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SOME NEW AND LITTLE-KNOWN SERPULID POLYCHAETES FROM THE CONTINENTAL SLOPE

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(Text-figs. 1–7)

Since 1956 several cruises of R.V. 'Sarsia' have been devoted to dredging on the continental slope, and biological dredging has been carried out on some other non-biological cruises (directed by Dr L. H. N. Cooper, Prof. W. F. Whittard and Dr M. N. Hill).

The cruises have been confined to the region between 46° and 52° N. (see Fig. 1). Between 51° and 52° the upper slope is moderately steep though the lower slope is gradual; from about 51° to about 49° the whole slope is gradual but south of this it becomes very steep and is dissected into ridges and canyons (see Day, 1959). The steep parts are ecologically interesting because they provide a variety of habitats ranging from soft ooze to hard rock. Sessile animals, such as corals, fix themselves to the rock or to loose stones and other animals then settle on them; eventually thick reefs may be built up (Le Danois, 1948).

Earlier Southward & Southward (1958) have described some barnacles found in this habitat, and here are described some of the serpulid polychaetes found attached to rocks, pebbles, corals and other hard substrata. Three new species were found and notes have been added on three other species that were not completely described originally. All the species found during the work on the slope are listed on p. 585, and a key to genera is included as an appendix.

Paraserpula planorbis gen.nov., sp.nov.

Material: 8 specimens, all on stones, from the following localities. (1) Approx. 48° 33′ N., 10° 07′ W.; depth 1220–1280 m; 4 specimens; 13. vi. 56. (2) 48° 34′ N., 10° 00′ W.; 1030–1280 m; 3 specimens; 3. v. 57. (3) 48° 30½′ N., 10° 06′ W.; 1370 m; 1 dry tube; 5. vii. 62.

Holotype and paratype specimens from (1), B.M. No. 1963. 9. 1/2.

The largest specimen has a body length of about 8 mm and branchiae about 5·5 mm long. There are 7 thoracic and 30–60 abdominal setigers. The branchial crown has 10 or 11 filaments each side and a smooth peduncle bearing a funnel-shaped operculum (Fig. 2c). The upper margin of the operculum is divided into about 20 pointed teeth. The upper surface is

radially grooved and the grooves continue down the sides for about half the length. The collar consists of one ventral and two dorsal lobes, all about the same length. The latter continue as thoracic membranes to the second setiger and then are reduced to low ridges, which extend as far as the last thoracic setiger but not around the ventral side (Fig. 2B). The collar setae look like bayonet-setae without the usual basal teeth. Instead the basal expansion is

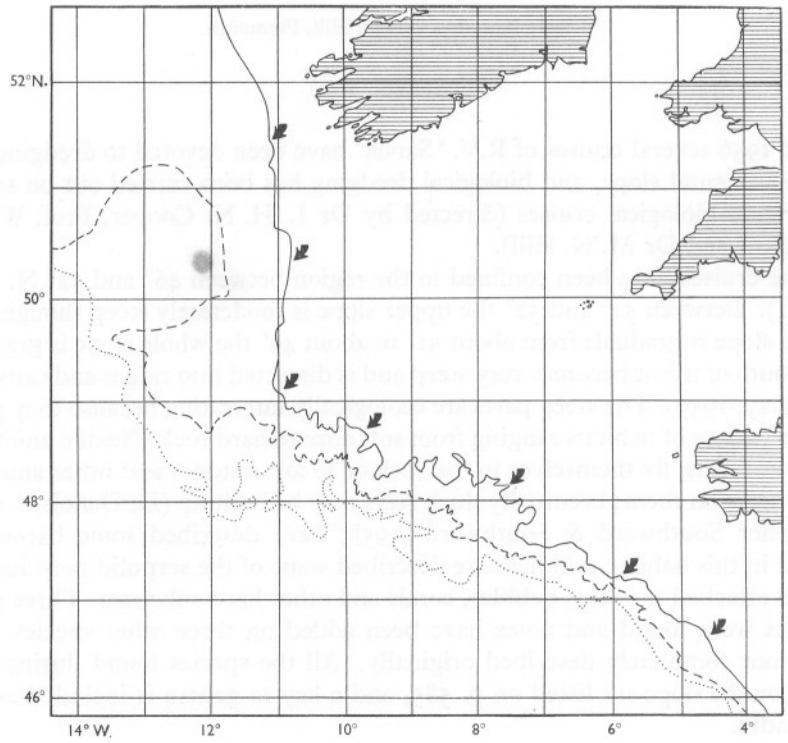

Fig. 1. Map of sea area between 46° and 52° N. Continental slope shown by contours: ——, 100 fathoms; – – – 1000 fathoms; ....., 2000 fathoms (after Hill, 1956). The arrows show the positions where most samples were taken; for details of station positions see text.

covered with fine hairs (Fig. 2D). In the same bundle there are narrow-winged setae (Fig. 2E) and fine capillaries. The other six thoracic setigers have narrow-winged (Fig. 2F) and simple capillary setae and 5-toothed uncini (Fig. 2H, I). The abdominal segments have trumpet-shaped setae with long points (Fig. 2G); the anterior segments have uncini like those of the thorax but farther back their teeth are smaller, more numerous and arranged in several series (Fig. 2J). The last 10–12 segments have one trumpet-seta and one capillary in each parapodium.

