Records of the Australian Museum (2005) Vol. 57: 39–152. ISSN 0067-1975

Exogoninae (Polychaeta: Syllidae) from Australia With the Description of a New Genus and Twenty-two New Species

GUILLERMO SAN MARTÍN

Departamento de Biología (Zoología),
Laboratorio de Biología Marina e Invertebrados,
Facultad de Ciencias, Universidad Autónoma de Madrid,
Canto Blanco, 28049 Madrid, Spain
guillermo.sanmartin@uam.es

ABSTRACT. Large collections of Syllidae (Polychaeta) from around Australia, which were deposited at the Australian Museum (Sydney), and at Museum Victoria as well as some specimens from Tasmania, have been examined and identified. Additionally material from the Hamburgische Zoologische Museum der Universität, Hamburg, Germany was examined. All known Australian species of the subfamily Exogoninae (Syllidae) are described and figured. Some were examined using the Scanning Electron Microscope to illustrate some characters and methods of reproduction in this subfamily. Keys to genera and species are given. A total of 74 species are reported from Australia belonging to 8 genera: *Nooralia* San Martín, 2002 (1 species); *Salvatoria* McIntosh, 1885 (7 species); *Prosphaerosyllis* San Martín, 1984 (10 species); *Erinaceusyllis* n.gen. (10 species); *Sphaerosyllis* Claparède, 1863 (12 species); *Brania* Quatrefages, 1866 (3 species); *Parapionosyllis* Fauvel, 1923 (2 species); and Exogone Örsted, 1845 (29 species). A total of 22 new species are described: *Salvatoria pilkena, S. koorineclavata, Prosphaerosyllis battiri, Erinaceusyllis cirripapillata, E. ettiennei, E. kathrynae, E. hartmannschroederae, Sphaerosyllis bardukaciculata, S. goorabantennata, S. voluntariorum, S. georgeharrisoni, Parapionosyllis winnunga, P. richardi, Exogone (Parexogone) patriciae, E. (P.) annamurrayae, E. (P.) penelopeae, E. (P.) wilsoni, Exogone (Exogone) koorenborongi, E. (E.) haswelli, E. (E.) ingridae, E. (E.) goorapuranga, E. (E.) arrakatarkoola*. Additionally, 13 species are new records for Australia: *Exogone (P.) homosetosa* (Hartmann-Schröder, 1965b); *E. (P.) wolfi* San Martín, 1991a; *E. (P.) caribensis* San Martín, 1991; *E. (P.) gambiae* Lanera, Sordino & San Martín, 1994; *Exogone (E.) longicornis* Westheide, 1974; *E. (E.) lourei* Berkeley & Berkeley, 1938; *E. (E.)breviantennata* Hartmann-Schröder, 1959; *E. (E.) dispar* (Webster, 1879); *E. (Sylline) naidinoides* Westheide, 1974; *Sphaerosyllis capensis* Day, 1953; *Prosphaerosyllis isabellae* Nogueira, San Martín & Amaral, 2001; *Erinaceusyllis bidentata* (Hartmann-Schröder, 1974); and *E. belizensis* (Russell, 1989). The Australian records of *Sphaerosyllis perspicax* Ehlers, 1908, and *S. sublaevis* Ehlers, 1913 should be referred to other species, and are not included (see Ehlers, 1908; 1913). A general discussion of the reproduction and systematics of the subfamily is given.

SAN MARTÍN, GUILLERMO, 2005. Exogoninae (Polychaeta: Syllidae) from Australia with the description of a new genus and twenty-two new species. *Records of the Australian Museum* 57(1): 39–152.

Table of Contents

Introduction

The family Syllidae was established by Grube (1850), and the origin of the name comes from the Latin name *Syllis*, meaning "a worm" (Brown, 1956).

This family is one of the most diverse of the Class Polychaeta (Annelida), represented by about 670 species belonging to 55 genera, but new taxa are still being described. General accounts on the family Syllidae have been given by Glasby (2000), Rouse & Pleijel (2001) and San Martín (2003). Syllids are common on all shallow substrates, but less common at depth, with some species symbiotic or parasitic on other marine invertebrates (Martín & Britayev, 1998).

The family Syllidae is currently divided into 4 subfamilies: Eusyllinae Malaquin, 1893; Exogoninae Langerhans, 1879; Autolytinae Langerhans, 1879; and Syllinae Grube, 1850. Although the names of the subfamilies are usually attributed to Rioja (1925), these names were previously used as *tribu* Exogoneae, *tribu* Autolyteae, and *tribu* Syllinae by Langerhans (1879); subsequently, Malaquin (1893) erected the subfamily Eusyllinae. Fauvel (1923) and later Rioja (1925) designated them as subfamilies. A recent discussion on the authority of each subfamily is given by Ruíz-Ramírez & Salazar-Vallejo (2001). The subfamily classification is probably inadequate, and some more groups could be proposed (Garwood, 1991; San Martín, 2003); a cladistic analysis of the family is currently in preparation by the author.

Contributions to the Australian Syllidae have been made by Augener (1913, 1927), Haswell (1886, 1920a, 1920b), Fauvel (1917), Monro (1931), Day & Hutchings (1979), Hutchings & Rainer (1979, 1980), Hutchings & Murray (1984), San Martín & López (1998, 2003) and Hartmann-Schröder, who described and recorded many species of Syllidae in her papers of 1979, 1980a, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1989, 1990, and 1991, and recently Glasby (2000) and Glasby & Watson (2001).

In this paper, all species belonging to the subfamily Exogoninae, known from Australia are described and figured, and keys provided. Further papers will deal with the other subfamilies.

Characters

The members of the subfamily Exogoninae are small to minute worms (few mm long, about 2–7 mm long), usually found living in sand interstitially, in mud, in crevices on corals and rocks, amongst algae, and in most shallow substrates, but some occur at great depths. No species are parasitic or commensal with other invertebrates. Exogonines are usually short, with few segments (approximately 30) sometimes broad (Figs. 10A, 16A, 29A), but species of some genera, such as *Exogone* Örsted, 1845 are long, slender and filiform (Figs. 69A, 91A), with more segments (around 50). Like most syllids, they are dorsally arched, convex, ventrally flat or concave. Typically, members of this group lack colour markings, with the exception of some species of the genus *Salvatoria* that have transverse red bands on some segments. The palps are fused, but the degree of fusion varies; some species have palps totally fused to each other or leaving a small distal notch (Figs. 12A,B, 49B, 69B,C, 81B,E,F, 91C, 94B), whereas some species have palps with the basal two-thirds fused only (Figs. 10B, 41B,C, 58A, 59A, 60A). The genus *Nooralia* San Martín, 2002, has palps free except at base, but as all other characters agree with the current definition of this subfamily. *Nooralia* is here included as an exogonine but its systematic position is doubtful (see below). Most species of the genus *Salvatoria* have palps dorsally connected by a membrane (Fig. 14A). The exogonine prostomium bears 3 antennae, sometimes the antennae are absent (e.g., *Exogone acerata* San Martín & Parapar, 1990), 4-lensed eyes and, sometimes, in addition 2 small anterior eyespots (without lenses); eyes can be absent in some species and may no longer be visible after preservation. In this paper, one antenna is considered long if it is similar to combined length of prostomium and palps together or if it is longer, and short if it is shorter than the above defined length. The peristomium typically has two pairs of tentacular cirri (*Nooralia, Brania, Salvatoria, Cicese*). A single pair of tentacular (peristomial) cirri is found in some genera (*Parapionosyllis, Exogone, Sphaerosyllis, Prosphaerosyllis, Erinaceusyllis*). Sometimes, the

peristomium dorsally covers the posterior part of prostomium; in some species of the genus *Erinaceusyllis* there are 2 lateral wings that protect the nuchal organs (Fig. 41A–C), and in some species of *Prosphaerosyllis* the whole prostomium is retracted into the peristomium or even into anterior chaetigers (Figs. 17A, 19A,B, 26A, 27A,C). The nuchal organs are typical of the family Syllidae, 2 dorsolateral, densely ciliated grooves between the prostomium and peristomium (Figs. 5B,C, 12A, 69E, 81B,C), but some are laterally positioned (Fig. 94B), sometimes covered with two lips (Figs. 18C,D, 39E, 69B–D). The internal lobes of the nuchal organs (see Lewbart & Riser, 1996) may be visible, and surround the anterior end of the pharynx (Figs. 19A,B, 23A, 30A, 33A, 38A, 66A, 87A). The pharynx is straight, provided with either a conical tooth located on the anterior margin of the opening (*Brania, Parapionosyllis, Exogone, Sphaerosyllis*) or a more or less rhomboidal to oval tooth, usually located behind the anterior rim (*Salvatoria, Cicese, Prosphaerosyllis, Erinaceusyllis*), or in the middle of the pharynx (Figs. 13A, 15A, 17A, 19A,B, 21A, 37A). *Nooralia*, however, lacks a pharyngeal tooth and the proventricle is minute (Fig. 1A,B). The anterior margin of the pharynx is usually surrounded by a crown of soft papillae, and another smaller crown may also be visible, but most species of the genera *Salvatoria, Erinaceusyllis*, and *Prosphaerosyllis* lack papillae. The pharynx of Exogoninae is considered long if it extends through more than three segments (Figs. 1A, 4A, 8A, 9A, 17A, 23A, 37A, 62A, 77A, 78A), and short if it extends through three segments or less (Figs. 46A, 47A, 48A, 51A, 54A, 55A, 58A, 59A, 61A, 79A, 80A, 87A, 92A). A pharynx is considered as wide if it is about ⅓ of the body width or more (see Figs. 4A, 6A, 8A, 9A, 15A, 17A, 21A, 23A, 24A, 37A), and slender if the width is less than ⅓ of the body width (Figs. 43A, 44A, 46A, 47A, 48A, 50A, 51A, 52A, 54A, 59A, 60A, 61A). Similar proportions are used also for the proventricle. The proventricle of the species of the genera *Salvatoria, Prosphaerosyllis*, and *Erinaceusyllis* are distinctly ovoid to barrel-shaped, lacking the midline of cells (Figs. 4A, 8A, 14A, 15A, 17A, 19A, 23A, 24A, 30A, 31A, 32A, 33A, 34A, 35A, 36A, 37A, 38A, 40A) or indistinct (fig. 7A, 9A, 11A); in contrast, species of all other genera have a distinct, dorsal midline on the proventricle (Figs. 42A, 43A, 44A, 45A).

The parapodia are uniramous, with dorsal and ventral cirri. Some species lack dorsal cirri on chaetiger 2, but others within the same genus may have them. This character may be considered as neotenic, as juveniles may lack dorsal cirri on chaetiger 2 (and also lack dorsal tentacular cirri) whereas adults of the same species have dorsal cirri on chaetiger 2 (and also 2 pairs of tentacular cirri) (personal observations on *Brania pusilla*; San Martín, 1984a, 1991a, 2003). Some species may grow cirri on chaetiger 2 after leaving the female while some species do not. The number of pairs of tentacular cirri is considered to be a generic character: genera with two pairs are differentiated from genera with a single pair, which may be otherwise identical, as for example in *Brania* (2 pairs) and *Parapionosyllis* (1 pair), as well as in *Cicese* (2 pairs) and *Erinaceusyllis* (1 pair). Dorsal cirri, antennae and tentacular cirri of the Exogoninae, are typically short on all genera, but there is a difference in shape and size among the different genera, from the spindle-shaped, elongate cirri found in most species of *Salvatoria* (Figs. 4A, 5A,B, 9A), to the minute, papilliform cirri of *Exogone*. Herein, a cirrus is considered as long if it is distinctly longer than twice the length of the parapodial lobe (Figs. 4A, 7A, 8A, 9A, 11A, 13A), short if it is similar to parapodial lobe in length or shorter (Figs. 15A, 17A, 24A, 28A, 42A, 43A, 44A, 45A, 50A); some species of the genus *Exogone* have dorsal cirri minute, papilliform (Figs. 68A, 72A, 79A). *Brania* and *Parapionosyllis* have bowling-pin shaped cirri, those of *Sphaerosyllis* are onion or bottle shaped, and similar to those of *Prosphaerosyllis*, which sometimes have a distal, retractile, button-shaped cirrostyle (Figs. 15B, 16D, 28B, 29C); the cirri of *Cicese* and *Erinaceusyllis* appear to be similar to those of *Salvatoria*, but may be proportionally shorter, sometimes similar to those of *Sphaerosyllis*.

Usually few neurochaetae are present per parapodium, but some species may have up to 15 on each anterior parapodium. The typical arrangement on each parapodium is one simple dorsal, capillary chaeta, several compound heterogomph (sometimes hemigomph) compound chaetae, and one simple ventral, capillary chaeta (Fig. 49F). Dorsal simple chaetae may be present from chaetiger 1 but are usually first present from midbody segments. Simple ventral chaetae are usually only present on posterior parapodia, although they may be absent. Both dorsal and ventral simple chaetae can be provided with some long, thin spines, named aristae. A simple chaeta is considered as thick when the width is similar to those of the shafts of the compound chaetae or larger (Figs. 65G, 66E,H, 67E,G, 80H,K). The blades may be short, less than about 10–12 µm (Figs. 15D, 17C, 21H, 38E, 42H, 46E, 50G, 66D, 72D, 74F, 78) or long (more than 12 µm); some blades may be elongate, distinctly longer than wide (Figs. 7B, 30D, 31B, 33C, 64E, 65D, 72G, 79E, 83F, 89G).

Each parapodium usually bears a single acicula, sometimes 2 on anteriormost parapodia. The aciculae of the members of the subfamily Exogoninae are of 3 main types: distally rounded, sometimes with a hollow appearance at the tip (Figs. 59I, 62D), such as in the genera *Brania, Exogone*, and *Parapionosyllis*; or distally enlarged, with a distal, oblique, filiform tip (acuminate) (Figs. 4G, 7D, 11G, 19F, 30E, 34E, 40H), typical of *Nooralia, Salvatoria, Cicese, Erinaceusyllis* and *Prosphaerosyllis*, or distally forming a right angle (Figs. 47I, 48H, 54D, 55H), which are typical of *Sphaerosyllis*.

Members of the genera *Cicese, Sphaerosyllis, Erinaceusyllis*, and *Prosphaerosyllis* are provided with dorsal and ventral papillae, which may be numerous, and often present on cirri and parapodia (Figs. 16A–D, 17A,B, 25D–F, 29A,B, 39D, 41A–D, 49A–D, 53, 56B,D,F,G); debris often adheres to these papillae and camouflages the animal within the sediment (Haswell, 1920a; Riser, 1991).

Reproduction

Three reproductive methods have been described: dorsal incubation of eggs by means of capillary notochaetae on the females (Kuper & Westheide, 1998) as reported in the recently described genus *Cicese* (Díaz-Castañeda & San Martín, 2001), *Salvatoria* (Figs. 5A,D, 10A, 12C,D), *Prosphaerosyllis* (Figs. 18E,F, 20A,F), and *Erinaceusyllis* n.gen. (Fig. 39B,C) or by means of compound notochaetae (*Nooralia*) (Fig. 3A–D), ventral incubation of eggs and development of attached juveniles in the genera *Brania,*

Parapionosyllis, Exogone (Figs. 91B, 94C,D), and *Sphaerosyllis* (Fig. 56A–E), and viviparity (reported in some species of *Exogone (Parexogone*), Pocklington & Hutchenson, 1983; San Martín, 1991a). All these methods demonstrate parental care of eggs and also sometimes of juveniles, which is a typical biological adaptation to interstitial life (Westheide, 1984; 1987). In both dorsal and ventral brooding, the mature males are provided with long, thin, natatory notochaetae (Figs. 18A, 25A,C, 39A, 49A, 91A). Recent discussion on methods of reproduction of the Syllidae are in Garwood (1991) and Franke (1999) and additional information is given by Westheide (1974), Perkins (1981), San Martín (1984a, 1991a, 2002, 2003), and Kudenov & Harris (1995).

In the case of dorsal brooding, larvae emerge from the eggs once embryonic development is completed; Kisseleva (1986) demonstrated for *S. clavata* that larve emerge from eggs with 3 segments; both adult males and females have notochaetae during the reproductive period. In the case of ventral brooding, however, larvae develop into juveniles that only leave the female's body when fully developed, and only males usually develop natatory notochaetae. It is possible that the female feeds these juveniles through an internal connection, as large juveniles can still be attached to the maternal body; the juveniles are attached to the female by their anus, connecting directly to the mother through dilated nephridial pores (Fig. 91B). This supposition would be an interesting topic of future research. Viviparity could be considered as an extreme case of protection of juveniles.

In the study of the Australian material, I have observed dorsal brooding in the species *Nooralia bulgannabooyanga* (by means of compound notochaetae), *Salvatoria kerguelensis, Salvatoria quadrioculata, S. longisetosa, S. euritmica, S. koorineclavata* n.sp., *Erinaceusyllis hartmannschroederae* n.sp., *E. serratosetosa, E. ettiennei* n.sp., *E. opisthoculata, Prosphaerosyllis longipapillata, P. papillosissima, P. sexpapillata, P. magnoculata*, and *P. nathani*. Observations on ventral brooding, with ventral attachment and development of juveniles have been made in *Exogone heterosetosa, E. africana, E. fustifera, E. naidinoides, Sphaerosyllis densopapillata, S. lateropapillata*, and *S. hirsuta*.

Systematic implications of the type of reproduction

Kuper & Westheide (1998) and Franke (1999) consider that dorsal or ventral attachment position is species-specific, and that both conditions can be found within a single genus; my observations, however, contradict this proposal. After examining thousands of specimens of Exogoninae from all around the world, I have found that all species of some genera brood dorsally (*Salvatoria, Prosphaerosyllis, Erinaceusyllis* and the recently described genus *Cicese*); others brood ventrally, and attach developing juveniles (*Brania, Parapionosyllis, Exogone, Sphaerosyllis*). Dorsal brooding requires the development of capillary notochaetae to attach the eggs, but how the eggs exit the body is unknown; probably capillary notochaetae are already attached to the membrane of each egg as it exits the body wall. Ventral brooding requires the development of glands that produce adhesive secretions and these females usually lack notochaetae; it is difficult to accept that such strong morphological differences associated with these different methods of egg protection occurs in closely related species. Furthermore, both kinds of brooding have been reported from species belonging to the subfamily Eusyllinae, ventral brooding in the genus *Syllides* (Heacox & Schröder, 1978) and some species belonging to the complex of genera known as *Pionosyllis* (the species *Typosyllis longisetosa* Hartmann-Schröder, 1990 that belong to this complex, personal observations) and *Pionosyllis augeneri* (Hartmann-Schröder, 1979, personal observations), and dorsal brooding in *Pionosyllis pulligera* (Pierantoni, 1905; Augener, 1913); brooding in the Eusyllinae, however, appears to have a different origin than in the Exogoninae. The ventral brooding in the Eusyllinae does not develop juveniles and the dorsal brooding of *P. pulligera* is made on the dorsal cirri, developing attached juveniles on these cirri.

One interpretation is that brooding of eggs evolved independently in two groups, and these two groups progressively adapted to an interstitial life, independently evolving fused palps, reduced body size and dorsal cirri, and even loss of dorsal pair of tentacular cirri in some genera. Well-developed attached juveniles of *Brania pusilla*, lack dorsal tentacular cirri and dorsal cirri on chaetiger 2, although the adults have two pairs of tentacular cirri and dorsal cirri on all parapodia (personal observations; San Martín, 1984a). As explained above, some species may develop these cirri in a final stage of juvenile development while others species do not.

If one accepts this interpretation, the Exogoninae is not a monophyletic group, but includes two sister clades of the Eusyllinae whose adaptations to an interstitial life (in sand, crevices in rocks and corals) produced apparently similar genera with similar bodies. This similarity may be considered more as the result of a "process of exogonization" of two Eusyllinae branches, than evolution of differences within one subfamily Exogoninae. Therefore, one group consists of *Salvatoria* and *Cicese*, and perhaps *Nooralia*, which broods dorsally by means of egg attachment to notochaetae, and the other group composed of *Brania, Parapionosyllis* and *Exogone*, which broods ventral developing juveniles. Recently, Mastrodonato *et al*. (2003) made a detailed study of the external gestation of *Exogone naidina* and came independently to similar conclusions.

The genus *Sphaerosyllis*, as usually accepted, has species that brood dorsally and others that brood ventrally developing juveniles (Riser, 1991). This genus appears to contradict the above hypothesis. However, the species *Sphaerosyllis hystrix* and other related species that have a small proventricle, a conical pharyngeal tooth located on anterior rim of pharynx, and usually parapodial glands, brood ventrally and develop juveniles (included in the subgenus *Sphaerosyllis* by San Martín, 1984b). In contrast, species belonging to the subgenus *Prosphaerosyllis* San Martín, 1984 as well as the species of the "*erinaceus*" group, brood dorsally by means of capillary notochaetae (personal observations; Imajima, 1966 for *S. erinaceus*). For this reason, together with the morphological differences, the genus *Erinaceusyllis* is erected here for the species of the "*erinaceus*" group and the subgenus *Prosphaerosyllis* is raised to generic level. Both these genera are to be considered phylogenetically separate from *Sphaerosyllis*, although morphologically similar in appearance.

Material and methods

The material examined was mainly from the collections in The Australian Museum, and was collected by many people including: N. Coleman, W.F. Ponder, S. Shepherd, S. Slack-Smith, G. Wilson, H. McHail, J.C. Verco, B. Duchworth, J.K. Lowry, R.T. Springthorpe, H.E. Stoddart, P.A. Hutchings, A. Murray, S. Dittmann, J. Kudenov, T.J. Ward, P.C. Young, A. Jones, and others. Also, material from the Museum of Victoria (MV) have been studied, mostly collected by N. Coleman, S. Rainer, and others.

Material from the Zoologiches Museum of Hamburg (HZM), collected and identified by Hartmann-Schröder, has been re-examined, and some specimens donated by N.W. Riser.

Most of material was identified while on a Visiting Fellowship at The Australian Museum, but some identifications and the preparation of manuscript were made at the Universidad Autónoma de Madrid, Spain.

The specimens are mostly preserved in 70% ethanol after fixation in formalin. Examinations were made using a compound microscope with interference contrast optics (Nomarsky). Drawings were made using a camera lucida drawing tube. Scanning Electron Microscope observations and photographs were made in the SIDI (Servicio Interdepartamental de Investigación) of the Universidad Autónoma de Madrid, Spain.

Information about Aboriginal words for the names of several new taxa was obtained from Endacott (1973). The order of descriptions, both for genera and for species in each genus, follows the order of apparition in the respective keys.

The following abbreviations have been used in the text: AM Australian Museum, Sydney; MV Museum of Victoria, Melbourne; HZM Hamburgische Zoologische Museum, Hamburg, Germany.

Some structures (e.g., nuchal organs or eyespots) are difficult to see. They are described only when they were examined, but they also are present on all species although they are not described in the respective sections.

Taxonomy

Key to genera of Australian Exogoninae

Two generic keys are given; one is based on reproductive and morphological characters, and the other based only on morphological characters. The order followed for descriptions is that of the first key. The order of description of species is that of the corresponding keys of each genus.

Key based on reproductive and morphological characters

1 Females brooding dorsally 2

—— Females brooding ventrally, developing juveniles, or viviparous 5

2 Brooding by means of compound notochaetae. Proventricle minute. Without pharyngeal tooth ..... *Nooralia*

—— Brooding by means of simple, capillary notochaetae. Proventricle long and wide. Pharyngeal tooth present, usually oval to rhomboidal 3

3 Body smooth; two pairs of tentacular cirri. Antennae and dorsal cirri long ..... *Salvatoria*

—— Body with papillae; single pair of tentacular cirri. Dorsal cirri usually short 4

4 Some dorsal cirri with a retractile cirrostyle. Antennae short. Pharynx relatively long and wide; pharyngeal tooth usually located far from anterior margin. Compound chaetae always with short, unidentate blades ..... *Prosphaerosyllis*

—— Antennae and dorsal cirri more or less elongate, without distal cirrostyle. Pharynx relatively slender; pharyngeal tooth usually located near anterior margin. Compound chaetae with elongate blades, bidentate, unidentate and bidentate, or unidentate ..... *Erinaceusyllis* n.gen.

5 Body smooth 6

—— Body covered with papillae ..... *Sphaerosyllis*

6 Two pairs of tentacular cirri ..... *Brania*

—— Single pair of tentacular cirri 7

7 Palps fused on the basal half to ⅔. Dorsal cirri bowling-pin shaped. Distinct parapodial glands ..... *Parapionosyllis*

—— Palps usually fused all along their length or with terminal notch. Dorsal cirri small, papilliform. Parapodial glands indistinct or minute, apparently absent ..... *Exogone*

Key based exclusively on morphological features

1 Two pairs of tentacular cirri 2
—— Single pair of tentacular cirri 4

2 Palps free from each other, except most basally. Proventricle minute. Pharyngeal tooth absent ..... *Nooralia*
—— Palps fused at least on basal half. Proventricle distinct. Pharyngeal tooth present 3

3 Palps fused on basal half to ⅔. Dorsal cirri bowling-pin shaped or truncate. Parapodial glands distinct, sometimes inside dorsal cirri. Acicula distally rounded, apparently hollow at tip. Pharynx slender, with distal soft papillae. Pharyngeal tooth conical, located at opening ..... *Brania*
—— Palps joined all along their length or mostly by a dorsal membrane. Dorsal cirri spindle-shaped, usually elongate. Parapodial glands absent. Acicula acuminate. Pharynx and proventricle long and wide; usually without papillae on pharyngeal opening. Pharyngeal tooth rhomboidal to ovate, usually located far from pharyngeal opening ..... *Salvatoria*

4 Body without papillae 5
—— Body papillate 6

5 Palps fused on basal half to ⅔. Dorsal cirri bowling-pin shaped. Parapodial glands distinct. Dorsal simple chaetae distally serrated ..... *Parapionosyllis*
—— Palps usually fused all along their length or with a distal, short notch. Dorsal cirri small, papilliform. Parapodial glands indistinct. Dorsal simple chaetae otherwise ..... *Exogone*

6 Prostomium with 4 eyes, without eyespots. Proventricle short, with few large muscular bands. Pharynx slender; pharyngeal tooth small, conical, located on anterior rim on pharynx. Antennae and dorsal cirri flask- to onion-shaped. Acicula distally with tip forming a right angle ..... *Sphaerosyllis*
—— Four eyes and 2 anterior eyespots on prostomium. Proventricle barrel-shaped, long and relatively wide, with numerous, slender muscular bands. Pharynx relatively large. Acicula acuminate 7

7 Pharynx distinctly wide, without papillae. Pharyngeal tooth rhomboidal to oval, long, usually located far from anterior rim. Antennae and dorsal cirri similar to *Sphaerosyllis*, but typically having an elongate cirrophore and a retractile cirrostyle. Compound chaetae always with short, unidentate falcigers ..... *Prosphaerosyllis*
—— Pharynx proportionally more slender, sometimes with soft papillae surrounding opening. Pharyngeal tooth small, located near anterior rim. Antennae and dorsal cirri elongate, but sometimes similar to those of *Sphaerosyllis*, always without retractile cirrostyle. Compound chaetae usually with elongate blades bidentate, bidentate and unidentate, or unidentate ..... *Erinaceusyllis* n.gen.

Genus *Nooralia* San Martín, 2002

Nooralia San Martín, 2002: 333.

Type species. *Nooralia bulgannabooyanga* San Martín, 2002.

Diagnosis. Body small, short, with about 30 chaetigers. Surface of body smooth. Prostomium with 4 eyes and 3 antennae. Palps fused at bases. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri of chaetiger 1 long, cylindrical to spindle-shaped; remaining dorsal cirri short, lanceolate. Parapodia with dorsal simple capillary chaetae and compound chaetae with unidentate and bidentate short blades. Ventral simple chaetae apparently absent. Pharynx long, unarmed, with a crown of soft papillae on anterior rim. Proventricle small, difficult to see. Pygidium with 2 large anal cirri. Females brooding eggs dorsally, by means of compound notochaetae.

Remarks. The relationship of *Nooralia* to other members of the group is difficult to elucidate, because the genus displays features that differentiate it from all other

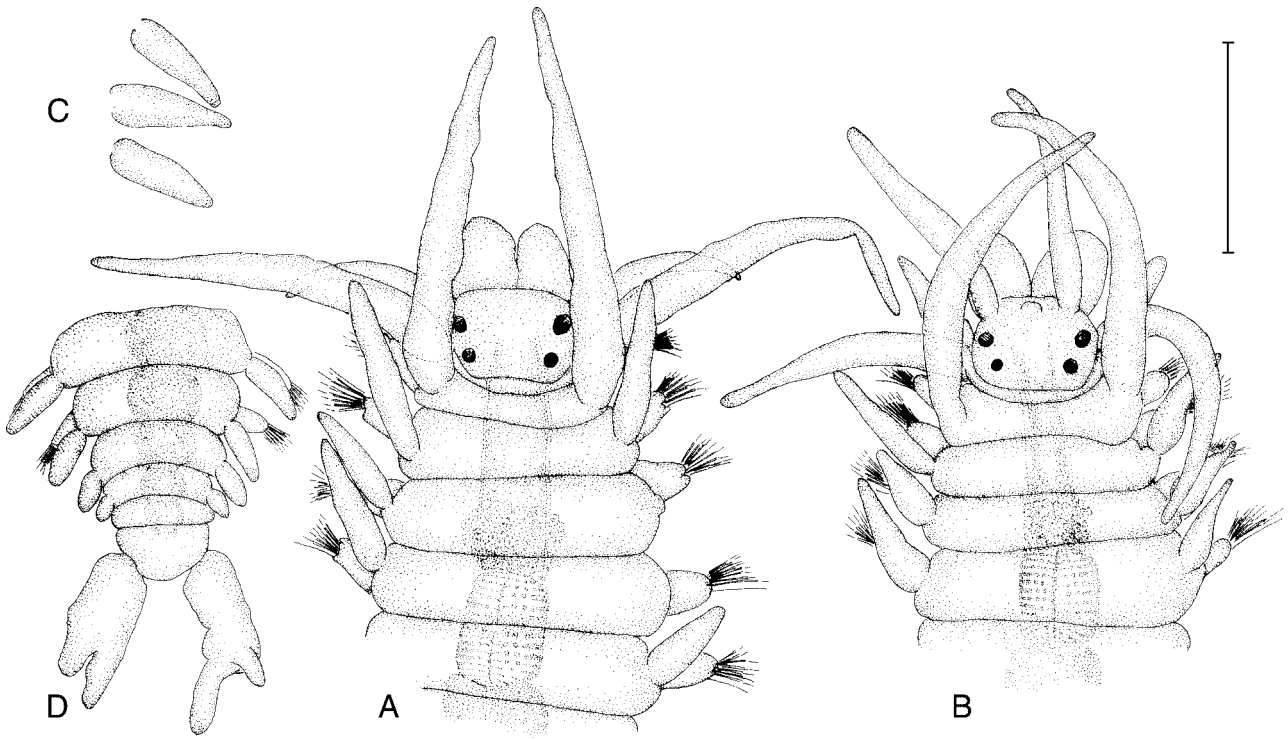


Fig. 1. *Nooralia bulgannabooyanga*. (*A*) anterior end, dorsal view, holotype (antennae missing). (*B*) anterior end, dorsal view, a paratype (median antenna missing). (*C*) alternative dorsal cirri, midbody, holotype. (*D*) posterior end, dorsal view, a paratype. Scale 0.09 mm.

Exogoninae genera, such as an indistinct proventricle and absence of a pharyngeal tooth. Characters such as the shape of the dorsal cirri, smooth dorsal surface and dorsal brooding of egg, as well as the shape of the aciculae of the single known species, suggest that it may be related to the genus *Salvatoria*. However, *Salvatoria* has palps fused by means of a dorsal membrane and a distinctly massive proventricle, which is long and large, and has a pharyngeal tooth. Furthermore, the compound chaetae of *Nooralia* are different to those of all other species of the genera included in the Exogoninae. The genus appears to have an isolated position in the Syllidae.

Nooralia bulgannabooyanga San Martín, 2002

Figs. 1A–D, 2A–G, 3A–F

Nooralia bulgannabooyanga San Martín, 2002: 336, figs. 1–3.

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: 1 specimen, AM W26326, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry, R.T., *et al*., 22 Apr

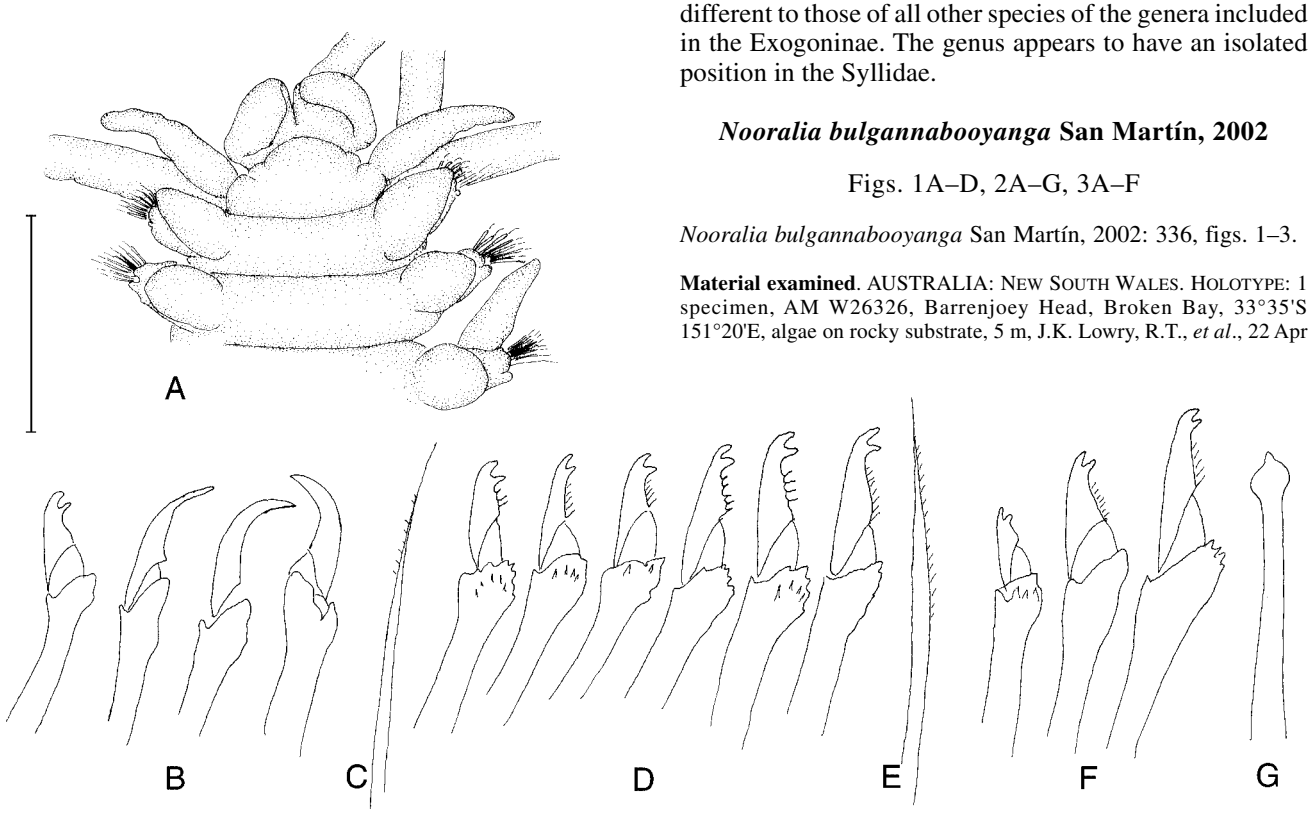


Fig. 2. *Nooralia bulgannabooyanga*. (*A*) anterior end, ventral view, holotype. (*B*) compound chaetae, chaetiger 1. (*C*) dorsal simple chaeta, midbody. (*D*) compound chaetae, midbody. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) acicula. Scale A: 0.09 mm, B–G: 28 µm.

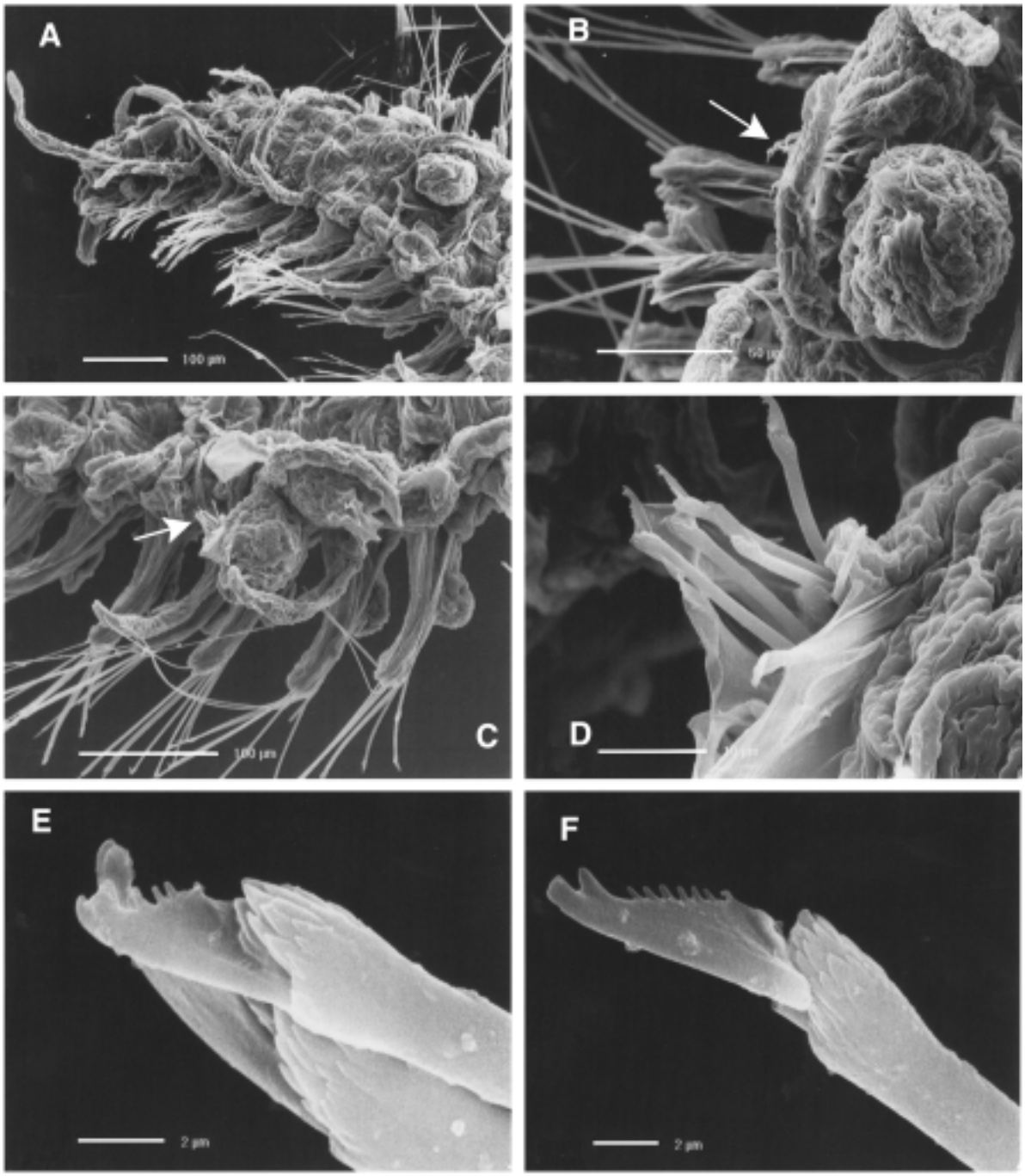


Fig. 3. SEM of *Nooralia bulgannabooyanga*, female carrying dorsally eggs. (*A*) anterior end, dorsal view. (*B*) detail of an egg. (*C*) the same. (*D*) detail of notochaetae. (*E*) dorsalmost compound neurochaeta. (*F*) ventralmost compound neurochaeta (midbody).

1993. Paratype: specimen on SEM stub, AM W27400, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry, R.T., *et al*., 22 Apr 1993. Paratype: 1 specimen, AM W27399, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry, R.T., *et al*., 22 Apr 1993. Paratype: 1 specimen, AM W26342, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla, 35°21.42'S 150°29.31'E, airlift over wall of sponges, bryozoa & hydrozoa, 15 m, K. Attwood, *et al*., 3 May 1997. 1 specimen, AM W28414, Northwest corner of Bowen Island, Jervis Bay, 35°06.8'S 150°46.11'E, dense bryozoans under rock ledge, 13 m, P. Serov & G.D.F. Wilson, 8 Dec 1993. 5 specimens, AM W28405, South ledge, Cook Island, 28°11.65'S 153°34.63'E, rock, 15 m, K. Attwood, 9 Jun 1993. WESTERN AUSTRALIA. 1 specimen. AM W ex 28366, Red Bluff, Kalbarri, 27°42'S 114°9'E, round-leaved seagrass in shallow sand on rocky shore, 3.5 m, R.T. Springthorpe, 10 Jan 1984.

Description. Body small, short, holotype 2.4 mm long, 0.3 mm wide, 31 chaetigers. Prostomium quadrangular to trapezoidal; 4 eyes in trapezoidal arrangement, apparently without anterior eyespots (Fig. 1A,B). Antennae missing on holotype and one paratype; another paratype with lateral antennae but median antenna missing; lateral antennae inserted just in front of anterior eyes, cylindrical, slightly rugose, longer than combined length of prostomium and palps (Fig. 1B); median antenna inserted at same level than lateral antennae, about twice as long. Palps fused at bases (Fig. 1A,B), usually ventrally folded (Fig. 2A). Dorsal tentacular cirri long and thick, laterally directed, similar to

lateral antennae but longer, distinctly longer than body width (Fig. 1A,B); ventral tentacular cirri slightly shorter than half length of dorsal tentacular cirri, oblique to laterally directed (Fig. 1A,B). Dorsal cirri of chaetiger 1 long, anteriorly directed, similar to dorsal tentacular cirri. Dorsal cirri present on all parapodia; dorsal cirri of chaetiger 2 much shorter than those of chaetiger 1, similar in length to ventral tentacular cirri, but distinctly longer than remaining dorsal cirri (Fig. 1A,B); dorsal cirri of midbody lanceolate, shorter than half body width, longer than parapodial lobes, slight variation in length (Fig. 1C). Last 2–3 segments with small dorsal cirri but lacking parapodia and chaetae (Fig. 1D). Ventral cirri large, ovate, slightly laminar (Fig. 2A). Parapodial lobes conical, distally bilobed and provided with posterior papilla (Fig. 2A). Parapodia of chaetiger 1 with 1 compound bidentate chaeta, the dorsalmost one, and 6 compound chaetae with unidentate, smooth, curved blades (Fig. 2B); progressively increasing numbers of compound chaetae with bidentate blades, chaetae with only bidentate blades from chaetiger 3–4. Midbody parapodia each with about 8–9 compound chaetae, strongly heterogomph, with spinose to rough shafts, and short, bidentate blades with short, fine marginal spines, inverse dorsoventral gradation in length, about 7–8 μm dorsally, 10 μm ventrally (Figs. 2D, 3E,F); posterior parapodia each with 9 compound chaetae, similar to those of midbody, with greater differences between dorsal and ventral blades (Fig. 2F). Dorsal simple chaetae from chaetiger 1, thin, distally with short, fine marginal spines, similar throughout (Fig. 2C,E). Ventral simple chaetae absent. Acicula solitary, slender, distally rounded, with a short, rounded tip (Fig. 2G). Pharynx long, slender, indistinct, everted or partially everted on all specimens, without pharyngeal tooth, a dark glandular area near proventricle (Fig. 1A,B), a crown of 10 soft papillae on anterior rim and few other, small and rounded, near distal crown. Proventricle small, minute, difficult to see, through 1–2 segments (Fig. 1A,B). Pygidium semicircular, with 2 long, wide, anal cirri (bifid on 1 paratype) (Fig. 1D). Females carrying eggs dorsally (Fig. 3A) by means of compound notochaetae (Fig. 3B–D).

Remarks. This genus and species is unique in the family Syllidae, in having the combination of a minute proventricle, unarmed pharynx, palps separated except basally, antennae, tentacular cirri and dorsal cirri of chaetiger 1 long, distally tapered, and remaining dorsal cirri short, spindle-shaped to oval, and, especially, because mature females brooding by means of compound notochaetae. Strictly, this taxon does not belong to any of the known subfamilies of the Syllidae; *Nooralia*, however, is placed provisionally in the Exogoninae because of its small, short body, presence of ventral cirri, short dorsal cirri on midbody, and brooding of eggs.

Distribution. Australia (New South Wales, Western Australia).

Habitat. Amongst algae, bryozoans and hydrozoans; 3.5–15 m depth.

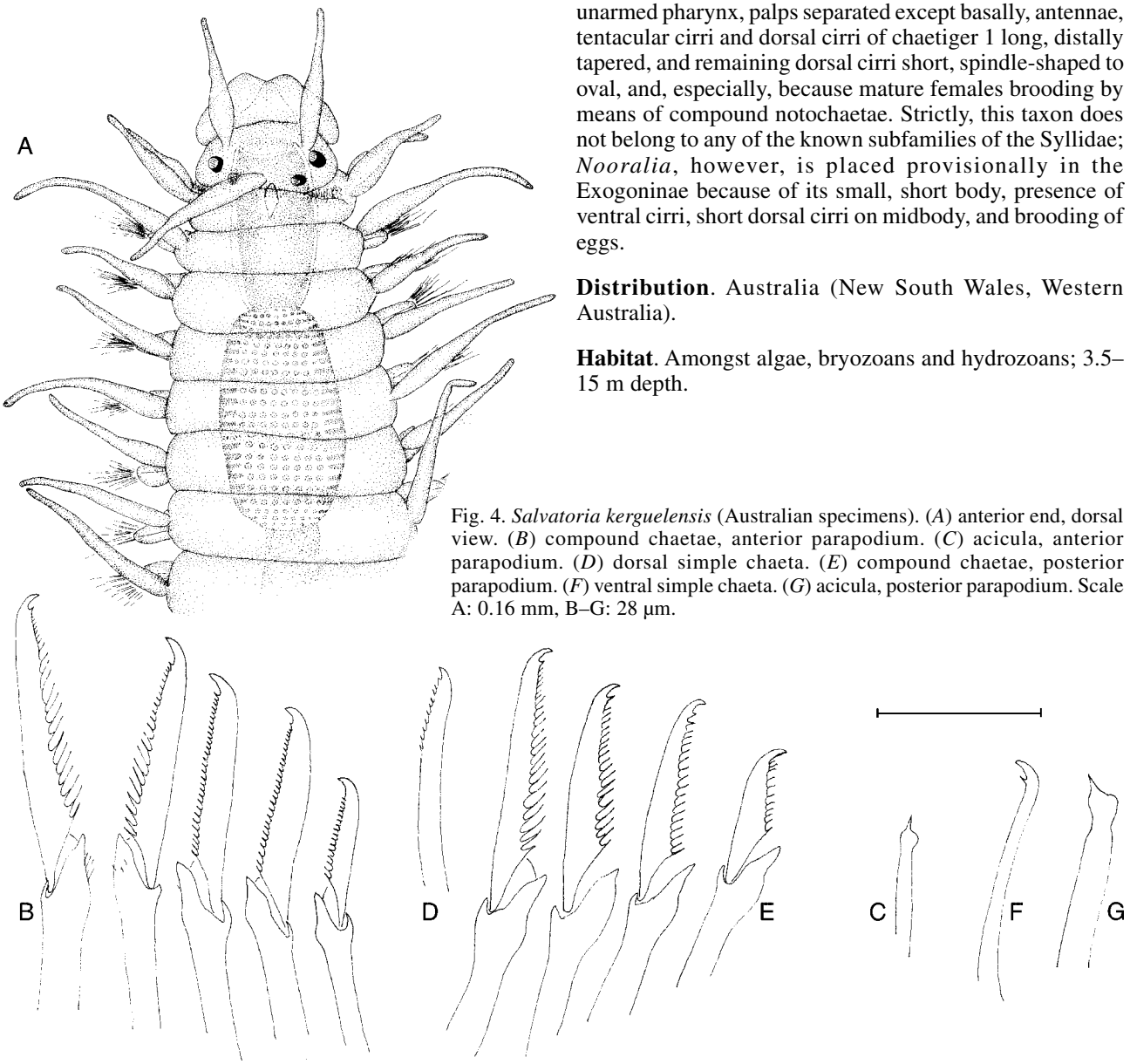


Fig. 4. *Salvatoria kerguelensis* (Australian specimens). (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodium. (*C*) acicula, anterior parapodium. (*D*) dorsal simple chaeta. (*E*) compound chaetae, posterior parapodium. (*F*) ventral simple chaeta. (*G*) acicula, posterior parapodium. Scale A: 0.16 mm, B–G: 28 μm.

Genus *Salvatoria* McIntosh, 1885

Salvatoria McIntosh, 1885: 188.
Grubea Quatrefages, 1866: 19.
Grubeosyllis Verrill, 1900: 633.
Protogrubea Czerniavsky, 1881: 414.
Pseudobrania San Martín, 1984: 150.
Brania.–in part Fauvel 1923: 296; in part Kudenov & Harris, 1995: 9. Not Quatrefages 1866.

Type species. *Salvatoria kerguelensis* McIntosh, 1885 by original designation.

Diagnosis. Body small with few segments, around 30, surface smooth, usually without colour markings, but some species with red transverse bands on some segments. Prostomium with 3 antennae, 4 eyes and, usually, 2 eyespots. Palps well developed, joined along their length by dorsal membrane, more or less distinct, sometimes with distal, usually short notch. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri usually spindle-shaped, proportionally long and slender in comparison with those present in other genera of the subfamily, usually slightly bulbous at their base and ending with an elongate, acute tip; dorsal cirri present on all segments or absent on chaetiger 2. Parapodia conical, typically ending in 3 rounded, small papillae. Ventral cirri digitiform, shorter than parapodial lobes. Parapodial glands absent. Compound chaetae heterogomph, with blades bidentate, sometimes subdistal tooth small, appearing as unidentate; some parapodia with dorsal and ventral simple capillary chaetae. Acicula usually solitary, acuminate, with long and filiform tip; in some species without tip, appearing distally rounded. Pharynx wide, usually without papillae around the opening, although some larger species have crown of small papillae; usually band of cilia at opening of pharynx; pharyngeal tooth typically rhomboidal to ovate, located anywhere from near anterior margin to about the middle of pharynx. Proventricle proportionally long and wide, massive, sometimes longer than pharynx but usually of the same length, with numerous, slender muscular rows. Pygidium with two anal cirri, similar to dorsal cirri. Reproduction by epigamy, females brooding eggs by means of capillary notochaetae; mature males provided with long natatory notochaetae.

Remarks. The systematic position of this genus has been controversial. McIntosh (1885) included his new genus *Salvatoria* in the family Hesionidae; his diagnosis was confused and incomplete; later, Monro (1939) re-examined the holotype and concluded that it belonged to the family Syllidae, considering it as a synonym of *Syllides*; this conclusion was followed by Hartman (1964). Previously, Ehlers (1897) described *Sphaerosyllis macintoshi* and considered *Salvatoria kerguelensis* as a synonym of that species; this opinion was accepted by Benham (1921). I have reexamined the holotype of *Salvatoria kerguelensis* and here come to a different conclusion.

First, the supposed articulations described by McIntosh on the antennae and anterior dorsal cirri are an artifact produced by small crystals of formalin; the pharyngeal tooth, although difficult to see, is present, but it is difficult to give its precise position; finally, the chaetae and aciculae are similar to those of other species described in the genus *Grubeosyllis* Verrill, 1900, but not those of *Brania*. Furthermore, McIntosh's original drawing of the holotype (pl. XXX, fig. 4) shows the prostomium in ventral view and the body in dorsal view in a single drawing clearly encouraging misinterpretations of the description.

The original name for this group was *Grubea*; the taxon *Grubeosyllis* was erected by Verrill (1900) specifically as a replacement name for *Grubea*, a name preoccupied by a genus of trematodes (Platyhelminthes). Ignoring Verrill, Fauvel (1923) considered *Brania* as a junior synonym of *Grubea*. Hartman (1959) regarded *Brania, Grubeosyllis*, and *Grubea* as synonyms retaining the name *Brania* for the group. Later, San Martín (1984a) erected the genus *Pseudobrania* for this group of species, and designated *Pseudobrania clavata* as the type species. San Martín (1991a) on a further revision, resurrected *Grubeosyllis* and considered *Pseudobrania* San Martín, 1984 as a junior synonym. After examining the holotype of *Salvatoria kerguelensis*, it is apparent that this also belongs to the group, and *Salvatoria* McIntosh, 1885 is proposed as the valid name of this genus, having priority over *Grubeosyllis* Verrill, 1900 (and also over *Pseudobrania* San Martín, 1984). Another possible available name for the genus is *Protogrubea* Czerniavsky, 1881; the generic characters, however, are poorly known and the type material appears lost.

Recently, Kudenov & Harris (1995) did not accept *Brania* and *Grubeosyllis* as different genera; all the species they describe in *Brania* belong to the re-erected genus *Salvatoria*. It appears that they misinterpreted some characters in their discussion. The reasons argued by San Martín (1984a, 1991a) for the separation of *Brania* and *Salvatoria*, are verified because *Salvatoria* broods dorsally by means of capillary notochaetae while *Brania* broods ventrally and develops juveniles attached to the female, which lacks notochaetae.

Key to species of *Salvatoria* recorded from Australia

1 Dorsal cirri present on chaetiger 2 2
—— Dorsal cirri absent on chaetiger 2 6

2 Blades of compound chaetae unidentate or provided with small, indistinct subdistal tooth ..... *S. kerguelensis*
—— Blades of compound chaetae distinctly bidentate 3

3 Blades of compound chaetae slender, elongate. Pharyngeal tooth located near the middle of pharynx ..... *S. longisetosa*
—— Blades of compound chaetae not elongate; some broad and relatively short. Pharyngeal tooth located near anterior rim 4

4 Palps separated on distal ⅓. Compound chaetae with blades strongly bidentate; space between both teeth wide, distinctly rounded ..... *S. euritmica*

—— Palps fused except for distal notch. Teeth of blades not so distinctly separated, forming an angle 5

5 Without eyespots. Body proportionally large and broad. Pharyngeal tooth located near anterior rim. Pharynx with papillae. Blades of compound chaetae with short marginal spines ..... *S. quadrioculata*

—— With 2 eyespots. Body small and slender. Pharyngeal tooth located distinctly posteriorly to anterior rim. Longer blades with moderately long spines on distal margin ..... *S. koorineclavata* n.sp.

6 Pharyngeal tooth located near middle of pharynx. Blades of compound chaetae distinctly bidentate ..... *S. opisthodentata*

—— Pharyngeal tooth located near anterior rim. Blades slender, with subdistal tooth small ..... *S. pilkena* n.sp.

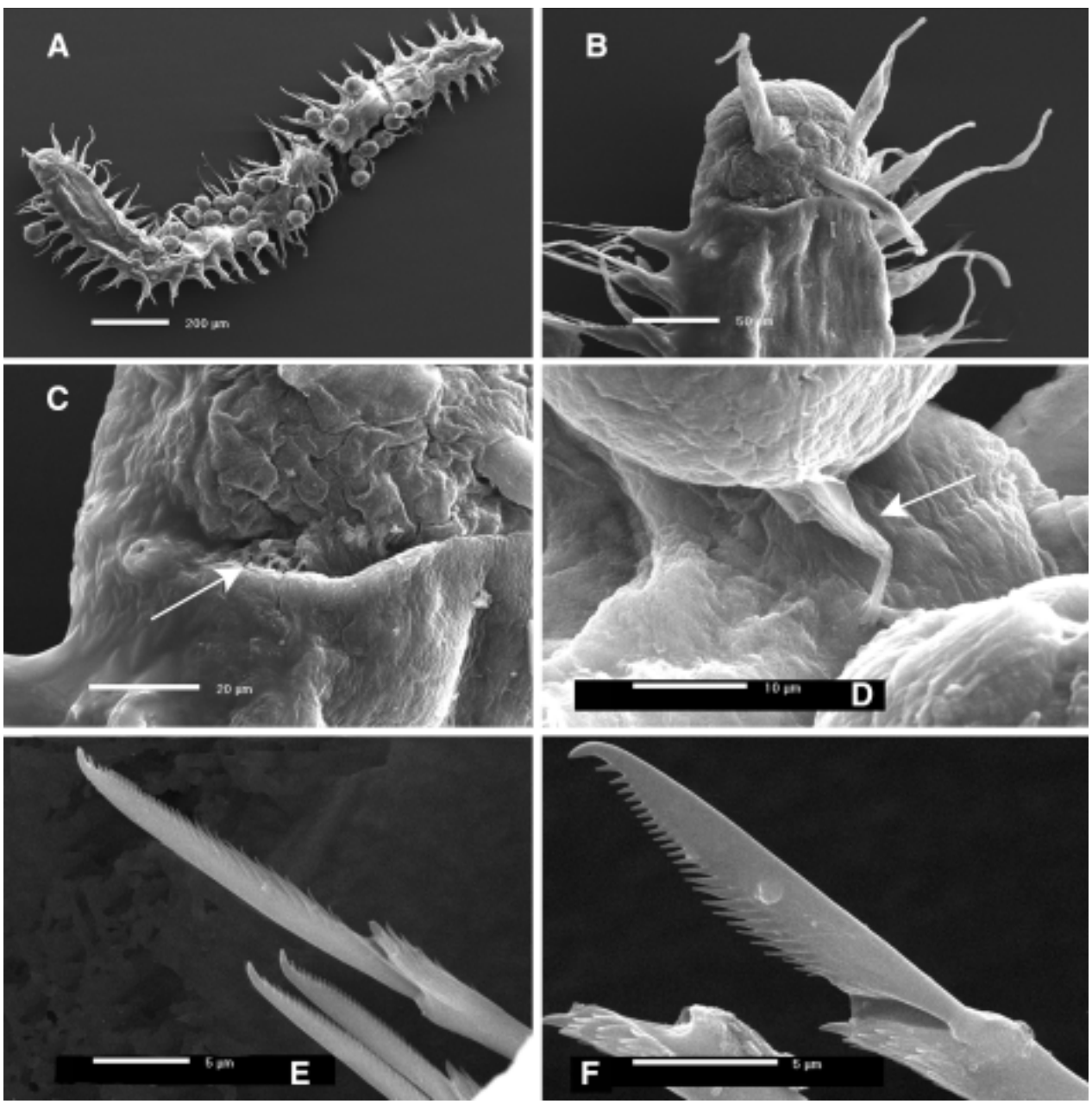


Fig. 5. SEM of *Salvatoria kerguelensis* (Australian specimens). (*A*) complete female carrying eggs. (*B*) anterior end, dorsal view. (*C*) detail of left nuchal organ. (*D*) capillary notochaetae supporting an egg. (*E*) dorsal compound chaeta, anterior parapodium. (*F*) mid compound chaetae, midbody parapodium.

Salvatoria kerguelensis McIntosh, 1885

Fig. 4A–G, 5A–F, 6A–F

Salvatoria kerguelensis McIntosh, 1885: 188, pl. 30, fig. 4, pl. 33, fig. 1, pl. 25a, figs. 11, 12.
Sphaerosyllis macintoshi.–Ehlers, 1897: 46; 1913: 481; Benham, 1921: 26.
Syllides kerguelensis.–Monro, 1939: 114; Hartman, 1964: 91, pl. 28, fig. 8.
Grubea kerguelensis.–Augener, 1913: 252, text-fig. 37, pl. 3, fig. 23. Not Haswell, 1920a: 223, pl. 17, figs. 18–20.
Grubeosyllis kerguelensis.–Augener, 1927: 155.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 24 specimens, AM W26800, The Blow Holes, Point Quobba, 24°39'S 113°25'E, exposed rock platform, intertidal, brown algae clumps, 0.5 m, J.K. Lowry *et al*., 7 Jan 1984. 4 specimens, AM W26806, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, lumps of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 24 specimens, AM W26809, The Blow Holes, Point Quobba, 24°39'S 113°25'E, short green algae from rock platform edge, 0.5 m, J.K. Lowry *et al*., 7 Jan 1984. 3 specimens, AM W26810, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sand from seagrass beds on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 6 specimens, AM W27404, Ningaloo reef off Ned's Camp, Cape Range National Park, 21°59.5'S 113°54.5'E, mixed algae, 2 m, J.K. Lowry, 1 Jan 1984. 16 specimens, AM W27411, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 4 specimens, AM W27414, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27417, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984.

Description. Body small, complete mature female carrying eggs 2.24 mm long, 0.2 mm wide, for 30 chaetigers. Prostomium ovate to pentagonal, slightly wider than long, with 4 eyes in trapezoidal arrangement and sometimes 2 anterior eyespots; median antenna inserted between posterior pair of eyes, slightly longer than prostomium and palps together, lateral antennae similar to median antenna but shorter (Figs. 4A, 5B), inserted in front of anterior pair of eyes. Palps dorsally joined by a membrane, with a distal notch, slightly ventrally folded, shorter or similar in length to prostomium. A distinct pair of ciliated nuchal organs between prostomium and peristomium (Figs. 4A, 5B,C). Peristomium similar in length to following segments; dorsal tentacular cirri shorter than lateral antennae, ventral tentacular cirri similar to dorsal ones, but shorter. Dorsal cirri on all parapodia; dorsal cirri of chaetiger 1 long, similar in length to chaetiger 1 width, dorsal cirri of chaetiger 2 and 3 distinctly shorter than dorsal cirri of chaetiger 1, those of chaetiger 3 slightly longer than those of chaetiger 2, dorsal cirri of chaetiger 4 similar in length to those of chaetiger 1, remaining dorsal cirri short and long arranged alternately; long cirri slightly shorter than width of corresponding segment (Fig. 4A, 5A,B). Compound chaetae similar throughout; anterior parapodia each with 8–9 compound chaetae, posterior parapodia each with 7; blades indistinctly bidentate, distally hooked, subdistal tooth small on longer blades (Fig. 5E), minute to absent on shorter blades, provided with short marginal spines (Fig. 5F), longer spines on longer blades (Figs. 4B,E, 5E,F), dorsoventral gradation in length of blades, about 11–12 µm above, 6–7 µm below in midbody. Dorsal simple chaetae from midbody, slender, indistinctly bidentate, with small subdistal tooth and short marginal spines (Fig. 4D). Ventral simple chaetae on far posterior chaetigers, sigmoid, indistinctly bidentate, margin smooth (Fig. 4F). Acicula solitary, slender, acuminate (Fig. 4C), slightly thicker posteriorly (Fig. 4G). Pharynx wide, without papillae, through about 4 segments; pharyngeal tooth rhomboidal, located slightly posteriorly from opening. Proventricle similar in length and width to pharynx (Fig. 4A), through 4 segments, with about 18–20 muscle cell rows. Pygidium small, with 2 anal cirri, similar to dorsal cirri but slightly longer.

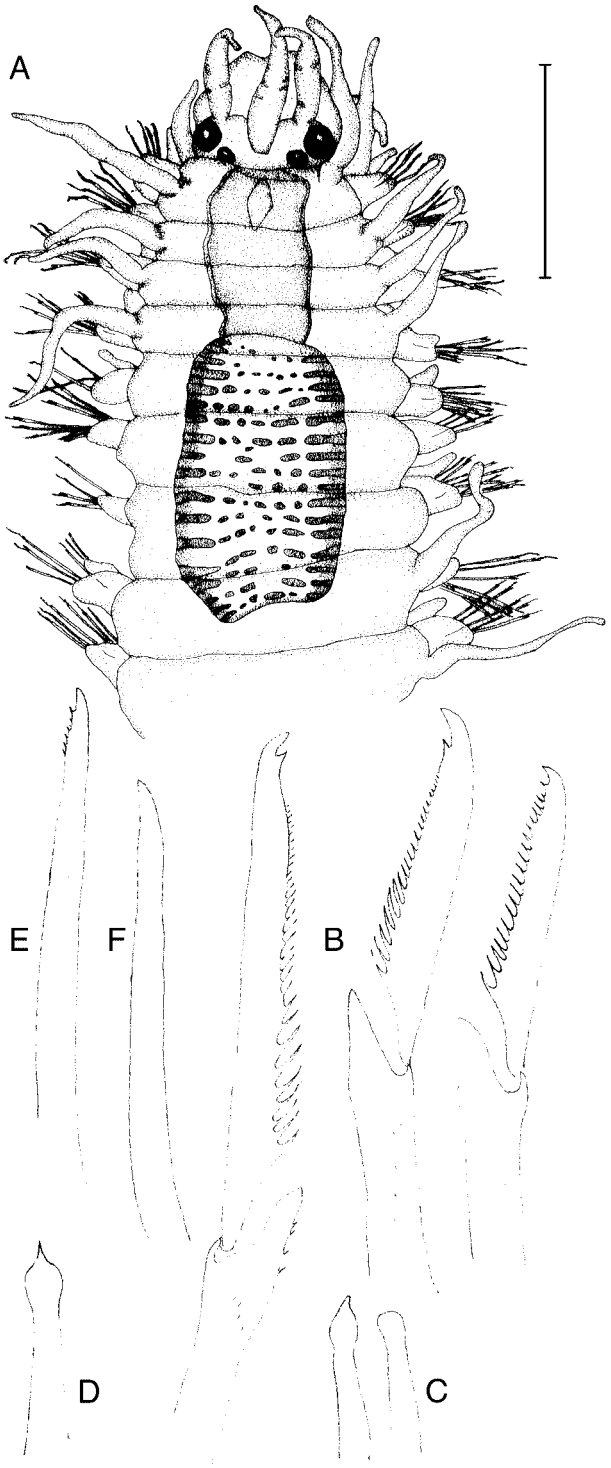


Fig. 6. *Salvatoria kerguelensis*. Holotype (BMNH). (*A*) anterior end, dorsal view (some dorsal cirri missing). (*B*) compound chaetae, midbody. (*C*) aciculae, anterior parapodium. (*D*) acicula, posterior parapodium. (*E*) dorsal simple chaeta. (*F*) ventral simple chaeta. Scale A: 0.26 mm, B–F: 10 µm.

Remarks. The holotype of the species is a damaged specimen masked by a dense cover of small crystals, difficult to examine, because it is opaque with some cirri lost (Fig. 6A) and many chaetae broken. It is longer than the above described specimens, about 4.3 mm long, 0.42 mm wide, 33 chaetigers. Compound chaetae similar to the additional material examined (Fig. 6B), but longer (blades 45 µm above, 10 µm below in midbody). Two aciculae present in more anterior parapodia, one distally rounded and the other acuminate (Fig. 6C), solitary acuminate acicula in midbody and posterior parapodia (Fig. 6D). Dorsal simple chaetae similar to those of Australian specimens (Fig. 6E), ventral simple chaetae unidentate and smooth (Fig. 6F), only on last chaetiger. Pharyngeal tooth present, apparently near the opening (Fig. 6A), but the exact position is not possible to elucidate because the opacity of the specimen.

The Australian specimens are much smaller than the holotype of the species, and the blades of the compound chaetae are much shorter; so the identification of these Australian specimens as *Salvatoria kerguelensis* is tentative. The compound chaetae are, however, similar and the differences in the location of the pharyngeal tooth could be the result of the poor condition of the holotype.

The record of this species from Port Jackson (Haswell, 1920a) is referred to *Salvatoria longisetosa*.

Distribution. Subantarctic seas: Kerguelen Islands, South Georgia. New Zealand. Australia (Western Australia).

Habitat. Volcanic mud, coralline algae, in sponges, seagrass beds, amongst algae.

Salvatoria longisetosa (Hartmann-Schröder, 1979) n.comb.

Fig. 7A–D

Brania longisetosa Hartmann-Schröder, 1979: 102, figs. 136, 137; 1980a: 54; 1981: 34; 1982: 67; 1983: 133; 1984: 22; 1985: 70; 1986: 42; 1987: 39; 1989: 27; 1991: 38, figs. 62–64; 1992a: 59.
Grubea kerguelensis.–Not McIntosh; Haswell, 1920a: 223, pl. 17, figs. 18–20.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W487, Port Jackson, 33°51'S 151°16'E. 1 specimen, AM W27203, Lennox Head, 28°48.5'S 153°36.5'E, worm tubes, 1 m, A. Murray *et al*., 01 Mar 1992. WESTERN AUSTRALIA. 1 specimen, AM W26506, Vancouver Peninsula, near Mistaken Island, King George Sound, 35°4'S 117°56'E, sea grass with hydroids & hydrozoans, 3 m, J.K. Lowry, 13 Dec 1983. 2 specimens, AM W27419, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small, up to 4.7 mm long, 0.21 mm wide, 33 chaetigers, usually without colour markings, but some mature specimens with transverse rows of red pigment on dorsum of anterior segments. Prostomium ovate; 4 eyes in trapezoidal arrangement, nearly in line, and 2 small anterior eyespots. Median antenna long and slender, spindle-shaped, about 1.5 times as long as combined length of prostomium and palps, inserted between posterior pair of eyes or slightly in front, lateral antennae much shorter, less than half of length of median antenna (Fig. 7A). Palps broad, similar in length to prostomium, dorsally fused all along their length except for a small notch, sometimes ventrally folded. Peristomium similar in length to following segments;

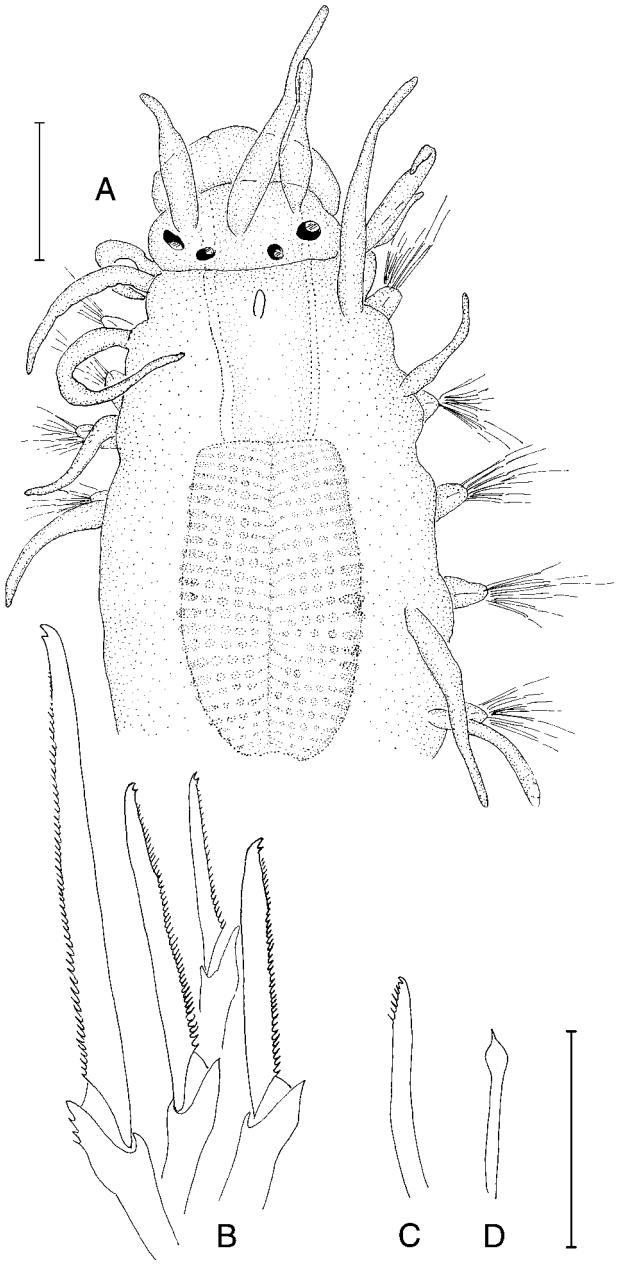


Fig. 7. *Salvatoria longisetosa*. (*A*) anterior end, dorsal view (some dorsal cirri missing). (*B*) compound chaetae, midbody. (*C*) dorsal simple chaeta. (*D*) acicula. Scale A: 0.1 mm, B–D: 20 µm.

tentacular cirri similar in shape to antennae, dorsal tentacular cirri similar to median antenna but shorter, ventral tentacular cirri similar in shape and length to lateral antennae. Dorsal cirri on all parapodia, similar to antennae and tentacular cirri in shape (Fig. 7A); dorsal cirri of chaetiger 1 similar in length to median antenna, remaining dorsal cirri varying in length, always shorter than those of chaetiger 1. Compound chaetae with slender shafts and elongate blades, bidentate, with subdistal tooth small and short (Fig. 7B), straight marginal spines; 1–2 dorsalmost chaetae with distinctly long blades, about 50 µm long, and 6–8 similar chaetae with shorter blades and dorsoventral gradation, 28–29 µm above, 18 µm below. Dorsal simple chaetae from midbody, slender, provided with short subdistal spines, minutely bidentate (Fig. 7C). Ventral simple chaetae in far posterior chaetigers, sigmoid, smooth, slender and bidentate. Acicula solitary,

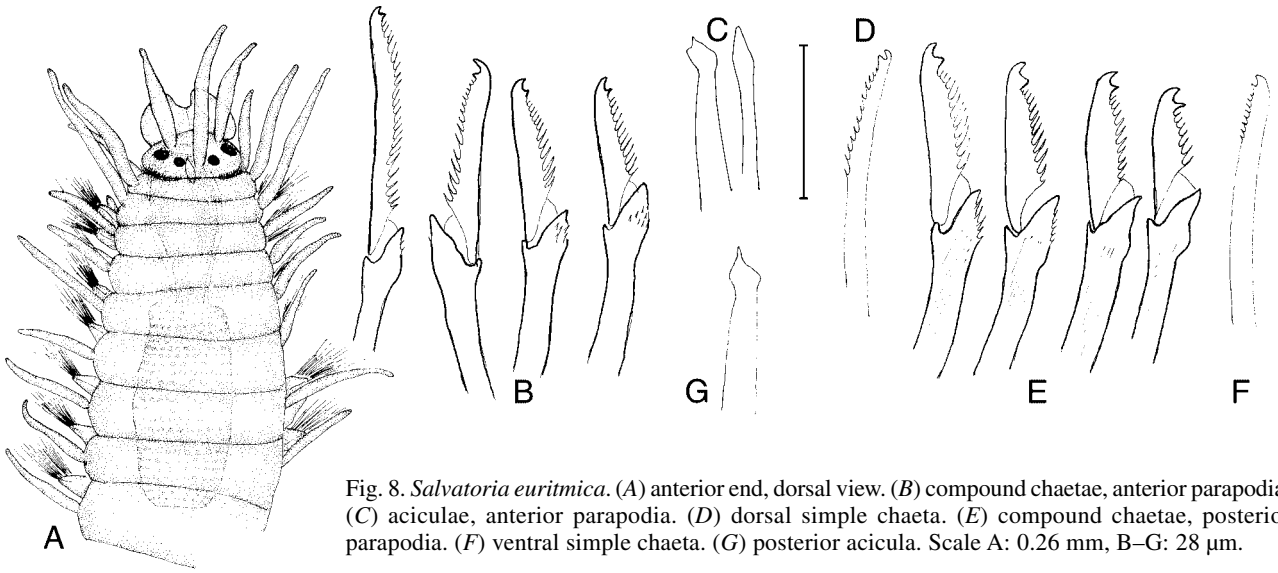


Fig. 8. *Salvatoria euritmica*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodia. (*C*) aciculae, anterior parapodia. (*D*) dorsal simple chaeta. (*E*) compound chaetae, posterior parapodia. (*F*) ventral simple chaeta. (*G*) posterior acicula. Scale A: 0.26 mm, B–G: 28 µm.

acuminate (Fig. 7D). Pharynx wide, proportionally long, through about 3–4 segments, without papillae on the opening; pharyngeal tooth small, ovate, located just in front of middle of pharynx (Fig. 7A). Proventricle similar in length and width to pharynx, with about 20–22 muscle cell rows.

Distribution. Australia (reported from all states, except the Northern Territory). Polynesia.

Habitat. Common on all shallow substrates: corals, sand, amongst algae, seagrass.

Salvatoria euritmica (Sardá, 1984)

Fig. 8A–G

Pseudobrania euritmica Sardá, 1984: 10, fig. 1.
Grubeosyllis euritmica.–San Martín, 1991a: 718, figs. 2c,d.
Salvatoria euritmica.–San Martín, 2003: 169, figs. 84–86.
Pionosyllis yambaensis Hartmann-Schröder, 1990: 52, figs. 18–22.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26724, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plates of *Acropora* covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W26725, Wallabi Group, Houtman Abrolhos, 28°38.68'S 113°45.37'E, bivalves, shell debris, fine sand and algae, 37 m, P.A. Hutchings on FRV "Flinders", 28 May 1994. 1 specimen, AM W27413, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed brown algae from rocky shore, 4 m, R.T. Springthorpe, 10 Jan 1984. 1 specimen, AM W27418, Red Bluff, Kalbarri, 27°42'S 114°09'E, round-leaved seagrass in shallow sand on rock, 4 m, R.T. Springthorpe, 10 Jan 1984. 7 specimens, AM W27422, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. Paratype of *Pionosyllis yambaensis*, 1 specimen, ZMUH, P-19966, Yamba, algae, 18 Jan 1976.

Description. Body small, proportionally broad anteriorly; a mature female carrying eggs, 2 mm long, 0.2 mm wide, 28 chaetigers; larger specimens up to 4 mm long, 0.35 mm wide, 29 chaetigers. Prostomium ovate to subpentagonal; 4 large eyes in trapezoidal arrangement and, sometimes, 1 pair of anterior small eyespots. Median antenna spindle-shaped, inserted between posterior eyes, longer than prostomium and palps together, usually about 2 times longer; lateral antennae similar in shape but shorter than median antenna, inserted in front of anterior pair of eyes (Fig. 8A). Palps similar in length to prostomium, broad, dorsally fused on their basal ⅔, leaving a deep distal notch. Two distinct ciliated nuchal organs between prostomium and peristomium (Fig. 8A). Peristomium similar in length to following segments; dorsal tentacular cirri similar to median antenna, usually slightly shorter, ventral tentacular cirri similar in length to lateral antennae. Dorsal cirri on all parapodia, spindle-shaped, those of chaetiger 1 longer than remaining, similar in length to median antenna; dorsal cirri of chaetiger 2 and 3 much shorter, remaining dorsal cirri alternating long and short, always shorter than body width (Fig. 8A). Parapodia each with 10 compound chaetae anteriorly, 9 in posterior parapodia, similar throughout, with proportionally thick shafts and strongly bidentate blades, with both teeth similar in size, widely separated by a concave, rounded space, provided with moderately long, fine, erect marginal spines, longer in dorsal chaetae, dorsoventral gradation in length of blades, 22 µm above 16 µm below on anterior parapodia (Fig. 8B), 20 µm above 14 µm below on posterior parapodia (Fig. 8E). Dorsal simple chaetae distinctly bidentate, with short subdistal marginal spines (Fig. 8D), present from proventricular segments. Ventral simple chaetae similar to dorsal one (Fig. 8F), on most posterior parapodia. Anterior parapodia each with 2 aciculae, one acuminate and another straight, with a subdistal small enlargement (Fig. 8C), remaining parapodia with solitary acicula, acuminate (Fig. 8G). Pharynx wide, usually cup-shaped, through 4–5 segments; pharyngeal tooth ovate, located near opening (Fig. 8A). Proventricle similar in length to pharynx, through about 3–4 segments, with about 15–20 muscle cell rows. Pygidium small, with 2 anal cirri similar to dorsal cirri.

Remarks. The original description of *P. yambaensis* and the examined paratype of that species agrees with the descriptions of *Salvatoria euritmica* from the Mediterranean Sea, so I assume that they are synonyms.

Distribution. Southern area of Spanish Mediterranean, Caribbean Sea, Australia (Western Australia, New South Wales).

Habitat. Amongst algae, seagrass, debris, in shallow water.

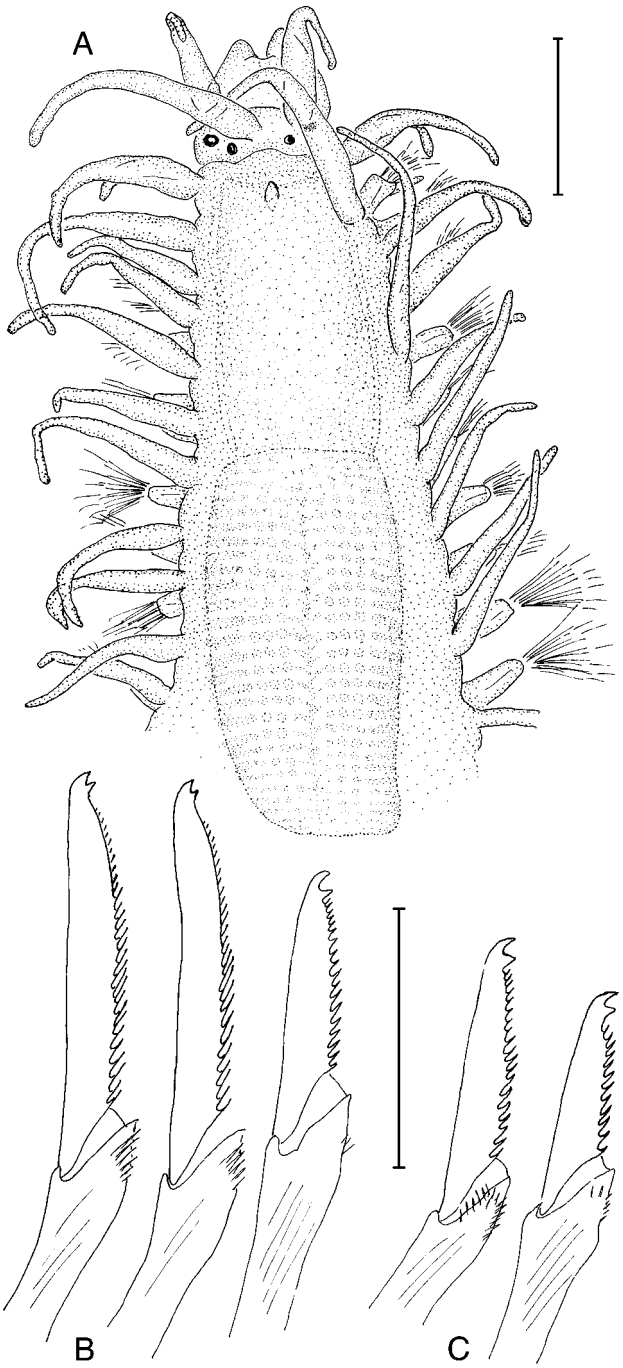


Fig. 9. *Salvatoria quadrioculata*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodium. (*C*) compound chaetae, posterior parapodium. Scale A: 0.2 mm, B,C: 20 µm.

Salvatoria quadrioculata (Augener, 1913) n.comb.

Figs. 9A–C, 10A–D

Grubea quadrioculata Augener, 1913: 254, pl. 3, fig. 31, text-fig. 38; Haswell, 1920a: 223, pl. 17, figs. 21–26.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W488, Port Jackson, 33°51'S 151°16'E. 1 specimen on slide, AM W25239, Port Jackson, 33°50'S 151°16'E. 1 specimen, AM W26421, Manta Reef, North West Solitary Island, 30°01.5'S 153°16.5'E, curly bryozoan, 18 m, R.T. Springthorpe, 25 Jun 1992. 17 specimens, AM W26438, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, dead bryozoan encrusted with algae, bryozoa and hydroids, 17 m, K. Attwood, 1 Mar 1997. 8 specimens, AM W26439, Manta Reef, North West Solitary Island, 30°01.5'S 153°16.5'E, lace bryozoan, 19 m, R.T. Springthorpe, 25 Jun 1992. 1 specimen, AM W26536, northern side of Bannister Head, 35°19.15'S 150°29.12'E, grey sponge from top of boulder, 18 m, K. Attwood, 6 May 1997. 1 specimen, AM W26538, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae & ascidians, 16 m, E.L. Albertson, 7 Mar 1992. 1 specimen, AM W26539, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla, 35°21.42'S 150°29.31'E, airlift over wall of sponges, bryozoa & hydrozoa, 15 m, K. Attwood *et al*., 3 May 1997. 5 specimens, AM W26540, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, surface of sponges, 19 m, K. Attwood *et al*., 1 May 1997. 1 specimen, AM W26545, Burrill Rocks, Ulladulla, 35°23.29'S 150°28.24'E, gorgonacean, 24 m, R.T. Springthorpe, 7 May 1997. 2 specimens, AM W26659, north east corner of Clark Island, 33°51.85'S 151°14.47'E, *Ecklonia* holdfast, 5 m, P.A. Hutchings, 17 Apr 1996. 1 specimen, AM W26507, west side of Bowen Island, half way along, ACT, 35°06.91'S 150°45.91'E, pink sponge on overhang and surrounding bottom, 8 m, P. Serov & G.D. F. Wilson, 7 Dec 1993. 15 specimens (4 on SEM stub), AM W26508, half way along west side of Bowen Island, Jervis Bay, ACT, 35°06.91'S 150°45.91'E, sponge encrusted rock, smooth grey sponge, 6 m, P. Serov & G.D.F. Wilson, 7 Dec 1993. 1 specimen, AM W26509, west side of Bowen Island, half way along, ACT, 35°06.91'S 150°45.91'E, grey sponge with orange flesh, large oscular chamber, 8 m, P. Serov & G.D.F. Wilson on "Sula", 7 Dec 1993.

