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THREE NEW SPECIES AND A NEW GENUS OF SPIRORBIDAE (POLYCHAETA) FROM THE SOUTHERN INDIAN OCEAN, WITH A BRIEF DESCRIPTION OF TWO SPECIES INCERTA SEDIS FROM THE SOUTHERN HEMISPHERE

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ABSTRACT

Crozetospira dufresnei gen. n., sp. n. from Crozet Islands is placed provisionally in the Paralaeospirinae. It has asymmetrical distribution of abdominal uncini, 3 thoracic setigers and simple collar chaetae with coarsely serrated and cross-striated blades. *Paralaeospira pseudotenuis* sp. n. from Heard Island differs from other *Paralaeospira* in having a strongly calcified conical opercular "plate" without a talon. *Romanchella sepicula* sp. n. from Crozet and Marion Islands is unusual for the genus in having a pin-shaped talon. Brief descriptions of what appear to be a *Eulaeospira* sp. and a *Nidificaria* sp. (from Adelie Land and Kerguelen Islands respectively) are based on non-brooding specimens. The former has unusual opercular morphology, with two talons on the same opercular plate.

Key words: Spirorbidae, *Crozetospira, Paralaeospira, Romanchella, Eulaeospira, Nidificaria,* Subantarctic.

INTRODUCTION

The spirorbids studied here are from collections made by French expeditions in the research vessel "Marion Dufresne" to some islands in the Subantarctic sector of the Indian Ocean between 1974-1982 and by the XII and XV French Antarctic expeditions to Adelie Land between 1962-1964. They were sent by Dr. H. Zibrowius to Drs P. and E.W. Knight-Jones for identification. Due to my interest in that region, Dr. H. Zibrowius kindly gave permission for me to examine this material during a four months collaborative stay with Drs P. and E. W. Knight-Jones at Swansea. The present paper describes a new genus and three new species and deals briefly with two unusual species (incerta sedis) which remain unidentified.

I am very grateful to Drs P. and E.W. Knight-Jones for their help in many ways; to Professor J.S. Ryland for facilities at the University of Wales, Swansea; to Dr. P.J. Hayward for identifying bryozoans on which some species had settled; to Dr. H. Zibrowius for allowing me to study the material and to the scientists and crew who made the collections. I would also like to thank the George Soros Foundation for financial support of my researches.

MATERIAL AND METHODS

The material studied was from the Crozet Islands, Marion Island, Heard Island, Kerguelen Islands and Pointe Geologie Islands (Adelie Land). Specimens were preserved in 70 % alcohol, some of them mounted in polyvinyl-lactophenol (without opercula) for study of chaetal structure. These are now deposited in the Museum Nationale d'Histoire Naturelle, Paris (MNHNP) and some paratypes in the Natural History Museum, London (NHML), Kamchatka Institute of the Ecology and Environment of the Far East Branch of the Russian Academy of Sciences, Petropavlovsk-Kamchatsky (KIE) and the Knight-Jones private collection (KJ).

RESULTS

Crozetospira gen. n.

Three thoracic setigers; collar chaetae simple, somewhat geniculate, with strongly serrated blades and distinct cross-striations; third thoracic setiger with sickle chaetae; collar margins not fused; abdominal uncini asymmetrically distributed (on the concave side of the body only); abdominal chaetae geniculate, intermediate in length between the short brush-like blades of Romanchellinae and the elongated blades of Januinae, similar in size to those of collar chaetae; thoracic uncini with blunt anterior peg and 4 rows of teeth; tube sinistral and vitreous.

Type species *Crozetospira dufresnei* sp. n.

Remarks. There were no brooding specimens in the material examined. To judge from the opercular structure and the asymmetrical distribution of the abdominal uncini, however, this is not an opercular-brooding species. There are three subfamilies with such asymmetry in distribution of abdominal uncini – Circeinae, Romanchellinae and Paralaeospirinae, but none have genera combining all the features found in this new species (P. Knight-Jones & Fordy 1979, Rzhavsky 1991). As Circeinae species are known only from the northern hemisphere (P. Knight-Jones et al. 1991) and Romanchellinae have characteristic brush-like abdominal chaetae, I place this genus provisionally in the Paralaeospirinae. It is, however, the only genus and only species of Paralaeospirinae with cross-striated collar chaetae (P. Knight-Jones et al. 1979).

Etymology. The genus is named after the Crozet Islands where it was found.

Crozetospira dufresnei sp. n.

Fig. 1

Material examined. Holotype – 1 specimen in alcohol (MNHNP, N° UD 328). 18.4.76., "Marion Dufresne" MD 08, 66/CP 270, westward of Hog Island, Crozet Islands (46°15.3'S, 49°13.3'E), depth 500-562 m, on stones.