The tube is white, with a very smooth, clean surface. The oldest part is serpentine but the rest is coiled like a *Spirorbis* tube, with a maximum diameter of 5 mm. The first two coils are cemented to the substratum and the third usually lies on top of the second (Fig. 2A). The whole tube is covered with a shiny outer layer of glassy material and there is no ornamentation apart from a few curved growth marks.

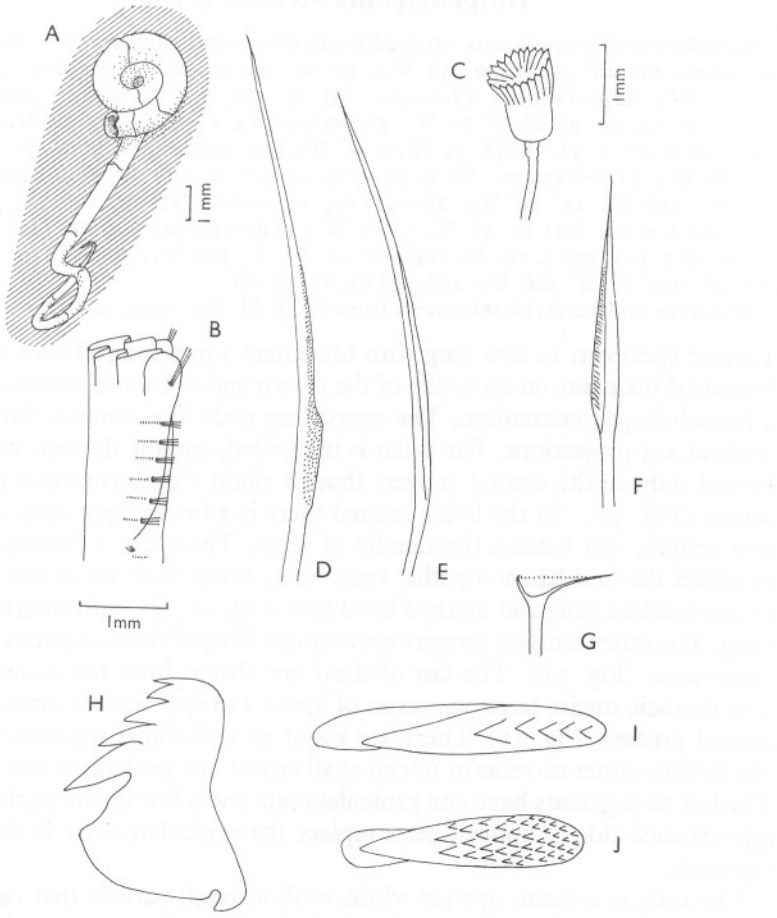

Fig. 2. *Paraserpula planorbis* gen.nov., sp.nov. A, Tube; B, thorax and collar; C, operculum; D, E, two types of collar setae; F, thoracic seta; G, abdominal seta; H, I, thoracic uncini, side and face views; J, abdominal uncinus, face view.

This species seems to be restricted to stones, in depths of more than 1000 m, and so far it has been found in only a small area.

The new genus *Paraserpula* resembles *Serpula* in the general plan of setation and the shape of the operculum. It differs in the collar setae (without

basal teeth) and in having multidentate abdominal uncini; also, there is no posterior ventral collar, the thoracic membranes being less well developed. This combination of characters is not found in any known genus, so a new name is suggested, with a single species, *P. planorbis*. The specific name describes the flat spiral of the tube.

Omphalopoma stellata sp.nov.

Material; about 50 specimens, on dead coral, stones and clinkers, from the following localities. (1) 48° 36′ N., 9° 58′ W.; 320 m; 12. vi. 56. (2) Approx. 48° 33′ N., 10° 07′ W.; 1230–1280 m; 13. vi. 56. (3) 47° 30′ N., 7° 20′ W.; 1600–1780 m; 19. xi. 56. (4) 47° 25′ N., 6° 30′ W.; 585–900 m; 14. v. 58. (5) 47° 57′ N., 7° 54′ W.; 640–730 m; 17. v. 58. (6) 48° 39′ N., 9° 45′ W.; 935–1060 m; 30. xi. 58. (7) 48° 40′ N., 9° 48′ W.; 1100–1250 m; 30. xi. 58. (8) 47° 37′ N., 7° 28′ W.; 1430 m; 1959. (9) 51° 32½′ N., 11° 43′ W.; 860–915 m; 25. vi. 60. (10) 47° 07′ N., 5° 41′ W.; 1040 m; 4. x. 61. (11) 46° 38′ N., 5° 13′ W.; 1340–1465 m; 5. x. 61. (12) 47° 35′ N., 7° 36′ W.; 1230 m; 4. vii. 62. (13) 48° 41′ N., 9° 39½′ W.; 368–410 m; 12. vii. 62. (14) 48° 39½′ N., 9° 42½′ W.; 495–565 m; 12. vii. 62.

Holotype and paratype specimens from (6), B.M. No. 1963. 9. 3/10.