Description. Body long, proportionally broad, 3.5–4 mm long, 0.3 mm wide, 33 chaetigers; segments wide and short (Figs. 9A, 10A,B). Prostomium ovate, wider than long, with 4 eyes in trapezoidal arrangement nearly in line. Median antenna long, thick at bases, more than twice as long as prostomium and palps together, inserted just in front of line between posterior eyes; lateral antennae similar in thickness but much shorter, similar in length to prostomium and palps together. Palps broad, slightly longer than prostomium, fused dorsally except for a distinct anterior notch (Figs. 9A, 10B). Peristomium covering posterior margin of prostomium; dorsal tentacular cirri similar to antennae, longer than lateral antennae but shorter than median antenna, ventral tentacular cirri similar in length to lateral antennae. Dorsal cirri on all parapodia (Fig. 9A); dorsal cirri of chaetiger 1 long, similar in length to median antenna, longer than body width, dorsal cirri of chaetigers 2 and 3 much shorter, remaining dorsal cirri irregularly varying in length. Compound chaetae with proportionally thick shafts, ornamented with short subdistal spines, and long, wide, strongly bidentate blades, with short, erect marginal spines (Fig. 10D); anterior parapodia each with about 10–11 compound chaetae, dorsoventral gradation in lengths of blades, 32 µm above, 22 µm below, teeth thicker and more separated ventrally (Fig. 9B); progressively posteriorly number of compound chaetae declines, with 4–5 on each posterior parapodia, with less marked dorsoventral gradation in length of blades, 23 µm above, 18 µm below, all compound chaetae similar to ventral ones of anterior parapodia (Fig. 9C). Dorsal and ventral simple chaetae not seen. Acicula solitary, acuminate. Pharynx wide, extending through about 6 segments, surrounded by a crown of few, small, soft papillae on the opening (Fig. 10C); pharyngeal tooth apparently small (but long when pharynx is everted, Fig. 10C), located close to anterior rim. Proventricle similar in shape to pharynx, through about 6 segments, with about 18–20 muscle cell rows. Pygidium small, provided with 2 long anal cirri, similar in shape to dorsal cirri.

Distribution. Australia: (Western Australia, New South Wales).

Habitat. Sublittoral, on sponges, bryozoans, ascidians, hydrozoans, gorgoneans, amongst crusts of calcareous algae, kelp holdfasts, in depths to 24 m.

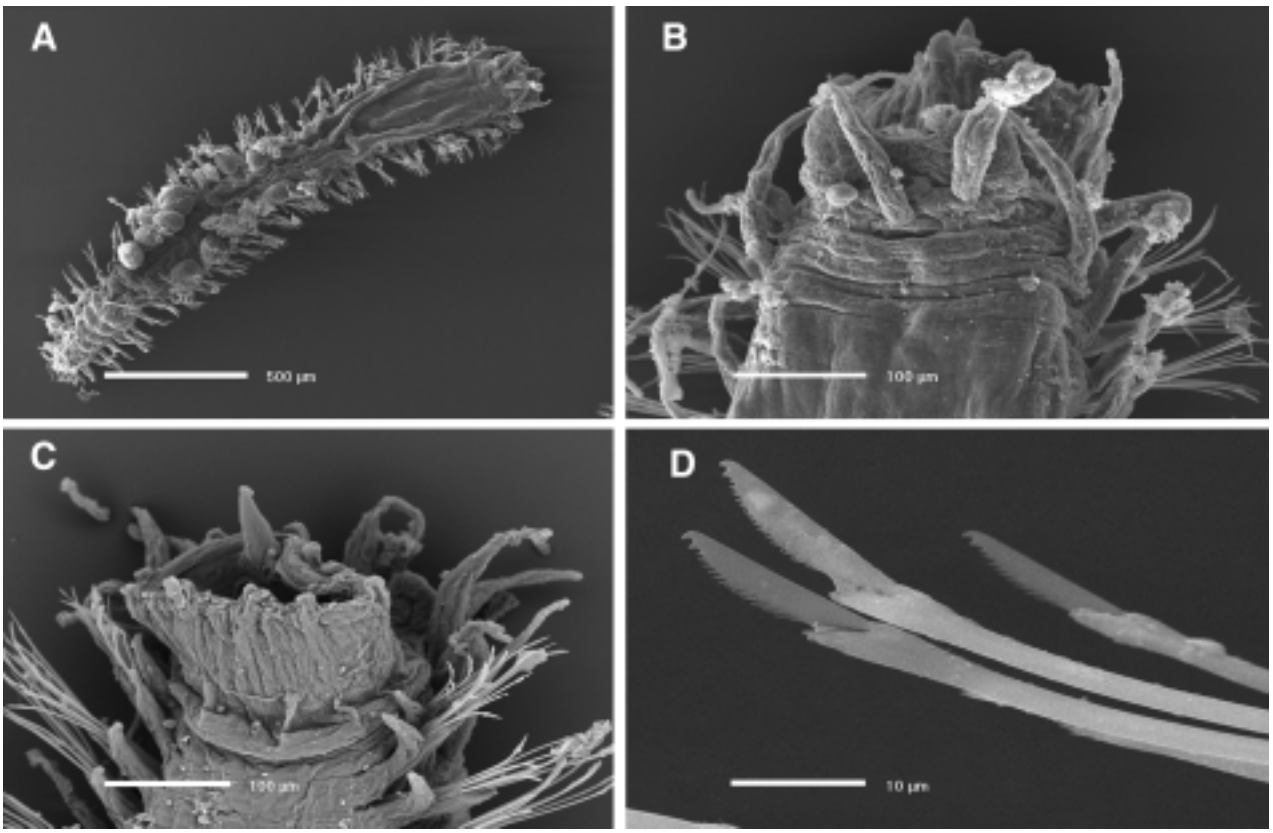


Fig. 10. SEM of *Salvatoria quadrioculata*. (*A*) complete female, carrying eggs. (*B*) anterior end, dorsal view. (*C*) everted proboscis, ventral view. (*D*) compound chaetae, midbody.

Salvatoria koorineclavata n.sp.

Figs. 11A–G, 12A–E

Brania clavata.–Hartmann-Schröder, 1979: 100, figs. 129–133; 1980: 53; 1990: 53; 1991: 37. Not Claparède, 1863.

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE, AM W26445, 400 yards south of southern entrance to Jervis Bay, ACT, 35°7'S 150°46'E, 21.3 m, P.A. Hutchings, 22 July 1972. PARATYPE: 1 specimen, AM W26446, southwest Bowen Island, ACT, 35°07.49'S 150°45.77'E, small pink/white sponge with irregular lobes found in seagrass, 8 m, P. Serov & G.D. F. Wilson, 8 Dec 1993. PARATYPE: 1 specimen, AM W15811, south bank of Lake Merimbula, 36°53.7'S 149°54.5'E, on short *Zostera* & *Halophila* spp., J.H. Day *et al*., 6 Oct 1975. 7 specimens, AM W26423, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26424, Richmond River, near shore Ballina, old wharf between Cherry & Martin Sts, 28°52.5'S 153°33.6'E, drift algae, 6 m, S.J. Keable, 5 Mar 1992. 4 specimens, AM W26425, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 4 AM W26426, 100 m northwest of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 2000. 1 specimen, AM W26427, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, dead bryozoan encrusted with algae, bryozoa and hydroids, 17 m, K. Attwood, 1 May 1997. 1 specimen, AM W26510, southwest Bowen Island, ACT, 30°07.49'S 150°45.77'E, sandy bottom; rock with bryozoans & encrusting polychaetes, 8 m, P. Serov & G.D.F. Wilson, 8 Dec 1993. 1 specimen, AM W26642, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, airlift, 12 m, G. Clark, 11 Dec 1989. 3 specimens, AM W26649, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 2000. 1 specimen, AM W26660, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 22 Apr 1983. 6 specimens, AM W27408, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. SOUTH AUSTRALIA. 1 specimen, AM W26742, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. WESTERN AUSTRALIA. PARATYPE: 1 specimen, AM W26514, off end of South Mole, Arthur Head, Fremantle, 32°3'S 115°44'E, orange tunicates, 6 m, J.K. Lowry, 25 Dec 1983.1 specimen, AM W26691, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plates of *Acropora* covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 3 specimens, AM W26692, north end of Long Island, Goss Passage, 28°27.9'S 113°46.3'E, dead coral covered in coralline algae & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimens, AM W26693, jetty adjacent to Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead coral with plate-like *Montipora* & *Acropora* spp., 12 m, P.A. Hutchings, 23 May 1994. 1 specimen, AM W26694, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 1 specimen, AM W26695, south west corner of Lucas Island, Kimberleys, 15°13'S 124°31'E, 30 m, P.A. Hutchings, 24 July 1988. 1 specimen, AM W26696, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat, plus epifauna, 2 m, P.A. Hutchings, 26 May 1994. 4 specimens, AM W26697, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W26698, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead branching coral covered in coralline algae, 10 m, P.A. Hutchings, 18 May 1994. 156 specimens, AM W26830, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, green algae, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 1 specimen, AM W26835, reef west of groyne, 2 km south of Cape Peron, 32°16'S 115°41'E, *Ulva* sp. on new limestone boulder groyne, 1 m, H.E. Stoddart, 26 Dec 1983. 33 specimens, AM W27401, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 10 specimens, AM W27402, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, very fine sediment and sand from patches in reef, 1 m, H.E. Stoddart, 2 Jan 1984. 19 specimens, AM W27403, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 3 specimens, AM W27405, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed brown algae from rocky shore, 4 m, R.T. Springthorpe, 10 Jan 1984. 5 specimens, AM W27406, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, lumps of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 7 specimens, AM W27407, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, tufted balls of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 4 specimens,

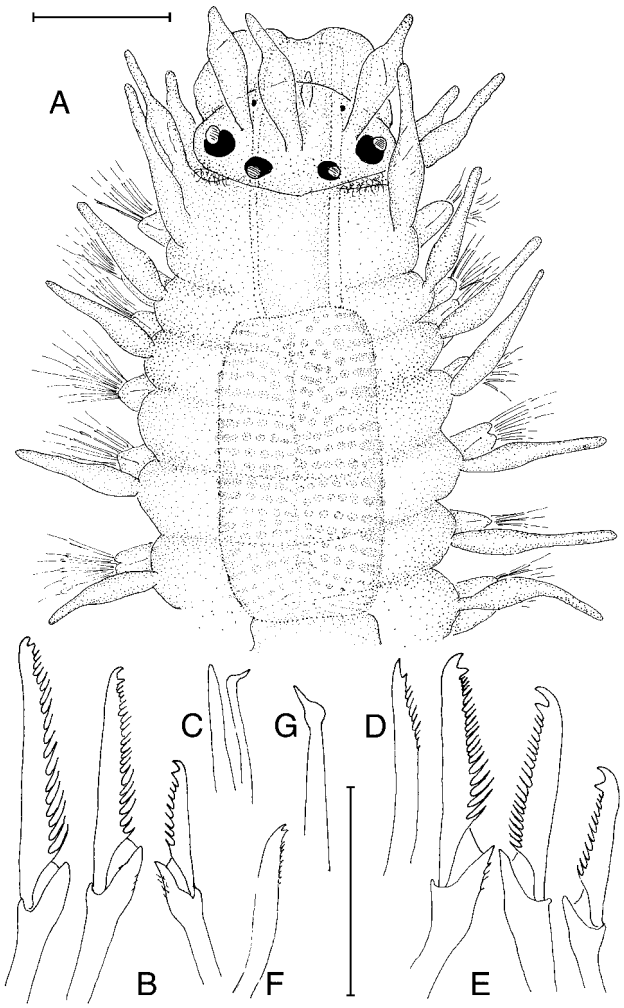


Fig. 11. *Salvatoria koorineclavata* n.sp. (*A*) anterior end, dorsal view of holotype. (*B*) compound chaetae, anterior parapodia. (*C*) aciculae, anterior parapodia. (*D*) dorsal simple chaeta. (*E*) compound chaetae, posterior parapodia. (*F*) ventral simple chaeta. (*G*) acicula, posterior parapodium. Scale A: 0.1 mm, B–G: 20 µm.

AM W27409, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sand from seagrass beds on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 23 specimens, AM W27416, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984. 1 specimen, AM W27423, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry & R.T. Springthorpe, 6 Jan 1984. 58 specimens, AM W27424, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27425, Red Bluff, Kalbarri, 27°42'S 114°09'E, rocky shore, dictyotalean from cave, 4 m, J.K. Lowry, 10 Jan 1984.

Description. Body small, holotype is a mature male with natatory chaetae, 2 mm long, 0.27 mm wide, for about 27 chaetigers. Prostomium ovate, wider than long, with 4 thick eyes in trapezoidal arrangement and 2 anterior eyespots. Antennae spindle-shaped (fig. 12A), subdistally inflated, ending in short tip, similar in length to combined lengths of prostomium and palps or slightly longer, median antenna longer than lateral antennae, inserted slightly in front of line between posterior eyes (Fig. 11A), lateral antennae inserted in front of and medial to anterior eyes (Fig. 11A). Palps similar in length to prostomium or shorter, fused dorsally by a membrane, with a small distal notch, sometimes ventrally folded (Fig. 12B). Two distinct ciliated nuchal organs between prostomium and peristomium (Figs. 11A, 12A). Peristomium similar in length to following segments; tentacular cirri similar to antennae but more elongate, dorsal pair similar in length to lateral antennae, ventral pair shorter. Dorsal cirri spindle-shaped, present on all chaetigers, all similar in length or with slight variations in length, except those of chaetiger 1, which are slightly longer than subsequent ones (Fig. 11A). Compound chaetae with bidentate blades, both teeth similar, provided with moderately long, distally directed, thin spines basally, shorter and straight as more distal on margin (Fig. 12E); spines longer in dorsalmost chaetae. Anterior parapodia each with about 9–10 compound chaetae (Fig. 11B), with dorsoventral gradation in length, 26 µm above, 12–13 µm below; posteriorly number of compound chaetae declines progressively to 5–6 on posterior parapodia, provided with shorter blades, less marked dorsoventral gradation in length of blades (Fig. 11E), 22 µm above, 16 µm below, and more strongly bidentate. Dorsal simple chaetae from anterior chaetigers, sometimes from chaetiger 1, bidentate, subdistal tooth shorter than distal tooth, with short subdistal marginal spines (Fig. 11D). Ventral simple chaetae on most posterior parapodia of some specimens, sigmoid, bidentate, similar to dorsal ones (Fig. 11F). Anterior parapodia each with 2 aciculae, one straight and another one acuminate (Fig. 11C); solitary acicula in midbody and posterior parapodia, acuminate, with long tip (Fig. 11G). Pharynx relatively long, through about 4–5 segments; pharyngeal tooth small, rhomboidal to ovate, located near anterior margin, but distinctly posteriorly, without papillae on opening. Proventricle similar in length to pharynx, through about 5 segments, with 21–22 muscle cell rows. Pygidium small, with 2 anal cirri, similar to dorsal cirri but slightly longer.

Remarks. This species has been previously reported from Australia as *Brania clavata* (= *Salvatoria clavata*); both species are similar and are easy to confuse; the Australian species, however, has a relatively longer pharynx and proventricle than the European species; in addition blades of compound chaetae are provided with relatively longer and upwards curved marginal spines, straight in *S. clavata*, and the pharyngeal tooth is located much more anteriorly than in *S. clavata* (San Martín, 2003). I have examined two specimens reported from Australia as *Brania clavata* by Hartmann-Schröder (HZM P-16668) and it is clear that they are not that species, but *S. koorineclavata* n.sp. So, the species *S. clavata* is probably not present in Australia and the records are referred to *S. koorineclavata*.

Other species described from other parts of the world, usually under the genus name *Brania*, are similar, both to *S. clavata* and *S. koorineclavata* n.sp., but details of the pharynx and proventricle as well as details of the compound chaetae are different. *Salvatoria californiensis* (Kudenov & Harris, 1995) has similar chaetae, but with shorter spines on the margin and less developed teeth, the acicula lacks a well defined acute tip, and the proventricle is much shorter, running through 2 segments instead of about 5 segments in *S. koorineclavata*, with fewer rows of muscle cells (19 rather than 21–22). *Salvatoria clavata* has been reported worldwide, but probably represents a suite of species.

Distribution. Australia (all States).

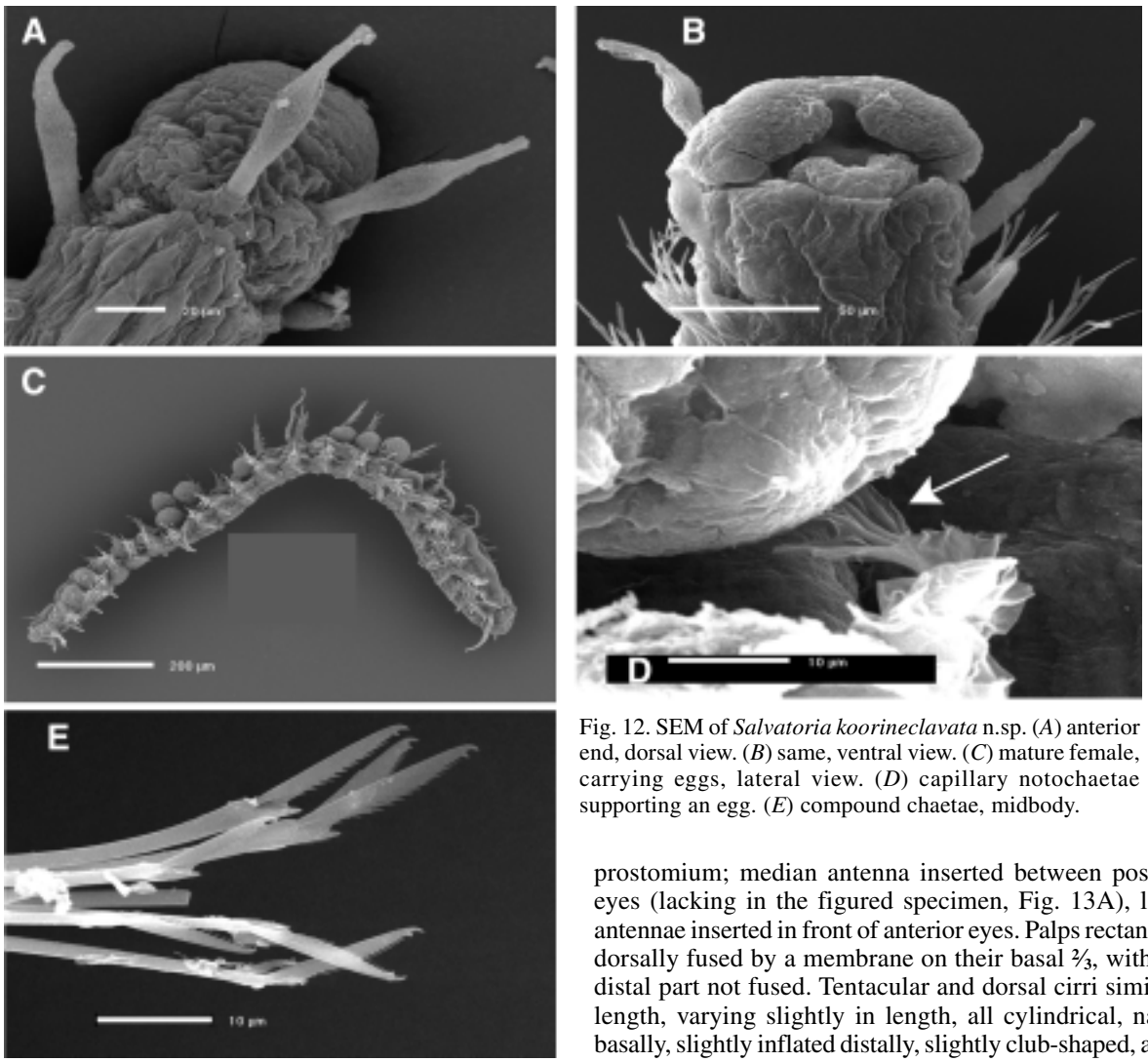


Fig. 12. SEM of *Salvatoria koorineclavata* n.sp. (*A*) anterior end, dorsal view. (*B*) same, ventral view. (*C*) mature female, carrying eggs, lateral view. (*D*) capillary notochaetae supporting an egg. (*E*) compound chaetae, midbody.

Habitat. Common in shallow waters on a variety of substrates, to 29 m depth.

Etymology. The name comes from an Aboriginal word, *Koorine*, meaning "daughter", in relation with the similarity of the Australian species to the European species of *S. clavata*.

Salvatoria opisthodentata (Hartmann-Schröder, 1979) n.comb.

Fig. 13A–D

Brania opisthodentata Hartmann-Schröder, 1979: 101, figs. 134, 135; 1981: 35. Not Hartmann-Schröder, 1991: 38, figs. 65–67.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W26543, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae & ascidians, 16 m, E.L. Albertson, 7 Mar 1992. VICTORIA. 2 specimens, MV F62748, eastern Bass Strait, 11.7 km west of Pt. Ricardo, 37°49.9'S 148°01'E, sand & shell, 29 m depth, 28 Sept 1990.

Description. Body fragile, delicate, broken specimens often lacking some appendages, minute, 1.9 mm long, 0.12–0.2 mm wide, 26 chaetigers. Prostomium ovate, wider than long, with 4 large eyes in trapezoidal arrangement and, sometimes, 2 anterior eyespots. Antennae slightly spindle-shaped, not longer than combined lengths of palps and prostomium; median antenna inserted between posterior eyes (lacking in the figured specimen, Fig. 13A), lateral antennae inserted in front of anterior eyes. Palps rectangular, dorsally fused by a membrane on their basal ⅔, with long distal part not fused. Tentacular and dorsal cirri similar in length, varying slightly in length, all cylindrical, narrow basally, slightly inflated distally, slightly club-shaped, absent on chaetiger 2 (Fig. 13A). About 4–5 compound chaetae on each parapodium, blades short, 18 µm above, 10 µm below, bidentate, both teeth widely separated and similar in size or subdistal tooth longer and thicker than distal tooth, slender, fine, erect marginal spines, longer in dorsalmost chaetae (Fig. 13C). Dorsal simple chaetae from chaetiger 1–2, unidentate, provided with small, short subdistal marginal spines (Fig. 13B). Ventral simple chaetae from about chaetiger 17, smooth, sigmoid, strongly bidentate (Fig. 13D). Pharynx long, through about 6 segments; pharyngeal tooth small, nearly conical, located in front of midline of pharynx (Fig. 13A). Proventricle slightly shorter than pharynx, through about 5 segments, with 21–22 muscle cell rows. Pygidium with 2 anal cirri, similar to dorsal cirri.

Remarks. The types of this species come from Western Australia and agree with the specimens described above. The two specimens reported from Queensland by Hartmann-Schröder (1991) were examined; one, the figured specimen, is similar to *Salvatoria pilkena* n.sp. (see below) but it could represent another, undescribed species; the other specimen is *Sphaerosyllis bardukaciculata* n.sp. (see below).

Distribution. Australia (Western Australia, Victoria, New South Wales).

Habitat. Coarse and fine sand, sand and shell, to 29 m depth.

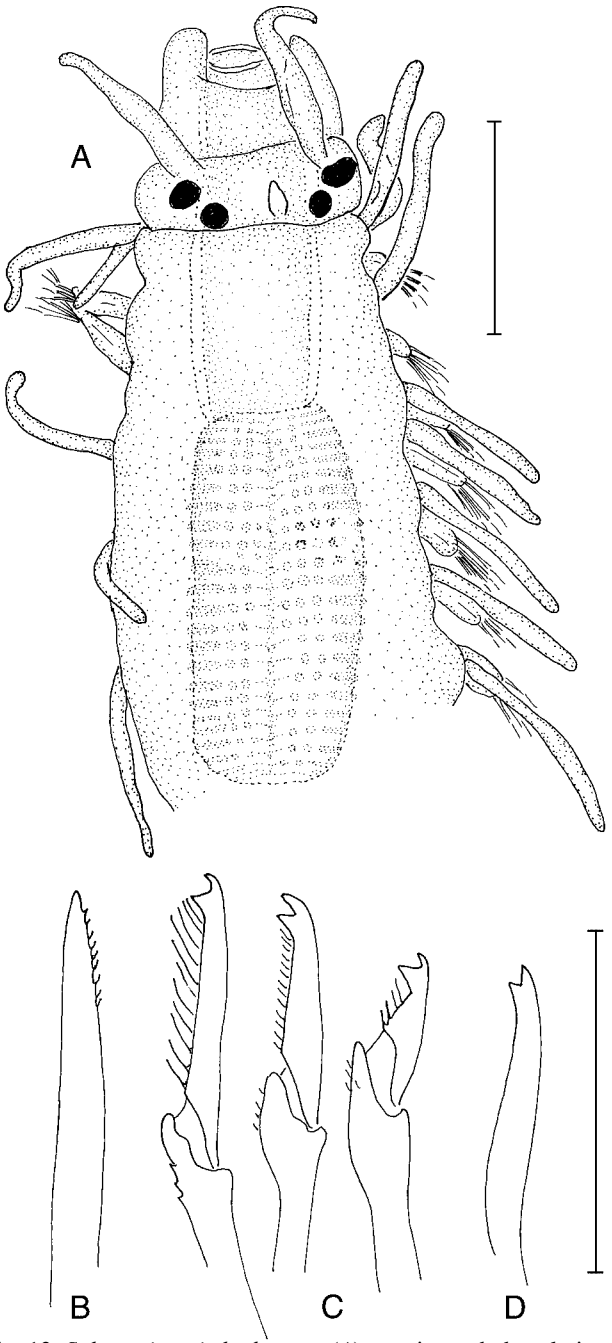


Fig. 13. *Salvatoria opisthodentata*. (*A*) anterior end, dorsal view (median antenna missing). (*B*) dorsal simple chaeta. (*C*) compound chaetae. (*D*) ventral simple chaeta. Scale A: 0.1 mm, B–D: 20 µm.

Salvatoria pilkena n.sp.

Fig. 14A–J

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: 1 specimen, AM W26886, Hinchinbrook Channel, 18°20'S 146°4'E, tidal mud- and sandflats, S. Dittmann, 22 Oct 1991. PARATYPE: 1 specimen, AM W27676, Hinchinbrook Channel, 18°20'S 146°4'E, tidal mud- and sandflats, S. Dittmann, 22 Oct 1991.

Description. Body small, holotype 2.2 mm long, 0.16 mm wide, 24 chaetigers. Prostomium ovate, distinctly wider than long; 4 eyes in trapezoidal arrangement, anterior eyespots not seen. Antennae small, rugose, more or less spindle-shaped; median antenna inserted between posterior eyes, similar in length to combined length of prostomium and palps, lateral antennae shorter than median antenna, inserted in front of anterior eyes. Palps shorter than prostomium, dorsally fused by a thin membrane, with a distal notch (Fig. 14A). Two distinct ciliated nuchal organs between prostomium and peristomium; peristomium similar in length to following segments, tentacular cirri similar to antennae, dorsal tentacular cirri similar in length to lateral antennae, ventral ones shorter. Dorsal cirri similar to antennae and tentacular cirri, lacking on chaetiger 2 (Fig. 14A); dorsal cirri of chaetiger 1 longer than remaining, similar in length to median antenna, all other dorsal cirri relatively short, some longer on posterior parapodia (Fig. 14B). Ventral cirri short, digitiform, those of posterior parapodia slightly longer. Parapodia ending, as typically other species of the genus, in 3 distinct rounded papillae (Fig. 14F). Compound chaetae with smooth, slender shafts and blades; blades bidentate, both teeth acute, subdistal tooth shorter than distal tooth, provided with moderately long spines, upwards pointed; on bases of longer blades, distal half of margin smooth or provided with small spines. Anterior parapodia each with about 6 compound chaetae, strong dorsoventral gradation in length of blades (Fig. 14E), 24 µm above, 8 µm below, longer blades with a double curvature; posterior parapodia each with only 4 compound chaetae, less marked dorsoventral gradation (Fig. 14H), 20 µm above, 14 µm below. Dorsal simple chaetae from chaetiger 1, smooth, slender, apparently unidentate (Fig. 14C,G). Ventral simple chaetae only present on most posterior chaetigers, sigmoid, smooth, strongly bidentate (Fig. 14I). Acicula solitary, acuminate (Fig. 14D). Pharynx long, through about 4 segments; pharyngeal tooth small, located near anterior margin. Proventricle similar in length to prostomium, through 3 segments, with about 18 muscle cell rows. Pygidium small, slightly bilobed, with 2 anal cirri, similar to dorsal cirri.

Remarks. *Salvatoria pilkena* n.sp. belongs to a small group of species with rugose dorsal cirri, different from the typical spindle-shaped typical of the genus, and lacking dorsal cirri on chaetiger 2. *Salvatoria swedmarki* (Gidholm, 1962) and *S. celiae* (Parapar & San Martín, 1992) are similar, but they differ from *S. pilkena* in having much longer proventricles and in the compound chaetae, which are short and unidentate in *S. swedmarki* and strongly bidentate, with long marginal spines of blades in *S. celiae* (see Gidholm, 1962; Parapar & San Martín, 1992; and San Martín, 2003). The described and figured specimen of *S. opisthodentata* by Hartmann-Schröder (1991) has similar compound chaetae and body but it is figured as having dorsal cirri on chaetiger 2; this specimen has been examined and lacks dorsal cirri on chaetiger 2.

Distribution. Australia (Queensland).

Habitat. Tidal mud and sand flats.

Etymology. The specific name is an Aboriginal word, *pilkena*, meaning "different", because of the unique features.

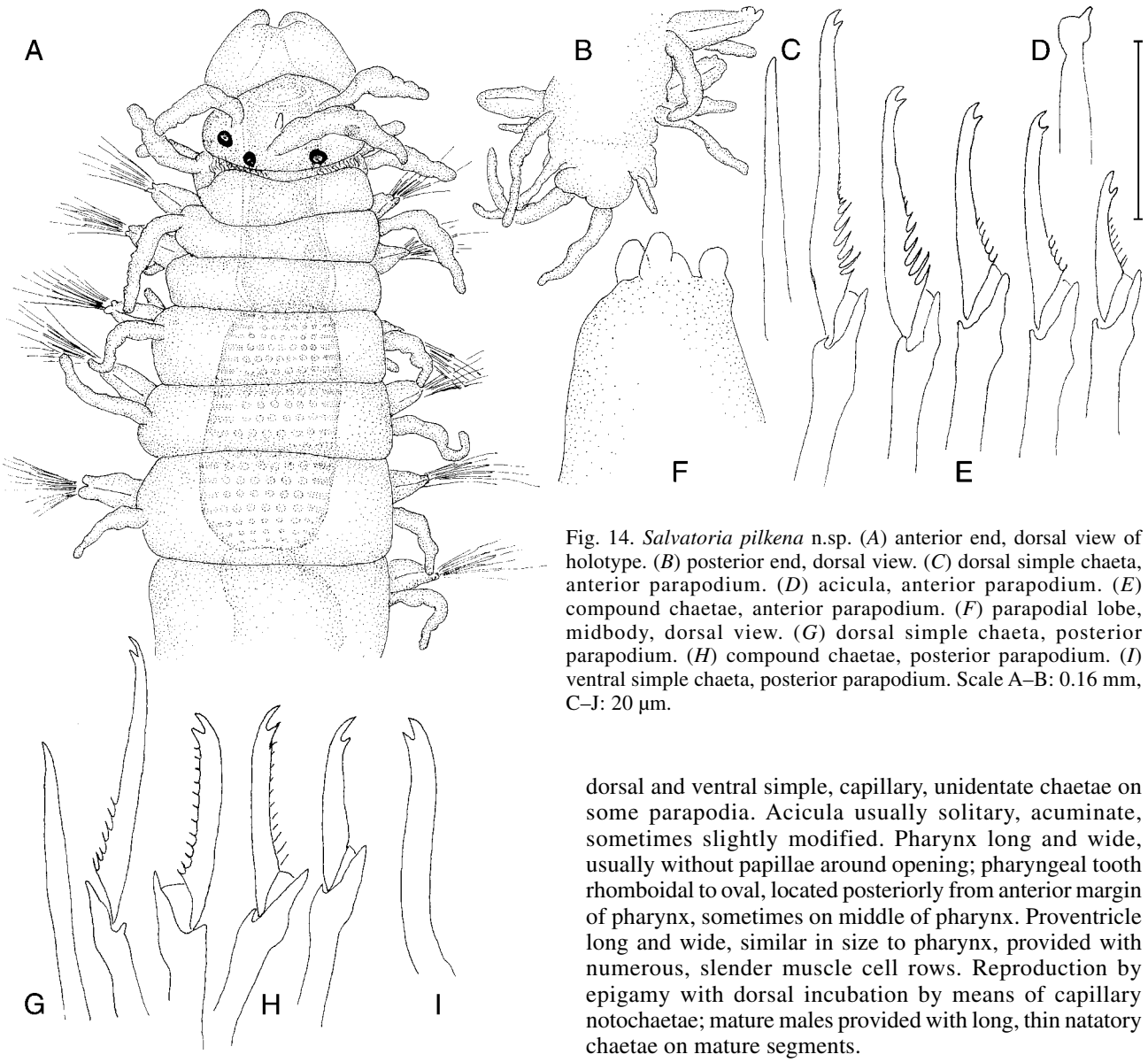


Fig. 14. *Salvatoria pilkena* n.sp. (*A*) anterior end, dorsal view of holotype. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) acicula, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) parapodial lobe, midbody, dorsal view. (*G*) dorsal simple chaeta, posterior parapodium. (*H*) compound chaetae, posterior parapodium. (*I*) ventral simple chaeta, posterior parapodium. Scale A–B: 0.16 mm, C–J: 20 μm.

Genus *Prosphaerosyllis* San Martín, 1984

Sphaerosyllis (Prosphaerosyllis) San Martín, 1984b: 377.

Diagnosis. Body small, with few segments, provided with dorsal and ventral papillae, also present on cirri and parapodia; usually covered by detritus; sometimes, some dorsal or ventral papillae long. Prostomium with 3 small, short antennae, 4 eyes, and 2 anterior eyespots, usually partially covered dorsally by peristomium, some species with the prostomium completely retracted inside peristomium. Palps fused along their length, short, slightly ventrally folded, provided with small papillae. Single pair of tentacular cirri, located ventrolaterally. Nuchal organs 2 small, ciliated lateral clefts, usually covered by peristomium and difficult to see. Antennae, tentacular and dorsal cirri short, pyriform to bulbous, with sphaerical bases and short tips that are usually retractile inside bases, especially in midbody and posterior parapodia; tips sometimes papilliform and short; dorsal cirri present on all parapodia. Parapodial glands absent. Parapodia with compound, heterogomph chaetae with unidentate, short, falcate blades; dorsal and ventral simple, capillary, unidentate chaetae on some parapodia. Acicula usually solitary, acuminate, sometimes slightly modified. Pharynx long and wide, usually without papillae around opening; pharyngeal tooth rhomboidal to oval, located posteriorly from anterior margin of pharynx, sometimes on middle of pharynx. Proventricle long and wide, similar in size to pharynx, provided with numerous, slender muscle cell rows. Reproduction by epigamy with dorsal incubation by means of capillary notochaetae; mature males provided with long, thin natatory chaetae on mature segments.

Type species. *Sphaerosyllis xarifae* Hartmann-Schröder, 1960; designated by San Martín (1984b).

Remarks. *Prosphaerosyllis* was erected as a subgenus of Sphaerosyllis Claparède, 1863 for a group of species differing from the type species of the genus, *S. hystrix* Claparède, 1863, and other species included in the nominal subgenus *Sphaerosyllis*, in the shape and position of the pharyngeal tooth, shape of pharynx and proventricle, shape of dorsal cirri and presence of dorsal cirri on chaetiger 2. This differentiation, however, has not been universally accepted, as these taxa are "based on artificial characters more than important phylogenetic characters" (Russell, 1989; Westheide, 1990; Kudenov & Harris, 1995), although these authors do not analyze the characters of the genus and do not explain which characters are of phylogenetic importance, and which are not. Riser (1991) discussed the genus and recognized three groups of species, one of which mostly agrees with *Prosphaerosyllis*, but he considered this not relevant to the concept of subgenera in *Sphaerosyllis*. In fact, there is another character not considered by any of the above mentioned authors, the type of reproduction,

which is different in *Prosphaerosyllis* (females carrying eggs by means of capillary notochaeta) to that present in *Sphaerosyllis* (females without notochaetae, brooding ventrally eggs and juveniles). For the above reasons, I propose here that *Prosphaerosyllis* be elevated to genus level taxon.

All species of *Prosphaerosyllis* have similar chaetae; species identification is based principally on the shape of dorsal cirri, position of pharyngeal tooth, and the arrangement of papillae; the papillae, however, can appear different when they are covered in debris, so the specimens must be cleaned before identification. Some species have papillae of three different sizes, short, moderate and long (see Fig. 17A,B) or of two sizes, short and moderate (see Figs. 15A, 16B,C).

Key to species of *Prosphaerosyllis* recorded from Australia

1 Some papillae on dorsum elongate, digitiform 2
—— All dorsal papillae similar, rounded 4

2 Papillae on dorsum of each segment, at least on midbody, arranged in transverse lines of 4–5 similar, moderately long papillae. Dorsal cirri of midbody similar to those of anterior parapodia but more elongate, similar in length to parapodial lobes ..... *P. xarifae*
—— Dorsal papillae long. Dorsal cirri from midbody distinctly more elongate than antennae and anterior dorsal cirri 3

3 Two longitudinal rows of papillae close to midline of dorsum, and 2 longitudinal rows of similar, but distinctly shorter, papillae, between long papillae and dorsal cirri. Dorsal cirri from midbody moderately long, slightly longer than parapodial lobes ..... *P. longipapillata*
—— All long dorsal papillae similar. Dorsal cirri from midbody long and slender, some distinctly longer than parapodial lobes ..... *P. nathani*

4 Papillae small 5
—— Papillae large, similar to vesicles 8

5 Papillae on dorsum forming a V, with 3 small papillae on each side ..... *P. sexpapillata*
—— Papillae irregularly distributed 6

6 All antennae on anterior margin of prostomium, close to eyespots ..... *P. opisthoculata*
—— Median antenna inserted most posteriorly than lateral antennae 7

7 Pharynx long, through about 7 segments. Palps densely papillated and dorsum with few minute papillae. Eyes small ..... *P. isabellae*
—— Pharynx short, through about 4 segments. Papillae distributed on palps and dorsum. Eyes large ..... *P. magnoculata*

8 Papillae few, large, inflated and forming large vesicles ..... *P. papillosissima*
—— Papillae numerous, smaller 9

9 Palps completely fused along their length. Dorsal cirri minute, papilliform. Prostomium and palps usually completely retracted into peristomium ..... *P. multipapillata*
—— Palps fused but with a distinct distal notch. Dorsal cirri distinct, with a bulbous bases. Prostomium and palps not retracted into peristomium ..... *P. battiri* n.sp.

Prosphaerosyllis xarifae (Hartmann-Schröder, 1960)

Figs. 15A–F, 16A–F

Sphaerosyllis xarifae Hartmann-Schröder, 1960: 103, figs. 121–124; 1979: 103, figs. 139–140; 1980a: 56; 1981: 37; 1984: 25; 1985: 72; 1991: 41. San Martín, 1984a: 236, fig. 54; 2003: 225, figs. 119, 120.

Material examined. AUSTRALIA: QUEENSLAND. 11 specimens, AM W26558, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. WESTERN AUSTRALIA. 1 specimen, AM W26726, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 2 specimens, AM W26727, jetty adjacent to Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate-coral—*Acropora* & *Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 1 specimen, AM W26829, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, tufted balls of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984, WA 417. 2 specimens on SEM stub, AM W27893, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984, WA 362.

Description. Body small 3.7 mm long, 0.2 mm wide, 31 chaetigers, broad anteriorly, provided with scattered, small dorsal (Figs. 15A, 16A,B) and ventral papillae; a row of 2–

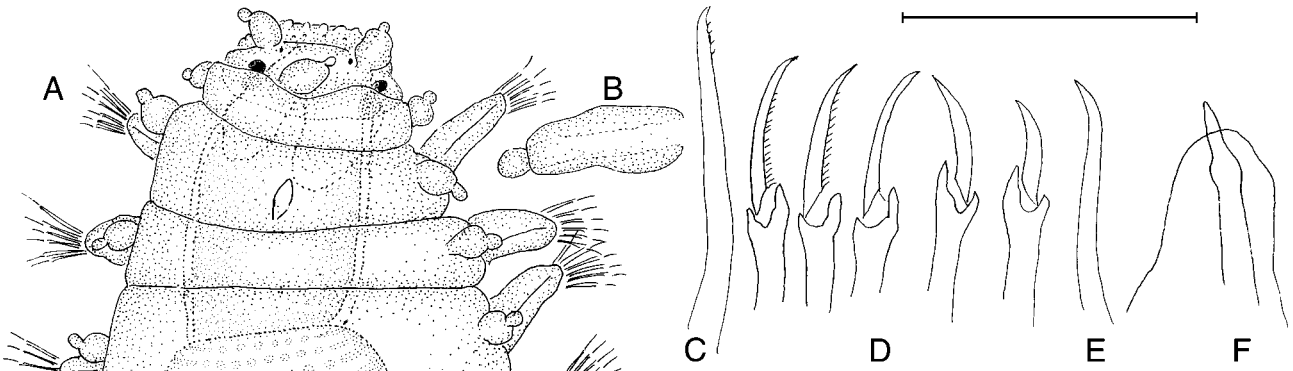


Fig. 15. *Prosphaerosyllis xarifae*. (*A*) anterior end, dorsal view. (*B*) dorsal cirrus, midbody. (*C*) dorsal simple chaeta. (*D*) compound chaetae, midbody. (*E*) ventral simple chaeta. (*F*) acicula. Scale A: 0.1 mm, B–E: 20 μm.

3 longer papillae on dorsum of each chaetiger from proventricular segments (Figs. 15A, 16C). Prostomium rectangular to oval; 4 large eyes in trapezoidal arrangement, close to each other on each side, and 2 anterior eyespots. Antennae small, pyriform, all similar in shape and size (Figs. 15A, 16B), with bulbous bases and short tip; lateral antennae inserted on anterior margin of prostomium, near eyespots, median antenna inserted between anterior eyes. Palps large, short, totally fused all along their length, with scattered papillae (Figs. 15A, 16B). Peristomium covering dorsally posterior margin of prostomium; tentacular cirri similar in shape to antennae, but smaller (Fig. 15A). Dorsal cirri on all segments; anterior dorsal cirri similar to antennae and tentacular cirri, with bulbous bases and short tip (Figs. 15A, 16B), bases elongate progressively posteriorly and tips become retractile (Figs. 15B, 16C,D); dorsal cirri of midbody slightly longer than parapodial lobes. Parapodial lobes relatively short, conical, with some small papillae (Fig. 16C–E). Compound chaetae heterogomph, with smooth shafts, and unidentate, thin blades, smooth or provided with short marginal spines of dorsal chaetae (Figs. 15D, 16F). Anterior parapodia each with 6 compound chaetae, diminishing to 4 on posterior parapodia. Slight dorsoventral gradation in size of blades, 20–13 μm on anterior parapodia, about 17–16 μm on posterior parapodia. Dorsal simple chaetae from anterior segments, usually from chaetiger 1, unidentate, with few, short subdistal spines (Fig. 15C). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 15E). Acicula solitary, acuminate (Fig. 15F). Pharynx long and wide, through 4–5 segments; pharyngeal tooth oval, located near middle of pharynx (Fig. 15A). Proventricle similar in length and width to pharynx, through 3–4 segments, with 20–25 muscle cell rows.

Remarks. *Prosphaerosyllis campoyi* San Martín *et al*., 1982 is close to *P. xarifae*, with similar arrangement of dorsal papillae, but the late species has some compound chaetae with blades with long marginal spines (see San Martín, 2003, figs. 100, 101). *Prosphaerosyllis riseri* Perkins, 1981 has similar dorsal cirri, but the blades of compound chaetae have longer spines on blades and it has only two rows of long dorsal papillae, plus other lateral papillae (Perkins, 1981; Russell, 1991).

Distribution. Red Sea. Mediterranean Sea. Eastern Atlantic, from Bay of Biscay to Canary Islands. Australia (Queensland, Western Australia, South Australia).

Habitat. Intertidal to about 40 m depth, on all kinds of substrates: algae, sand, mud, seagrasses, calcareous substrates.

Prosphaerosyllis longipapillata (Hartmann-Schröder, 1979)

Figs. 17A–G, 18A–H

Sphaerosyllis longipapillata Hartmann-Schröder, 1979: 106, figs. 148–150; 1982: 71; 1984: 23; 1985: 71; 1986: 43; 1991: 40.
Sphaerosyllis (Prosphaerosyllis) longipapillata.–Hartmann-Schröder, 1987: 41.

Material examined. AUSTRALIA: NEW SOUTH WALES. 4 specimens, AM W484, Port Jackson, 33°51'S 151°16'E. 1 specimen, AM W12402, Careel Bay, Pittwater, 33°37'S 151°19'E, *Zostera* sp., P.A. Hutchings, 06 Sep 1973. 2 specimens, AM W15812, south bank of Lake Merimbula, 36°53.7'S 149°54.5'E, short *Zostera* & *Halophila* spp., J.H. Day & party, 06 Oct 1975. 1 specimen, AM W22624, Cararma Inlet, Jervis Bay, 35°00'S 150°46.5'E, *Zostera capricorni*, L. Howitt, Mar 1989. 4 specimens, AM W23140, Honeymoon Bay, Jervis Bay, 35°03.8'S 150°45.4'E, unvegetated sediment, 20 m, P.A. Hutchings & party, 20 Feb 1989. 1 specimen, AM W23906, Port Hacking, 34°04.08'S 151°06.27'E, sand, 18.7 m, A M party, 27 Oct 1994. 1 specimen, AM W23922, Port Hacking, 34°04.17'S 151°06.41'E, sand, 16.4 m, AM party, 12 Jan 1995. 1 specimen, AM W23923, Pittwater, 33°35.84'S 151°18.33'E, sand, 15.3 m, AM party, 31 July 1995. 1 specimen, AM W23924, Port Hacking, 34°04.11'S 151°06.46'E, sand, 17.3 m, AM party, 12 Oct 1995. 19 specimens, AM W26645, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, airlift, 12 m, G. Clark, 11 Dec 1989. 10 specimens, AM W26654, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 1983. 1 specimen, AM W26658, north east corner of Clark Island, 33°51.85'S 151°14.47'E, encrustation on outside of bottle, 5 m, P.A. Hutchings, 17 Apr 1996. 1 specimen, AM W26699, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W26700, Green Point, Jervis Bay, 35°01.0'S 150°46.0'E, in *Zostera* & *Halophila*, 5 m, P.A. Hutchings,

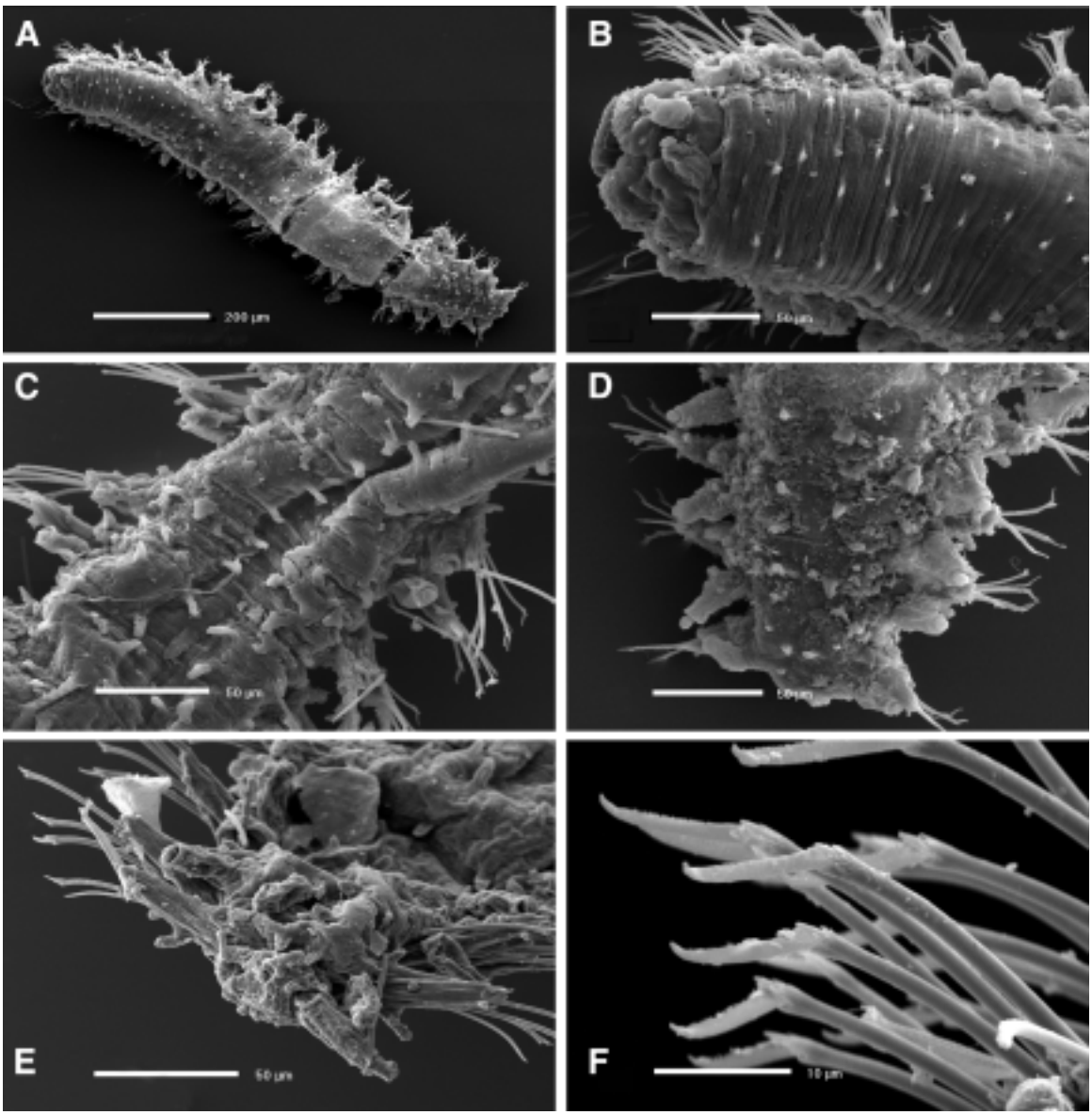


Fig. 16. SEM of *Prosphaerosyllis xarifae*. (*A*) dorsal view. (*B*) anterior end, dorsal view. (*C*) midbody segments, dorsal view. (*D*) posterior segments, dorsal view. (*E*) pygidium, posterior vew. (*F*) chaetal bundle, midbody.

23 Jan 1973. 1 specimen, AM W26701, North Creek Canal, Richmond River, 28°52.1'S 153°32.8'E, mud, 3 m, P.B. Berents *et al*., 02 Mar 1992. 1 specimen, AM W196422, Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 16 May 1980. 1 specimen, AM W196423, Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 21 Aug 1980. 1 specimen, AM W196424, Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 21 Aug 1980. 1 specimen, AM W196425, east end Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 18 Dec 1979. 2 specimens, AM W196426, east end Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 16 May 1980. 5 specimens, AM W196427, east end Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 21 Aug 1980. 1 specimen, AM W196428, east end Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 21 Aug 1980. 4 specimens, AM W196429, 0.5 km east of Dangar Island, Hawkesbury River, 33°33'S 150°14'E, A. Jones & party, 21 Aug 1980. 1 specimen, AM W196430, 0.5 km east of Dangar Island, Hawkesbury River, 33°33'S 150°14'E, A. Jones & party, 21 Aug 1980.1 specimen, AM W196432, Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 18 Dec 1979. VICTORIA. 1 specimen, AM W4504, Bass Strait, 38°59'S 148°34'E, globerina clay, 466 m, C. Phipps, May 1969. 1 specimen, AM W16235, Port Phillip Bay, 38°21.0'S 144°51.5'E, sand, 9 m, 09 Dec 1971. 1 specimen, MV F87427, Port Phillip Bay, off Port Arlington, 38°07.0'S 144°41.3'E, sand, 2 m depth, 10 Jun 1971. TASMANIA. 1 specimen, AM W23143, next to jetty at boat ramp, Dover, Port Esperance, 43°19'S 147°01.5'E, *Heterozostera* & surface sediment, 1.5 m, P.B. Berents, 19 Apr 1991. SOUTH AUSTRALIA. 5 specimens, AM W26748, Elliston Reef, 33°39'S 134°53'E, algal washings, P.A. Hutchings, 11 Mar 1979. 1 specimen, AM W26749, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. 32 specimens, AM W26750, Billy Lights Point, Port Lincoln, 34°45'S 135°53'E, stone washings from sheltered intertidal rocks, I. Loch, 15 Feb 1985. WESTERN AUSTRALIA. 1 specimen, AM W26820, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, black sponge, 1.5 m, J.K. Lowry, 2 Jan 1984. 2 specimens, AM W26834, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry & R.T. Springthorpe, 6 Jan 1984. 3 specimens, AM W27118, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 1 specimen, AM W27119, Wallabi Island group, 28°23.98'S 113°46.73'E, rubble, medium sand from scallop beds, 40 m, P.A. Hutchings on FRV "Flinders", 28 May 1994. 1 specimen, AM W27120, Wallabi Island group, 28°23.61'S 113°45.09'E, scallop beds, shell & sponge debris, 35 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 1 specimen, AM W27651, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 7 specimens, AM W27656, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly

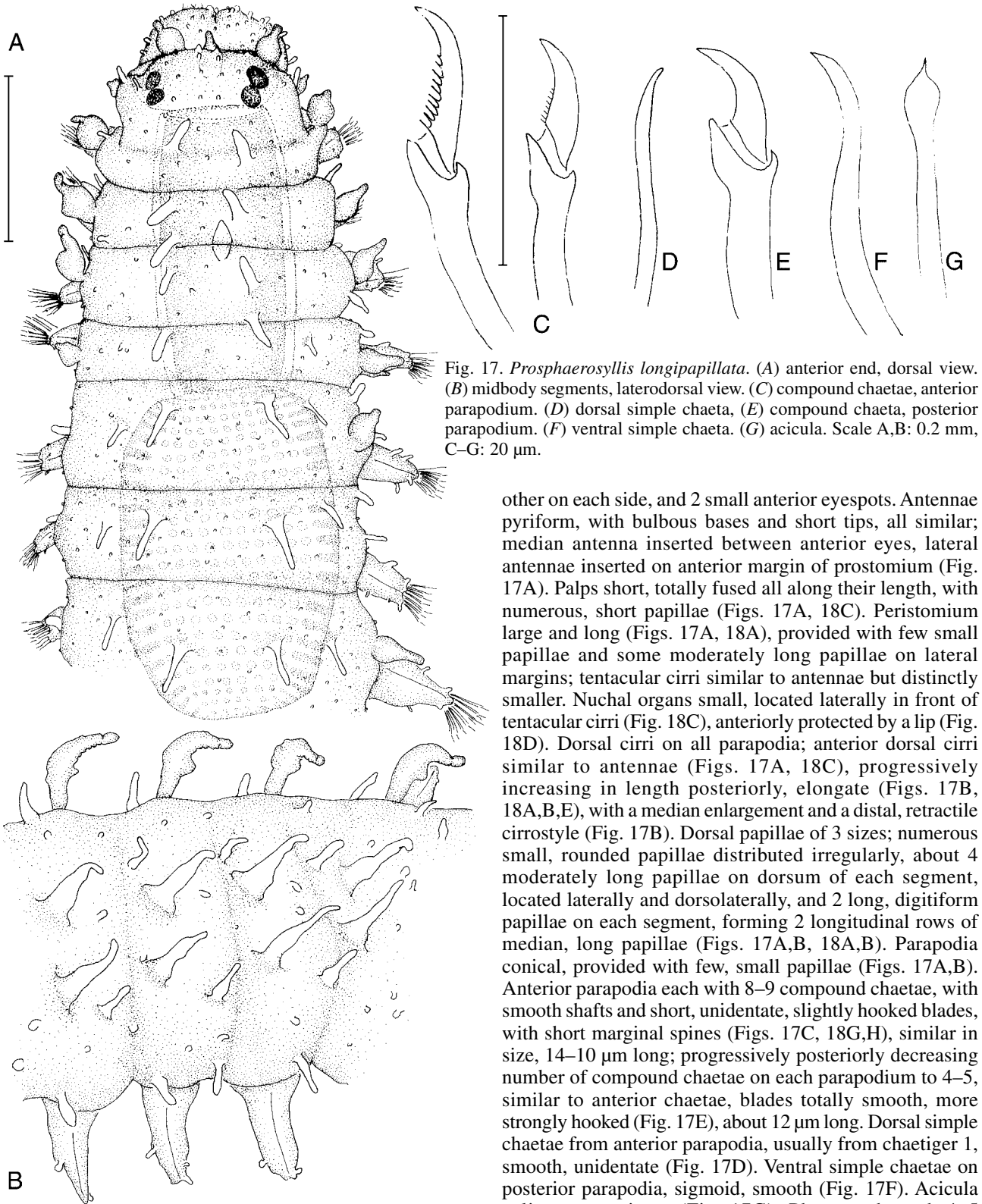


Fig. 17. *Prosphaerosyllis longipapillata*. (*A*) anterior end, dorsal view. (*B*) midbody segments, laterodorsal view. (*C*) compound chaetae, anterior parapodium. (*D*) dorsal simple chaeta, (*E*) compound chaeta, posterior parapodium. (*F*) ventral simple chaeta. (*G*) acicula. Scale A,B: 0.2 mm, C–G: 20 μm.

Caulerpa sp., 1 m, J.K. Lowry, 2 Jan 1984.1 specimen, AM W27665, reef west of groyne, 2 km south of Cape Peron, 32°16'S 115°41'E, orange sponge in deep channel of limestone reef, 4.5 m, R.T. Springthorpe, 26 Dec 1983.

Description. Body small, short, 3.5 mm long, 0.3 mm wide, 28–30 chaetigers, usually covered by debris (Fig. 18B,F). Prostomium rectangular to oval, wider than long, usually partially or totally covered by dorsal fold of peristomium, with 4 large eyes in trapezoidal arrangement, close to each other on each side, and 2 small anterior eyespots. Antennae pyriform, with bulbous bases and short tips, all similar; median antenna inserted between anterior eyes, lateral antennae inserted on anterior margin of prostomium (Fig. 17A). Palps short, totally fused all along their length, with numerous, short papillae (Figs. 17A, 18C). Peristomium large and long (Figs. 17A, 18A), provided with few small papillae and some moderately long papillae on lateral margins; tentacular cirri similar to antennae but distinctly smaller. Nuchal organs small, located laterally in front of tentacular cirri (Fig. 18C), anteriorly protected by a lip (Fig. 18D). Dorsal cirri on all parapodia; anterior dorsal cirri similar to antennae (Figs. 17A, 18C), progressively increasing in length posteriorly, elongate (Figs. 17B, 18A,B,E), with a median enlargement and a distal, retractile cirrostyle (Fig. 17B). Dorsal papillae of 3 sizes; numerous small, rounded papillae distributed irregularly, about 4 moderately long papillae on dorsum of each segment, located laterally and dorsolaterally, and 2 long, digitiform papillae on each segment, forming 2 longitudinal rows of median, long papillae (Figs. 17A,B, 18A,B). Parapodia conical, provided with few, small papillae (Figs. 17A,B). Anterior parapodia each with 8–9 compound chaetae, with smooth shafts and short, unidentate, slightly hooked blades, with short marginal spines (Figs. 17C, 18G,H), similar in size, 14–10 μm long; progressively posteriorly decreasing number of compound chaetae on each parapodium to 4–5, similar to anterior chaetae, blades totally smooth, more strongly hooked (Fig. 17E), about 12 μm long. Dorsal simple chaetae from anterior parapodia, usually from chaetiger 1, smooth, unidentate (Fig. 17D). Ventral simple chaetae on posterior parapodia, sigmoid, smooth (Fig. 17F). Acicula solitary, acuminate (Fig. 17G). Pharynx through 4–5 segments; pharyngeal tooth ovate, located about on midline of pharynx (Fig. 17A). Proventricle similar in size to pharynx, through 3 segments, with about 22 muscle cell rows.

Distribution. Australia (all States).

Remarks. The species *Prosphaerosyllis bilineata* (Kudenov & Harris, 1995), from California, is similar but the

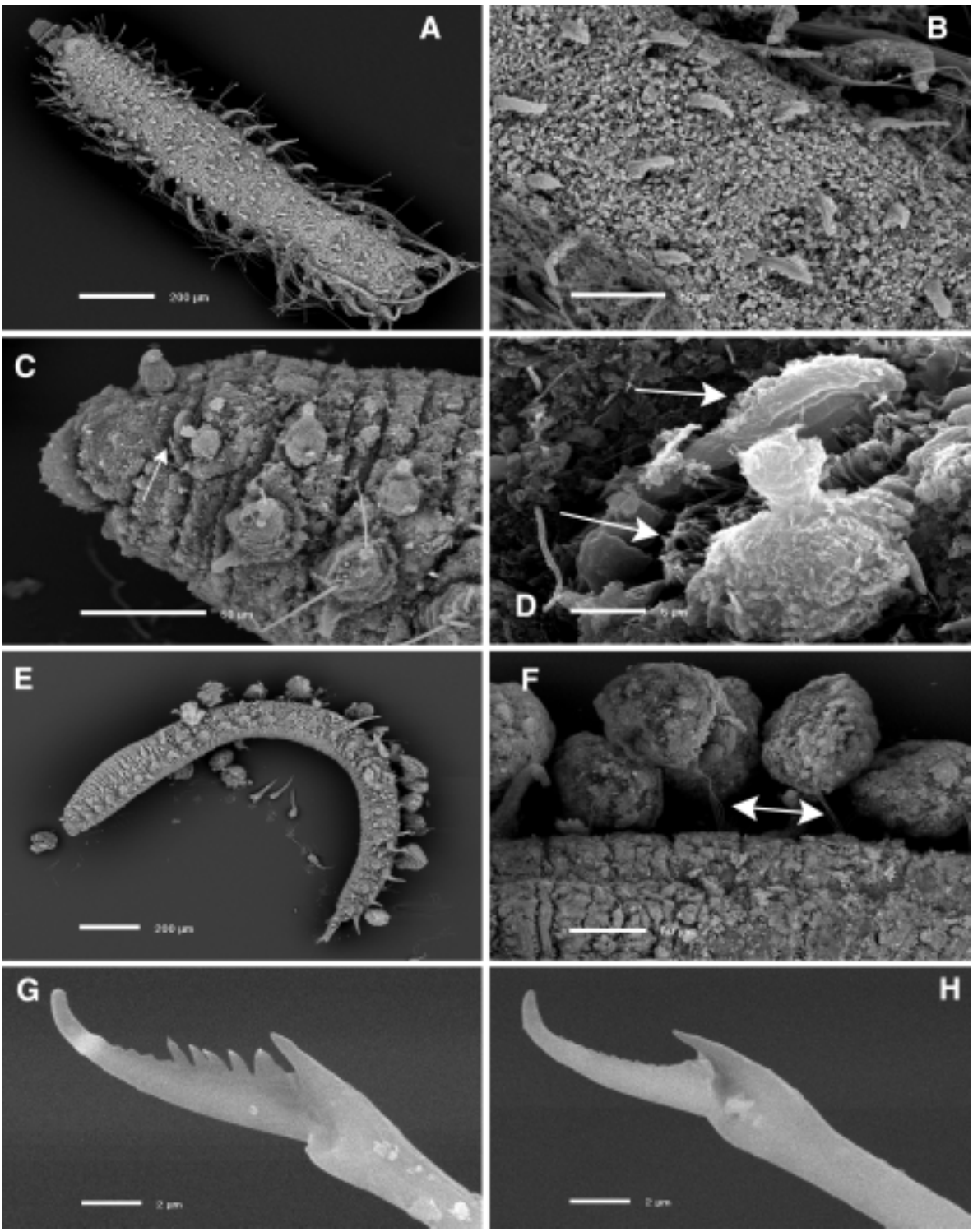


Fig. 18. SEM of *Prosphaerosyllis longipapillata*. (*A*) dorsal view of a mature male with natatory notochaetae. (*B*) dorsum, midbody. (*C*) prostomium, peristomium and most anterior segments, lateral view. (*D*) detail of nuchal organ and tentacular cirrus. (*E*) mature female carrying eggs, lateral view. (*F*) detail of the eggs, attached by means of capillary notochaetae. (*G*) anterior compound chaeta. (*H*) posterior compound chaeta.

arrangement of dorsal papillae appear to be slightly different. Also, *Prosphaerosyllis chinensis* (Jing & Wu, 1991) appears to be close to *P. longipapillata*, with similar arrangement of dorsal papillae (Jing & Wu, 1991).

Habitat. Common on all substrates, from corals to mud; occurs from intertidal to 466 m depth.

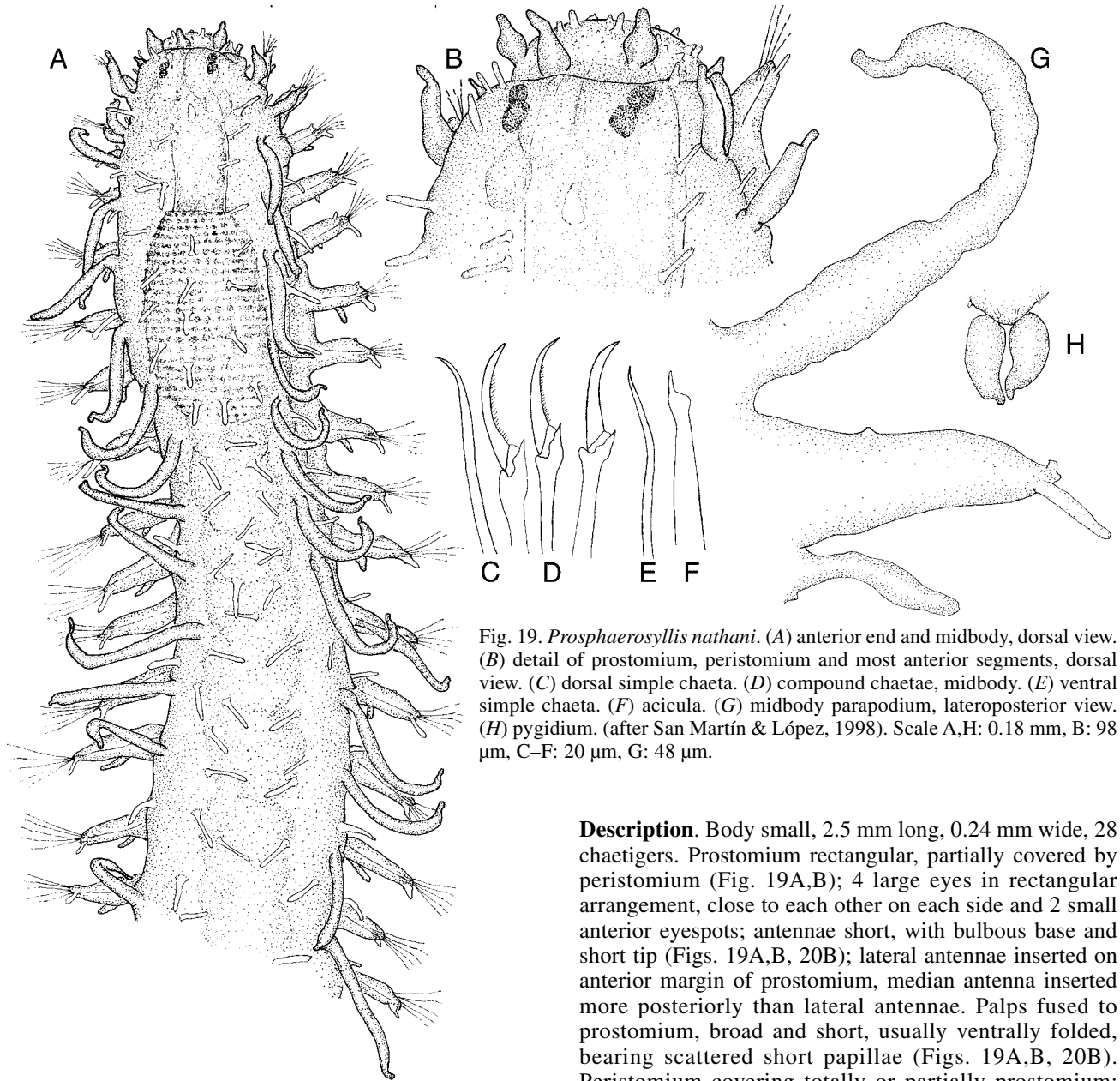


Fig. 19. *Prosphaerosyllis nathani*. (*A*) anterior end and midbody, dorsal view. (*B*) detail of prostomium, peristomium and most anterior segments, dorsal view. (*C*) dorsal simple chaeta. (*D*) compound chaetae, midbody. (*E*) ventral simple chaeta. (*F*) acicula. (*G*) midbody parapodium, lateroposterior view. (*H*) pygidium. (after San Martín & López, 1998). Scale A,H: 0.18 mm, B: 98 µm, C–F: 20 µm, G: 48 µm.

***Prosphaerosyllis nathani* San Martín & López, 1998**

Figs. 19A–H, 20A–D

Sphaerosyllis (Prosphaerosyllis) nathani San Martín & López, 1998: 241, fig. 1.

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W22146, 300 m north east of Green Point, Hawkesbury River, 33°34'S 151°13.5'E, sandy mud, 5 m, A.R. Jones & A. Murray, 11 Feb 1981. 1 specimen, AM W196433, Green Point—Croppy Point, Hawkesbury River, 33°33.5'S 151°14.5'E, mud, 6 m, A. Jones *et al*., 03 Nov 1977. QUEENSLAND. 1 specimen, AM W26564, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1977. TASMANIA. 1 specimen on SEM stub, AM W27988, north end of beach, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, clean gravelly sand, intertidal, N.W. Riser, 24 Jan 1986. WESTERN AUSTRALIA. Paratype: 1 specimens, AM W23142, reef south of Lucas Island, 15°16'S 124°29'E, 2 m, P.A. Hutchings, 24 July 1988. 1 specimen, AM W26715, off end of South Mole, Arthur Head, Fremantle, 32°03'S 115°44'E, orange tunicates, 6 m, J.K. Lowry, 25 Dec 1983.

Additional material. NEW ZEALAND. Paratype: 1 specimens, AM W23483, Kaikoura, 42°24'S 173°41'E, holdfast of *Laminaria*, N.W. Riser.

Description. Body small, 2.5 mm long, 0.24 mm wide, 28 chaetigers. Prostomium rectangular, partially covered by peristomium (Fig. 19A,B); 4 large eyes in rectangular arrangement, close to each other on each side and 2 small anterior eyespots; antennae short, with bulbous base and short tip (Figs. 19A,B, 20B); lateral antennae inserted on anterior margin of prostomium, median antenna inserted more posteriorly than lateral antennae. Palps fused to prostomium, broad and short, usually ventrally folded, bearing scattered short papillae (Figs. 19A,B, 20B). Peristomium covering totally or partially prostomium; tentacular cirri similar in shape to antennae but smaller (Figs. 19A,B, 20B). Dorsum covered by debris; dorsal papillae long, thin, digitiform, arranged in 3 irregular dorsal rows (Fig. 19A); each segment also bearing solitary papilla dorsolaterally between dorsal cirri; as result, there are 5 papillae dorsally visible on each segment (Figs. 19A, 20C). Ventral side with long papillae, similar to dorsal papillae, also arranged in 5 irregular rows. Dorsal cirri on all chaetigers; dorsal cirri of anterior segments slightly elongate in some specimens, similar in length to parapodial lobes (Figs. 19A,B), shorter in other specimens, similar to antennae (Fig. 20B); those of remaining segments proportionally long, distinctly longer than parapodial lobes (Figs. 19A,G, 20A,C); dorsal cirri becoming shorter at posterior end of body. Ventral cirri relatively long, digitiform. Parapodial lobes elongate, conical, each with small anterior papilla, inconspicuous prechaetal papilla and long postchaetal papilla (Figs. 19A,G). Parapodia each with about 4 compound chaetae, similar throughout, heterogomph, with blades unidentate and slightly falciform (Fig. 20D), dorsal blades with short marginal spines, ventral ones

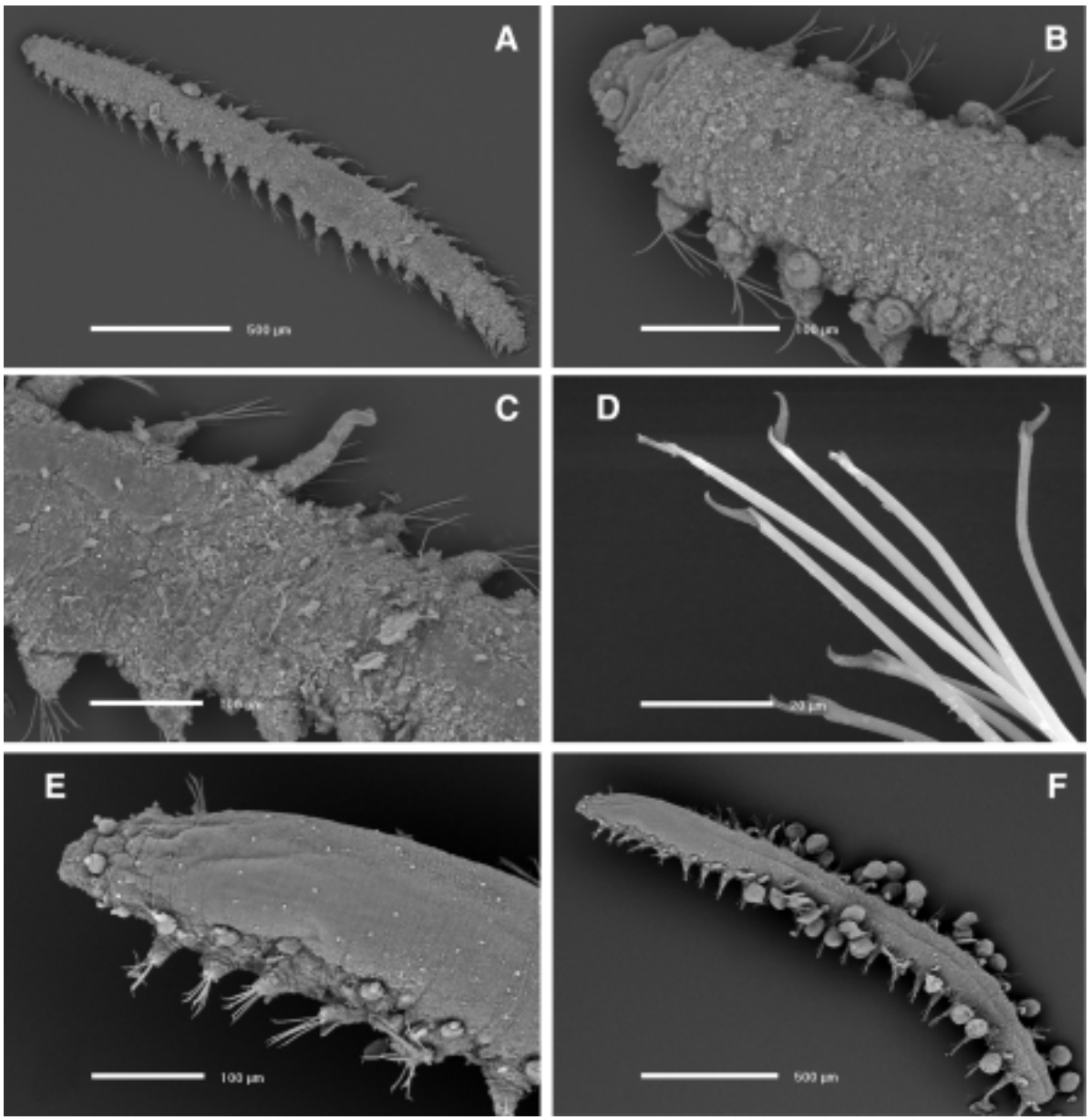


Fig. 20. SEM of *Prosphaerosyllis nathani*. (*A*) dorsal view of a female, carrying two eggs dorsally. (*B*) anterior end, dorsal view (median antenna missing). (*C*) midbody, dorsal view. (*D*) chaetal bundle, midbody. SEM of *Prosphaerosyllis sexpapillata*. (*E*) anterior end, laterodorsal view. (*F*) dorsal view of a mature female, carrying eggs.

smooth (Fig. 19D); all blades about 16 µm long. Dorsal simple chaetae from chaetiger 1, thin, smooth, sigmoid (Fig. 19C). Ventral simple chaetae on posterior parapodia, similar to dorsal one (Fig. 19E). Acicula solitary, acuminate (Fig. 19F). Pygidium semi-circular, with two long, thick anal cirri (Fig. 19H). Pharynx through about 4 segments; pharyngeal tooth oval, located well posteriorly from anterior margin, just anteriorly to middle of pharynx (Figs. 19A,B). Proventricle long and wide, through 3–4 segments, with 25 muscle cell rows.

Distribution. Australia (New South Wales, Queensland, Western Australia). New Zealand.

Habitat. Mud, sand, also on tunicates and holdfasts; on shallow depths.

Prosphaerosyllis sexpapillata (Hartmann-Schröder, 1979)

Figs. 20E–F, 21A–H

Sphaerosyllis sexpapillata Hartmann-Schröder, 1979: 105, figs. 144–147; 1980a: 55; 1981: 37; 1982: 72; 1983: 135; 1984: 24; 1985: 72; 1986: 43; 1989: 30; 1990: 54.

Sphaerosyllis (Prosphaerosyllis) sexpapillata.–Hartmann-Schröder, 1987: 42.

Material examined. AUSTRALIA: TASMANIA. 6 specimens, AM W27672, north end of beach, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, coarse gravel, intertidal, 24 Jan 1986, N.W. Riser. WESTERN AUSTRALIA. 1 specimen, HZM P-17068, Rockingham, Point Peron, G. Hartmann-Schröder.

Description. Body small, up to 2.6 mm long, 0.55 mm wide, 25 chaetigers, broad anteriorly, provided with scattered, small dorsal and ventral papillae (Figs. 20E, 21A) on

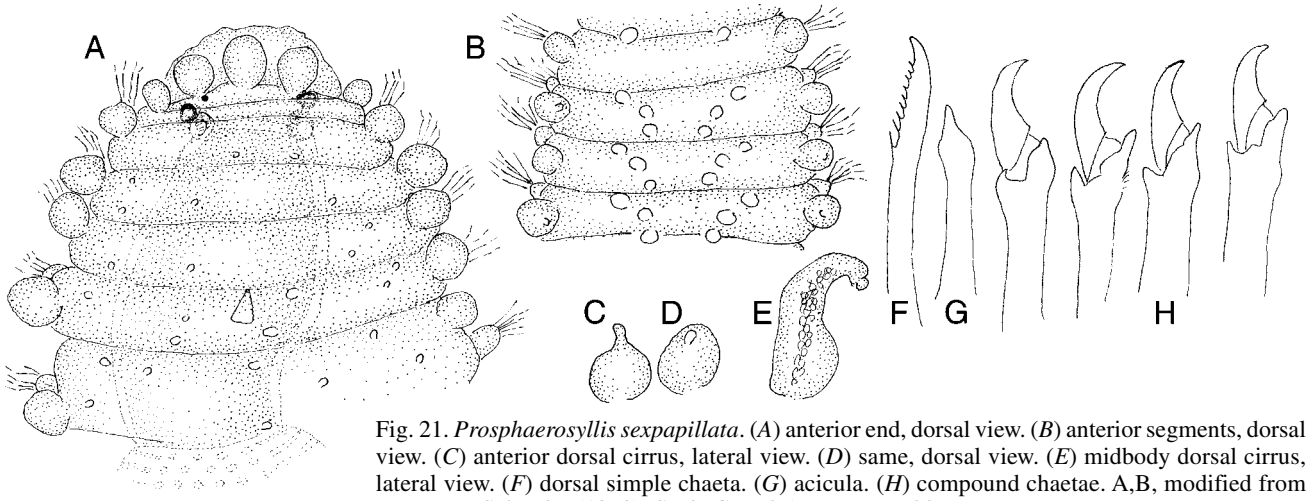


Fig. 21. *Prosphaerosyllis sexpapillata*. (*A*) anterior end, dorsal view. (*B*) anterior segments, dorsal view. (*C*) anterior dorsal cirrus, lateral view. (*D*) same, dorsal view. (*E*) midbody dorsal cirrus, lateral view. (*F*) dorsal simple chaeta. (*G*) acicula. (*H*) compound chaetae. A,B, modified from Hartmann-Schröder (1979). Scale C,D: 0.1 mm, F–H: 20 µm.

anterior segments; from proventricular level, each segment provided dorsally with 6 small papillae, arranged forming a "V", 3 on each side of segment (Figs. 20E,F, 21B). Prostomium oval, longer than wide, nearly completely covered by peristomium; 4 large eyes in trapezoidal arrangement and 2 anterior eyespots. Antennae small, pyriform to sphaerical, all similar in shape and size (Figs. 20E, 21A), with bulbous bases and minute, indistinct tip; all antennae inserted in line, in front of eyespots (Fig. 21A). Palps large, short, totally fused all along their length, with a few papillae (Fig. 21A). Peristomium covering dorsally almost all prostomium; tentacular cirri similar in shape to antennae, but smaller (Figs. 20E, 21A). Dorsal cirri on all segments, similar to antennae anteriorly, appearing sphaerical (Fig. 21A) but provided with a short, small tip (Figs. 20E, 21C,D); from midbody posteriorly, dorsal cirri slightly elongate (Fig. 20F), with a distal, retractile tip and an internal, dark gland (Fig. 21E). Parapodial lobes relatively short. Compound chaetae heterogomph, with strong articulation, with smooth shafts, and unidentate, short blades, smooth (Fig. 21H). Anterior parapodia each with 7–8 compound chaetae, diminishing to 3–4 on posterior parapodia. All blades similar in size, 10–12 µm on anterior parapodia, slightly shorter on posterior parapodia. Dorsal simple chaetae from anterior segments, usually from chaetiger 1, unidentate, with few, short subdistal spines (Fig. 21F). Ventral simple chaetae on posterior parapodia, sigmoid, smooth (not seen in the examined specimen). Acicula solitary, acuminate (Fig. 21G). Pharynx wide, through 5 segments; pharyngeal tooth oval, located just posteriorly to middle of pharynx (Fig. 21A). Proventricle similar in length and width to pharynx, through 3 segments, with 18–20 muscle cell rows.

Remarks. This species is similar to *P. longipapillata* Hartmann-Schröder, 1979 and *P. nathani* San Martín & López, 1998, differing mainly in having small papillae, arranged forming a V on dorsum of each segment instead of rows of long papillae. *Prosphaerosyllis pumila* (Westheide, 1974) from Galápagos Islands is similar in having all the antennae inserted on anterior margin of prostomium, but the dorsal cirri are similar throughout, with longer tips than those of *P. sexpapillata* and the pharyngeal tooth is much smaller, located more anteriorly in the pharynx (Westheide, 1974).

One specimen from Tasmania, used for SEM photographs, agrees well with the above description, although the median antenna is missing and it is difficult to say if it is anterior or not on prostomium. That specimen is a mature female, carrying eggs dorsally. In the original description, the elongation of dorsal cirri from midbody was omitted, but it is present both in the examined specimen from HZM (P-17068) as well as in the specimen used for SEM examination.

Distribution. Australia (Western and South Australia, New South Wales, Queensland).

Habitat. Amongst algae, sediments. Intertidal and shallow depths.

Prosphaerosyllis opisthoculata (Hartmann-Schröder, 1979) n.comb.

Fig. 22A–G

Sphaerosyllis opisthoculata Hartmann-Schröder, 1979: 106, figs. 151–153; 1984: 24; 1985: 71; 1991: 40.

Material examined. No material examined.

Description. (Based on original description). Body small, 2 mm long, 20 chaetigers. Papillae small, few and scattered. Prostomium almost totally covered by peristomium; antennae small, inserted on anterior margin of prostomium, near eyespots (Fig. 22A), median antenna slightly posteriorly to lateral antennae. Eyes large, coalescent to each other on each side, located on the posterior part of prostomium, on level of chaetiger 1 (Fig. 22A). Tentacular cirri small, similar to antennae. Dorsal cirri on all parapodia, those of anterior segments short, with bulbous bases and distally slightly elongate. Compound chaetae hemigomph, with short, smooth, unidentate blades (Figs. 22C, 22F). Dorsal simple chaetae unidentate (Figs. 22B, 22E), from chaetiger 1. Ventral simple chaetae similar to dorsal (Fig. 22D,G). Pharynx through 4 segments; pharyngeal tooth located near anterior rim. Proventricle through 3 segments, with 17 muscle cell rows.