Paratypes. 1) 43 specimens in alcohol and 2 whole body mounts on a slide (MNHNP, N° UD 329, UD 330 – 30; KIE, N° 1/2502-10; NHML, N° 1994.2134-2138 – 5). Label is the same as holotype. 2) 12 specimens and fragments of the tubes in alcohol (MNHNP, N° UD 331 – 7; KJ, N° Rl – 5) 10.2.82., "Marion Dufresne", MD 30, 26/DC 60, north-westward of the Penguin Islands, Crozet Islands (46°25.1'S, 50°22.5'E), depth 105-120 m, on stones and empty serpulid tubes. 3) 1 specimen in alcohol (MNHNP, N° UD 332). 14.2.82., "Marion Dufresne", MD 30, 39/CP 113, westward of Hog Island, Crozet Islands, (46°13.6'S, 49°32.0'E), depth 280 m, substratum unknown. 4) 1 specimen in alcohol without tube (MNHNP, N° UD 333). 19.4.76., "Marion Dufresne", MD 08, 71/BB 285-286, Crozet Islands (46°37.5'S, 50°39'E), depth 270 m, substratum unknown.

Description. Tube (Fig. 1A) sinistral, no more than 1.5 mm in whorl diameter, vitreous, with hard, thick walls, the inner sides of which are translucent. Some specimens have a thin, brownish, transparent membrane lining the initial whorl, which is also visible through the walls. Tube whorls usually planospiral and without ridges, but two specimens have a single, submedian longitudinal ridge and one has the last whorl turning upward away from the substratum. Tubes of small specimens entirely transparent and smooth, but larger ones somewhat opaque and rough because of small surface wrinkles and indentations.

Operculum oblique, with concave plate, length comparable to body length. Talon relatively massive, thick close to junction with plate, but narrow, very long and somewhat curved posteriorly, extending almost to base of opercular stalk (Fig. 1G), with 1-3 (usually 2) rounded knobs laterally on the widest part (Fig. 1B-F) and thin internal filament extending from opercular plate to tip of talon.

Branchial crown very short, operculum projecting far beyond it distally. Collar with free margins. Each specimen from one abundant sample had widespread collar and chaetae (Fig. 1G), but others had these pressed to body, probably as a result of fixation within tube.

Thoracic chaetae very long and large. Collar chaetae (Fig. 1H) somewhat geniculate, with strongly serrated and cross-striated blades, 3-4 per fascicle, accompanied by some capillary chaetae (Fig. 1I). Chaetae of 2nd (Fig. 1J) and 3rd setigers simple, each with smooth blade; sickle chaetae (Fig. 1K) also present in 3rd fascicle. Only two thoracic tori on each side of the body. Uncini long and narrow, with blunt anterior peg and 4 longitudinal rows of teeth (Fig.