Largest specimen 10 mm long with branchiae 3 mm long. There are 6 or 7 branchial filaments on each side of the crown and a smooth peduncle bearing a funnel-shaped operculum. The operculum ends in a concave, brown plate, without any projections. The collar is undivided, and the thoracic membranes extend only to the second setiger, though slight ridges continue to the last setiger (Fig. 3A). In the living animal there is a brown spot each side of the first setiger, just behind the bundle of setae. There are 7 thoracic setigers, of which the first has notopodial setae only; these setae are of two types: (i) with a notched wing and toothed basal part (Fig. 3E), (ii) with a narrow, entire wing. The other thoracic setigers have simple winged setae, capillary setae and sickle-setae (Fig. 3D). The last of these are absent from the second setiger. The thoracic uncini have one series of about 12 teeth and an anterior gouge-shaped process (Fig. 3F). There are about 40 abdominal segments, many of which have either no setae or uncini at all or just one geniculate seta (Fig. 3G). The last 20 segments have one geniculate seta and a few uncini of the thoracic type on each side. Capillary setae replace the geniculate setae in the last few segments.

The tube is a clean, opaque white, with a rough surface that can acquire a brown colour with age. The part attached to the substratum is triangular in section with a crest of small teeth along the top and transverse rows of 3 or 5 teeth at intervals. Well-grown tubes usually have the terminal part standing away from the substratum (Fig. 3H), circular in section and encircled at intervals by rings of 6 or 7 teeth. The specific name *stellata* refers to the star-shaped appearance of these rings, especially the one around the mouth of the tube.

O. stellata is sometimes abundant on dead coral but has only occasionally

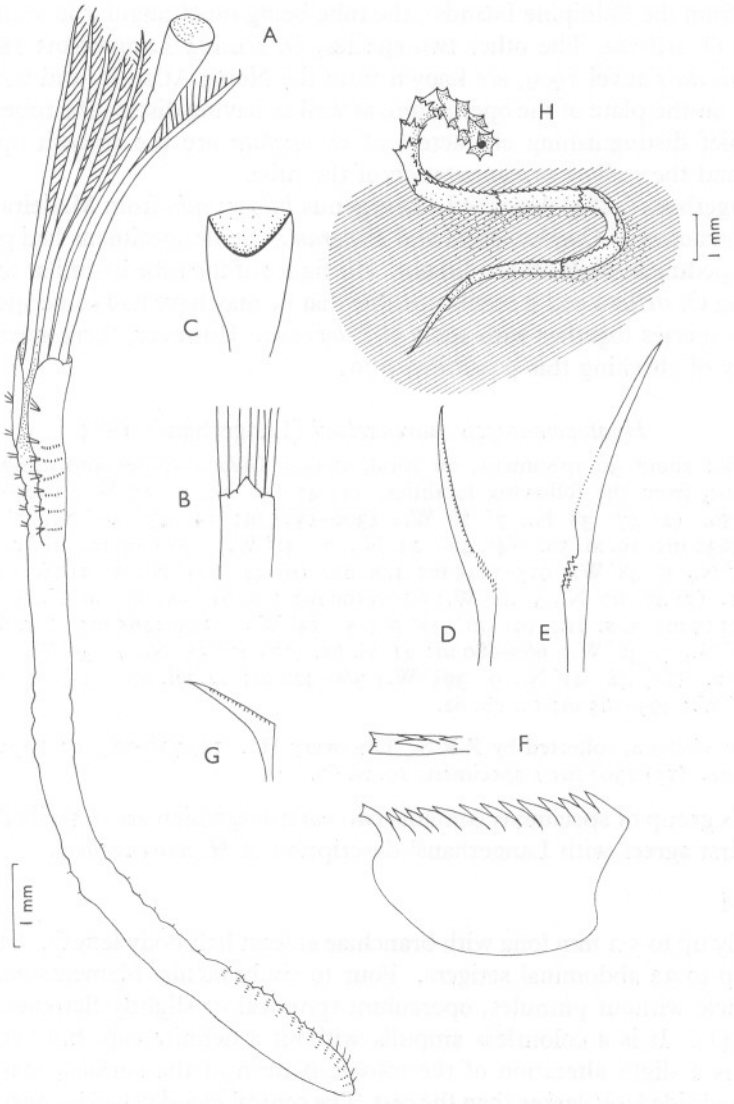

Fig. 3. *Omphalopoma stellata* sp.nov. A, Whole animal, dorsal view; B, collar region, ventral view; C, operculum, side view in transparency; D, thoracic sickle-seta; E, notched collar seta; F, thoracic uncinus, side view and face view of anterior end; G, abdominal seta; H, tube.

been found on stones. It seems to be most common in holes and crevices, particularly inside the thecae of corals. It is often accompanied by a copepod, which lives inside the tube (Southward, in the Press).

The genus *Omphalopoma*, as revised by de Saint-Joseph (1894), contains 3 species. *O. umbilicalis* Mørch 1863 is known from the tube and operculum

only (from the Phillipine Islands), the tube being quadrangular in section and unlike *O. stellata*. The other two species, *O. cristata* Langerhans 1884 and *O. aculeata* Fauvel 1909, are known from the North Atlantic, and both have spines on the plate of the operculum, as well as having distinctive tubes. Thus the chief distinguishing characters of *O. stellata* are the smooth opercular plate and the stellate ornamentation of the tube.