Remarks. Although this species was described in *Sphaerosyllis*, all characters agree with the above diagnosis of *Prosphaerosyllis* and it is transferred to that genus.

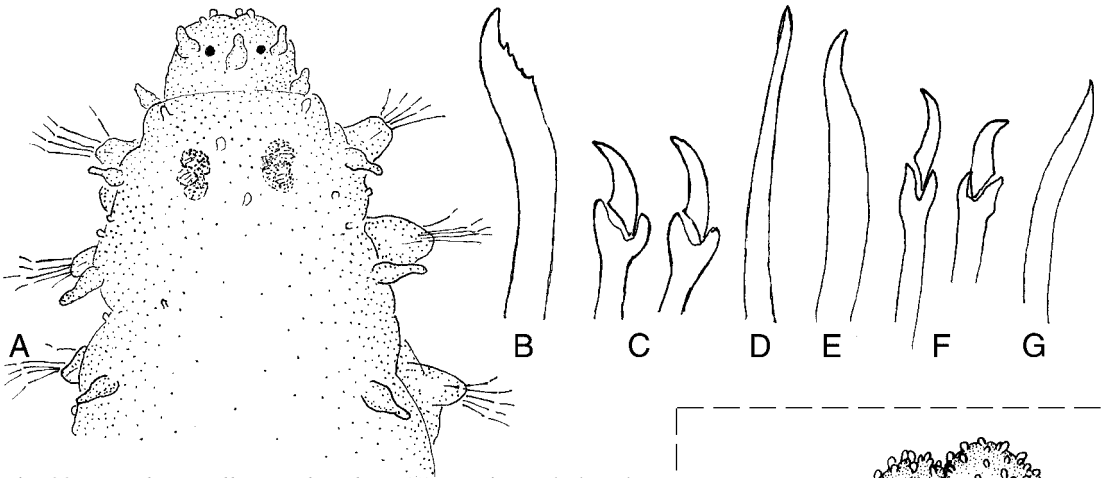


Fig. 22. *Prosphaerosyllis opisthoculata*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, anterior parapodium. (*D*) ventral simple chaeta, anterior parapodium. (*E*) dorsal simple chaeta. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta, posterior parapodium. Modified from Hartmann-Schröder (1979).

Distribution. Australia (Western Australia, South Australia, Queensland).

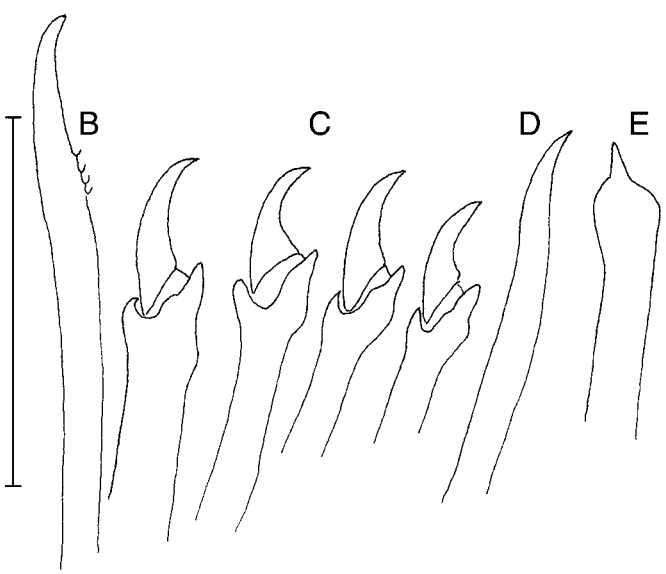
Habitat. Intertidal sand.

Prosphaerosyllis isabellae (Nogueira, San Martín & Amaral, 2001) n.comb.

Fig. 23A–E

Sphaerosyllis isabellae Nogueira *et al*., 2001: 1777, fig. 1.
Sphaerosyllis magnoculata Not Hartmann-Schröder, 1986. Hartmann-Schröder, 1989: 29, fig. 37.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26620, north end of Long Island, Goss Passage, 28°27.9'S 113°46.3'E, dead coral covered in coralline algae & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimen, AM W26621, south east end of Long Island, Goss Passage, 28°28.8'S 113°46.5'E, dead coral substrate, embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994.



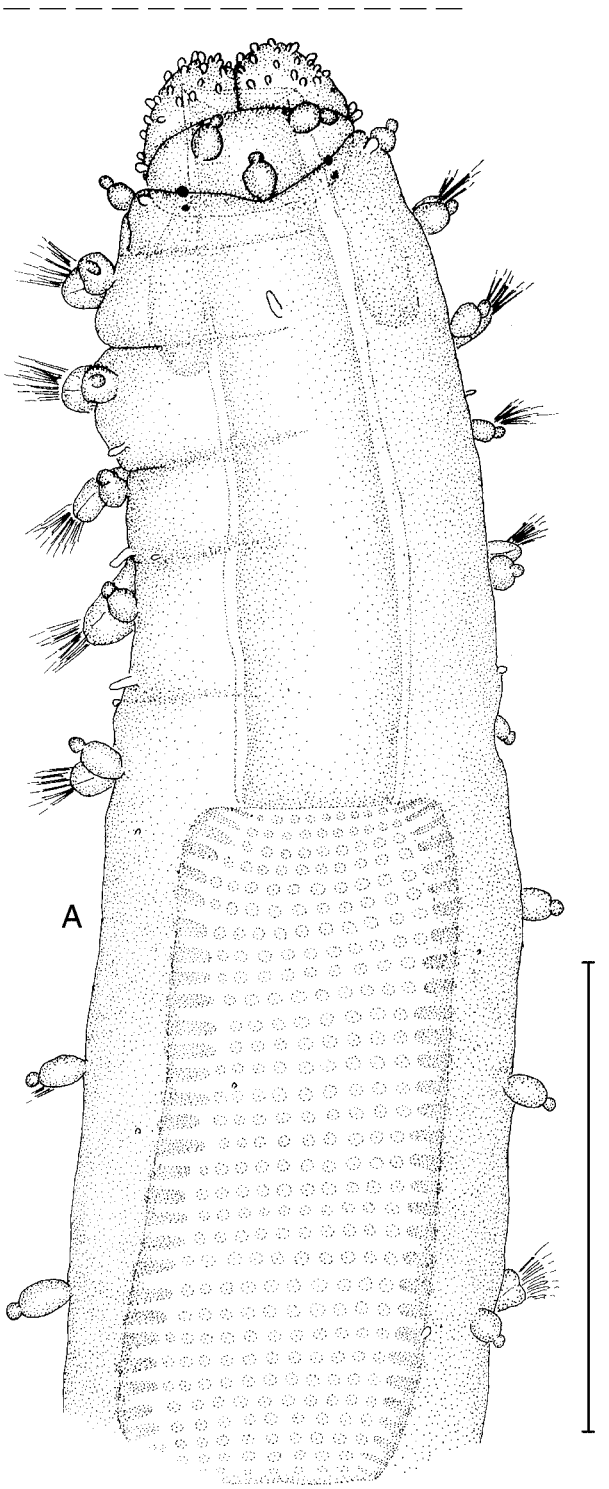


Fig. 23. *Prosphaerosyllis isabellae*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, midbody. (*C*) compound chaetae, midbody. (*D*) ventral simple chaeta. (*E*) acicula. Scale A: 0.064 mm, B–E: 20 μm.

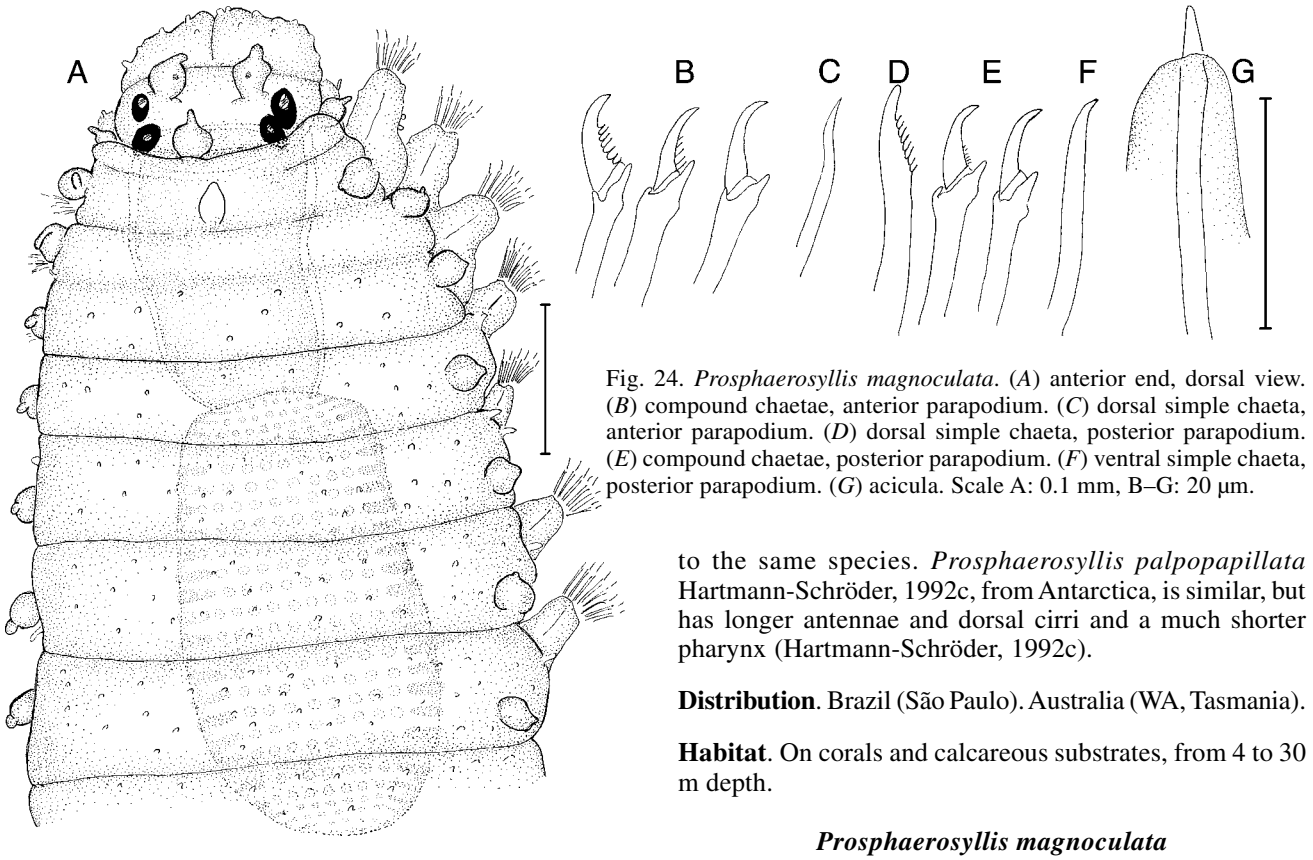


Fig. 24. *Prosphaerosyllis magnoculata*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodium. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) dorsal simple chaeta, posterior parapodium. (*E*) compound chaetae, posterior parapodium. (*F*) ventral simple chaeta, posterior parapodium. (*G*) acicula. Scale A: 0.1 mm, B–G: 20 µm.

Description. Body short, relatively slender, dorsal and ventral surfaces with small, scattered papillae, 3 mm long, 0.15 mm wide, 33 chaetigers. Prostomium rectangular to oval; 2 pairs of small eyes in rectangular arrangement close to each other on each side, and 2 anterior, small ocular eyespots. Antennae short, with bulbous bases and short, rounded tips (Fig. 23A); lateral antennae inserted on anterior margin of prostomium, just behind eyespots; median antenna inserted on posterior margin. Palps completely fused to each other, with a dorsal furrow, shorter than prostomium, densely covered by short papillae (Fig. 23A). Peristomium large, covering dorsally posterior part of prostomium; tentacular cirri similar to antennae but even smaller (Fig. 23A). Dorsal cirri on all segments, small, mammiform, with an oval subdistal part and short, button-like, retractile tip (Fig. 23A). Parapodia conical, short, provided with few, small papillae. Anterior parapodia each with about 6–7 compound chaetae, strongly heterogomph, smooth shafts, with short, unidentate, slightly hooked blades, provided with short marginal spines; numbers of compound chaetae decreasing posteriorly to 2–4; from proventricular segments all compound chaetae with smooth, hooked blades (Fig. 23C), 9–6 µm long. Dorsal simple chaetae from chaetiger 1, unidentate, with few, short subdistal spines (Fig. 23B). Ventral simple chaetae on posterior parapodia, similar to dorsal simple chaeta, smooth (Fig. 23D). Acicula solitary, acuminate (Fig. 23E). Pharynx long, everted on both specimens, through about 5 segments; pharyngeal tooth small, located on anterior ⅓; proventricle long and large, through 3–4 segments, with about 35–40 muscle cell rows.

Remarks. The Australian specimens of this species agree well with the original description, although the long distance between Brazil and Australia, so I assume that they belong to the same species. *Prosphaerosyllis palpopapillata* Hartmann-Schröder, 1992c, from Antarctica, is similar, but has longer antennae and dorsal cirri and a much shorter pharynx (Hartmann-Schröder, 1992c).

Distribution. Brazil (São Paulo). Australia (WA, Tasmania).

Habitat. On corals and calcareous substrates, from 4 to 30 m depth.

Prosphaerosyllis magnoculata (Hartmann-Schröder, 1986) n.comb.

Figs. 24A–G, 25A–C

Sphaerosyllis magnoculata Hartmann-Schröder, 1986: 45, figs. 29–31.

Not *Sphaerosyllis magnoculata* Hartmann-Schröder, 1989: 29, fig. 37.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W202655, Triangular Islets, Shoalwater Bay, 22°21'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. NEW SOUTH WALES. 1 specimen, AM W22589, Cararma Inlet, Jervis Bay, 35°00'S 150°46.5'E, unvegetated, sandy to muddy sediment, intertidal, 0 m, L. Howitt, Dec 1988. 1 specimen, AM W22625, Cararma Inlet, Jervis Bay, 35°00'S 150°46.5'E, *Zostera capricorni*, L. Howitt, Mar 1989. 1 specimen, AM W23141, Honeymoon Bay, Jervis Bay, 35°03.8'S 150°45.4'E, unvegetated sediment, 20 m, P.A. Hutchings & party, 21 Feb 1991. 1 specimen, AM W23484, Honeymoon Bay, Jervis Bay, 35°03.8'S 150°45.4'E, unvegetated sediment, 20 m, P.A. Hutchings & party, 20 Feb 1989. 1 specimen, AM W23564, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W26532, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 1 specimen, AM W26704, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, sand and shell grit, 15 m, K.B. Attwood, 09 Jun 1993. VICTORIA. 3 specimens, MV F62801, Bass Strait, 1 km E off Woodside Beach, 38°33'S 146°57'E, sand, 15 m depth, 9 Mar 1989. 51 specimens, MV F62262, Same locality, 13.3 km of eastern edge of Lake Tyres, 37°51.74'S 148°14.77'E, sand & shell, 37 m depth, 25 Sept 1990. TASMANIA. 2 specimens, AM W27674, north end of beach, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, coarse gravel, intertidal, 0 m, N.W. Riser, 24 Jan 1986. WESTERN AUSTRALIA. 1 specimen, AM W26702, off end of South Mole, Arthur Head, Fremantle, 32°03'S 115°44'E, orange tunicates, 6 m, J.K. Lowry, 25 Dec 1983.

Description. Body small, 2–3 mm long, 0.24 mm wide, 20–30 chaetigers, broad anteriorly, provided with scattered, small dorsal and ventral papillae (Figs. 24A, 25A–C). Prostomium rectangular to oval, wider than long; 4 large eyes in trapezoidal arrangement and 2 anterior eyespots.

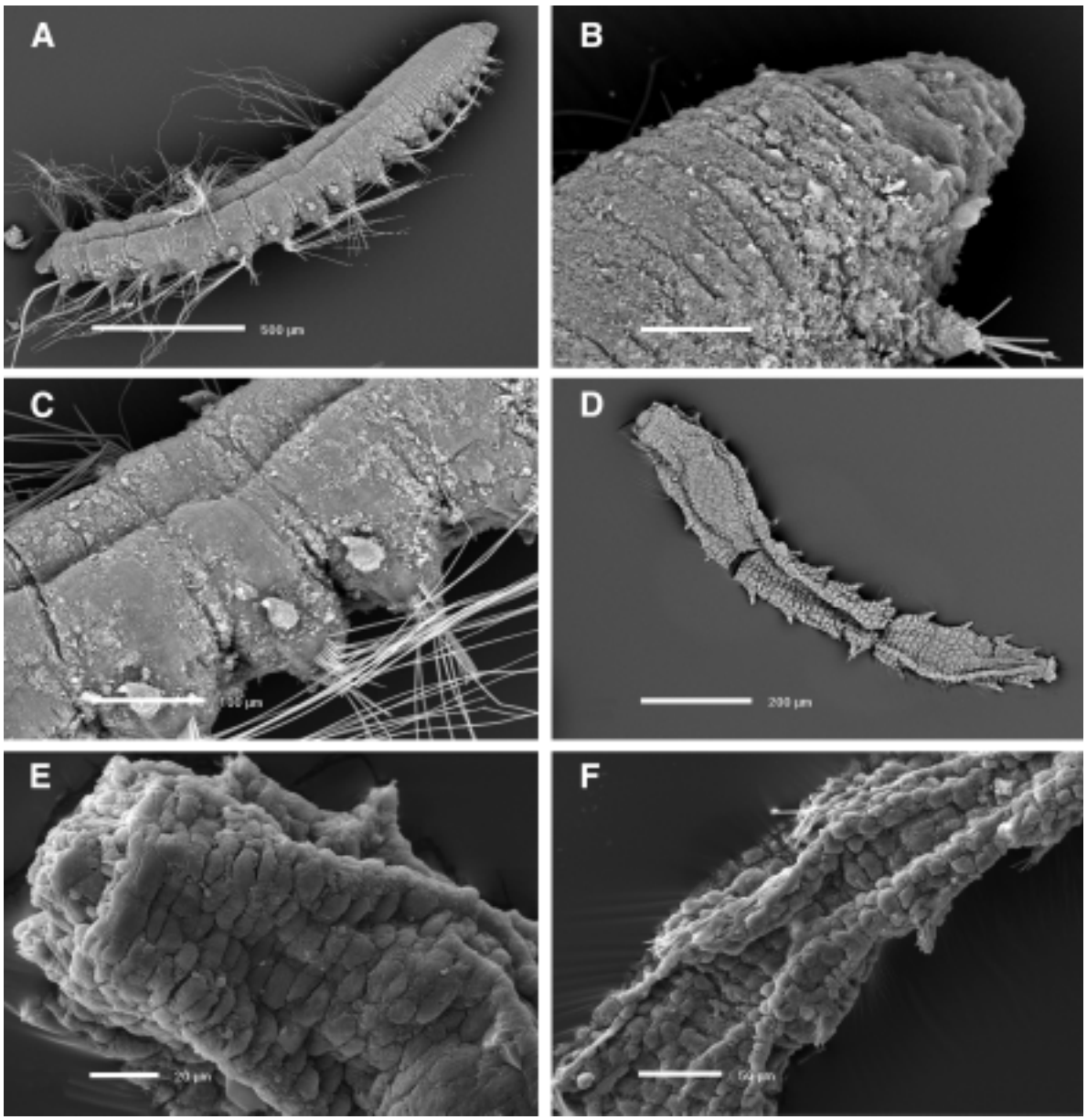


Fig. 25. SEM of *Prosphaerosyllis magnoculata*. (*A*) dorsal view of a mature male with long natatory notochaetae. (*B*) prostomium, peristomium and chaetiger 1, laterodorsal view (antennae missing). (*C*) midbody segments, laterodorsal view. SEM of *Prosphaerosyllis multipapillata*. (*D*) dorsal view. (*E*) anterior end, dorsal view. (*F*) ventral view, midbody.

Antennae small, pyriform, all similar in shape and size (Fig. 24A), with bulbous bases and short tip; lateral antennae inserted in front of anterior eyes, near eyespots, median antenna inserted between posterior eyes. Palps large, short, totally fused all along their length, with some papillae (Figs. 24A, 25B). Peristomium covering dorsally posterior margin of prostomium; tentacular cirri similar in shape to antennae, but smaller (Fig. 24A). Dorsal cirri on all segments, similar throughout, similar to antennae (Figs. 24A, 25A,C). Parapodial lobes relatively short, conical, with some short papillae. Compound chaetae heterogomph, with smooth shafts, and unidentate, short blades, smooth or provided with short marginal spines on dorsal chaetae (Fig. 24B,E). Anterior parapodia each with 7–8 compound chaetae, diminishing to 3–4 on posterior parapodia. All blades similar in size, 8–9 µm on anterior parapodia, slightly shorter on posterior parapodia. Dorsal simple chaetae from anterior segments, usually from chaetiger 1, unidentate, with few, short subdistal spines (Fig. 24D), slender and smooth anteriorly (Fig. 24C). Ventral simple chaetae on posterior parapodia, sigmoid, smooth (Fig. 24F). Acicula solitary, straight with a subdistal small enlargement, protruding only slightly from parapodial lobes (Fig. 24G). Pharynx wide, through 4 segments; pharyngeal tooth oval, located near anterior ⅓ of pharynx (Fig. 23A). Proventricle similar in length and width to pharynx, through 3 segments, with 22 muscle cell rows.

Remarks. This species resembles *P. sexpapillata*, described above, but differs in having scattered dorsal papillae and all dorsal cirri similar, not elongate on posterior parapodia and in the shape of the aciculae.

Distribution. Australia (Western Australia, South Australia, Victoria, Tasmania, New South Wales).

Habitat. Intertidal to about 37 m depth, on all kind of substrates: algae, sand, mud, seagrasses, tunicates.

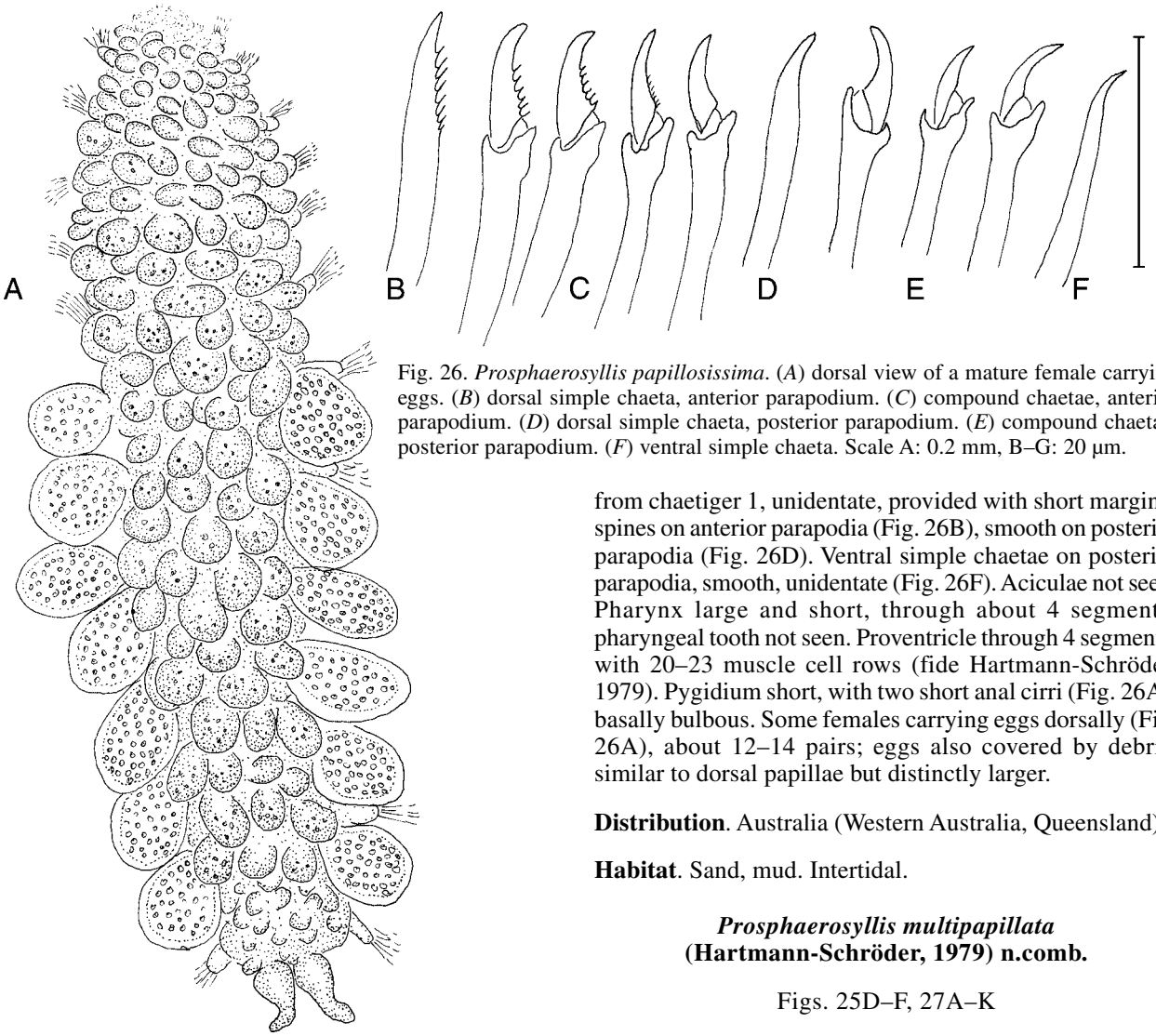


Fig. 26. *Prosphaerosyllis papillosissima*. (*A*) dorsal view of a mature female carrying eggs. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, anterior parapodium. (*D*) dorsal simple chaeta, posterior parapodium. (*E*) compound chaetae, posterior parapodium. (*F*) ventral simple chaeta. Scale A: 0.2 mm, B–G: 20 µm.

Prosphaerosyllis papillosissima (Hartmann-Schröder, 1979) n.comb.

Fig. 26A–F

Sphaerosyllis papillosissima Hartmann-Schröder, 1979: 108, figs. 159–162; 1981: 37; 1982: 72.

Material examined. AUSTRALIA: QUEENSLAND. 16 specimens, AM W26931, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 18 Nov 1988.

Description. Body minute, up to 1.4 mm long, 0.2 mm wide, 14–16 chaetigers, covered by debris, opaque; papillae large, forming vesicles of different sizes, covering dorsum (Fig. 26A) and ventrum, ventral papillae slightly shorter than dorsal papillae, but large in relation to size of body. Prostomium, palps and tentacular cirri covered by anterior segments, not visible, only antennae visible on some specimens, short, papilliform, distally truncated. Dorsal cirri similar to antennae, difficult to see. Apparently, without eyes. Anterior parapodia each with 4–5 compound chaetae, provided with short, falciform, unidentate blades, smooth or provided with short marginal spines (Fig. 26C), about 11–9 µm long. Posterior parapodia each with 3 compound chaetae, similar to those of anterior parapodia (Fig. 26E), with slightly shorter, smooth blades. Dorsal simple chaetae from chaetiger 1, unidentate, provided with short marginal spines on anterior parapodia (Fig. 26B), smooth on posterior parapodia (Fig. 26D). Ventral simple chaetae on posterior parapodia, smooth, unidentate (Fig. 26F). Aciculae not seen. Pharynx large and short, through about 4 segments; pharyngeal tooth not seen. Proventricle through 4 segments, with 20–23 muscle cell rows (fide Hartmann-Schröder, 1979). Pygidium short, with two short anal cirri (Fig. 26A), basally bulbous. Some females carrying eggs dorsally (Fig. 26A), about 12–14 pairs; eggs also covered by debris, similar to dorsal papillae but distinctly larger.

Distribution. Australia (Western Australia, Queensland).

Habitat. Sand, mud. Intertidal.

Prosphaerosyllis multipapillata (Hartmann-Schröder, 1979) n.comb.

Figs. 25D–F, 27A–K

Sphaerosyllis multipapillata Hartmann-Schröder, 1979: 107, figs. 154–158; 1982: 72; 1983: 135.

Material examined. AUSTRALIA: NEW SOUTH WALES. 6 specimens, AM W22991, Bass Point, 34°36'S 150°54'E, 50 m, The Ecology Lab, for Ready Mixed Industries, 1 Feb 1990. 1 specimen, AM W24374, east of Long Reef, 33°43.63'S 151°19.46'E, sand, 30 m, Fisheries Research Institute, 24 July 1989. VICTORIA. 9 specimens, MV F62673, Eastern Bass Strait, 15 km of eastern edge of Lake Tyers, 50°8'S 148°15.58'E, sand and shell, 25 m depth, 25 Sept 1990. 14 specimens, MV F62205, Eastern Bass Strait, 10.9 km W of Pt. Ricardo, 37°48.96'S 140°30.41'E, medium sand, 18 m depth, Feb 1991.

Description. Body small, broad, 4.2 mm long, 0.45 mm wide, 28 chaetigers, densely covered by numerous, rounded papillae, all similar (Figs. 25D,E, 27A–C), also on ventral surface (Fig. 25F); some specimens contracted on anterior half of body (Figs. 25E, 27A,C), forming a voluminous region, distinctly broader than posterior half (Fig. 25D). Prostomium rectangular, wider than long, with 4 eyes in rectangular arrangement, and 2 anterior, minute eyespots. Antennae small, papilliform, distally truncated (Fig. 27B,C); lateral antennae inserted in front of anterior eyes, median antenna inserted between anterior pair of eyes. Palps similar in length to prostomium, totally fused all along their length, with scattered papillae (Fig. 27B,C). Peristomium covering partially (Fig. 27B,C) or totally (Fig. 27A) prostomium and palps; some specimens with prostomium and palps contracted to level of chaetiger 1 (Fig. 27A); tentacular cirri

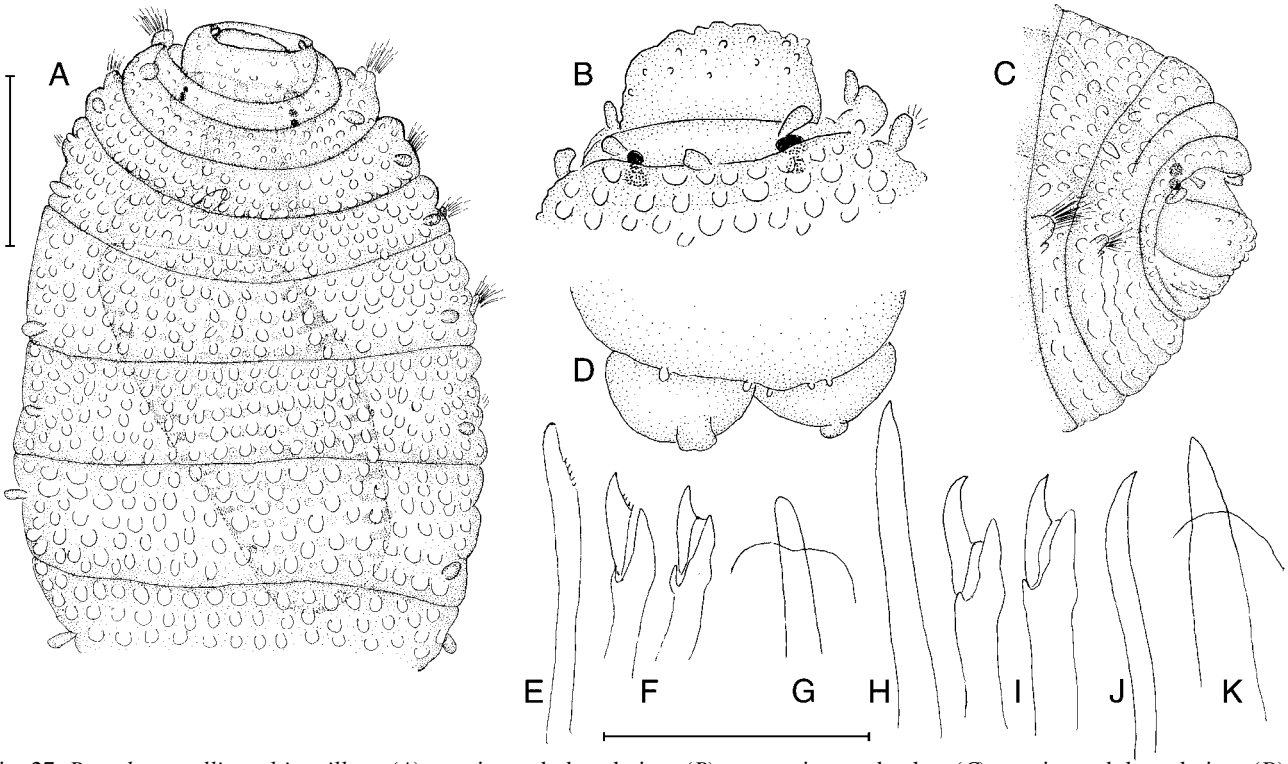


Fig. 27. *Prosphaerosyllis multipapillata*. (*A*) anterior end, dorsal view. (*B*) prostomium and palps. (*C*) anterior end, lateral view. (*D*) pygidium. (*E*) dorsal simple chaeta, anterior parapodium. (*F*) compound chaetae, anterior parapodium. (*G*) acicula, anterior parapodium. (*H*) dorsal simple chaeta, posterior parapodium. (*I*) compound chaetae, posterior parapodium. (*J*) ventral simple chaeta. (*K*) acicula, posterior parapodium. Scale A,C: 0.064 mm, B,D: 0.1 mm, E–K: 20 µm.

similar to antennae, even shorter (Fig. 27A–C). Dorsal cirri on all segments, papilliform, similar to dorsal papillae (Fig. 27A–C). Parapodia short, conical. Compound chaetae strongly heterogomph, shafts smooth, with short blades, smooth (Fig. 27I) or provided with short marginal spines (Fig. 27F) on anterior parapodia; parapodia each with about 4–6 compound chaetae; blades about 8–6 µm on anterior parapodia, 9 µm on midbody. Dorsal simple chaetae relatively thick, provided with few, short marginal spines, usually from chaetiger 1 (Fig. 27E), smooth and almost straight on posterior parapodia (Fig. 27H). Ventral simple chaetae on posterior parapodia, sigmoid, smooth (Fig. 27J). Acicula solitary, straight, protruding out from parapodial lobes (Fig. 27G), slightly larger on posterior parapodia (Fig. 27K). Pharynx wide, usually contracted (Fig. 27A); pharyngeal tooth oval, located on middle of pharynx. Proventricle long, large, through 2–4 segments, with 25 muscle cell rows. Pygidium small, with two large and short anal cirri, with a semispherical cirrophore and short, small cirrostyle (Fig. 27D).

Remarks. *Prosphaerosyllis adelae* San Martín, 1984b, from the Mediterranean Sea, appears to be similar, because the strong contraction of the prostomium inside the peristomium and having the anterior part of body broad; the Mediterranean species, however, has a dorsum with few, small papillae, being long, digitiform on ventral surface (San Martín, 1984b, 2003).

Distribution. Australia (Western Australia, Victoria, New South Wales).

Habitat. Fine to coarse sand and gravel, intertidal to 50 m depth.

Prosphaerosyllis battiri n.sp.

Figs. 28A–H, 29A–F

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE: AM W26802, outer Ningaloo Reef, off Ned's Camp, Cape Range National Park, 21°59.5'S 113°54.5'E, airlift from living *Porites* sp., 2 m, R.T. Springthorpe & J.K. Lowry, 1 Jan 1984. PARATYPES: 2 specimens (1 specimen on SEM stub), AM W27667, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, very fine sediment and sand from patches in reef, 1 m, H.E. Stoddart, 2 Jan 1984.

Description. Body short, holotype mature male with natatory chaetae from chaetiger 8 to 23, 2.72 mm long, 0.27 mm wide, 28 chaetigers. Prostomium oval to pentagonal, slightly larger than long, contracted on anterior segments but not covered by them (Figs. 27A, 28B); 4 large eyes in trapezoidal arrangement and 2 anterior eyespots. Antennae all similar, small, mamilliform; median antenna inserted between posterior eyes, lateral antennae inserted in front of anterior eyes, slightly posteriorly to eyespots (Fig. 28A). Palps short, fused all along their length except for a terminal notch, provided with distinct papillae (Fig. 28A). Peristomium small, short, indistinct, covering posterior margin of prostomium (Figs. 28A, 29B); tentacular cirri similar to antennae but smaller (Figs. 28A, 29B), similar to papillae. Dorsum and ventrum covered by large, round papillae, forming 3–4 irregular transverse rows, giving a rough appearance (Fig. 29A), especially on anterior half of body (Figs. 28A, 29B), papillae less numerous on posterior half of body (Figs. 28B, 29D). Dorsal cirri on all parapodia, short, mamilliform (Fig. 29C) to lemon-shaped on anterior parapodia (Figs. 28A, 29B), longer and larger on posterior half of body, dilated basally, provided with a distinct, retractile cirrostyle (Figs. 28B, 29C). Compound chaetae

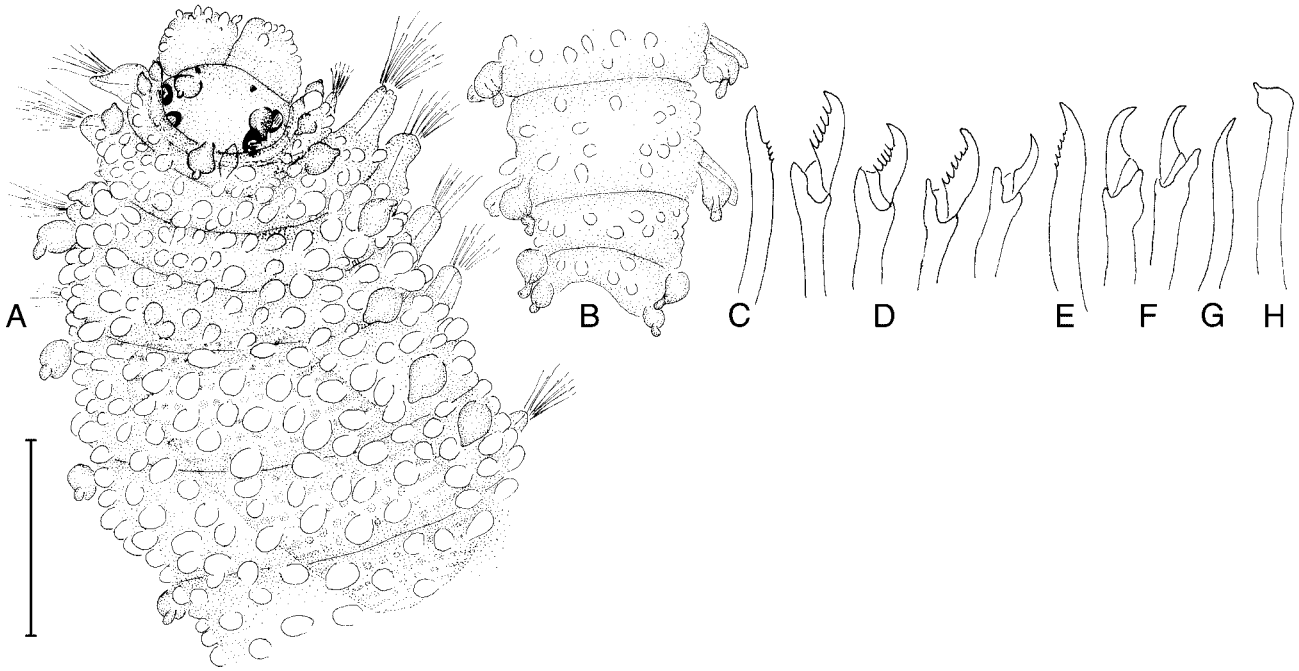


Fig. 28. *Prosphaerosyllis battiri* n.sp. (*A*) anterior end, dorsal view (Holotype). (*B*) posterior end, dorsal view (Paratype). (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. (*H*) acicula. Scale A,B: 1.6 mm, C–H: 20 µm.

provided with short, falcate, unidentate blades, with short marginal spines of anterior parapodia (Figs. 28D, 29E,F), smooth on remaining parapodia (Fig. 28F); anterior parapodia each with 5 compound chaetae, blades 6–4 µm long, posterior parapodia each with 4 compound chaetae, blades all about 4.5 µm long. Dorsal simple chaetae from chaetiger 1, unidentate, nearly smooth on margin (Fig. 28C,E). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, unidentate (Fig. 28G). Acicula solitary, slender, acuminate (Fig. 28H). Pharynx through about 4–5 segments; pharyngeal tooth large, rhomboidal, located in anterior half pf pharynx (Fig. 28A). Proventricle through 3 segments, with about 26 muscle cell rows.

Remarks. *Prosphaerosyllis battiri* n.sp. is characterized by having palps not totally fused, prostomium not retracted on peristomium or only slightly retracted, the shape of dorsal cirri and the arrangement of papillae, which are numerous anteriorly and less numerous on posterior segments. It appears to resemble *Prosphaerosyllis semiverrucosa* Ehlers, 1913, but the arrangement of dorsal papillae is reversed, being more or less smooth on anterior segments and rough on posterior half of body (Ehlers, 1913; Day, 1967); I have examined one posterior piece of one specimen of *S. semiverrucosa* (ZHM P-14615) and it agrees perfectly with Ehlers' and Day's descriptions, with numerous dorsal papillae.

Distribution. Australia (Western Australia).

Habitat. On corals and sediments in shallow water.

Etymology. From the Aboriginal name *battiri*, meaning rough.

Genus *Erinaceusyllis* n.gen.

Diagnosis. Body small to minute, more or less densely covered by papillae, usually small, short, scarce, sometimes also distributed on cirri and parapodia. Prostomium with 3 antennae, 4 eyes and 2 anterior eyespots. Peristomium usually large, covering posterior margin of prostomium, sometimes forming 2 dorsolateral wings covering nuchal organs; single pair of tentacular cirri. Dorsal cirri on chaetiger 2 absent or present, depending upon the species, usually absent. Antennae, tentacular cirri and dorsal cirri spindle-shaped to pyriform, with slightly bulbous bases and short to moderately long tip. A pair of anal cirri similar to dorsal cirri, usually longer. Compound chaetae heterogomph, with blades short or long, sometimes long and slender, bidentate, bidentate and unidentate, or unidentate. Pharyngeal tooth small, conical to rhomboidal, located near anterior margin, sometimes near middle of pharynx; pharynx usually without papillae around opening, but present on larger species. Proventricle long and wide, barrel-shaped, with numerous, slender muscle cell rows (15–22). Mature males with natatory chaetae; females brooding eggs dorsally, by means of capillary notochaetae.

Type species. *Sphaerosyllis erinaceus* Claparède, 1863, herein designated.

Remarks. This new genus consists of several species previously described under *Sphaerosyllis* and several described as sub-species of *Sphaerosyllis erinaceus*, differing by the compound chaetae; these differences are sufficient to consider all of them as different species. *Erinaceusyllis* n.gen. is obviously similar to *Sphaerosyllis*.

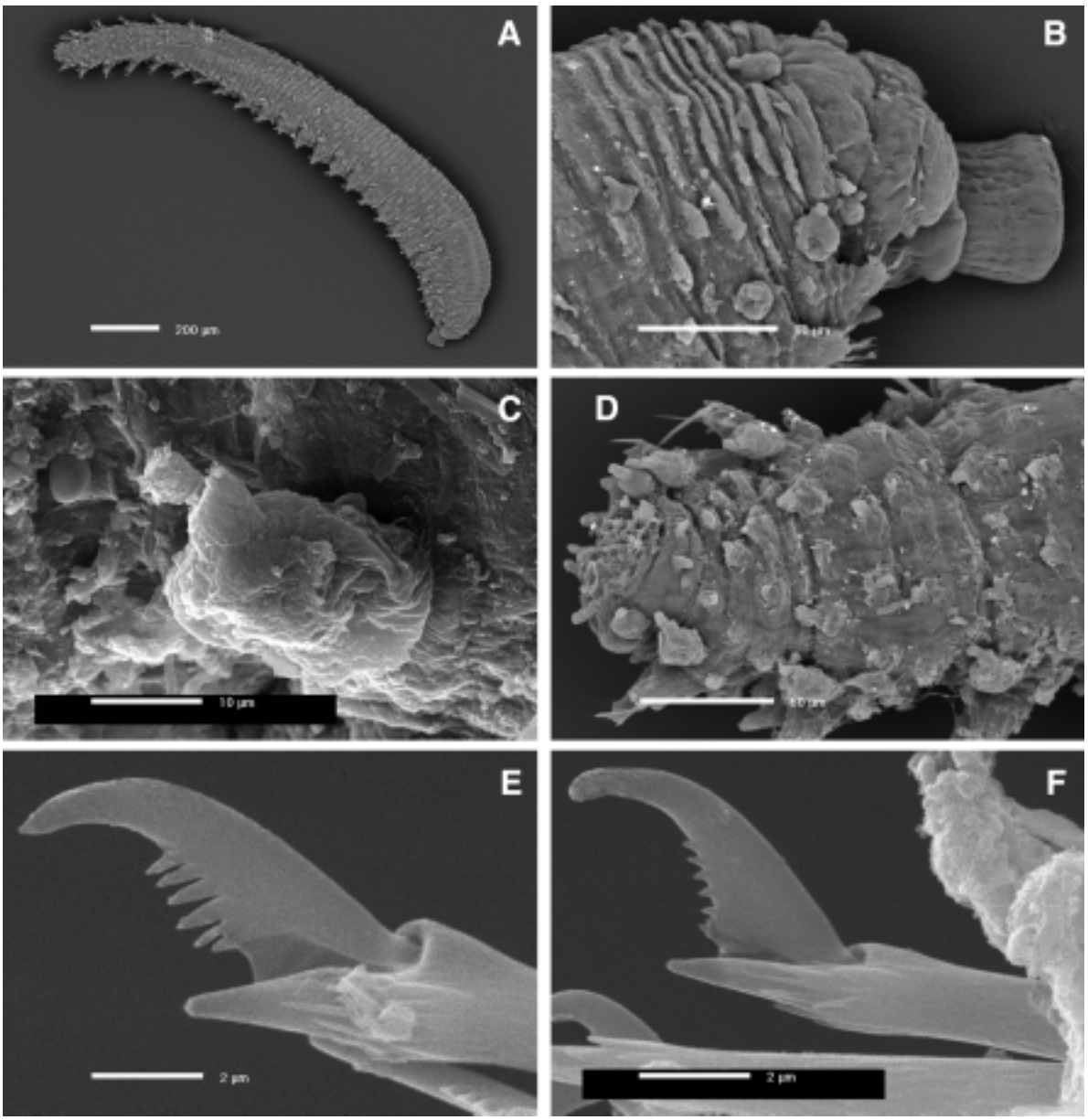


Fig. 29. SEM of *Prosphaerosyllis battiri* n.sp. (*A*) complete paratype, dorsolateral view. (*B*) prostomium, peristomium and chaetigers 1 and 2, dorsolateral view. (*C*) dorsal cirrus, midbody. (*D*) posterior end, dorsal view. (*E, F*) compound chaetae, anterior parapodium.

Species of *Sphaerosyllis*, however, always have papillae on the pharynx opening, the pharyngeal tooth is conical, always located on the anterior margin of pharynx or very near, usually with a short proventricle provided with few, a large muscle cell rows, large posterior acicula distally bent at a right angle, blades of compound chaetae always short and unidentate, and brood developing ventrally embryos and juveniles, without capillary notochaetae on the females, only on males. *Sphaerosyllis horrockensis, Sphaerosyllis belizensis*, and *S. centroamericana*, are herein transferred to *Erinaceusyllis* n.gen. because their characters agree with the diagnosis given above and they are different to that of *Sphaerosyllis* as given below. *Prosphaerosyllis* is close to *Erinaceusyllis* n.gen., but the pharyngeal tooth is rhomboidal to oval and located usually near middle of pharynx, antennae are always short, tentacular and dorsal cirri have a bulbous cirrophore and retractile cirrostyle, and the papillae are more numerous, usually of different sizes.

The genus *Cicese* Díaz-Castañeda & San Martín, 2001 is identical to *Erinaceusyllis* but has two pairs of tentacular cirri instead of a single pair (Díaz-Castañeda & San Martín, 2001).

The type species of this genus is *Sphaerosyllis erinaceus* Claparède, 1863; the original description, however, is incomplete (Claparède, 1863); the species has been reported worldwide but probably these records represent a complex of different species, that need to be re-examined.

Key to species of *Erinaceusyllis* recorded from Australia

1 Dorsal cirri present on chaetiger 2 ..... *E. horrockensis*
—— Dorsal cirri absent on chaetiger 2 2

2 Blades of compound chaetae all bidentate ..... *E. bidentata*
—— All or some blades unidentate 3

3 Longer blades of compound chaetae bidentate, remaining blades unidentate ..... *E. belizensis*
—— All blades unidentate 4

4 At least some compound chaetae with long, slender blades 5
—— All blades relatively short, falcate 7

5 Median antenna located close to lateral antennae, on anterior margin of prostomium, similar in size to lateral ones. Anterior eyes in line with eyespots ..... *E. centroamericana*
—— Median antenna longer than lateral ones, inserted posteriorly. Anterior eyes near posterior ones, posterior to eyespots 6

6 Long and mid-sized blades of each parapodium provided basally with long, erect pointed spines ..... *E. serratosetosa*
—— Long and mid-sized blades with short, fine marginal spines. Blades slender, sabre-shaped ..... *E. ettiennei* n.sp.

7 Dorsal cirri each provided with 1–2 distinct, long, mushroom-shaped papillae ..... *E. cirripapillata* n.sp.
—— Dorsal cirri without this kind of papillae 8

8 Pharyngeal tooth located in front of middle of pharynx ..... *E. opisthodentata*
—— Pharyngeal tooth located near anterior rim 9

9 Blades of compound chaetae of each parapodium all similar in size, those of dorsal chaetae with long marginal spines and remaining smooth or with short marginal spines ..... *E. hartmannschroederae* n.sp.
—— Compound chaetae with dorsoventral gradation in length of blades, all of which are provided with short marginal spines ..... *E. kathrynae* n.sp.

Erinaceusyllis horrockensis (Hartmann-Schröder, 1981) n.comb.

Fig. 30A–I

Brania horrockensis Hartmann-Schröder, 1981: 35, figs. 68–72. *Sphaerosyllis horrockensis*.–Hartmann-Schröder, 1982: 71; 1983: 134; 1984: 23; 1985: 70; 1986: 43; 1987: 41; 1989: 28.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W26436, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 1 specimen, AM W26440, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 1 specimen, AM W26441, Richmond River, near shore Ballina, old wharf between Cherry & Martin Sts, 28°52.5'S 153°33.6'E, drift algae, 6 m, S.J. Keable, 5 Mar 1992. 4 specimens, AM W26442, Halfway Reef, 200 m south of Sullivan Reef, Ulladulla, 35°21.42'S 150°29.31'E, airlift over wall of sponges, bryozoa & hydrozoa, 15 m, K. Attwood *et al*., 3 May 1997. 3 specimens, AM W26533, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 2 specimens, AM W26544, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae & ascidians, 16 m, E.L. Albertson, 7 Mar 1992. 7 specimens, AM W26610, Grotto Point, Balmoral Beach, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 1983. 3 specimens, AM W26612, north east corner of Clark Island, 33°51.85'S 151°14.47'E, encrustation on outside of bottle, 5 m, P.A. Hutchings, 17 Apr 1996. 1 specimen, AM W26644, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, airlift, 12 m, G. Clark, 11 Dec 1989. 2 specimens, AM W26705, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson, R.T. Springthorpe & G.D.F. Wilson, 3 Mar 1992. VICTORIA. 6 specimens, MV F62701, Eastern Bass Strait, 11.7 km W of Pt. Ricardo, 37°49.89'S 148°30.13'E, coarse sand, 27 m depth, 4 June 1991. TASMANIA. 3 specimens, AM W27671, north end of beach, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, clean gravelly sand, intertidal, 0 m, N.W. Riser, 24 Jan 1986. SOUTH AUSTRALIA. 4 specimens, AM W26746, Billy Lights Point, Port Lincoln, 34°45'S 135°53'E, stone washings from sheltered intertidal rocks, 0 m, I. Loch, 15 Feb 1985. 1 specimen, AM W26747, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26671, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat, plus epifauna, 2 m, P.A. Hutchings, 26 May 1994.

Description. Body small to minute, 2.7 mm long, 0.15 mm wide, 28 chaetigers, covered with small, scattered papillae (Fig. 30A). Prostomium oval, wider than long; 4 large eyes in trapezoidal arrangement, nearly in line, and 2 anterior eyespots; antennae spindle-shaped, basally bulbous; median antenna similar to combined length of prostomium and palps, inserted slightly anteriorly to anterior eyes; lateral antennae shorter than median antenna, inserted slightly anteriorly to median antenna (Fig. 30A,B). Palps shorter than prostomium, fused along their length. Peristomium similar in length to following segments; tentacular cirri

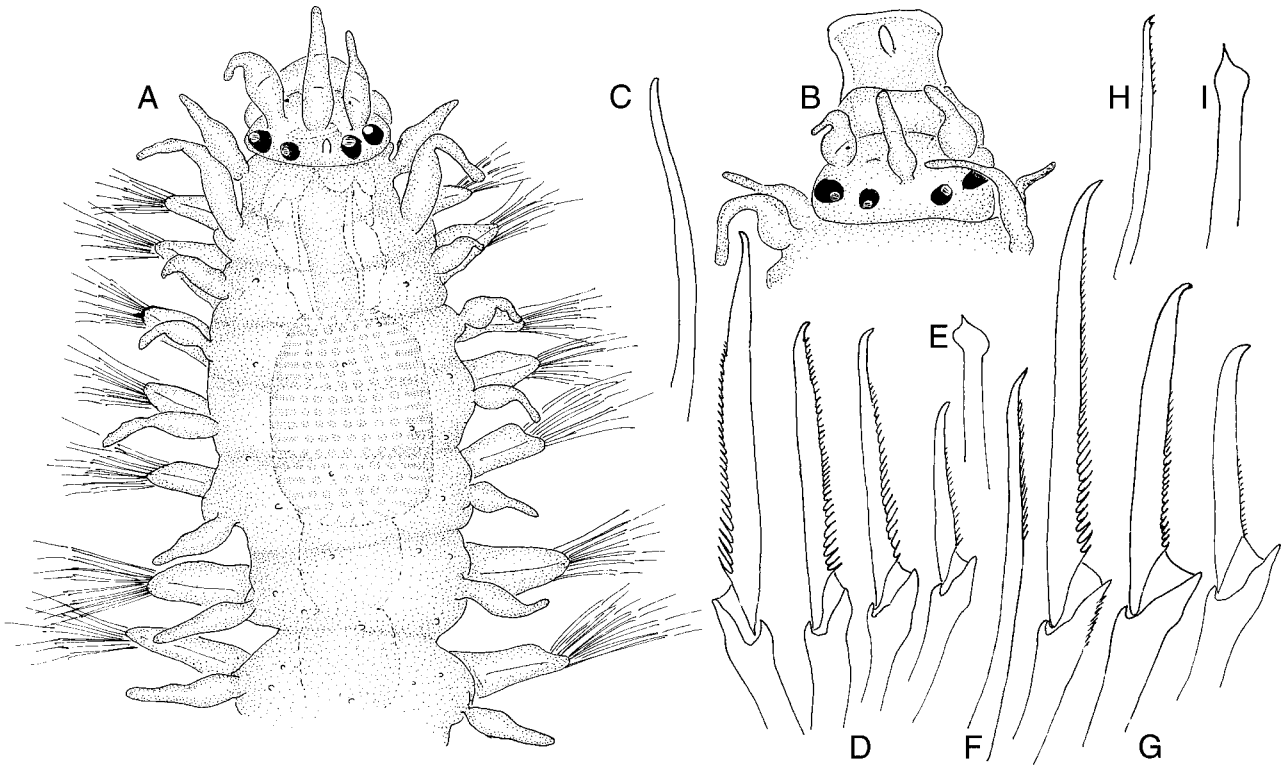


Fig. 30. *Erinaceusyllis horrockensis*. (*A*) anterior end, dorsal view. (*B*) prostomium and anterior rim of everted pharynx. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) acicula, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,B: 0.1 mm, C–I: 20 μm.

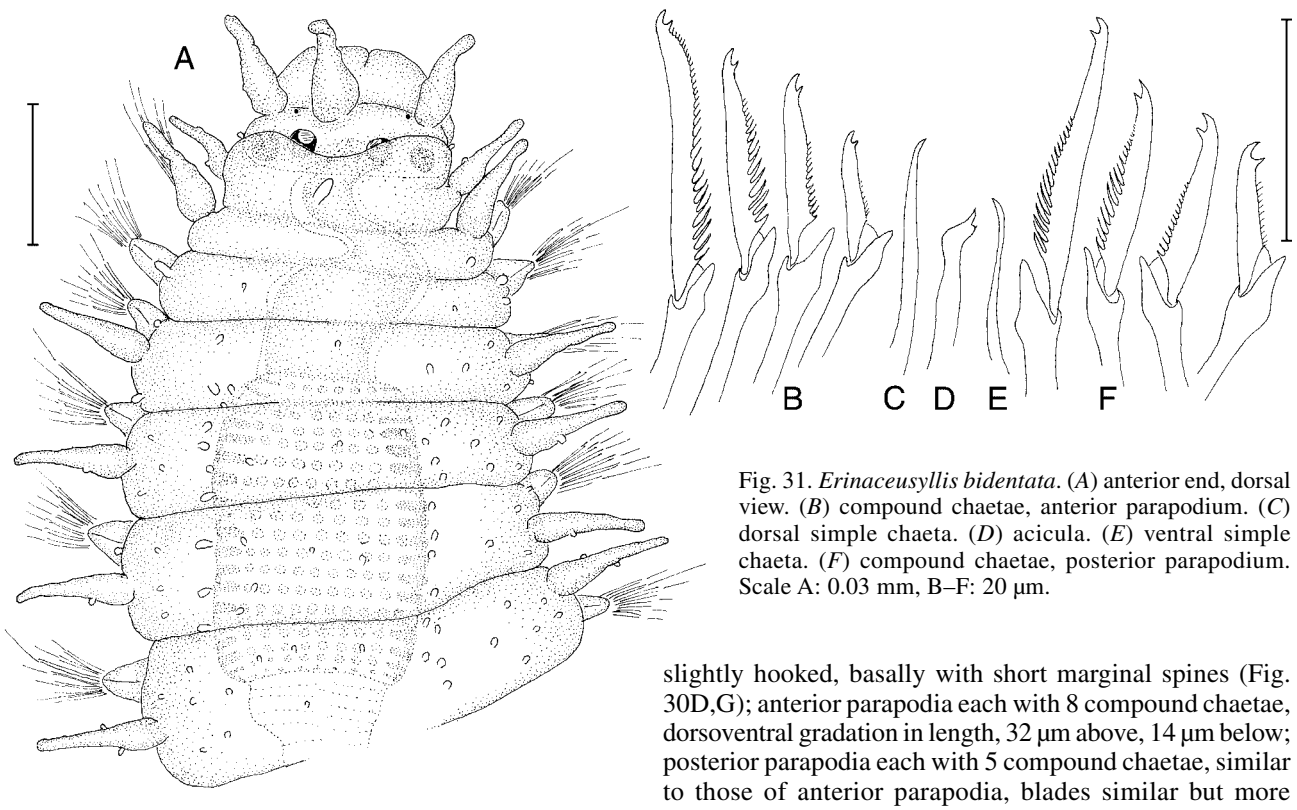


Fig. 31. *Erinaceusyllis bidentata*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodium. (*C*) dorsal simple chaeta. (*D*) acicula. (*E*) ventral simple chaeta. (*F*) compound chaetae, posterior parapodium. Scale A: 0.03 mm, B–F: 20 μm.

similar to lateral antennae. Dorsal cirri on all segments; dorsal cirri of chaetiger 1 longer than antennae, dorsal cirri of chaetiger 2 much shorter, basally inflated, sphaerical, progressively longer on midbody, with bulbous bases and short tip (Fig. 30A). Compound chaetae heterogomph, with smooth shafts and blades elongate, unidentate, distally slightly hooked, basally with short marginal spines (Fig. 30D,G); anterior parapodia each with 8 compound chaetae, dorsoventral gradation in length, 32 μm above, 14 μm below; posterior parapodia each with 5 compound chaetae, similar to those of anterior parapodia, blades similar but more elongate, about 36 μm above 20 μm below. Dorsal simple chaetae on anterior parapodia, usually from chaetiger 1, distally entire, smooth (Fig. 30C) or provided with short marginal spines (Fig. 30F). Ventral simple chaetae slender, smooth, indistinctly bidentate (Fig. 30H), on posterior parapodia. Acicula solitary, acuminate (Fig. 30C,I). Pharynx

proportionally slender, through 4 segments; pharyngeal tooth small, oval, located near opening (Fig. 30A,B); pharyngeal papillae apparently absent. Proventricle barrel-shaped, through 3 segments, with about 17 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but longer.

Distribution. Australia (Victoria, New South Wales, Tasmania, South Australia, and Western Australia).

Habitat. Coarse sand, shell and gravel, amongst algae, in encrustations, sponges, ascidians and bryozoans, coral rubble; intertidal to 27 m depth.

Erinaceusyllis bidentata (Hartmann-Schröder, 1974) n.comb.

Fig. 31A–F

Sphaerosyllis erinaceus bidentata Hartmann-Schröder, 1974a: 134, pl. 13, figs. 116–119; 1992b: 227, figs. 16–18.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26723, north end of Long Island, Goss Passage, 28°27.9'S 113°46.3'E, dead coral covered in coralline algae & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimen, AM W27642, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small to minute, 1.3 mm long, 0.14 mm wide, 24 chaetigers (incomplete specimen), covered with small, scattered papillae, more conspicuous on lateral margins of segments, also some papillae on dorsal cirri (Fig. 31A). Prostomium oval, wider than long; 4 large eyes nearly in line, and 2 anterior eyespots; antennae spindle-shaped with bulbous bases, shorter than combined length of prostomium and palps together, median antenna inserted slightly anterior to eyes; lateral antennae inserted on anterior margin, near eyespots. Palps similar in length to prostomium, fused along their length. Peristomium similar in length to following segments, covering dorsally posterior margin of prostomium, frontally slightly excavate (Fig. 31A); tentacular cirri similar to antennae but smaller. Dorsal cirri similar to antennae, longer than tentacular cirri, with bulbous bases and slightly elongated tip, absent on chaetiger 2 (Fig. 31A). Compound chaetae heterogomph, similar throughout; blades distinctly bidentate, margin provided with moderate-sized erect spines on bases of longer blades (Fig. 31B,F), short marginal spines of short blades (Fig. 31B,F); dorsoventral gradation in length, 26–12 µm on midbody. Dorsal simple chaetae from anterior parapodia, unidentate, smooth (Fig. 31C). Ventral simple chaetae slender, smooth, unidentate (Fig. 31E), present on posterior parapodia. Acicula solitary, acuminate (Fig. 31D). Pharynx proportionally long and slender, through 4 segments; pharyngeal tooth located slightly posterior to opening (Fig. 31A). Proventricle long and wide, barrel-shaped, through 3 segments, with about 20 muscle cell rows.

Remarks. This species is characterized by having all the compound chaetae bidentate and the anterior position of the median antenna. The previous descriptions show similar compound chaetae; the longer blades, however, are more slender and elongated. *Erinaceusyllis cryptica* (Ben-Eliahu, 1977) and *Erinaceusyllis bilobata* (Perkins, 1981) also have all compound chaetae with bidentate blades, but the median antenna is inserted more posteriorly (Ben-Eliahu, 1977; San Martín, 2003; Perkins, 1981; Russell, 1991). *Erinaceusyllis parvoculata* (Russell, 1989) has also similar compound chaetae, but the arrangement of eyes is distinctly different and the median antenna is inserted much more posteriorly (Russell, 1989).

Distribution. Eastern Africa (Mozambique). Australia (Western Australia).

Habitat. Sand, mixed bottoms (sand, algae, detritus, dead coral), shallow depth.

Erinaceusyllis belizensis (Russell, 1989) n.comb.

Fig. 32A–E

Sphaerosyllis belizensis Russell, 1989: 375, fig. 1; Olano *et al*., 1998: 86, fig. 2.

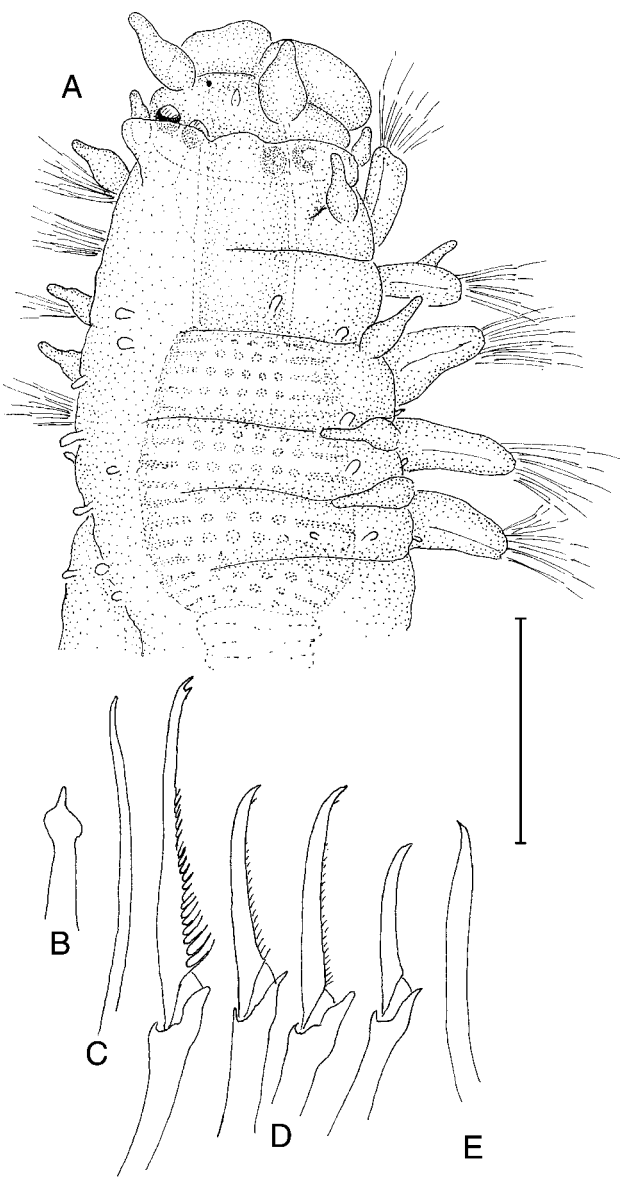


Fig. 32. *Erinaceusyllis belizensis*. (*A*) anterior end, dorsal view (median antenna missing). (*B*) acicula. (*C*) dorsal simple chaeta. (*D*) compound chaetae, midbody. (*E*) ventral simple chaeta. Scale A: 0.1 mm, B–E: 20 µm.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26803, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984.

Description. Body minute, up to 1.18 mm long, 0.16 mm wide, 20 chaetigers, with scattered small papillae on dorsum and laterally, partially covered by debris. Prostomium oval, wider than long; 4 large eyes in trapezoidal arrangement, nearly in line, and 2 anterior eyespots; antennae spindle- to onion-shaped, with bulbous bases and short to moderately tips; median antenna similar to combined length of prostomium and palps, inserted between eyes, lateral antennae shorter than median antenna, inserted near anterior margin, lateral to eyespots. Palps shorter than prostomium, fused along their length. Peristomium forming a distinct, trilobed hood covering posterior part of prostomium (Fig. 32A); tentacular cirri similar to antennae but much smaller. Dorsal cirri shorter than antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2 (Fig. 32A), more elongate on midbody. Parapodia conical, with a few papillae. Compound chaetae heterogomph; parapodia each with 1 compound chaeta provided with proportionally long, slender, bidentate blade, about 32 µm, smooth distally, provided with fine, moderately long marginal spines on bases, and 6–7 anteriorly, 4–5 posteriorly, compound chaetae with smooth margin or provided with short, straight spines, unidentate or provided with minute subdistal spine, distally slightly hooked (Fig. 32D), 22–15 µm long. Dorsal simple chaetae from anterior parapodia, unidentate, apparently smooth (Fig. 32C). Ventral simple chaetae slender, smooth, unidentate (Fig. 32E), present on posterior parapodia. Acicula solitary, acuminate (Fig. 32B). Pharynx proportionally slender, through 3 segments; pharyngeal tooth small, located near pharynx opening (Fig. 32A). Proventricle barrel-shaped, through 3 segments, with about 18 muscle cell rows. Pygidium small, with numerous long papillae, anal cirri elongate.

Distribution. Belize, Western and Eastern Mediterranean, Australia (Western Australia).

Habitat. On mangrove roots, on bryozoans, corals, and algae, mud, on shallow water.

Erinaceusyllis centroamericana (Hartmann-Schröder, 1959) n.comb.

Fig. 33A–D

Sphaerosyllis centroamericana Hartmann-Schröder, 1959: 127, figs. 79–82; 1965a: 117; 1974a: 135, pl. 13, figs. 120–122; 1977: 58, fig. 20; 1979: 102; 1980a: 54; 1980b: 395; 1981: 36; 1986: 42; 1990: 54. Westheide, 1974: 101, figs. 45, 46 D, E.

Material examined. AUSTRALIA: WESTERN AUSTRALIA.1 specimen, HZM P-16696, Broome, G. Hartmann-Schröder.

Additional material. EL SALVADOR: 6 specimens, HZM P-14610 G. Hartmann-Schröder.

Description. Body small to minute, up to 2 mm long, 0.16 mm wide, 21 chaetigers, covered with small, scattered papillae (Fig. 33A). Prostomium oval to trapezoidal; 4 small eyes in rectangular arrangement, and 2 anterior eyespots, close to anterior eyes, similar in size to eyes (Fig. 33A); antennae pyriform, with bulbous bases and short tips, all similar in size, shorter than prostomium, inserted nearly in line, in front of anterior eyes and eyespots. Palps short, fused along their length. Peristomium long, covering dorsally more than posterior half of prostomium (Fig. 33A); tentacular cirri similar to antennae. Dorsal cirri similar to antennae, with bulbous bases and short tips, slightly elongate on midbody, absent on chaetiger 2 (Fig. 33A). Compound chaetae heterogomph, similar throughout; blades slender,

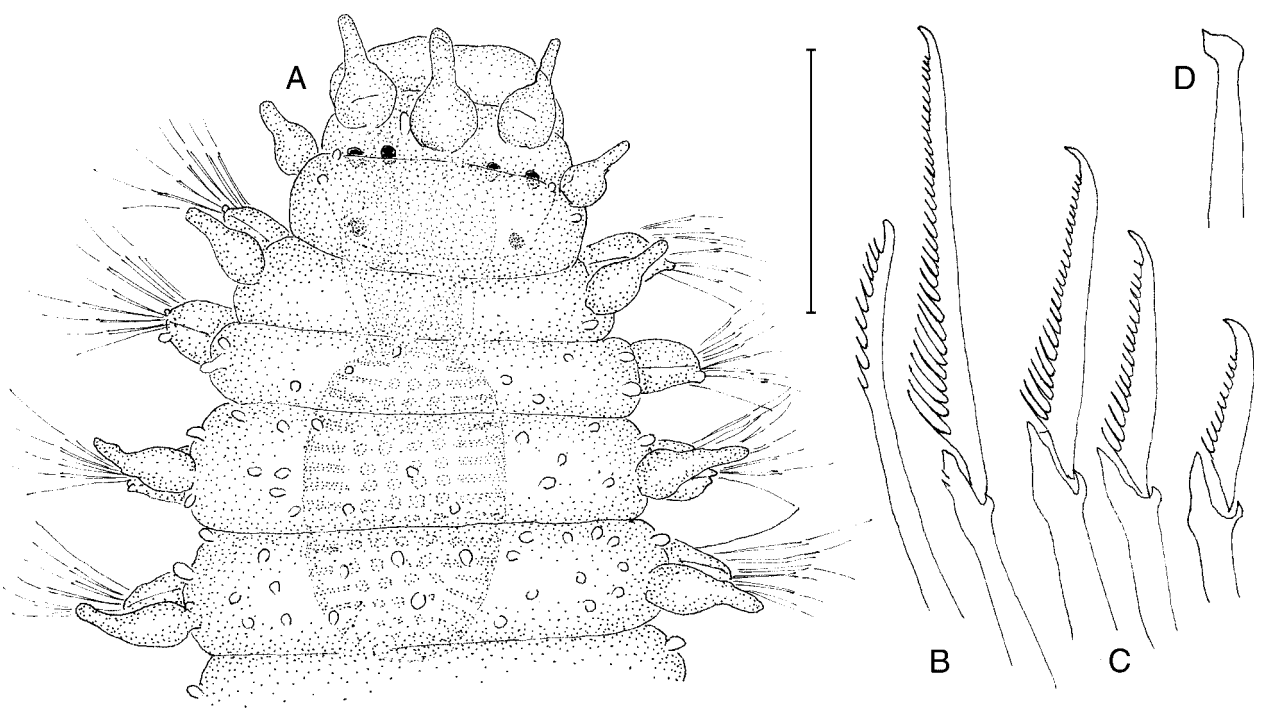


Fig. 33. *Erinaceusyllis centroamericana*. (*A*) anterior end, dorsal view (median antenna missing). (*B*) dorsal simple chaeta. (*C*) compound chaetae. (*D*) acicula. Scale A: 0.9 mm, B–D: 20 µm.

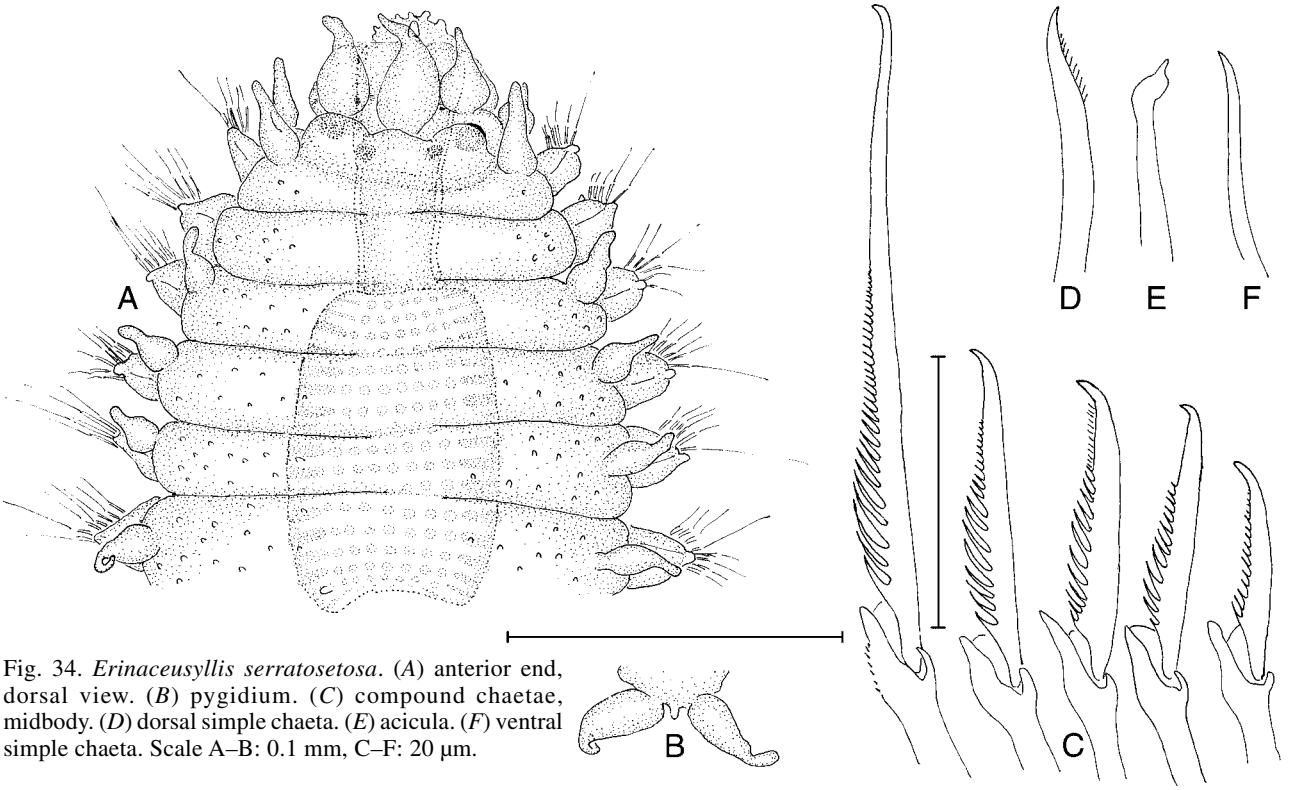


Fig. 34. *Erinaceusyllis serratosetosa*. (*A*) anterior end, dorsal view. (*B*) pygidium. (*C*) compound chaetae, midbody. (*D*) dorsal simple chaeta. (*E*) acicula. (*F*) ventral simple chaeta. Scale A–B: 0.1 mm, C–F: 20 µm.

elongate, unidentate, distally slightly hooked, provided with proportionally long marginal spines on bases of longer blades (Fig. 33C); parapodia each with 1 compound chaeta with long blade, about 36 µm on midbody, and 6 compound chaetae with dorsoventral gradation, 25–15 µm long (Fig. 33C). Dorsal simple chaetae from chaetiger 1, unidentate, provided with short marginal spines (Fig. 33B). Ventral simple chaetae slender, smooth, present on posterior parapodia (fide Westheide, 1974), not seen in the examined specimens. Acicula solitary, acuminate (Fig. 33D). Pharynx proportionally long and slender, through 3–4 segments; pharyngeal tooth small, located near opening (Fig. 33A). Proventricle barrel-shaped, through 2–3 segments, with about 15–20 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but distinctly longer.

Remarks. *Erinaceusyllis renaudae* Hartmann-Schröder, 1958, from Cuba and Bahamas, is similar but lacks eyes and has a shorter proventricle (Hartmann-Schröder, 1958; 1973).

Distribution. Circumtropical: El Salvador, Galápagos Islands, Caribbean Sea, Hawaii, Samoa, Angola, Mozambique, Tanzania. Australia (Western Australia, South Australia, Queensland).

Habitat. On sand, algae and mangroves. Intertidal.

Erinaceusyllis serratosetosa (Hartmann-Schröder, 1982) n.comb.

Fig. 34A–F

Sphaerosyllis erinaceus serratosetosa Hartmann-Schröder, 1982: 70, figs. 57–59; 1983: 134; 1990: 54; 1991: 39.

Sphaerosyllis erinaceus (not Claparède).–Hartmann-Schröder, 1979: 102; 1980a: 54.

Material examined. AUSTRALIA: QUEENSLAND. 2 specimens, AM W26703, Triangular Islets, Shoalwater Bay, 22°23'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. 1 specimen, AM W26940, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 14 Oct 1989. 1 specimen, and 2 specimens on SEM stub, AM W26941, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 22 Oct 1991. 1 specimen, AM W26942, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 20 Oct 1991. NEW SOUTH WALES. 1 specimen, AM W11109, Careel Bay, Pittwater, 33°37'S 151°19'E, in *Zostera* beds, P.A. Hutchings, 30 July 1973. 1 specimen, AM W23549, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 5 specimens, AM W23550, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 6 specimens, AM W23551, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 4 specimens, AM W23559, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. WESTERN AUSTRALIA. PARATYPES: 2 specimens, AM W18556, Cervantes, 30°30'S 115°03'E, fine sand among *Posidonia*, intertidal, G. Hartmann-Schröder, 24 Oct 1975. 1 specimen, AM W26833, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, on shallow sand flats, 0.5 m, J.K. Lowry & H.E. Stoddart, 6 Jan 1984.

Description. Body small to minute, up to 2.5 mm long, 0.14 mm wide, up to 34 chaetigers, usually smaller, provided with small, scattered papillae (Fig. 34A). Prostomium oval to pentagonal; 4 large eyes in trapezoidal arrangement, nearly in line, and 2 anterior eyespots; antennae with bulbous bases and short tips; median antenna similar to combined length of prostomium and palps, inserted slightly anteriorly to posterior eyes; lateral antennae shorter than median antenna, inserted on anterior margin, slightly posterior to eyespots. Palps shorter than prostomium, fused along their length. Peristomium shorter than following segments, covering dorsally posterior margin of prostomium, sometimes trilobed (Fig. 34A); tentacular cirri similar to antennae but smaller. Dorsal cirri shorter than antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2 (Fig. 34A). Parapodia rectangular to conical, with a distal papilla and, sometimes, other smaller

distal papilla. Compound chaetae heterogomph, shafts marginally smooth or provided with short subdistal spines; blades elongate, unidentate, distally slightly hooked, margin provided on bases with long, erect spines, especially long on longer blades, short spines on middle, smooth on distal third (Fig. 34C); parapodia each with 1–2 compound chaetae with long, spiniger-like blade, about 52 µm on midbody, and 9 on anterior, 6 on midbody, 3 on posterior parapodia, similar but much shorter, with dorsoventral gradation, 26–16 µm on midbody. Dorsal simple chaetae from anterior parapodia, usually from chaetiger 1, unidentate, provided with short marginal spines (Fig. 34D). Ventral simple chaetae slender, smooth, unidentate (Fig. 34F), on posterior parapodia. Acicula solitary, acuminate (Fig. 34E). Pharynx proportionally long and slender, through 4 segments; pharyngeal tooth small, near opening (Fig. 34A). Proventricle long and wide, barrel-shaped, through 4 segments, with about 22 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but longer, and a median papilla (Fig. 34B).

Distribution. Australia (Western Australia, Queensland, New South Wales). Recently reported a single specimen from Western Mediterranean (San Martín, 2003).

Habitat. Sand, mud, on seagrasses, in shallow water.

Erinaceusyllis ettiennei n.sp.

Fig. 35A–F

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: AM W26624, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. PARATYPES: 3 specimens, AM W26625, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. Several fragments on SEM stub, AM W26936, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 20 Oct 1991. 1 specimen, AM W26937, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 14 Oct 1989. several fragments on SEM stub, AM W26938, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 20 Nov 1988. 1 specimen, AM W26939, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 20 Nov 1988. 1 specimen, AM W27668, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 22 Oct 1991.

Description. Body small to minute, 1.2 mm long, 0.15 mm wide, 19–22 chaetigers, covered with small, scattered, indistinct papillae. Prostomium oval, wider than long; 4 large eyes in trapezoidal arrangement, nearly in line, and 2 anterior eyespots; antennae with bulbous bases and with short tips; median antenna similar to combined length of prostomium and palps, inserted slightly in front to anterior eyes; lateral antennae shorter than median antenna, inserted on anterior margin, near eyespots. Palps similar in length to prostomium, fused along their length, but with a distinct distal notch. Peristomium similar to following segments, covering dorsally posterior margin of prostomium, slightly bilobed (Fig. 35A); tentacular cirri similar to antennae but smaller. Dorsal cirri shorter than antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2 (Fig. 35A). Compound chaetae heterogomph, similar throughout; blades slender, elongate, unidentate, distally slightly hooked, margin provided with short, thin spines on longer blades (Fig. 35C); parapodia each with 2 compound chaetae with long, spiniger-like blade, about 53–48 µm on midbody, and other 6 provided with filiform, curved, sabre-shaped blades,

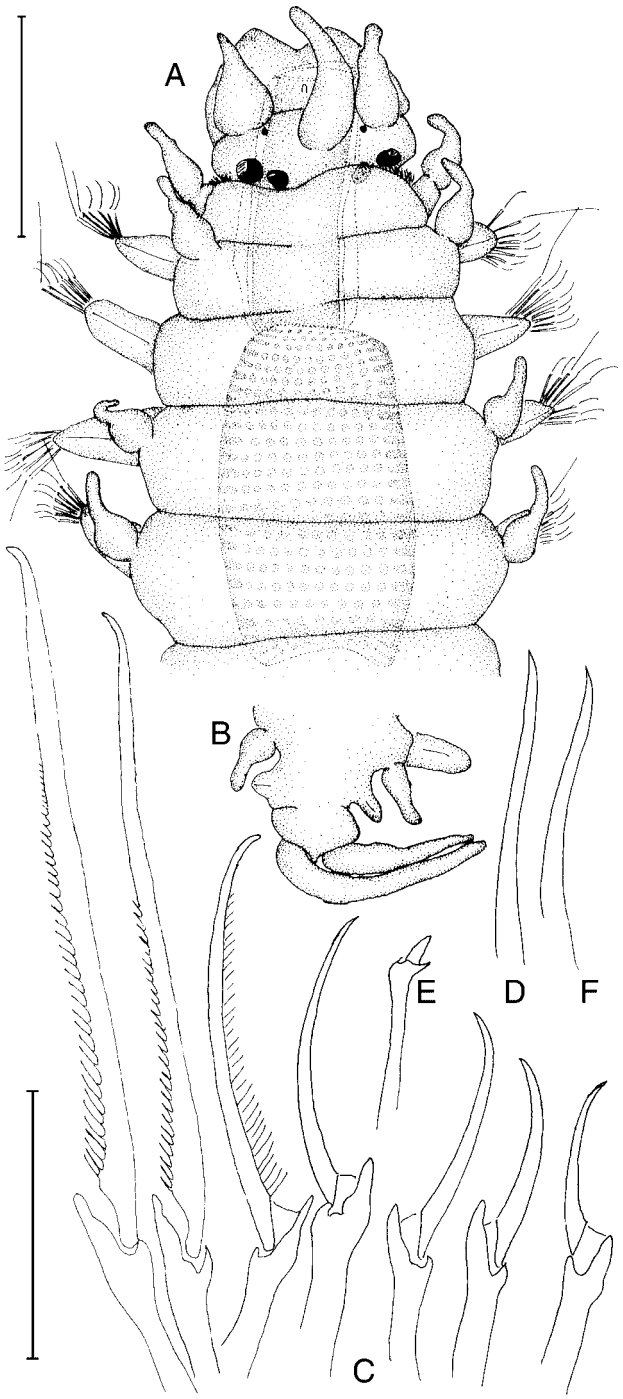


Fig. 35. *Erinaceusyllis ettiennei* n.sp. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) compound chaetae, midbody. (*D*) dorsal simple chaeta. (*E*) acicula. (*F*) ventral simple chaeta. Scale A,B: 0.1 mm, C–F: 20 µm.

with normal dorsoventral gradation, 30–13 µm long. Dorsal simple chaetae from midbody, unidentate, smooth (Fig. 35D). Ventral simple chaetae slender, smooth, unidentate (Fig. 35F), present on posterior parapodia. Acicula solitary, acuminate (Fig. 35E), with minute subdistal spines. Pharynx proportionally long and slender, through 4 segments; pharyngeal tooth small, located near opening (Fig. 35A), pharynx without papillae on anterior rim. Proventricle long and wide, barrel-shaped, through 4 segments, with about 22 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but distinctly longer, and a median papilla (Fig. 35B).