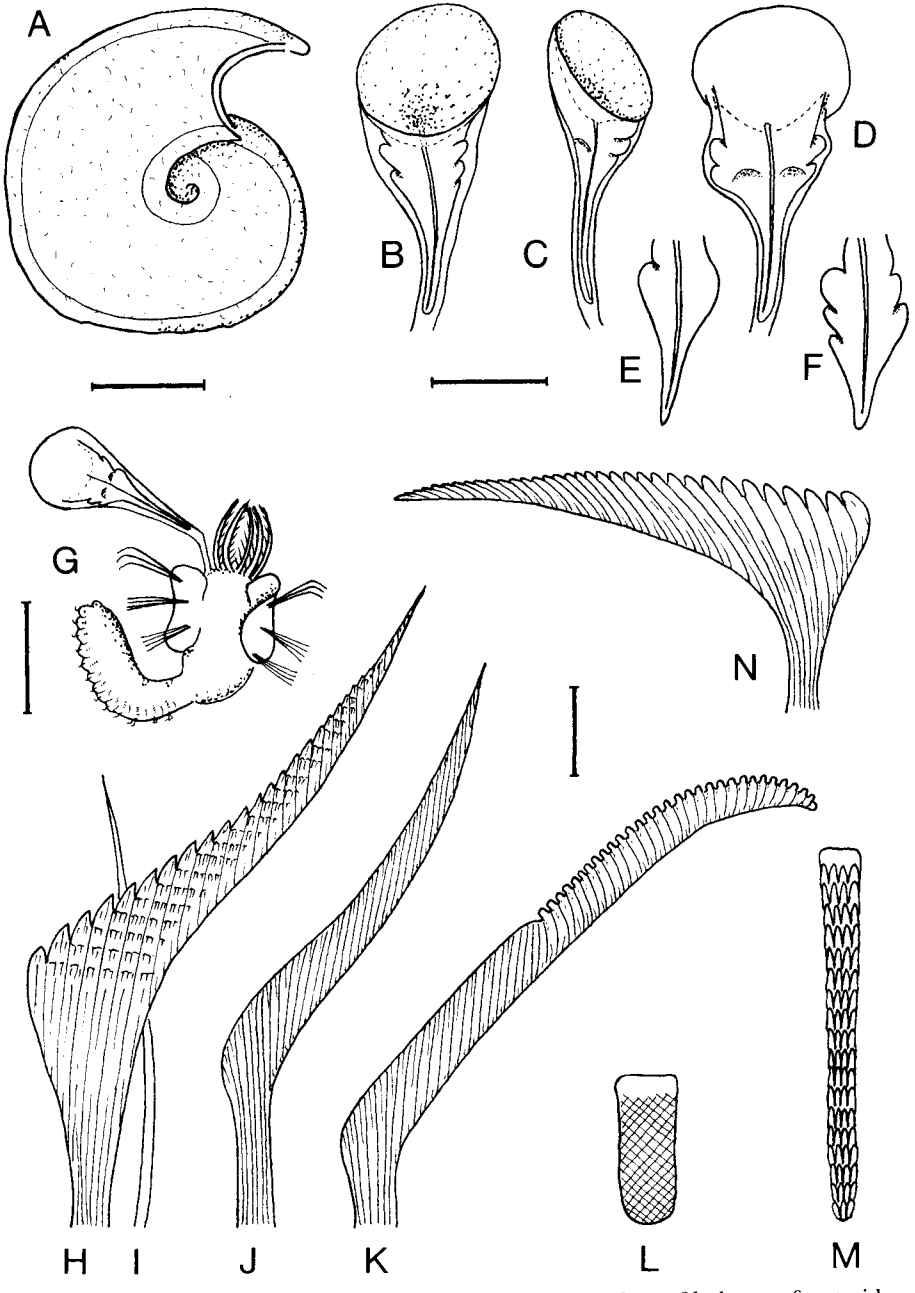

Fig. 1 . *Crozetospira dufresnei* gen. n., sp. n. A – tube; B-D – operculum of holotype, front, side and back view respectively; E-F – variation in talon morphology, front view; G – whole animal, dorsal view; H – collar chaeta; I – accompanying capillary chaeta from 1st setiger; J – simple chaeta from 2nd setiger; K – sickle chaeta from 3rd setiger; L – abdominal uncinus; M – thoracic uncinus; N – abdominal geniculate chaeta. Scale: A – 0.5 mm; B-F – 0.25 mm; G – 0.4 mm; H-N – 0.01 mm.

1M). Abdominal chaetae 1-2 per fascicle, geniculate, with heel and serrated blades (Fig. 1N), blades moderately long, like those in Paralaeospirinae and most Spirorbinae, somewhat shorter than blades of collar chaetae. Hooked capillary chaetae were not observed. Abdomen very short, with 8-12 setigers and tori on the concave side only. Abdominal uncini short, each with a blunt anterior peg and numerous rows of teeth (Fig. 1L).

Etymology. The species is named in tribute to the ship companies who collected the material and it commemorates indirectly the discoverer of Crozet Islands.

Ecology. Worms were collected at depths from 105-562 m, most from stones, some from serpulid tubes.

Distribution. Known only from Crozet Islands, Indian Ocean.

Paralaeospira Caullery & Mesnil, 1879

Paralaeospira pseudotenuis sp.n.

Fig. 2

Material examined. Holotype – 1 specimen in alcohol (MNHNP, N° UD 318). 8.4.74., "Marion Dufresne", MD 03, 9/28 DM 3, Atlas Cove, Heard Island, depth 5-6 m, on bryozoan *Notoplites* sp.

Paratype – 1 specimen, whole body mount on a slide, without operculum, tube is not preserved since it was destroyed during preparation (MNHNP, N° UD 319). Label is the same as holotype. There were also 2 empty tubes of adult size and 5 empty tubes of juveniles, the latter attached to the adult tubes.

Description. Tube (Fig. 2A,B) sinistral, white, with successive whorls overlying each other because the thin bryozoan branches did not provide enough area for attachment. Diameter of whorls approximately 1-1.5 mm.

Both specimens had an embryo string within the tube, not attached to the body or tube wall.

Branchial crown short, collar with free dorsal margins. Operculum with a long stalk, projecting far beyond branchial crown (Fig. 2C), distal "plate" of the operculum (Fig. 2C,D) is conical, strongly calcified, hard and vitreous, but somewhat opaque. Cone asymmetrical, with a notch in basal margin on side next to substratum (Fig. 2C). A narrow cone-shaped cavity is visible internally, but no talon. Basal part of opercular ampulla is soft, not calcified.

