 471, figs. 1-5.

? *Sabellaria fauveli* — Gravier, 1909: 650, pl. 18, figs 60-69.

Diagnosis — External paleae with a long conspicuous pinnate plume arising close to the upper distal margin of the palea (Fig. 1g). Middle paleae strong, uncinate, with a basal tooth. Inner paleae similar, but smaller. Uncini with 8 teeth. Maximum reported length 25 mm.

Distribution — South America: SE Brazil (from Rio Grande do Sul to Rio de Janeiro, and probably northward); Peru (?). Other sites: Caribbean; Atlantic coast of Mexico; Florida.

Remarks — A number of other forms, including *P. caudata* Moerch, 1863 (from the West Indies), *Sabellaria (Pallasia) castelnaui* Grube, 1870 (from New Zealand), *S. fauveli* Gravier, 1909 (from Peru) and *Centrocorone spinifera* Treadwell, 1939 (from Porto Rico), have been referred to *P. lapidosa* by JOHANSSON (1927) and HARTMAN (1944). In our opinion, this material, especially the records from the Pacific, needs reexamination. *P. lapidosa* is one of the most conspicuous polychaete species along the tropical and subtropical coasts of the Western Atlantic, building sandy reefs of great extent in the lower intertidal and shallow subtidal zones of exposed rocky beaches. If really present on the Pacific coast of South America, it should have been consistently reported by other authors. AMARAL (1987) provided a brief characterization of the species, based upon material collected along the southeastern coast of Brazil. However, her drawing of an external palea is slightly misleading, since the teeth of the prolonged plume are depicted as round and not tapering.

Sabellaria Savigny, 1818

Type species: *Sabellaria alveolata* L., 1767

Sabellaria bella Grube, 1870

Sabellaria bella Grube,1870: 69. — AUGENER,1934: 151, fig. 31a-d. — GRUET & LANA, 1988: 32, figs 1-2.
Sabellaria alcocki — RULLIER & AMOUREUX, 1979: 187, *pro parte* (*non* GRAVIER, 1906).

Diagnosis — External paleae asymetrical, with 2-3 lateral spines on each side of a central spike with 5-6 lateral teeth (Fig. 1h). Middle paleae alternate long (narrow, basally excavated, with a fine point) and short (spoon-shaped, crenulated). Inner paleae geniculate, basally excavated and distally serrated. Uncini with 6 (seldom 5) teeth.

Distribution — SE Brazil (Espirito Santo to Santa Catarina States).

Remarks — The opercular paleae were redescribed by GRUET & LANA (1988). Previous records from North Carolina and Peru (HARTMAN, 1944) were considered doubtful, on the basis of inner paleae morphology.

Sabellaria bellis Hansen, 1882

Sabellaria bellis Hansen, 1882: 19, pl. 6, figs 5-17. — AUGENER, 1934: 149, fig. 30a-e. — HARTMAN, 1944: 339, pl. 30, figs. 27-29.— RULLIER & AMOUREUX, 1979: 188. — GRUET & LANA, 1988: 34, figs 3-4.

Diagnosis — External paleae with a broad spiny median spike and two lateral teeth, rarely a small additional one (Fig. 1i). Middle paleae all of the same length, short, spoon-shaped and laterally crenulated. Inner paleae long, concave and distally spiny.

Distribution — SE Brazil (Rio de Janeiro and Santa Catarina States).

Remarks — Opercular paleae were also redescribed and illustrated by GRUET & LANA (1988), who restricted the present distribution range of *S. bellis* to the southeastern Brazilian coast.

Sabellaria fissidens Grube, 1870

Sabellaria fissidens Grube, 1870: 69. — EHLERS, 1901b: 196, pl. 24, figs 6-16. — RINGUELET, 1969: 213.

Diagnosis (modified from EHLERS, 1901b) — External paleae with distal serrations and a simple, bifurcated tip (Fig. 1j). Middle paleae concave, all of the same length. Inner paleae distally simple. Uncini with 7 teeth. Maximum reported length 28,5 mm.

Distribution — Coast of Chile, without reference to type- locality; Patagonic littoral (?).

Remarks — The presently available descriptions of *S. fissidens* correspond to the original material (GRUBE, 1870), fully redescribed by EHLERS (1901b). RINGUELET (1969) reported the species from the Patagonic littoral, but provided no descriptions or illustrations.