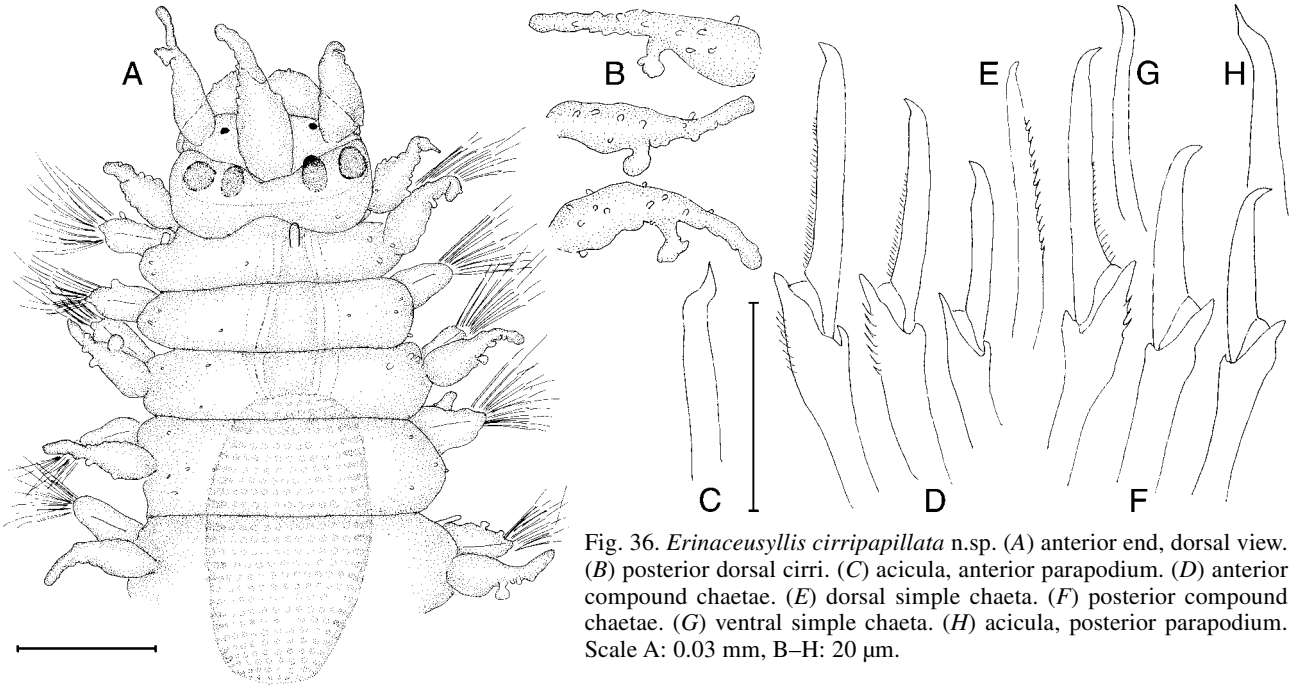


Fig. 36. *Erinaceusyllis cirripapillata* n.sp. (*A*) anterior end, dorsal view. (*B*) posterior dorsal cirri. (*C*) acicula, anterior parapodium. (*D*) anterior compound chaetae. (*E*) dorsal simple chaeta. (*F*) posterior compound chaetae. (*G*) ventral simple chaeta. (*H*) acicula, posterior parapodium. Scale A: 0.03 mm, B–H: 20 μm.

Remarks. This species is characterized by the compound chaetae, with slender, thin blades, curved as a sabre. The most similar species is *Erinaceusyllis serratosetosa*, but this species can be differentiated by the size of body and the compound chaetae, which have long, curved marginal spines on the long blades.

Distribution. Australia (Queensland).

Habitat. Mud on shallow water.

Etymology. This species is named in honour of Mr Ettienne Fourie.

Erinaceusyllis cirripapillata n.sp.

Fig. 36A–H

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W26711, North Creek Canal, Richmond River, 28°52.1'S 153°32.8'E, mud, 3 m, P.B. Berents, S.J. Keable & A. Murray, 02 Mar 1992, NSW 627.

Description. Body small, 2.5 mm long, 0.18 mm wide, 31 chaetigers, provided with small, scattered papillae on dorsum, more abundant on lateral margins of segments (Fig. 36A). Prostomium rectangular, wider than long; 4 large eyes in line, near to posterior margin of prostomium, and 2 anterior eyespots; median antenna longer than combined length of prostomium and palps, inserted between eyes, lateral antennae shorter than median antenna, inserted near anterior margin, slightly posterior and lateral to eyespots. Palps shorter than prostomium, fused along their length, distally notched, provided with few, small papillae. Peristomium shorter than following segments, covering dorsally posterior margin of prostomium, bilobed (Fig. 36A); tentacular cirri similar to antennae but smaller. Dorsal cirri shorter than antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2, more elongate posteriorly (Fig. 36A,B); antennae, tentacular cirri and dorsal cirri provided with numerous small papillae and 1, sometimes 2, long, distinct papillae, mushroom-shaped, with a stalk and distally enlarged and truncated (Fig. 36A,B). Parapodia rectangular to conical, with scattered papillae, sometimes similar to those of dorsal cirri. Compound chaetae heterogomph, smooth on margin or provided with short, straight spines on longer blades; blades elongate, unidentate, distally slightly hooked (Fig. 36D,F); anterior parapodia each with 6–7 compound chaetae with dorso-ventral gradation in length, 28–12 μm, 6 on posterior parapodia, similar to those of anterior parapodia but slender. Dorsal simple chaetae from chaetiger 7, unidentate, provided with short marginal spines (Fig. 36E). Ventral simple chaetae slender, smooth, unidentate (Fig. 36G), present on posterior parapodia. Acicula solitary, acuminate (Fig. 36H). Pharynx proportionally slender, through 3 segments; pharyngeal tooth on pharynx opening (Fig. 36A). Proventricle long and wide, barrel-shaped, through 3 segments, with about 26 muscle cell rows. Pygidium small, with numerous papillae, anal cirri missing.

Remarks. *Erinaceusyllis cirripapillata* n.sp., is characterized by having papillae on dorsal cirri, one of them being distinctive, mushroom-shaped. None species of this genus or *Sphaerosyllis* is described having that kind of papillae on dorsal cirri.

Distribution. Australia (New South Wales).

Habitat. Mud in shallow water.

Etymology. The name of the species refers to the distinct, characteristic papillae on the dorsal cirri.

Erinaceusyllis opisthodentata (Hartmann-Schröder, 1987) n.comb.

Fig. 37A–E

Sphaerosyllis (Sphaerosyllis) erinaceus opisthodentata Hartmann-Schröder, 1987: 40, figs. 13–16; 1990: 54.

Material examined. AUSTRALIA: VICTORIA. 3 PARATYPES, HZM P-18882,

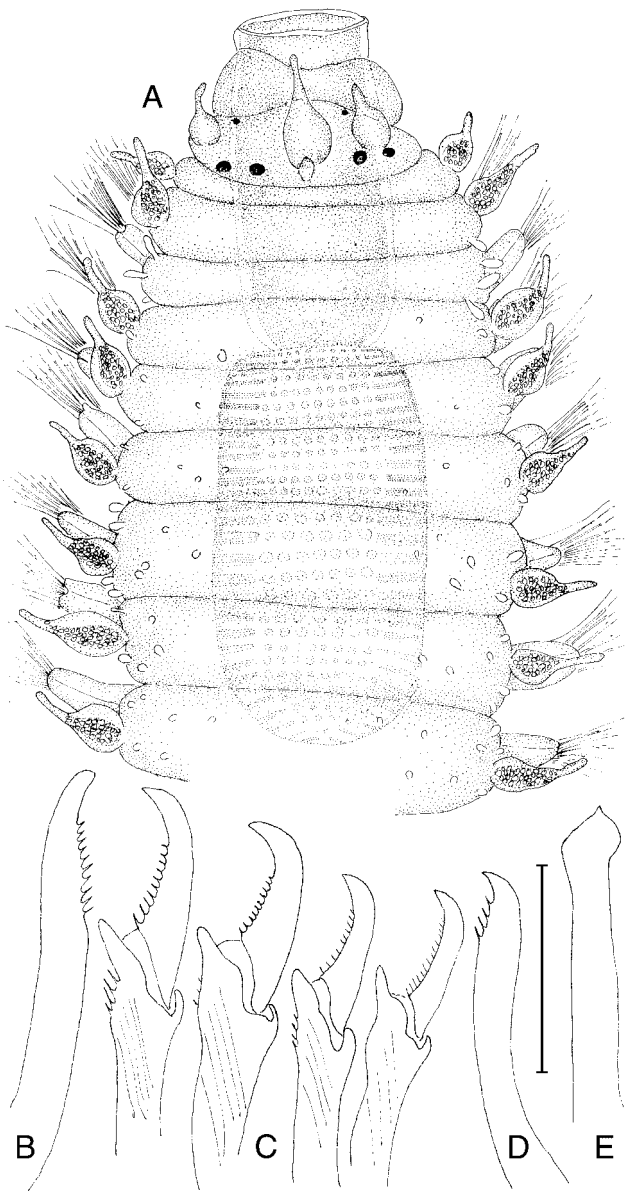


Fig. 37. *Erinaceusyllis opisthodentata*. (*A*) anterior end, dorsal view (Paratype). (*B*) dorsal simple chaeta. (*C*) compound chaetae, mid-posterior parapodium. (*D*) ventral simple chaeta. (*E*) acicula. Scale A: 1.6 mm, B–E: 20 μm.

Warrnambool, coralline algae, G. Hartmann-Schröder, 22 Dec 1975.

Description. Body small, 2.2 mm long, 0.17 mm wide, 26 chaetigers. Small, scattered papillae on dorsum, more abundant on lateral margins of segments, longer on chaetiger 2 (Fig. 37A). Prostomium oval to pentagonal, much wider than long; 4 eyes linearly arranged, on posterior margin of prostomium, and 2 anterior eyespots; antennae with well-developed bulbous bases and moderate, slender tips, median antenna slightly shorter than combined length of prostomium and palps, inserted in front of eyes, lateral antennae distinctly smaller and shorter than median antenna, inserted near lateral margins of prostomium, near to eyespots (Fig. 37A). Palps shorter than prostomium, fused along their length, forming a bilobed structure. Peristomium shorter than following segments (Fig. 37A); tentacular cirri similar to lateral antennae but smaller. Dorsal cirri similar in length to median antenna, longer than tentacular cirri, with bulbous bases and short tip, provided with conspicuous internal, dark gland, absent on chaetiger 2 (Fig. 37A), more elongate on midbody segments. Compound chaetae heterogomph, blades provided with short, straight marginal spines, unidentate, distally slightly hooked (Fig. 37C); anterior parapodia each with 6–7 compound chaetae with slight dorsoventral gradation in length, about 26–20 μm long, diminishing in number to 4 on posterior parapodia, similar to those of anterior parapodia but shorter, 22–15 μm long (Fig. 37C). Dorsal simple chaetae from chaetiger 1, unidentate, provided with short marginal spines (Fig. 37B). Ventral simple chaetae from midbody, slender, unidentate, with short marginal spines (Fig. 37D). Acicula solitary, acuminate, with short tip (Fig. 37E). Pharynx proportionally wide, long, through 5–6 segments when retracted, without papillae on opening; pharyngeal tooth rhomboidal, small, located anterior to middle of pharynx (Fig. 37A). Proventricle long and wide, similar in length to pharynx, barrel-shaped, through 5 segments, with about 17–20 muscle cell rows. One paratype is a female carrying eggs dorsally by means of capillary notochaetae.

Distribution. Australia (Victoria, New South Wales).

Habitat. Algae, encrusting coralline algae. Intertidal.

Erinaceusyllis hartmannschroederae n.sp.

Figs. 38A–I, 39A–F

Sphaerosyllis erinaceus.–not Claparède, 1863; Hartmann-Schröder, 1982: 69; 1983: 134; 1984: 22; 1985: 70; 1986: 43; 1989: 28; 1991: 39.

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W26447, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson, R.T. *et al*., 3 Mar 1992. PARATYPES: 36 specimens, AM W26448, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson *et al*., 3 Mar 1992. QUEENSLAND. 1 specimen, AM W26565, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 1 specimen, AM W26569, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 1 specimen, AM W26571, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 2 specimens, and 4 specimens on SEM stub, AM W26935, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 14 Oct 1989. VICTORIA. 1 specimen, MV F87430, Geelong Arm of Port Phillip Bay, Victoria, 38°09.3'S 144°42.7'E, sand & seagrass, 3 m depth, 11 June 1971. TASMANIA. 42 specimens, AM W27670, north end of beach, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, clean gravelly sand, intertidal, 0 m, N.W. Riser, 24 Jan 1986. WESTERN AUSTRALIA. 1 specimen, AM W27645, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small, slender, up to 3 mm long, 0.23 mm wide, 30 chaetigers, with scattered, short papillae on dorsum (Figs. 38A, 39A–D), slightly longer laterally, also on parapodia and cirri. Prostomium oval, slightly wider than long; 4 large eyes in trapezoidal arrangement, nearly in line, and 2 anterior eyespots; antennae with bulbous bases and short tips; median antenna shorter than combined length of prostomium and palps, inserted slightly anterior to posterior eyes; lateral antennae shorter than median antenna, inserted on anterior margin, slightly posterior and lateral to eyespots. Palps shorter than prostomium, fused along their length. Peristomium forming a trilobed hood, covering dorsally the

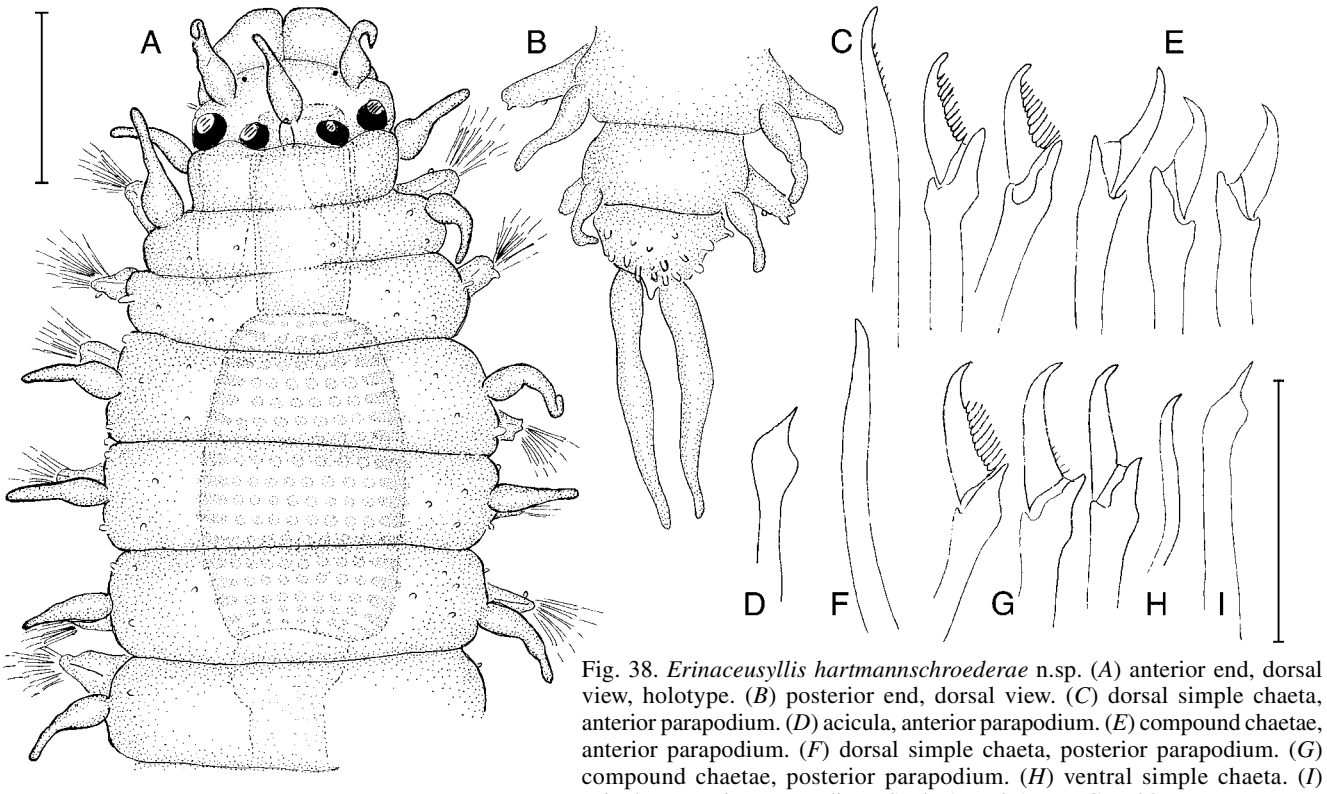


Fig. 38. *Erinaceusyllis hartmannschroederae* n.sp. (*A*) anterior end, dorsal view, holotype. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) acicula, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,B: 0.1 mm, C–I: 20 µm.

posterior margin of prostomium (Figs. 38A, 39D); tentacular cirri similar to antennae but slightly smaller. Nuchal organs small, densely ciliated, protected by an anterior lip (Fig. 39E). Dorsal cirri similar to antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2 (Figs. 38A, 39D), elongate in midbody and posterior parapodia (Figs. 38B, 39C). Parapodia rectangular to conical, with two small, distal papillae. Compound chaetae heterogomph, shafts apparently smooth (Fig. 38E,G) but provided with fine subdistal spines (Fig. 39F); blades short, falcate, unidentate, all similar in length, about 13–10 µm on midbody; margin of blades provided with long, slender spines on 2–3 most superior compound chaetae, remaining blades smooth (Figs. 38E,G, 39F); anterior parapodia each with 6–7 compound chaetae, diminishing in number progressively posteriorly to 5 on each posterior parapodia. Dorsal simple chaetae from anterior parapodia, usually from chaetiger 1, unidentate, provided with short marginal spines (Fig. 38C) or smooth (Fig. 38F). Ventral simple chaetae slender, smooth, unidentate (Fig. 38H), on posterior parapodia. Acicula solitary, acuminate (Fig. 38D,I). Pharynx through 4 segments; pharyngeal tooth, near opening (Fig. 38A). Proventricle long and wide, barrel-shaped, through 3–4 segments, with about 18–20 muscle cell rows. Pygidium semi-circular, with two anal cirri similar to dorsal cirri but longer, and several papillae (Fig. 38B).

Remarks. This species was widely reported in Australia as *Sphaerosyllis erinaceus* and *S. erinaceus erinaceus*, a species described from Northern Europe, reported widely all around the world, from Arctic, temperate, tropical, to Antarctic seas. This appear to be a complex of species, in need of revision. There is not a recent redescription of the European specimens, which would probably clarify the situation. Fauvel (1923) states that the blades of the compound chaetae are long and slender, different from the short, falcate blades of the Australian specimens, suggesting that they are different species. Recently, I have examined some specimens from Spitzbergen identified as *Sphaerosyllis erinaceus* in the HZM collections and the compound chaetae are distinctly different to those reported from Australia, which are in fact a mixture of several of the species herein described in *Erinaceusyllis*. Imajima (1966) reported and described *S. erinaceus* from Japan, which agree quite well with the specimens from Spitzbergen, and these specimens are similar to *E. hartmannschroederae* n.sp., but the blades show distinct dorsoventral gradation in length. Several subspecies of *S. erinaceus* have been described from several areas, on the basis of differences in the shape and size of the compound chaetae; these differences are sufficiently important to consider them as distinct species.

Distribution. Australia (all states).

Habitat. All kind of sediments, intertidal to about 15 m depth.

Etymology. The species is named in honour to Dr Gesa Hartmann-Schröder, who reported and described many species of syllids from Australia and worldwide.

Erinaceusyllis kathrynae n.sp.

Figs. 40A–H, 41A–F

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W26400, southwest side of South Solitary Island, Australia, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. PARATYPE: 1 specimen, AM W26401, Northern side of Bannister Head, 35°19.15'S 150°29.12'E, grey sponge from top of boulder, 18 m, K. Attwood, 6 May 1997. PARATYPE: 1 specimen, AM W26402, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26408, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae &

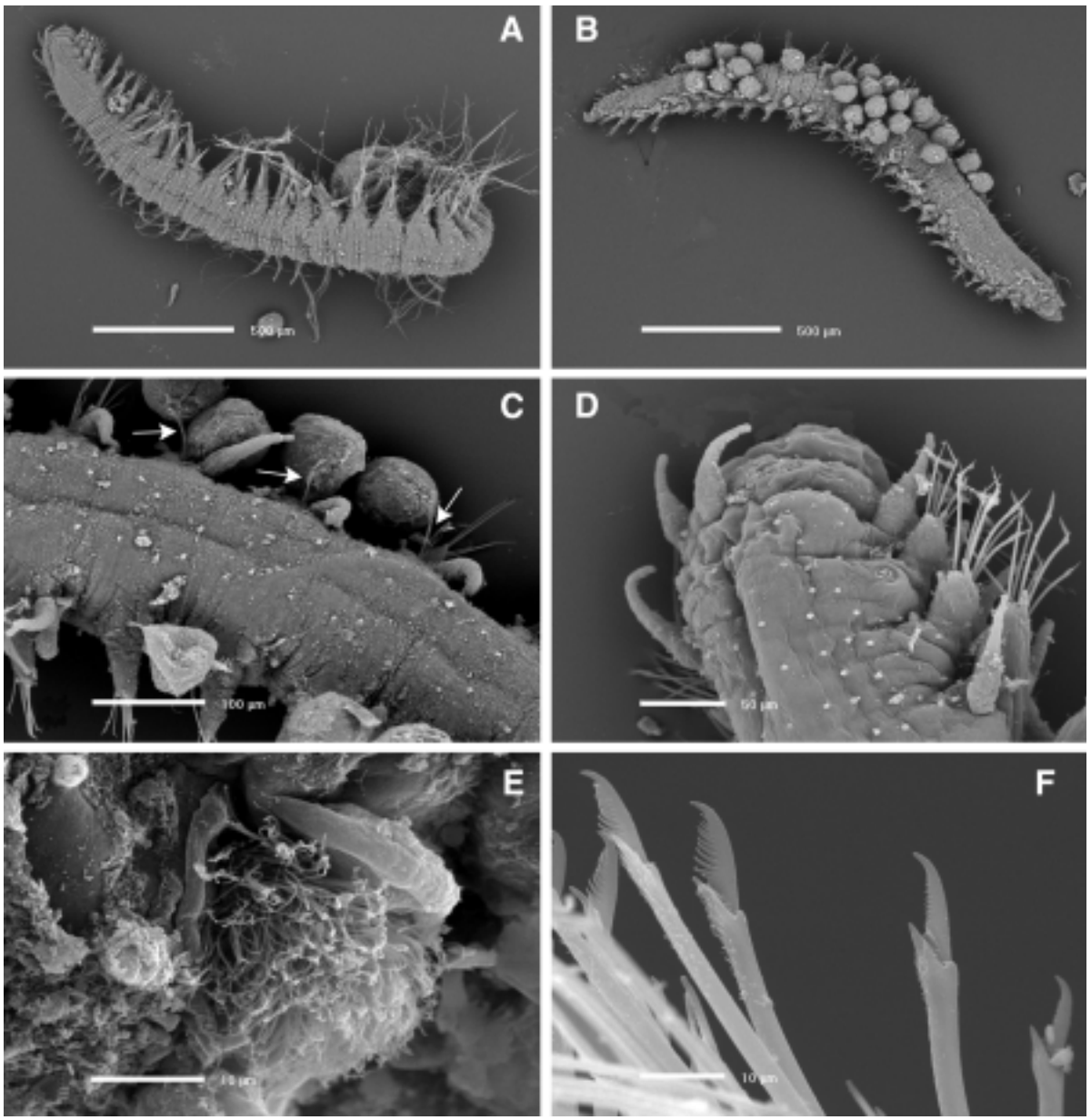


Fig. 39. SEM of *Erinaceusyllis hartmannschroederae* n.sp. (*A*) mature male with natatory chaetae, dorsal view. (*B*) mature female carrying eggs, dorsal view. (*C*) midbody of the mature female, dorsal view. (*D*) anterior end, dorsal view (right antenna and dorsal cirrus of chaetiger 1 missing). (*E*) detail of nuchal organs. (*F*) compound chaetae, midbody.

ascidians, 16 m, E.L. Albertson, 7 Mar 1992. WESTERN AUSTRALIA. 2 specimens, AM W26815, reef west of groyne, 2 km south of Cape Peron, 32°16'S 115°41'E, orange sponge in deep channel of limestone reef, 4.5 m, R.T. Springthorpe, 26 Dec 1983. 2 specimens on SEM stub, AM W26817, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 2 specimens, AM W26826, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984.

Description. Body small, holotype 2.3 mm long, 0.16 mm wide, 30 chaetigers, longest paratype 3.1 mm long, 34 chaetigers. Small, scattered papillae on dorsum and palps, more abundant on lateral margins of segments (Figs. 40A, 41A–D). Prostomium oval, wider than long; 4 large eyes in trapezoidal arrangement and 2 anterior eyespots; antennae spindle-shaped, with bulbous bases and short tips, median antenna similar to combined length of prostomium and palps, inserted between eyes, lateral antennae shorter than median antenna, located near anterior margin, lateral to eyespots. Palps shorter than prostomium, basal half fused, with distinct terminal notch, forming a bilobed structure (Figs. 40A, 41A–C), provided with few, small papillae. Peristomium similar in length to following segments, bilobed, forming 2 anterior lateral wings, covering dorsally posterior margin of prostomium (Figs. 40A, 41B,C); tentacular cirri similar to antennae but smaller. Dorsal cirri shorter than antennae, longer than tentacular cirri, with bulbous bases and short tips, absent on chaetiger 2 (Fig.

Fig. 41 (facing page). SEM of *Erinaceusyllis kathrynae* n.sp. (*A*) dorsal view, anterior end and midbody. (*B*) prostomium, peristomium and chaetiger 1 (median antenna missing). (*C*) anterior end, frontal view. (*D*) midbody parapodia, dorsal view. (*E*) compound chaeta, anterior parapodium. (*F*) compound chaeta, posterior parapodium.

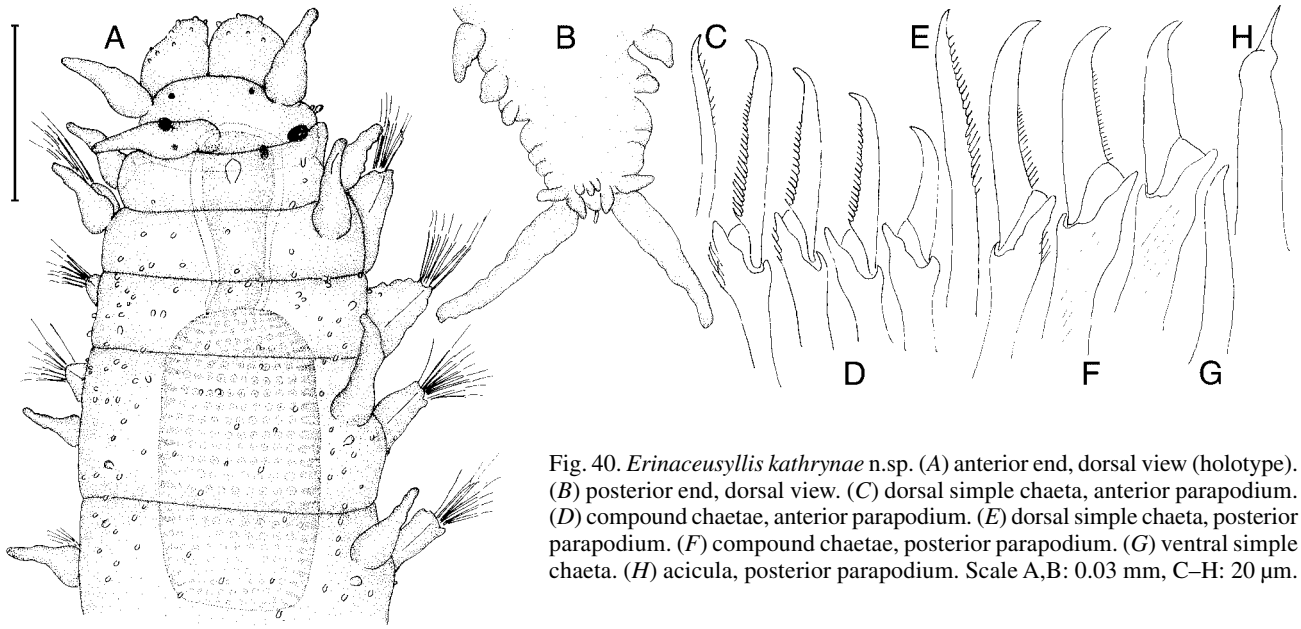
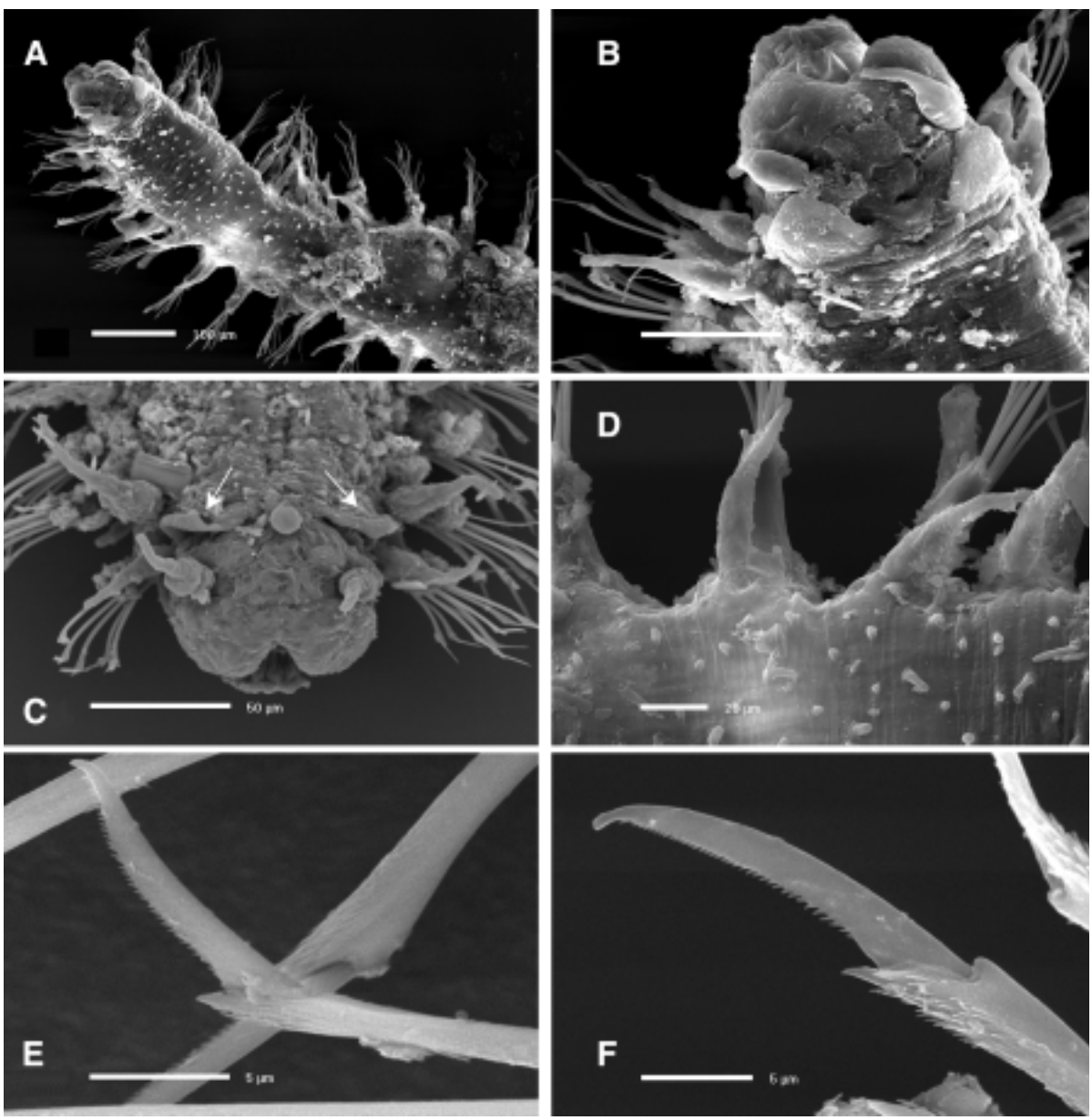


Fig. 40. *Erinaceusyllis kathrynae* n.sp. (*A*) anterior end, dorsal view (holotype). (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. (*H*) acicula, posterior parapodium. Scale A,B: 0.03 mm, C–H: 20 µm.



41A), more elongate in midbody segments (Fig. 41D). Parapodia conical, with a few papillae. Compound chaetae heterogomph, blades marginally smooth or provided with short, straight spines on longer blades, unidentate, distally slightly hooked (Figs. 40D,F, 41E,F); anterior parapodia each with 5–7 compound chaetae with usual dorsoventral gradation in length (Fig. 40D), 22–13 µm long, 4 compound chaetae on each posterior parapodia, similar to those of anterior parapodia (Fig. 40F). Dorsal simple chaetae from from chaetiger 1, unidentate, provided with short marginal spines (Fig. 40C,E). Ventral simple chaetae from midbody, slender, smooth, unidentate (Fig. 40G). Acicula solitary, acuminate, with a long, filiform tip (Fig. 40H). Pharynx proportionally slender, through 3 segments; pharyngeal tooth rhomboidal, small, located near opening (Fig. 40A). Proventricle long and wide, barrel-shaped, through 3 segments, with about 15–17 muscle cell rows. Pygidium small, with numerous long papillae, anal cirri elongate (Fig. 40B).

Remarks. *Erinaceusyllis kathrynae* n.sp. is similar to *E. cirripapillata*, but it lacks the characteristic papillae on the cirri; *Sphaerosyllis perspicax* Ehlers, 1908, which probably belongs to *Erinaceusyllis*, is also similar, but the anterior dorsal cirri are strongly inflated at their bases, the eyes and the antennae are both arranged in line, and the palps are completely fused all along their length (Ehlers, 1908).

Distribution. Australia (New South Wales, Western Australia).

Habitat. Coral rubble, sponges, encrusting and coralline algae, 3–18 m depth.

Etymology. This species is named in honour of Kathryn (Kate) Attwood, of The Australian Museum.

Genus *Sphaerosyllis* Claparède, 1863

Sphaerosyllis Claparède, 1863: 45.

Diagnosis. Body small, provided with similar dorsal and ventral papillae, sometimes extending to cirri and parapodia, usually covered by detritus. Prostomium with 3 antennae, 4 eyes, without eyespots, usually partially covered dorsally by peristomium. Palps fused all along their length. Single pair of tentacular cirri, located lateroventrally, directed to anteriorly. Antennae, tentacular and dorsal cirri short, pyriform to bulbous- or flask-shaped, with sphaerical bases and short, slender tips; dorsal cirri absent on chaetiger 2. Parapodial glands usually present and distinct, with fibrillar, hyaline, or granular material. Parapodia with compound, heterogomph chaetae with unidentate, short blades; dorsal and ventral simple, unidentate chaetae on some parapodia. Aciculae usually solitary, thick, distally bent at right angle; sometimes with another straight, slender acicula in anterior parapodia. Pharynx slender, provided with small, soft papillae around opening; pharyngeal tooth conical, on anterior margin. Proventricle short, provided with few (12–20/23), large muscle cell rows. Reproduction by epigamy with incubation; mature males provided with long, thin natatory chaetae; females without natatory chaetae, brooding eggs and juveniles ventrally.

Type species. *Sphaerosyllis hystrix* Claparède, 1863 (fide Hartman, 1959).

Remarks. The species *Sphaerosyllis bifurcata* and *S. bifurcatoides* were originally described in the genus *Parapionosyllis*; but their characters agree with the diagnosis of *Sphaerosyllis* and differ distinctly with that of *Parapionosyllis* given below. These two species are herein transferred to *Sphaerosyllis*.

Key to species of *Sphaerosyllis* recorded from Australia

1 Papillae long, distinct, with slender stalk and expanded, rounded or slightly trilobed tips. Shafts of compound chaetae distally bifid 2

—— Papillae small, rounded, without stalk. Shafts not bifid distally 5

2 Dorsal simple chaetae of midbody provided with a single, distinct spur and minute spines ..... *Sphaerosyllis rotundipapillata*

—— Dorsal simple chaetae without a single, distinct spur 3

3 Antennae shorter than prostomium and palps together. Dorsal cirri shorter than parapodial lobes. Dorsal simple chaetae distally serrated ..... *Sphaerosyllis bifurcatoides*

—— Antennae and dorsal cirri longer or similar than prostomium and palps together. Dorsal simple chaeta with spines, not serrated 4

4 Papillae distinct and numerous from anterior segments. Dorsalmost compound chaetae from midbody with a single, long subdistal spine on blade. Similar spine on ventral simple chaetae ..... *Sphaerosyllis voluntariorum* n.sp.

—— Papillae on anterior segments relatively sparse. Compound and simple chaetae without a long, subdistal spine ..... *Sphaerosyllis bifurcata*

5 Only simple chaetae from midbody; compound chaetae only on anterior parapodia ..... *Sphaerosyllis bardukaciculata* n.sp.

—— Compound chaetae on all parapodia 6

6 All antennae in line, inserted on anterior margin of prostomium 7
—— Median antenna inserted more posteriorly than lateral antennae 9

7 Dorsum appears smooth, except for few long, slender papillae on pygidium ..... *Sphaerosyllis pygipapillata*
—— Dorsum with distinct papillae 8

8 Dorsum densely papillated. Parapodial glands indistinct, with granular or hyaline material ..... *Sphaerosyllis densopapillata*
—— Dorsum relatively sparsely papillated. Parapodial glands distinct, with fibrillar material ..... *Sphaerosyllis capensis*

9 Antennae distinctly longer than prostomium and palps together ..... *Sphaerosyllis goorabantennata* n.sp
—— Antennae similar length or shorter than the combined length of prostomium and palps together 10

10 Lateral margins of midbody segments provided with few distinctly long papillae ..... *Sphaerosyllis lateropapillata*
—— Papillae all similar 11

11 Parapodial glands large, present from anteriormost segments. Median antenna inserted close to lateral antennae ..... *Sphaerosyllis georgeharrisoni* n.sp
—— Parapodial glands small, absent on more anterior segments. Median antenna distinctly posterior to lateral antennae, on posterior margin of prostomium ..... *Sphaerosyllis hirsuta*

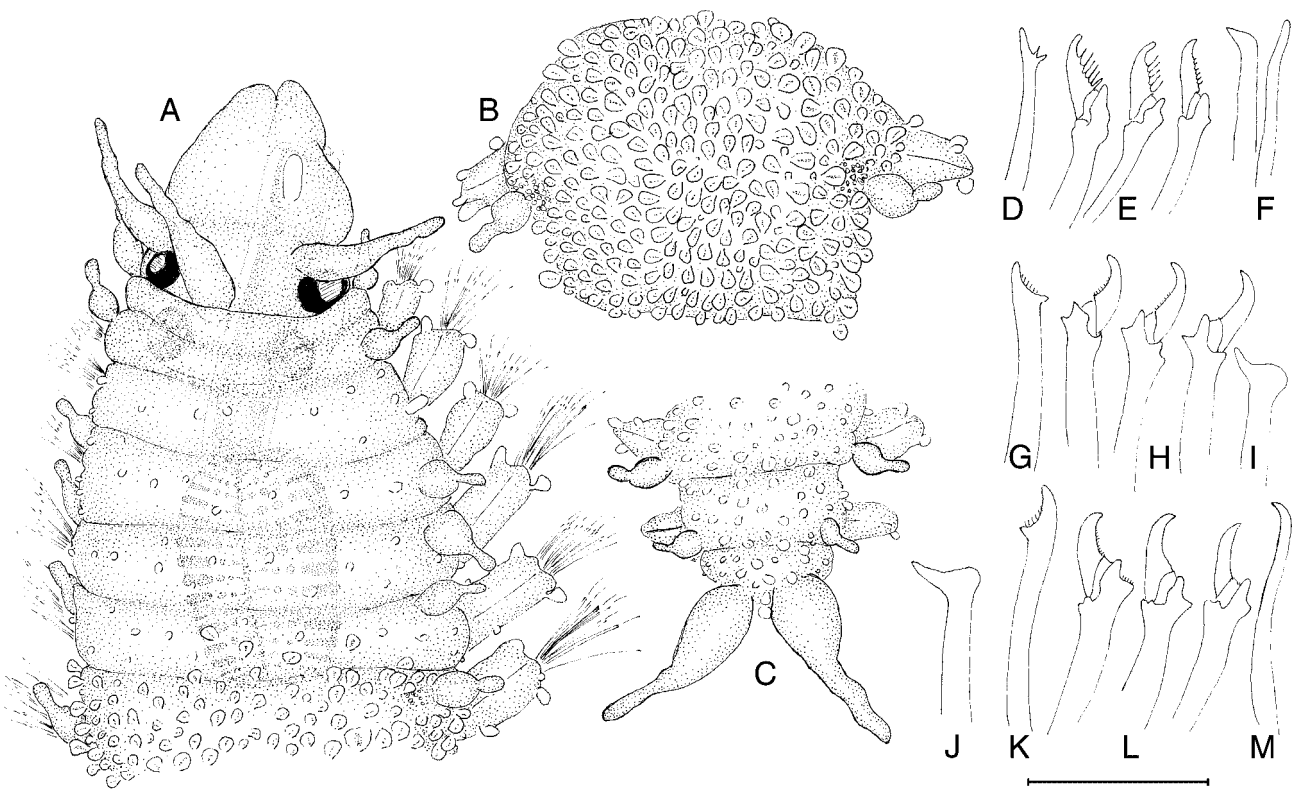


Fig. 42. *Sphaerosyllis rotundipapillata*. (*A*) anterior end, dorsal view. (*B*) midbody segment, dorsal view. (*C*) posterior end, dorsal view. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) aciculae, anterior parapodium. (*G*) dorsal simple chaeta, midbody. (*H*) compound chaetae, midbody. (*I*) acicula, midbody. (*J*) acicula, posterior parapodium. (*K*) dorsal simple chaeta, posterior parapodium. (*L*) compound chaetae, posterior parapodium. (*M*) ventral simple chaeta. Scale A–C: 0.9 mm, D–M: 20 µm.

Sphaerosyllis rotundipapillata Hartmann-Schröder, 1982

Fig. 42A–M

Sphaerosyllis rotundipapillata Hartmann-Schröder, 1982: 73, figs. 60–68; 1983: 135; 1984: 24; 1985: 24; 1991: 72.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 3 specimens, HZM P-17069, Fremantle, algae, intertidal, G. Hartmann-Schröder, 2 Nov 1975.

Description. Body small, proportionally long and slender, filiform, up to 4.1 mm long, about 0.17–0.2 mm wide, 38 chaetigers. Anterior segments with few, small round papillae (Fig. 42A); from about chaetiger 6 and midbody chaetigers, papillae numerous (Fig. 42B) covering dorsum, some papillae on parapodia, and ventrum; papillae long, distinct, with slender stalk and expanded, rounded or truncated tips (Fig. 42B), with slightly dark inclusions. Papillae absent on prostomium and palps, sparse on peristomium and more anterior and posterior segments. Prostomium trapezoidal; 4 large eyes in trapezoidal arrangement. Antennae relatively long in relation to dorsal cirri, with bulbous bases and long, slender tips, distinctly shorter than prostomium and palps together (Fig. 42A). Palps similar in length to prostomium, fused along their length, with distal notch. Peristomium shorter than following segments, covering posterior part of prostomium; tentacular cirri small, distinctly shorter than antennae. Dorsal cirri short, similar to tentacular cirri, shorter than parapodial lobes, with bulbous bases and short tips (Figs. 42A,B,C). Parapodial lobes rectangular in dorsal view, provided with 2 distal, rounded papillae (Fig. 42A). Ventral cirri relatively long, slender. Parapodial glands small, difficult to see, with granular material (Fig. 42A,B). Anterior parapodia each with 7 compound chaetae with unidentate blades; shafts more angular and thicker ventrally, with a subdistal small spur (Fig. 42E); blades of dorsal compound chaetae with long, straight marginal spines, about 9–10 µm long, blades of ventral compound chaetae smooth, similar in length to dorsal blades. Number of compound chaetae on each parapodium diminishing posteriorly to 3 on midbody (Fig. 42H) and posterior parapodia (Fig. 42L), with thick shafts provided with strong subdistal spur giving bifurcate appearance, and hooked blades, smooth or provided with short marginal spines, similar in length to those on anterior and midbody compound chaetae. Dorsal simple chaeta from anterior parapodia, usually from chaetiger 1, unidentate, with a distinct subdistal spur, provided with small superior spines (Fig. 42G,K), slender on anterior parapodia (Fig. 42D). Ventral simple chaetae present on posterior parapodia, sigmoid, distally hooked, unidentate, smooth (Fig. 42M). Most anterior parapodia each with one slender, straight acicula and another one bent at tip, forming right angle (Fig. 42F); solitary acicula with bent tip, at right angle in remaining parapodia (Fig. 42I,J). Pygidium small, with some rounded papillae and two anal cirri, similar to dorsal cirri but much longer (Fig. 42C). Pharynx through 3–4 segments; pharyngeal tooth relatively long, conical, on anterior rim (Fig. 42A). Proventricle through 2–3 segments, with 14–18 muscle cell rows.

Distribution. Australia (Western Australia, South Australia and questionably Queensland [Hartmann-Schröder, 1991]).

Habitat. Sand, amongst algae, *Posidonia* beds. Intertidal and shallow bottoms.

Sphaerosyllis bifurcatoides (Hartmann-Schröder, 1979) n.comb.

Fig. 43A–J

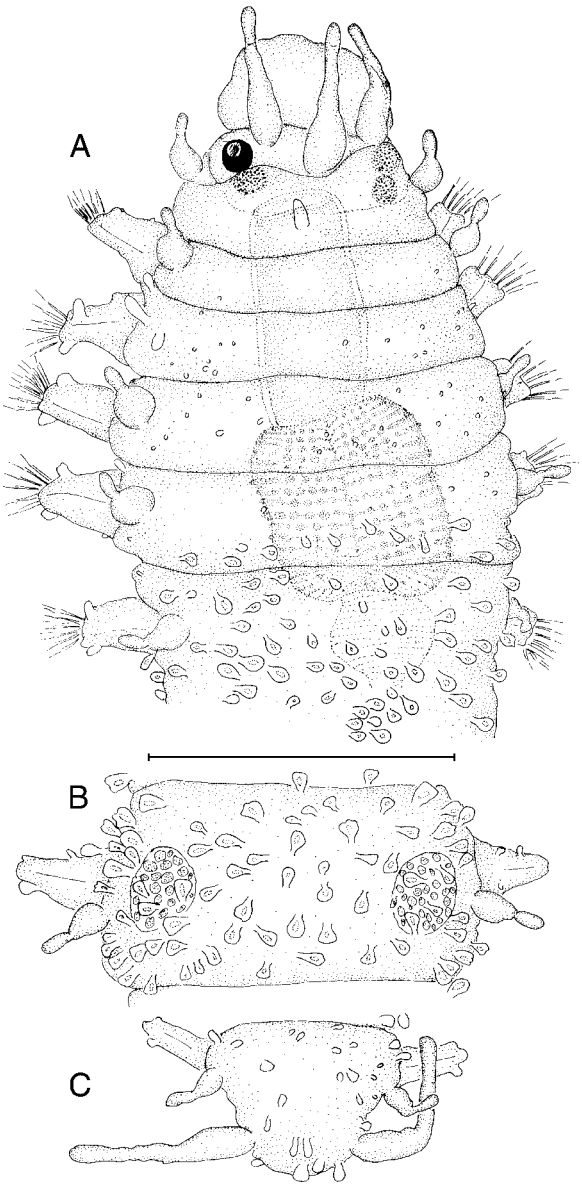
Parapionosyllis bifurcatoides Hartmann-Schröder, 1979: 97, figs. 112–118; 1991: 35.

Material examined. AUSTRALIA: VICTORIA. 14 specimens, MV F62748, Eastern Bass Strait, 11.7 km W of Pt. Ricardo, 37°49.90'S 148°30.01'E, 29 m depth, 28 Sept 1990. 2 specimens, MV F87426, off Werribee, Port Phillip Bay, 38°02.3'S 144°41.3'E, sand, 10 m depth, 10 Jun 1971. WESTERN AUSTRALIA.1 specimen, AM W26821, the Blow Holes, Point Quobba, 113°25'E 24°39'S, exposed intertidal rock shelf, short tufted clumps of brown algae, 7 Jan 1984.

Description. Body small, slender, 1.9 mm long, 0.15 mm wide, 32 chaetigers. Anterior segments with few, small dorsal papillae (Fig. 43A); from post-proventricular segments posteriorly, papillae numerous (Fig. 43A,B) covering dorsum, some papillae on parapodia; papillae long, distinct, with slender stalk and expanded, rounded or slightly trilobed tips (Figs. 43A,B,G), with dark inclusions. Papillae absent on prostomium and palps, scarce on peristomium and more anterior segments. Prostomium ovate to trapezoidal; 4 large eyes in trapezoidal arrangement. Antennae relatively long, with bulbous bases and long, slender tips, shorter than combined length of prostomium and palps (Fig. 43A) or similar in length. Palps short, broad, fused along their length. Peristomium similar in length to following segments, anterior margin slightly bilobed, covering posterior part of prostomium; tentacular cirri shorter than antennae, with bulbous bases and short, distally rounded tips. Dorsal cirri short, similar to tentacular cirri, slightly shorter than parapodial lobes, with bulbous bases and slender tips (Fig. 43A,B). Parapodial lobes rectangular, provided with 2 distal, rounded papillae (Fig. 43A). Ventral cirri relatively long, slender. Parapodial glands large, difficult to see, with granular material (Figs. 43B). Anterior parapodia each with 6–7 compound chaetae with unidentate, short blades; shafts more angular and thicker ventrally, with a subdistal spur (Fig. 43E); blades of dorsal compound chaetae with moderate, straight marginal spines, blades of ventral compound chaetae smooth, all blades similar in length, about 8 µm long. Number of compound chaetae on each parapodium diminishing posteriorly to 3 on posterior parapodia, with thick shafts provided with strong subdistal spur giving bifurcate appearance, and hooked blades, smooth or provided with short marginal spines (Fig. 43J), similar to those of anterior parapodia. Dorsal simple chaetae from anterior parapodia, unidentate, with few subdistal, irregular serrations on margin (Fig. 43D,I). Ventral simple chaetae present on posterior parapodia, sigmoid, unidentate, smooth (Fig. 43K). Solitary acicula with bent tip, forming right angle (Fig. 43F,H). Pygidium small, with a few rounded papillae and 2 anal cirri, longer than dorsal cirri (Fig. 43C). Pharynx through 3–4 segments; pharyngeal tooth conical, on anterior rim (Fig. 43A). Proventricle small, through 2 segments, with 15 muscle cell rows.

Distribution. Australia (Western Australia, Victoria, Queensland).

Habitat. Sand, coral sand, algae; intertidal to about 15 m depth.



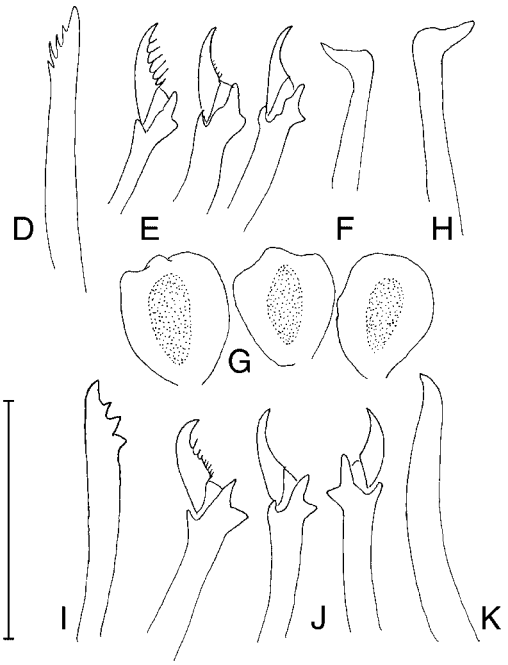


Fig. 43. *Sphaerosyllis bifurcatoides*. (*A*) anterior end, dorsal view. (*B*) midbody segment, dorsal view. (*C*) posterior end, dorsal view. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) acicula, anterior parapodium. (*G*) detail of papillae. (*H*) acicula, posterior parapodium. (*I*) dorsal simple chaeta, posterior parapodium. (*J*) compound chaetae, posterior parapodium. (*K*) ventral simple chaeta. Scale A–C: 70 μm, D–K: 20 μm.

***Sphaerosyllis voluntariorum* n.sp.**

Fig. 44A–I

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE: AM W26821, Ningaloo reef off Ned's Camp, Cape Range National Park, 21°59.5'S 113°54.5'E, mixed algae, 2 m, J.K. Lowry, 1 Jan 1984.

Description. Body small, slender, 1.4 mm long, 0.14 mm wide, 26 chaetigers. Papillae numerous (Figs. 44A,B,C) covering dorsum, few papillae on parapodia; papillae long, distinct, with slender stalk and expanded, rounded or slightly trilobed tips, with dark inclusions. Papillae absent on prostomium and palps. Prostomium ovate to trapezoidal, wider than long; 4 large eyes in trapezoidal arrangement. Antennae relatively long, with bulbous bases and long, slender tips, similar to combined length of prostomium and palps (Fig. 44A). Palps similar in length to prostomium, fused along their length, ventrally folded. Peristomium similar in length to following segments, covering posterior half of prostomium; tentacular cirri shorter than antennae. Dorsal cirri similar to tentacular cirri, similar in length to parapodial lobes, with bulbous bases and slender tips (Fig. 44A,C), elongate on midbody. Parapodial lobes conical, provided with 2 subdistal, rounded papillae (Fig. 44A,C), and sometimes few other basal papillae similar to dorsal papillae (Fig. 44C). Ventral cirri relatively long, slender. Parapodial glands small, difficult to see, with granular material (Fig. 44A,C). Anterior parapodia each with 5 compound chaetae with unidentate blades (Fig. 44D); blades of dorsal compound chaetae with moderate, straight marginal spines, about 12 μm long, blades of ventral compound chaetae smooth, about 9 μm long. Number of compound chaetae on each parapodium diminishing posteriorly to 3 on posterior parapodia, with thick shafts provided with strong subdistal spur giving bifurcate appearance, and hooked blades, smooth, provided with a long, distinct subdistal spine on most dorsal compound chaetae (Fig. 44G), about 10–9 μm long. Dorsal simple chaetae from chaetiger 1, unidentate, with few subdistal marginal spines (Fig. 44F). Ventral simple chaetae on posterior parapodia, sigmoid, distally hooked, unidentate, smooth, provided with a long, distinct subdistal spine (Fig. 44H). Parapodia each with solitary, slender acicula, bent to a right angle (Fig. 44E,I). Pygidium small, with numerous, rounded papillae, and 2 anal cirri, similar to dorsal cirri but much longer (Fig. 44B). Pharynx through 3 segments; pharyngeal tooth not seen; probably located on anterior rim (Fig. 44A). Proventricle through 1–2 segments, with 12 muscle cell rows.

Remarks. This species is closely related to *Sphaerosyllis bifurcata, S. bifurcatoides* and *S. rotundipapillata*, all Australian endemic species, all characterized by having large, distinct dorsal papillae, distally rounded or trilobed,

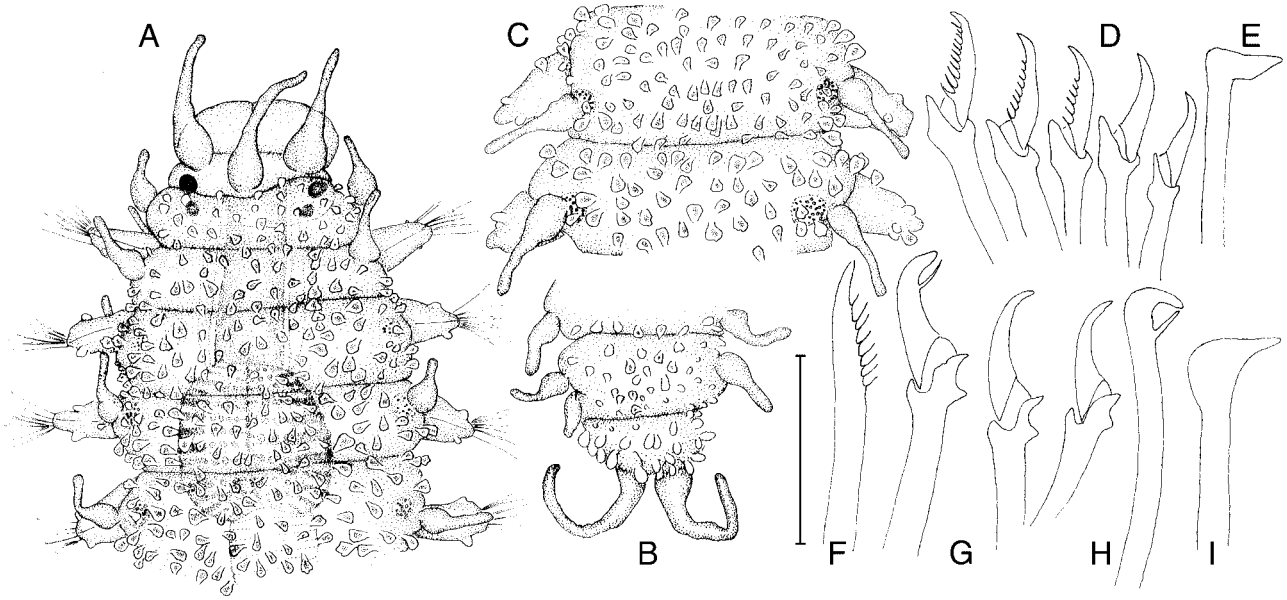


Fig. 44. *Sphaerosyllis voluntariorum* n.sp. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) midbody segments, dorsal view. (*D*) compound chaetae, anterior parapodium. (*E*) acicula, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A–C: 82 µm, D–H: 28 µm.

and shafts of compound chaetae distally bifid. *Sphaerosyllis voluntariorum* is represented by a single specimen, but it is distinctly different to these three species because it is more densely papillated on anterior segments and by having a long, distinct subdistal spine on the ventral simple chaetae and on the blades of dorsalmost, posterior compound chaetae.

Distribution. Australia (Western Australia).

Habitat. On algae, 2 m depth.

Etymology. This species is dedicated to the volunteers of the Marine Invertebrate section of The Australian Museum, who sorted samples from all around Australia, extracting specimens of syllids for this study.

Sphaerosyllis bifurcata (Hartmann-Schröder, 1979) n.comb.

Fig. 45A–I

Parapionosyllis bifurcata Hartmann-Schröder, 1979: 96, figs. 105–111; 1991: 35.

Material examined. AUSTRALIA: QUEENSLAND.1 specimen on SEM stub, AM W26932, Haughton River estuary, near Cungulla, 19°24'S 147°6'E, tidal flats (mud & sand); mudflat with *Avicennia* mangroves, S. Dittmann, 5 Sep 1991. NEW SOUTH WALES. 4 specimens, AM W26707, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson *et al*., 3 Mar 1992.

Description. Body small, slender, 3 mm long, 0.17 mm wide, 32 chaetigers. Anterior segments with few papillae

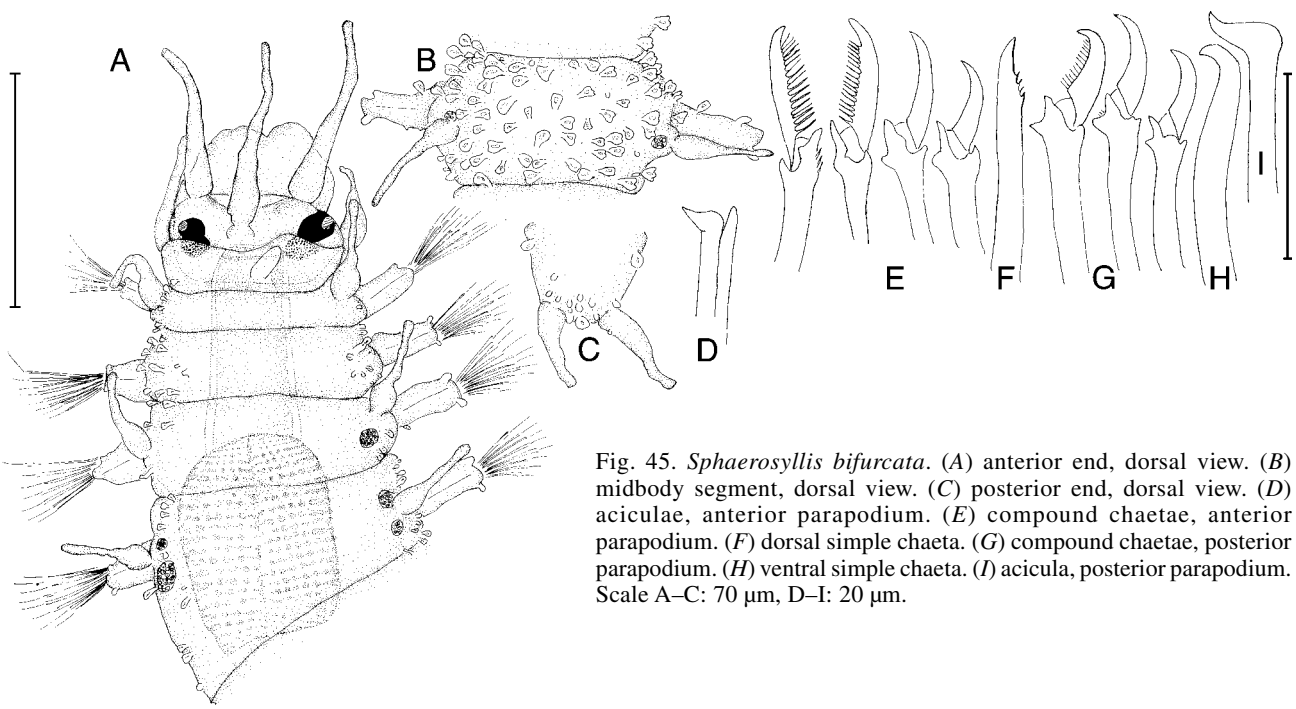


Fig. 45. *Sphaerosyllis bifurcata*. (*A*) anterior end, dorsal view. (*B*) midbody segment, dorsal view. (*C*) posterior end, dorsal view. (*D*) aciculae, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) dorsal simple chaeta. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A–C: 70 µm, D–I: 20 µm.

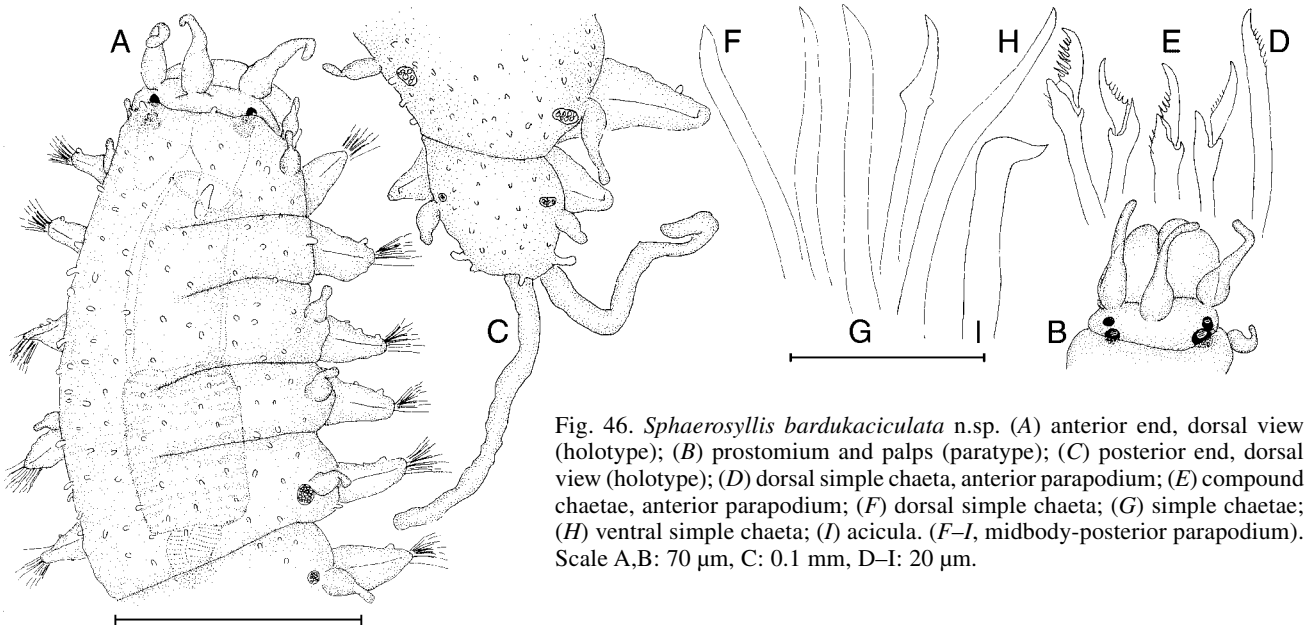


Fig. 46. *Sphaerosyllis bardukaciculata* n.sp. (*A*) anterior end, dorsal view (holotype); (*B*) prostomium and palps (paratype); (*C*) posterior end, dorsal view (holotype); (*D*) dorsal simple chaeta, anterior parapodium; (*E*) compound chaetae, anterior parapodium; (*F*) dorsal simple chaeta; (*G*) simple chaetae; (*H*) ventral simple chaeta; (*I*) acicula. (*F–I*, midbody-posterior parapodium). Scale A,B: 70 μm, C: 0.1 mm, D–I: 20 μm.

on dorsolateral position (Fig. 45A); from midbody, papillae numerous (Fig. 45B) covering dorsum, few papillae on parapodia; papillae long, distinct, with slender stalk and expanded, rounded or slightly trilobed tips (Fig. 45B), with dark inclusions. Papillae absent on prostomium and palps, scarce on peristomium and anteriormost segments. Prostomium ovate to trapezoidal, wider than long; 4 thick eyes in trapezoidal arrangement. Antennae relatively long, with bulbous bases and long, slender tips, longer than combined length of prostomium and palps (Fig. 45A). Palps similar in length to prostomium, fused all along their length, with distal notch. Peristomium similar in length to following segments, anterior margin slightly bilobed, covering posterior part of prostomium; tentacular cirri relatively long but shorter than antennae. Dorsal cirri relatively long, shorter than tentacular cirri, similar in length to parapodial lobes, with bulbous bases and slender tips (Fig. 45A,B). Parapodial lobes rectangular in dorsal view, provided with 2 distal, rounded papillae (Fig. 45A), and sometimes few other basal papillae similar to dorsal papillae (Fig. 45B). Ventral cirri relatively long, slender. Parapodial glands small, difficult to see, with granular material (Fig. 45A,B). Anterior parapodia each with 6–7 compound chaetae with unidentate blades; shafts thicker ventrally, with a subdistal spur (Fig. 45E); blades of dorsal compound chaetae with long, straight marginal spines, about 16 μm long, blades of ventral compound chaetae smooth, about 12–10 μm long. Number of compound chaetae on each parapodium decreasing posteriorly to 3 on posterior parapodia, with thick shafts provided with strong subdistal spur giving bifurcate appearance, and hooked blades, smooth or provided with short marginal spines (Fig. 45G), about 10 μm long. Dorsal simple chaetae from anterior parapodia, unidentate, with few subdistal marginal spines (Fig. 45F). Ventral simple chaetae on posterior parapodia, sigmoid, distally hooked, unidentate, smooth (Fig. 45H). Anteriormost parapodia each with one slender, straight acicula and another one bent at tip, forming right angle (Fig. 45D); solitary acicula with bent tip, forming right angle in remaining parapodia (Fig. 45I). Pygidium small, with a few rounded papillae and 2 anal cirri, similar to dorsal cirri but slightly thicker (Fig. 45C). Pharynx through 3–4 segments; pharyngeal tooth relatively long, conical, on anterior rim (Fig. 45A). Proventricle through 2 segments, with 15 muscle cell rows.

Remarks. The aciculae were described as distally rounded in the original description; depending upon the view, the aciculae appear to be rounded in some parapodia, but they have the typical shape of *Sphaerosyllis* in lateral view.

Distribution. Australia (Western Australia, New South Wales, Queensland).

Habitat. Mud, fine to coarse sand, gravel. Intertidal to 15 m depth.

Sphaerosyllis bardukaciculata n.sp.

Fig. 46A–I

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: AM W26712, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1985. PARATYPES: 4 specimens, AM W26713, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1985. 1 specimen (identified as *Brania opisthodentata*), ZHM P-21030, Heron Island, coarse sand, intertidal, G. Hartmann-Schröder, 4 Feb 1976.

Description. Body small, 2.3 mm long, 0.15 mm wide, 24 chaetigers. Dorsal surface provided with short papillae (Fig. 46A,C). Prostomium ovate, partially covered dorsally by peristomium (Fig. 46A,B), wider than long; 4 eyes in trapezoidal arrangement; antennae longer than prostomium, shorter than combined length of prostomium and palps (Fig. 46A); median antenna inserted in front of anterior eyes, slightly posteriorly to lateral antennae; lateral antennae inserted on anterior margin of prostomium (Fig. 46A,B). Palps fused all along their length, with a dorsal furrow (Fig. 46B). Dorsal cirri short on anterior segments (Fig. 46A), slightly longer on midbody and posterior segments (Fig. 46C), absent on chaetiger 2. Parapodial glands small, with granular material, present from chaetigers 4–5 (Fig. 46A,C). Anterior parapodia each with 3–4 compound chaetae, with short, unidentate blades, provided with moderate to short marginal spines, spines longer on dorsalmost chaetae (Fig. 46E), about 8 μm long, and dorsal simple chaeta, unidentate, with short marginal spines (Fig. 46D); progressively, blades

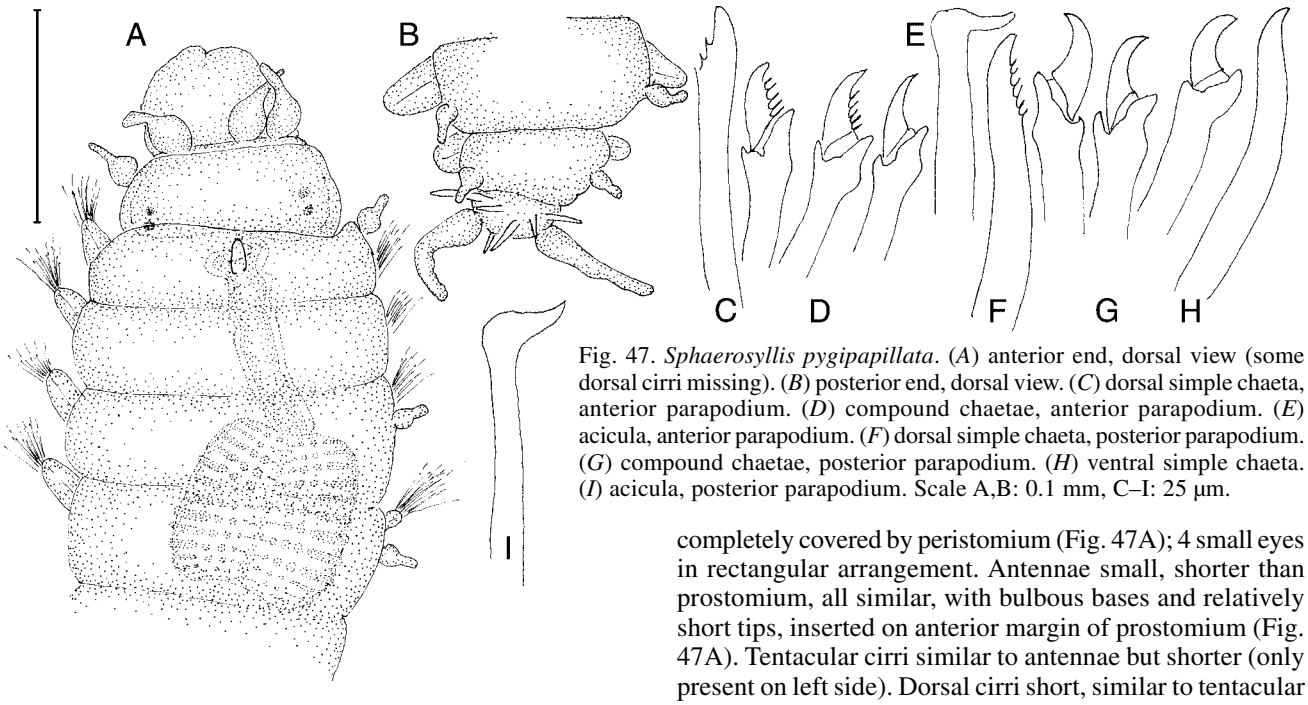


Fig. 47. *Sphaerosyllis pygipapillata*. (*A*) anterior end, dorsal view (some dorsal cirri missing). (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) acicula, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,B: 0.1 mm, C–I: 25 µm.

of compound chaetae missing and shafts enlarging, forming thick simple chaetae; from midbody posteriorly, parapodia each with 4 simple chaetae by modification of compound chaetae (Fig. 46G), dorsal (Fig. 46F) and ventral (Fig. 46H) unidentate, smooth, simple chaetae. Acicula solitary, distally bent at right angle (Fig. 46I). Pharynx through about 3 segments (Fig. 46A), pharyngeal tooth relatively long, on anterior margin. Proventricle through 2 segments (Fig. 46A), with 23 muscle cell rows. Pygidium small, provided with relatively long papillae, and 2 long anal cirri (Fig. 46C).

Remarks. *Sphaerosyllis bardukaciculata* n.sp. is similar to *Sphaerosyllis aciculata* Perkins, 1981, from Florida; the chaetae are nearly identical; *S. bardukaciculata*, however, differs from *S. aciculata* in having longer antennae and anal cirri, and parapodial glands with granular material instead of fibrillar material (Perkins, 1981).

Distribution. Australia (Queensland).

Habitat. Coarse sand.

Etymology. The name is derived from the Aboriginal word *barduk*, meaning "near", referring to its similarity with *S. aciculata*.

Sphaerosyllis pygipapillata Hartmann-Schröder, 1981

Fig. 47A–I

Sphaerosyllis pygipapillata Hartmann-Schröder, 1981: 38, figs. 73–76.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE, HZM 16490, Exmouth, Tantabiddy Creek, intertidal sand, G. Hartmann-Schröder, 11 Oct 1975.

Description. The single known specimen is small, 1.08 mm long, 0.14 mm wide, 19 chaetigers, complete, apparently without papillae on dorsum. Prostomium rectangular, completely covered by peristomium (Fig. 47A); 4 small eyes in rectangular arrangement. Antennae small, shorter than prostomium, all similar, with bulbous bases and relatively short tips, inserted on anterior margin of prostomium (Fig. 47A). Tentacular cirri similar to antennae but shorter (only present on left side). Dorsal cirri short, similar to tentacular cirri (Fig. 47A). Parapodial glands not seen. Anterior parapodia each with about 4–5 compound chaetae, blades unidentate, provided with short marginal spines or smooth, longer on dorsal chaetae (Fig. 47D), blades all similar and short, about 5 µm long. Progressively posteriorly, number of compound chaetae on each parapodium decreasing to 3 on posterior parapodia, with similar blades, all smooth (Fig. 47G), slightly hooked. Dorsal simple chaetae from chaetiger 1, unidentate, provided with short marginal spines (Fig. 47C,F). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 47H). Acicula solitary, distally bent at right angle (Fig. 47E,I). Pygidium small, provided with a few long, acute papillae and 2 anal cirri, similar in shape to dorsal cirri but much longer (Fig. 47B). Pharynx slender, through 3 segments (Fig. 47A); pharyngeal tooth anteriorly located. Proventricle small, through 2 segments, with 13 muscle cell rows.

Distribution. Australia (Western Australia).

Habitat. Fine sand, intertidal.

Sphaerosyllis densopapillata Hartmann-Schröder, 1979

Figs. 48A–H, 49A,B

Sphaerosyllis capensis densopapillata Hartmann-Schröder, 1979: 104, figs. 141–143; 1980: 54; 1981: 36; 1982: 69; 1990: 53.
Sphaerosyllis cuticulata Hartmann-Schröder, 1991(in part): 41, figs. 68–72.

Material examined. AUSTRALIA: QUEENSLAND. 2 specimens, AM W26566, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 2 specimens, AM W26577, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, Jan 1977. 1 specimen, AM W26714, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. 2 specimens, AM W26933, Hinchinbrook Channel, 18°20'S 146°4'E, tidal flats (mud & sand), S. Dittmann, 14 Oct 1989. WESTERN AUSTRALIA. 4 specimens, AM W17727, Exmouth, near Tantabiddy Creek, 21°56'S 113°58'E, algae & crusts, G. Hartmann-Schröder, 11 Jan 1975. 1 specimen, AM W26626, off south end of Long

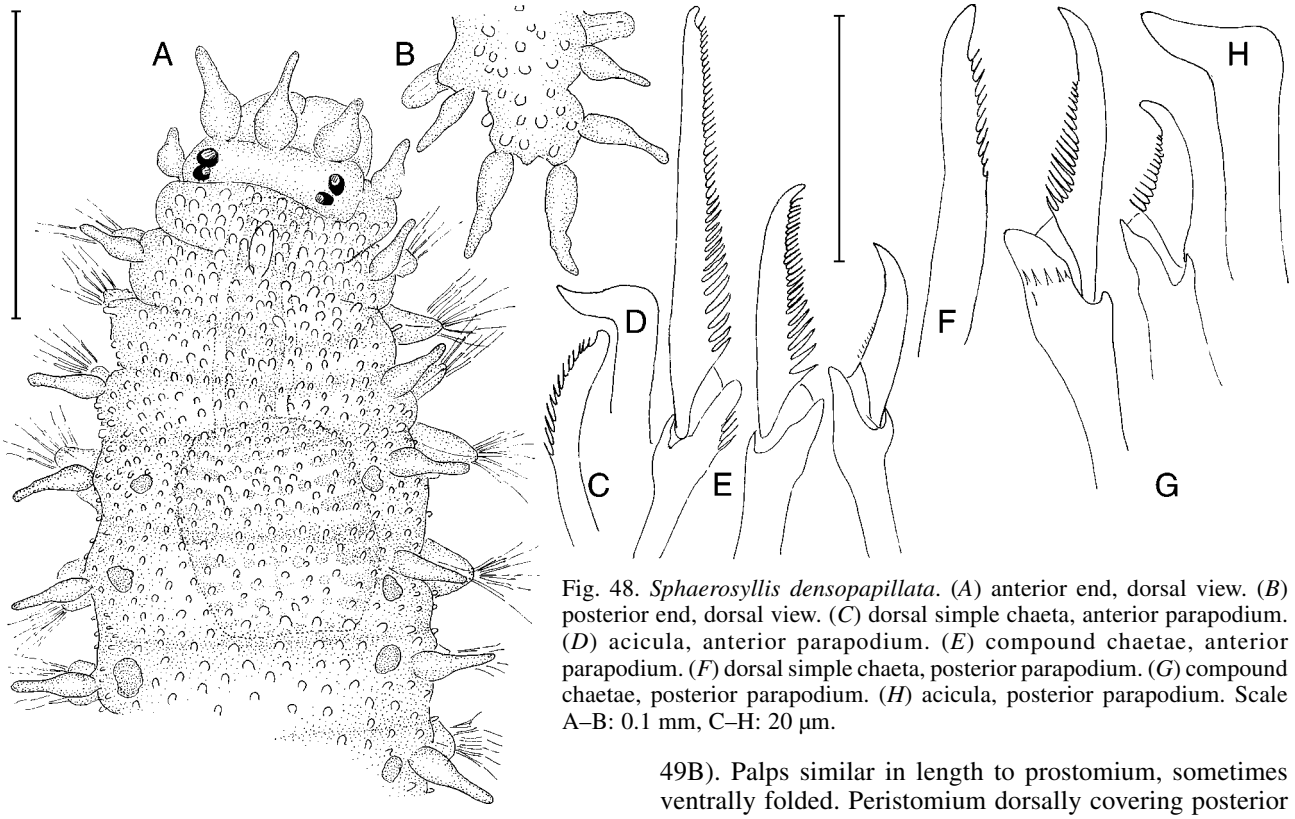


Fig. 48. *Sphaerosyllis densopapillata*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) acicula, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) acicula, posterior parapodium. Scale A–B: 0.1 mm, C–H: 20 µm.

Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 3 specimens, AM W26627, east side of Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, intertidal; fauna in sand under boulders; very low tide, 0 m, P.A. Hutchings, 24 May 1994. 1 specimen, AM W26628, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* with coralline algae, sponges & ascidians, 23 m, P.A. Hutchings, 19 May 1994. 7 specimens, AM W26629, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 1 specimen, AM W26630, south west corner of Lucas Island, Kimberleys, 15°13'S 124°31'E, 30 m, P.A. Hutchings, 24 July 1988. 46 specimens, AM W26631, north end of Long Island, Goss Passage, 28°27.9'S 113°46.3'E, dead coral covered in coralline algae & brown algae, 6 m, C. Bryce, 22 May 1994. 50 specimens and 6 specimens on SEM stub, AM W27641, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimens, AM W27647, Lafontaine Island, Kimberley region, 14°10'S 125°47'E, 15 m, P.A. Hutchings, 19 July 1988. 11 specimens, AM W27648, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27655, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984. 1 specimen, AM W27659, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry & R.T. Springthorpe, 6 Jan 1984.

Additional material. HOLOTYPE. HZM P-20560, Heron Island, G. Hartmann-Schröder.

Description. Body small, relatively short, up to 2.5 mm long, 0.12 mm wide, 26 chaetigers. Dorsal surface provided with numerous, rounded papillae, present from peristomium to pygidium (Figs. 48A,B, 49A,B). Prostomium rectangular; 4 eyes in rectangular to trapezoidal arrangement, close to each other on each side. Antennae inserted on anterior margin of prostomium, all similar or median antenna slightly longer than lateral antennae, all longer than palps, shorter than combined length of prostomium and palps (Figs. 48A, 49B). Palps similar in length to prostomium, sometimes ventrally folded. Peristomium dorsally covering posterior part of prostomium, similar in length to following segments; tentacular cirri slightly shorter than antennae. Dorsal cirri similar to tentacular cirri, slightly elongate (Fig. 48A), especially on far posterior segments (Fig. 48B). Small, indistinct parapodial glands with hyaline to granular material from chaetiger 4 (Fig. 48A), difficult to see. Anterior parapodia each with about 6 compound chaetae, numbers declining posteriorly to 3 on posterior parapodia; strong dorsoventral gradation in length of blades, especially on anterior segments, 36 µm above 16 µm below (Fig. 48E), less marked on posterior parapodia, 24 µm above 14 µm below (Fig. 48G); longer blades provided with long marginal spines basally, spines shorter on ventral and posterior chaetae. Dorsal simple chaetae from anterior parapodia, curved, unidentate, provided with short marginal spines (Fig. 48C), slightly thicker on posterior parapodia (Fig. 48F). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, unidentate. Acicula solitary, distally bent at right angle (Fig. 48D), thicker posteriorly (Fig. 48H). Pharynx through 3–4 segments; pharyngeal tooth relatively long (Fig. 48A). Proventricle small, through 2 segments, with 13–14 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but longer (Fig. 48B).