Collar chaetae 7-11 per fascicle, each with a distinct fin of 4-5 large and 2-3 small teeth and serrated blade without cross-striations (Fig. 2E). Accompanying capillary chaetae (Fig. 2G) also present. Chaetae of 2nd (Fig. 2F) and 3rd setigers simple, with finely serrated or smooth blades. There are also sickle chaetae in the 3rd setiger, but their position in the preparation is unfavourable for showing relative proportions of the serrated and smooth regions of their

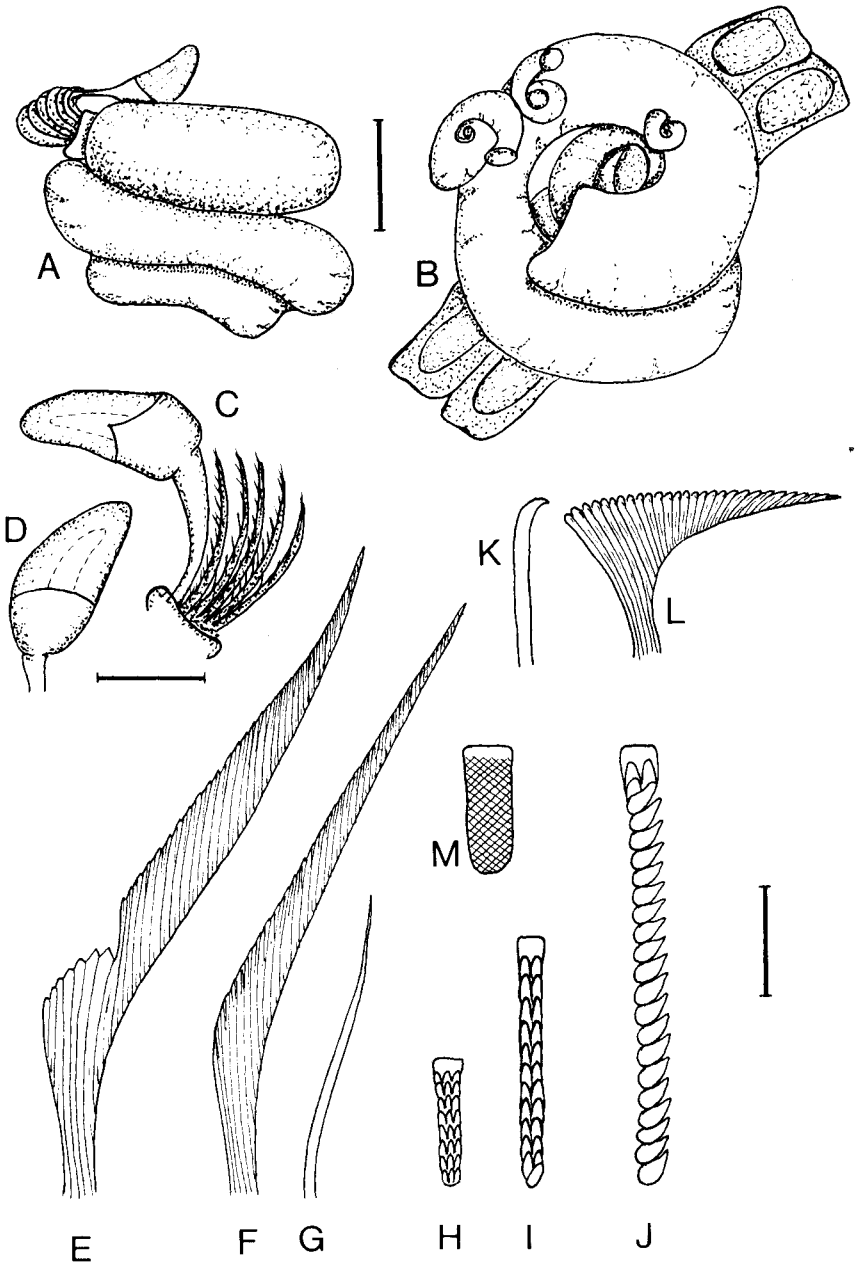

Fig. 2. *Paralaeospira pseudotenuis* sp. n. A-B – tubes; C – operculum, viewed from side nearest substratum; D – operculum, viewed from opposite side; E – collar chaeta; F – simple chaeta from 2nd setiger; G – accompanying capillary chaeta from 1st setiger; H – smallest thoracic uncinus, ventral end of torus; I – intermediate thoracic uncinus, central part of torus; J – largest thoracic uncinus, dorsal end of torus; K – abdominal hooked capillary chaeta; L – abdominal geniculate chaeta; M – abdominal uncinus. Scale: A-B – 0.4 mm; C-D – 0.025 mm; E-M – 0.01 mm.

blades. Three thoracic tori on concave side of body and two on convex side; largest uncini (Fig. 2J) are the most dorsal, approximately the same length as blades of collar chaetae, narrow, with a blunt anterior peg and one longitudinal row of teeth; shortest uncini (Fig. 2H) are ventral, 0.25 times as long, with 3 longitudinal rows of teeth; intermediate uncini (Fig. 2I) have 2 rows of teeth.