Langerhans (1884) described a new genus *Filogranula* from Madeira, which had characters of *Omphalopoma* and *Filograna*. Some specimens had pinnules on the peduncle while others did not. His figure of the tube is similar to that of a young *O. stellata* and it seems possible that he may have had some specimens of this species together with some of *Filograna*. However, there seems to be no way of checking this possibility now.

Hyalopomatopsis marenzelleri (Langerhans) 1884

Material: about 30 specimens, on coral, stones, *Cidaris* spines and antipatharian skeletons, from the following localities. (1) 47° 30′ N., 7° 28′ W.; 1005–1100 m; 18. xi. 56. (2) 47° 38′ N., 7° 28′ W.; 1300–1375 m; (3) 47° 30′ N., 7° 20′ W.; 1580–1630 m; 19. xi. 56. (4) 47° 25′ N., 6° 30′ W.; 585–900 m; 14. v. 58. (5) 47° 12′ N., 5° 48′ W.; 915–1135 m; 4. x. 61. (6) 47° 07½′ N., 5° 41′ W.; 1025 m; 4. x. 61. (7) 47° 07′ N., 5° 42′ W.; 640–1190 m; 4. x. 61. (8) 46° 40′ N., 5° 11′ W.; 1005–1115 m; 5. x. 61. (9) 46° 38′ N., 5° 13′ W., 1335–1465 m; 5. x. 61. (10) 47° 49′ N., 7° 42′ W.; 660–680 m; 21. vi. 61. (11) 47° 35′ N., 7° 36′ W.; 1225 m; 4. vii. 62. (12) 48° 41′ N., 9° 39½′ W.; 366–420 m; 12. vii. 62. (13) 48° 39½′ N., 9° 42½′ W.; 495–565 m; 12. vii. 62.

Near Madeira, collected by R.R.S. 'Discovery II': (14) 735–785 m; 4 specimens; 10. iv. 62. (15) 1307 m; 1 specimen; 10. iv. 62.

This group of specimens contains two varieties, which are described below. The first agrees with Langerhans' description of *H. marenzelleri*.

Var. A

Body up to 5·2 mm long with branchiae at least half body length. 6 thoracic and up to 32 abdominal setigers. Four to six branchial filaments each side. Peduncle without pinnules, operculum spherical or slightly flattened on top (Fig. 4E). It is a colourless ampulla without a definite cap, but sometimes there is a slight alteration of the mosaic pattern of the surface, making the flattened side look darker than the rest. The central blood vessel is conspicuous. The collar is divided at the sides (Fig. 4D), and thoracic membranes reach only the second setiger. The collar setae are strongly notched and covered by serrations (Fig. 4B), and some simple winged setae, also strongly serrated, are present in the same bundle. The other thoracic setigers have winged (Fig. 4C) and capillary setae. The thoracic uncini bear many transverse rows of small teeth, 3 or 4 in each row, and a fish-tail shaped anterior process (Fig. 4H). The abdominal uncini are similar but have up to 8 teeth in each row (Fig. 4I). The abdominal setae have long capillary shafts and very small geniculate tips

(Fig. 4J), and they occur singly in the parapodia, but are sometimes missing from the first few abdominal setigers.

The tube is up to 20 mm long and not more than 0·5 mm in diameter. It is often only partly attached to the substratum (Fig. 4A). The attached part may be either circular or triangular in section, but there is no marked keel, and only slight growth marks.