Remarks. *Sphaerosyllis densopapillata*, originally described as a subspecies of *S. capensis*, is similar to *S. magnidentata* Perkins, 1981 from Florida, Bahamas, Cuba, Belize, and the Canary Islands. Both species have a similar size, arrangement of antennae, parapodial glands small, with hyaline contents, and a large pharyngeal tooth (see Perkins, 1981; Russell, 1991; Núñez *et al*., 1992). *Sphaerosyllis densopapillata*, however, has many more dorsal papillae; juvenile specimens have a less densely papillated dorsum, and the papillae are more difficult to see on specimens covered by a dense coat of detritus. I have examined the holotype and 11 paratypes of the species *S. cuticulata*

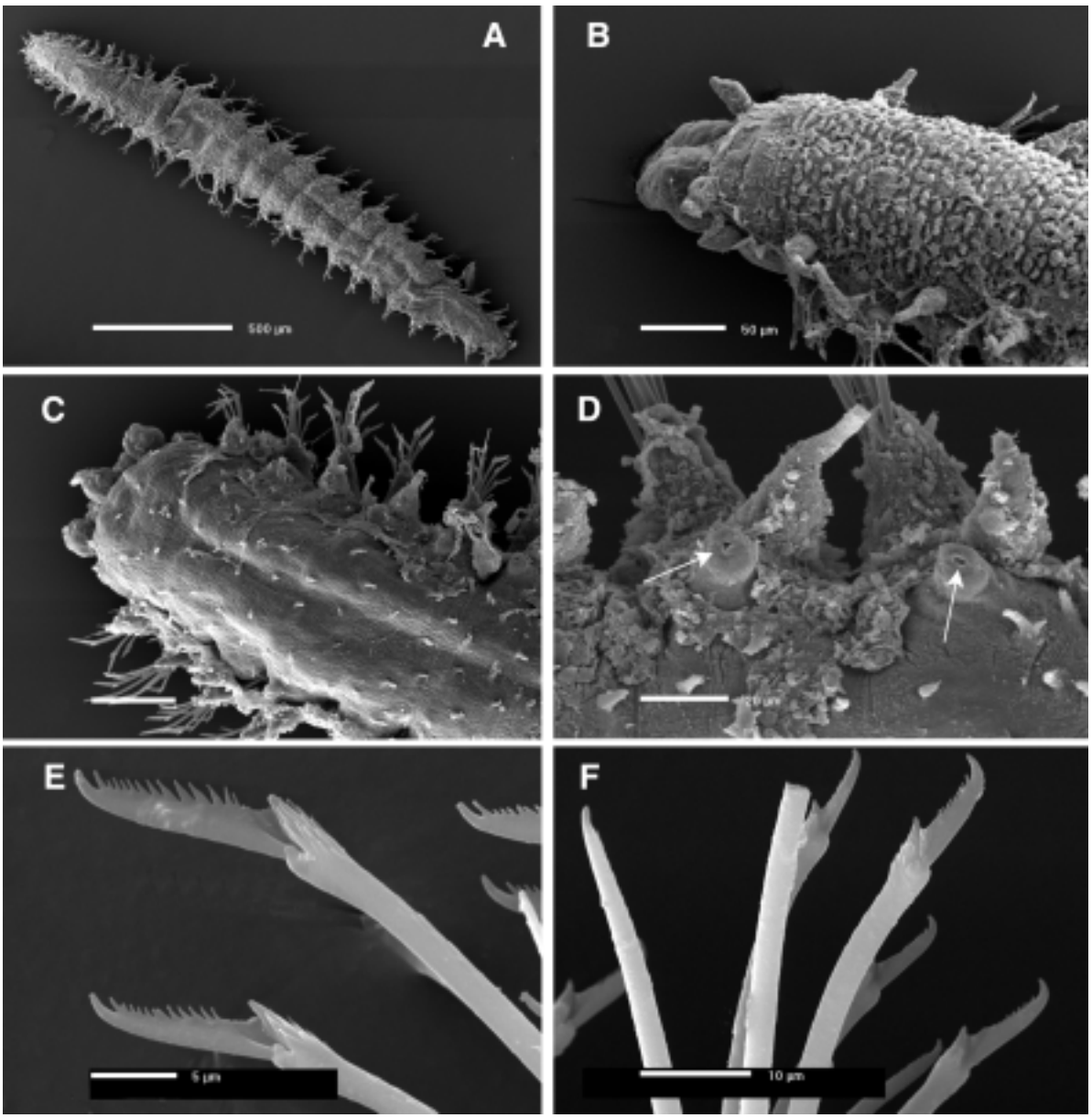


Fig. 49. SEM of *Sphaerosyllis densopapillata*. (*A*) dorsal view, mature male with natatory chaetae. (*B*) anterior end, dorsal view. SEM of *Sphaerosyllis capensis*. (*C*) anterior end, dorsal view. (*D*) midbody parapodia. (*E*) anterior compound chaetae. (*F*) chaetal bundle.

Hartmann-Schröder, 1991; the holotype appears to be a juvenile specimen of *S. densopapillata*, with less papillated dorsum than the larger specimens; the paratypes belong to *S. capensis* (see below).

Distribution. Australia (Western Australia, Queensland, New South Wales).

Habitat. Sand, from fine to coarse. Amongst algae, inside corals and coralline algae. Intertidal to about 30 m depth.

Sphaerosyllis capensis Day, 1953

Figs. 49C–F, 50A–I

Sphaerosyllis hystrix var. *capensis* Day, 1953: 420, fig. g–l.
Sphaerosyllis capensis.–Day, 1967: 276, fig. 12.II.g–j; Hartmann-Schröder, 1974a: 133, pl. 12, figs. 111–115.
Sphaerosyllis cuticulata Hartmann-Schröder, 1991 (in part): 41.

Material examined. AUSTRALIA:. WESTERN AUSTRALIA. 2 specimens, AM W26798, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plates of *Acropora*, covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27657, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 1 specimen, and 2 specimens on SEM stub, AM W27658, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984.

Additional material. 11 paratypes of *Sphaerosyllis cuticulata*, HZM P-20560, Heron Island, G. Hartmann-Schröder.

Description. Body small, short, 1.7 mm long, 0.14 mm wide, 18 chaetigers, dorsum sparsely covered with small papillae, extending to palps and parapodia (Figs. 49C,D, 50A,B). Prostomium rectangular, mostly covered by peristomium (Fig. 49C, 50A); 4 eyes in trapezoidal arrangement. Antennae similar in length to prostomium or

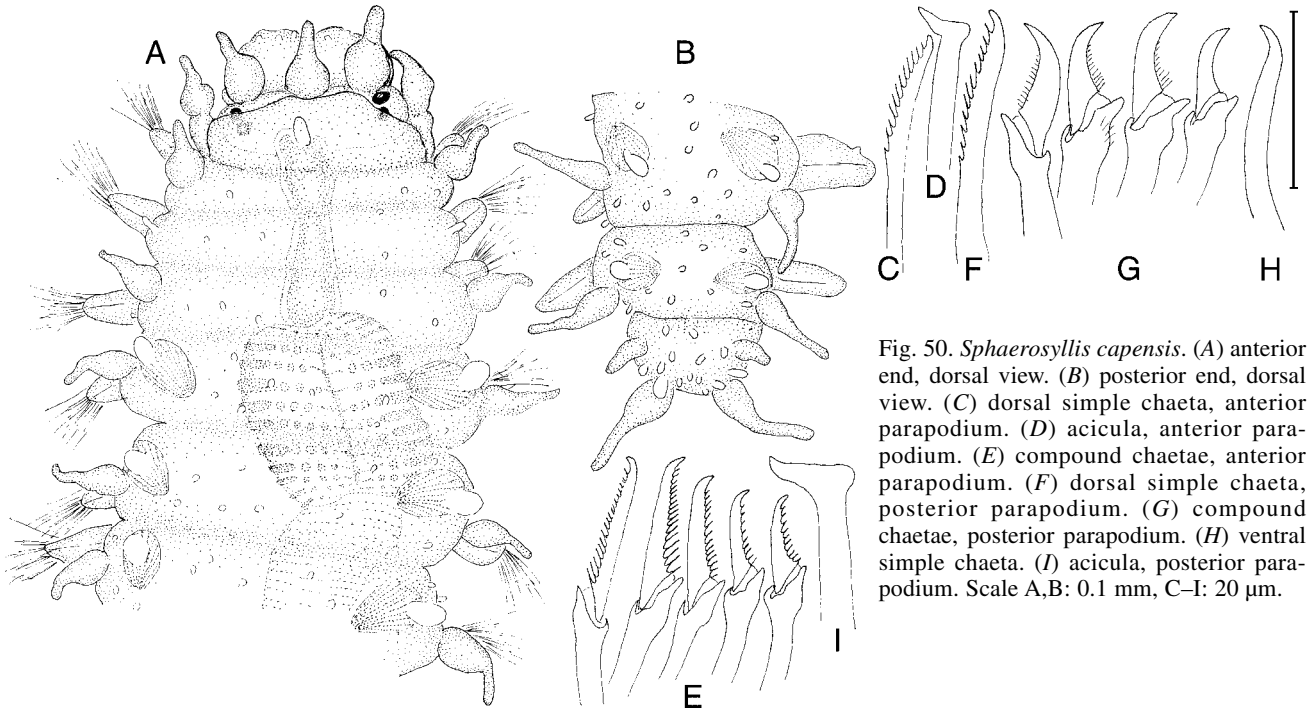


Fig. 50. *Sphaerosyllis capensis*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) acicula, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,B: 0.1 mm, C–I: 20 μm.

slightly longer, all similar, with bulbous bases and moderate tips, inserted on anterior margin of prostomium, just in front of anterior eyes (Figs. 49C, 50A). Tentacular cirri similar to antennae but shorter. Dorsal cirri short, similar to tentacular cirri (Fig. 50A), slightly elongate from midbody (Figs. 49D, 50B). Parapodial glands from chaetiger 4, large, distinct, with fibrillar material (Fig. 50A), provided each with a distinct large dorsal papilla longer than all other papillae (Fig. 50A,B), opening by a pore (Fig. 49D). Anterior parapodia each with about 7–8 compound chaetae, blades unidentate, provided with moderately long marginal spines, longer on dorsal chaetae (Fig. 50E), with a subdistal spine longer than others (Fig. 49E), and marked dorsoventral gradation in length, about 23 μm above, 13 μm below. Progressively posteriorly number of compound chaetae on each parapodium decreasing to 5–6, with larger shafts and shorter blades, about 15–13 μm long, slightly hooked, smooth or provided with short marginal spines (Figs. 49F, 50G). Dorsal simple chaetae from chaetiger 1, unidentate, provided with moderately long marginal spines (Fig. 50C,F). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 50H). Acicula solitary, with tips bent at right angle (Fig. 50D,I). Pygidium small, provided with few papillae and 2 anal cirri, similar in shape to dorsal cirri but longer. Pharynx slender, through 3 segments; pharyngeal tooth anteriorly located. Proventricle small, through 2 segments, with 14 muscle cell rows.

Remarks. *Sphaerosyllis hystrix* from European coasts is similar, but the median antenna is inserted more posteriorly and the compound chaetae of anterior parapodia have longer blades with more marked dorsoventral gradation in length (San Martín, 1984a, 2003). *Sphaerosyllis taylori* Perkins, 1981, from the Atlantic coasts of North America, Caribbean Sea, Canary Islands, and the Mediterranean, also has a less marked gradation in length of blades, parapodial glands with fibrillar material, but the median antenna is inserted more posteriorly than in *S. capensis* and the blades are shorter (Perkins, 1981; San Martín, 1984a, 2003). The paratypes of *S. cuticulata* agrees with the above described specimens, except for the antennae, which are slightly longer, but I consider them as belonging to the same species.

Distribution. South Africa, Angola and Mozambique. Red Sea. Australia (Western Australia, Queensland).

Habitat. In muddy sand, coralline algae, and dead coral, in shallow waters.

Sphaerosyllis goorabantennata n.sp.

Fig. 51A–H

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE: AM W26622, north end of Long Island, Goss Passage, 28°27.9'S 113°46.3'E, dead coral covered in coralline algae & brown algae, 6 m, C. Bryce, 22 May 1994. PARATYPES: 2 specimens, AM W26623, north east entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead *Acropora*, coralline & brown algae on coral substrate, 24 m, P.A. Hutchings, 25 May 1994.

Description. Body small, slender, 2.5 mm long, 0.11 mm wide, 26 chaetigers; papillae small, few, those of lateral side longer, especially on chaetiger 2 (Fig. 51A). Prostomium rectangular, wide; 4 small eyes in trapezoidal arrangement. Antennae proportionally long, distinctly longer than combined length of prostomium and palps, with bulbous bases and long, slender, filiform tips (Fig. 51A). Palps blunt, longer than prostomium, fused along their length, with a dorsal furrow and few papillae. Peristomium similar in length to following segments; tentacular cirri long, shorter than antennae. Dorsal cirri similar to those of other species of genus, with a bulbous bases and slender, short tips; shorter than tentacular cirri (Fig. 51A), slightly elongate on posterior parapodia (Fig. 51D). Anterior parapodia each with 5–6 compound chaetae, with unidentate blades, provided with moderate to short marginal spines (Fig. 51C), and dorsoventral gradation in length, 26 μm above, 14 μm below. Posterior parapodia each with 4 compound chaetae, with blades unidentate, provided with short marginal spines,

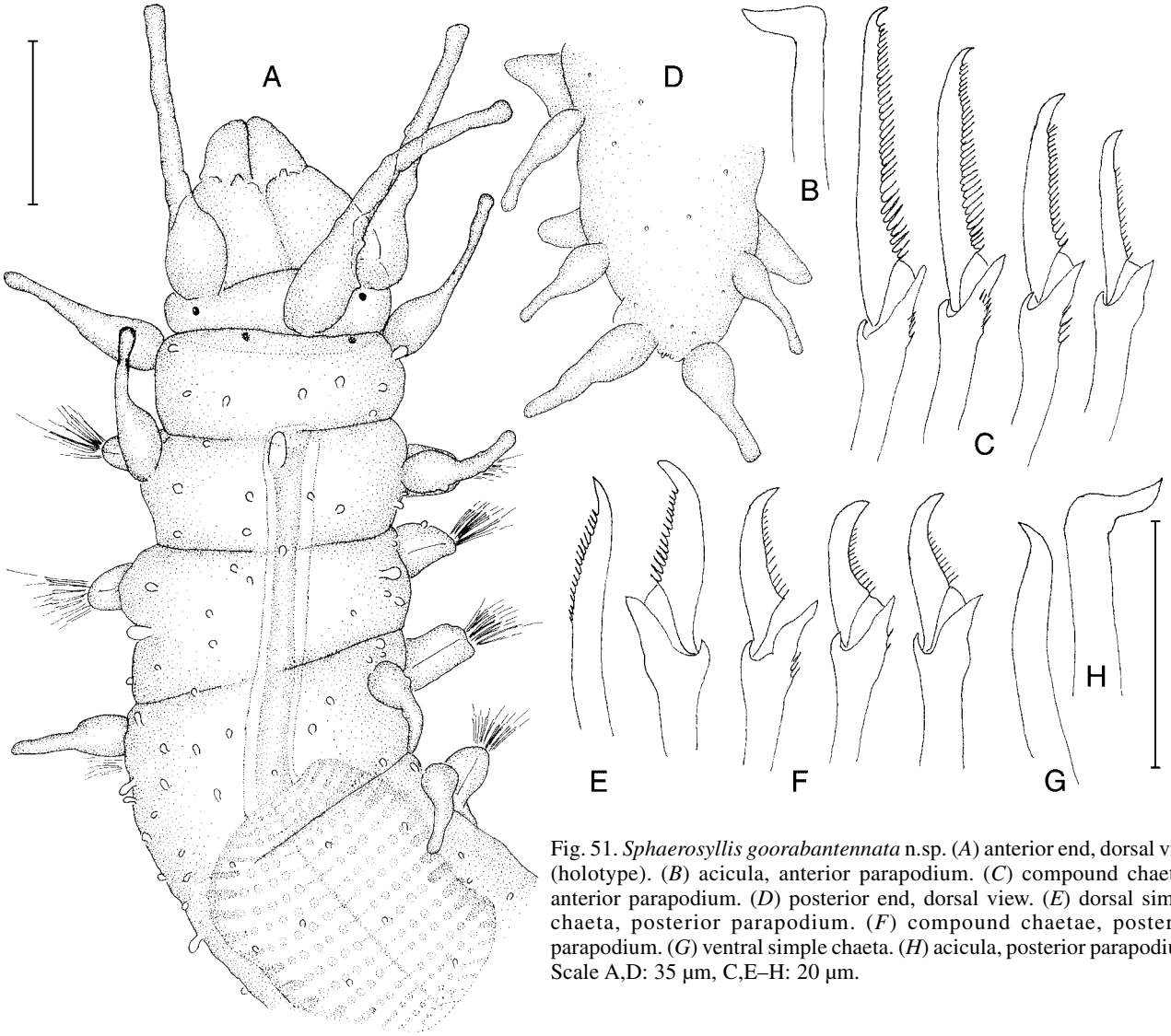


Fig. 51. *Sphaerosyllis goorabantennata* n.sp. (*A*) anterior end, dorsal view (holotype). (*B*) acicula, anterior parapodium. (*C*) compound chaetae, anterior parapodium. (*D*) posterior end, dorsal view. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. (*H*) acicula, posterior parapodium. Scale A,D: 35 µm, C,E–H: 20 µm.

slightly hooked, and slight dorsoventral gradation in length, about 16–12 µm long (Fig. 51F). Dorsal simple chaetae from proventricular segments, unidentate, provided with short marginal spines (Fig. 51E). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, unidentate (Fig. 51G). Acicula solitary, bent at right angle (Fig. 51B,H). Parapodial glands not seen. Pygidium small, with a few small papillae and 2 anal cirri similar to dorsal cirri but longer (Fig. 51D). Pharynx slender, through 3 segments (Fig. 51A). Proventricle through 1–2 segments, with 15 muscle cell rows.

Remarks. *Sphaerosyllis goorabantennata* n.sp. is characterized by its small size, small scattered papillae, and distinctly long antennae and tentacular cirri, differing from all other species of the genus in these characters. *Sphaerosyllis minima* Hartmann-Schröder, 1960 and *S. minima magnapapillata* Hartmann-Schröder, 1974 are also small, but the antennae and tentacular cirri are much shorter, similar to all other species of the genus (Hartmann-Schröder, 1960; 1974a).

Distribution. Australia (Western Australia).

Habitat. In dead corals, 6–24 m depth.

Etymology. From the Aboriginal word *gooraba* meaning big, in reference to the long antennae, characteristic of the species.

Sphaerosyllis lateropapillata Hartmann-Schröder, 1986

Figs. 52A–I, 53A–C

Sphaerosyllis capensis lateropapillata Hartmann-Schröder, 1986: 44, figs. 22–28.

Sphaerosyllis (Sphaerosyllis) capensis lateropapillata.–Hartmann-Schröder, 1987: 40.

Sphaerosyllis lateropapillata lateropapillata.–Hartmann-Schröder & Rosenfeldt, 1988: 43; Hartmann-Schröder, 1989: 29, figs. 34–36; 1990: 54.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W26479, east of Malabar, Sydney, 34°03.20'S 151°14.60'E, 76.4 m, Fisheries Research Institute, 21 Jun 1996. 1 specimen, AM W26706, North Ledge, Cook Island, 28°11.44'S 153°34.67'E, sponge, 10 m, A.R. Parker, 08 Jun 1993. 3 specimens, AM W26791, Lafontaine Island, Kimberley region, 14°10'S 125°47'E, 15 m, P.A. Hutchings, 19 July 1988. WESTERN AUSTRALIA. 2 specimens, AM W27121, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 15 specimens and 2 specimens on SEM stub, AM W27646, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27649,

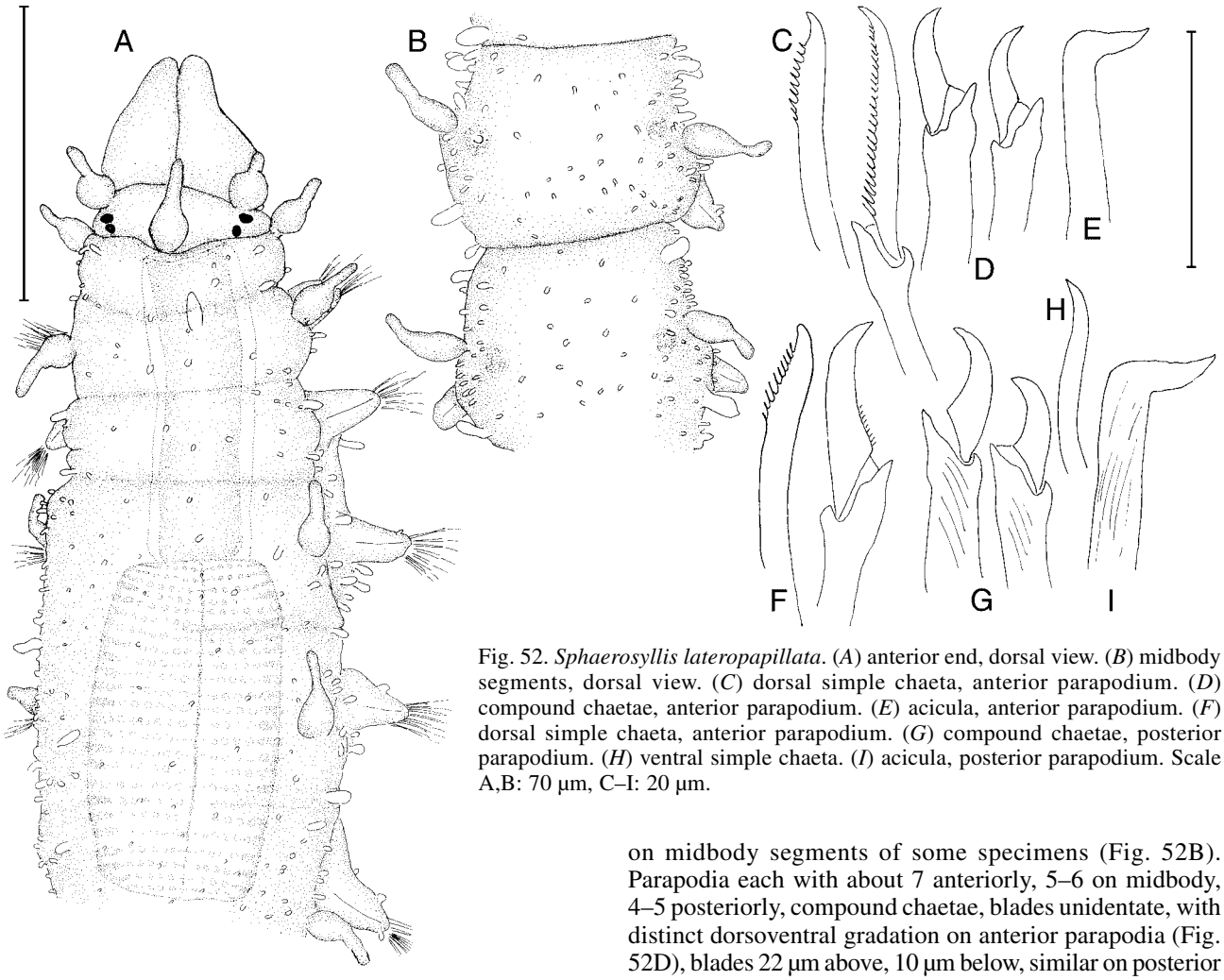


Fig. 52. *Sphaerosyllis lateropapillata*. (*A*) anterior end, dorsal view. (*B*) midbody segments, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) acicula, anterior parapodium. (*F*) dorsal simple chaeta, anterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,B: 70 µm, C–I: 20 µm.

north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27660, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry & R.T. Springthorpe, 6 Jan 1984. 1 specimen, AM W27663, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed brown algae from rocky shore, 4 m, R.T. Springthorpe, 10 Jan 1984.

Description. Body relatively long and slender, 4.2 mm long, 0.17 mm wide, 40 chaetigers. Dorsal surface provided with scattered small papillae, more abundant and slightly longer on lateral edges on each segment; a few, usually 1–2, longer, oval papillae on anterior and posterior part of each segment on each lateral side of middle segments (Figs. 52A,B, 53B,C). Prostomium oval to rectangular, 4 eyes in trapezoidal arrangement. Antennae shorter than combined length of prostomium and palps when palps extended (Fig. 52A), slightly longer when palps ventrally folded (Fig. 53A); median antenna inserted on posterior margin of prostomium, lateral antennae inserted in front of anterior eyes, on anterior margin of prostomium (Fig. 52A). Palps triangular, longer than prostomium, sometimes ventrally folded, fused along their length, with distinct dorsal furrow. Peristomium similar in length to following segments, covering posterior part of prostomium (Fig. 52A); tentacular cirri similar or shorter than antennae. Dorsal cirri similar to antennae and tentacular cirri (Fig. 52A, 53A), slightly elongate on midbody segments (Figs. 52B, 53B). Parapodial glands with granular material, difficult to see, only visible on midbody segments of some specimens (Fig. 52B). Parapodia each with about 7 anteriorly, 5–6 on midbody, 4–5 posteriorly, compound chaetae, blades unidentate, with distinct dorsoventral gradation on anterior parapodia (Fig. 52D), blades 22 µm above, 10 µm below, similar on posterior parapodia (Fig. 52G), 18–10 µm long; longer blades with short marginal spines, short blades smooth, slightly hooked. Dorsal simple chaetae from anterior parapodia, unidentate, with short marginal spines, similar throughout (Fig. 52C,F). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 52H). Acicula solitary, distally bent at right angle (Fig. 52E), slightly larger posteriorly (Fig. 52I). Pharynx through 4 segments; pharyngeal tooth slightly posteriorly from anterior rim (Fig. 52A). Proventricle relatively long, through 2–3 segments, with 20 muscle cell rows.

Distribution. Australia (South Australia, Victoria, New South Wales, Western Australia). Antarctica.

Habitat. Amongst algae, in sponges and dead corals. Intertidal to about 76 m depth.

Sphaerosyllis georgeharrisoni n.sp.

Figs. 53D–F, 54A–H

Material examined AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE, AM W28657, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P. Hutchings, 22 May 1994. PARATYPE, 1 specimen, AM W27123, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P. Hutchings, 22 May 1994. PARATYPE, 1 specimen, AM W27128, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate-like *Acropora* covered in coralline algae, 8 m, P. Hutchings, 25 May 1994. PARATYPE, 1 specimen, AM W28658, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate

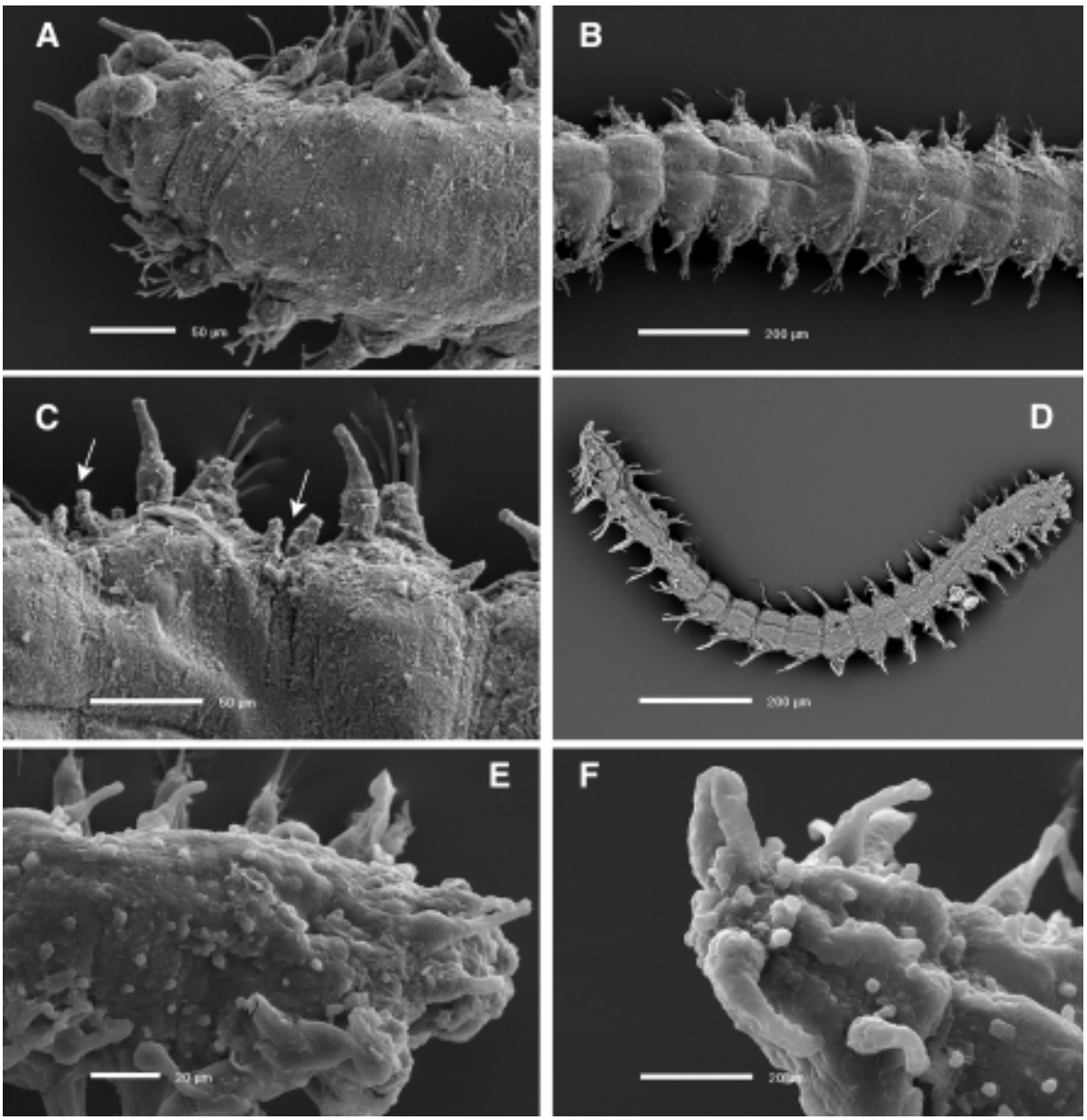


Fig. 53. SEM of *Sphaerosyllis lateropapillata*. (*A*) anterior end, dorsal view. (*B*) midbody, dorsal view. (*C*) midbody parapodia, dorsal view. SEM of *Sphaerosyllis georgeharrisoni*. (*D*) dorsal view of a complete specimen. (*E*) anterior end, dorsal view. (*F*) posterior end, dorsal view.

covered in coralline algae, 5 m, P. Hutchings, 25 May 1994. 2 specimens, AM W27122, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P. Hutchings, 19 May 1994. 22 specimens, AM W27124, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 4 specimens, AM W27125, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 5 specimens, AM W27126, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate-coral substrate—*Acropora, Montipora* spp., 12 m, P. Hutchings, 23 May 1994.1 specimen, AM W27127, West Deacon Island, 28°28.6'S 113°48.4'E, attached to dead coral, 7 m, A. Brearley, 21 May 1994. 3 specimens, AM W27129, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P. Hutchings, 25 May 1994.1 specimen on SEM stub, AM W27677, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry and R.T. Springthorpe, 6 Jan 1984.

Description. Body small, slender (Fig. 53D), 2.3 mm long, 0.12 mm wide, 26 chaetigers; dorsum covered with small papillae, extended to palps and parapodia, numerous on midbody (Fig. 54A). Prostomium rectangular, mostly covered by peristomium (Figs. 53E, 54A); 4 eyes in trapezoidal arrangement. Antennae similar in length to prostomium or slightly shorter, all similar, with bulbous bases and moderate tip; lateral antennae inserted on anterior margin, median antenna inserted slightly posteriorly (Fig. 53E), just in front of anterior eyes (Fig. 54A). Tentacular cirri similar to antennae but shorter. Dorsal cirri short, similar to tentacular cirri (Figs. 53E, 54A). Parapodial glands large, with granular or hyaline material, usually both kinds of material in the same specimen (Fig. 54A); some specimens with parapodial glands difficult to see. Anterior parapodia each with about 5 compound chaetae, blades unidentate, provided with moderately long marginal spines, longer on dorsal chaetae (Fig. 54C), with marked dorsoventral gradation in length, about 20 µm above, 10 µm below. Posteriorly, number of compound chaetae on each parapodium decreasing to 3 on posterior parapodia, with larger

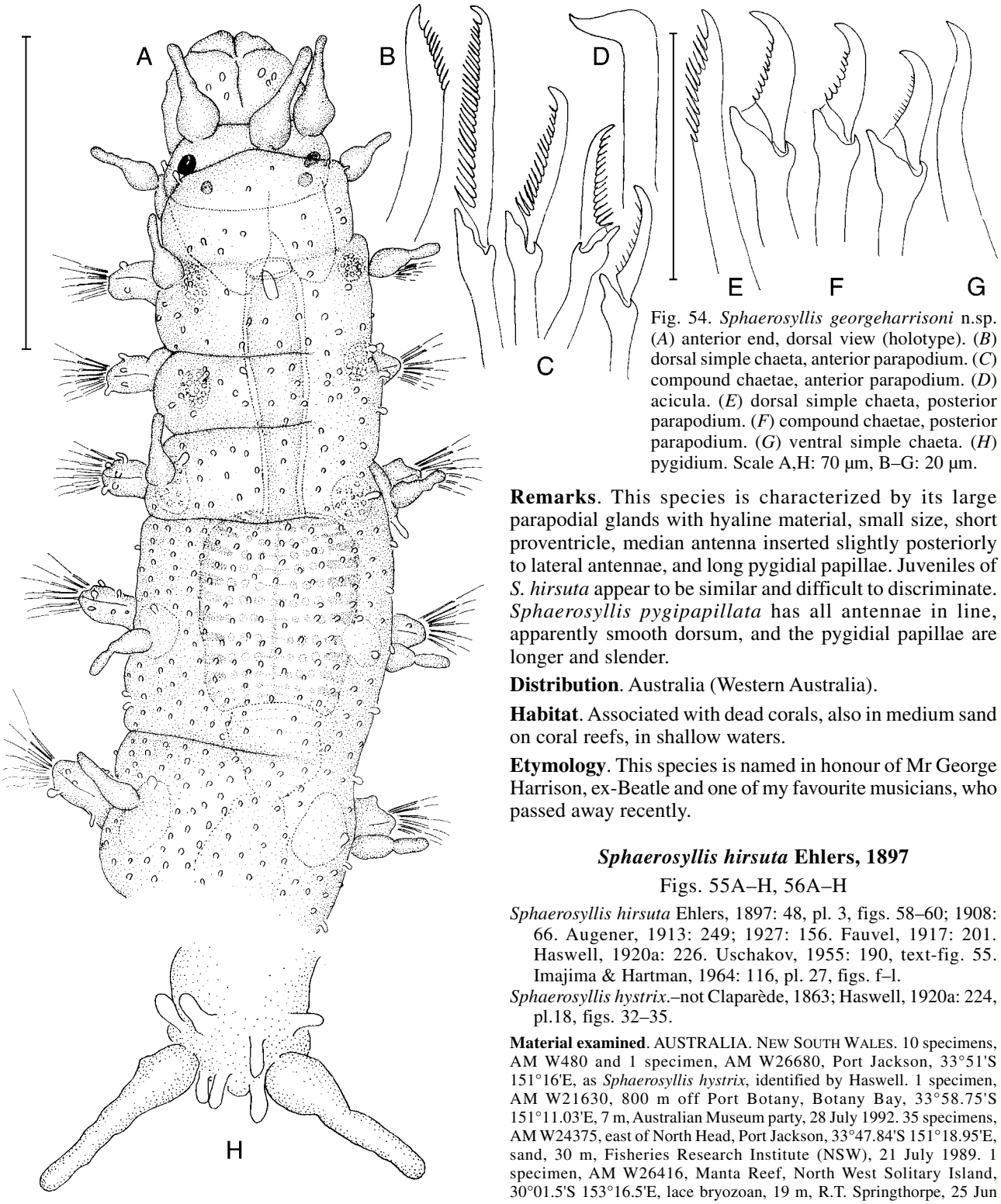


Fig. 54. *Sphaerosyllis georgeharrisoni* n.sp. (*A*) anterior end, dorsal view (holotype). (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, anterior parapodium. (*D*) acicula. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. (*H*) pygidium. Scale A,H: 70 μm, B–G: 20 μm.

shafts and blades shorter, about 12–10 μm long, slightly hooked, smooth or provided with short marginal spines (Fig. 54F). Dorsal simple chaetae from chaetiger 1, unidentate, provided with moderately long marginal spines (Fig. 54B,E). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 54G). Acicula solitary, with tips bent at right angle (Fig. 54D). Pygidium small, provided with few (5–7) long papillae and 2 anal cirri, similar in shape to dorsal cirri but longer (Figs. 53F, 54H). Pharynx slender, through 3 segments; pharyngeal tooth anteriorly located. Proventricle small, through 1 segment, with 13–14 muscle cell rows.

Remarks. This species is characterized by its large parapodial glands with hyaline material, small size, short proventricle, median antenna inserted slightly posteriorly to lateral antennae, and long pygidial papillae. Juveniles of *S. hirsuta* appear to be similar and difficult to discriminate. *Sphaerosyllis pygipapillata* has all antennae in line, apparently smooth dorsum, and the pygidial papillae are longer and slender.

Distribution. Australia (Western Australia).

Habitat. Associated with dead corals, also in medium sand on coral reefs, in shallow waters.

Etymology. This species is named in honour of Mr George Harrison, ex-Beatle and one of my favourite musicians, who passed away recently.

Sphaerosyllis hirsuta Ehlers, 1897

Figs. 55A–H, 56A–H

Sphaerosyllis hirsuta Ehlers, 1897: 48, pl. 3, figs. 58–60; 1908: 66. Augener, 1913: 249; 1927: 156. Fauvel, 1917: 201. Haswell, 1920a: 226. Uschakov, 1955: 190, text-fig. 55. Imajima & Hartman, 1964: 116, pl. 27, figs. f–l.

Sphaerosyllis hystrix.–not Claparède, 1863; Haswell, 1920a: 224, pl.18, figs. 32–35.

Material examined. AUSTRALIA. NEW SOUTH WALES. 10 specimens, AM W480 and 1 specimen, AM W26680, Port Jackson, 33°51'S 151°16'E, as *Sphaerosyllis hystrix*, identified by Haswell. 1 specimen, AM W21630, 800 m off Port Botany, Botany Bay, 33°58.75'S 151°11.03'E, 7 m, Australian Museum party, 28 July 1992. 35 specimens, AM W24375, east of North Head, Port Jackson, 33°47.84'S 151°18.95'E, sand, 30 m, Fisheries Research Institute (NSW), 21 July 1989. 1 specimen, AM W26416, Manta Reef, North West Solitary Island, 30°01.5'S 153°16.5'E, lace bryozoan, 19 m, R.T. Springthorpe, 25 Jun 1992. 1 specimen, AM W26417, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 1 specimen, AM W26418, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 2 specimens, AM W26419, 100 m northwest of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae and ascidians, 16 m, E.L. Albertson, 7 Mar 2000. 1 specimen, AM W26420, Halfway Reef, 200 m, south of Sullivan Reef, Ulladulla, 35°21.42'S 150°29.31'E, airlift over wall of sponges, bryozoa, hydrozoa, 15 m, K. Attwood *et al.*, 3 May 2000. 7 specimens, AM W26546, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 48 specimens, AM W26611, Grotto Point, Balmoral Beach, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 1983. 2 specimens, AM W26613, Camp Cove, Port Jackson, 33°50.5'S 151°16.6'E, algae & algal turf, P. Serov & G.D.F. Wilson, 27 Nov 1992.

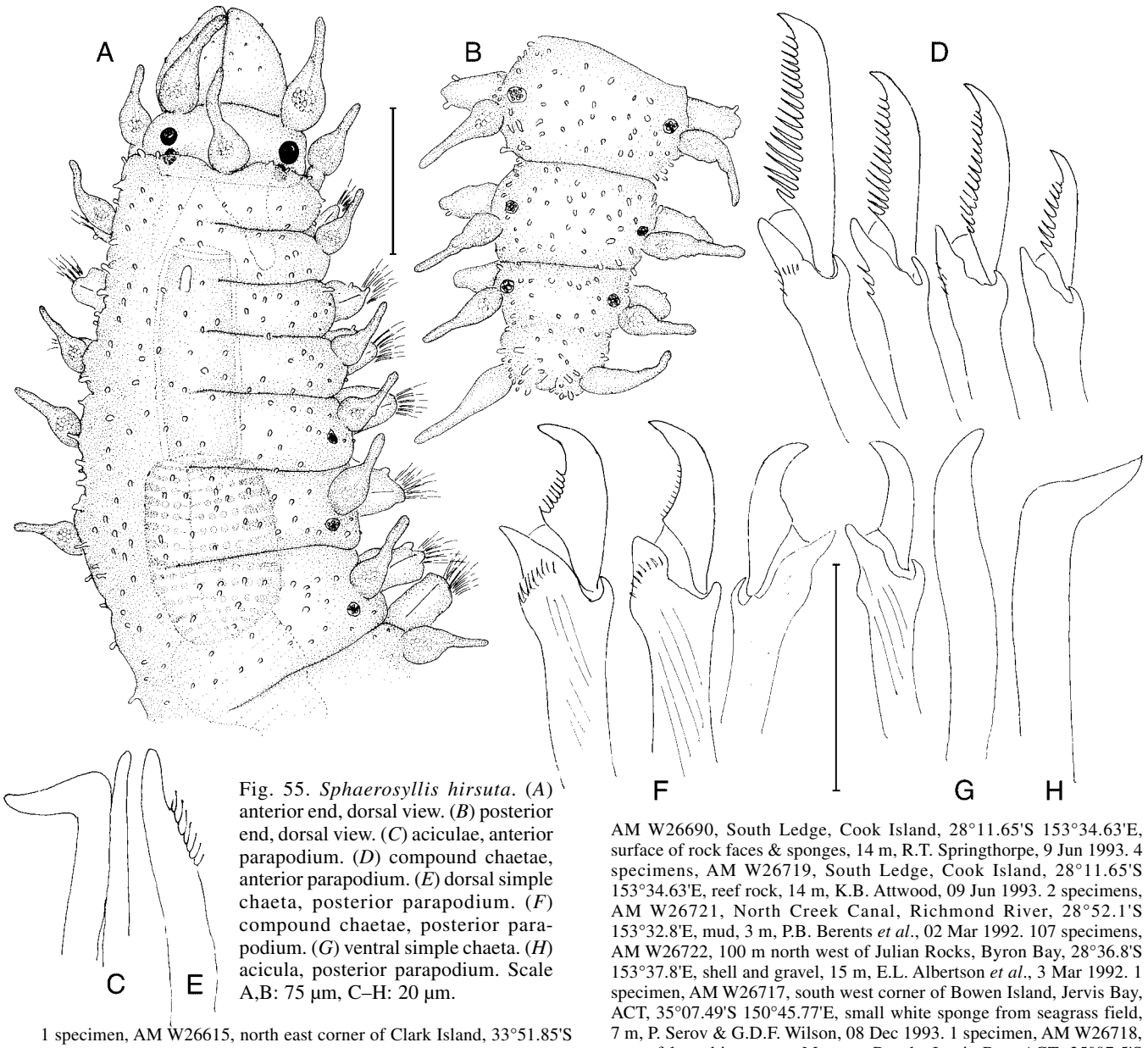


Fig. 55. *Sphaerosyllis hirsuta*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) aciculae, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. (*H*) acicula, posterior parapodium. Scale A,B: 75 µm, C–H: 20 µm.

1 specimen, AM W26615, north east corner of Clark Island, 33°51.85'S 151°14.47'E, inside bottle, 5 m, P.A. Hutchings, 17 Apr 1996. 43 specimens, AM W26646, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, 12 m, G. Clark, 11 Dec 1989. 3 specimens, AM W26650, north east corner of Clark Island, 33°51.85'S 151°14.47'E, *Ecklonia* holdfast, 5 m, P.A. Hutchings, 17 Apr 1996. 5 specimens, AM W26652, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry *et al*., 22 Apr 1983. 2 specimens, AM W26655, Camp Cove, Port Jackson, 33°50.5'S 151°°16.6'E, algae & algal turf, P. Serov & G.D.F. Wilson, 27 Nov 1992. 3 specimens, AM W26675, North ledge, Cook Island, 28°11.44'S 153°34.67'E, coralline turf, 10 m, E.L.A. Ho, 8 Jun 1993. 2 specimens, AM W26676, North Ledge, Cook Island, 28°11.44'S 153°34.67'E, sponge, 10 m, A.R. Parker, 08 Jun 1993. 2 specimens, AM W26677, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, clump of solitary ascidians, 14 m, G.D.F. Wilson, 9 Jun 1993. 2 specimens, AM W26678, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, frilly bryozoan, 15 m, R.T. Springthorpe, 9 Jun 1993. 1 specimen, AM W26679, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, yellow/green sponge & crinoid, 12 m, A.R. Parker, 9 Jun 1993. 1 specimen, AM W26685, northeast of Mary's Rock, Cook Island, 28°11.42'S 153°34.79'E, orange frilly bryozoan, 19 m, R.T. Springthorpe, 8 Jun 1993. 2 specimens, AM W26686, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, rock, 15 m, K.B. Attwood, 9 Jun 1993. 1 specimen, AM W26687, North Ledge, Cook Island, 28°11.44'S 153°34.67'E, reef rock, 12 m, K.B. Attwood, 8 Jun 1993. 1 specimen, AM W26688, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, surface of massive sponges, 14 m, R.T. Springthorpe, 9 Jun 1993. 18 specimens, AM W26689, North ledge, Cook Island, 28°11.44'S 153°34.67'E, shell grit, 14 m, K.B. Attwood, 8 Jun 1993. 1 specimen, AM W26690, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, surface of rock faces & sponges, 14 m, R.T. Springthorpe, 9 Jun 1993. 4 specimens, AM W26719, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, reef rock, 14 m, K.B. Attwood, 09 Jun 1993. 2 specimens, AM W26721, North Creek Canal, Richmond River, 28°52.1'S 153°32.8'E, mud, 3 m, P.B. Berents *et al*., 02 Mar 1992. 107 specimens, AM W26722, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson *et al*., 3 Mar 1992. 1 specimen, AM W26717, south west corner of Bowen Island, Jervis Bay, ACT, 35°07.49'S 150°45.77'E, small white sponge from seagrass field, 7 m, P. Serov & G.D.F. Wilson, 08 Dec 1993. 1 specimen, AM W26718, east of launching ramp, Murrays Beach, Jervis Bay, ACT, 35°07.5'S 150°46'E, intertidal pool overhangs with dead, sponge-encrusted barnacles, 0 m, H.E. Stoddart, 28 Jun 1981. 1 specimen, AM W26720, half way along west side of Bowen Island, Jervis Bay, ACT, 35°06.91'S 150°45.91'E, airlift from light grey sponge, 6 m, P. Serov & G.D.F. Wilson, 07 Dec 1993. VICTORIA. 1 specimen, MV F62701, Eastern Bass Strait, 11.7 km W of Pt. Ricardo, 37°49.89'S 148°30.13'E, coarse sand, 27 m depth, 4 Jun 1991. 54 specimens, MV F61900, Eastern Bass Strait, 15.5 km SW of Pt. Ricardo, 37°53.14'S 148°28.94'E, medium sand, 45 m depth, Feb 1991. 4 specimens, MV F87425, Geelong Arm, Port Phillip Bay, 38°09.3'S 144°42.7'E, sand and seagrasses, 3 m depth, 11 Jan 1971. SOUTH AUSTRALIA. 1 specimen, AM W26708, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. 20 specimens, AM W26745, Billy Lights Point, Port Lincoln, 34°45'S 135°53'E, stone washings from sheltered intertidal rocks, I. Loch, 15 Feb 1985. 4 specimens, AM W27117, Flinders Cairn, south of Tulka, on Port Lincoln, 34°49'S 135°47'E, mussel clumps at mid-tide, P.A. Hutchings, 10 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26664, off end of South Mole, Arthur Head, Fremantle, 32°3'S 115°44'E, sponges, 6 m, R.T. Springthorpe, 25 Dec 1983. 3 specimens, AM W26665, off end of South Mole, Arthur Head, Fremantle, 32°3'S 115°44'E, orange tunicates, 6 m, J.K. Lowry, 25 Dec 1983. 1 specimen, AM W27106, Vancouver Peninsula, King George Sound, 35°04'S 117°56'E, seagrass with hydroid/bryozoan, 3 m, J.K. Lowry, 13 Dec 1983. 1 specimen, AM W27107, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 14 specimens, AM W27108, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate

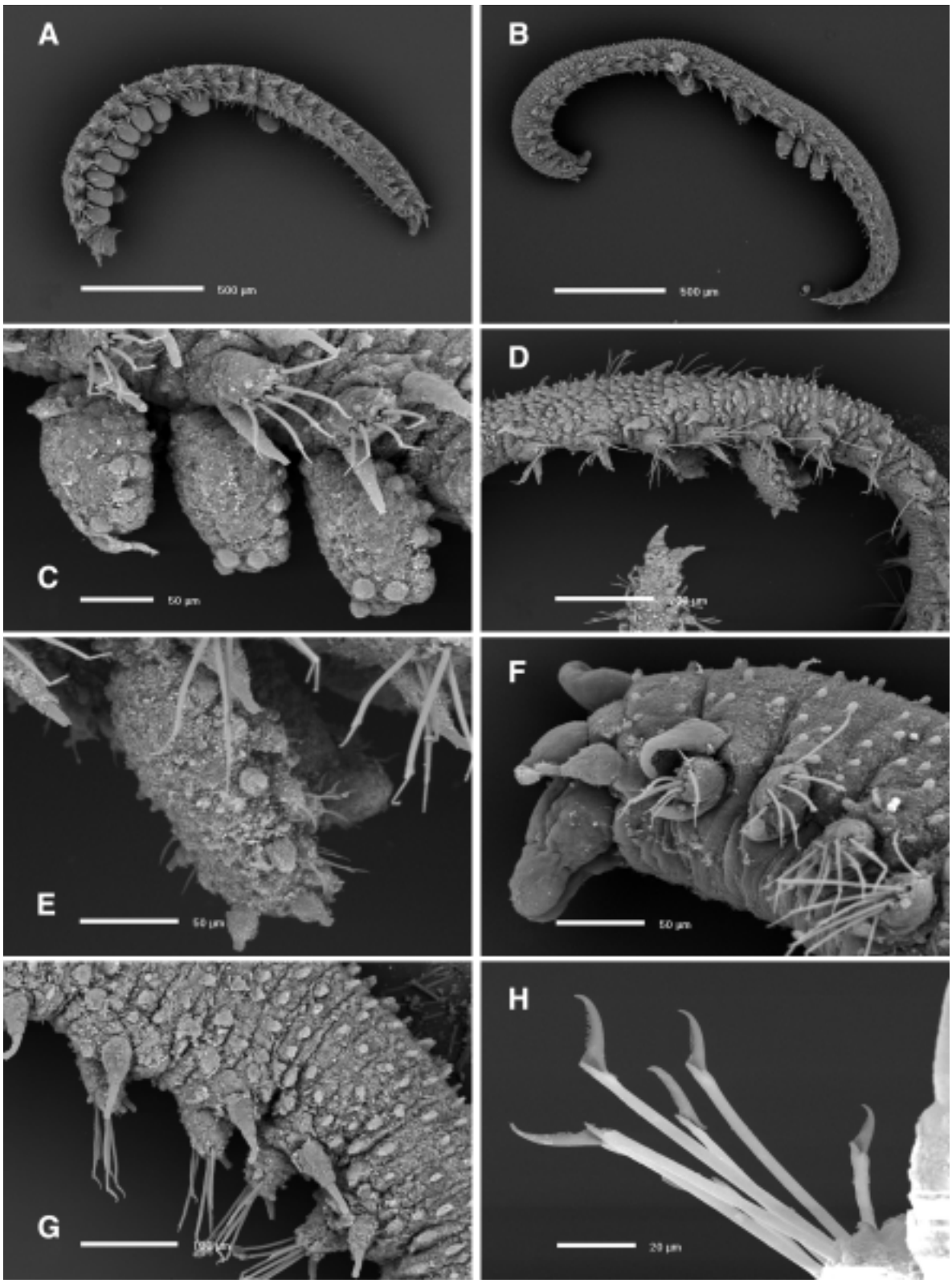


Fig. 56. SEM of *Sphaerosyllis hirsuta*. (*A*) mature female carrying eggs, lateral view. (*B*) mature female carrying juveniles, lateral view. (*C*) detail of early juveniles. (*D*) midbody and pygidium (with juveniles). (*E*) detail of a juvenile. (*F*) anterior end, lateral view. (*G*) midbody, dorsal view. (*H*) compound chaetae, anterior parapodium.

with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 2 specimens, AM W27109, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 16 specimens, AM W27110, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral substrate covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27111, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 10 specimens, AM W27112, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate-coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 11 specimens, AM W27113, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W27114, Wallabi Island group, 28°27.05'S 113°45.10'E, scallop beds in medium to fine sand with shell debris, 38 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 2 specimens, AM

W27115, Wallabi Island group, 28°23.61'S 113°45.09'E, scallop beds, shell & sponge debris, 35 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 1 specimen, AM W27116, west side of Cassini Island, 13°57'S 125°37'E, P.A. Hutchings, 18 July 1988. 1 specimen, AM W27650, outer Ningaloo Reef, off Ned's Camp, Cape Range National Park, 21°59.5'S 113°54.5'E, airlift from living *Porites* sp., 2 m, R.T. Springthorpe and J.K. Lowry, 1 Jan 1984. 1 specimen, AM W27662, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 1 specimen, AM W27664, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, shallow sand flats, 0.5 m, J.K. Lowry & H.E. Stoddart, 6 Jan 1984. 1 specimen, AM W27666, reef west of groyne, 2 km south of Cape Peron, 32°16'S 115°41'E, orange sponge in deep channel of limestone reef, 4.5 m, R.T. Springthorpe, 26 Dec 1983.

Description. Body variable in size, some specimens relatively long, slender, up to 7–8 mm long, 0.25–0.26 mm wide, 50–55 chaetigers, provided with distinct, numerous conical papillae on dorsal and ventral sides, palps, parapodia and pygidium (Figs. 55A,B, 56A,B,D,F,G). Colour light brown to cream in alcohol. Prostomium rectangular, wider than long; 4 moderate to large eyes in trapezoidal to rectangular arrangement. Antennae pyriform, similar in length to palps; lateral antennae inserted on anterior margin of prostomium, median antenna inserted between posterior eyes (Figs. 55A, 56F). Palps triangular, broad, similar in length to prostomium, fused along their length, with a dorsal furrow. Peristomium similar in length to following segments, covering dorsally posterior part of prostomium; tentacular cirri similar to antennae, slightly shorter (Figs. 55A, 56F). Dorsal cirri similar to tentacular cirri, with bulbous bases and relatively short tips (Fig. 55A,B), slightly elongate on midbody (Fig. 56D,G) and posterior segments (Fig. 55B); antennae, tentacular cirri and dorsal cirri with internal granular gland and duct with two openings, one at the middle and other on the tip of the cirrus (Fig. 55A,B), distinct on some of longer specimens, but indistinct on others. Parapodial glands small, indistinct, with granular material (Fig. 55A,B). Anterior parapodia each with 5–7 compound chaetae, some shafts provided with a few short subdistal spines, blades unidentate, provided with moderate to short marginal spines, longer on more dorsal chaetae (Figs. 55D, 56H); moderate dorsoventral gradation in length, 24 µm above 12 µm below (large specimens). Progressively posteriorly diminishing number of compound chaetae on each parapodium to 3–4, shafts slightly larger, blades slightly hooked, smooth or provided with short marginal spines (Fig. 55F), about 16–12 µm long. Solitary simple chaetae from anterior parapodia, usually from chaetiger 1, unidentate, provided with short subdistal marginal spines (Fig. 55E). Ventral simple chaetae from midbody or posterior parapodia, sigmoid, smooth, unidentate (Fig. 55G). Anterior parapodia each with two aciculae, one slender and straight and other slightly larger, distally bent at right angle (Fig. 55C); midbody and posterior parapodia each with solitary, large bent acicula (Fig. 55H). Pharynx through 4 segments; pharyngeal tooth on anterior margin (Fig. 55A). Proventricle through 2 segments, with 13–15 muscle cell rows. Pygidium small, with two anal cirri similar to dorsal cirri but longer (Fig. 55B); pygidial papillae slightly longer than others on dorsal surface of body.

Remarks. This species is widely distributed, reported in Pacific coasts of South America, New Zealand, Japan and Kurile Islands. The species *Sphaerosyllis californiensis* Hartman may be synonymous with this species.

Distribution. Pacific. Australia (New South Wales, Victoria, South Australia, Western Australia).

Habitat. All substrates, from dead coral, algae, encrusting organisms, to seagrasses and sand. Intertidal to c. 45 m depth.

Genus *Brania* Quatrefages, 1866

Brania Quatrefages, 1866: 18.

Diagnosis. Body small, slender, with few segments. Prostomium with 2 pairs of eyes and, sometimes, 1 pair of eyespots, 3 bowling-pin to spindle-shaped antennae. Palps fused for about their basal ⅔, and the remaining distal ⅓ free. Two pairs of tentacular cirri, bottle-shaped, truncated or bowling-pin shaped. Dorsal cirri on all parapodia, short, bowling-pin shaped or truncated. Parapodia conical, with a distal, rounded small papilla. Parapodial glands present, sometimes inside dorsal cirri. Pharynx provided with an anterior tooth, surrounded by a crown of soft papillae. Compound chaetae with unidentate blades provided with subdistal spines and rounded tips; aciculae with rounded, slightly hollow tips. Dorsal simple chaetae usually subdistally serrated. Ventral simple chaetae sigmoid, usually unidentate. Mature males with natatory chaetae; mature females brooding eggs and juveniles ventrally, without natatory chaetae.

Type species. *Exogone pusilla* Dujardin, 1839 (fide Hartman, 1959).

Brania pusilla (Dujardin, 1839)

Fig. 57A–E

Exogone pusilla Dujardin, 1839: 298, Figs. 9, 10.
Grubea pusilla.–Fauvel, 1923: 299, fig. 115, a–f.
Brania pusilla.–Day, 1967: 267, fig. 129d–f. Campoy, 1982: 248, pl. 14. Hartmann-Schröder, 1971: 163; 1982: 68, figs. 51, 52; 1984: 22; 1986: 42; 1987: 39; 1989: 28; 1996: 169, fig. 72. Gardiner, 1976: 130, fig. 10o. San Martín, 1984a: 181, pl. 38; 2003: 151, figs. 73, 74.
Grubea pusilloides.–Haswell, 1920a: 222, pl. 17, figs. 27–29.
Brania pusilloides.–Day & Hutchings, 1979: 100.

Key to the species of *Brania* recorded from Australia

1 Dorsal cirri distally truncated, with fibrillar inclusions ..... *B. pusilla*
—— Dorsal cirri distally rounded, not truncated, without fibrillar inclusions 2

2 Marked dorsoventral gradation in length of blades of compound chaetae throughout; posterior dorsal simple chaetae with about 4 similar subdistal serrations; dorsal cirri with subdistal constriction more or less marked ..... *B. articulata*
—— Slight dorsoventral gradation in length of blades of compound chaetae; posterior dorsal simple chaetae with subdistal serrations of different sizes; dorsal cirri without subdistal constriction ..... *B. furcelligera*

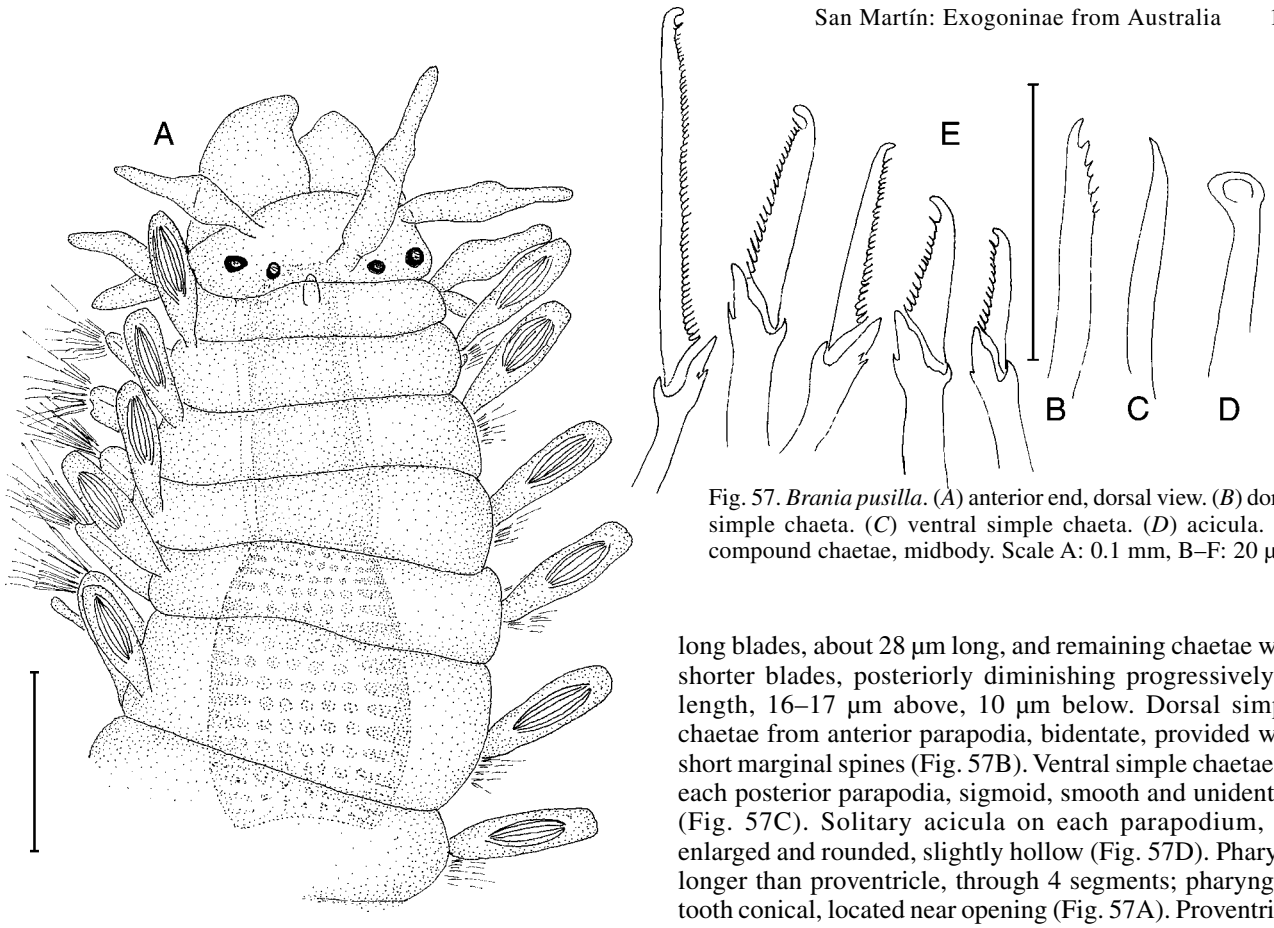


Fig. 57. *Brania pusilla*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta. (*C*) ventral simple chaeta. (*D*) acicula. (*E*) compound chaetae, midbody. Scale A: 0.1 mm, B–F: 20 µm.

Material examined. AUSTRALIA: NEW SOUTH WALES. SYNTYPES of *Grubea pusilloides*, 2 specimens, AM W478, Port Jackson, 33°51'S 151°16'E. Collected & identified by Haswell. 1 specimen on slide, AM W25236, Port Jackson, 33°50'S 151°16'E. Collected & identified by Haswell. 1 specimen on slide, AM W25237. Identified by Haswell. 1 specimen on slide, AM W25238. Identified by Haswell. 1 specimen on slide, AM W8632. Identified by Haswell.

Description. Body small, short, about 2 mm long, 0.13 mm wide, for 27 chaetigers. The longest specimen examined (W2537) is 1.65 mm long, with 26 chaetigers. Prostomium semi-circular, with 4 eyes in trapezoidal arrangement. Antennae elongate, spindle-shaped to bowling-pin shaped; median antenna longer than lateral ones, similar in length to prostomium and palps together, inserted between posterior eyes; lateral antennae slightly longer than prostomium, inserted in front of and slightly medial to anterior eyes, similar in shape to median antenna. Palps similar in length to prostomium, fused on their basal ⅔ (Fig. 57A). Peristomium similar in length to following segments; dorsal tentacular cirri similar to lateral antennae but slightly shorter and distally slightly truncated, ventral tentacular cirri similar to dorsal ones but shorter. Dorsal cirri sub-rectangular, distally truncated, oval in shape, containing fibrillar material (Fig. 57A), slightly longer than parapodial lobes. Ventral cirri digitiform, shorter than parapodial lobes. Compound chaetae similar throughout, slightly shorter on anterior parapodia, with heterogomph articulation, provided with short subdistal spines on shafts; blades unidentate, distally rounded, slightly hooked, and short marginal spines and a subdistal spine near tip, longer than other spines, more marked on longer blades (Fig. 57E). Parapodium each with 6–8 compound chaetae on anterior parapodia, 3–4 on posterior parapodia; strong dorsoventral gradation in length of blades; on each parapodium 1–2 compound chaetae with long blades, about 28 µm long, and remaining chaetae with shorter blades, posteriorly diminishing progressively in length, 16–17 µm above, 10 µm below. Dorsal simple chaetae from anterior parapodia, bidentate, provided with short marginal spines (Fig. 57B). Ventral simple chaetae on each posterior parapodia, sigmoid, smooth and unidentate (Fig. 57C). Solitary acicula on each parapodium, tip enlarged and rounded, slightly hollow (Fig. 57D). Pharynx longer than proventricle, through 4 segments; pharyngeal tooth conical, located near opening (Fig. 57A). Proventricle short, through 2 segments, with about 15–16 muscle cell rows. Pygidium small, bilobed, with two long anal cirri, similar in length to median antenna. Attached juveniles lacking eyes, dorsal cirri on chaetiger 2 and dorsal tentacular cirri.

Remarks. The Australian specimens were originally described as *Grubea pusilloides* and was considered as a different species than *Brania pusilla* from the European coasts; I have not found, however, any difference between the Australian and European specimens, so I consider both as synonyms.

Distribution. East Atlantic Ocean, from the North Sea to South Africa, extending to the Indian coasts of South Africa. West Atlantic (North Carolina). Mediterranean Sea. Australia (Western Australia, South Australia, Victoria, New South Wales).

Habitat. Found on all hard substrates, seagrasses, algae, calcareous concretions, also in coarse to fine sand, from intertidal to about 200 m depth, rare in waters deeper than 40 m.

Brania articulata Hartmann-Schröder, 1982

Fig. 58A–J

Brania articulata Hartmann-Schröder, 1982: 68, figs. 53–56; 1990: 52, fig. 23.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W27892, Hinchinbrook Channel, 18°20'S 146°4'E, tidal mud- and sandflats, S. Dittmann, 22 Oct 1991. WESTERN AUSTRALIA. 2 specimens, AM W27098, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27099, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 2 specimens, AM W27100, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimen, AM W27101, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral

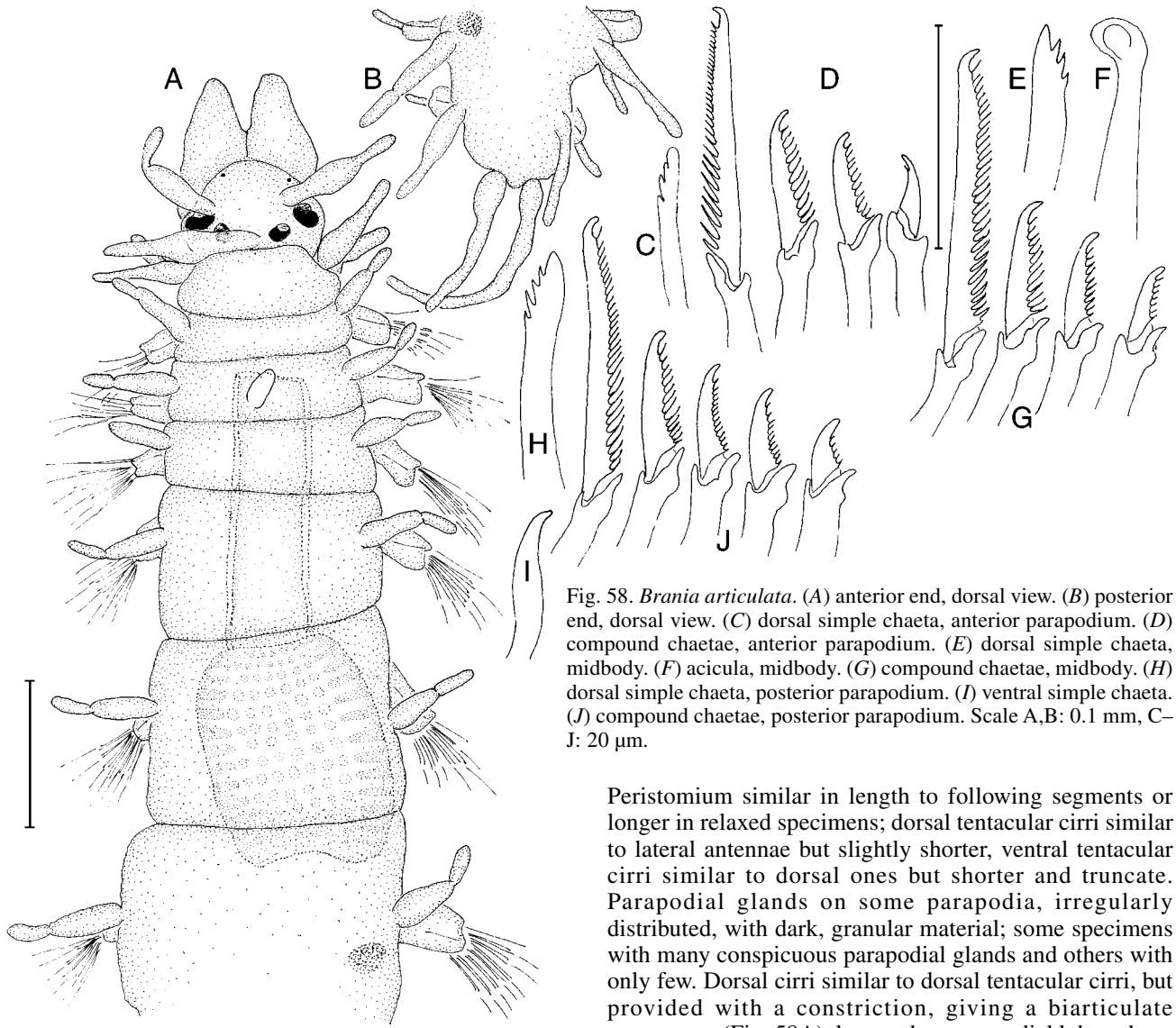


Fig. 58. *Brania articulata*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, midbody. (*F*) acicula, midbody. (*G*) compound chaetae, midbody. (*H*) dorsal simple chaeta, posterior parapodium. (*I*) ventral simple chaeta. (*J*) compound chaetae, posterior parapodium. Scale A,B: 0.1 mm, C–J: 20 μm.

embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27102, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead branching *Acropora* with coralline & brown algae, 24 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W27103, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate-like *Acropora* covered in coralline algae, 8 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W27104, East Montlivet Island, 15°06'S 125°18'E, 6 m, P.A. Hutchings, 16 July 1988. 2 specimens, AM W27105, southwest corner of Lucas Island, 15°13'S 124°31'E, 30 m, P.A. Hutchings, 24 July 1988. 1 specimen, AM W27415, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 2 specimens, AM W27421, Red Bluff, Kalbarri, 27°42'S 114°09'E, brown alga from surf zone on rocky shore, 0.5 m, H.E. Stoddart, 9 Jan 1984.

Description. Body small, a mature male about 2.54 mm long, 0.12 mm wide, for 29 chaetigers. Prostomium semi-circular to pentagonal, with 4 large eyes in trapezoidal arrangement and 2 anterior, small eyespots. Antennae elongate, spindle-shaped to bowling-pin shaped; median antenna longer than lateral ones, slightly shorter than combined length of prostomium and palps, inserted between posterior eyes; lateral antennae slightly longer than prostomium, inserted in front of anterior eyes, similar in shape to median antenna. Palps similar in length to prostomium, fused for their basal half (Fig. 58A). Peristomium similar in length to following segments or longer in relaxed specimens; dorsal tentacular cirri similar to lateral antennae but slightly shorter, ventral tentacular cirri similar to dorsal ones but shorter and truncate. Parapodial glands on some parapodia, irregularly distributed, with dark, granular material; some specimens with many conspicuous parapodial glands and others with only few. Dorsal cirri similar to dorsal tentacular cirri, but provided with a constriction, giving a biarticulate appearance (Fig. 58A), longer than parapodial lobes, those of posterior parapodia longer than those of anterior parapodia (Figs. 58A, 58B). Ventral cirri digitiform, shorter than parapodial lobes. Compound chaetae similar throughout, slightly shorter on anterior parapodia, with heterogomph articulation; blades unidentate, distally rounded, slightly hooked, marginal spine moderate in length; a subdistal spine near tips, longer than other spines, more distinct on longer blades (Figs. 58D,G,J). Parapodium each with 6–7 compound chaetae on anterior parapodia, 5 on posterior parapodia; strong dorsoventral gradation in length of blades; on each parapodium 1–2 compound chaetae with long blades, about 28 μm long in midbody, and remaining chaetae with shorter blades, diminishing progressively in length posteriorly, 12 μm above, 8 μm below. Dorsal simple chaetae from anterior parapodia, unidentate, provided with about 4–5 short serrations on margin, all similar (Figs. 58C,E,H); anterior dorsal simple chaetae more slender than posterior ones (Fig. 58C,H). Ventral simple chaetae on posterior parapodia, sigmoid, smooth and unidentate (Fig. 58I). Solitary acicula with tips enlarged and rounded, slightly hollow (Fig. 58F). Pharynx longer than proventricle, through 3 segments; pharyngeal tooth conical, located on anterior margin (Fig. 58A). Proventricle short, through 1–2 segments, with about 15–

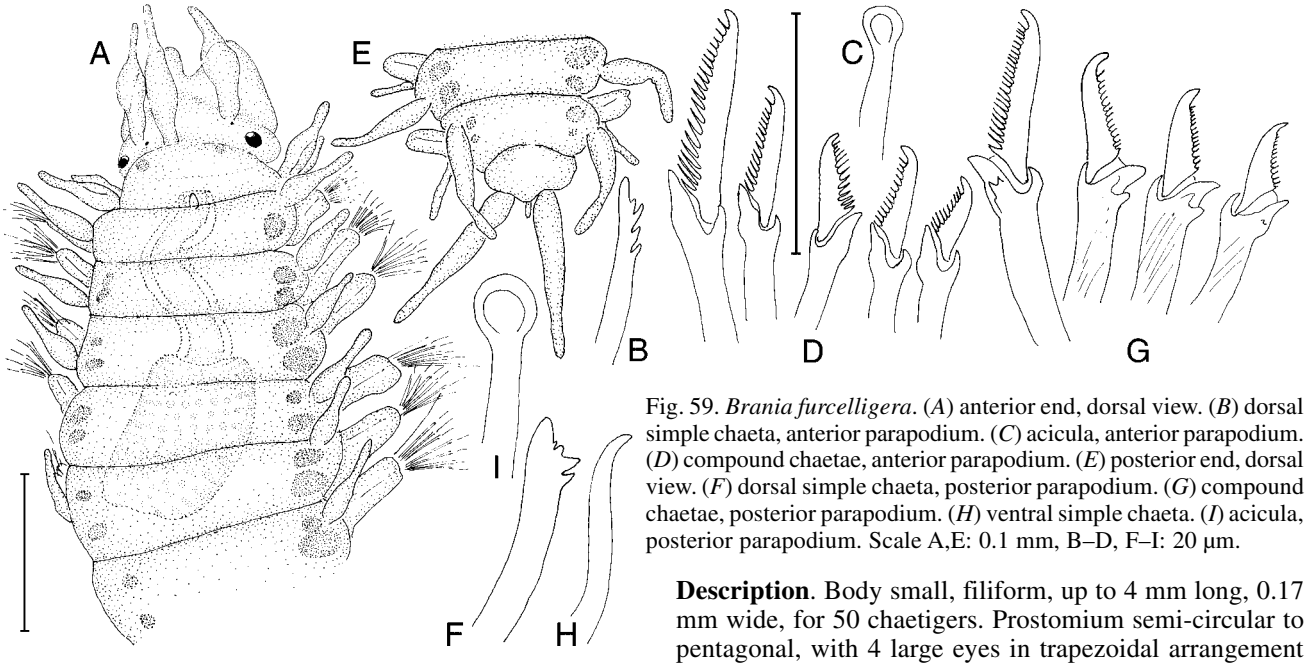


Fig. 59. *Brania furcelligera*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) acicula, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) posterior end, dorsal view. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. (*I*) acicula, posterior parapodium. Scale A,E: 0.1 mm, B–D, F–I: 20 µm.

17 muscle cell rows. Pygidium small, bilobed, with 2 long anal cirri, longer than median antenna (Fig. 58B).

Remarks. *Brania glandulosa* Hartmann-Schröder, 1980b, from West Indies, has similar compound and simple chaetae, but the antennae are more elongate, the parapodial glands are much more developed, and the proventricle is slightly longer (Hartmann-Schröder, 1980b).

Distribution. Australia (Western Australia, New South Wales, Queensland).

Habitat. Fine sand and algae. In dead corals. Eulittoral and sublittoral, known up to 30 m depth.

Brania furcelligera (Augener, 1913)

Fig. 59A–I

Grubea furcelligera Augener, 1913: 256, pl. 3, figs. 20, 21, text-fig. 39.

Brania furcelligera.–Day & Hutchings, 1979: 100. Hartmann-Schröder, 1974b: 48, figs. 27–32; 1980a: 54, fig. 44; 1983: 133, fig. 21; 1991: 38; 1992a: 59.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W26437, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae and ascidians, 16 m, E.L. Albertson, 7 Mar 1992. SOUTH AUSTRALIA. 7 specimens, AM W26743, Victor Harbour, 35°33'S 138°38'E, algal washings, P.A. Hutchings, 16 Mar 1979. 7 specimens, AM W26744, Elliston Reef, 33°39'S 134°53'E, algal washings, P.A. Hutchings, 11 Mar 1979. WESTERN AUSTRALIA. 2 specimens, AM W26816, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, very fine sediment and sand from patches in reef, 1 m, H.E. Stoddart, 2 Jan 1984. 1 specimen, AM W27095, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat with epifauna, 2 m, P.A. Hutchings, 26 May 1994. 2 specimens, AM W27410, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27412, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 3 specimens, AM W27420, north end of beach, Buni Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small, filiform, up to 4 mm long, 0.17 mm wide, for 50 chaetigers. Prostomium semi-circular to pentagonal, with 4 large eyes in trapezoidal arrangement and 2 anterior small eyespots. Antennae elongate, spindle-shaped to bowling-pin shaped; median antenna longer than lateral ones, slightly shorter than prostomium and palps together, inserted between posterior eyes and eyespots; lateral antennae slightly longer than prostomium, inserted in front of anterior eyes, similar in shape to median antenna. Palps similar in length to prostomium, fused for their basal half (Fig. 59A). Peristomium similar in length to following segments, covering dorsally posterior margin of prostomium; dorsal tentacular cirri similar to lateral antennae but shorter, ventral tentacular cirri similar to dorsal ones but shorter. Parapodial glands conspicuous, with dark, granular material, usually 2 glands per parapodium. Dorsal cirri similar to dorsal tentacular cirri (Fig. 59A), slightly longer than parapodial lobes, longer on posterior chaetigers than on anterior chaetigers (Fig. 59A,E).Ventral cirri digitiform, shorter than parapodial lobes. Compound chaetae similar throughout, but having heterogomph articulation on anterior parapodia (Fig. 59D), and hemigomph articulations on posterior parapodia, with thicker shafts, provided with a few thick spines (Fig. 59G); blades unidentate, distally rounded, slightly hooked, marginal spines moderate in length; a subdistal spine near tip longer than other spines, more marked on longer blades (Fig. 59D,G). Parapodium each with about 8 compound chaetae on anterior parapodia, 5 on posterior parapodia; slight dorsoventral gradation in length of blades, diminishing progressively in length, 18 µm above, 6.5 µm below on anterior parapodia; 14 µm above, 8 µm below on posterior parapodia. Dorsal simple chaetae from anterior parapodia, unidentate, provided with about 4–5 short marginal serrations of different sizes, one of them much larger than others (Fig. 59B,F), posterior dorsal simple chaetae much thicker than anterior ones. Ventral simple chaetae on posterior parapodia, sigmoid, smooth and unidentate (Fig. 59H). Solitary acicula on each parapodium, tip enlarged, rounded, and slightly hollow (Fig. 59C,I). Pharynx longer than proventricle, through 3–4 segments; pharyngeal tooth conical, located on anterior margin (Fig. 59A). Proventricle short, through 2 segments, with about 16–18 muscle cell rows. Pygidium small, bilobed, with 2

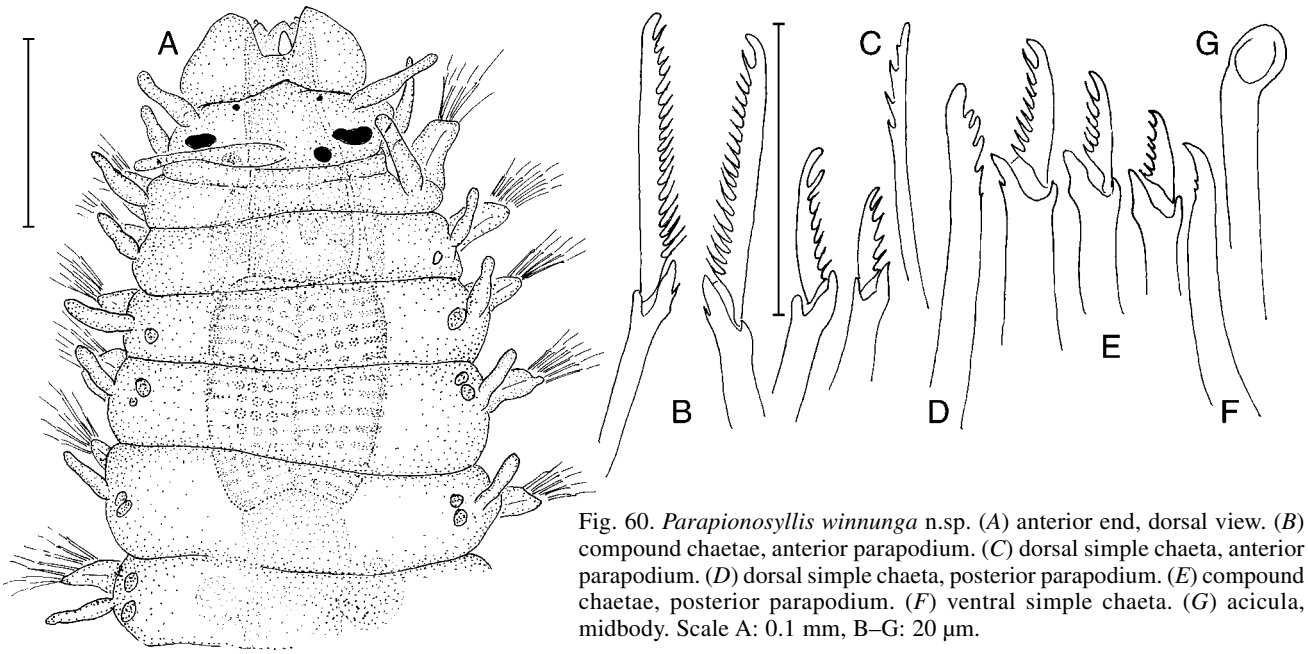


Fig. 60. *Parapionosyllis winnunga* n.sp. (*A*) anterior end, dorsal view. (*B*) compound chaetae, anterior parapodium. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) dorsal simple chaeta, posterior parapodium. (*E*) compound chaetae, posterior parapodium. (*F*) ventral simple chaeta. (*G*) acicula, midbody. Scale A: 0.1 mm, B–G: 20 µm.

long anal cirri, longer than median antenna (Fig. 59E).

Remarks. *Brania arminii* (Langerhans, 1881), from the Canary Islands, Mediterranean Sea and Red Sea, is similar, differing in the shape of dorsal simple chaetae (see Langerhans, 1881; Núñez *et al*., 1992; San Martín, 1984a, 2003).