Asetigerous region short; abdomen long, with about 30 setigers. First 10 setigers are long, their total length approximately 1.5 times the sum of the length of the remaining abdominal setigers. Abdominal chaetae geniculate, each with fairly protuberant heel and serrated blade (Fig. 2L), up to 4 in each anterior fascicle, but only one per setiger posteriorly; hooked capillary chaetae (Fig. 2K), 1 per fascicle, also occur in posterior region of abdomen. Abdominal uncini asymmetrically distributed as usual, mostly on concave side of body, with only some small tori posteriorly on convex side. Uncini short, each with a blunt anterior peg and numerous longitudinal rows of teeth (Fig. 2M), largest being in anterior region of abdomen.

Differential diagnosis. Paralaeospira pseudotenuis differs from other *Paralaeospira* species in lacking a talon and having a distally elongated, strongly calcified, conical opercular "plate". There is *Paralaeospira sicula* Knight-Jones & Knight-Jones, 1994, which has a similar conical operculum, but with a dagger-like talon and a characteristically ridged tube (P. & E. W. Knight-Jones 1994). In fact most species of *Paralaeospira* have talons, thus differing from *P. pseudotenuis*. *Paralaeospira levinseni* (Caullery & Mesnil, 1897), which often lacks a talon, has a flat or slightly convex distal plate.

P. pseudotenuis is very similar in appearance to *Metalaeospira tenuis* Knight-Jones, 1973, but the latter species has simple collar chaetae and the distal cone of its operculum is horny, not strongly calcified.

Etymology. The species is named because of the resemblance to *M. tenuis* shown by its long, thin tube and conical operculum.

Ecology. Worms were collected at depths of 5-6 m from the bryozoan *Notoplites* sp.

Distribution. Known only from Atlas Cove, Heard Island (Antarctic region of the Indian Ocean).

Romanchella Caullery & Mesnil, 1897

Romanchella sepicula sp.n.

Fig. 3

Material examined. Holotype – operculum, body and fragments of tube in alcohol (MNHNP, N° UD 320) 20.4.74., "Marion Dufresne", MD 03, 26/64/CP17, Killerwhales Channel, Crozet Islands (46°24′S, 51°59′E), depth 180 m, on hydrozoans.