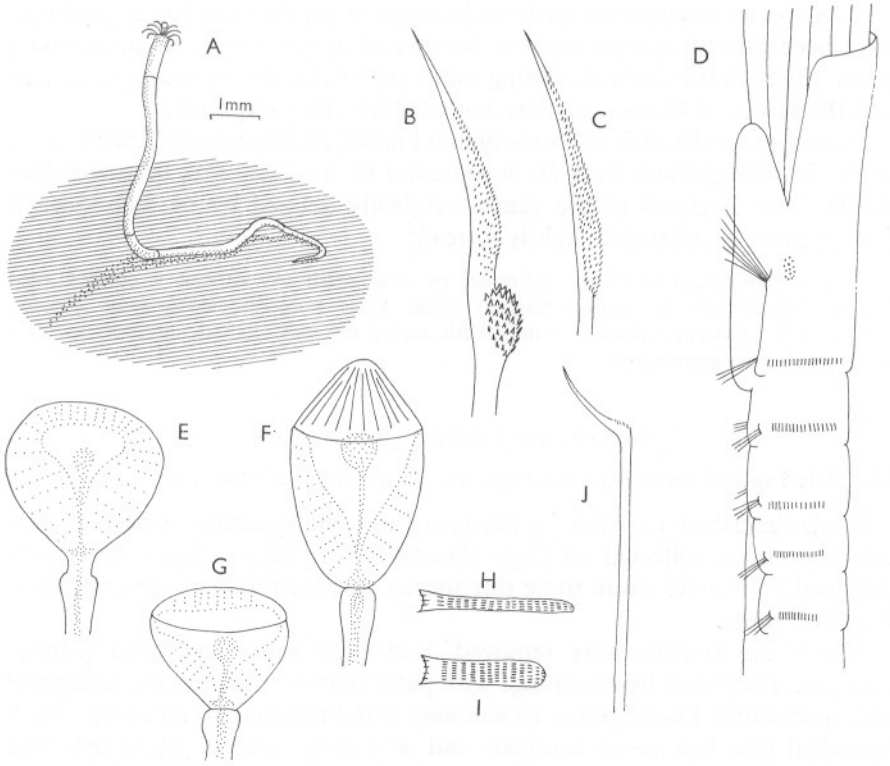

Fig. 4. *Hyalopomatopsis marenzelleri*. A, Animal in tube; B, collar seta; C, winged thoracic seta; D, thorax and collar, side view; E, operculum of variety A; F, operculum of variety B; G, intermediate type of operculum; H, thoracic uncinus, face view; I, abdominal uncinus, face view; J, abdominal seta.

Var. B

Body up to 11 mm long with branchiae at least half body length. 6 thoracic and up to 45 abdominal setigers. Operculum oval, with light brown, convex cap (Fig. 4F). The cap is horny and slightly striated. The central blood vessel is conspicuous. Abdominal setae are present only on the posterior 3–9 setigers, the anterior setigers having uncini only. In the shape of the setae and uncini and in other characters the two varieties are the same. The specimens of

H. marenzelleri from the Azores, mentioned by Fauvel (1914), seem to belong to this variety, and the specimens from Madeira, collected by 'Discovery', are all this variety.

The operculum of var. B might be developed from that of var. A (a few intermediate types have been found, Fig. 4 G), but there is no apparent correlation with size of animal or degree of maturity. Mature and very young (less than 1 mm) specimens of both varieties have been found.

This species seems to be fairly widespread in depths over 500 m, and may have been missed at some stations because of its small size. It occurs on a great variety of substrata, including some, such as the stems of antipatharians and the spines of *Cidaris*, that are not used by other serpulids.

One other species of *Hyalopomatopsis* is known, *H. langerhansi* (Ehlers) 1887, which is distinguished from *H. marenzelleri* by its total of 24 branchial filaments. The diagnosis of the genus, originally defined by de Saint-Joseph (1894), must be amended slightly to read:

Hyalopomatopsis: operculum spherical or oval, with or without a convex cap; thoracic membrane to second setiger; collar setae notched; sickle-setae absent; uncini with numerous rows of small teeth and a fish-tail shaped anterior process; abdominal setae geniculate.

Neovermilia falcigera (Roule) 1906

Material: 6 specimens on dead coral; 51° 10′ N., 11° 47′ W.; 1390–1580 m; 26. vi. 60.

Roule described *Vermilia (?) falcigera* from one specimen, without operculum or tube, collected off Cape Bojador, West Africa. Some specimens collected by 'Sarsia' seem to be this species and the following description is based on them.

The living animals were removed from their tubes and fixed without narcosis. They were bright orange with paler thoracic membranes, branchiae and operculum. The largest is 20 mm long with branchiae 10 mm long. Each branchial lobe has 40–50 filaments and is spirally twisted (1½ turns). The peduncle is smooth and rather narrow. The operculum is almost spherical, semi-transparent, with a smooth shiny surface (Fig. 5 B). Just below the operculum the peduncle is flattened to form a very narrow membrane each side. There are 7 thoracic and about 60 abdominal setigers. The thoracic membranes and collar are well developed (Fig. 5 A). The collar setae are all capillaries while the other thoracic setigers have large bundles of about 80 winged setae and a few capillaries. The neuropodia extend almost to the mid ventral line and contain 120–150 uncini of the *Serpula* type with 6–7 small and 1 large tooth (Fig. 5 C). The abdominal uncini are similar but there are fewer of them. The abdominal setae have very long capillary shafts with small, curved, geniculate tips (Fig. 5 D).

The tube is white and more or less cylindrical, with numerous annular

ridges. It winds over the surface of lumps of dead coral (*Amphihelia*, etc.), being cemented to the coral at intervals.

The genus *Neovermilia* was established by Day (1961) for a single species, *N. capensis*, from South Africa. *N. falcigera* agrees with his description of the genus, except that in *N. capensis* the operculum is concave, not spherical, the peduncle is triangular in cross section, the collar setae have narrow wings and the abdominal setae are shorter. Another species that might be assigned to this genus is *Vermilia sphaeropomatus* Benham 1927, which differs from *N. falcigera* only in having a cylindrical peduncle, 20–25 branchial filaments each side, a shorter ventral collar lobe, winged collar setae and fewer thoracic uncini.