Distribution. Australia (New South Wales, South Australia, Western Australia, Queensland). South Africa, New Zealand. Islands of tropical Pacific.

Habitat. Sand, coralline sand, algae, corals.Intertidal and shallow water.

Genus *Parapionosyllis* Fauvel, 1923

Parapionosyllis Fauvel, 1923: 289.

Diagnosis. Body small to minute. Prostomium with 2 pairs of eyes and, sometimes, a pair of eyespots, 3 bowling-pin shaped antennae. Palps partially fused, distal half or ⅓ free of each other. Single pair of tentacular cirri, bottle- or bowling-pin shaped, located lateroventrally. Dorsal cirri on all parapodia, short, bowling-pin shaped. Parapodial lobes conical, with an small, thin distal rounded papilla. Parapodial glands present. Pharynx provided with an anterior tooth, surrounded by soft papillae. Compound chaetae with unidentate blades provided with a subdistal spine and rounded tip; aciculae with a rounded, slightly hollowed tip. Dorsal simple chaetae usually subdistally serrated. Ventral simple chaetae sigmoid, usually unidentate. Mature males with natatory chaetae; mature females brooding eggs or juveniles ventrally, lacking natatory chaetae. *Parapionosyllis* is identical to *Brania*, but having a single pair rather than two pairs of tentacular cirri.

Type species. *Pionosyllis gestans* Pierantoni, 1903 (fide Hartman, 1959).

Parapionosyllis winnunga n.sp.

Fig. 60A–G

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: AM W26449, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1985. PARATYPE: 1 specimen, AM W26450, Halifax Bay, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977.

Description. Body minute, 1.8 mm long, 0.11 mm wide, for 27 chaetigers. Prostomium ovate, wider than long, with 4 large eyes in trapezoidal arrangement and 2 anterior small eyespots, anterior eyes larger than posterior eyes. Antennae slender and proportionally short, spindle-shaped, bowling-pin shaped; median antenna longer than lateral ones, shorter than combined length of prostomium and palps, inserted between posterior eyes; lateral antennae slightly shorter than prostomium, inserted in front of anterior eyes and lateral to eyespots, similar in shape to median antenna. Palps similar in length to prostomium, fused for their basal half (Fig. 60A). Peristomium shorter than following segments; tentacular cirri similar to lateral antennae but shorter. Parapodial glands small, with dark, granular material, usually 2 glands per parapodium. Dorsal cirri similar to lateral antennae (Fig. 60A), slightly longer than parapodial lobes. Ventral cirri digitiform, shorter than parapodial lobes. Compound chaetae similar throughout, but having

Key to the species of *Parapionosyllis* recorded from Australia

1 Blades of compound chaetae provided with short spines and a long, distinct subdistal erect spine ..... *P. winnunga* n.sp.

—— Blades of compound chaetae with moderately long spines and subdistal spine not longer than marginal spines ..... *P. richardi* n.sp.

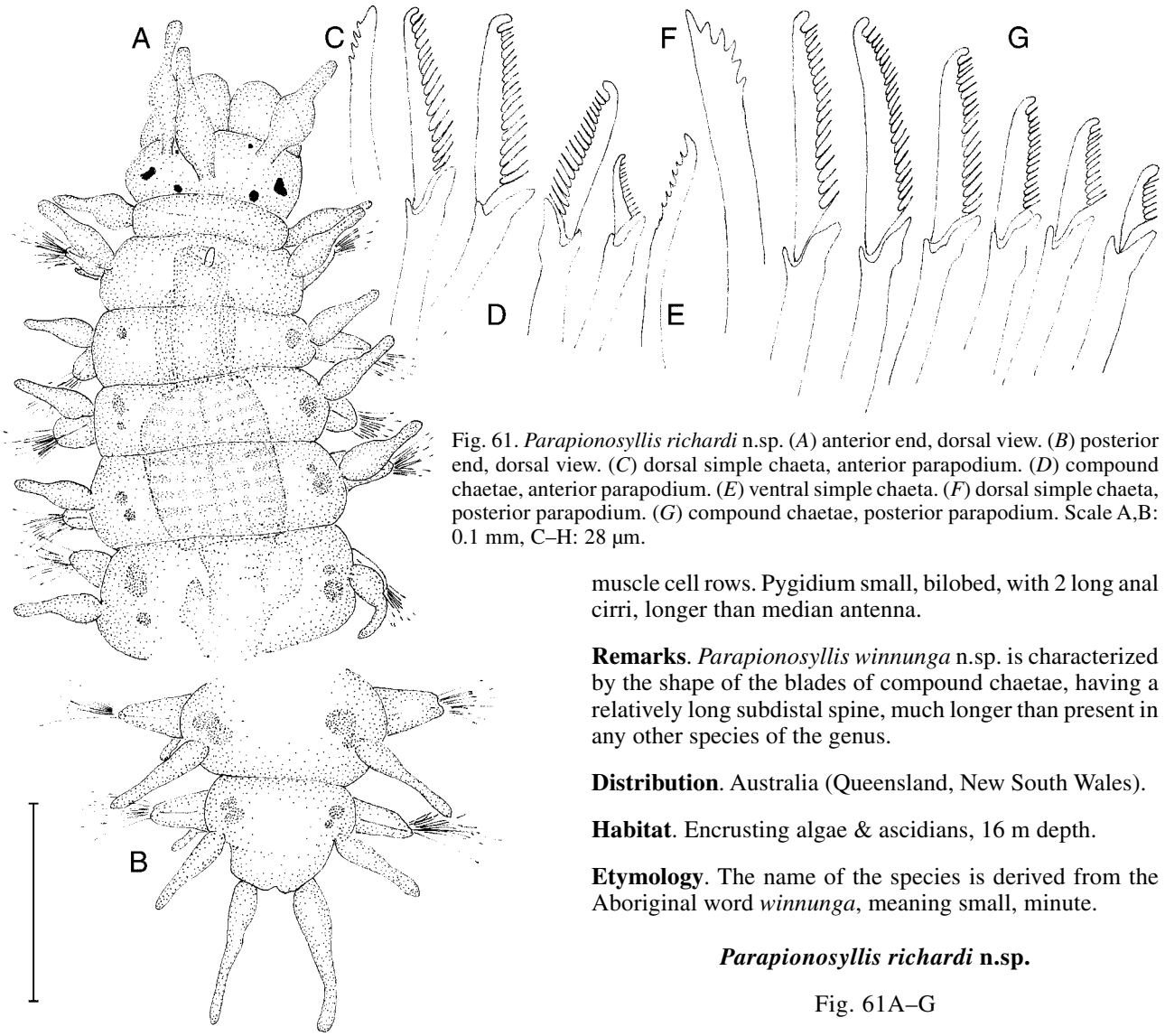


Fig. 61. *Parapionosyllis richardi* n.sp. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) ventral simple chaeta. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. Scale A,B: 0.1 mm, C–H: 28 µm.

heterogomph articulation on anterior parapodia (Fig. 60B), and hemigomph articulation with thicker shafts on posterior parapodia (Fig. 60E); blades unidentate, distally rounded, slightly hooked, marginal spines moderate in length, and a subdistal spine near tip, much longer than other spines (Fig. 60B,E). Anterior parapodia each with 7 compound chaetae, 1–2 with long, slender blades about 20 µm long, with moderate, thin marginal spines, and 5 compound chaetae with shorter blades, diminishing progressively in length, 10 µm above, 5 µm below; long blades absent from midbody; posterior parapodia each with 6 compound chaetae, with thicker shafts, dorsoventral gradation in length of blades, 10 µm above, 6 µm below, and short marginal spines. Dorsal simple chaetae from chaetiger 1, unidentate, provided with about 4–5 short serrations, all similar (Fig. 60D), anterior dorsal simple chaetae slender (Fig. 60C). Ventral simple chaetae on each parapodium from about chaetiger 18, sigmoid, smooth and unidentate (Fig. 60F). Solitary acicula on each parapodium, tip enlarged and rounded, slightly hollowed distally (Fig. 60G). Pharynx longer than proventricle, through 3–4 segments; pharyngeal tooth conical, located on anterior margin (Fig. 60A). Proventricle short, through 2–2½ segments, with about 13 muscle cell rows. Pygidium small, bilobed, with 2 long anal cirri, longer than median antenna.

Remarks. *Parapionosyllis winnunga* n.sp. is characterized by the shape of the blades of compound chaetae, having a relatively long subdistal spine, much longer than present in any other species of the genus.

Distribution. Australia (Queensland, New South Wales).

Habitat. Encrusting algae & ascidians, 16 m depth.

Etymology. The name of the species is derived from the Aboriginal word *winnunga*, meaning small, minute.

Parapionosyllis richardi n.sp.

Fig. 61A–G

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE: AM W27398, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. PARATYPES: 2 specimens, AM W26799, north east entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plates of *Acropora*, covered in coralline algae, 8 m, P.A. Hutchings, 25 May 1994.

Description. Body minute, holotype 1.12 mm long, 0.13 mm wide, for 20 chaetigers, paratype in two pieces, 2.5 mm long, 0.1 mm wide, for 27 chaetigers. Prostomium ovate, wider than long, with 4 small eyes in trapezoidal arrangement and 2 anterior small eyespots, anterior eyes larger than posterior eyes, reniform. Antennae thick, spindle- to bowling-pin shaped, with distinct median enlargement; median antenna longer than lateral ones, shorter than prostomium and palps together, inserted between posterior eyes; lateral antennae similar in length to prostomium, inserted in front of anterior eyes and just lateral to eyespots, similar in shape to median antenna. Palps similar in length to prostomium, fused for their basal half (Fig. 61A). Peristomium shorter than following segments; tentacular cirri similar to lateral antennae but shorter. Parapodial glands small, with dark, granular material, usually 2 glands per parapodium. Dorsal cirri bowling-pin shaped (Fig. 61A), longer than parapodial lobes. Parapodial lobes conical, with

a small, thin distal rounded papilla. Ventral cirri digitiform, shorter than parapodial lobes. Compound chaetae similar throughout, (Fig. 61D,G); blades unidentate, distally distinctly rounded, slightly hooked, marginal spines moderate in length; subdistal spine near tip, similar to other spines but slightly longer and thicker (Fig. 61D,G). Parapodia each with about 6–8 compound chaetae, blades 18 µm above 6 µm below in midbody segments (Fig. 61G); chaetae of anterior parapodia with slightly shorter blades (Fig. 61D), diminishing progressively in length, 10 µm above, 5 µm below; long blades disappearing in posterior-most parapodia. Dorsal simple chaetae from chaetiger 1, unidentate, provided with about 4–5 short spines of similar size (Fig. 61F), anterior dorsal simple chaetae slender (Fig. 61C). Ventral simple chaetae on most posterior parapodia, sigmoid, with short marginal spines and unidentate (Fig. 61E). Solitary acicula in each parapodium, tip enlarged and rounded, slightly hollow. Pharynx similar in length to proventricle, through 2 segments; pharyngeal tooth conical, located on anterior margin (Fig. 61A). Proventricle short, through 2–2½ segments, with about 13 muscle cell rows. Pygidium small, bilobed, with two anal cirri, similar to posterior dorsal cirri, but longer (Fig. 61B).

Remarks. *Parapionosyllis richardi* n.sp., is characterized by having compound chaetae with a strong gradation in length of blades, provided with moderately long marginal spines and dorsal simple chaetae with few teeth, all similar in size. *Parapionosyllis macaronesiaensis* Brito, Núñez & San Martín (2000), from Canary and Madeira Islands (see Brito *et al*., 2000), has similar chaetae, but the dorsalmost compound chaetae are provided with long blades and the remaining are much shorter, with a dorsoventral gradation, and the dorsal simple chaetae have 2 teeth longer than the rest. The most similar species appears to be *Parapionosyllis elegans* (Pierantoni, 1903); both species have compound chaetae with moderately long marginal spines and gradation in size of blades. The antennae of *P. elegans*, however, have a smaller enlargement, longer the proventricle, the ventral simple chaetae are smooth, and the dorsal simple chaetae have a distinctly longer and thicker tooth (see Pierantoni, 1903; San Martín, 2003). *Parapionosyllis uebelackerae* San Martín (1991b), from the Gulf of México, is a larger species, with longer blades on the compound chaetae, although the dorsal simple chaetae are similar (San Martín, 1991b).

Distribution. Australia (Western Australia).

Habitat. In dead corals.

Etymology. The species is dedicated to Mr Richard Johnson, of The Australian Museum.

Genus *Exogone* Örsted, 1845

Exogone Örsted, 1845: 20.

Diagnosis. Body small, slender, more or less filiform. Prostomium with 3 antennae, exceptionally without antennae; usually 4 eyes, sometimes also with 2 eyespots, occasionally without eyes. Palps well developed, completely fused to each other or with terminal notch. Single pair of minute tentacular cirri. Dorsal cirri usually small, papilliform to oval, present on all segments or absent on chaetiger 2 in adults of some species. Usually compound chaetae and dorsal and ventral simple chaetae; sometimes blades fused to shafts or without blades, forming simple chaetae. Two usually long anal cirri present. Body surface smooth. Pharynx with anterior margin surrounded by soft lobes, with anterior tooth. Mature females carrying eggs ventrally, developing to embryos and juveniles, lacking capillary notochaetae (natatory chaetae); mature males with long natatory chaetae; some species shown to be viviparous.

The genus was revised by San Martín (1991a), who recognized three subgenera, *Parexogone* Mesnil & Caullery, 1918; *Exogone* Örsted, 1845; and *Sylline* Claparède, 1864. This diagnosis is here slightly modified.

Type species. *Exogone naidina* Örsted, 1845 (Hartman, 1959).

Subgenus *Parexogone* Mesnil & Caullery, 1918

Parexogone Mesnil & Caullery, 1918: 125.

Diagnosis. Compound chaetae not modified, all with heterogomph articulations, falcigers all similar in shape and blade length, or falcigers and heterogomph spiniger-like (elongate falcigers) with shaft tips simple, blades relatively similar to falcigers but longer. Dorsal simple chaetae similar throughout body, tips unidentate or bidentate, with both teeth similar.

Type species. *Paedophylax hebes* Webster & Benedict, 1884.

Key to the subgenera of *Exogone*

1 Compound chaetae with tapering, elongated, bidentate falcigers, both teeth similar, and, sometimes, some compound chaetae on each parapodium with elongate, spiniger-like blade. Probably viviparous species (only proved on a few species) ..... *Parexogone*

—— Compound chaetae otherwise, with both elongated, spiniger-like blades and other with short falcigers, or blades missing. Females brooding eggs ventrally, developing juveniles 2

2 Compound chaetae on most parapodia with short blades, with subdistal tooth smaller than distal tooth, together a single (or few) compound chaeta with long, filiform, spiniger-like blade ..... *Exogone*

—— Compound chaetae with blades minute, fused to shafts or absent ..... *Sylline*

Key to the species of *Exogone (Parexogone)* recorded from Australia

1 Adults with dorsal cirri on chaetiger 2 2
—— Adults without dorsal cirri on chaetiger 2 6

2 All antennae small, papilliform. Palps free from each other for distal ⅓ ..... *E. (P.) exmouthensis*
—— Antennae longer, not papilliform. Palps fused along their length 3

3 Median antenna similar to combined length of prostomium and palps; lateral antennae sphaerical to egg-shaped ..... *E. (P.) penelopeae* n.sp.
—— Median antenna distinctly longer than combined length of prostomium and palps; lateral antennae elongate 4

4 Dorsal and ventral simple chaetae bidentate, with both teeth similar ..... *E. (P.) wolfi*
—— At least, ventral simple chaetae with subdistal tooth distinctly larger than distal one 5

5 Ventral simple chaetae large, distinctly thick. Dorsal simple chaetae with subdistal tooth larger than distal one. Anterior parapodia each with some chaetae provided with long, spiniger-like blades ..... *E. (P.) patriciae* n.sp.
—— Ventral simple chaetae not so large. Dorsal simple chaetae with both teeth similar. Without compound chaetae with long, spiniger-like blades ..... *E. (P.) annamurrayae* n.sp.

6 Median antenna long, similar in length to combined length of prostomium and palps 7
—— Median antenna distinctly shorter than combined length of prostomium and palps 10

7 Compound chaetae all with short, similar blades 8
—— At least on anterior parapodia, some compound chaetae with distinctly longer blades than other chaetae, spiniger-like 9

8 Blades short, all similar in length; dorsal and ventral simple chaetae thick, bidentate, with teeth separated from each other ..... *E. (P.) wilsoni* n.sp.
—— Blades with usual dorsoventral gradation in length. Dorsal and ventral simple chaetae not unusually thick and teeth close to each other ..... *E. (P.) sexoculata*

9 Spiniger-like blades, at least on anterior parapodia, more than 4 times length of falciger blades; dorsal cirri minute ..... *E. (P.) tasmanica*
—— Spiniger-like blades not so long; dorsal cirri larger ..... *E. (P.) gambiae*

10 Antennae inserted on posterior margin of prostomium. Lateral antennae and dorsal cirri minute ..... *E. (P.) caribensis*
—— Antennae inserted on anterior margin of prostomium. Lateral antennae and dorsal cirri not unusually small ..... *E. (P.) homosetosa*

Exogone (Parexogone) exmouthensis Hartmann-Schröder, 1980

Figs. 62A–G, 69E

Exogone exmouthensis Hartmann-Schröder, 1980a: 57, figs. 45, 46; 1992a: 60, figs. 18–20.

Not *Exogone (Parexogone) exmouthensis*.–San Martín, 1991a: 726.

Material examined. AUSTRALIA: SOUTH AUSTRALIA. 2 specimens, AM W26633, Fifth Creek, Port Pirie, Spencer Gulf, 33°12'S 137°55'E, *Posidonia* in subtidal region, 2.8 m, T.J. Ward, Mar 1980. 1 specimen, AM W26661, off Fifth Creek, Port Pirie, Spencer Gulf, 33°12'S 137°55'E, *Posidonia* & *Amphibolus* spp. in subtidal region, 4.6 m, T.J. Ward, Aug 1979. WESTERN AUSTRALIA. 1 specimen, AM W27022, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plates of *Acropora* covered in coralline algae, 20 m, P.A. Hutchings, 20 May 1994. 2 specimens, AM W27023, southeast end of Long Island, Beacon Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27024, East Montalivet Island, 15°06'S 125°18'E, 6 m, P.A. Hutchings, 16 July 1988. 3 specimens, AM W27427, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984. 1 specimen, and 2 specimens on SEM stub, AM W27439, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27451, Lafontaine Island, Kimberley region, 14°10'S 125°47'E, 15 m, P.A. Hutchings, 19 July 1988. 3 specimens, and 1 specimen on SEM stub, AM W27458, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 1 specimen, AM W27461, north end of beach, Bundegi Reef,

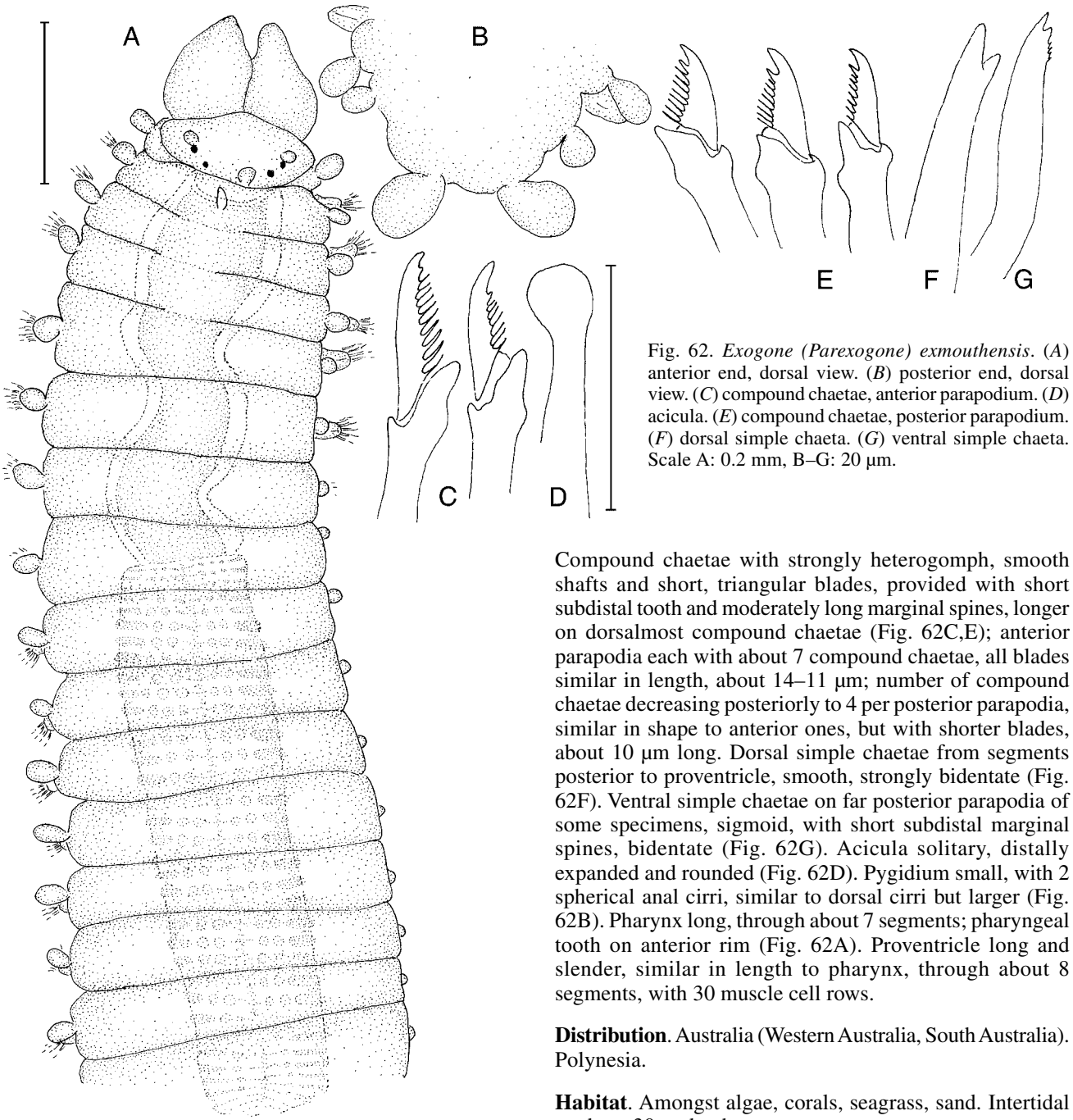


Fig. 62. *Exogone (Parexogone) exmouthensis*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) compound chaetae, anterior parapodium. (*D*) acicula. (*E*) compound chaetae, posterior parapodium. (*F*) dorsal simple chaeta. (*G*) ventral simple chaeta. Scale A: 0.2 mm, B–G: 20 µm.

Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27463, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry and R.T. Springthorpe, 6 Jan 1984.

Description. Body long and slender, filiform, 6.4 mm long, 0.4 mm wide, about 74 chaetigers. Prostomium ovate, wider than long, with 4 small eyes in trapezoidal arrangement and, sometimes, 2 minute anterior eyespots; antennae papilliform, sphaerical, minute; median antenna slightly larger than lateral antennae, inserted between posterior eyes, lateral antennae inserted in front of anterior eyes. Palps long and broad, dorsally fused except for a distal deep notch (Fig. 62A, 69E). Peristomium covered by chaetiger 1 dorsally; tentacular cirri egg-shaped, larger than antennae. Dorsal cirri on all parapodia, similar to tentacular cirri (Figs. 62A, 69E). Compound chaetae with strongly heterogomph, smooth shafts and short, triangular blades, provided with short subdistal tooth and moderately long marginal spines, longer on dorsalmost compound chaetae (Fig. 62C,E); anterior parapodia each with about 7 compound chaetae, all blades similar in length, about 14–11 µm; number of compound chaetae decreasing posteriorly to 4 per posterior parapodia, similar in shape to anterior ones, but with shorter blades, about 10 µm long. Dorsal simple chaetae from segments posterior to proventricle, smooth, strongly bidentate (Fig. 62F). Ventral simple chaetae on far posterior parapodia of some specimens, sigmoid, with short subdistal marginal spines, bidentate (Fig. 62G). Acicula solitary, distally expanded and rounded (Fig. 62D). Pygidium small, with 2 spherical anal cirri, similar to dorsal cirri but larger (Fig. 62B). Pharynx long, through about 7 segments; pharyngeal tooth on anterior rim (Fig. 62A). Proventricle long and slender, similar in length to pharynx, through about 8 segments, with 30 muscle cell rows.

Distribution. Australia (Western Australia, South Australia). Polynesia.

Habitat. Amongst algae, corals, seagrass, sand. Intertidal to about 30 m depth.

Exogone (Parexogone) penelopeae n.sp.

Fig. 63A–L

Material examined. AUSTRALIA: SOUTH AUSTRALIA. HOLOTYPE: AM W26410, Elliston Reef, 33°39'S 134°53'E, algae, P.A. Hutchings, 11 Mar 1979. NEW SOUTH WALES. PARATYPES: 2 specimens, AM W26411, northern side of Bannister Head, 35°19.15'S 150°29.12'E, grey sponge from top of boulder, 18 m, K. Attwood, 6 May 1997.

Description. Body cylindrical, moderately long, holotype incomplete, 4 mm long, 0.31 mm wide, 46 chaetigers. Prostomium ovate to sub-pentagonal, wider than long; 4 large eyes in trapezoidal arrangement; median antenna inserted between posterior eyes, thick, cylindrical, similar in length to prostomium and palps together or slightly shorter; lateral antennae egg-shaped, ovate, much shorter

than median antenna, inserted in front of anterior eyes. Palps broad, slightly longer than prostomium, fused along their length, with a small dorsal distal furrow (Fig. 63A). Peristomium slightly shorter than following segments, covering dorsally posterior part of prostomium; tentacular cirri similar to lateral antennae but much smaller. Dorsal cirri on all segments, egg-shaped, larger than tentacular cirri but smaller than lateral antennae, shorter than parapodial lobes (Fig. 63A). Compound chaetae including 2–4 on anterior parapodia, 1–2 in midbody and posterior parapodia, spiniger-like with elongate blades, bidentate, both teeth small and similar, and long, erect, fine marginal spines, distal spines longer than remaining, extending beyond tips of blades, blades 39 µm long on anterior parapodia (Fig. 63B), 36 µm on midbody (Fig. 63F), 26–23 µm on posterior parapodia (Fig. 63J), in addition with several falcigers, 8 on anterior parapodia, 4–5 on midbody, 3–4 on posterior parapodia, with strongly bidentate blades, provided with long, erect marginal spines, longer on distal part, extending beyond tip, more strongly bidentate, with longer and thicker subdistal tooth posteriorly (Figs. 63C,G,K), slight dorsoventral gradation in length of blades on anterior parapodia, 18 µm above, 10 µm below, and all similar in length on remaining parapodia, about 16 µm on midbody, 12 µm on posterior parapodia. Dorsal simple chaetae from post-proventricular parapodia, bidentate, distal tooth small subdistal tooth long, provided with 6–7 thin, long, erect, spines (aristae) (Fig. 63H), disposed on a transverse inferior ridge (Fig. 63I). Ventral simple chaetae from about chaetiger 28 in holotype, sigmoid, similar to dorsal simple chaetae, but thicker, major difference in size of teeth, with only 2 aristae, proportionally shorter than those of dorsal simple chaetae (Fig. 63L). Anterior parapodia each with 2 aciculae, one straight and one bent laterally (Fig. 63D); remaining parapodia each with solitary acicula, distally expanded and rounded (Fig. 63E). Pharynx moderate in length, through about 5–6 segments; pharyngeal tooth conical, on anterior rim (Fig. 63A). Proventricle short, through 3 segments, with 17 muscle cell rows.

Remarks. This species is characterized by having several aristae on dorsal and ventral simple chaetae, compound chaetae with strongly bidentate blades, provided with long spines and subdistal tooth slightly longer than distal tooth, as well as short, egg-shaped lateral antennae and relatively short median antenna; no other species has these combinations of characters.

Distribution. Australia (New South Wales, South Australia, Western Australia).

Habitat. On sponges and algal washings, up to 18 m depth.

Etymology. The species is named in honour of Dr Penelope (Penny) Berents, of The Australian Museum.

Exogone (Parexogone) wolfi San Martín, 1991

Fig. 64A–J

Exogone (Parexogone) wolfi San Martín, 1991a: 726, fig. 6; San Martín *et al*., 1996: 252, fig. 3; San Martín, 2003: 243, figs. 129, 130.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W27092, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 4 specimens, AM W27093, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 1 specimen, AM W27094, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate-like *Acropora* covered in coralline algae, 8 m, P.A. Hutchings, 25 May 1994.

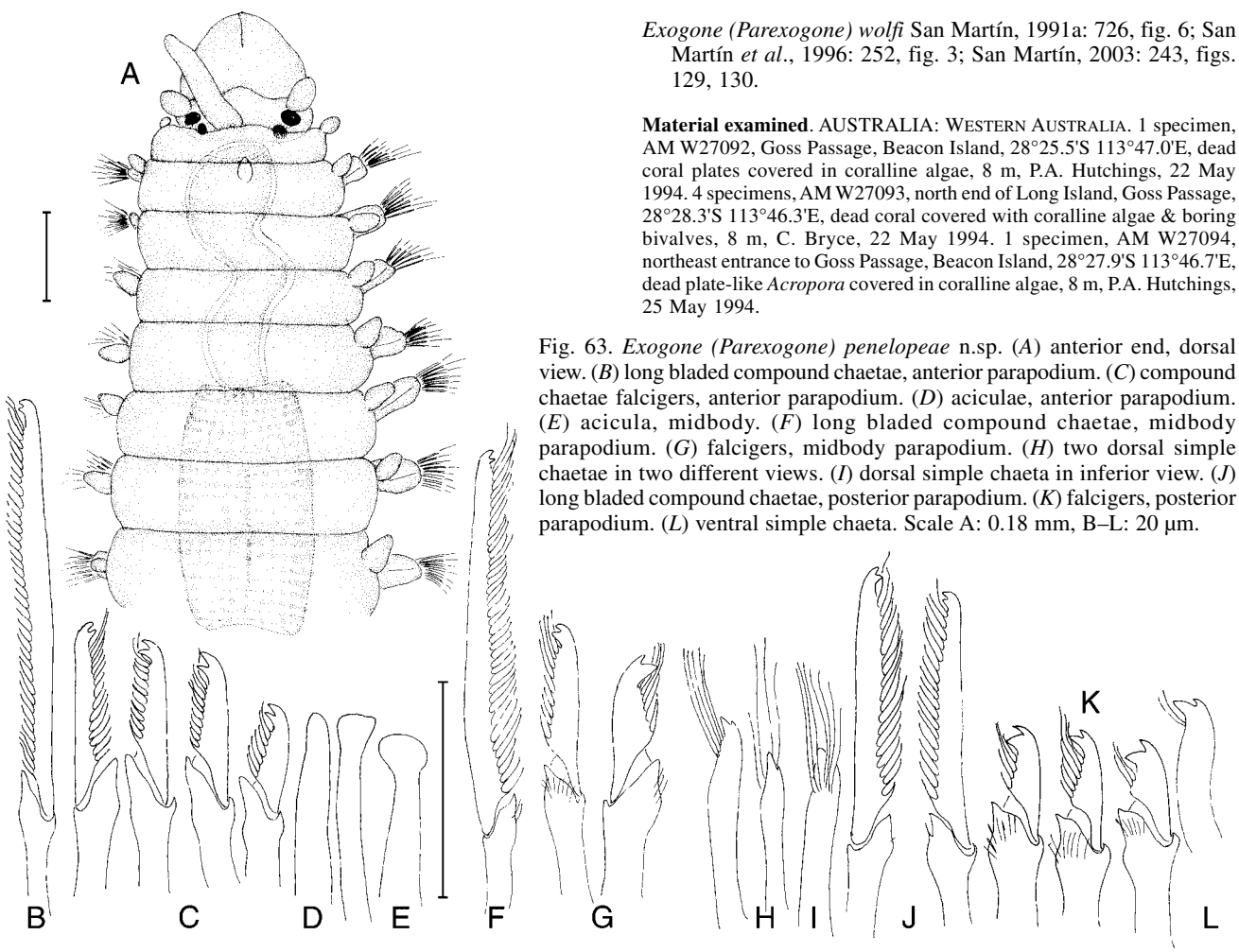


Fig. 63. *Exogone (Parexogone) penelopeae* n.sp. (*A*) anterior end, dorsal view. (*B*) long bladed compound chaetae, anterior parapodium. (*C*) compound chaetae falcigers, anterior parapodium. (*D*) aciculae, anterior parapodium. (*E*) acicula, midbody. (*F*) long bladed compound chaetae, midbody parapodium. (*G*) falcigers, midbody parapodium. (*H*) two dorsal simple chaetae in two different views. (*I*) dorsal simple chaeta in inferior view. (*J*) long bladed compound chaetae, posterior parapodium. (*K*) falcigers, posterior parapodium. (*L*) ventral simple chaeta. Scale A: 0.18 mm, B–L: 20 µm.

Description. Body long, slender, filiform, 8 mm long, 0.12 mm wide, 53 chaetigers. Prostomium nearly rounded; 2 pairs of small eyes in trapezoidal arrangement and 2 minute anterior eyespots. Median antenna inserted in front of line between posterior eyes, cylindrical, 1.5 times as long as combined length of prostomium and palps; lateral antennae much shorter than median antenna, slightly shorter than prostomium, inserted in front of anterior eyes (Fig. 64A). Palps longer than prostomium, completely fused all along their length, forming a triangular, acute piece. Peristomium similar to inmediately following segments, rectangular in shape; tentacular cirri minute, papilliform. Segments posterior to proventricle longer than wide (Fig. 64A). Dorsal cirri papilliform, elongate, shorter than parapodial lobes, present on all parapodia. Compound chaetae with smooth shafts or provided with long, thin subdistal spines, and including on each parapodium chaetae with elongate, spiniger-like, bidentate blades, both teeth small and similar (Fig. 64B,E), those of posterior parapodia with subdistal tooth slightly longer than distal one (Fig. 64K), provided with long, thin, erected marginal spines, those of distal part even longer, extending beyond tip, together with several falcigers, similar in shape to spiniger-like, but shorter (Figs. 64C,F,I). Anterior parapodia each with 1–2 spiniger-like chaetae, blades about 40 µm long (Fig. 64B), and about 10 falcigers (Fig. 64C) with dorsoventral gradation in length, 23 µm above, 12 µm below; progressively to midbody, blades longer; midbody parapodia each with 1 spiniger-like chaeta (Fig. 64E), blade about 54 µm long, and 5–6 falcigers (Fig. 64F), blades 24 µm above 14 µm below; posterior parapodia each with 1 spiniger-like chaeta much shorter than those of midbody (Fig. 64K), 28 µm long, and only 2–3 falcigers, with subdistal tooth slightly longer than distal tooth (Fig. 64I), blades 12 µm above 9 µm below. Dorsal simple chaetae from midbody, distinctly bidentate, provided with several long marginal spines (aristae), extending beyond tip (Fig. 64D), thicker and more strongly bidentate on posterior parapodia (Fig. 64H). Ventral simple chaetae on posterior parapodia, strongly bidentate, subdistal tooth slightly longer than distal tooth, provided with moderately long, thin subdistal marginal spines (Fig. 63J). Acicula

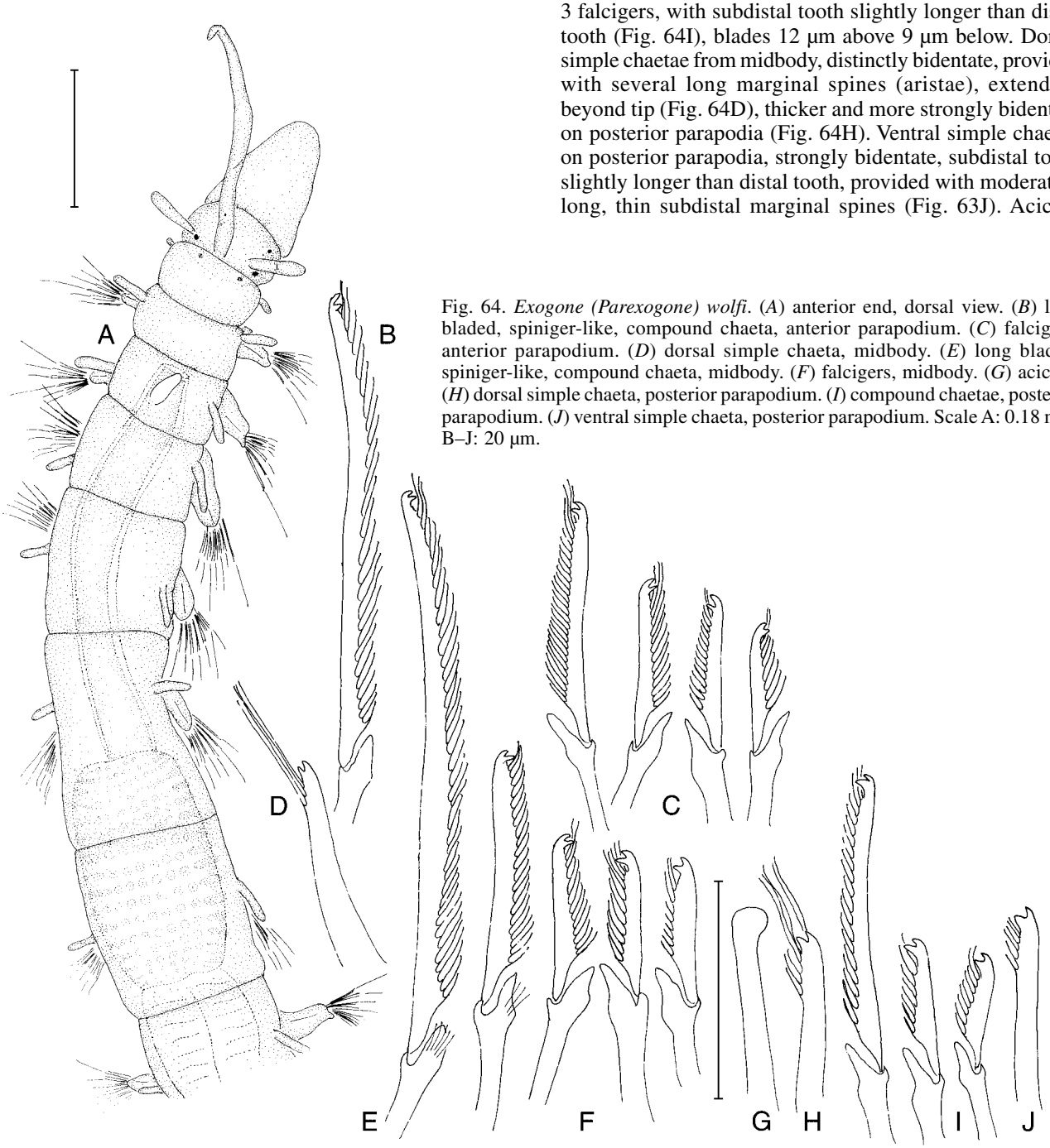


Fig. 64. *Exogone (Parexogone) wolfi*. (*A*) anterior end, dorsal view. (*B*) long bladed, spiniger-like, compound chaeta, anterior parapodium. (*C*) falcigers, anterior parapodium. (*D*) dorsal simple chaeta, midbody. (*E*) long bladed, spiniger-like, compound chaeta, midbody. (*F*) falcigers, midbody. (*G*) acicula. (*H*) dorsal simple chaeta, posterior parapodium. (*I*) compound chaetae, posterior parapodium. (*J*) ventral simple chaeta, posterior parapodium. Scale A: 0.18 mm, B–J: 20 µm.

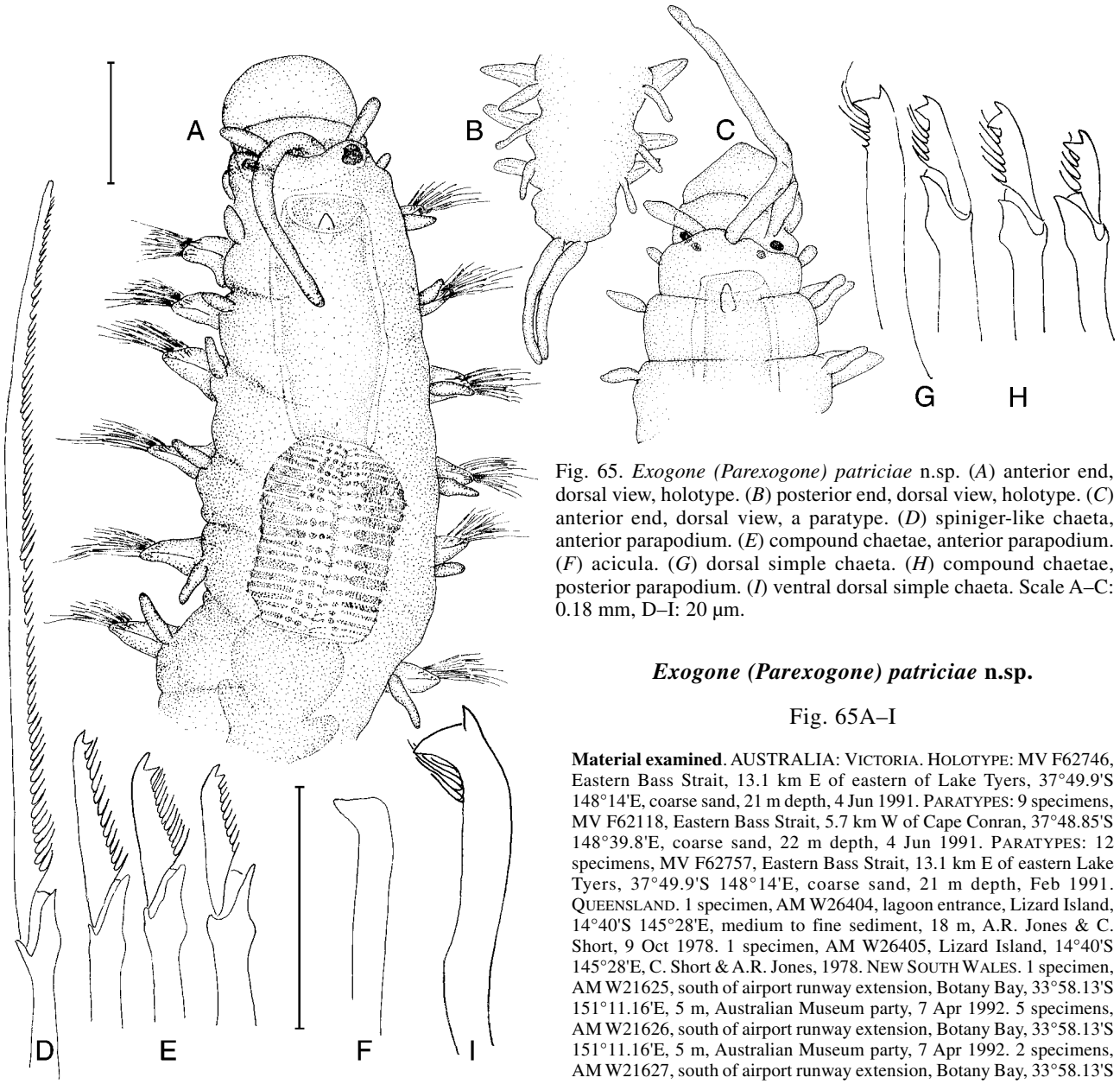


Fig. 65. *Exogone (Parexogone) patriciae* n.sp. (*A*) anterior end, dorsal view, holotype. (*B*) posterior end, dorsal view, holotype. (*C*) anterior end, dorsal view, a paratype. (*D*) spiniger-like chaeta, anterior parapodium. (*E*) compound chaetae, anterior parapodium. (*F*) acicula. (*G*) dorsal simple chaeta. (*H*) compound chaetae, posterior parapodium. (*I*) ventral dorsal simple chaeta. Scale A–C: 0.18 mm, D–I: 20 µm.

solitary, distally expanded and rounded (Fig. 64G). Pharynx long and slender, through about 4 segments; pharyngeal tooth on anterior rim (Fig. 64A). Proventricle short, through 1.5 segments, with about 17 muscle cell rows. Pygidium semi-circular, with 2 long anal cirri.

Remarks. The Australian specimens agree well with the previous descriptions, so I consider them as the same species, despite strong differences in habitat preference and wide distribution.

Distribution. USA (Florida and Gulf of México). Capbreton Canyon (Gulf of Biscay, between Spain and France). Eastern Mediterranean. Australia (Western Australia).

Habitat. Interstitial in sand, between 106 and 1,000 m depth. The Australian specimens have been collected in shallow waters, inside dead corals with other organisms.

Exogone (Parexogone) patriciae n.sp.

Fig. 65A–I

Material examined. AUSTRALIA: VICTORIA. HOLOTYPE: MV F62746, Eastern Bass Strait, 13.1 km E of eastern of Lake Tyers, 37°49.9'S 148°14'E, coarse sand, 21 m depth, 4 Jun 1991. PARATYPES: 9 specimens, MV F62118, Eastern Bass Strait, 5.7 km W of Cape Conran, 37°48.85'S 148°39.8'E, coarse sand, 22 m depth, 4 Jun 1991. PARATYPES: 12 specimens, MV F62757, Eastern Bass Strait, 13.1 km E of eastern Lake Tyers, 37°49.9'S 148°14'E, coarse sand, 21 m depth, Feb 1991. QUEENSLAND. 1 specimen, AM W26404, lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 1 specimen, AM W26405, Lizard Island, 14°40'S 145°28'E, C. Short & A.R. Jones, 1978. NEW SOUTH WALES. 1 specimen, AM W21625, south of airport runway extension, Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 7 Apr 1992. 5 specimens, AM W21626, south of airport runway extension, Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 7 Apr 1992. 2 specimens, AM W21627, south of airport runway extension, Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 7 Apr 1992. 1 specimen, AM W26406, south of Worang Point, Twofold Bay, 37°03.5'S 149°56.5'E, benthic, 6.1 m, S. Keable, P. Albertson, 21 Feb 1985, E166. 1 specimen, AM W26522, south of airport runway extension, Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 7 Apr 1992.

Description. Body long, slender, filiform, holotype 5.8 mm long, 0.1 mm wide, 59 chaetigers. Prostomium ovate, wider than long; 4 eyes in trapezoidal arrangement; median antennae long, about 2.5 times longer than combined length of prostomium and palps, cylindrical, inserted between posterior pair of eyes (Fig. 65A,C); lateral antennae similar in length to prostomium, inserted in front of anterior eyes. Palps broad, short, completely fused (Fig. 65A,C). Peristomium similar to following segments, covering posterior part of prostomium; tentacular cirri ovate, smaller than dorsal cirri; dorsal cirri on all parapodia, ovate, slightly shorter than parapodial lobes (Fig. 65A), elongate on posterior parapodia (Fig. 65B). Anterior parapodia each with 1–2 compound chaetae with long, spiniger-like, unidentate blade, provided with short, fine marginal spines, about 64 µm long, and 8–10 compound chaetae with bidentate

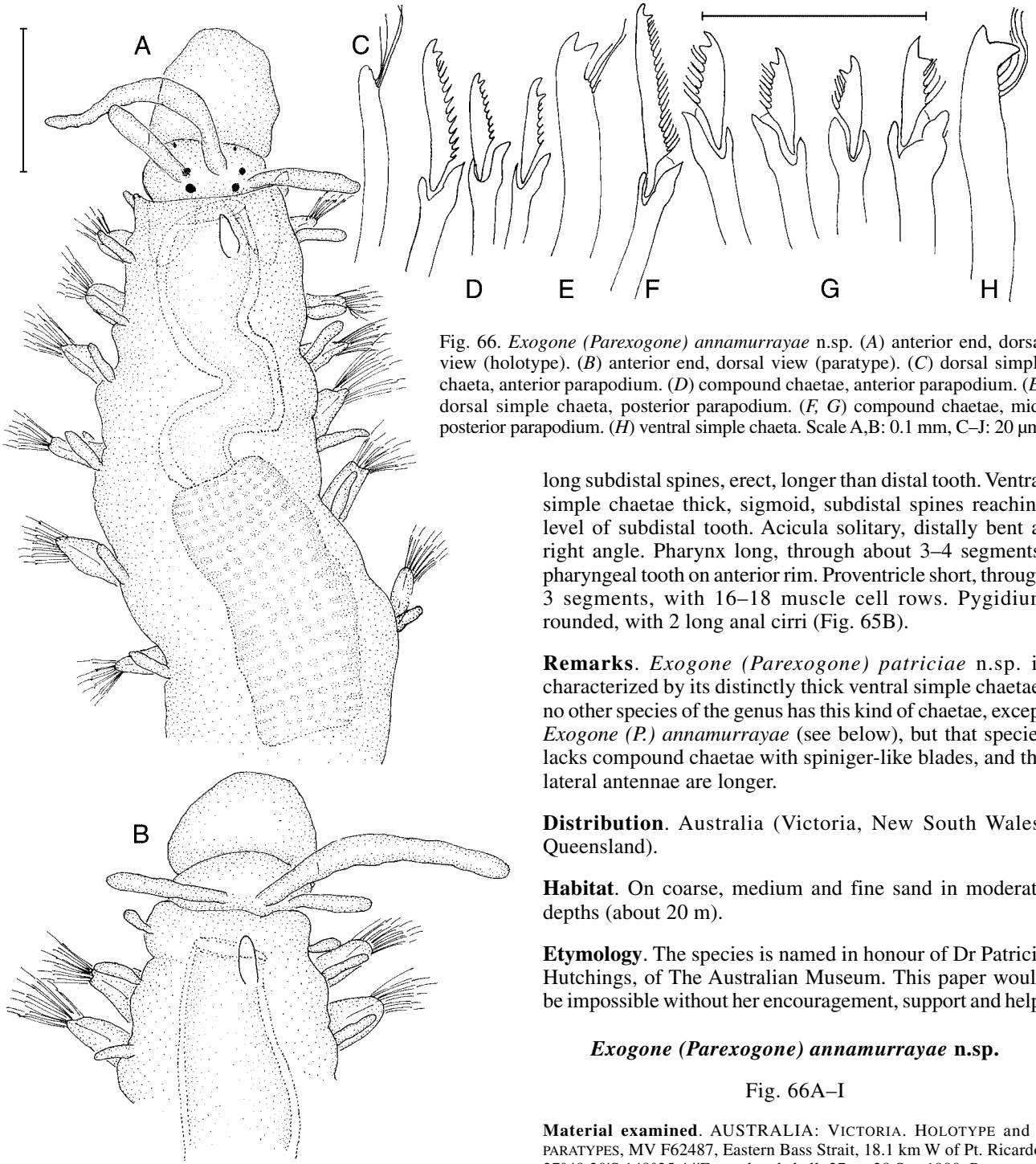


Fig. 66. *Exogone (Parexogone) annamurrayae* n.sp. (*A*) anterior end, dorsal view (holotype). (*B*) anterior end, dorsal view (paratype). (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F, G*) compound chaetae, mid-posterior parapodium. (*H*) ventral simple chaeta. Scale A,B: 0.1 mm, C–J: 20 µm.

falcigers, teeth similar, provided with moderately long marginal spines, slight dorsoventral gradation in length, 16.8 µm above, 12.4 µm below. Posteriorly spiniger-like chaetae are lost and chaetae with shorter blades replace them, the numbers of falcigers per parapodium decreasing to 5 in midbody; posterior parapodia each with 4 falcigers, blades short, subdistal tooth large, and distal tooth smaller, forming a wide angle between them; long marginal spines, erect, longer towards tips, extending beyond tip of subdistal tooth, blades 9 µm above, 8 µm below. Dorsal and ventral simple chaetae from chaetiger 26 in holotype, thick, strongly bidentate, with long, broad, triangular subdistal tooth much larger than distal tooth; dorsal simple chaetae provided with long subdistal spines, erect, longer than distal tooth. Ventral simple chaetae thick, sigmoid, subdistal spines reaching level of subdistal tooth. Acicula solitary, distally bent at right angle. Pharynx long, through about 3–4 segments, pharyngeal tooth on anterior rim. Proventricle short, through 3 segments, with 16–18 muscle cell rows. Pygidium rounded, with 2 long anal cirri (Fig. 65B).

Remarks. *Exogone (Parexogone) patriciae* n.sp. is characterized by its distinctly thick ventral simple chaetae; no other species of the genus has this kind of chaetae, except *Exogone (P.) annamurrayae* (see below), but that species lacks compound chaetae with spiniger-like blades, and the lateral antennae are longer.

Distribution. Australia (Victoria, New South Wales, Queensland).

Habitat. On coarse, medium and fine sand in moderate depths (about 20 m).

Etymology. The species is named in honour of Dr Patricia Hutchings, of The Australian Museum. This paper would be impossible without her encouragement, support and help.

Exogone (Parexogone) annamurrayae n.sp.

Fig. 66A–I

Material examined. AUSTRALIA: VICTORIA. HOLOTYPE and 8 PARATYPES, MV F62487, Eastern Bass Strait, 18.1 km W of Pt. Ricardo, 37°49.30'S 148°25.44'E, sand and shell, 27 m, 28 Sep 1990. PARATYPE: 1 specimen, MV F62734, Eastern Bass Strait, Victoria, 5 km W of Cape Conran, 37°48.85'S 148°39.85'E, coarse sand, 22 m, Feb 1991.

Description. Body long, slender, filiform, holotype is a complete specimen, broken in two pieces, 5 mm long, 0.16 mm wide, 60 chaetigers. Prostomium ovate, wider than long; 4 small eyes nearly in square arrangement and 2 minute anterior eyespots (Fig. 66A), but most of the examined specimens apparently without eyes, which disappear after fixation (Fig. 66B). Antennae inserted approximately on middle along of prostomium; median antenna long, approximately twice as long as combined length of prostomium and palps, lateral antennae similar in length to combined length of prostomium and palps (Fig. 66B) or

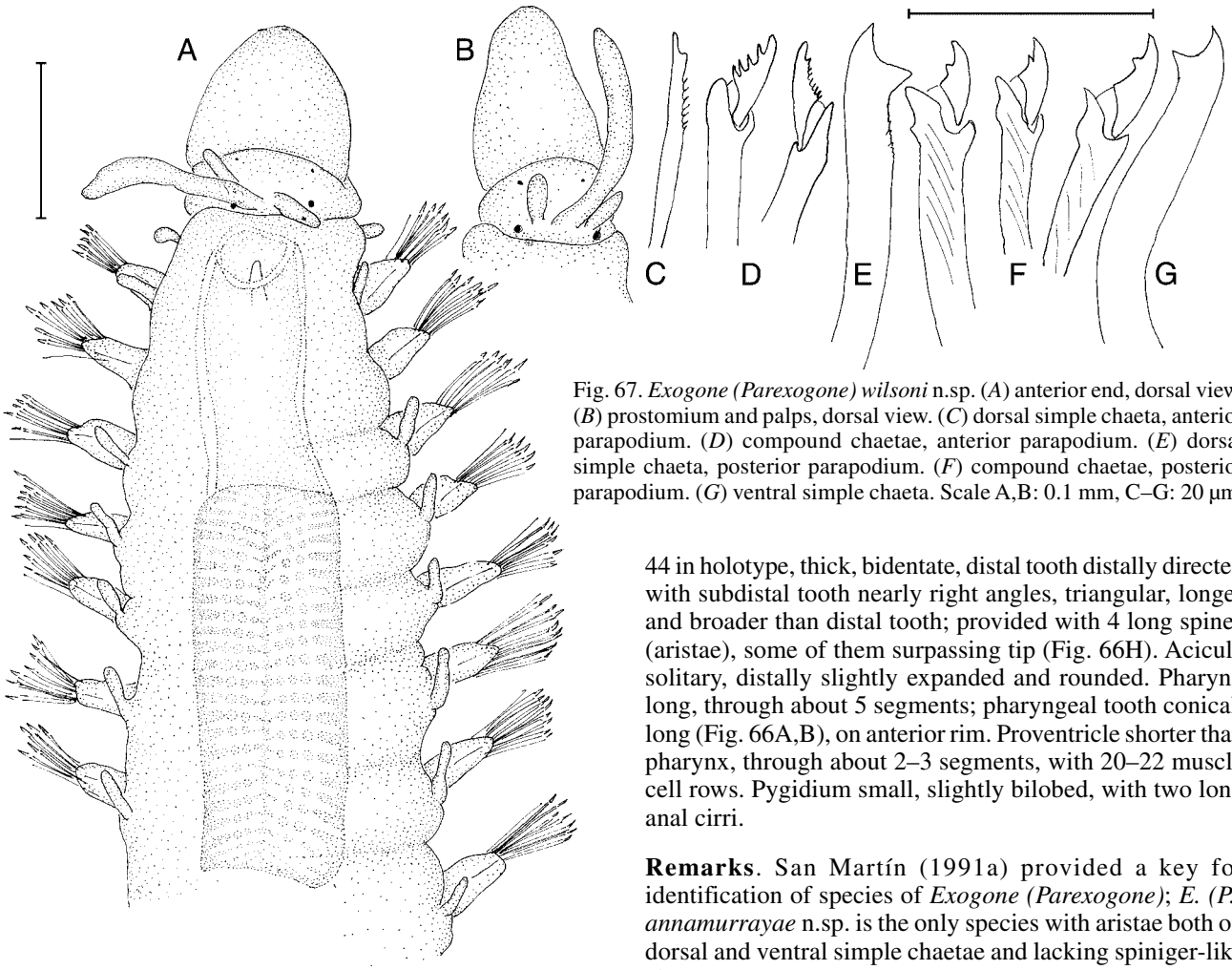


Fig. 67. *Exogone (Parexogone) wilsoni* n.sp. (*A*) anterior end, dorsal view. (*B*) prostomium and palps, dorsal view. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) compound chaetae, posterior parapodium. (*G*) ventral simple chaeta. Scale A,B: 0.1 mm, C–G: 20 µm.

slightly shorter (Fig. 66A). Palps completely fused to each other, similar in length to prostomium or longer. Peristomium similar in length to following segments, covering posterior margin of prostomium; tentacular cirri small, papilliform (Fig. 66A,B). Dorsal cirri on all segments, oval, elongate, shorter than parapodial lobes (Fig. 66A,B). Anterior parapodia each with about 5–6 compound chaetae, with hemigomph articulation, smooth shafts, and short, bidentate blades with both teeth similar or subdistal tooth slightly smaller than distal tooth, short marginal spines (Fig. 66D), showing slight dorsoventral gradation in length, 14 µm above, 9.6 µm below. Number of compound chaetae on each parapodium decreasing posteriorly to 3 on each posterior parapodia, one of these with slight elongate blade, bidentate with both teeth similar and short marginal spines (Fig. 66F), about 17 µm long, and other two compound chaetae with short blades, strongly bidentate, and moderately long marginal spines (Fig. 66I), about 10–11 µm long; posteriormost parapodia with all chaetae similar to those described above (Fig. 66G), usually one with thick shaft and broad subdistal tooth, forming wide angle with distal tooth (Fig. 66J). Dorsal simple chaetae from about chaetiger 6; anterior dorsal simple chaetae slender, indistinctly bidentate, marginally smooth, provided with 4 long subdistal spines, extending beyond tip (Fig. 66C); progressively, dorsal simple chaetae thicker, broader, more strongly bidentate, with subdistal tooth slightly longer than distal one (Fig. 66E). Ventral simple chaetae from chaetiger 44 in holotype, thick, bidentate, distal tooth distally directed with subdistal tooth nearly right angles, triangular, longer and broader than distal tooth; provided with 4 long spines (aristae), some of them surpassing tip (Fig. 66H). Acicula solitary, distally slightly expanded and rounded. Pharynx long, through about 5 segments; pharyngeal tooth conical, long (Fig. 66A,B), on anterior rim. Proventricle shorter than pharynx, through about 2–3 segments, with 20–22 muscle cell rows. Pygidium small, slightly bilobed, with two long anal cirri.

Remarks. San Martín (1991a) provided a key for identification of species of *Exogone (Parexogone)*; *E. (P.) annamurrayae* n.sp. is the only species with aristae both on dorsal and ventral simple chaetae and lacking spiniger-like chaetae.

Distribution. Australia (Victoria).

Habitat. On coarse sand, in moderate depths (c. 20–30 m).

Etymology. The species is named in honour of Miss Anna Murray, of The Australian Museum.

Exogone (Parexogone) wilsoni n.sp.

Fig. 67A–G

Material examined. AUSTRALIA: VICTORIA. HOLOTYPE and 28 PARATYPES, MV F62118, Eastern Bass Strait, 5.7 km W of Cape Conran, 37°48.85'S 148°39.85'E, coarse sand, 22 m, 4 Jun 1991. PARATYPE: 1 specimen, MV F62734, Eastern Bass Strait, 5.7 km of Cape Conran, 37°48.85'S 148°39.80'E, 22 m depth, Feb 1991. PARATYPES: 2 specimens, MV F87423, Southern Port Phillip Bay, 144°55'E 38°21'S, sand, 4 m, 12 Oct 1971. NEW SOUTH WALES. 1 specimen, AM W21623, 1500 m offshore, east of Ramsgate Baths, Botany Bay, 33°59.16'S 151°09.96'E, 5 m, Australian Museum party, 7 Apr 1992. 1 specimen, AM W21624, 500 m west of north Port Botany, east Botany Bay, 33°58.28'S 151°11.98'E, 7 m, Australian Museum party, 28 July 1992. 1 specimen, AM W22621, Cararma Inlet, Jervis Bay, 35°0'S 150°46.5'E, *Zostera capricorni*, L. Howitt, Mar 1989. 1 specimen, AM W23580, Foreshore Beach, Botany Bay, 33°57.4'S 151°11.4'E, sand, Kinhill Engineers, Jan 1992. 1 specimen, AM W23913, Port Hacking, 34°04.11'S 151°06.37'E, sand, 13.4 m, Australian Museum Party, 31 May 1994. 1 specimen, AM W23914, Port Hacking, 34°04.00'S 151°06.38'E, sand, 16.9 m, Australian Museum Party, 10 Aug 1995. 1 specimen, AM W26515, south of airport runway extension, northeast Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 6 Apr 1992, NSW 767. 1 specimen, AM W26516, south of airport runway extension, northeast Botany Bay,

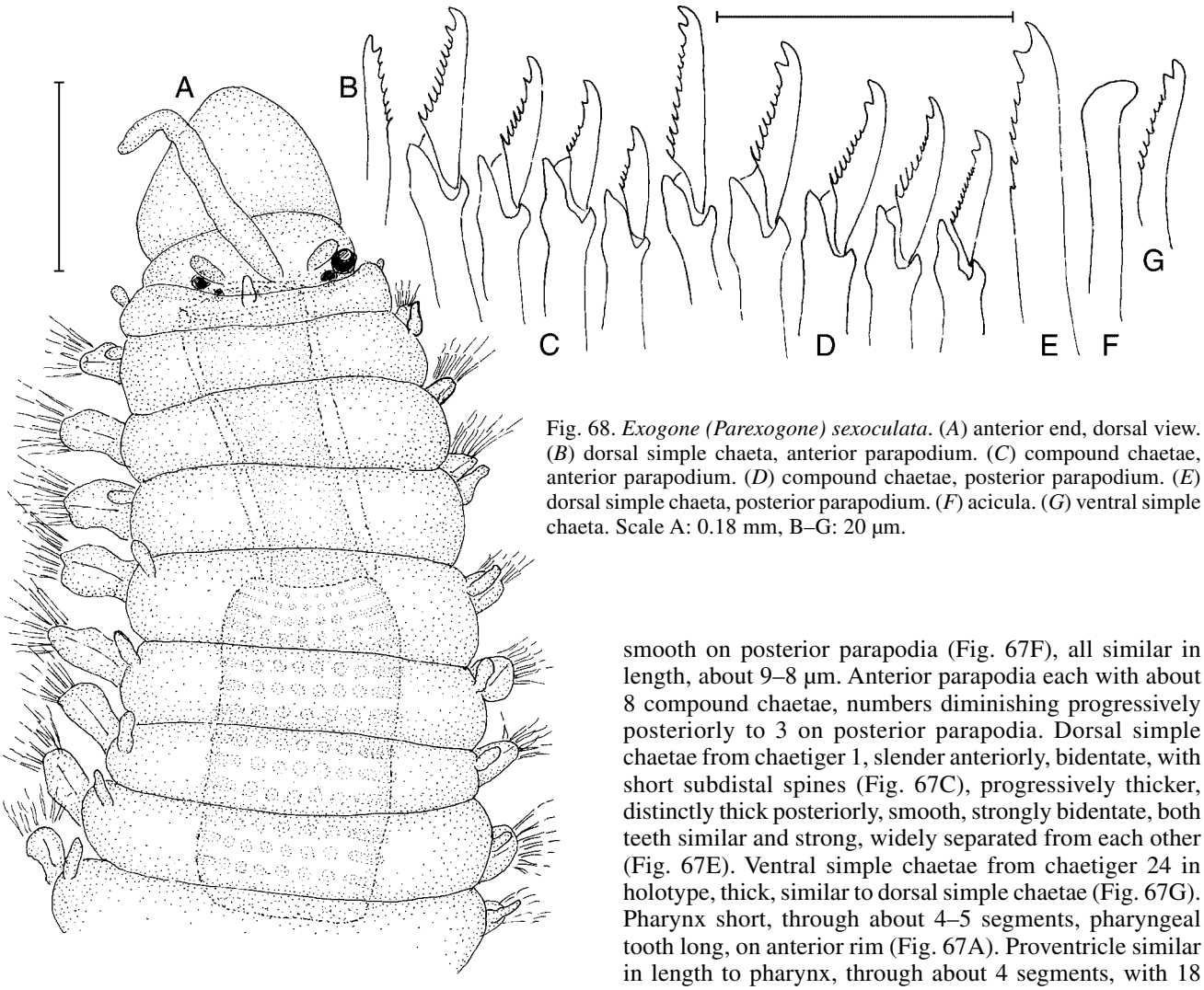


Fig. 68. *Exogone (Parexogone) sexoculata*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, anterior parapodium. (*D*) compound chaetae, posterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) acicula. (*G*) ventral simple chaeta. Scale A: 0.18 mm, B–G: 20 µm.

33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 6 Apr 1992. 1 specimen, AM W26517, 800–1000 m off Port Botany, east side of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, Australian Museum party, 6 Apr 1992. 1 specimen, AM W26518, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, Australian Museum party, 27 July 1992.

Description. Body small and slender, moderately long, 2.8 mm long, 0.2 mm wide, 40 chaetigers. Prostomium oval, wider than long; 4 small eyes in trapezoidal arrangement and 2 minute anterior eyespots (Fig. 67A,B); antennae inserted close to each other, just in front of anterior eyes, lateral antenna cylindrical, long, similar in length to combined length of prostomium and palps, lateral antennae about ¼ length of median antenna. Palps broad, completely fused to each other, forming a triangular piece, slightly longer than prostomium. Peristomium similar in length to following segments, covering dorsally posterior end of prostomium; tentacular cirri papilliform. Dorsal cirri papilliform, shorter than parapodial lobes, smaller than lateral antennae but slightly larger than tentacular cirri, absent on chaetiger 2 (Fig. 67A). Compound chaetae with smooth, thick shafts, thicker and becoming more angular posteriorly; blades short, bidentate, subdistal tooth small, well separated from distal tooth on posterior parapodia, with short marginal spines on anterior parapodia (Fig. 67D), smooth on posterior parapodia (Fig. 67F), all similar in length, about 9–8 µm. Anterior parapodia each with about 8 compound chaetae, numbers diminishing progressively posteriorly to 3 on posterior parapodia. Dorsal simple chaetae from chaetiger 1, slender anteriorly, bidentate, with short subdistal spines (Fig. 67C), progressively thicker, distinctly thick posteriorly, smooth, strongly bidentate, both teeth similar and strong, widely separated from each other (Fig. 67E). Ventral simple chaetae from chaetiger 24 in holotype, thick, similar to dorsal simple chaetae (Fig. 67G). Pharynx short, through about 4–5 segments, pharyngeal tooth long, on anterior rim (Fig. 67A). Proventricle similar in length to pharynx, through about 4 segments, with 18 muscle cell rows.

Remarks. *Exogone (Parexogone) wilsoni* n.sp. is similar to *E. (P.) hebes* from Atlantic coasts of North America and Europe; *E. (P.) wilsoni*, however, has proportionally longer median antenna and the chaetae, although similar, are different, with smaller proximal tooth and some spines on the margin (see San Martín, 2003). *Exogone (P.) parahomoseta* Hartmann-Schröder, 1974b, from South Africa, as well as its subspecies *mediterranea* from the Mediterranean Sea, have the dorsal simple chaetae marginally serrated, and the blades of compound chaetae are provided with long and thick marginal spines (Hartmann-Schröder, 1974b; San Martín, 1984a, 2003). *Exogone (Parexogone) breviseta* Kudenov & Harris, 1995, from California, has shorter antennae, proportionally longer blades on the compound chaetae, and lacks compound chaetae with large shafts and short blades, with subdistal tooth well separated from distal tooth, smooth on margin (see Kudenov & Harris, 1995); in addition, the dorsal and ventral simple chaetae are not as thick as those present in *E. (P.) wilsoni*.

Distribution. Australia (Victoria, New South Wales).

Habitat. Sand, 4–22 m depth.

Etymology. The species is named in honour of Dr Robin Wilson, of the Museum of Victoria.

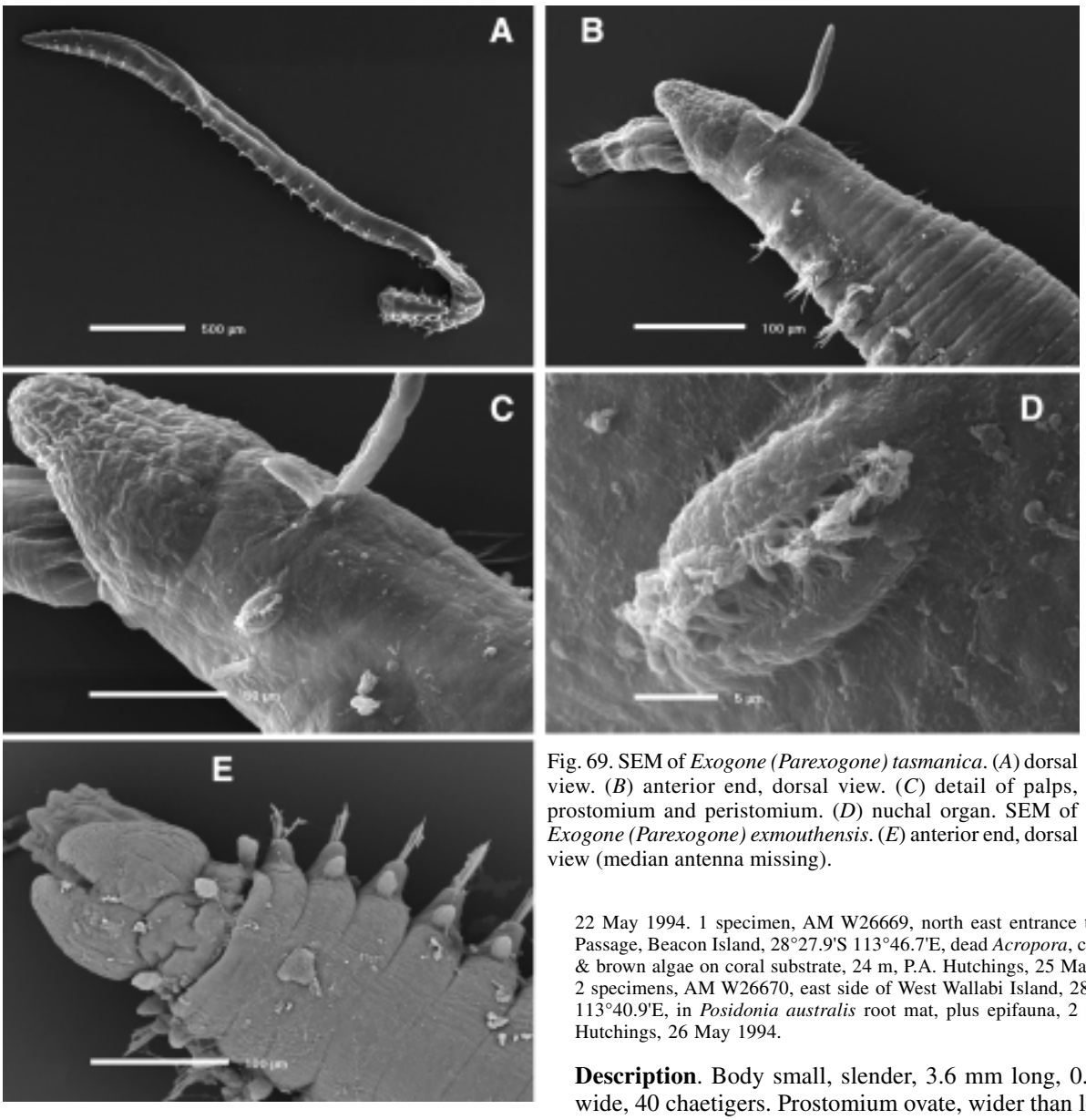


Fig. 69. SEM of *Exogone (Parexogone) tasmanica*. (*A*) dorsal view. (*B*) anterior end, dorsal view. (*C*) detail of palps, prostomium and peristomium. (*D*) nuchal organ. SEM of *Exogone (Parexogone) exmouthensis*. (*E*) anterior end, dorsal view (median antenna missing).

Exogone (Parexogone) sexoculata Hartmann-Schröder, 1979

Fig. 68A–G

Exogone sexoculata Hartmann-Schröder, 1979: 10, figs. 175–177; 1980a: 56; 1981: 38; 1982: 74; 1986: 45; 1987: 42; 1989: 31; 1990: 55; 1991: 42.

Material examined. AUSTRALIA: NEW SOUTH WALES. 1 specimen, AM W23540, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W23541, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W26407, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, Australian Museum Party, 6 Apr 1992. 13 specimens, and 4 specimens on SEM stub, AM W27441, Waratah Bay, Cowan Creek, 33°37.8'S 151°09.9'E, 4.5 m, A. Jones & party, 03 Oct 1980. 11 specimens, AM W196617, small bay in Cowan Creek, Hawkesbury River, 33°39.0'S 151°09.5'E, 7.5 m, A. Jones & party, 04 Oct 1980. SOUTH AUSTRALIA. 1 specimen, AM W26754, Victor Harbour, 35°33'S 138°38'E, algal washings, P.A. Hutchings, 16 Mar 1979. WESTERN AUSTRALIA. 2 specimens, AM W26668, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 1 specimen, AM W26669, north east entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead *Acropora*, coralline & brown algae on coral substrate, 24 m, P.A. Hutchings, 25 May 1994. 2 specimens, AM W26670, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat, plus epifauna, 2 m, P.A. Hutchings, 26 May 1994.

Description. Body small, slender, 3.6 mm long, 0.2 mm wide, 40 chaetigers. Prostomium ovate, wider than long, 2 pairs of large eyes in trapezoidal arrangement, anterior pair larger than posterior eyes, and 2 anterior eyespots; median antenna long, slightly longer than combined length of prostomium and palps, cylindrical, inserted between posterior pair of eyes, lateral antennae small, ovoid, inserted close to inner margin of anterior eyes, slightly in front of line of insertion of median antenna (Fig. 68A). Palps fused along their length, longer than prostomium, forming a triangular, broad piece. Peristomium slightly shorter than following segments; tentacular cirri minute, smaller than lateral antennae. Dorsal cirri small, with slightly bulbous bases, much shorter than parapodial lobes, absent on chaetiger 2 (Fig. 68A). Parapodial lobes ending on a rounded distal papilla. Compound chaetae similar throughout, all bidentate falcigers, with distinct subdistal tooth, short, thin marginal spines and dorsoventral gradation in length, blades 12–13 µm above, 8 µm below; some blades on some specimens slightly longer on anterior parapodia (Fig. 68C,D); parapodia each with about 6–7 compound chaetae. Dorsal simple chaetae from anterior parapodia, distinctly bidentate, with short marginal spines, slender on anterior parapodia (Fig. 68B), thicker on posterior segments (Fig.

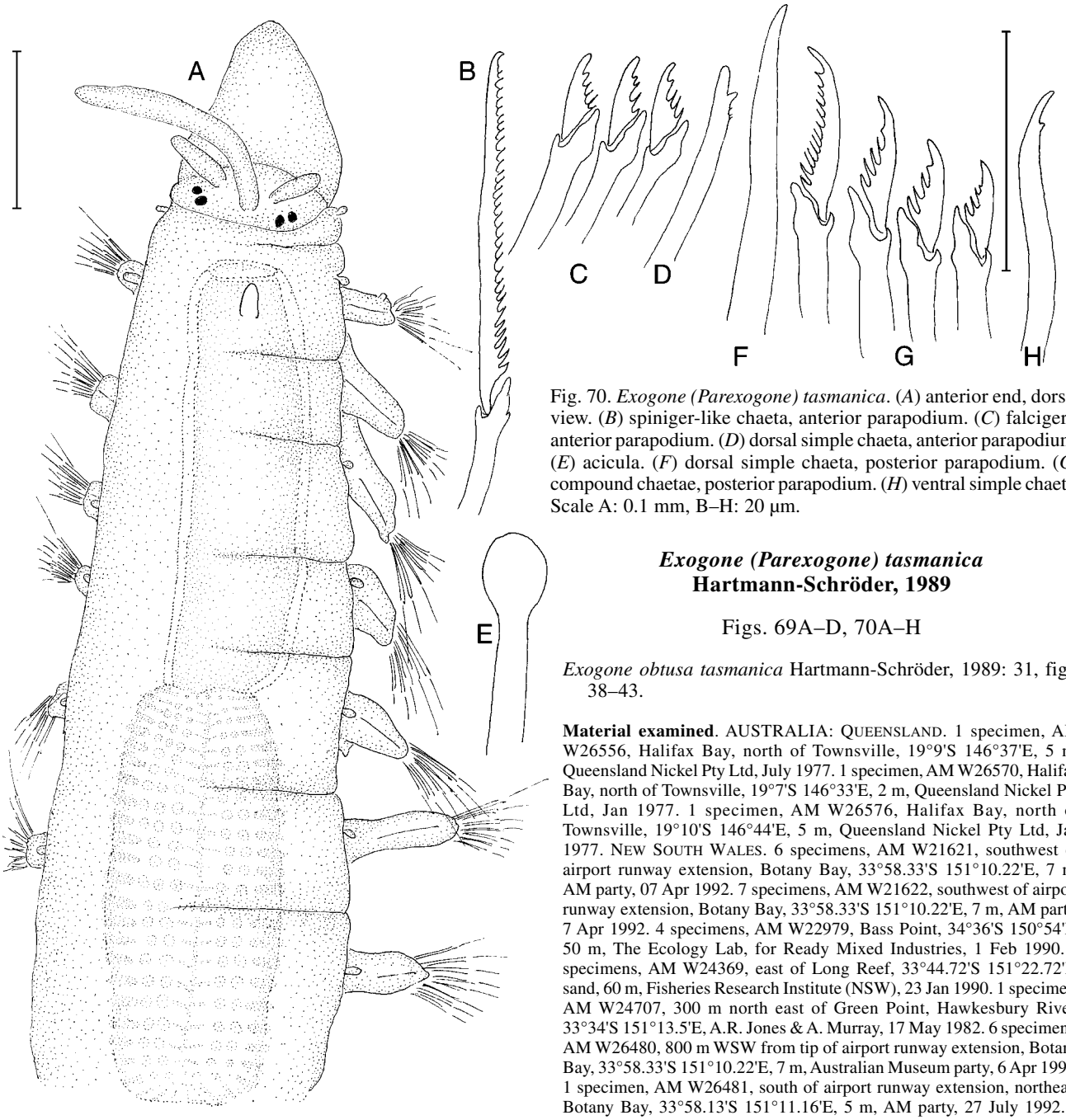


Fig. 70. *Exogone (Parexogone) tasmanica*. (*A*) anterior end, dorsal view. (*B*) spiniger-like chaeta, anterior parapodium. (*C*) falcigers, anterior parapodium. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) acicula. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. Scale A: 0.1 mm, B–H: 20 µm.

68E). Ventral simple chaetae on posterior parapodia, sigmoid, distinctly bidentate, with short marginal spines (Fig. 68G). Solitary acicula distally curved, sometimes with an additional slender, straight acicula on anterior parapodia (Fig. 68F). Pharynx through about 4–5 segments; pharyngeal tooth on anterior rim (Fig. 68A). Proventricle through 4 segments, with 19–20 muscle cell rows.

Distribution. Australia (all States).

Habitat. Sand, mud, algae, dead corals; a common species on shallow water, down to about 24 m depth.

Exogone (Parexogone) tasmanica Hartmann-Schröder, 1989

Figs. 69A–D, 70A–H

Exogone obtusa tasmanica Hartmann-Schröder, 1989: 31, figs. 38–43.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26556, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 1 specimen, AM W26570, Halifax Bay, north of Townsville, 19°7'S 146°33'E, 2 m, Queensland Nickel Pty Ltd, Jan 1977. 1 specimen, AM W26576, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, Jan 1977. NEW SOUTH WALES. 6 specimens, AM W21621, southwest of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 07 Apr 1992. 7 specimens, AM W21622, southwest of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 7 Apr 1992. 4 specimens, AM W22979, Bass Point, 34°36'S 150°54'E, 50 m, The Ecology Lab, for Ready Mixed Industries, 1 Feb 1990. 2 specimens, AM W24369, east of Long Reef, 33°44.72'S 151°22.72'E, sand, 60 m, Fisheries Research Institute (NSW), 23 Jan 1990. 1 specimen, AM W24707, 300 m north east of Green Point, Hawkesbury River, 33°34'S 151°13.5'E, A.R. Jones & A. Murray, 17 May 1982. 6 specimens, AM W26480, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, Australian Museum party, 6 Apr 1992. 1 specimen, AM W26481, south of airport runway extension, northeast Botany Bay, 33°58.13'S 151°11.16'E, 5 m, AM party, 27 July 1992. 2 specimens, AM W26482, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26483, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26484, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26485, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 4 specimens, AM W26486, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 4 specimens, AM W26487, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26488, 800 m WSW from tip of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, AM party, 6 Apr 1992. 3 specimens, AM W26489, 800–1000 m off Port Botany, east of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, AM party, 6 Apr 1992. 2 specimens, AM W26490, 800–1000 m off Port Botany, east of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26491, 800–1000 m off Port Botany, east of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, AM party, 6 Apr 1992. 2 specimens, AM W26492, 800–1000 m off Port Botany, east of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, AM party, 6 Apr 1992. 3 specimens, AM W26493,

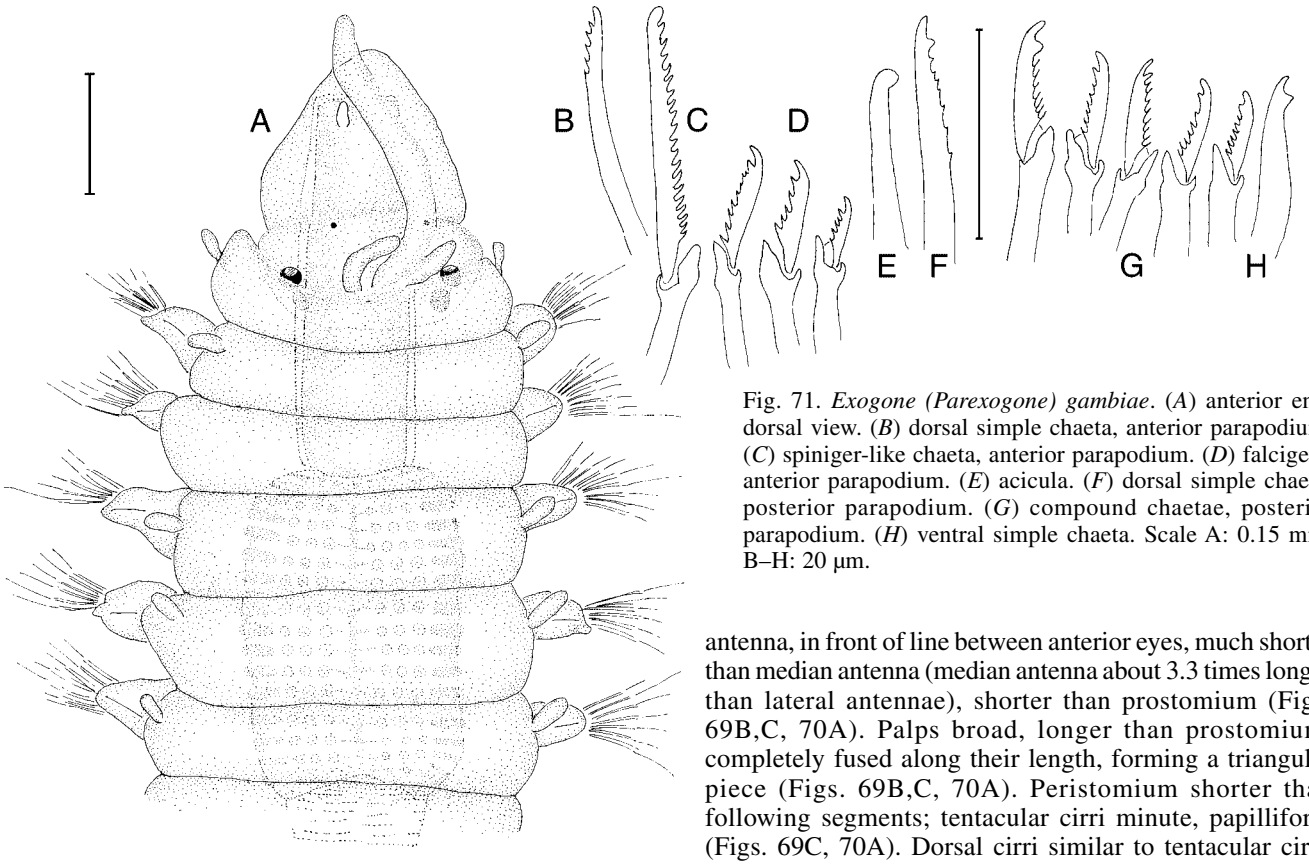


Fig. 71. *Exogone (Parexogone) gambiae*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) spiniger-like chaeta, anterior parapodium. (*D*) falcigers, anterior parapodium. (*E*) acicula. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound chaetae, posterior parapodium. (*H*) ventral simple chaeta. Scale A: 0.15 mm, B–H: 20 µm.