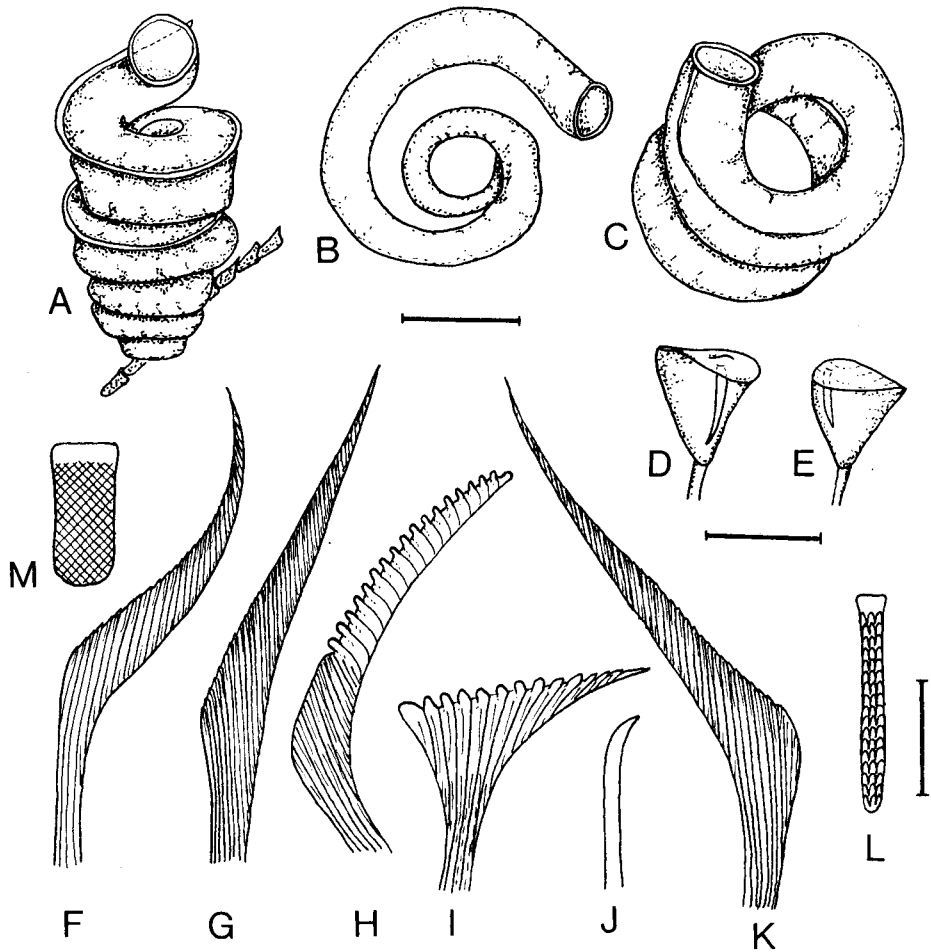

Fig. 3. *Romanchella sepicula* sp. n. A – tower-shaped tube with distinct lateral longitudinal ridge; B – smooth evolute planospiral tube; C – irregularly coiled tube with rudimentary ridge; D-E – opercular variation; F – collar chaeta from concave side; G – simple chaeta from 2nd setiger; H – sickle chaeta from 3rd setiger; I – abdominal geniculate chaeta; J – abdominal hooked capillary chaeta; K – collar chaeta from convex side; L – thoracic uncinus; M – abdominal uncinus. Scale: A-C – 0.4 mm; D-E – 0.25 mm; F-M – 0.01 mm.

Paratypes. 1) 3 adult specimens + 6 juvenile tubes (some perhaps empty) in alcohol and 2 whole body mounts on slides (MNHNP, N° UD 321, UD 322 A & B). Label is the same as holotype. 2) 1 specimen in alcohol (MNHNP, N° UD 323). 22.3.76. "Marion Dufresne", MD 08, 9CL 61, American Bay, Possession Island, Crozet Islands (46°22.8′S, 51°50.5′E), depth 75-104 m, on hydrozoans. 3) 3 specimens in alcohol (without tubes which were destroyed during examination) (MNHNP, N° UD 324). 29.3.76., "Marion Dufresne", MD 08, 31/BB

157, Marion Island (46°59.5′S, 37°46.8′E), depth 192 m, on hydrozoans. 4) 1 specimen with tube in alcohol (MNHNP, N° UD 325). 26.3.76., "Marion Dufresne" MD 08, 18/BB 108, Marion Island (46°49.8′S, 37°56.4′E), depth 138 m, on hydrozoans. 5) 3 specimens in alcohol with tubes (KIE, N° 1/2525). 26.3.76., "Marion Dufresne", MD 08, 19/BB 111, Marion Island, (46°46.2′S, 38°03.2′E), depth 190 m, on bryozoans *Caberea darwinii* Busk. 5) 64 specimens with tubes in alcohol and 2 whole body mounts on a slide (MNHNP, N° UD 326, UD 327 – 26; KIE, N° 2/2526 – 25; NHML, N° 1994.2118-2122 – 10; KJ, N° R2 – 5). 24.3.76., "Marion Dufresne", MD 08, 12/BB 79, Marion Island (46°55.7′S, 37°54.1′E), depth 95 m, on bryozoans *Idmidronea* sp.

Description. Tube small, white, sinistral, thin-walled, often planospiral in young and some adult specimens (Fig. 3B), but adult tubes often evolute (Fig. 3C) or tower-shaped (Fig. 3A). Diameter of largest whorls of these specimens about 0.7 mm and height of tower 1-1.5 mm. Tube surface smooth or with 1 low, sharp longitudinal ridge towards the periphery of the whorl. Tube mouth is round in section, but adjacent upper surface of the tower, bounded by the sharp peripheral ridge, is almost flat in tower-shaped specimens.

Operculum small, funnel-shaped with soft, transparent ampulla and flat or somewhat convex calcified distal plate (Fig. 3D,E), sometimes with a small convexity on the distal plate surface adjacent to the talon attachment or behind it in flat opercular specimens. Talon long, pin-shaped and subcentral.

Collar margins are fused over the mid-dorsal thoracic groove.

Collar chaetae simple, slightly geniculate, with finely serrated blades (Fig. 3F,K), 4-5 per fascicle, those on the convex side (Fig. 3K) somewhat larger and with more distinct serration. Chaetae of 2nd (Fig. 3G) and 3rd setigers simple, smooth or very finely serrated, similar to collar chaetae from concave side. Sickle chaetae (Fig. 3H) also present in 3rd fascicle. Two thoracic tori on each side of body. Uncini long, narrow, each with a blunt anterior peg and 2 or 3 longitudinal rows of teeth (Fig. 3L).

Abdominal chaetae 1-2 per fascicle, geniculate, each with angular heel and serrated blade, somewhat brush-like, but not much smaller than collar chaeta blade (Fig. 3I); 1 hooked capillary chaeta (Fig. 3J) per fascicle also present. Abdominal uncini asymmetrically distributed as usual, on concave side of body, with only some small tori posteriorly on the convex side. Uncini short, each with a blunt anterior peg and numerous rows of teeth (Fig. 3M).