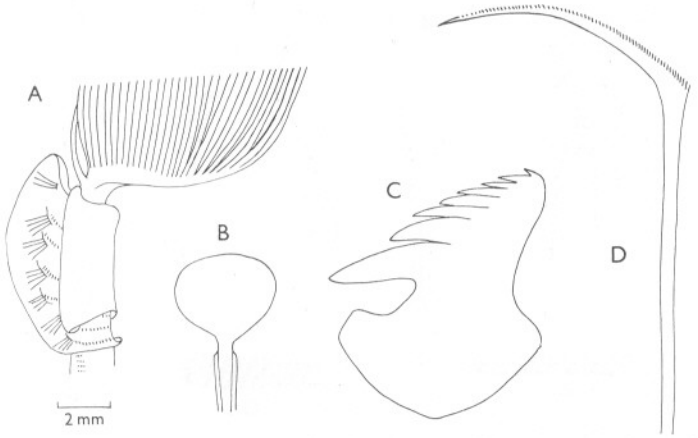

Fig. 5. *Neovermilia falcigera*. A, Thorax, collar and part of branchial crown, side view; B, operculum; C, thoracic uncinus, side view; D, tip of abdominal seta.

? Salmacina setosa Langerhans 1884

Material: 10 specimens on dead coral, from the following localities. (1) 47° 30′ N., 7° 20′ W.; 1590–1775 m; 1 specimen; 19. xi. 56. (2) 51° 10′ N., 11° 47′ W.; 1390–1590 m; 9 specimens; 26. vi. 60.

Body 1·1–3·0 mm long with branchiae 1·1–2·1 mm long. 4 branchial filaments each side, no operculum. Collar well developed, with 2 dorsal lobes and one ventral lobe subdivided into three (Fig. 6A). The thoracic membrane extends to the third setiger then becomes a low ridge. There are 6 thoracic and 10–15 abdominal setigers. The collar setae have notched wings (Fig. 6B) which are more finely serrated than those of *S. incrustans* and *S. dysteri*; there are some simple winged setae in the same bundle. The other thoracic setigers have winged (Fig. 6D), sickle-shaped (Fig. 6C) and capillary setae. The uncini have 2 or 3 series of small teeth and a wide, flat anterior tooth (Fig. 6F). The abdominal uncini have about 6 series of teeth (Fig. 6G). The abdominal setae are winged and very slightly bent over (Fig. 6E).

The white, cylindrical tube is attached to the substratum for all or most of its length. It looks very much like a short tube of *H. marenzelleri* (p. 579).

Salmacina setosa was described by Langerhans (1884) from some very small specimens (0·4 mm long) collected near Madeira. It appeared to be a young stage because it still possessed some long 'larval' setae. Its other abdominal setae were like those described here (Fig. 6E). Some other differences that make the identification of the present specimens uncertain are: the thoracic membrane in *S. setosa* reached the sixth setiger, the collar setae had only a narrow incision in the wing and the uncini seem to have had more teeth.

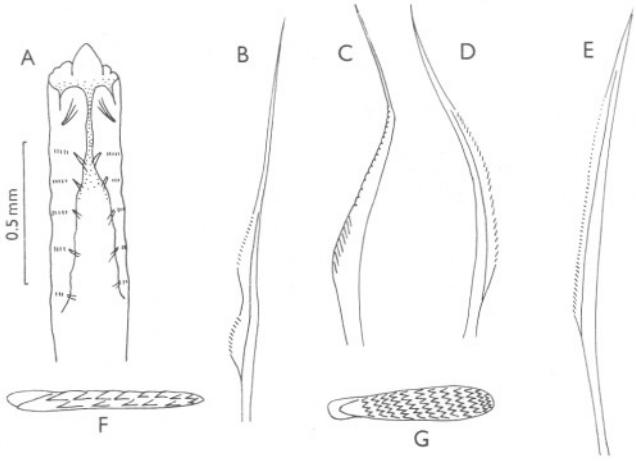

Fig. 6. *? Salmacina setosa.* A, Thorax and collar; B, collar seta; C, D, sickle and winged seta from thorax; E, abdominal seta; F, thoracic uncinus, face view; G, abdominal face view.

Spirorbis (Laeospira) sarsiae sp.nov.

Material: several animals and numerous empty tubes, on dead coral, from the following localities. (1) 48° 40′ N., 9° 48′ W.; 1100–1245 m; tubes only; 30. xi. 58. (2) 47° 37′ N., 7° 28′ W.; 1420 m; tubes only; 59. (3) 51° 10′ N., 11° 47′ W.; 1380–1570 m; 26. vi. 60.

Holotype specimen from (3), B.M. No. 1963. 9. 11.

The largest animal is 1·5 mm long with branchiae 1 mm long. There are 3 thoracic setigers and about 12 abdominal. The branchial crown has 4 filaments each side and a bell-shaped operculum (Fig. 7E), sometimes more elongated. The opercular plate is flat, colourless and calcareous, with a cylindrical talon extending almost into the peduncle. A membranous wing runs down one side of the operculum and peduncle. The collar is undivided. The collar setae have a very small notch in the finely serrated wing (Fig. 7B) and capillary setae are also present in the bundle. The second setiger has only winged setae (Fig. 7C), while the third also has sickle-setae (Fig. 7D). The

thoracic uncini have 3 series of about 20 small teeth and a wide anterior process (Fig. 7F); the abdominal uncini have numerous, even smaller, teeth and a very wide anterior process (Fig. 7G). The abdominal setae have wide geniculate tips (Fig. 7H). Incubation takes place in the tube and apparently only 2 or 3 eggs are produced at one time.