Sabellaria minuta Carrasco & Bustos, 1981

Sabellaria minuta Carrasco & Bustos, 1981: 167, figs 1-7.

Diagnosis — External paleae serrate, with a long median spike with bifid serrations (Fig. 1k). Middle paleae alternating long and short. Inner paleae concave and distally simple. Uncini with 5-6 teeth. Probably the smallest species of the genus, with a maximum reported length of 7 mm.

Distribution — Continental shelf off Central Chile, near Concepcion, at 135 and 220 m depth.

Remarks — *Sabellaria minuta* is known only from the original description. This is the only record, besides *S. fissidens*, of the genus along the Pacific coast of South America.

Sabellaria nanella Chamberlin, 1919

Sabellaria nanella Chamberlin, 1919: 261, pl. 2, figs 5-7. — HARTMAN, 1938: 16, pl. 3, figs 8-10. — HARTMAN, 1944: 340, pl. 30, figs 18-20. — HARTMAN, 1969: 509, figs 1-4. — RULLIER & AMOUREUX, 1979: 188. — LANA & GRUET, 1989: 243.

Diagnosis — External paleae directed outwards, with terminal smooth spikes terminating in a hook; a median spike stronger and situated in a different plane (Fig. 1l). Middle paleae concave and distally flat. Inner paleae concave, tapering to a point. Uncini with five teeth in two lateral rows and one tooth at superior extreme. Maximum reported length 18,5 mm.

Distribution — South America: SE Brazil (off Espirito Santo and Rio de Janeiro States); Argentina (Monte Hermoso, near Bahia Blanca). Other records: California.

Remarks — According to GRUET (pers. com.) and BREMEC (pers. obs.), material from South America appears to be morphologically indistinguishable from the type-material, originally described from California.

Sabellaria wilsoni Lana & Gruet, 1989

Sabellaria wilsoni Lana & Gruet, 1989: 239, figs 1-21.

? *Sabellaria spinulosa* var. *alcocki* — FAUVEL, 1919: 477.

Diagnosis — Outer paleae assymetrical, distally flattened and spinous, with a central penicillate spike (Fig. 1m). Middle paleae of a single kind, directed upward, basally concave with two lateral expansions. Inner paleae pointing inwards, geniculated, basally excavated and distally pointed. Uncini with five teeth in two lateral rows, two or more teeth at posterior end, one median tooth at anterior end. Maximum reported length 22 mm.

Remarks — Dr. Mary PETERSEN (in litt.), from the Zoological Museum of Copenhagen, has called our attention to the close similarity between *S. wilsoni* and *S. vulgaris beaufortensis*. She kindly provided us with a set of unpublished drawings of *S. vulgaris* and *S. vulgaris beaufortensis* from North Carolina and Nova Scotia. *S. wilsoni* clearly differs from the North-American material in that its middle paleae are long and nearly straight, while those of *S. vulgaris* and *S. vulgaris beaufortensis* are much shorter and sharply recurved at the distal end.

Two specimens of *Sabellaria spinulosa alcocki* reported in FAUVEL (1919) from the French Guiana and mounted on a slide (n. C78, Laboratoire of Zoology, IRFA, Angers, France) were reexamined by LANA & GRUET (1989) and found to be identical to *S. wilsoni*. If confirmed through the observation of additional material, this record will greatly extend the northern range of *S. wilsoni*.

Comments on other records of *Sabellaria* from South America — Two specimens from the eastern Brazilian coast reported as *Sabellaria alcocki* by RULLIER & AMOUREUX (1979), were shown to belong in fact to *S. bella* and *S. wilsoni* (LANA & GRUET, 1989). As remarked above, *S. spinulosa alcocki*, reported from the French Guiana (FAUVEL, 1919), most probably belongs to *S. wilsoni*.