Remarks and differential diagnosis. Judging from the fused collar and both chaetal structure and distribution (3 thoracic setigers, simple collar chaetae, sickle chaetae in the 3rd setiger and somewhat brush-type abdominal chaetae) I place this new species in the genus *Romanchella.* Three paratypes, of which the tubes were destroyed, had embryos in the faecal groove (about 15 in two rows). The embryos were very close to the body and there was no long brooding stalk. They may be held in place by an oviducal funnel (E. W. Knight-Jones

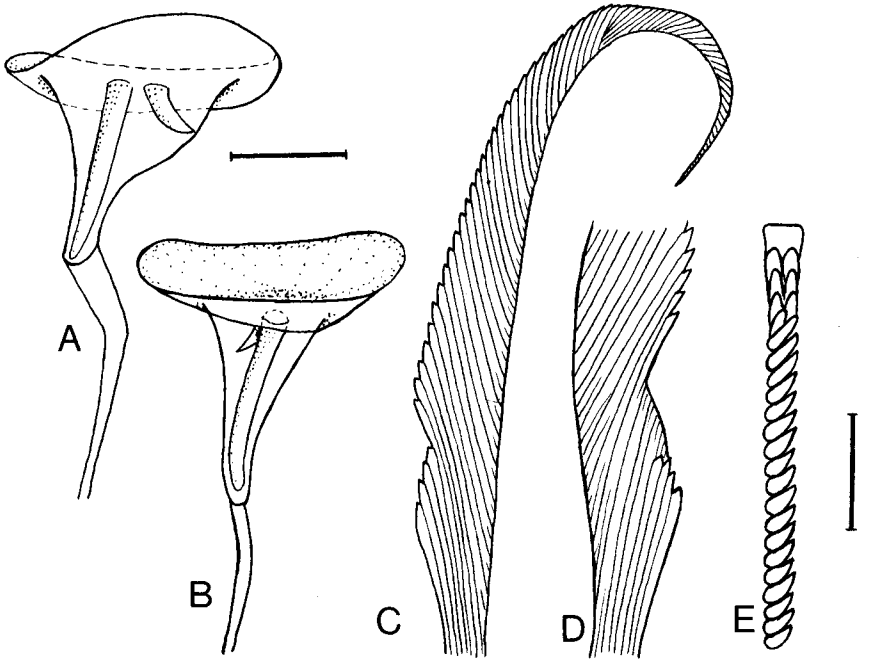

Fig. 4. ? *Eulaeospira* sp. A-B – operculum, lateral and front view respectively; C – collar chaeta from concave side; D – basal part of collar chaeta from convex side; E – thoracic uncinus. Scale: A-B – 0.25 mm; C-E – 0.01 mm.

et al. 1972). The species is very distinct from other *Romanchella*, however, in structure of operculum and tube morphology. The operculum is indeed very similar to the primary operculum of some juvenile Pileolariinae (*Vinearia*, *Pileolaria*) in having a long pin-shaped talon, but *R. sepicula* certainly incubates its embryos in the tube.

Etymology. The species is named for the sharp longitudinal ridge bordering the outer margin of the tower-shaped tubes.

Ecology. Worms were collected at depths of 75-195 m from hydrozoans and from the bryozoans *Idmidronea* sp. and *Caberea darwinii*.

Distribution. Known only from Crozet Islands and Marion Island, Indian Ocean.

Incerta sedis

? *Eulaeospira* sp.

Material. 1 specimen (operculum and tube fragment in alcohol and a whole body mount on a slide). This will be kept temporarily in the KIE collection (N°

1 a,b/2551), to be deposited later in the NMNHP. 17.2.64., XV French Antarctic Expedition to Adelie Land, between the Bernard Island and Curie Island, Pointe de Geologie Archipelago, D 77, depth 135 m, on serpulid tube probably, coll. P. M. Arnaud.

Description. Tube white, sinistral, about 2 mm in coil diameter, with one low longitudinal ridge. Operculum (Fig. 4A, B) with somewhat concave and semitransparent distal plate bearing two talons, one long and pin-shaped and the other short and curved like a claw. Margins of collar not fused dorsally. Collar chaetae with distinct serrated blade and without cross-striations; those on concave side (Fig. 4C) with distinct notch in basal part of blade, intermediate between simple and fin and blade type of chaetae; those from convex side (Fig. 4D) with a more distinct gap and rudimentary fin; accompanying capillary chaetae also present. Chaetae of 2nd and 3rd thoracic setigers simple with finely serrated blade. Sickle chaetae absent from 3rd thoracic setiger. Two thoracic tori on each side of body. Uncini long, each with a blunt anterior peg and 1 or 2 longitudinal rows of teeth.

Discussion. The specimen is incomplete, just the thoracic region with operculum. Method of embryo incubation is unknown. This operculum is very unusual in having 2 talons, a character not observed in any other spirorbid taxa. With regard to the number of thoracic tori, structure of collar chaetae, absence of sickle chaetae in 3rd setiger and free collar margins, this specimen may belong to *Eulaeospira*, but the two known species of this genus *(Eulaeospira convexis* (Wisely, 1963) and *Eulaeospira orientalis* Pillai, 1970) have opercula without talons. It would be premature to give the species a name on the basis of an incomplete specimen, as this very unusual operculum could be aberrant.