800–1000 m off Port Botany, east of Botany Bay, 33°58.75'S 151°11.03'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26494, 200–500 m west of airport runway extension, Botany Bay, 33°57.82'S 151°10.43'E, 7 m, AM party, 6 Apr 1992. 2 specimens, AM W26495, 200–500 m west of airport runway extension, Botany Bay, 33°58.28'S 151°11.98'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26496, 200–500 m west of airport runway extension, Botany Bay, 33°58.28'S 151°11.98'E, 7 m, AM party, 6 Apr 1992. 2 specimens, AM W26497, 200–500 m west of airport runway extension, Botany Bay, 33°58.28'S 151°11.98'E, 7 m, AM party, 6 Apr 1992. 1 specimen, AM W26498, south of airport runway extension, northeast Botany Bay, 33°58.13'S 151°11.16'E, 5 m, AM party, 6 Apr 1992. 1 specimen, AM W26499, south of airport runway extension, northeast Botany Bay, 33°58.13'S 151°11.16'E, 5 m, AM party, 6 Apr 1992. 2 specimens, AM W27130, near Hungry Beach, Hawkesbury River, 33°34.5'S 151°16.5'E, sandy mud, 4 m, A. Jones & A. Murray, 17 May 1982. 1 specimen, AM W196618, Hawkesbury River, Juno Head-Hungry Beach, 33°34.5'S 151°16.5'E, mud, 4 m, A. Jones & A. Murray, 22 Feb 1980. 1 specimen, AM W196619, between Juno Point & Hungry Beach, Hawkesbury River, 33°34.5'S 151°16.5'E, sandy mud, 12 m A. Jones & C. Short, 05 May 1977. 1 specimen, AM W196620, Juno Head-Hungry Beach, Hawkesbury River, 33°34.5'S 151°16.5'E, sandy mud, middle of river, 10 m, A. Jones & C. Short, 05 May 1977. 2 specimens, AM W196622, Green Pt.–Croppy Pt. Hawkesbury River, 33°33.5'S 151°14.5'E, mud, 6 m, A. Jones & party, 22 Feb 1980. 1 specimen, AM W196623, east end Brooklyn Boat Channel, Hawkesbury River, 33°33'S 151°14'E, A. Jones & party, 16 May 1980. TASMANIA. 16 specimens, AM W27669, near freshwater stream, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, clean gravelly sand, intertidal, 0 m, N.W. Riser, 24 Jan 1986. WESTERN AUSTRALIA. 1 specimen, AM W27459, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984.

Description. Body long and slender, filiform (Fig. 69A), 4.8 mm long, 0.2 mm wide, 41 chaetigers. Prostomium ovate, wider than long; 4 eyes in trapezoidal arrangement and, sometimes, 2 anterior eyespots; median antenna inserted close to middle of prostomium, long, cylindrical, slightly longer than combined length of prostomium and palps (Fig. 69B); lateral antennae located near median antenna, in front of line between anterior eyes, much shorter than median antenna (median antenna about 3.3 times longer than lateral antennae), shorter than prostomium (Figs. 69B,C, 70A). Palps broad, longer than prostomium, completely fused along their length, forming a triangular piece (Figs. 69B,C, 70A). Peristomium shorter than following segments; tentacular cirri minute, papilliform (Figs. 69C, 70A). Dorsal cirri similar to tentacular cirri, much smaller than parapodial lobes, absent on chaetiger 2 (Figs. 69B, 70A); parapodial lobes elongate, with a distal papilla. Anterior parapodia each with 1–2 compound chaetae provided with elongate, spiniger-like blades, unidentate or provided with a minute subdistal spine, distally curved, with short marginal spines (Fig. 70B), 30 µm long; in addition 8–9 compound chaetae with short, bidentate falcigers, subdistal tooth small, and short marginal spines (Fig. 70C), all similar in length, about 8 µm long. Decreasing number and length of spiniger-like chaetae posteriorly, only one on midbody segments, lacking on posterior parapodia; posterior parapodia each with 5–6 compound chaetae, with curved blades, moderate marginal spines, with dorsoventral gradation in length (Fig. 70G), 15 µm above, 8 µm below; ventralmost posterior compound chaetae nearly unidentate. Dorsal simple chaetae from anterior parapodia; anterior dorsal simple chaetae slender, provided with a subdistal teeth and short marginal spines (Fig. 70D), becoming progressively thicker, smooth and unidentate posteriorly (Fig. 70F). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, slightly bidentate (Fig. 70H). Acicula solitary, distally expanded and rounded (Fig. 70E). Pharynx through 4–5 segments; pharyngeal tooth on anterior rim (Fig. 70A). Proventricle through 2–3 segments, with about 24 muscle cell rows.

Remarks. *Exogone (P.) molesta* Banse, 1972, from the Northeast Pacific is similar, but the antennae are distinctly shorter and the dorsal cirri are longer (Banse, 1972).

Distribution. Australia (Tasmania, New South Wales, Queensland).

Habitat. Sand, mud, from shallow sediments up to 60 m depth.

Exogone (Parexogone) gambiae Lanera, Sordino & San Martín, 1994

Fig. 71A–H

Exogone (Parexogone) gambiae Lanera *et al*., 1994: 236, figs. 2, 3; San Martín, 2003.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26549, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, Queensland Nickel Pty Ltd, Jan 1977. 1 specimen, AM W26550, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 4 specimens, AM W26551, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 2 specimens, AM W26554, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, Queensland Nickel Pty Ltd, July 1977. 1 specimen, AM W26563, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, Queensland Nickel Pty Ltd, July 1977. NEW SOUTH WALES. 1 specimen, AM W26435, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. SOUTH AUSTRALIA. 1 specimen, AM W26755, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26513, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plates of *Acropora*, covered in coralline algae, 20 m, P.A. Hutchings, 20 May 1994. 1 specimen, AM W27046, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27047, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27048, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate covered in coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 2 specimens, AM W27049, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27050, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 1 specimen, AM W27051, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 2 specimens, AM W27052, southwest corner of Lucas Island, 15°13'S 124°31'E, 30 m, P.A. Hutchings, 24 July 1988.

Description. Body small, about 1.8 mm long, 0.12 mm wide, 27 chaetigers. Prostomium oval; 4 small eyes in trapezoidal arrangement, and 2 small anterior eyespots; antennae inserted close to each other, on middle of prostomium (Fig. 71A); median antenna long, cylindrical, slightly longer than prostomium and palps together; lateral antennae shorter than prostomium, median antenna about 5 times as long as lateral antennae. Palps broad, completely fused along their length, longer than prostomium, forming a triangular piece (Fig. 71A). Peristomium similar in length to following segments; tentacular cirri papilliform, shorter than lateral antennae. Dorsal cirri papilliform, shorter than parapodial lobes, larger than tentacular cirri but shorter than lateral antennae, absent on chaetiger 2 (Fig. 71A). Anterior parapodia each with 2–3 compound chaetae with spiniger-like blades, indistinctly bidentate, distal tooth rounded and subdistal tooth small, marginal spines moderate and coarse (Fig. 71C), about 25 µm long, in addition 8 compound falcigers, with short blades, slight dorsoventral gradation, 12 µm above, 6 µm below, distinctly bidentate (Fig. 71D) and short marginal spines. Number of spiniger-like chaetae on each parapodium progressively decreasing posteriorly, absent from midbody; middle and posterior parapodia with compound heterogomph falcigers, 5 on posterior parapodia, distinctly bidentate, provided with short, fine marginal spines (Fig. 71G); blades of posterior parapodia about 13 µm above, 9 µm below. Dorsal simple chaetae from anterior parapodia, usually from chaetiger 1, distinctly bidentate, with short marginal spines (Fig. 71B), increasingly thicker posteriorly (Fig. 71F). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, distinctly bidentate (Fig. 71H). Solitary acicula, distally rounded (Fig. 71E). Pygidium bilobed, with 2 long anal cirri. Pharynx long, through about 5–6 segments, pharyngeal tooth near anterior rim (Fig. 71A). Proventricle though 3–4 segments, with about 15 muscle cell rows.

Remarks. *Exogone (P.) acutipalpa* Kudenov & Harris, 1995 is similar, but it has unidentate dorsal simple chaetae, the long-bladed compound chaetae with proportionally longer blades, and the blades diminishing progressively in length on the parapodia (Kudenov & Harris, 1995).

Distribution. Western Mediterranean. Australia (Western Australia, New South Wales, Queensland).

Habitat. Seagrass, algae, dead coral, sand, intertidal to about 30 m depth.

Exogone (Parexogone) caribensis San Martín, 1991

Fig. 72A–I

Exogone (Parexogone) caribensis San Martín, 1991a: 725, fig. 5; San Martín *et al*., 1996: 251, fig. 2; San Martín, 2003: 248, figs. 134, 135.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W27014, 100 m off Mangrove Beach in lagoon, Lizard Island, 14°40'S 145°28'E, coarse to medium sand, 3 m, A. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W27015, inside lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sand, 18 m, A. Jones & C. Short, 9 Oct 1978. TASMANIA. 3 specimens, AM W27673, near freshwater stream, Parsons Cove, Freycinet National Park, 42°08.6'S 148°16.9'E, clean gravelly sand, intertidal, 0 m, N.W. Riser, 24 Jan 1986. WESTERN AUSTRALIA. 1 specimen, AM W26796, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral substrate embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 3 specimens, AM W27012, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 3 specimens, AM W27013, Wallabi Island group, 28°27.05'S 113°45.10'E, scallop beds medium to fine sand with shell debris, 38 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 1 specimen, AM W27442, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small, thin, about 3.6 mm long, 0.24 mm wide, 37 chaetigers. Prostomium ovate to rectangular, wider than long; 4 small eyes in trapezoidal arrangement and 2 anterior eyespots (Fig. 72A); antennae inserted close to each other, between posterior eyes; median antenna cylindrical, much longer than lateral antennae, shorter than combined length of prostomium and palps; lateral antennae minute, papilliform. Palps long, broad, fused along their length, slightly longer than prostomium (Fig. 72A). Tentacular and dorsal cirri minute, papilliform; dorsal cirri absent on chaetiger 2 (Fig. 72A). Anterior parapodia each with 1–2 compound chaetae with blades long, distally rounded unidentate or provided with minute subdistal tooth, and short, coarse marginal spines (Fig. 72C), about 25 µm long; in addition 10–12 compound chaetae with short blades, unidentate or sub-bidentate, margin coarsely serrated (Fig. 72D), 9 µm long. Blades of spiniger-like chaetae slightly longer (Fig. 72G) on midbody, about 36 µm long, falcigers similar (Fig. 72H); midbody parapodia each with solitary spiniger-like chaeta and 4–5 falcigers; posterior parapodia each with only 3–4 falcigers. Dorsal simple chaetae from

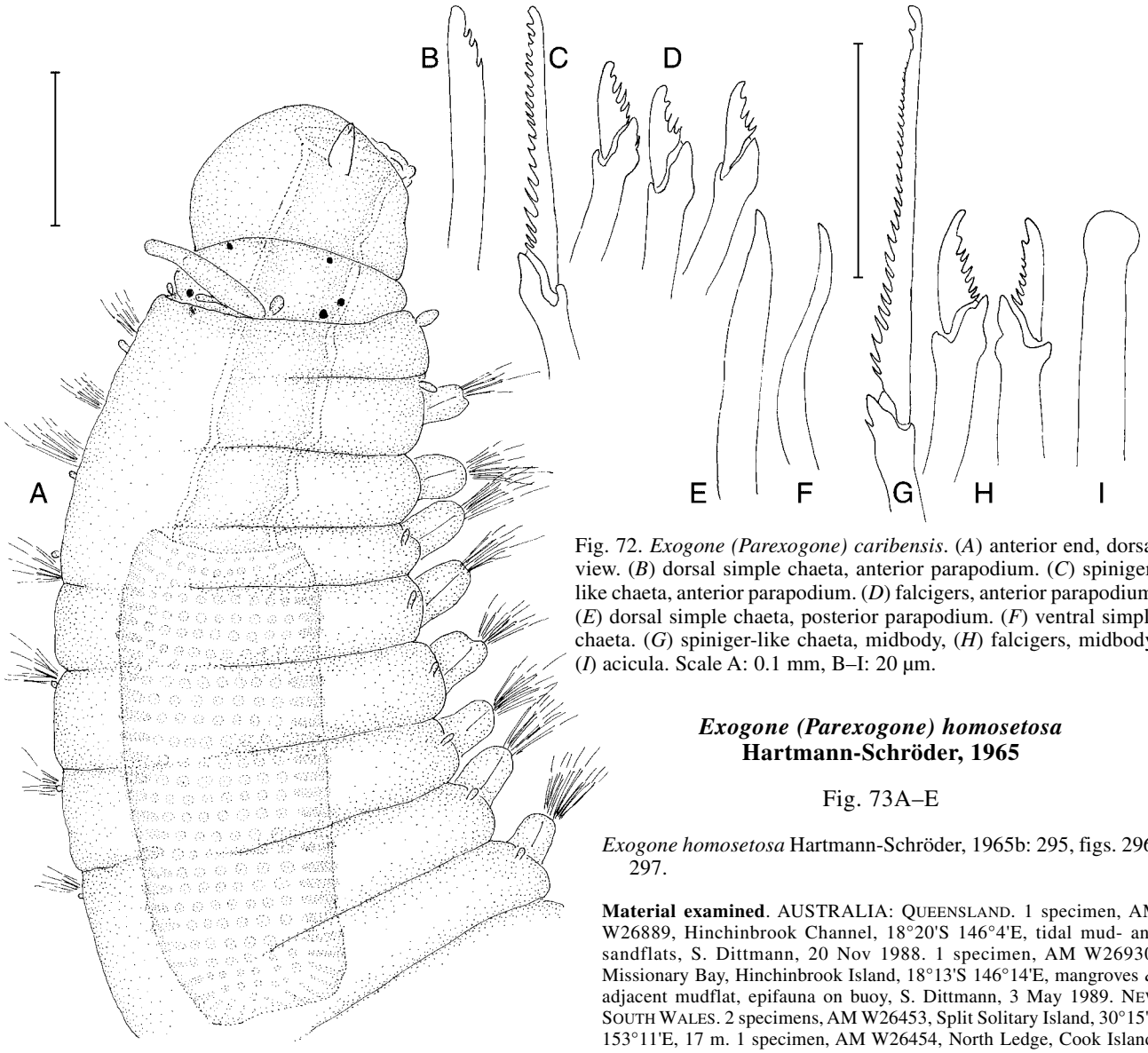


Fig. 72. *Exogone (Parexogone) caribensis*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) spiniger-like chaeta, anterior parapodium. (*D*) falcigers, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) ventral simple chaeta. (*G*) spiniger-like chaeta, midbody, (*H*) falcigers, midbody, (*I*) acicula. Scale A: 0.1 mm, B–I: 20 µm.

anterior parapodia, unidentate, subdistally serrated (Fig. 72B), thicker and smooth on posterior parapodia (Fig. 72E). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, smooth (Fig. 72F). Acicula solitary, distally expanded and rounded (Fig. 72I). Pharynx long, through about 4–5 segments; pharyngeal tooth conical, on anterior rim (Fig. 72A). Proventricle slightly shorter than pharynx, through 5–6 segments, with about 23 muscle cell rows. Pygidium with 2 long anal cirri.

Distribution. USA (Florida and Gulf of México). Capbreton Canyon (between Spain and France). Eastern Mediterranean. Australia (Queensland, Tasmania, Western Australia).

Habitat. Sandy sediments, from shallow waters to 1,100 m depth; occasionally young specimens on algae.

Exogone (Parexogone) homosetosa Hartmann-Schröder, 1965

Fig. 73A–E

Exogone homosetosa Hartmann-Schröder, 1965b: 295, figs. 296, 297.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26889, Hinchinbrook Channel, 18°20'S 146°4'E, tidal mud- and sandflats, S. Dittmann, 20 Nov 1988. 1 specimen, AM W26930, Missionary Bay, Hinchinbrook Island, 18°13'S 146°14'E, mangroves & adjacent mudflat, epifauna on buoy, S. Dittmann, 3 May 1989. NEW SOUTH WALES. 2 specimens, AM W26453, Split Solitary Island, 30°15'S 153°11'E, 17 m. 1 specimen, AM W26454, North Ledge, Cook Island, 28°11.44'S 153°34.67'E, sponge, 10 m, A.R. Parker, 08 Jun 1993. WESTERN AUSTRALIA. 1 specimen, AM W27085, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 32 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27086, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27087, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27088, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27089, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead branching *Acropora* with coralline & brown algae, 24 m, P.A. Hutchings, 25 May 1994.

Description. Body slightly elongate, but proportionally shorter than other species, 3.5 mm long, 0.16 mm wide, 40 chaetigers. Prostomium ovate, wider than long; 4 eyes in rectangular arrangement, small in inmature specimens, large and close to each other on each side in mature ones (Fig. 73A), and 2 anterior eyespots. Antennae inserted close to each other, just in front of anterior eyes or between them; median antenna elongate, cylindrical, shorter than combined length of half of prostomium and palps; lateral antennae about ⅓ of length of median antenna, ovate (Fig. 73A). Palps long, triangular, completely fused along their length,

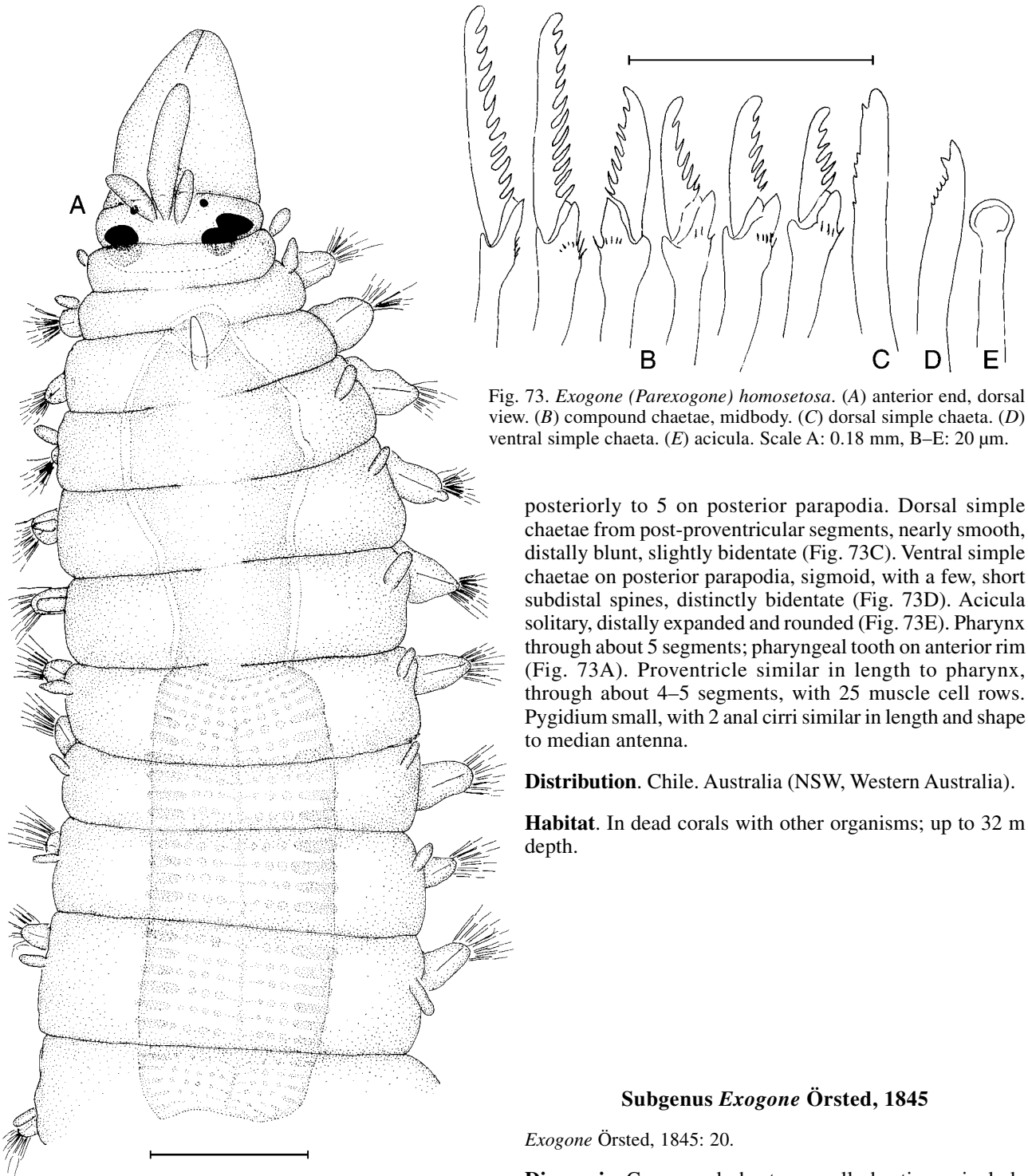


Fig. 73. *Exogone (Parexogone) homosetosa*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, midbody. (*C*) dorsal simple chaeta. (*D*) ventral simple chaeta. (*E*) acicula. Scale A: 0.18 mm, B–E: 20 μm.

with a slight dorsal furrow (Fig. 73A). Peristomium slightly shorter than following segments, covering dorsally posterior part of prostomium; tentacular cirri small, papilliform, smaller than lateral antennae. Dorsal cirri papilliform, smaller than lateral antennae but larger than tentacular cirri, absent on chaetiger 2, shorter than parapodial lobes (Fig. 73A). Compound chaetae heterogomph, shafts with small subdistal spines, similar throughout, blades bidentate, with small subdistal tooth and moderate, coarse marginal spines, 1–2 with longer blades (20 μm) and remaining shorter, (13–10 μm) (Fig. 73B); anterior parapodia each with about 12 compound chaetae, numbers diminishing progressively posteriorly to 5 on posterior parapodia. Dorsal simple chaetae from post-proventricular segments, nearly smooth, distally blunt, slightly bidentate (Fig. 73C). Ventral simple chaetae on posterior parapodia, sigmoid, with a few, short subdistal spines, distinctly bidentate (Fig. 73D). Acicula solitary, distally expanded and rounded (Fig. 73E). Pharynx through about 5 segments; pharyngeal tooth on anterior rim (Fig. 73A). Proventricle similar in length to pharynx, through about 4–5 segments, with 25 muscle cell rows. Pygidium small, with 2 anal cirri similar in length and shape to median antenna.

Distribution. Chile. Australia (NSW, Western Australia).

Habitat. In dead corals with other organisms; up to 32 m depth.

Subgenus *Exogone* Örsted, 1845

Exogone Örsted, 1845: 20.

Diagnosis. Compound chaetae on all chaetigers, include both spiniger-like chaetae with fine, long, filiform, usually bifid blades and falcigers with short, bidentate blades, subdistal tooth much longer than distal tooth, shafts tips usually complex and spinose; sometimes spiniger-like chaetae of anteriormost parapodia may be absent; occasionally blades of spiniger-like chaetae modified. Tips of dorsal simple chaetae of anterior chaetigers finely spinulose subterminally and with rounded tip; dorsal simple chaetae progressively increasing in thickness posteriorly and changing slightly in shape. Antennae reduced or absent in some species.

Type species. *Exogone naidina* Örsted, 1845.

Key to the species of *Exogone (Exogone)* recorded from Australia

1 Shafts of spiniger-like compound chaetae distally enlarged, spinose; blades of these chaetae relatively short, triangular 2

—— Shafts not enlarged; blades of spiniger-like compound chaetae thin, slender, filiform 3

2 Antennae inserted near posterior margin of prostomium; median antenna longer than combined length of prostomium and palps, spindle-shaped ..... *E. (E.) heterosetosa*

—— Antennae inserted near anterior margin of prostomium; median antenna shorter than combined length of prostomium and palps together, bowling-pin shaped ..... *E. (E.) heterosetoides*

3 Shafts of spiniger-like compound chaetae of one of the anteriormost parapodia enlarged, provided with a triangular process 4

—— Shafts of spiniger-like compound chaetae similar throughout 5

4 Chaetae with modified shafts on chaetiger 1 ..... *E. (E.) longicornis*

—— Chaetae with modified shafts on chaetiger 2 ..... *E. (E.) lourei*

5 Anteriormost parapodia without spiniger-like compound chaetae 6

—— Spiniger-like compound chaetae from chaetiger 1 8

6 Without dorsal cirri on chaetiger 2. Compound chaetae on anteriormost parapodia uniformly short with deeply bifid blades ..... *E. (E.) naidina*

—— Dorsal cirri present on chaetiger 2. Blades of falcigers of anterior parapodia similar to those of remaining segments 7

7 Antennae inserted on anterior margin of prostomium. Pharynx and proventricle short (through about 2 segments each). Shafts of anterior and midbody compound chaetae with long, fine spines ..... *E. (E.) goorapuranga* n.sp.

—— Antennae inserted on middle of prostomium. Pharynx and proventricle longer (through more than 2 segments each). Spines of shafts of compound chaetae moderately long ..... *E. (E.) arrakatarkoola* n.sp.

8 Dorsal simple chaetae provided with long, fine spines (aristae) 9

—— Dorsal simple chaetae without aristae 10

9 All antennae short. Blades of some falcigers on midbody and posterior segments strongly modified. Ventral simple chaetae without aristae ..... *E. (E.) ingridae* n.sp

—— Median antenna long, similar in length to prostomium and palps together. Without strongly modified falcigerous blades. Ventral simple chaetae with aristae ..... *E. (E.) aristata*

10 Median antenna distinctly longer than lateral antennae ..... *E. (E.) dispar*

—— Median antenna small, slightly longer than lateral antennae 11

11 Dorsal simple chaetae distinctly bidentate, with both teeth similar ..... *E. (E.) haswelli* n.sp.

—— Dorsal simple chaetae unidentate or indistinctly bidentate, with distal tooth reduced 12

12 Antennae inserted on anterior margin of prostomium. Proventricle short (through about 1–2 segments). Shafts of compound chaetae of midbody provided with a distinct, long spine ..... *E. (E.) koorenborongi* n.sp.

—— Antennae inserted between eyes, on middle of prostomium. Shafts without long spines 13

13 Median antenna pyriform. Blades of falcigers short, encased in shafts ..... *E. (E.) brevifalcigera*

—— Median antenna ovate. Blades projecting distinctly beyond the shafts 14

14 Body slender, filiform. Proventricle short (through about 2 segments) ..... *E. (E.) breviantennata*

—— Body broad. Proventricle long, through more than 2 segments ..... *E. (E.) africana*

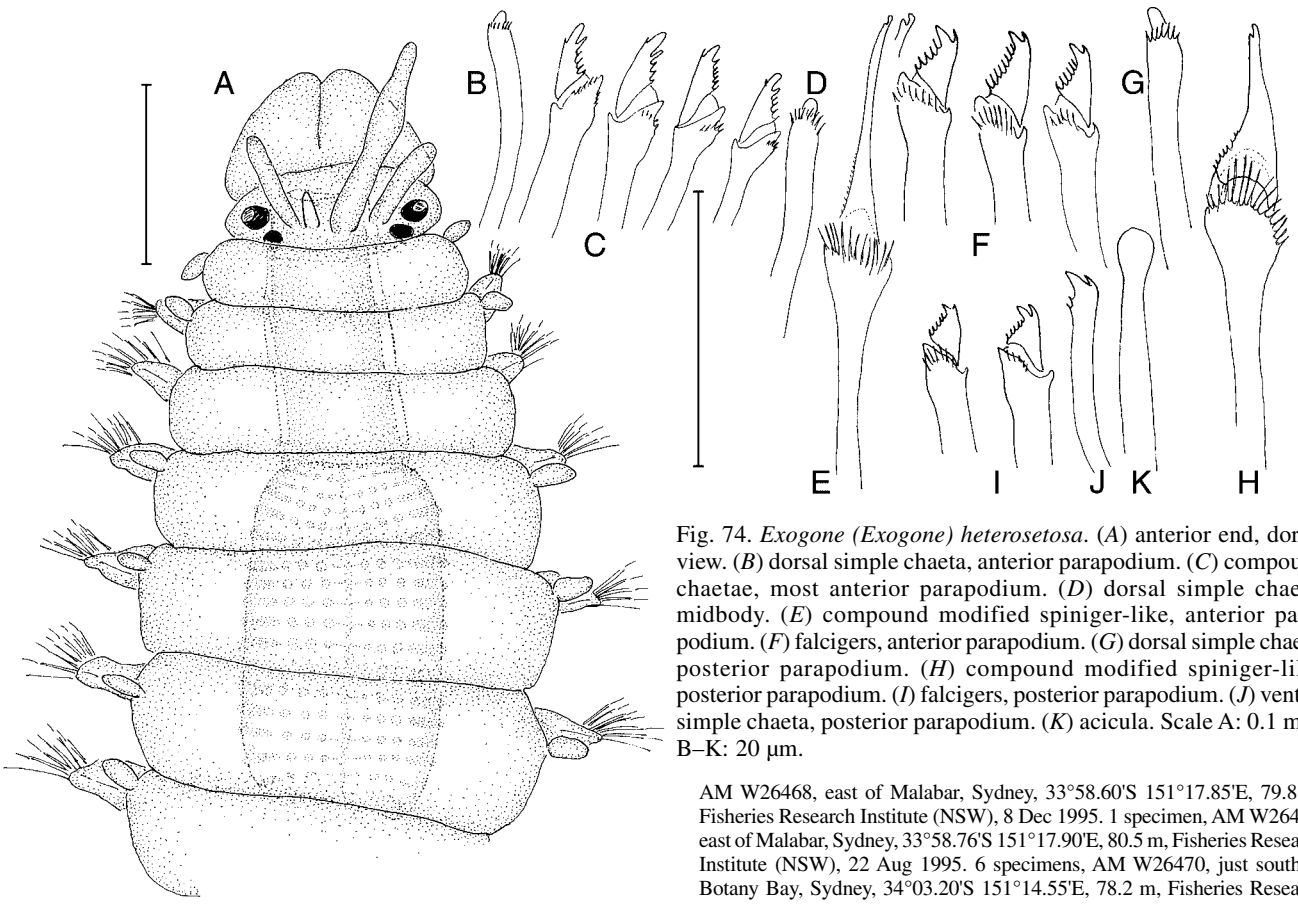


Fig. 74. *Exogone (Exogone) heterosetosa*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, most anterior parapodium. (*D*) dorsal simple chaeta, midbody. (*E*) compound modified spiniger-like, anterior parapodium. (*F*) falcigers, anterior parapodium. (*G*) dorsal simple chaeta, posterior parapodium. (*H*) compound modified spiniger-like, posterior parapodium. (*I*) falcigers, posterior parapodium. (*J*) ventral simple chaeta, posterior parapodium. (*K*) acicula. Scale A: 0.1 mm, B–K: 20 μm.

Exogone (Exogone) heterosetosa McIntosh, 1885

Fig. 74A–K

Exogone heterosetosa McIntosh, 1885: 205, pl. 33, figs. 15–16, pl. 34A, fig. 11; Haswell, 1920a: 221, figs. 11–17; Hutchings & Murray, 1984: 32; Blankenstein & Lana (1986): 63.

Exogone heterochaeta Ehlers, 1897: 51, pl. 31. Augener, 1913: 247; 1927: 156.

?*Exogone heterosetoides australis* Hartmann-Schröder & Rosenfeldt, 1988: 44, fig. 23; Hartmann-Schröder, 1989: 30; 1990: 55; San Martín & Parapar, 1997: 291.

Exogone heterosetoides.–Hartmann-Schröder, 1987: 42, figs. 17–19. Not Hartmann-Schröder, 1979.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26582, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 2 m, Queensland Nickel Pty Ltd, Feb 1985. NEW SOUTH WALES. 3 specimens, AM W23537, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W23904, Pittwater, 33°35.79'S 151°18.30'E, sand, 14.8 m, Australian Museum Party, 3 Jun 1994. 1 specimen, AM W26430, 100 m northwest of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 2 specimens, AM W26431, Manta Reef, North West Solitary Island, 30°01.5'S 153°16.5'E, lace bryozoan, 19 m, R.T. Springthorpe, 25 Jun 1992. 6 specimens, AM W26432, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26468, east of Malabar, Sydney, 33°58.60'S 151°17.85'E, 79.8 m, Fisheries Research Institute (NSW), 8 Dec 1995. 1 specimen, AM W26469, east of Malabar, Sydney, 33°58.76'S 151°17.90'E, 80.5 m, Fisheries Research Institute (NSW), 22 Aug 1995. 6 specimens, AM W26470, just south of Botany Bay, Sydney, 34°03.20'S 151°14.55'E, 78.2 m, Fisheries Research Institute (NSW), 21 Jun 1996. 2 specimens, AM W26471, east of Malabar, Sydney, 33°58.72'S 151°17.95'E, 81.9 m, Fisheries Research Institute (NSW), 22 Aug 1995. 1 specimen, AM W26472, east of Malabar, Sydney, 33°58.72'S 151°18.00'E, 82 m, Fisheries Research Institute (NSW), 22 Aug 1995. 1 specimen, AM W26473, east of Malabar, Sydney, 33°58.76'S 151°18.00'E, 82.6 m, Fisheries Research Institute (NSW), 22 Aug 1995. 1 specimen, AM W26474, east of Malabar, Sydney, 33°58.60'S 151°18.00'E, 81.6 m, Fisheries Research Institute (NSW), 15 Nov 1995. 1 specimen, AM W26475, east of Malabar, Sydney, 33°58.60'S 151°17.95'E, 81.5 m, Fisheries Research Institute (NSW), 19 Dec 1995. 1 specimen, AM W26530, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, purple finger sponge, 12 m, A.R. Parker, 9 Jun 1993. 4 specimens, AM W26531, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson *et al*., 3 Mar 1992. 14 specimens, AM W26614, north east corner of Clark Island, 33°51.85'S 151°14.47'E, encrustation on outside of bottle, 5 m, P.A. Hutchings, 17 Apr 1996. 3 specimens, AM W26636, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 1983. 10 specimens, AM W26638, Crowdy Head, 31°50'S 152°45'E, brown algae in rock pools, J.K. Lowry, 13 Jan 1982. 2 specimens, AM W26641, north east corner of Clark Island, 33°51.85'S 151°14.47'E, 5 m, P.A. Hutchings, 17 Apr 1996. 14 specimens, AM W26656, north east corner of Clark Island, 33°51.85'S 151°14.47'E, encrustation on outside of bottle, 5 m, P.A. Hutchings, 17 Apr 1996. 3 specimens, AM W26729, mid point of Aislings Beach, Twofold Bay, 37°05'S 149°56'E, benthic, 32.9 m, S. Keable & P. Albertson, 21 Feb 1985. 1 specimen, AM W26730, Cararma Inlet, Jervis Bay, 35°0'S 150°46.5'E, *Zostera capricorni*, L. Howitt, Mar 1989. 2 specimens, AM W26731, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, gravel under rocks, 15 m, R. Gentle, Solitary Is. Underwater Research Group, 7 Mar 1992. 1 specimen, AM W26794, 100 m north west

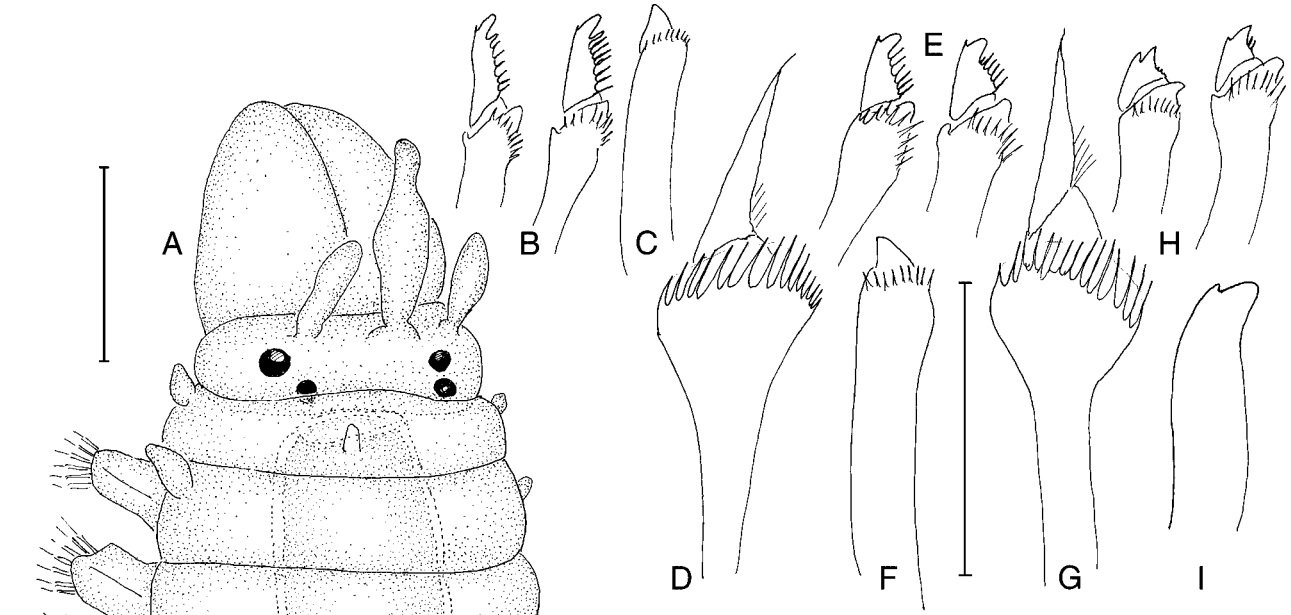


Fig. 75. *Exogone (Exogone) heterosetoides*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, most anterior parapodia. (*C*) dorsal simple chaeta, anterior parapodium. (*D*) compound spiniger-like chaeta, midbody. (*E*) compound falcigers, midbody. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) spiniger-like chaeta, posterior parapodium. (*H*) falcigers, posterior parapodium. (*I*) ventral simple chaeta. Scale A: 0.1 mm, B–I: 20 µm.

of Split Solitary Island, 30°14'S 153°10.8'E, encrusting algae and ascidians, 16 m, E.L. Albertson, 7 Mar 1992. 1 specimen, AM W27462, small bay in Cowan Creek, Hawkesbury River, 33°39.0'S 151°09.5'E, 7.5 m, A. Jones *et al*., 04 Oct 1980. 1 specimen, AM W196624, Waratah Bay, Cowan Creek, 33°37.8'S 151°09.9'E, 4.5 m, A. Jones *et al*., 3 Oct 1980. SOUTH AUSTRALIA. 1 specimen, AM W26759, Victor Harbour, 35°33'S 138°38'E, *Zostera* washings, P.A. Hutchings, 16 Mar 1979. 1 specimen, AM W26760, Billy Lights Point, Port Lincoln, 34°45'S 135°53'E, stone washings from sheltered intertidal rocks, 0 m, I. Loch, 15 Feb 1985. 4 specimens, AM W26761, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. 1 specimen, AM W26762, Maston Point, American River, Kangaroo Island, 35°47'S 137°46'E, clumps of sponge in channel below wharf, 5 m, P.A. Hutchings, 02 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26823, Red Bluff, Kalbarri, 27°42'S 114°09'E, brown alga from surf zone on rocky shore, 0.5 m, H.E. Stoddart, 9 Jan 1984. 1 specimen, AM W27056, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 10 specimens, AM W27057, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 3 specimens, AM W27058, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 1 specimen, AM W27059, northeast entrance to Goss Passage, Beacon Island, 28°27.8'S 113°46.7'E, dead branching *Acropora* substrate covered with algae, 24 m, P.A. Hutchings, 25 May 1994. 2 specimens, AM W27060, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 1 specimen on SEM stub, AM W27678, west of Penguin Island, Warnbro Sound, 32°20'S 115°43'E, dead reef sponges, 5 m, P.A. Hutchings, 21 Mar 1993.

Description. Body proportionally short, broad, 3–4 mm long, 0.23 mm wide, 30–40 chaetigers. Prostomium oval, wider than long; 4 thick eyes in trapezoidal arrangement. Median antenna long, cylindrical, usually with a subterminal enlargement, slightly longer than prostomium and palps together, inserted close to line between posterior eyes; lateral antennae similar in length to prostomium, cylindrical, inserted between median antenna and each posterior eye (Fig. 74A). Palps broad, relatively short, similar in length to prostomium or slightly shorter, fused along their length, with a dorsal furrow and a distal notch (Fig. 74A). Peristomium similar in length to following segments; tentacular cirri ovoid, much shorter than lateral antennae. Dorsal cirri similar to tentacular cirri, slightly longer, absent on chaetiger 2 (Fig. 74A), shorter than parapodial lobes. Most anterior parapodia each with about 5–7 compound chaetae, all compound chaetae heterogomph falcigers, with long subdistal teeth and small, indistinct distal teeth, and short marginal spines (Fig. 74C), about 6–7 µm long; from about chaetiger 4–5 parapodia with 4–6 similar compound falcigers (Fig. 74F) and solitary strongly modified spiniger-like, distally spinose on shaft, and blade triangular, large on bases, proportionally short, about 15–16 µm long, distally minutely bidentate (Fig. 74E); from midbody posteriorly spiniger-like chaetae with shorter, more strongly triangular blades (Fig. 74H), indistinctly bidentate, about 14 µm long, in addition 3–4 falcigers with short blades (Fig. 74I), about 4–5 µm long. Dorsal simple chaetae from anterior parapodia, with rounded tips and finely spinulose subterminally, thicker posteriorly (Figs. 74B,D,G). Ventral simple chaetae on posterior parapodia, sigmoid, nearly smooth, with long subdistal tooth and short, small distal tooth (Fig. 74J). Acicula solitary, distally rounded (Fig. 74K). Pharynx through 4 segments; pharyngeal tooth on anterior rim (Fig. 74A). Proventricle through 3 segments, with about 20 muscle cell rows.

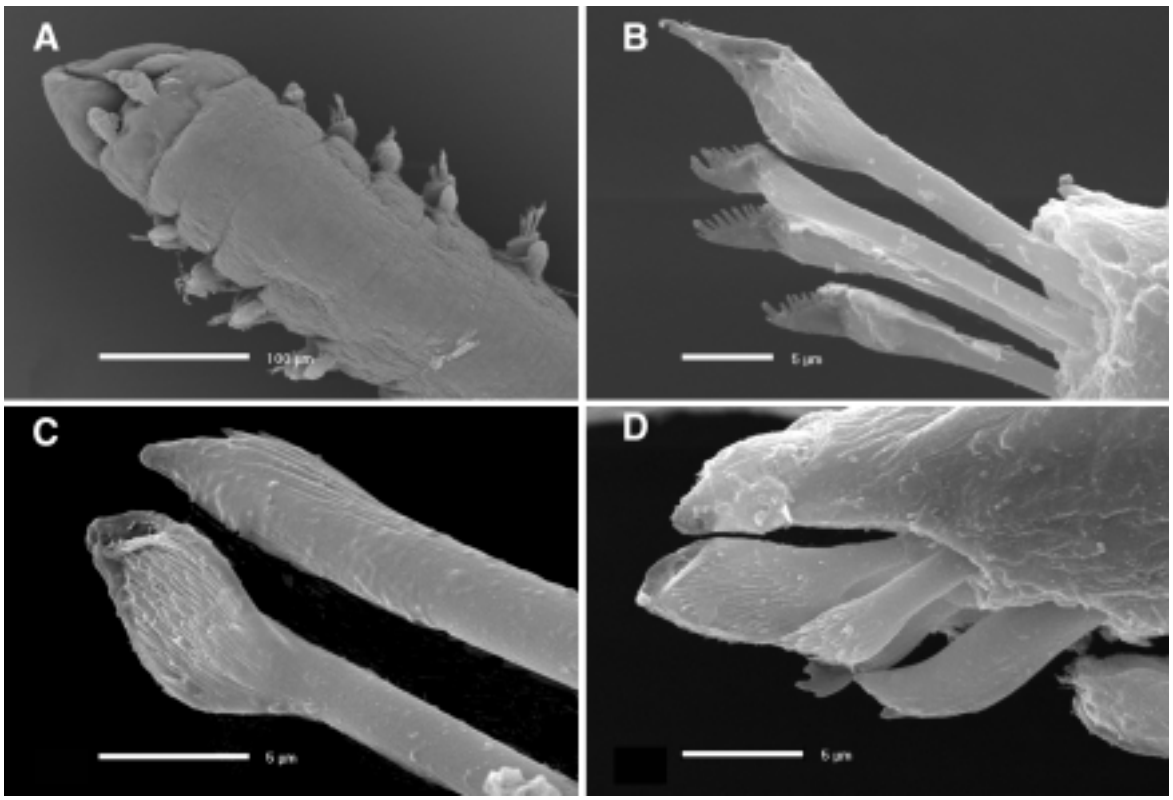


Fig. 76. SEM of *Exogone (Exogone) heterosetoides*. (*A*) anterior end, dorsal view. (*B*) compound chaetae, midbody. (*C*) dorsal simple chaeta and shaft of spiniger-like chaeta. (*D*) chaetal bundle, posterior parapodium.

Remarks. The Australian specimens agree with Haswell's (1920a) description of *E. heterosetosa*; the original description did not specify the length of the median antenna, because "the state of the preparation renders its presence doubtful"(McIntosh, 1885); subsequent descriptions of the species, however, show a long median antenna.

Distribution. Subantarctic seas. Australia (New South Wales, South Australia, Tasmania, Victoria, Western Australia, Queensland).

Habitat. All substrates: mud, sand, gravel, dead corals, algae, sponges. From shallow waters to about 600 m depth.

Exogone (Exogone) heterosetoides Hartmann-Schröder, 1979

Figs. 75A–I, 76A–D

Exogone heterosetoides Hartmann-Schröder, 1979: 110, figs. 171–174. Not *Exogone heterosetoides* Hartmann-Schröder, 1987: 42, figs. 17–19.

Material examined. AUSTRALIA: NEW SOUTH WALES. 8 specimens, AM W26374, south of Worang Point, Twofold Bay, 37°03.5'S 149°56.5'E, benthic sediment, 6.1 m, S. Keable & P. Albertson, 21 Feb 1985. 3 specimens, AM W26375, east of Lookout Point, Twofold Bay, 37°5'S 149°56'E, benthic sample, 27.4 m, S. Keable & P. Albertson, 21 Feb 1985. 2 specimens, AM W26376, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, gravel under rocks, 17 m, R. Gentle, Solitary Islands Underwater Research Group, 7 Mar 1992. 1 specimen, AM W26377, Split Solitary Island, 30°15'S 153°11'E, 17 m. 1 specimen, AM W26537, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26547, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26643, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, airlift, 12 m, G. Clark, 11 Dec 1989. 1 specimen, AM W26653, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry *et al*., 22 Apr 1983. 1 specimen, AM W26728, north of Honeysuckle Point, Twofold Bay, 37°5'S 149°56'E, benthic sample, 31.1 m, S. Keable, P. Albertson, 21 Feb 1985. 2 specimens, AM W26732, Murrays Beach, Jervis Bay, ACT, 35°07.5'S 150°45.5'E, 9 m, P.A. Hutchings, 23 Jan 1973. SOUTH AUSTRALIA. 1 specimen, AM W26757, Victor Harbour, 35°33'S 138°38'E, algae, P.A. Hutchings, 16 Mar 1979. 1 specimen, AM W26758, Sleaford Bay, Port Lincoln, 34°54'S 135°47'E, algal washings, P.A. Hutchings, 10 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26825, outer edge of Ningaloo Reef off Ned's Camp, Cape Range National Park, 21°59'S 113°54.5'E, coral rubble, brown alga, 12 m, J.K. Lowry, 2 Jan 1984. 1 specimen, AM W26831, Bundegi Reef, near Point Murat, Exmouth Gulf, 21°49'S 113°11'E, small octocorals, 9 m, R.T. Springthorpe, 4 Jan 1984. 9 specimens, AM W27061, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* with sponges, ascidians, coralline algae, 32 m, P.A. Hutchings, 19 May 199. 6 specimens, AM W27062, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 3 specimens, AM W27063, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 10 specimens, AM W27064, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 20 m, P.A. Hutchings, 20 May 1994. 1 specimen, AM W27065, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae & sponges, 24 m, P.A. Hutchings, 21 May 1994. 2 specimens, AM W27066, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 5 specimens, AM W27067, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 4 specimens, AM W27068, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27069, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral substrate with coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 12 specimens, AM W27070, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 2 specimens, AM W27071, off jetty near Fisheries Hut, Beacon Island,

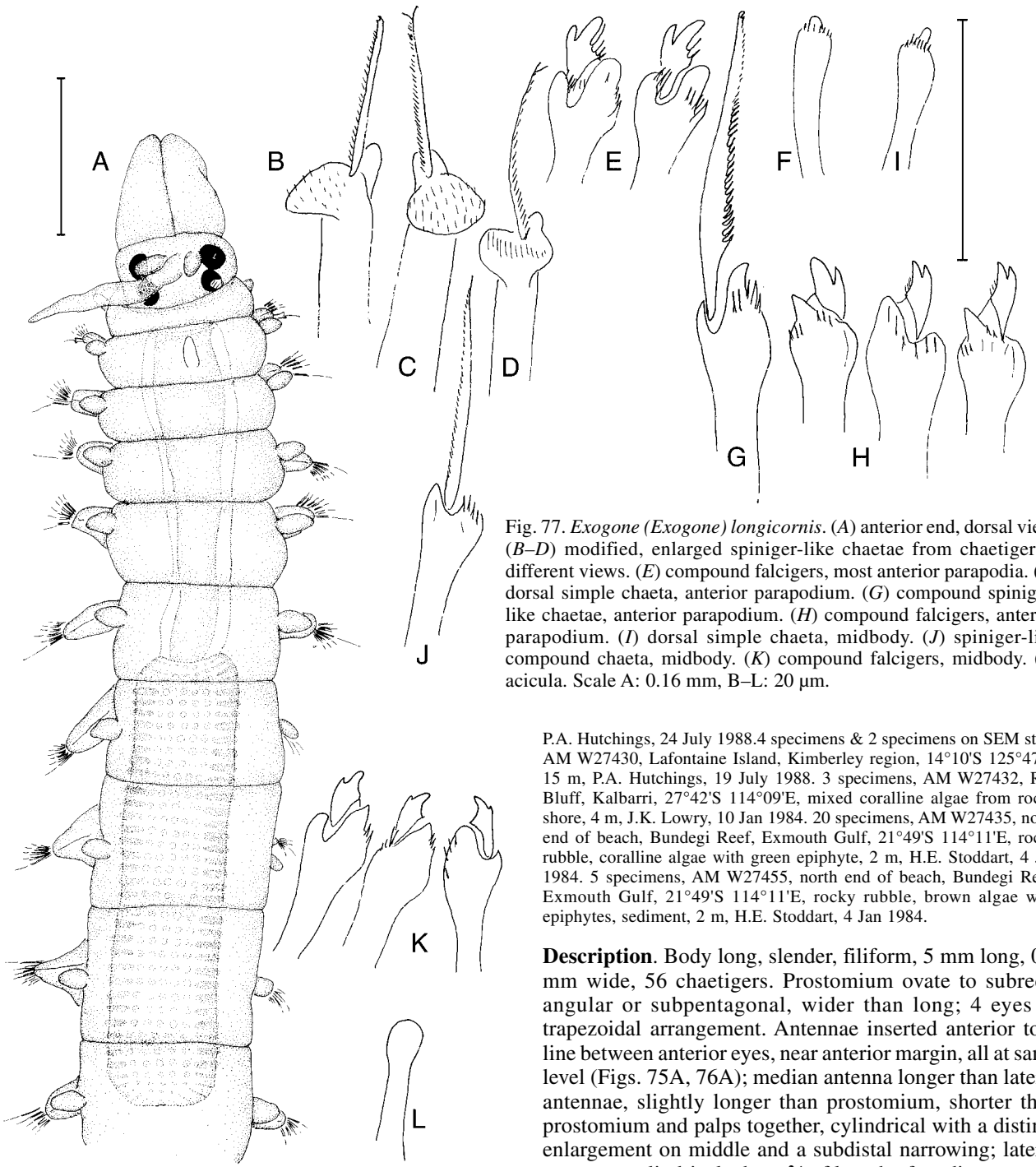


Fig. 77. *Exogone (Exogone) longicornis*. (*A*) anterior end, dorsal view. (*B–D*) modified, enlarged spiniger-like chaetae from chaetiger 1, different views. (*E*) compound falcigers, most anterior parapodia. (*F*) dorsal simple chaeta, anterior parapodium. (*G*) compound spiniger-like chaetae, anterior parapodium. (*H*) compound falcigers, anterior parapodium. (*I*) dorsal simple chaeta, midbody. (*J*) spiniger-like compound chaeta, midbody. (*K*) compound falcigers, midbody. (*L*) acicula. Scale A: 0.16 mm, B–L: 20 μm.

28°25.5'S 113°47.0'E, dead plate coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 6 specimens, AM W27072, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead branching *Acropora* substrate covered with algae, 24 m, P.A. Hutchings, 25 May 1994. 11 specimens, AM W27073, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate-like *Acropora* covered with coralline algae, 8 m, P.A. Hutchings, 25 May 1994. 3 specimens, AM W27074, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 2 specimens, AM W27075, Wallabi Island group, 28°34.65'S 113°46.46'E, coral rubble & sponges, 49 m, P.A. Hutchings on FRV "Flinders", 28 Jun 1994. 5 specimens, AM W27076, East Montlivet Island, 15°06'S 125°18'E, 6 m, P.A. Hutchings, 16 July 1988. 1 specimen, AM W27077, Long Reef, 13°58'S 125°38'E, 25 m, P.A. Hutchings, 17 July 1988. 11 specimens, AM W27078, southwest corner of Lucas Island, 15°13'S 124°31'E, 30 m, P.A. Hutchings, 24 July 1988.4 specimens & 2 specimens on SEM stub, AM W27430, Lafontaine Island, Kimberley region, 14°10'S 125°47'E, 15 m, P.A. Hutchings, 19 July 1988. 3 specimens, AM W27432, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 20 specimens, AM W27435, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 5 specimens, AM W27455, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body long, slender, filiform, 5 mm long, 0.2 mm wide, 56 chaetigers. Prostomium ovate to subrectangular or subpentagonal, wider than long; 4 eyes in trapezoidal arrangement. Antennae inserted anterior to a line between anterior eyes, near anterior margin, all at same level (Figs. 75A, 76A); median antenna longer than lateral antennae, slightly longer than prostomium, shorter than prostomium and palps together, cylindrical with a distinct enlargement on middle and a subdistal narrowing; lateral antennae cylindrical, about ⅔ of length of median antenna (Fig. 75A). Palps broad, longer than prostomium, fused along their length, with a distinct dorsal furrow (Figs. 75A, 76A). Peristomium similar in length to following segments; tentacular cirri ovoid, small. Dorsal cirri similar to tentacular cirri but longer, shorter than parapodial lobes, absent on chaetiger 2 (Figs. 75A, 76A). Anterior 5 parapodia each with about 5 compound falcigers, with spinose shafts and short, bidentate blades, subdistal tooth long and minute, indistinct distal tooth, with straight, moderate marginal spines (Fig. 75B), 6–7 μm long, without compound spiniger-like chaetae. From about chaetiger 6, parapodia each with solitary spiniger-like chaeta, shaft enlarged, distally expanded, with numerous long spines, and proportionally short, thin, unidentate, triangular blade, appearing like a

long spine under low magnifications, provided with a few thin marginal spines (Figs. 75D, 76B,C); in addition 3 falcigers, similar to those of anteriormost parapodia but shorter (Figs. 75E, 76B), about 5–6 µm long; posterior parapodia each with solitary compound spiniger-like chaetae (Fig. 75G) similar to those of midbody segments; in addition 2 falcigers, with short blades (Figs. 75H, 76D), 4 µm long. Dorsal simple chaetae from chaetiger 1 or from an anteriormost parapodium, with rounded tips and finely spinulose subterminally (Figs. 75C, 76C), thicker posteriorly (Fig. 75F). Ventral simple chaetae on posterior parapodia, thick, sigmoid, smooth, bidentate, with small distal tooth and large subdistal tooth (Figs. 75I, 76D). Pharynx short, through about 3–4 segments; pharyngeal tooth small, on anterior rim (Fig. 75A). Proventricle short in relation to length of body, small, through 3 segments, with 14 muscle cell rows. Pygidium with 2 long anal cirri.

Remarks. *Exogone (E.) heterosetosa* and *E. (E.) heterosetoides*, only known from the Southern Hemiphere, both have modified spiniger-like chaetae, with distally enlarged and spinose shafts and relatively short, triangular blades. Recently, another species, *E. (E.) mompasensis* Martínez, Adarraga & San Martín (2002), with similar chaetae, has been discovered on the Atlantic Spanish coasts. This species differs from these two Southern species in the size of the median antenna, insertion of the antennae, size of the proventricle, and details of the chaetae (Martínez *et al*., 2002). San Martín (1991a) erroneously placed *E. heterosetoides* in the subgenus *Parexogone*.

Distribution. Australia (Western Australia, South Australia, New South Wales).

Habitat. Common on all shallow bottoms: algae, sand, seagrass, dead corals, mud, etc; intertidal to 33 m depth.

Exogone (Exogone) longicornis Westheide, 1974

Fig. 77A–L

Exogone longicornis Westheide, 1974: 117, figs. 54, 55.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26666, jetty adjacent to Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead coral with plate-like species (*Acropora* and *Montipora*), 12 m, P.A. Hutchings, 23 May 1994. 5 specimens, AM W26667, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat, plus epifauna, 2 m, P.A. Hutchings, 26 May 1994.

Additional material. Santa Cruz Island, Galápagos Islands, 2 specimens, W. Westheide. Coiba National Park, Panamá, Granito de Oro Island, intertidal coarse sand, 13 specimens.

Description. Both Australian specimens anterior fragments, about 22 chaetigers, one specimen is a mature male with natatory chaetae; complete specimens from Panamá 2.9 mm long, 0.2 mm wide, 33 chaetigers. Body long and slender, filiform. Prostomium square to oval, wider than long; 4 large eyes nearly in rectangular arrangement. Antennae inserted between anterior pair of eyes, close to each other; median antenna long, slightly thick, cylindrical, similar in length to prostomium and palps together or slightly longer; lateral antennae small, ovoid (Fig. 77A). Palps slightly longer than prostomium, fused all their length, with a distinct dorsal furrow, with a distal notch. Peristomium shorter than following segments, covering posterior margin of prostomium; tentacular cirri small, papilliform. Dorsal cirri ovoid, small, shorter than parapodial lobes, present on all segments (Fig. 77A). Parapodia of chaetiger 1 with 1, sometimes 2, shafts of compound chaetae enlarged, forming a large, stout, triangular process near tips; process covered by small, short spines on distal side of that process (Figs. 77B,C,D), blades relatively short, with moderate long marginal spines, distally bifid, about 14 µm long; in addition about 5–6 compound chaetae with shafts distally slightly enlarged, hemigomph articulations, and a few thin spines, and blades short, about 4–5 µm long, distal tooth slightly shorter than sub-distal tooth, and few thin, moderately long marginal spines (Fig. 77E). Remaining anteriormost parapodia with similar falcigers, and unmodified spiniger-like chaetae. Anterior and midbody parapodia each with solitary spiniger-like chaetae; shafts provided with short spines, and blades relatively short, indistinctly bidentate, with short marginal spines (Fig. 77G), 26 µm long, and 3–4 falcigers, shafts distally slightly enlarged and provided with short spines, and small blades, smooth or provided with short marginal spines (Fig. 77H) similar in length to those of most anterior parapodia. Posterior parapodia of the fragments each with a similar spiniger-like chaetae, with slender blade, apparently unidentate, with minute marginal spines (Fig. 77J), 20 µm long, in addition 3 compound falcigers with short, small, smooth blades, distal tooth small (Fig. 77K), about 4 µm long. Dorsal simple chaetae from chaetiger 2, with rounded tips and finely spinulose subterminally (Fig. 77F,I). Ventral simple chaetae not seen. Acicula solitary, distally rounded (Fig. 77L). Pharynx long, through 5 segments; pharyngeal tooth on anterior margin (Fig. 77A). Proventricle similar in length to pharynx, through 4–5 segments, with 33–38 muscle cell rows.

Remarks. The original description omits the presence of compound spiniger-like chaetae with modified shafts on chaetiger 1; the examined specimens from Galápagos Islands, however, have them as do the Australian specimens and those from Panamá. The figured specimen of the original description (Westheide, 1974, fig. 54A) shows a shorter proventricle and a longer median antenna than those of the Australian specimens; the examined specimen from Galápagos and those from Panamá have a long proventricle, and some specimens have shorter median antenna than others, suggesting that they all represent a single species.*Exogone (E.) rostrata* Naville, 1933, from the Mediterranean Sea, and the Canary and Madeira Islands, is apparently morphologically identical (see Alós *et al*., 1983; San Martín, 1984a, 2003; Pascual & Núñez, 1999). It could be a circumtropical species or a complex of similar species; until this problem has been resolved I am retaining the name *longicornis* for the Pacific specimens.

Distribution. Galápagos Islands. Pacific coast of Panamá. Australia (Western Australia).

Habitat. Interstitial in coarse sand; in dead corals. Shallow bottoms.

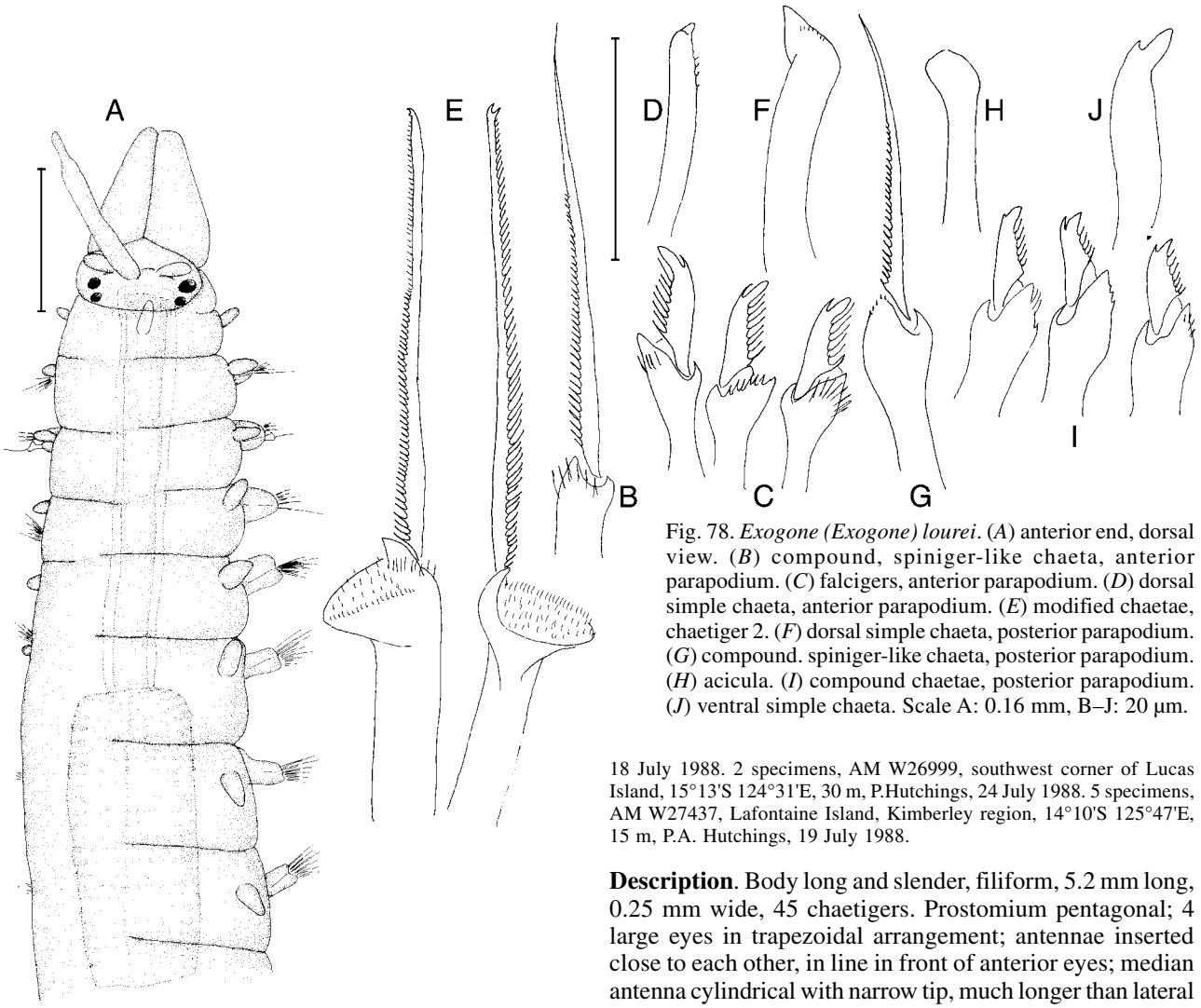


Fig. 78. *Exogone (Exogone) lourei*. (*A*) anterior end, dorsal view. (*B*) compound, spiniger-like chaeta, anterior parapodium. (*C*) falcigers, anterior parapodium. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) modified chaetae, chaetiger 2. (*F*) dorsal simple chaeta, posterior parapodium. (*G*) compound. spiniger-like chaeta, posterior parapodium. (*H*) acicula. (*I*) compound chaetae, posterior parapodium. (*J*) ventral simple chaeta. Scale A: 0.16 mm, B–J: 20 µm.

Exogone (Exogone) lourei
Berkeley & Berkeley, 1938

Fig. 78A–J

Exogone lourei Berkeley & Berkeley, 1938: 44, figs. 6–12; Rioja, 1941: 703, pl. 3, figs. 10–13; Hartman, 1968: 425, figs. 1–5; Banse, 1972: 200, figs. 5a–d; Perkins, 1981: 1092; Uebelacker, 1984 (in part): 30–39, fig. 30–34a–f.

Exogone (Exogone) lourei.–San Martín, 1991a: 728, 735; Núñez *et al*., 1992: 45, fig. 2; Kudenov & Harris, 1995: 15, fig. 1.3.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26991, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead branching coral substrate covered in coralline algae, 10 m, P.Hutchings, 18 May 1994. 12 specimens, AM W26992, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead plate-coral substrate covered in coralline algae, 8 m, P.Hutchings, 22 May 1994. 1 specimen, AM W26993, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.5'E, dead coral substrate embedded in calcareous substrate, 30 m, P.Hutchings, 22 May 1994. 7 specimens, AM W26994, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate, plate-like spp., *Acropora, Montipora*, 12 m, P.Hutchings, 23 May 1994. 1 specimen, AM W26995, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.9'E, dead branching coral substrate, covered with coralline algae, 24 m, P.Hutchings, 25 May 1994. 2 specimens, AM W26996, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.Hutchings, 25 May 1994. 1 specimen, AM W26997, East Montlivet Island, 15°06'S 125°18'E, 6 m, P.Hutchings, 16 July 1988. 1 specimen, AM W26998, west side of Cassini Island, 13°57'S 125°37'E, P.Hutchings, 18 July 1988. 2 specimens, AM W26999, southwest corner of Lucas Island, 15°13'S 124°31'E, 30 m, P.Hutchings, 24 July 1988. 5 specimens, AM W27437, Lafontaine Island, Kimberley region, 14°10'S 125°47'E, 15 m, P.A. Hutchings, 19 July 1988.

Description. Body long and slender, filiform, 5.2 mm long, 0.25 mm wide, 45 chaetigers. Prostomium pentagonal; 4 large eyes in trapezoidal arrangement; antennae inserted close to each other, in line in front of anterior eyes; median antenna cylindrical with narrow tip, much longer than lateral antennae, slightly shorter than prostomium and palps together; lateral antennae ovate, about ⅕–⅙ of median antennal length (Fig. 78A). Palps long, fused along their length, triangular with a distal notch (Fig. 78A). Peristomium similar in length to following segments; tentacular cirri similar to lateral antennae but shorter. Dorsal cirri ovate to slightly pyriform, slightly longer than lateral antennae, shorter than parapodial lobes, present on all segments (Fig. 78A). Anterior parapodia each with 1 compound spiniger-like chaeta, with unidentate, long and slender blade, 42 µm long, short marginal spines of blade and few subdistal spines on shaft (Fig. 78B); in addition 4–5 falcigers with long subdistal tooth and short distal tooth, moderately long marginal spines (Fig. 78C), 12–10 µm long. Spiniger-like chaetae of chaetiger 2 with thick shafts, provided with a triangular process with minute spines on surface, and long, about 43 µm long, distally bifid blade, with moderate to short marginal spines (Fig. 78E). Compound chaetae similar throughout but posteriorly with shorter spines and shorter blades; posterior parapodia each with 1 spiniger-like (Fig. 78G), blades 28 µm long, and 3 falcigers, blades 8–9 µm long (Fig. 78I). Dorsal simple chaetae from anterior parapodia, with rounded tips and finely spinulose subterminally (Fig. 78D), thicker posteriorly (Fig. 78F). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, bidentate, subdistal tooth long and broad, distal tooth small (Fig. 78J). Acicula solitary, slender, distally

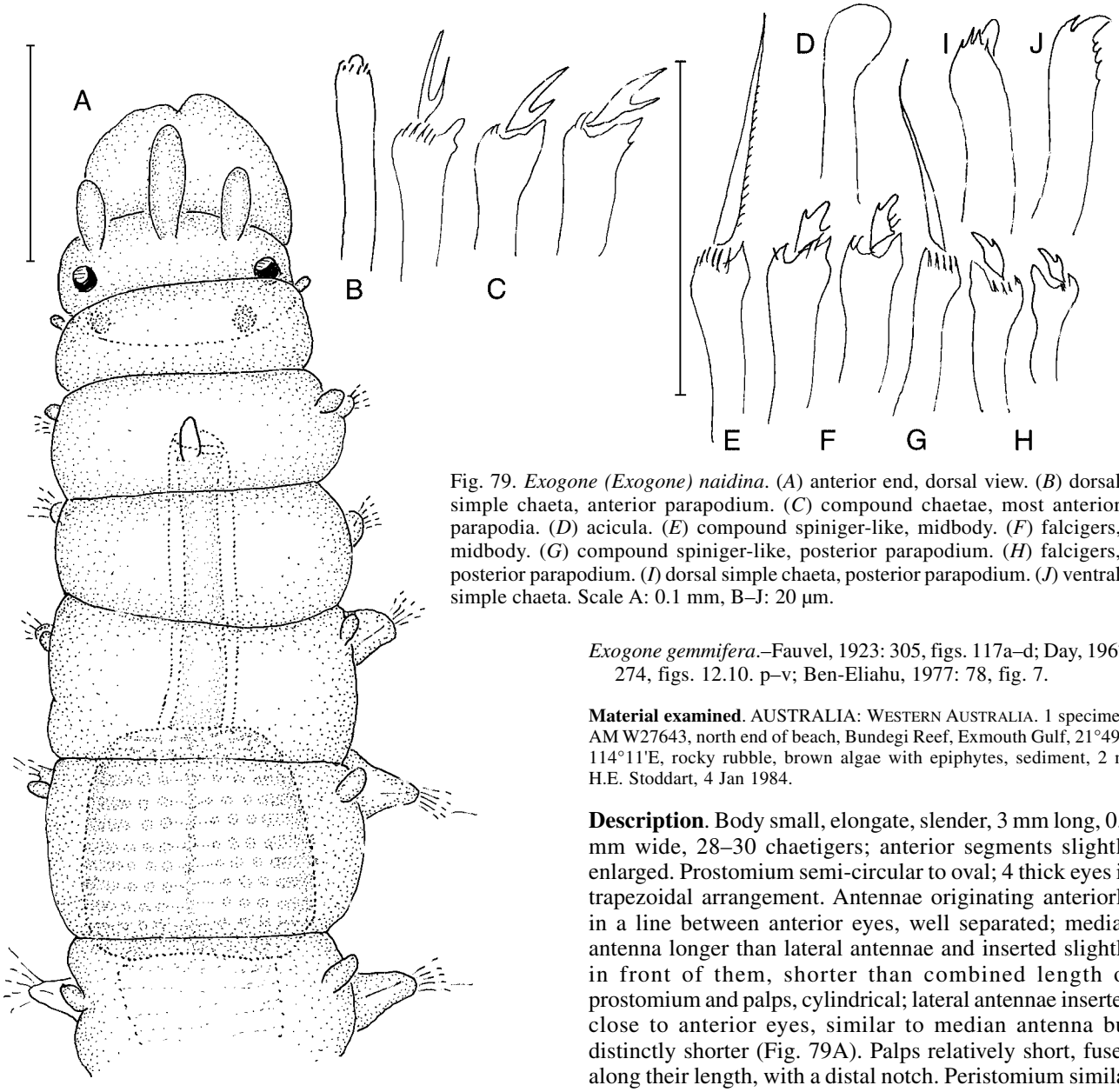


Fig. 79. *Exogone (Exogone) naidina*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, most anterior parapodia. (*D*) acicula. (*E*) compound spiniger-like, midbody. (*F*) falcigers, midbody. (*G*) compound spiniger-like, posterior parapodium. (*H*) falcigers, posterior parapodium. (*I*) dorsal simple chaeta, posterior parapodium. (*J*) ventral simple chaeta. Scale A: 0.1 mm, B–J: 20 μm.

rounded (Fig. 78H). Pharynx long, slender, through 6–7 segments; pharyngeal tooth on anterior margin (Fig. 78A): Proventricle shorter than pharynx, through 3 segments, with about 23 muscle cell rows. Pygidium with 2 long anal cirri.

Distribution. Pacific coasts from British Columbia to Panamá. Caribbean area: Florida, Gulf of México, Belize, Cuba. Eastern Atlantic (Canary Islands). Australia (Western Australia).

Habitat. Interstitial in coarse to medium sand. Inside dead corals. Intertidal to about 30 m depth.

Exogone (Exogone) naidina Örsted, 1845

Fig. 79A–J

Exogone naidina Örsted, 1845: 20, Figs. 1–14; Hartmann-Schröder, 1971: 171, figs. 56 a–c; 1979: 108, fig. 163; 1980a: 56; 1981: 38; 1982: 74; 1984: 25; 1986: 45; Gardiner, 1976: 132, figs. 11j–n; San Martín, 1984a: 208, pl. 46.

Exogone (Exogone) naidina San Martín, 2003: 262, figs. 142, 143.

Exogone gemmifera.–Fauvel, 1923: 305, figs. 117a–d; Day, 1967: 274, figs. 12.10. p–v; Ben-Eliahu, 1977: 78, fig. 7.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W27643, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body small, elongate, slender, 3 mm long, 0.2 mm wide, 28–30 chaetigers; anterior segments slightly enlarged. Prostomium semi-circular to oval; 4 thick eyes in trapezoidal arrangement. Antennae originating anteriorly in a line between anterior eyes, well separated; median antenna longer than lateral antennae and inserted slightly in front of them, shorter than combined length of prostomium and palps, cylindrical; lateral antennae inserted close to anterior eyes, similar to median antenna but distinctly shorter (Fig. 79A). Palps relatively short, fused along their length, with a distal notch. Peristomium similar to following segments in length; tentacular cirri minute, papilliform. Dorsal cirri similar to tentacular cirri but longer, distinctly shorter than lateral antennae, absent on chaetiger 2 (Fig. 79A). Parapodia of anteriormost 3 segments, each with 4–5 compound chaetae with spinose shafts and short, unidentate blades, about 6 μm, each provided with a long basal spur, making them appear bifid (Fig. 79C). Parapodia from chaetiger 4 each with 1 compound chaetae with unidentate, spiniger-like blade, short marginal spines (Fig. 79E), about 14 μm long, and 3 compound falcigers, shafts provided with subdistal and distal spines, and short blades, with long subdistal teeth and short distal teeth (Fig. 79F), about 5 μm long; posterior parapodia each with one spiniger-like, similar to those of anterior parapodia and midbody, but provided with shorter, smooth blade (Fig. 79G), about 11 μm long, and 2 compound falcigers with short, smooth blades (Fig. 79H). Dorsal simple chaetae from anterior parapodia, with rounded tips and finely spinulose subterminally (Fig. 79B), thicker posteriorly (Fig. 79I). Ventral simple chaetae on posterior parapodia, sigmoid, bidentate, subdistal tooth long and distal tooth short, with few, short

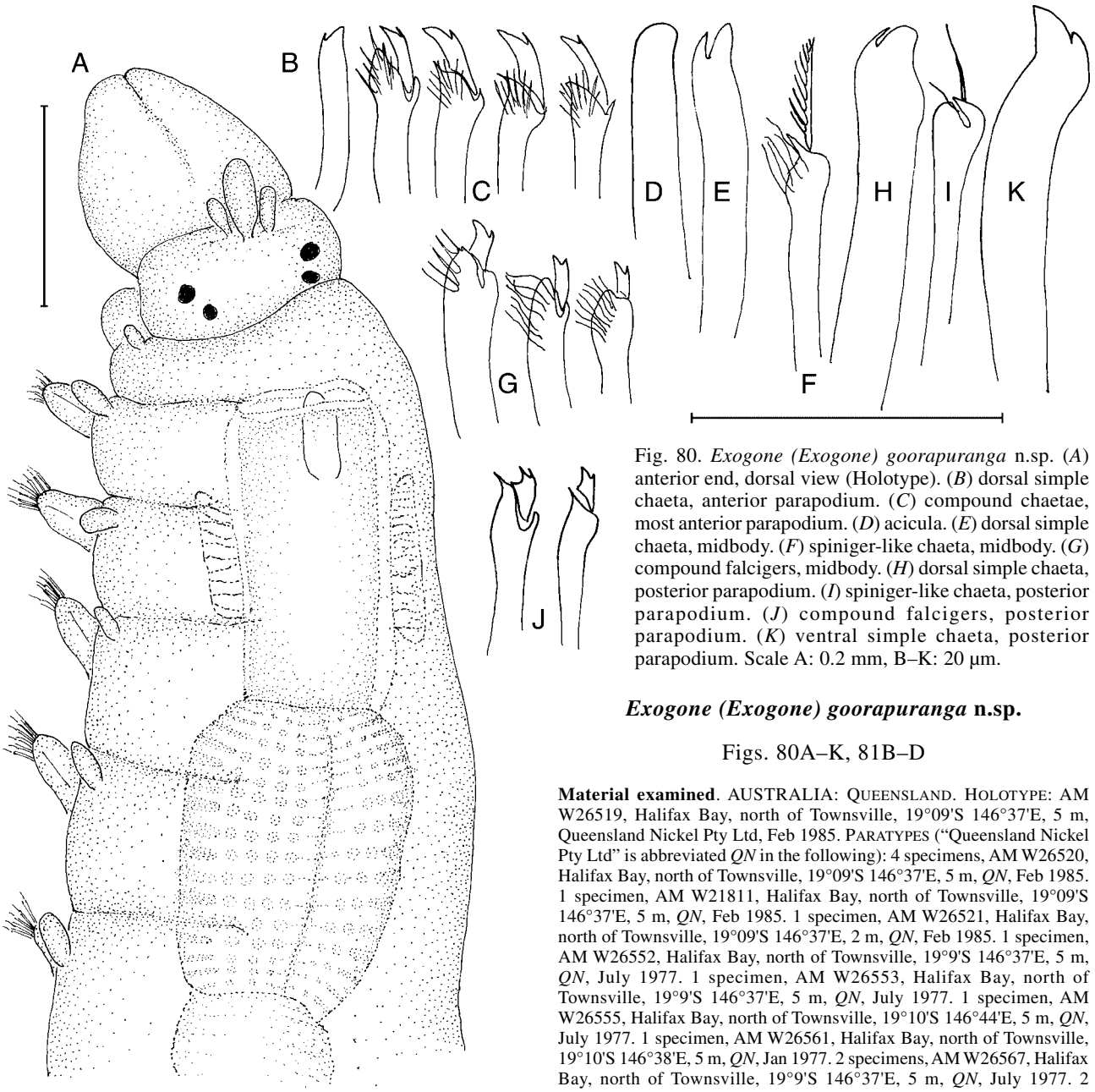


Fig. 80. *Exogone (Exogone) goorapuranga* n.sp. (*A*) anterior end, dorsal view (Holotype). (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound chaetae, most anterior parapodium. (*D*) acicula. (*E*) dorsal simple chaeta, midbody. (*F*) spiniger-like chaeta, midbody. (*G*) compound falcigers, midbody. (*H*) dorsal simple chaeta, posterior parapodium. (*I*) spiniger-like chaeta, posterior parapodium. (*J*) compound falcigers, posterior parapodium. (*K*) ventral simple chaeta, posterior parapodium. Scale A: 0.2 mm, B–K: 20 µm.

subdistal marginal spines (Fig. 79J). Acicula solitary, slender, distally rounded (Fig. 79D). Pygidium with 2 long anal cirri. Pharynx long and slender, through 3 segments; pharyngeal tooth on anterior rim (Fig. 79A). Proventricle short, through 1–2 segments, with 14–16 muscle cell rows.

Remarks. This species is apparently cosmopolitan in temperate and tropical waters. In Australia it has been reported all around, but perhaps some of these reports could be referred to other similar species. *Exogone (Exogone) dwisula* Kudenov & Harris, 1995, from California, is similar, but the proventricle is longer, through 1.5–2 segments (Kudenov & Harris, 1995).

Distribution. Cosmopolitan. Australia (all States).

Habitat. Shallow waters, on algae, fine to coarse sand, seagrasses.

Exogone (Exogone) goorapuranga n.sp.