The tube is sinistrally coiled, forming a flat nautiloid spiral for three turns, then sometimes lifting a little from the substratum. The whole tube is opaque white, without keels or other ornament, and the diameter of the largest coil is 2·5 mm.

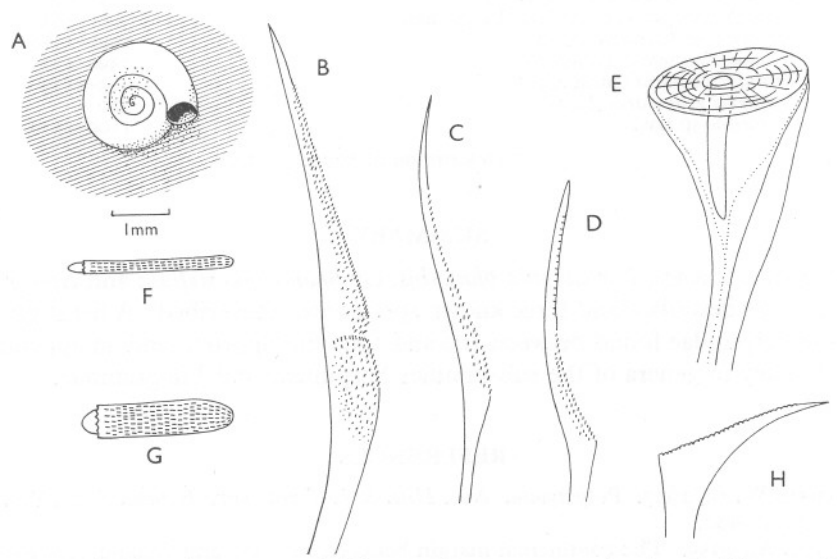

Fig. 7. *Spirorbis sarsiae* sp.nov. A, Tube; B, collar seta; C, D, winged and sickle setae from thorax; E, operculum; F, G, thoracic and abdominal uncini, face view; H, abdominal seta.

This species is assigned to the sub-genus *Laeospira*, but the very small size of the notch in the collar setae suggests some relationship with the sub-genus *Leodora*. *Spirorbis medius* Pixell 1912 may be a close relative, but it is distinguished by the shape of the opercular talon, the number of branchial filaments and the number of abdominal setigers. *S. medius* is apparently confined to the intertidal zone (Southern, 1914).

S. sarsiae is apparently restricted to fairly deep water, and has been found only on dead coral and not on other substrata available at the same depth. It has been named *sarsiae* in recognition of the work of the Marine Biological Association's Research Vessel 'Sarsia'.

TABLE 1. SERPULID POLYCHAETA FOUND AT 31 STATIONS

Area investigated shown in Fig. 1. Depth range 200–1775 m (110–970 fathoms).

Species	No. of stations	Depth distribution (m)
Serpula vermicularis L.*	9	200–750
Hydroides norvegica (Gunnerus)*	5	200–366
Paraserpula planorbis sp.nov.	3	1030–1370
Vermiliopsis infundibulum (Philippi)*	2	205–1430
V. multicristata (Philippi)*	5	320–1190
V. langerhansi Fauvel*	1	1590–1775
Omphalopoma stellata sp.nov.	14	320–1775
Placostegus tridentatus (Fabricius)*	10	205–1775
Hyalopomatopsis marenzelleri (Langerhans)	13	366–1465
Neovermilia falcigera (Roule)	1	1390–1580
? *Salmacina setosa* Langerhans	2	1390–1775
Protula tubularia (Montagu)*	3	265–1135
Spirorbis granulatus (L.)*	1	320
S. sarsiae sp.nov.	3	1100–1570

* Description in Fauvel, 1927.

SUMMARY

Three new species, *Paraserpula planorbis*, *Omphalopoma stellata* and *Spirorbis sarsiae*, are described and three known species are redescribed. A list is given of the Serpulidae found between 100 and 1000 fm (approx.) and an appendix gives a key to genera of the sub-families Serpulinae and Filograninae.

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APPENDIX

The last publication of a key to the genera of the family Serpulidae was by de Saint-Joseph in 1894. Since then some genera have been divided and others have been combined, while several new ones have been described. An up-to-date list of valid genera is given by Hartman in her 'Catalogue of the polychaetous annelids of the world' (1959). The following key is designed for use in conjunction with this catalogue and the accompanying bibliography (Hartman, 1951). The few genera described after the publication of the catalogue are referred to their authors.