KEY TO SABELLARIIDAE FROM SOUTH AMERICA

1a	Opercular crown with two rows of paleae; a pair of large hooks *[Idanthyrsus]*	**2**
1b	Opercular crown with three rows of paleae; dorsal hooks absent	**3**
2a	External opercular paleae almost straight, with tapered lateral denticles or spinelets	*Idanthyrsus armatus*
2b	External opercular paleae with curved shafts and slender lateral denticles	*Idanthyrsus pennatus*

3a Middle opercular paleae cover the inner ones; operculum a flattened cone *[Phragmatopoma]* **4**
3b Middle opercular paleae not concealing the inner ones; operculum open *[Sabellaria]* **8**

4a External opercular paleae without distal appendage ..... *Phragmatopoma virgini*
4b External opercular paleae with distal appendage **5**

5a Distal appendage long, spatulate, distally rounded, with a smooth margin.... *Phragmatopoma peruensis*
5b Distal appendage pinnate or comb-like..... **6**

6a Distal appendage short, rectangular, with a frayed distal border ..... *Phragmatopoma moerchi*
6b Distal appendage long, pinnate or brush-like..... **7**

7a Distal appendage a long and nearly straight pinnate plume arising from the upper distal edge of the palea ..... *Phragmatopoma lapidosa*
7b Distal appendage a palmately filamentous membrane, brush-like, nearly at right angles to the main shaft ..... *Phragmatopoma attenuata*

8a Inner paleae distally serrated or frayed **9**
8b Inner paleae distally simple or tapering to a point **10**

9a Inner paleae distally serrated; middle paleae alternately long and short; external paleae assymetrical, with 2-3 lateral spines on each side of a central serrated spike, provided with 5-6 lateral teeth ..... *Sabellaria bella*
9b Inner paleae with about 6 distal spines; middle paleae all of the same length; external paleae with a broad spiny central spike and two (rarely a small additional one) teeth..... *Sabellaria bellis*

10a External paleae with distal processes in the same plane **11**
10b External paleae with a strong median simple spike in a different plane ..... *Sabellaria nanella*

11a Median spike of outer paleae a simple, bifurcated tip ..... *Sabellaria fissidens*
11b Median spike of outer paleae with a conspicuous spiny process **12**

12a Median spike with bifid serrations ..... *Sabellaria minuta*
12b Median spike penicillate ..... *Sabellaria wilsoni*

BIOGEOGRAPHICAL COMMENTS

Thirteen species of Sabellariidae are presently known from South America (Fig. 2), five in the Atlantic, six in the Pacific with two in both oceans, not including some doubtful records mentioned above. *Idanthyrsus armatus* and *Phragmatopoma virgini*, the only species common to the two oceans, have been recorded mainly from the connected sectors of the South Atlantic and South Pacific, or near this area.

The existence of distinct sabellariid faunas along the two margins of the South American continent, with some degree of convergence towards its southern sector, can be attributed to prevalent oceanographic conditions. Subantarctic water is of lesser significance in the Atlantic, since South America, owing to its southeastward extent, deflects large quantities of colder waters along its west coast (SVERDRUP *et al.*, 1942). A tropical or subtropical sector along the Pacific is not as extensive as in the Atlantic, because of the Humboldt Current. Consequently, average water temperatures along the west coast of South America are lower than on the east margin.

HARTMANN-SCHRÖDER (1960) recognized distinct north-temperate, tropical and south-temperate polychaete faunas in a zoogeographic analysis from Alaska to "Tierra del Fuego". With the current information, it is not yet possible to draw such putative boundaries for the regional sabellariid fauna. However, a group made up of *Phragmatopoma lapidosa* and a more diversified *Sabellaria* stock, dominant along the warmer waters of the Atlantic side north of 35° S, is clearly separated from an East Pacific and southern Atlantic group, represented by several *Phragmatopoma* species, besides *Idanthyrsus armatus*, *Sabellaria minuta* and *S. fissidens*.

Only *P. lapidosa*, *I. armatus* and *P. moerchi* have been consistently reported from extensive areas in the region. GRUET & LANA (1991) have suggested, in relation to *Sabellaria*, that the low number of described species and discontinuous distribution patterns, mainly along the Pacific coast, are probably due to incomplete sampling or

to a lack of suitable habitats. However, it is well known that many species of *Sabellaria* and *Phragmatopoma* are very conspicuous members of the rocky intertidal fauna, building sand-reefs of great extent. It would have been difficult to overlook them during the several faunal surveys carried out along both coasts of South America this century. We suggest that disjunct distribution, as currently reported for most species, is in fact an actual zoogeographical pattern of the continental sabellariid fauna.