? *Nidificaria* sp.

Material. 1 specimen (operculum and tube fragment in alcohol and whole body mount on a slide). This will be kept temporarily in the KIE collection (N°1 a,b/2550), to be deposited later in MNHNP. 15.3.75., "Marion Dufresne", MD 04, J 114/DC 272, south-south-eastward of the Kerguelen Islands (49°54.5′S, 70°24.4′E), depth 168 m, on serpulid tube.

Description. Tube white, sinistral with low longitudinal ridge, about 2 mm in coil diameter. Operculum with long stalk, extending far beyond branchial crown, opercular plate deeply concave, forming a bell-shaped calcified funnel, bearing a short talon like a tear-drop, distal margin of funnel not coinciding with margin of opercular ampulla (Fig. 5A, B). Collar margins not fused dorsally. Collar chaetae each with a fin and a coarsely serrated and distinctly cross-striated blade (Fig. 5C), accompanied by capillary chaetae. Chaetae of 2nd and 3rd thoracic setigers simple, with finely serrated blades. Sickle chaetae also present in 3rd thoracic setiger, but these are damaged distally and not in a

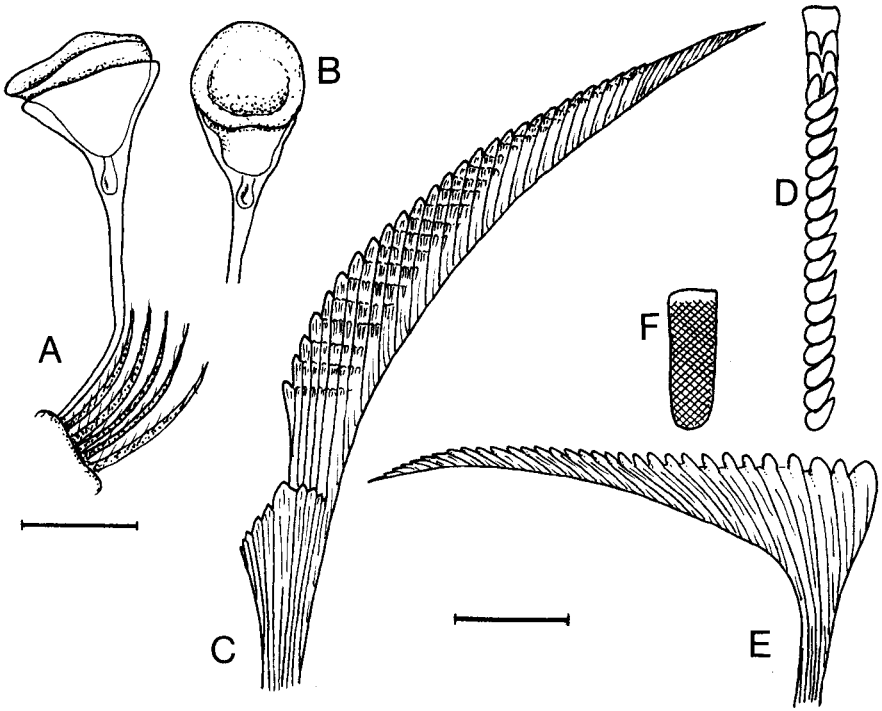

Fig. 5. ? *Nidificaria* sp. A-B – operculum, lateral and front view respectively; C – collar chaeta; D – thoracic uncinus; E – abdominal geniculate chaeta; F – abdominal uncinus. Scale: A-B – 0.25 mm; C-F – 0.01 mm.

good position for drawing. Two thoracic tori on each side of body. Uncini long, narrow, with 1 longitudinal row of teeth for most of the length (Fig. 5D). Abdomen with 15 setigers. Abdominal chaetae geniculate, each with angular heel and long serrated blade, 1 per fascicle on most setigers, with 1 hooked capillary chaeta only in last three setigers. Abdominal tori distributed fairly symmetrically, largest between middle and posterior regions. Uncini short, each with a blunt anterior peg and many longitudinal rows of teeth (Fig. 5F).

Discussion. There are no embryos either in tube or operculum, but the form and distribution of chaetae suggest that this species belongs to the Pileolariinae. The shape of the operculum is not unlike the open cup to which broods of *Nidificaria* are attached (see P. Knight-Jones 1984, P. Knight-Jones & Thorp 1984), but alternatively it may be an unusual primary operculum of a *Pileolaria* or some other related genus. There is no known *Nidificaria* or other spirorbid species with such an operculum, but this may be aberrant and it would be premature to name a single non-brooding specimen on the basis of this somewhat incomplete description.

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