Key to valid genera of the family Serpulidae

1.	Body asymmetrical, less than 5 thoracic setigers.	45
—	Body symmetrical, at least 5 thoracic setigers.	2
2.	Operculum present.	6
—	Operculum absent.	3
3.	Collar setae notched.	4
—	Collar setae not notched.	5
4.	Abdominal setae all capillary.	*Protis*

—	Abdominal setae geniculate.	*Salmacina*[1]
5.	Thoracic membrane complete.	*Protula*[2]
—	Thoracic membrane to 5th setiger only.	*Subprotula*
—	No thoracic membrane.	*Salmacinopsis*
6.	Opercular peduncle with pinnules.	7
—	Opercular peduncle without pinnules.	12
7.	Two equal opercula.	9
—	One operculum.	8
8.	Collar setae notched.	*Filogranula*[3]
—	Collar setae not notched.	10
9.	Opercula have denticulate margins.	*Dipomatus*
—	Opercula have smooth margins.	*Filograna*[1]
10.	Abdominal setae geniculate.	11
—	Abdominal setae all capillary.	*Josephella*
11.	Sickle-setae in at least some thoracic segments.	*Apomatus*[2]
—	No sickle-setae.	*Spirodiscus*
12.	Collar setae with 1, 2 or a few, *large* teeth below smooth blade.	13
—	Collar setae different (or absent).	19
13.	Collar setae with 1 tooth.	*Chitinopomoides*
—	Collar setae with 2 or more teeth.	14
14.	Operculum a single funnel or cup, with serrated margin.	15
—	Operculum a cup with additional crown of spines or other process.	17
15.	Operculum without basal projections.	16
—	3 or 4 projections at base of operculum.	*Crucigera*
16.	Operculum calcareous, few radii.	*Sclerostyla*
—	Operculum cartilaginous, many radii.	*Serpula*
17.	Operculum with crown of spines.	18
—	Operculum with large, black, spinous cap.	*Olgaharmania*
—	Operculum of 2 similar concentric funnels fringed with branched processes.	*Schizocraspedon*
18.	Opercular spines serrated or branched.	*Hydroides*
—	Opercular spines simple.	*Eupomatus*
19.	Collar setae with coarsely toothed blade.	20
—	Collar setae different (or absent).	24
20.	Collar setae with a lower group of teeth separated by a smooth shaft from the serrated blade.	*Ficopomatus*
—	Collar setae without lower teeth.	21
21.	Operculum spherical, with or without annuli of teeth.	22
—	Operculum hemispherical, with chitinous plate.	23
22.	Thoracic membranes fused dorsally.	*Neopomatus* Pillai 1960
—	Thoracic membranes free from one another.	*Sphaeropomatus*
23.	Opercular plate smooth.	*Mercierellopsis*
—	Opercular plate covered with small spines.	*Mercierella*
24.	Wings or other projections from base of operculum.	25
—	No projections from base of operculum.	32
25.	Collar setae present.	27
—	Collar setae absent.	26
26.	Two projections from opercular plate.	*Olga* Jones 1962

[1] *Filograna* and *Salmacina* are combined by Day (1955).
[2] *Protula* and *Apomatus* are combined by Hanson (1948).
[3] See p. 578.

— No projections from opercular plate. *Pomatoleios*
27. Collar setae of more than one type. 29
— Collar setae narrow-winged only. *Galeolaria*
— Collar setae capillary only. 28
28. Opercular plate convex or flat, with or without spines. *Pomatoceros*
— Opercular plate concave, with 2 branched spines. *Pseudopomatoceros*
29. Uncini with gouge-shaped anterior tooth. 30
— Uncini with pointed terminal tooth. *Omphalopomopsis*
30. Collar setae aciculate. *Crosslandiella*
— Collar setae geniculate or notched. 31
31. Opercular plate with group of spines. *Spirobranchus*
— Opercular plate or cap variable, but no group of spines. *Pomatostegus* (? *Conopomatus* Pillai 1960)
32. Collar setae absent. 33
— Collar setae present. 37
33. Opercular plate with rosette of unequal projections. *Rhodopsis*
— Opercular plate smooth. 34
34. Thoracic membrane complete. 35
— Thoracic membrane to 1st setiger only. *Bonhourella*
35. Abdominal setae capillary only. *Ditrupa*
— Abdominal setae geniculate or trumpet-shaped. 36
36. Abdominal setae geniculate (cave-dwelling, F.W. form). *Marifugia*
— Abdominal setae trumpet-shaped. *Placostegus*
37. Collar setae winged and capillary. 38
— Collar setae notched. 41
38. Branchial filaments with external barbules. *Dasynema*
— No external barbules. 39
39. Operculum without definite cap or plate. 40
— Operculum with horny or calcareous cap. *Vermiliopsis*
40. Thoracic membrane complete. *Neovermilia* Day 1961
— Thoracic membrane to 5th setiger only. *Paumotella*
— No thoracic membrane. *Hyalopomatus*
41. Operculum with serrated margin. *Paraserpula* gen.nov.
— Operculum spherical or oval. 42
— Operculum with flat or concave plate. 43
42. Thoracic membrane to 2nd setiger. *Hyalopomatopsis*
— Thoracic membrane to 3rd setiger. *Cystopomatus*
43. Thoracic uncini with gouge-shaped anterior tooth and more than 10 small teeth. *Omphalopoma*
— Thoracic uncini with entire anterior tooth and 6–10 small teeth. 44
44. Collar setae with 4 or more equal teeth. *Chitinopoma*
— Collar setae with 2 large and 2 small teeth, adult tube with brood chambers. *Miroserpula*
45. Special collar setae present. *Spirorbis* (sens. lat.[1])
— All thoracic setae similar. *Helicosiphon*

[1] There are 6 sub-genera, elevated to genera by Hartman (1959).