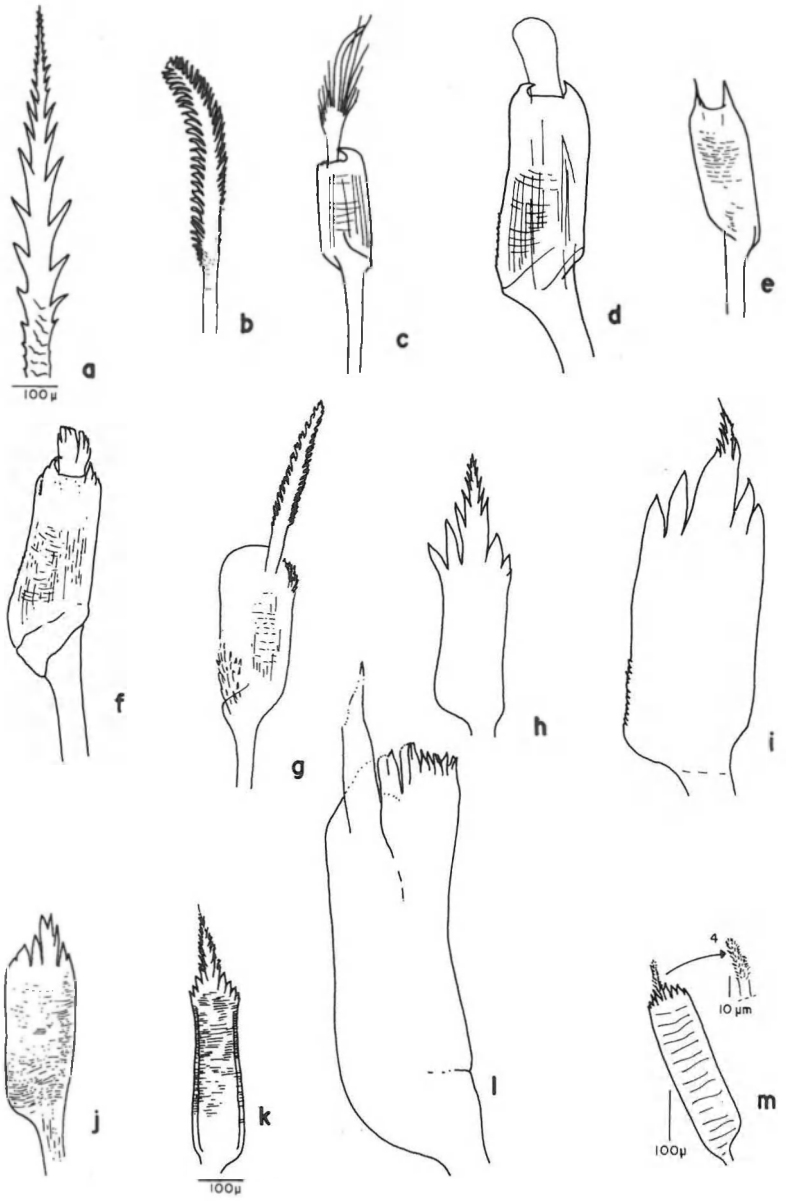

FIG. 1. — Outer opercular paleae of sabellariid species from South America. a: *Idanthyrsus armatus*. b: *I. pennatus*. c: *Phragmatopoma attenuata*. d: *P. peruensis*. e: *P. virgini*. f: *P. moerchi*. g: *P. lapidosa*. h: *Sabellaria bella*. i: *S. bellis*. j. *S. fissidens*. k: *S. minuta*. l: *S. nanella*. m: *S. wilsoni*.

Larval transport by wave currents has been considered the main recruitment source for benthic shelf species (JOSEFSON, 1985). One could expect that littoral surface currents be responsible for the continuous distribution of invertebrate fauna along continental shelves. This would be specially true concerning the dispersal of polychaete species with active larval phases, such as the sabellariids. Larval development, from fertilization to settlement, can take up to 32 weeks in warm-temperate sabellariid species, and 3-4 weeks in tropical species (ECKELBARGER, 1977). Yet, as shown above, continuous occurrence patterns are not a common feature among the local sabellariid fauna. A number of factors could account for this, both in large and small spatial scales. The circulation of the Pacific water masses is more sluggish than in the Atlantic and does not allow for an intense mixing of different water masses (SVERDRUP *et al.*, 1942). In addition, surface winds or inshore upwelling, present on both sides of the continent, have been previously shown to sweep away pelagic larvae of littoral forms (ROUGHGARDEN *et al.*, 1988). Large-scale physical-oceanographic processes which transport larvae farther offshore also appear to regulate latitudinal differences in the recruitment of marine invertebrates, mainly in the tropics (SUTHERLAND, 1990). Experimental evidence concerning sabellariid recruitment in small spatial scales has suggested that larvae respond first to proper flow conditions and only then to chemical cues that induce metamorphosis (PAWLIK *et al.*, 1991). Unlike the larvae of solitary sabellariid species, which show no preference for conspecific substrata, settlement of gregarious species seems to be highly dependent on the presence of conspecific reefs (PAWLIK, 1988). In this context, it is reasonable to suppose that the dispersion of colonial sabellariids is rather through reef accretion than through the formation of new reefs.

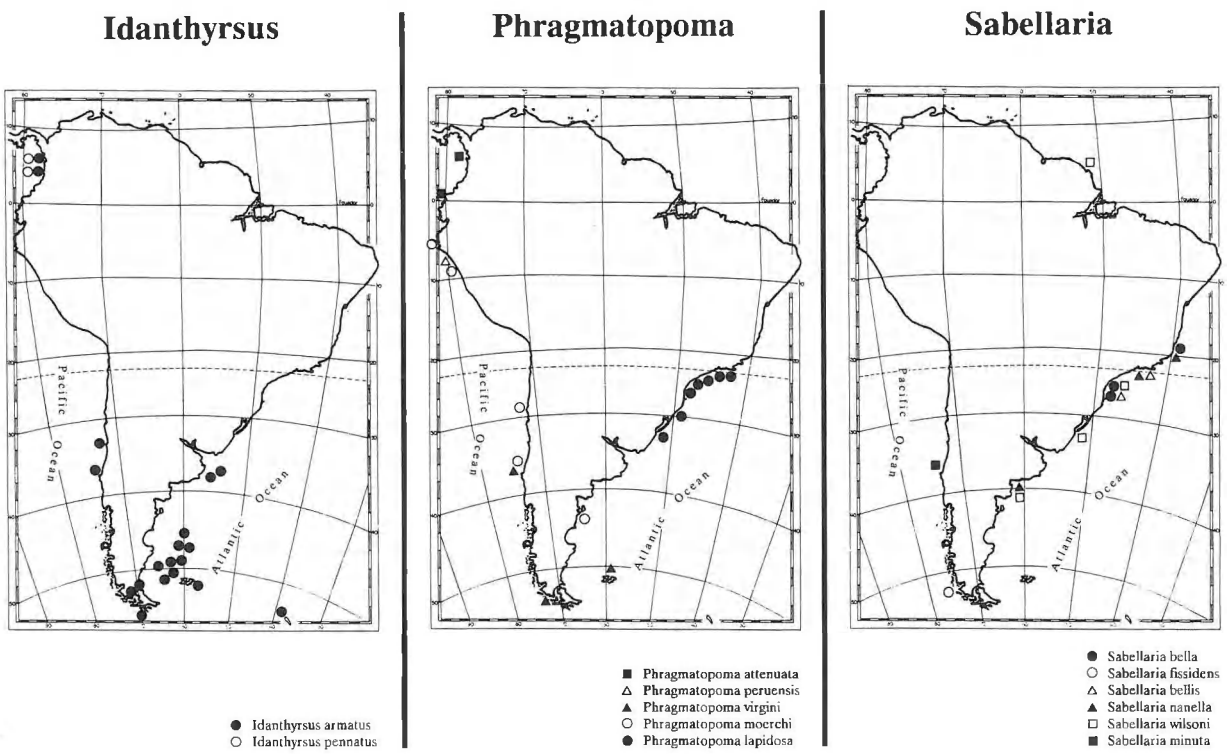

FIG 2. — Distribution of sabellariid species in South America.

All these factors may provide an explanation for the disjunt distribution patterns of the regional sabellariid fauna, through the restriction of stenothermic species dispersal. Despite the presence of extensive sandy reefs , distribution of sabellariids can in fact be determined by pre-settlement processes, such as local patterns of larval transport, which will affect larval survival and recruitment.

These results provide additional evidence in support of an alternate hypothesis to the dispersal paradigm for sabellariids, previously stated by FAUCHALD (1984). We suggest that sabellariids, contrary to what could be expected from their active dispersal phase, can in fact have endemic or geographically restricted distribution patterns.

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