Figs. 80A–K, 81B–D

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: AM W26519, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, Queensland Nickel Pty Ltd, Feb 1985. PARATYPES ("Queensland Nickel Pty Ltd" is abbreviated *QN* in the following): 4 specimens, AM W26520, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, *QN*, Feb 1985. 1 specimen, AM W21811, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 5 m, *QN*, Feb 1985. 1 specimen, AM W26521, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 2 m, *QN*, Feb 1985. 1 specimen, AM W26552, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, *QN*, July 1977. 1 specimen, AM W26553, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, *QN*, July 1977. 1 specimen, AM W26555, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, July 1977. 1 specimen, AM W26561, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, *QN*, Jan 1977. 2 specimens, AM W26567, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, *QN*, July 1977. 2 specimens, AM W26568, Halifax Bay, north of Townsville, 19°09'S 146°37'E, 2 m, *QN*, Feb 1985. 1 specimen, AM W26572, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, Jan 1977. 4 specimens, AM W26574, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, *QN*, July 1977. 4 specimens, AM W26575, Halifax Bay, north of Townsville, 19°10'S 146°37'E, 2 m, *QN*, Jan 1977. 1 specimen, AM W26580, Halifax Bay, north of Townsville, 19°7'S 146°33'E, 2 m, *QN*, Jan 1977. 5 specimens, AM W26581, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, July 1977. 2 specimens, AM W26584, Halifax Bay, north of Townsville, 19°10'S 146°36'E, 2 m, *QN*, July 1977. 1 specimen, AM W26585, between bommies inside lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 2 specimens, AM W26586, 600 m SW of Research Point, lagoon, south Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 1 specimen, AM W26587, 100 m off eastern end of Mangrove Beach, south Lizard Island, 14°40'S 145°28'E, 3.6 m, A.R. Jones & C. Short, 11 Oct 1978. 4 specimens, AM W26588, 600 m SW of Research Point, lagoon, south Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 1 specimen, AM W26589, 100 m off eastern end of Mangrove Beach, Lizard Island, 14°40'S 145°28'E, 3.6 m, A.R. Jones & C. Short, 11 Oct 1978. 1 specimen, AM W26590, 600 m SW of Research Point, lagoon, south Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m,

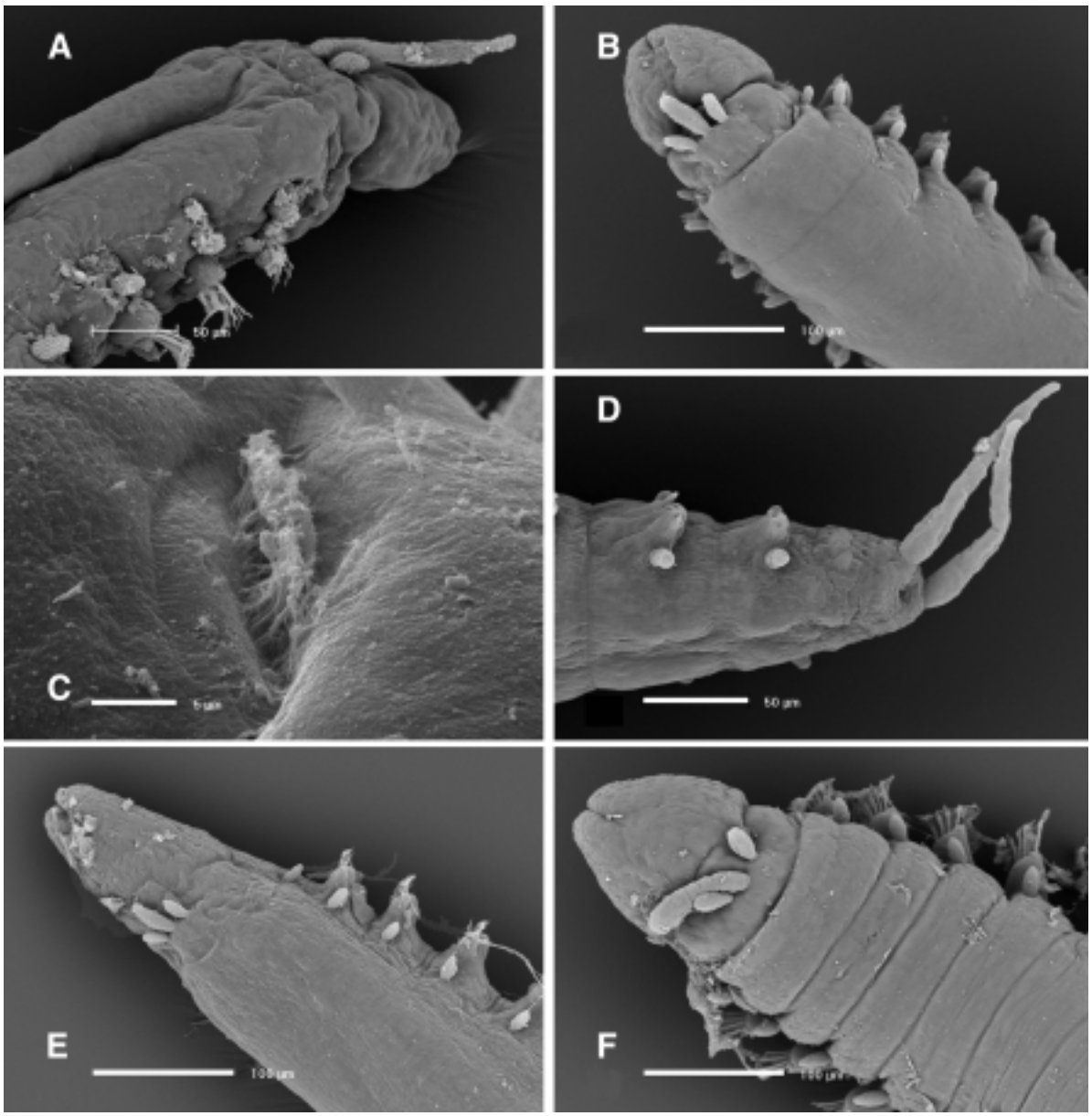


Fig. 81. SEM of *Exogone (Exogone) longicornis*, (*A*) anterior end, dorsal view. SEM of *Exogone (Exogone) goorapuranga*, (*B*) anterior end, dorsal view. (*C*) detail of nuchal organs. (*D*) posterior end, lateral view. SEM of *Exogone (Exogone) breviantennata*, A, anterior end, dorsal view. SEM of *Exogone (Exogone) dispar*, A, anterior end, dorsal view.

A.R. Jones & C. Short, 11 Oct 1978. 1 specimen, AM W26591, lagoon at south end of Lizard Island, 14°40'S 145°28'E, 3.6 m, A.R. Jones & C. Short, 11 Oct 1978. 2 specimens, AM W26592, 400 m off Chinamans Ridge, Watson's Bay, Lizard Island, 14°40'S 145°28'E, filamentous algae, 12 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26593, 600 m SW of Research Point, lagoon, south Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 1 specimen, AM W26594, 100 m off eastern end of Mangrove Beach, south Lizard Is., 14°40'S 145°28'E, 3.6 m, A.R. Jones & C. Short, 11 Oct 1978. 1 specimen, AM W26595, 100 m off Mangrove Beach, south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26596, 100 m off Mangrove Beach, south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26597, 1000 m off Chinamans Ridge, Watson's Bay, Lizard Island, 14°40'S 145°28'E, seagrasses, 21.2 m, A.R. Jones & C. Short, 13 Oct 1978.1 specimen, AM W26598, 200 m SW of Freshwater Beach, lagoon at south end of Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, A.R. Jones & C. Short, 10 Oct 1978. 1 specimen, AM W26599, 600 m SW of Research Point, lagoon at south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 4 specimens, AM W26600, 600 m SW of Research Point, lagoon at south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 1 specimen, AM W26601, 100 m off Mangrove Beach, lagoon at south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978. 3 specimens, AM W26602, 1000 m off Chinamans Ridge, western coast of Lizard Island, 14°40'S 145°28'E, seagrasses, 21.2 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26603, between bommies inside lagoon entrance, south end of Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 1 specimen, AM W26604, 100 m off Mangrove Beach, lagoon at south end of Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978. 4 specimens, AM W26605, 1000 m off Chinamans Ridge, Watsons Bay, west coast of Lizard Island, 14°40'S 145°28'E, seagrasses, 21.2 m, A.R. Jones & C. Short, 13 Oct 197. 6 specimens, AM W26606, 1 km off Chinamans Ridge, Watsons Bay, Lizard Island, 14°40'S 145°28'E, seagrasses, 21.2 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26607, 400 m off Chinamans Ridge, Watsons Bay, west coast of Lizard Island, 14°40'S 145°28'E, filamentous algae, 12 m, A.R. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26608, 100 m off Chinamans Ridge, Watsons Bay, west coast of Lizard Island, 14°40'S 145°28'E, sand, 9 m, A.R. Jones & C. Short, 13 Oct 1978. 2 specimens,

AM W26609, 600 m west of Research Point, lagoon at south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 4 specimens, AM W202674, Triangular Island, Shoalwater Bay, 22°23'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. WESTERN AUSTRALIA. 1 specimen, AM W27053, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27054, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 3 specimens, AM W27055, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 2 specimens, AM W27452, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27661, 5 km offshore, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, airlift in strap-leaved seagrass beds, 2 m, J.K. Lowry and R.T. Springthorpe, 6 Jan 1984.

Description. Body long, slender, filiform, holotype incomplete, 2.5 mm long, 0.4 mm wide, 26 chaetigers; longest paratype 3 mm long for 35 chaetigers. Prostomium oval, wider than long; 4 eyes in trapezoidal arrangement. Antennae small, originating close to each other near middle of anterior margin of prostomium (Figs. 80A, 81B); lateral antennae papilliform, median antenna about twice as long as lateral antennae (Figs. 80A, 81B). Palps long, broad, fused along their length, with a dorsal furrow and a distal notch (Figs. 80A, 81B). Peristomium similar in length to following segments, covering dorsal posterior part of prostomium; tentacular cirri minute, smaller than lateral antennae. Dorsal cirri ovoid, shorter than parapodial lobes, similar in size to lateral antennae, present on all segments (Figs. 80A, 81B). Anteriormost 6 chaetigers each with 5–6 compound falcigers, blades with subdistal tooth long and wide, distal tooth small, marginally smooth, shafts provided with long spines (Fig. 80C), blades about 6 µm long, without spiniger-like chaetae. From about chaetiger 7 posteriorly, parapodia each with 1 compound spiniger-like chaeta, with short, unidentate blade, 7–8 µm long, with long marginal spines (Fig. 80F), and 3 falcigers similar to those of anterior parapodia but shorter (Fig. 80G), 2–3 µm long; shafts of all compound chaetae provided with long, fine subdistal spines. Progressively posteriorly, both shafts and blades become less spinose; posterior parapodia each with 1 compound spiniger-like chaeta, with filiform, minute, smooth blade and distally enlarged, nearly smooth shaft (Fig. 80I), and 2 falcigers, with smooth shafts and minute blades (Fig. 80J). Dorsal simple chaetae from anterior parapodia, smooth, bidentate, subdistal tooth long and distal tooth minute (Fig. 80B), thicker and provided with relatively longer distal tooth posteriorly (Fig. 80E,H). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, similar to posterior dorsal simple chaetae (Fig. 80K). Acicula solitary, slender, distally rounded (Fig. 80D). Pharynx short and relatively wide, through 3 segments; lateral muscles of pharynx distinct, giving appearance of one gland on each side (Fig. 80A); pharyngeal tooth wide and long (Fig. 80A). Proventricle short, through 2 segments, with 18 muscle cell rows. Pygidium with 2 long anal cirri (Fig. 81D).

Remarks. Apparently, *Exogone (E.) goorapuranga* n.sp. resembles *E. naidina*; it lacks, however, compound chaetae with modified blades on anteriormost parapodia, and the shafts of compound chaetae have long, hair-like spines. Probably, some records of *E. (E.) naidina* from Australia should be referred to *Exogone (E.) goorapuranga*.

Distribution. Australia (Queensland, Western Australia).

Habitat. On fine to coarse sediment, inside dead corals, algae; intertidal to 33 m depth.

Etymology. The name of the species is derived from the combination of two Aboriginal words, *goora* which means, amongst others, long, and *puranga*, which means hairs, in reference to the long hairs or spines on shafts of compound chaetae.

Exogone (Exogone) arrakatarkoola n.sp.

Fig. 82A–L

Material examined. AUSTRALIA: QUEENSLAND. HOLOTYPE: AM W26364, lagoon at south end of Lizard Island, 250 m ESE of Palfrey Island, 14°40'S 145°28'E, very fine sediment, 12 m, C. Short & A.R. Jones, 12 Oct 1978. PARATYPES: 4 specimens, AM W26365, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPES: 4 specimens, AM W26366, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPES: 3 specimens, AM W26367, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPE: 1 specimen, AM W26368, 100 m off east end of Mangrove Beach, Lizard Island, 14°40'S 145°28'E, 3.6 m, C. Short & A.R. Jones, 11 Oct 1978. PARATYPE: 1 specimen, AM W26369, 100 m off east end of Mangrove Beach, Lizard Island, 14°40'S 145°28'E, 3.6 m, C. Short & A.R. Jones, 11 Oct 1978. PARATYPES: 4 specimens, AM W26370, 100 m off Mangrove Beach, south end of Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPES: 4 specimens, AM W26371, 400 m off Chinamans Ridge, Lizard Island, 14°40'S 145°28'E, 12 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPES: 2 specimens, AM W26372, 100 m off Mangrove Beach, south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. PARATYPES: 5 specimens, AM W26373, 100 m off Mangrove Beach, south end of Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, C. Short & A.R. Jones, 13 Oct 1978. 2 specimens, AM W26559, Halifax Bay, north of Townsville, 19°9'S 146°37'E, 5 m, *QN*, Jan 1977. 18 specimens, AM W26560, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, Jan 1977. 1 specimen, AM W26573, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, July 1977. 11 specimens, AM W26578, Halifax Bay, north of Townsville, 19°10'S 146°44'E, 5 m, *QN*, July 1977. 4 specimens, AM W26579, Halifax Bay, north of Townsville, 19°10'S 146°37'E, 5 m, *QN*, Jan 1977. 2 specimens, AM W26583, Halifax Bay, north of Townsville, 19°10'S 146°38'E, 5 m, *QN*, July 1977. 1 specimen, AM W26793, 3 m from coral bommie in lagoon at south end of Lizard Island, 14°40'S 145°28'E, coarse to medium sand, 3 m, A. Jones and C. Short, 13 Oct 1978. 1 specimen on SEM stub, AM W26891, Hinchinbrook Channel, 18°20'S 146°4'E, tidal mud- and sandflats, S. Dittmann, 14 Oct 1989.

Description. Body long, slender, filiform, 3.8–4 mm long, 0.2 mm wide, 40 chaetigers. Prostomium oval to rectangular, about 2.5 times wider than long; 4 large eyes in trapezoidal arrangement, anterior pair slightly larger than posterior pair; antennae located close to each other, between anterior eyes (Fig. 82A); median antenna cylindrical, shorter than prostomium, lateral antennae shorter, slightly more than ½ the length of median antenna (Fig. 82A). Palps broad, fused along their length, relatively short, slightly longer than prostomium. Peristomium distinct; tentacular cirri small, papilliform. Dorsal cirri longer than tentacular cirri, similar in length to lateral antennae, slightly pyriform (Fig. 82A), present on all segments. Anteriormost 2–3 parapodia each with about 8 compound chaetae, heterogomph, with long subdistal spines on shafts, and falcigerous blades, 1–2 dorsalmost chaetae with blades provided with indistinct distal tooth and long subdistal tooth, moderately long

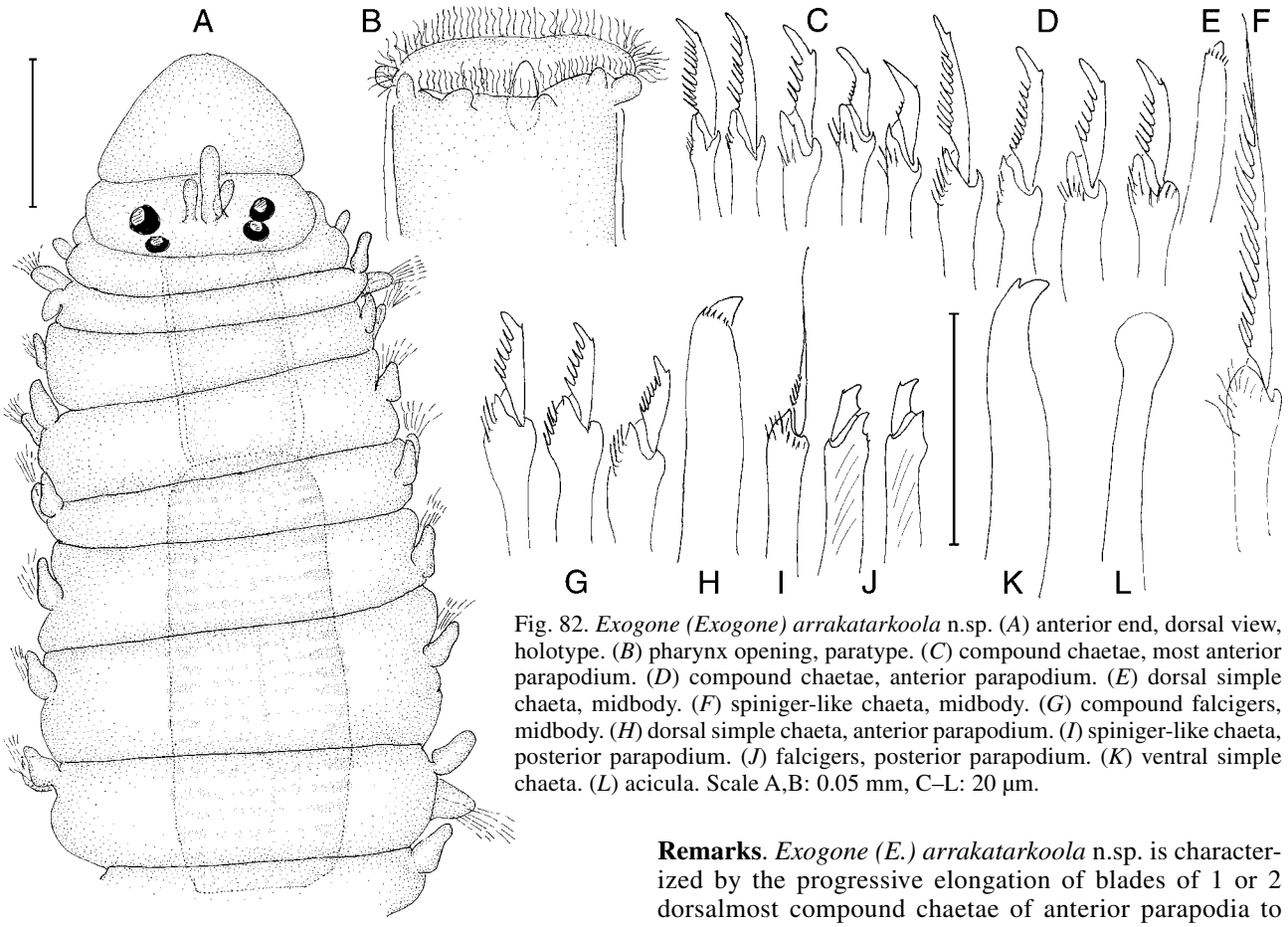


Fig. 82. *Exogone (Exogone) arrakatarkoola* n.sp. (*A*) anterior end, dorsal view, holotype. (*B*) pharynx opening, paratype. (*C*) compound chaetae, most anterior parapodium. (*D*) compound chaetae, anterior parapodium. (*E*) dorsal simple chaeta, midbody. (*F*) spiniger-like chaeta, midbody. (*G*) compound falcigers, midbody. (*H*) dorsal simple chaeta, anterior parapodium. (*I*) spiniger-like chaeta, posterior parapodium. (*J*) falcigers, posterior parapodium. (*K*) ventral simple chaeta. (*L*) acicula. Scale A,B: 0.05 mm, C–L: 20 µm.

marginal spines and about 12–13 µm long, remaining compound chaetae with blades slightly shorter, 11–10 µm long, with shorter marginal spines and distal tooth slightly longer than those of dorsalmost ones (Fig. 82C). On parapodia of following 3–5 segments dorsalmost 1–2 compound chaetae have slightly elongate blades, about 15 µm long, with moderately long marginal spines; the remaining 6–7 compound chaetae with blades similar to those of anteriormost parapodia but slightly longer, about 12 µm long (Fig. 82D). Progressively posteriorly, 1–2 dorsalmost elongate falcigers transformed to spiniger-like chaetae, with spinose shafts, unidentate, filiform blades, provided with long marginal spines (Fig. 82F), blades about 34 µm long in midbody; remaining falcigers similar to those of anterior parapodia, but shorter (Fig. 82G), blades about 10 µm above, 8 µm below, numbering 3 on midbody segments. Posterior parapodia each with 1 compound spiniger-like chaetae, with filiform, nearly smooth blade (Fig. 82I), 19 µm long, and 2, sometimes 3, falcigers, with nearly smooth shafts and short, smooth blades, about 5 µm long (Fig. 82J). Dorsal simple chaetae from anterior parapodia, sometimes from chaetiger 1, with rounded tips and finely spinulose subterminally (Fig. 82E), thicker posteriorly (Fig. 82H). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, with small distal tooth and longer subdistal tooth (Fig. 82K). Pharynx long, through about 5–6 segments; pharyngeal tooth located on anterior rim, surrounded by 10 soft papillae and a dense crown of long cilia (Fig. 82B). Proventricle similar in length to pharynx, through about 4–5 segments, with 32 muscle cell rows. Pygidium with 2 long anal cirri.

Remarks. *Exogone (E.) arrakatarkoola* n.sp. is characterized by the progressive elongation of blades of 1 or 2 dorsalmost compound chaetae of anterior parapodia to spiniger-like blades. *Exogone (E.) naidina* and *E. (E.) goorapuranga* also lack spiniger-like chaetae on anteriormost parapodia but *Exogone (E.) arrakatarkoola* has a much longer proventricle than either of these two species, lacks compound chaetae with modified blades on anteriormost parapodia, characteristic of *Exogone (E.) naidina*, and long spines on shafts of compound chaetae, present in *E. (E.) goorapuranga*.

Distribution. Australia (Queensland).

Habitat. Interstitial in fine to coarse sediment.

Etymology. The specific name is derived from a combination of two Aboriginal words, *arkoola*, meaning hair, and *arrakata* meaning mouth, in reference to the long cilia or "hairs" on the pharynx opening.

Exogone (Exogone) ingridae n.sp.

Fig. 83A–N

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W26451, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, surface of sponges, 19 m, P. Berents *et al*., 1 May 1997. PARATYPES: 8 specimens, AM W26452, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, on surface of sponges, 17 m, K. Attwood, 1 May 1997. WESTERN AUSTRALIA. 1 specimen, AM W27090, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates with sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 1 specimen, AM W27091, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate-coral substrate, *Acropora, Montipora*, 12 m, P.A. Hutchings, 23 May 1994.

Description. Body long, relatively broad, 4 mm long, 0.3 mm wide, 38 chaetigers. Prostomium oval to subpentagonal,

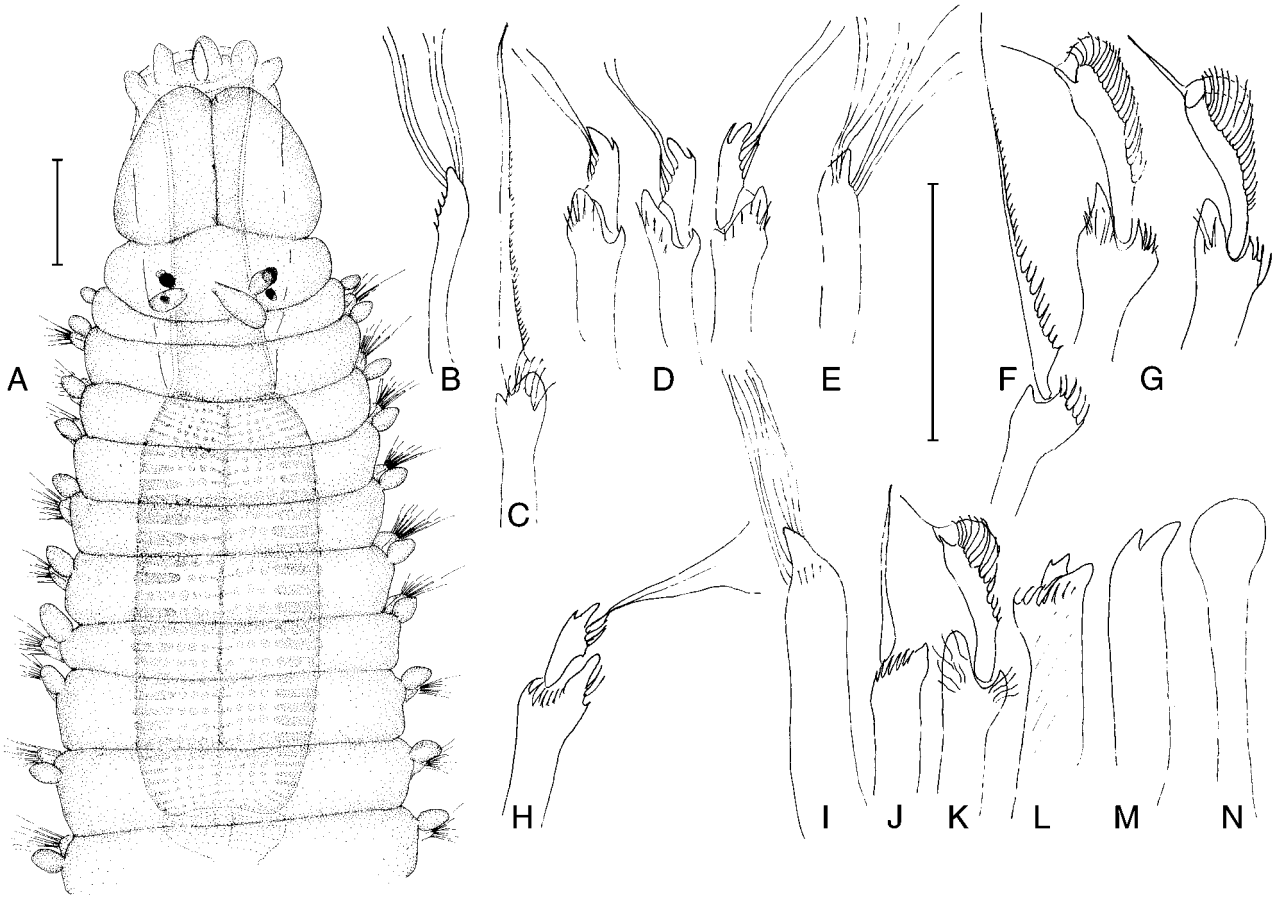


Fig. 83. *Exogone (Exogone) ingridae* n.sp. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) compound spiniger-like chaeta, anterior parapodium. (*D*) falcigers, anterior parapodium. (*E*) dorsal simple chaeta, midbody. (*F*) spiniger-like chaeta, midbody. (*G*) modified falcigers, midbody. (*H*) normal falciger, midbody. (*I*) dorsal simple chaeta, posterior parapodium. (*J*) spiniger-like, posterior parapodium. (*K*) modified falciger, posterior parapodium. (*L*) normal falciger, posterior parapodium. (*M*) ventral simple chaeta. (*N*) acicula. Scale A: 0.1 mm, B–N: 20 µm.

wider than long; 4 eyes in rectangular arrangement. Antennae ovoid, short, inserted separately between posterior eyes; median antenna about twice as long as lateral antennae, much shorter than prostomium; lateral antennae inserted near posterior eyes (Fig. 83A). Palps broad, longer than prostomium, fused along their length, with a distinct dorsal furrow and a terminal notch (Fig. 83A). Tentacular segment about half as long as following segments; tentacular cirri small, shorter than lateral antennae. Dorsal cirri ovoid, longer than tentacular cirri, similar in length to lateral antennae and parapodial lobes. Parapodia of 3 anterior chaetigers each with solitary compound spiniger-like chaeta, shafts with subdistal long, thin spines, and slender, unidentate blade with short marginal spines (Fig. 83C), 30 µm long, and 4 falcigers, shafts provided with subdistal spines and bidentate blades, subdistal tooth long and broad, distal tooth small and long, thin marginal spines, 2 distalmost of which even longer than whole blade, all blades similar in length, about 9 µm long (Fig. 83D). From chaetiger 4 posteriorly, each parapodium with single compound spiniger-like chaeta, similar to those of anterior parapodia but provided with longer spines, both on shafts and blades (Fig. 83F), in addition with 2 strongly modified falcigers, articulation hemigomph with long spines, and blades curved, provided with long, erect spines connected by a membrane, ending in a long, filiform tip (Fig. 83G), and finally one compound falciger, similar to those of anterior parapodia (Fig. 83H). Posterior parapodia each with one compound spiniger-like chaeta with thick shaft and short, filiform, smooth blade, about 14–15 µm long (Fig. 83J), one strongly modified falciger similar to those of midbody (Fig. 83K), and one falciger with thick shaft and very short, smooth, bidentate blade (Fig. 83L). Dorsal simple chaetae from anterior segments (chaetiger 3 on holotype), with 6 long subdistal spines (aristae), thicker posteriorly (Figs. 83B,E,I). Ventral simple chaetae on posterior parapodia, sigmoid, thick, smooth, bidentate, subdistal tooth longer and thicker than distal tooth (Fig. 83M). Acicula solitary, distally expanded and rounded (Fig. 83N). Pygidium with 2 long anal cirri. Pharynx long, through about 7 segments, everted in holotype, provided with a crown of 10 soft papillae; pharyngeal tooth on anterior rim (Fig. 83A). Proventricle long, similar in length to pharynx, with about 27 muscle cell rows.

Remarks. This species is unique in having strongly modified compound chaetae on mid and posterior parapodia and long aristae on dorsal simple chaetae as well as on the blades of non-modified falcigers.

Distribution. Australia (New South Wales, Western Australia).

Habitat. On sessile invertebrate substrates such as sponges, bryozoans, dead corals; 12–23 m depth.

Etymology. The species is named in honour of Ms Ingrid Skirka, Sydney, Australia.

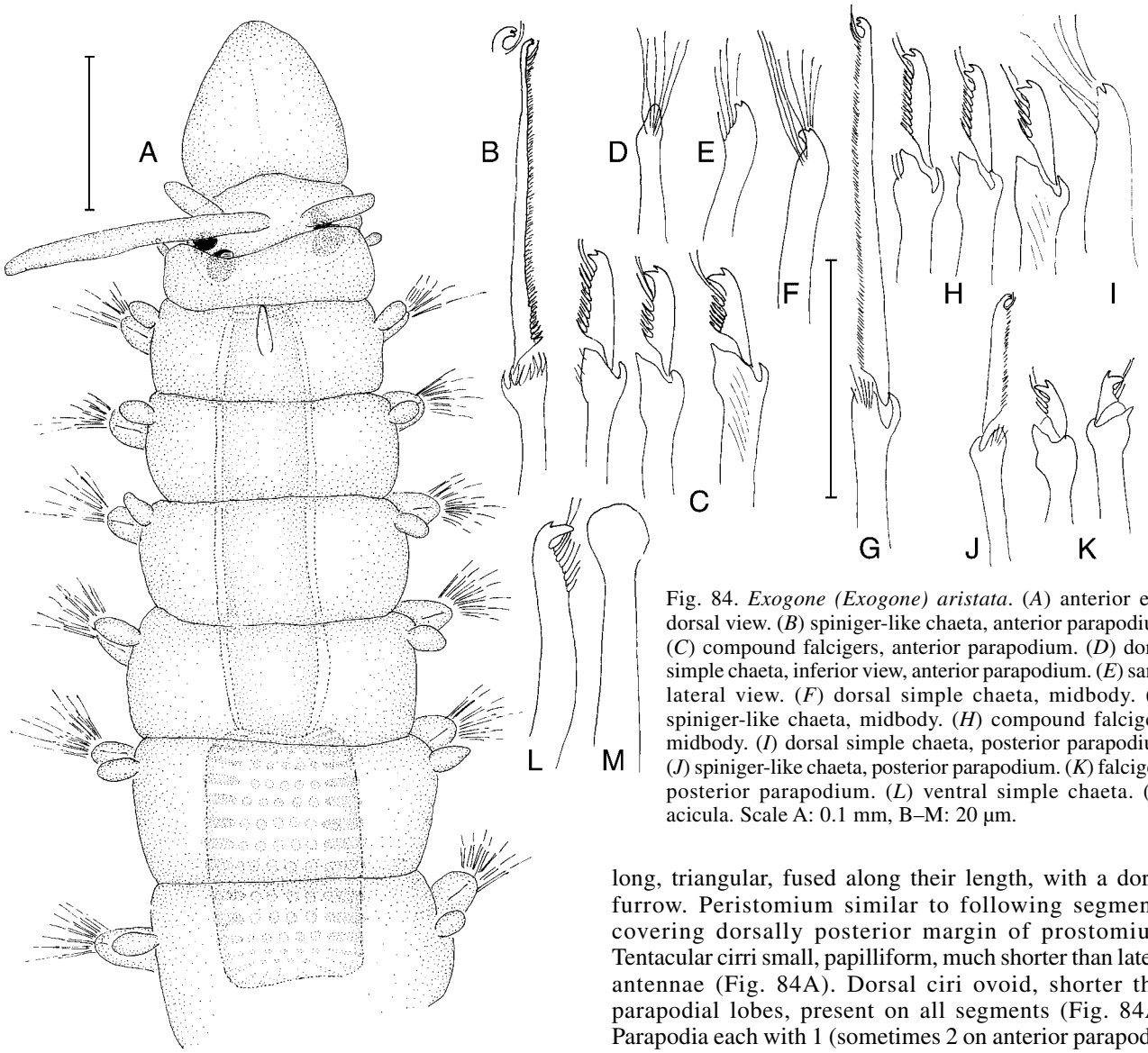


Fig. 84. *Exogone (Exogone) aristata*. (*A*) anterior end, dorsal view. (*B*) spiniger-like chaeta, anterior parapodium. (*C*) compound falcigers, anterior parapodium. (*D*) dorsal simple chaeta, inferior view, anterior parapodium. (*E*) same, lateral view. (*F*) dorsal simple chaeta, midbody. (*G*) spiniger-like chaeta, midbody. (*H*) compound falcigers, midbody. (*I*) dorsal simple chaeta, posterior parapodium. (*J*) spiniger-like chaeta, posterior parapodium. (*K*) falcigers, posterior parapodium. (*L*) ventral simple chaeta. (*M*) acicula. Scale A: 0.1 mm, B–M: 20 µm.

Exogone (Exogone) aristata
Hartmann-Schröder, 1982

Fig. 84A–M

Exogone aristata Hartmann-Schröder, 1982: 75, figs. 69–72; 1989: 30.

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26988, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral algae covered in coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimen, AM W26989, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead *Acropora*, coral substrate covered in algae, 24 m, P.A. Hutchings, 25 May 1994. 3 specimens, AM W26990, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 3 specimens, and 1 specimen on SEM stub, AM W27460, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, green algae, 1.5 m, R.T. Springthorpe, 2 Jan 1984.

Description. Body long and slender, filiform, 2.6 mm long, 0.2 mm wide, 42 chaetigers. Prostomium oval, wider than long; 4 large eyes in trapezoidal arrangement; antennae inserted between anterior eyes; median antenna long, cylindrical, slightly longer than combined length of prostomium and palps, lateral antennae inserted close to eyes, about ¼ of length of median antenna (Fig. 84A). Palps long, triangular, fused along their length, with a dorsal furrow. Peristomium similar to following segments, covering dorsally posterior margin of prostomium. Tentacular cirri small, papilliform, much shorter than lateral antennae (Fig. 84A). Dorsal ciri ovoid, shorter than parapodial lobes, present on all segments (Fig. 84A). Parapodia each with 1 (sometimes 2 on anterior parapodia) compound chaetae hemigomph, distally spinose, with spiniger-like blade, distally curved, bifid, with short marginal spines, except 2–3 distalmost ones which are longer and erect, extending beyond tip (Figs. 84B,G,J); in addition compound falcigers 5–6 on anterior parapodia diminishing to 3 on posterior parapodia, with subdistal tooth long and broad and short distal tooth, moderate marginal spines, except 2–3 distalmost ones, long, erect, extending beyond tip (Figs. 84C,H,K); blades both of spiniger-like chaetae and falcigers provided with several rows of marginal spines. Blades of spiniger-like chaetae about 28 µm on anterior parapodia, 37 µm on midbody, 12 µm on posterior parapodia. Blades of falcigers about 10 µm on anterior parapodia, 16–18 µm on midbody, 4–5 µm on posterior parapodia. Dorsal simple chaetae from post-proventricular parapodia, distally bidentate, thicker posteriorly, with 6–8 long, thin spines (aristae) (Figs. 84D,E,F,I). Ventral simple chaetae on posterior parapodia, sigmoid, bidentate, with long subdistal tooth and short distal tooth, provided with several long subdistal spines, 2 distalmost ones much longer than other spines, erect, extending beyond tip of chaeta (Fig. 84L). Acicula solitary, slender, distally expanded and rounded (Fig. 84M). Pharynx long and slender, through about 4 segments; pharyngeal tooth on anterior rim (Fig.

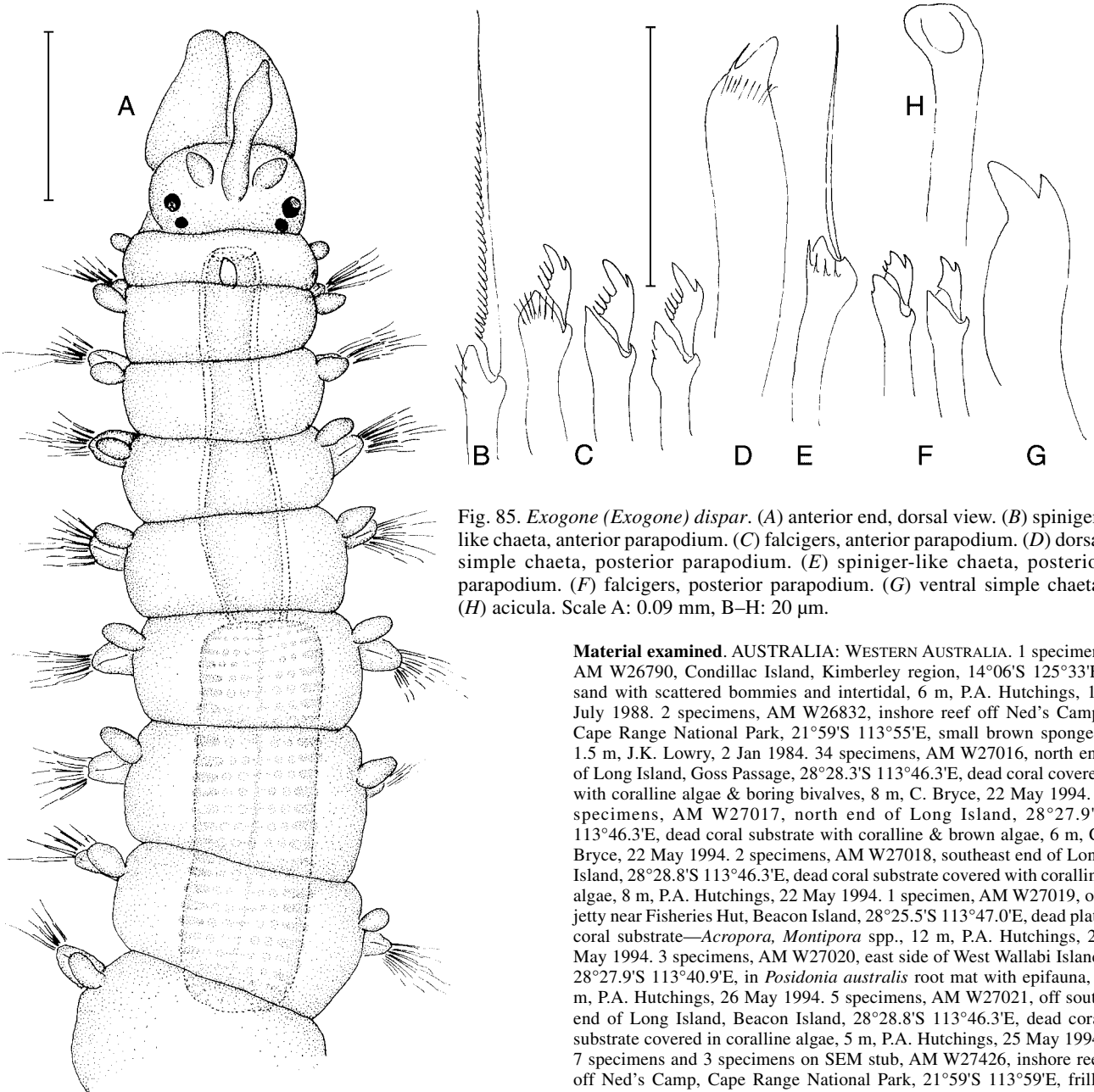


Fig. 85. *Exogone (Exogone) dispar*. (*A*) anterior end, dorsal view. (*B*) spiniger-like chaeta, anterior parapodium. (*C*) falcigers, anterior parapodium. (*D*) dorsal simple chaeta, posterior parapodium. (*E*) spiniger-like chaeta, posterior parapodium. (*F*) falcigers, posterior parapodium. (*G*) ventral simple chaeta. (*H*) acicula. Scale A: 0.09 mm, B–H: 20 µm.

84A). Proventricle short, through 1½–2 segments, with about 15 muscle cell rows. Pygidium with 2 long anal cirri.

Distribution. Australia (New South Wales, Western Australia).

Habitat. Amongst *Posidonia* and algae, in dead corals; intertidal to about 24 m depth.

Exogone (Exogone) dispar (Webster, 1879)

Figs. 81F, 85A–G

Paedophylax dispar Webster, 1879: 223, pl. 4, fig. 49, pl. 5, figs. 50–55.

Exogone dispar.–Westheide, 1974: 298, figs. 48, 49; Perkins, 1981: 1090; Uebelacker, 1984: 30–43, fig. 30–36; Campoy, 1982: 290, pl. 21; San Martín, 1984a: 221, pl. 52; Fan *et al*., 1993: 25, fig. 5.

Exogone (Exogone) dispar.–San Martín, 1991a: 729; 2003: 274, figs. 149, 150; Ruíz-Ramírez & Salazar-Vallejo, 2001: 127, fig. 3 (45–54).

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 1 specimen, AM W26790, Condillac Island, Kimberley region, 14°06'S 125°33'E, sand with scattered bommies and intertidal, 6 m, P.A. Hutchings, 16 July 1988. 2 specimens, AM W26832, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, small brown sponges, 1.5 m, J.K. Lowry, 2 Jan 1984. 34 specimens, AM W27016, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 7 specimens, AM W27017, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 2 specimens, AM W27018, southeast end of Long Island, 28°28.8'S 113°46.3'E, dead coral substrate covered with coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27019, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 3 specimens, AM W27020, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat with epifauna, 2 m, P.A. Hutchings, 26 May 1994. 5 specimens, AM W27021, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 7 specimens and 3 specimens on SEM stub, AM W27426, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa* sp., 1 m, J.K. Lowry, 2 Jan 1984. 1 specimen, AM W27428, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, coral rubble covered with algae, 1.5 m, J.K. Lowry, 2 Jan 1984. 6 specimens, AM W27454, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 30 specimens, AM W27644, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body long, slender, filiform, 5 mm long, 0.25 mm wide, 35 chaetigers. Prostomium rounded to oval; 4 eyes in trapezoidal arrangement. Antennae inserted close to each other approximately on middle of prostomium, anteriorly to line between anterior eyes (Fig. 85A); median antenna distinctly longer than lateral antennae, shorter than prostomium and palps together, with a subdistal enlargement; lateral antennae ovate, ⅓ or less than median antenna. Palps broad, fused all along their length, with a dorsal furrow and distal notch, similar in length to prostomium (Figs. 81F, 85A). Peristomium similar in length to following segments; tentacular cirri small, ovoid. Dorsal cirri ovoid, similar to

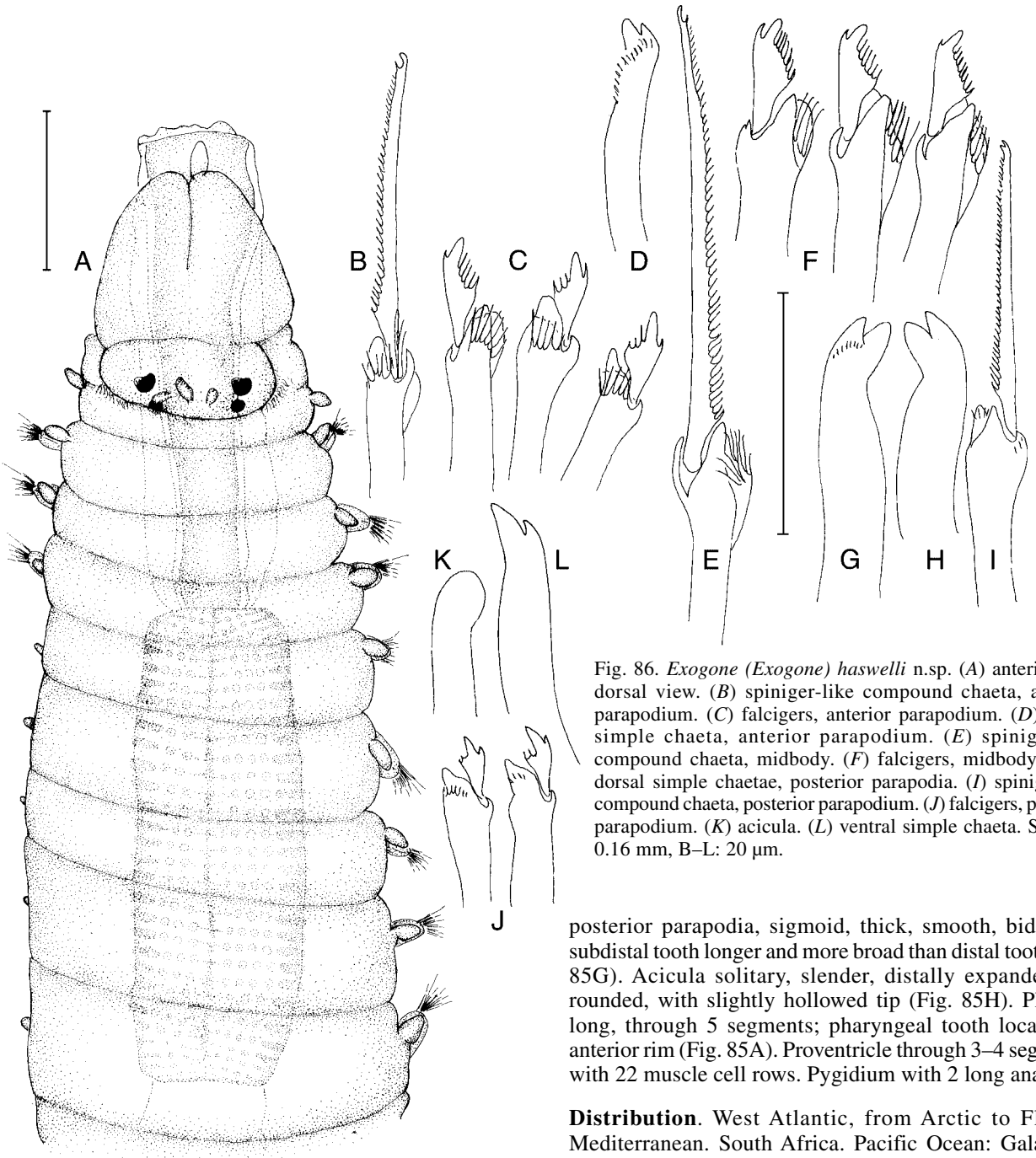


Fig. 86. *Exogone (Exogone) haswelli* n.sp. (*A*) anterior end, dorsal view. (*B*) spiniger-like compound chaeta, anterior parapodium. (*C*) falcigers, anterior parapodium. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) spiniger-like compound chaeta, midbody. (*F*) falcigers, midbody. (*G,H*) dorsal simple chaetae, posterior parapodia. (*I*) spiniger-like compound chaeta, posterior parapodium. (*J*) falcigers, posterior parapodium. (*K*) acicula. (*L*) ventral simple chaeta. Scale A: 0.16 mm, B–L: 20 µm.

tentacular cirri but longer, similar to lateral antennae or slightly shorter, present on all parapodia (Figs. 81F, 85A). Anterior parapodia each with 1–2 compound chaetae with unidentate, filiform spiniger-like blades, with short marginal spines (Fig. 85B), about 28–29 µm long; in addition 5–6 compound chaetae with falcigerous blades, bidentate, subdistal tooth long and distal tooth short and moderate marginal spines (Fig. 85C), about 8 µm long. Decreasing number of compound chaetae posteriorly to 1 spiniger-like and 2 falcigers; posterior compound chaetae less spinulated, both on shafts and blades (Fig. 85E,F); blades of spiniger-like chaetae about 18 µm and those of falcigers about 4–5 µm long. Dorsal simple chaetae from anterior segments (4–5), with rounded tips and finely spinulose subterminally, thicker posteriorly (Fig. 85D). Ventral simple chaetae on posterior parapodia, sigmoid, thick, smooth, bidentate, subdistal tooth longer and more broad than distal tooth (Fig. 85G). Acicula solitary, slender, distally expanded and rounded, with slightly hollowed tip (Fig. 85H). Pharynx long, through 5 segments; pharyngeal tooth located on anterior rim (Fig. 85A). Proventricle through 3–4 segments, with 22 muscle cell rows. Pygidium with 2 long anal cirri.

Distribution. West Atlantic, from Arctic to Florida. Mediterranean. South Africa. Pacific Ocean: Galápagos Islands, Japan, Australia (Western Australia).

Habitat. Sediments, from mud to coarse sand, broken shells, inside corals, amongst algae and seagrasses; intertidal and shallow waters.

Exogone (Exogone) haswelli n.sp.

Fig. 86A–L

Material examined. AUSTRALIA: NEW SOUTH WALES. HOLOTYPE: AM W26443, Palm Beach, Pittwater, 33°35'S 151°19'E, sand, seagrass, *Halophila* & *Posidonia*, 3 m, J.K. Lowry & R.T. Springthorpe, 28 Apr 1983. PARATYPES: 20 specimens, AM W26444, Palm Beach, Pittwater, 33°35'S 151°19'E, sand, seagrass, *Halophila & Posidonia*, 3 m, J.K. Lowry & R.T. Springthorpe, 28 Apr 1983. WESTERN AUSTRALIA. 2 specimens, and 2 specimens on SEM stub, AM W27456, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984.

Description. Body long, slender, filiform, 4.6 mm long, 0.3 mm wide, 54 chaetigers. Prostomium oval, wider than long; 4 eyes in trapezoidal to rectangular arrangement. Antennae minute, papilliform, inserted between posterior pair of eyes, close to each other but distinctly separate (Fig. 86A), all similar, difficult to see. Palps broad, long, about twice as long as prostomium, with a dorsal furrow and a distal notch. Peristomium shorter than following segments, laterally and ventrally expanded at anterior end, surrounding prostomium (Fig. 86A); tentacular cirri small, ovoid to papilliform, similar in shape and size to antennae. Two ciliated, distinct nuchal organs. Dorsal cirri ovoid, slightly longer than antennae and tentacular cirri, present on all parapodia (Fig. 86A). Parapodia each with solitary compound chaetae with spiniger-like blade and several falcigers, 3–4 anteriorly to 2 on each posterior parapodia. Spiniger-like chaetae with hemigomph shafts, provided with a distal longitudinal keel with long, thin spines and elongate blades bidentate and short marginal spines (Figs. 86B,E,I), about 28 µm in length on anterior parapodia, 39 µm in midbody, 24 µm on posterior parapodia. Falcigers heterogomph, shafts with a ridge with long, slender spines on anterior and midbody parapodia (Fig. 86C,F), blades with long, thick subdistal tooth and short, small distal tooth, provided with moderate to short marginal spines, 10 µm long on midbody, about 6 µm long on posterior parapodia (Fig. 86J). Dorsal simple chaetae from chaetiger 6 in holotype, distinctly bidentate, with broad teeth and subdistal spines on anterior parapodia (Fig. 86D), progressively thicker, more strongly bidentate with broader teeth, with few short spines (Fig. 86G) or smooth (Fig. 86H). Ventral simple chaetae from midbody, sigmoid, smooth, bidentate, subdistal tooth long and broad, distal tooth much smaller (Fig. 86L). Acicula solitary, distally rounded (Fig. 86K). Pharynx long and slender, through 7 segments; pharyngeal tooth conical, near anterior rim (Fig. 86A). Proventricle long and slender through about 5–6 segments, with 30 muscle cell rows.

Remarks. *Exogone (Exogone) haswelli* n.sp. is characterized by having minute, papilliform antennae, long proventricle and strongly bidentate dorsal simple chaetae. Similar dorsal simple chaetae are present in *Exogone (E.) pseudolourei* San Martín, 1991, from the Caribbean Sea, but that species has much longer antennae, especially the median one, much shorter proventricle and enlarged, shafts with a triangular process, on spiniger-like compound chaetae of chaetiger 2 (San Martín, 1991a).

Distribution. Australia (New South Wales, Western Australia).

Habitat. Sand and seagrass, amongst coralline algae, in shallow water.

Etymology. The species is named in honour of the late Professor William Haswell, the first Australian polychaetologist, and one who contributed substantially to our knowledge of the Australian Syllidae.

Exogone (Exogone) koorenborongi n.sp.

Fig. 87A–K

Material examined. AUSTRALIA: WESTERN AUSTRALIA. HOLOTYPE: AM W26617, south east end of Long Island, Goss Passage, 28°28.8'S 113°46.5'E, dead coral covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. PARATYPES: 2 specimens, AM W26618, south east end of Long Island, Goss Passage, 28°28.8'S 113°46.5'E, dead coral covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. PARATYPE: 1 specimen, AM W26619, south east end of Long Island, Goss Passage, 28°28.8'S 113°46.5'E, dead coral covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994.

Description. Body small, slender, filiform, 3.3 mm long, 0.14 mm wide, 29 chaetigers; lateral lobes of nuchal organs usually dark to black, distinct (Fig. 87A). Prostomium oval; 4 eyes in trapezoidal to rectangular arrangement; antennae minute, inserted close to each other near anterior margin of prostomium, ovoid, median antenna slightly longer than lateral antennae (Fig. 87A). Palps broad, longer than prostomium, fused along their length, with a distinct dorsal furrow, with distal notch (Fig. 87A). Peristomium small, dorsally covered by chaetiger 1; tentacular cirri similar both in shape and length to antennae. Dorsal cirri ovoid, longer than antennae, shorter than parapodial lobes or similar in length, present on all segments (Fig. 87A). Anterior parapodia each with 1 compound chaeta, shaft distally provided with long spines of which one distinctly longer, and short, smooth, unidentate blade, about 18 µm long (Fig. 87D); in addition 3 falcigers with spinose shafts and short, smooth blades, with distal tooth indistinct and long subdistal tooth (Fig. 87E), about 4–5 µm long. Midbody parapodia each with solitary compound spiniger-like chaeta, similar to those of anterior parapodia (Fig. 87F), and 2 compound falcigers with spinose shafts, one spine longer than others, and blades short, usually one of them provided with very small distal tooth and one without distal tooth (Fig. 87G). Posterior parapodia each with a single spiniger-like compound chaeta, similar to those of midbody (Fig. 87J) and solitary compound falciger, with blade short, smooth and without distal tooth (Fig. 87K). Dorsal simple chaetae from anterior parapodia, with rounded tips and finely spinulose subterminally, thicker posteriorly (Fig. 87C,H). Ventral simple chaetae on posterior parapodia, thick, sigmoid, bidentate, subdistal tooth long and broad, distal tooth small (Fig. 87I). Pygidium semi-circular, with 2 short anal cirri, longer than dorsal cirri (Fig. 87B) and a distal papilla. Pharynx through 2 segments; pharyngeal tooth on anterior rim (Fig. 87A). Proventricle small, occupying only one segment, nearly rounded, with about 12 muscle cell rows.

Remarks. This species is characterized by its small size, minute, papilliform antennae located on anterior margin of prostomium and short proventricle. The dark lateral lobes of the nuchal organs (see Lewbart & Riser, 1996) are more distinct in some specimens and almost indistinct in others.

Exogone (E.) koorenborongi n.sp. is similar to *Exogone (E.) goorapuranga*, described above; that species, however, has a longer median antenna, lacks spiniger-like compound chaetae on anteriormost parapodia, and the chaetae, both compound and simple, are different. Also *Exogone (E.) koorenborongi* is similar to *Exogone (E.) naidina*, and it is possible that some records of that species in Australia should be referred to *Exogone (E.) koorenborongi*.

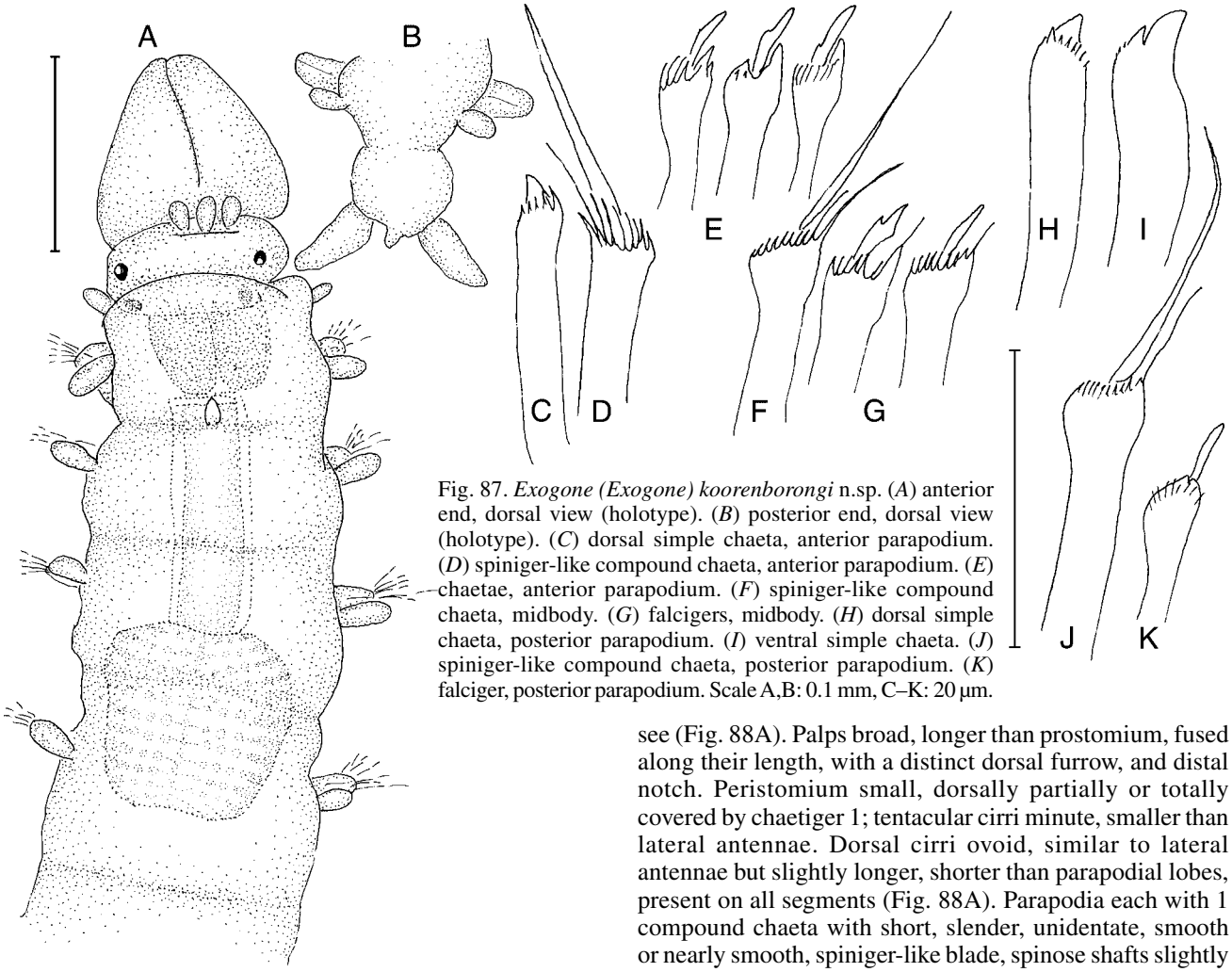


Fig. 87. *Exogone (Exogone) koorenborongi* n.sp. (*A*) anterior end, dorsal view (holotype). (*B*) posterior end, dorsal view (holotype). (*C*) dorsal simple chaeta, anterior parapodium. (*D*) spiniger-like compound chaeta, anterior parapodium. (*E*) chaetae, anterior parapodium. (*F*) spiniger-like compound chaeta, midbody. (*G*) falcigers, midbody. (*H*) dorsal simple chaeta, posterior parapodium. (*I*) ventral simple chaeta. (*J*) spiniger-like compound chaeta, posterior parapodium. (*K*) falciger, posterior parapodium. Scale A,B: 0.1 mm, C–K: 20 µm.

Distribution. Australia (Western Australia).

Habitat. Inside dead corals, 8–30 m depth.

Etymology. The specific name comes from combining two Aboriginal words: *kooren* meaning neck, and *borongi* meaning dark, in reference to the dark lobes of the nuchal organs.

Exogone (Exogone) brevifalcigera Hartmann-Schröder, 1990

Fig. 88A–M

Exogone brevifalcigera Hartmann-Schröder, 1990: 56, figs. 24–26.

Material examined. AUSTRALIA: NEW SOUTH WALES. PARATYPES: 2 specimens, AM W203314, Angourie Point, Maclean, 29°21'S 154°22'E, 0 m, Hartmann-Schröder, 17 Jan 1976. 1 specimen, AM W26398, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, rock, 15 m, K.B. Attwood, 9 Jun 1993. 1 specimen, AM W26399, Split Solitary Island, 30°15'S 153°11'E, 17 m.

Description. Body small, slender, relatively broad, 2.9 mm long, 0.4 mm wide, 38 chaetigers; holotype slightly longer, 3.2 mm long, 38 chaetigers. Prostomium rectangular to oval; 4 eyes in trapezoidal arrangement; anterior eyespots not seen. Antennae small, inserted close to each other, approximately on middle of prostomium; median antenna about twice as long as the lateral antennae, slightly pyriform, shorter than prostomium; lateral antenna ovoid, difficult to see (Fig. 88A). Palps broad, longer than prostomium, fused along their length, with a distinct dorsal furrow, and distal notch. Peristomium small, dorsally partially or totally covered by chaetiger 1; tentacular cirri minute, smaller than lateral antennae. Dorsal cirri ovoid, similar to lateral antennae but slightly longer, shorter than parapodial lobes, present on all segments (Fig. 88A). Parapodia each with 1 compound chaeta with short, slender, unidentate, smooth or nearly smooth, spiniger-like blade, spinose shafts slightly different on midbody and posterior segments (Figs. 88C,G,K); in addition 5 falcigers on anterior parapodia reduced to only 2 on posterior parapodia; falcigers with distally spinose shafts and minute, sometimes indistinct, smooth, bidentate blades with subdistal tooth longer than distal tooth (Figs. 88E,H,L), slightly longer on anterior parapodia, about 5 µm, than on posterior ones, 3 µm long. Dorsal simple chaetae from anterior parapodia, with rounded tips and finely spinulose subterminally, slender on anterior parapodia (Fig. 88D), thicker, unidentate, with less spines posteriorly (Fig. 88F,J). Ventral simple chaetae on posterior parapodia, sigmoid, unidentate, provided with short, small spines above (Fig. 88M). Acicula solitary, distally rounded (Fig. 88I). Pygidium semi-circular, with 2 long anal cirri (Fig. 88B). Pharynx through 4–5 segments; pharyngeal tooth conical, acute, long, longer than median antenna (Fig. 88A). Proventricle through 4–5 segments, with about 21 muscle cell rows.

Remarks. *Exogone (E.) marisae* Pascual, Núñez & San Martín, 1996, from Canary Islands have the falcigers similar, with short blades, encased in spinose shafts, but the antennae are inserted more anteriorly on the prostomium, the proventricle is shorter, and the dorsal simple chaetae have aristae (Pascual *et al*., 1996).

Distribution. Australia (New South Wales).

Habitat. On shallow hard substrates.

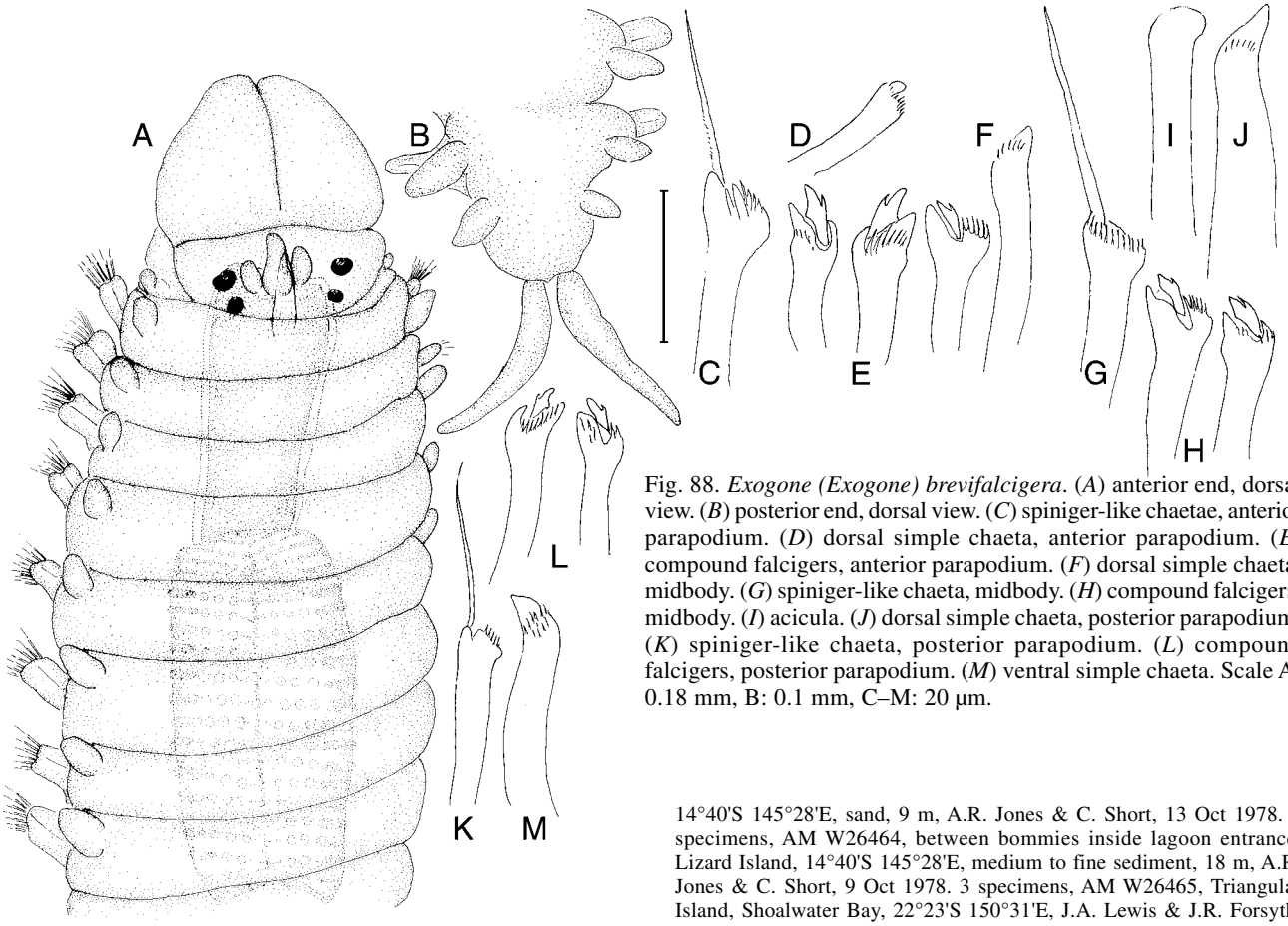


Fig. 88. *Exogone (Exogone) brevifalcigera*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) spiniger-like chaetae, anterior parapodium. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) compound falcigers, anterior parapodium. (*F*) dorsal simple chaeta, midbody. (*G*) spiniger-like chaeta, midbody. (*H*) compound falcigers, midbody. (*I*) acicula. (*J*) dorsal simple chaeta, posterior parapodium. (*K*) spiniger-like chaeta, posterior parapodium. (*L*) compound falcigers, posterior parapodium. (*M*) ventral simple chaeta. Scale A: 0.18 mm, B: 0.1 mm, C–M: 20 μm.

Exogone (Exogone) breviantennata Hartmann-Schröder, 1959

Figs. 81E, 89A–I

Exogone breviantennata Hartmann-Schröder, 1959: 125, figs. 75–78; Zottoli & Long, 2000: 502, figs. 1–5.

Exogone (Exogone) breviantennata.–San Martín, 1991a: 730, fig. 8; Pascual *et al*., 1996: 70.

Exogone ovalis Hartmann-Schröder, 1960: 106, figs. 131–133.

Exogone breviantennata ovalis Hartmann-Schröder, 1974c: 28.

Exogone occidentalis Westheide, 1974: 305, fig. 52; Russell, 1991: 59, fig. 4.

Exogone verugera.–Not Claparède, 1868; Haswell, 1920a: 219, pl. 17, figs. 7–10; Berkeley & Berkeley, 1948: 78, fig. 116; Day, 1967: 272, fig. 12.10 g–l; Gardiner, 1976: 132, fig. 11 a–e; Imajima, 1966: 399, fig. 3; Rioja, 1943: 221, figs. 12–16.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26456, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, medium grained sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978, B3–3. 4 specimens, AM W26457, lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 3 specimens, AM W26458, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, medium sediment, 3 m, A. Jones & C. Short, 13 Oct 1978. 1 specimen, AM W26459, Lizard Island, 14°40'S 145°28'E, A.R. Jones & C. Short, Oct 1978. 1 specimen, AM W26460, 600 m southwest of Research Point, Lizard Island, 14°40'S 145°28'E, coarse to medium grained sediment, 4.5 m, A.R. Jones, C. Short, 10 Oct 1978. 2 specimens, AM W26461, 100 m off Mangrove Beach, Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 3 m, A.R. Jones & C. Short, 13 Oct 1978. 3 specimens, AM W26462, between bommies inside lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 1 specimen, AM W26463, 100 m off Chinamans Ridge, Watsons Bay, Lizard Island, 14°40'S 145°28'E, sand, 9 m, A.R. Jones & C. Short, 13 Oct 1978. 2 specimens, AM W26464, between bommies inside lagoon entrance, Lizard Island, 14°40'S 145°28'E, medium to fine sediment, 18 m, A.R. Jones & C. Short, 9 Oct 1978. 3 specimens, AM W26465, Triangular Island, Shoalwater Bay, 22°23'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. 4 specimens, AM W26466, Triangular Island, Shoalwater Bay, 22°23'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. WESTERN AUSTRALIA. 2 specimens, AM W26804, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27000, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead branching coral covered with coralline algae, 10 m, P.A. Hutchings, 18 May 1994. 7 specimens, AM W27001, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in sponges, ascidians & algae, 23 m, P.A. Hutchings, 19 May 1994. 16 specimens, AM W27002, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 6 specimens, AM W27003, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 20 m, P.A. Hutchings, 20 May 1994. 4 specimens, AM W27004, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 3 specimens, AM W27005, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 2 specimens, AM W27006, off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead plate coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 5 specimens, AM W27007, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australia* root mat, with epifauna, 2 m, P.A. Hutchings, 26 May 1994. 3 specimens, AM W27008, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead branching *Acropora* with coralline and brown algae, 24 m, P.A. Hutchings, 25 May 1994. 9 specimens, AM W27009, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate coral covered with coralline algae, 8 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W27010, Wallabi Island group, 28°34.65'S 113°46.46'E, coral rubble & sponges, 49 m, P.A. Hutchings on FRV "Flinders", 28 Jun 1994. 2 specimens, AM W27011, East Montlivet Island, 15°06'S 125°18'E, 6 m, P.A. Hutchings, 16 July 1988. 11 specimens, and 2 specimens on SEM stub, AM W27433, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27443, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, shallow sand flats, 0.5 m, J.K. Lowry and H.E. Stoddart, 6 Jan 1984.

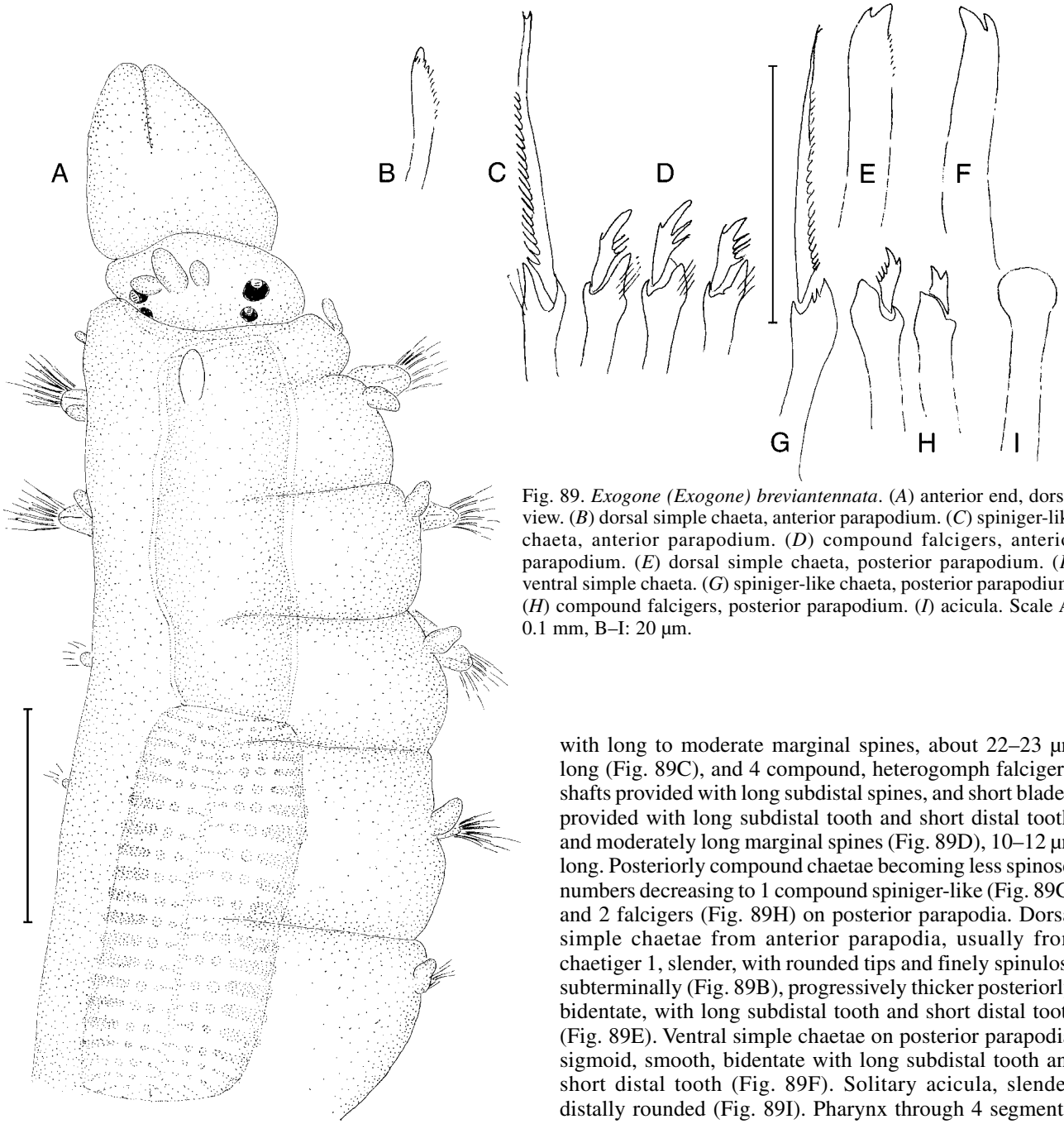


Fig. 89. *Exogone (Exogone) breviantennata*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta, anterior parapodium. (*C*) spiniger-like chaeta, anterior parapodium. (*D*) compound falcigers, anterior parapodium. (*E*) dorsal simple chaeta, posterior parapodium. (*F*) ventral simple chaeta. (*G*) spiniger-like chaeta, posterior parapodium. (*H*) compound falcigers, posterior parapodium. (*I*) acicula. Scale A: 0.1 mm, B–I: 20 μm.

Description. Body long, slender, filiform, 3.7 mm long, 0.17 mm wide, 46 chaetigers. Prostomium ovate, wider than long; 4 eyes in trapezoidal arrangement. Antennae small, papilliform to ovate, inserted close to each other, between or slightly in front of anterior eyes, median antenna slightly longer than lateral antennae (Figs. 81E, 89A). Palps longer than prostomium, completely fused along their length, with a dorsal furrow and a distal notch, forming a triangular piece (Figs. 81E, 89A). Peristomium similar in length to following segments or slightly shorter; tentacular cirri minute, papilliform. Dorsal cirri small, similar to lateral antennae, present on all segments (Figs. 81E, 89A). Anterior and midbody parapodia each with one compound chaeta, spiniger-like, bifid blade, with hemigomph articulation, shaft provided with long, subdistal spines; blade provided with long to moderate marginal spines, about 22–23 μm long (Fig. 89C), and 4 compound, heterogomph falcigers, shafts provided with long subdistal spines, and short blades, provided with long subdistal tooth and short distal tooth, and moderately long marginal spines (Fig. 89D), 10–12 μm long. Posteriorly compound chaetae becoming less spinose; numbers decreasing to 1 compound spiniger-like (Fig. 89G) and 2 falcigers (Fig. 89H) on posterior parapodia. Dorsal simple chaetae from anterior parapodia, usually from chaetiger 1, slender, with rounded tips and finely spinulose subterminally (Fig. 89B), progressively thicker posteriorly, bidentate, with long subdistal tooth and short distal tooth (Fig. 89E). Ventral simple chaetae on posterior parapodia, sigmoid, smooth, bidentate with long subdistal tooth and short distal tooth (Fig. 89F). Solitary acicula, slender, distally rounded (Fig. 89I). Pharynx through 4 segments; pharyngeal tooth on anterior rim (Fig. 89A). Proventricle short, through 2 segments, with about 17 muscle cell rows.

Remarks. Small, young specimens of *E. (E.) africana* can easily be confused with specimens of *E. (E.) breviantennata*; the latter, however, is more slender proportionally, with shorter proventricle, and the compound chaetae are more distinctly spinose. Furthermore, *E. (E.) breviantennata* is only present in tropical areas, and *E. (E.) africana* is distributed all around Australia, but appears to be less abundant in tropical waters.

Distribution. Presumably circumtropical. Australia (Queensland, Western Australia).

Habitat. Present on all kinds of substrates, from fine to coarse sand, algae, seagrasses, inside dead corals, sponges. Intertidal to about 49 m depth.

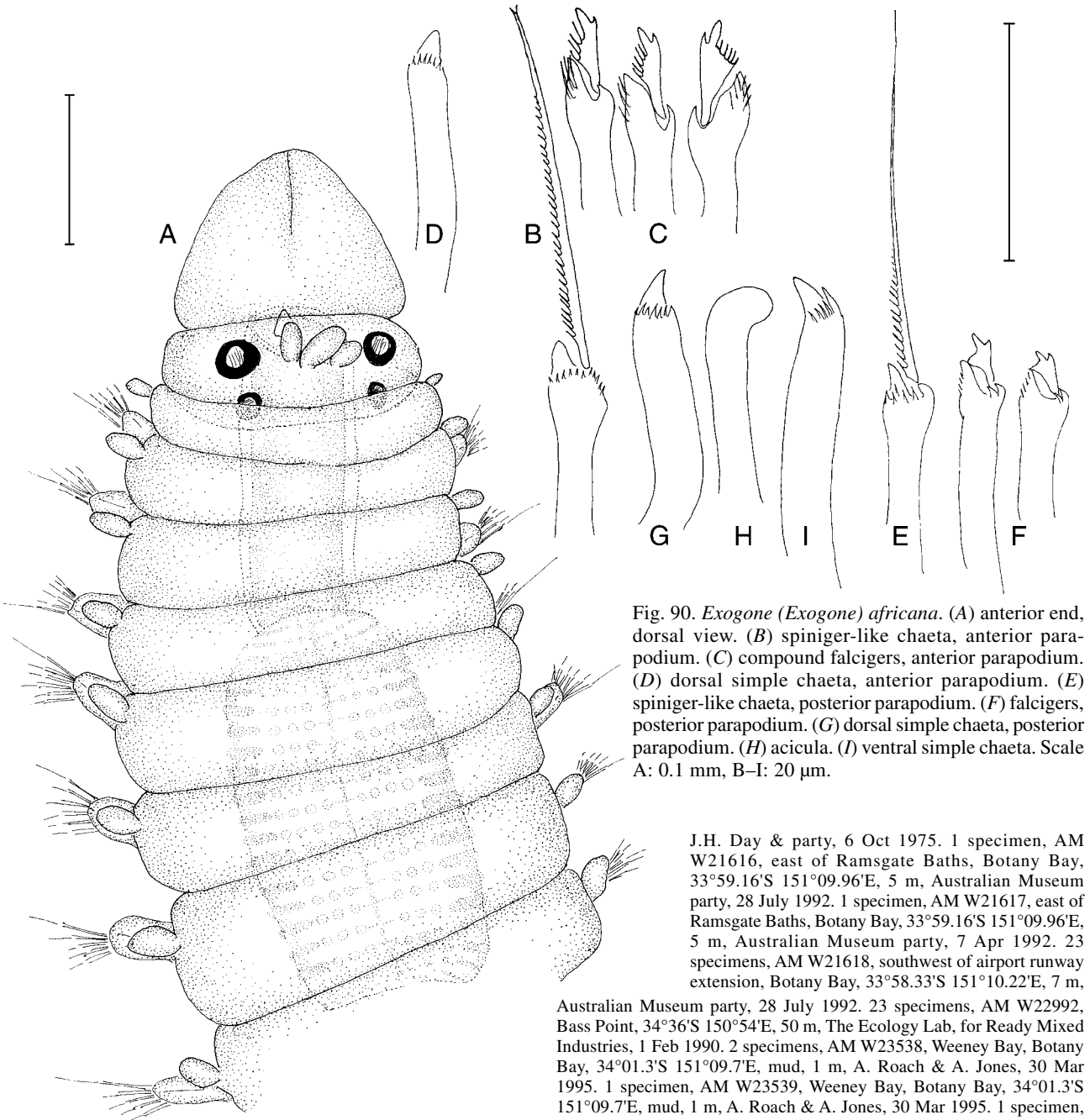


Fig. 90. *Exogone (Exogone) africana*. (*A*) anterior end, dorsal view. (*B*) spiniger-like chaeta, anterior parapodium. (*C*) compound falcigers, anterior parapodium. (*D*) dorsal simple chaeta, anterior parapodium. (*E*) spiniger-like chaeta, posterior parapodium. (*F*) falcigers, posterior parapodium. (*G*) dorsal simple chaeta, posterior parapodium. (*H*) acicula. (*I*) ventral simple chaeta. Scale A: 0.1 mm, B–I: 20 µm.

Exogone (Exogone) africana
Hartmann-Schröder, 1974

Figs. 90A–I, 91A–E

Exogone verugera africana Hartmann-Schröder, 1974a: 137, figs. 164–168; 1979: 108, figs. 164–168 (in part); 1980a: 57; 1981: 39; 1982: 74; 1983: 136; 1984: 25; 1985: 73; 1986: 46; 1989: 32; 1990: 56; 1991: 42.

Exogone verugera Not Claparède, 1868. Haswell, 1920a: 219, pl. 17.

Material examined. AUSTRALIA: QUEENSLAND. 1 specimen, AM W26529, 600 m south of Research Point, Lizard Island, 14°40'S 145°28'E, coarse to medium sediment, 4.5 m, A.R. Jones & C. Short, 10 Oct 1978. 4 specimens, AM W26662, Triangular Island, Shoalwater Bay, 22°23'S 150°31'E, J.A. Lewis & J.R. Forsyth, 1981. NEW SOUTH WALES. 1 specimen, AM W15813, transect on south bank, Lake Merimbula, 36°53.7'S 149°54.5'E, 12.5cm above LWS on short *Zostera* & *Halophila*; J.H. Day & party, 6 Oct 1975. 1 specimen, AM W21616, east of Ramsgate Baths, Botany Bay, 33°59.16'S 151°09.96'E, 5 m, Australian Museum party, 28 July 1992. 1 specimen, AM W21617, east of Ramsgate Baths, Botany Bay, 33°59.16'S 151°09.96'E, 5 m, Australian Museum party, 7 Apr 1992. 23 specimens, AM W21618, southwest of airport runway extension, Botany Bay, 33°58.33'S 151°10.22'E, 7 m, Australian Museum party, 28 July 1992. 23 specimens, AM W22992, Bass Point, 34°36'S 150°54'E, 50 m, The Ecology Lab, for Ready Mixed Industries, 1 Feb 1990. 2 specimens, AM W23538, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W23539, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W23905, Port Hacking, 34°04.23'S 151°06.38'E, sand, 18.6 m, Australian Museum Party, 27 Oct 1994. 1 specimen, AM W23907, Port Hacking, 34°04.40'S 151°06.40'E, sand, 13.2 m, Australian Museum Party, 16 Dec 1994. 1 specimen, AM W23908, Port Hacking, 34°04.04'S 151°04.04'E, sand, 15.8 m, Australian Museum Party, 1 May 1995. 1 specimen, AM W23909, Port Hacking, 34°04.00'S 151°06.35'E, sand, 15.7 m, Australian Museum Party, 10 Aug 1995. 4 specimens, AM W23910, Port Hacking, 34°04.00'S 151°06.38'E, sand, 16.9 m, Australian Museum Party, 10 Aug 1995. 7 specimens, AM W23911, Port Hacking, 34°04.13'S 151°06.37'E, sand, 14.6 m, Australian Museum Party, 12 Oct 1995. 2 specimens, AM W23921, Port Hacking, 34°04.08'S 151°06.27'E, sand, 18.7 m, Australian Museum Party, 27 Oct 1994. 1 specimen, AM W24368, east of Long Reef, 33°44.72'S 151°22.72'E, sand, 60 m, Fisheries Research Institute (NSW), 29 Apr 1991. 1 specimen, AM W24370, east of Long Reef, 33°44.72'S 151°22.72'E, sand, 60 m, Fisheries Research Institute (NSW), 29 Apr 1990. 3 specimens, AM W26422, 100 m northwest of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 2000. 2 specimens, AM W26434, Manta Reef, North West Solitary Island, 30°01.5'S 153°16.5'E, lace bryozoan, 19 m, R.T. Springthorpe, 25 Jun 1992. 2 specimens, AM W26476, just south of Botany Bay, Sydney, 34°03.20'S 151°14.60'E, 79.1 m, Fisheries Research Institute (NSW), 21 Jun 1996. 3 specimens,

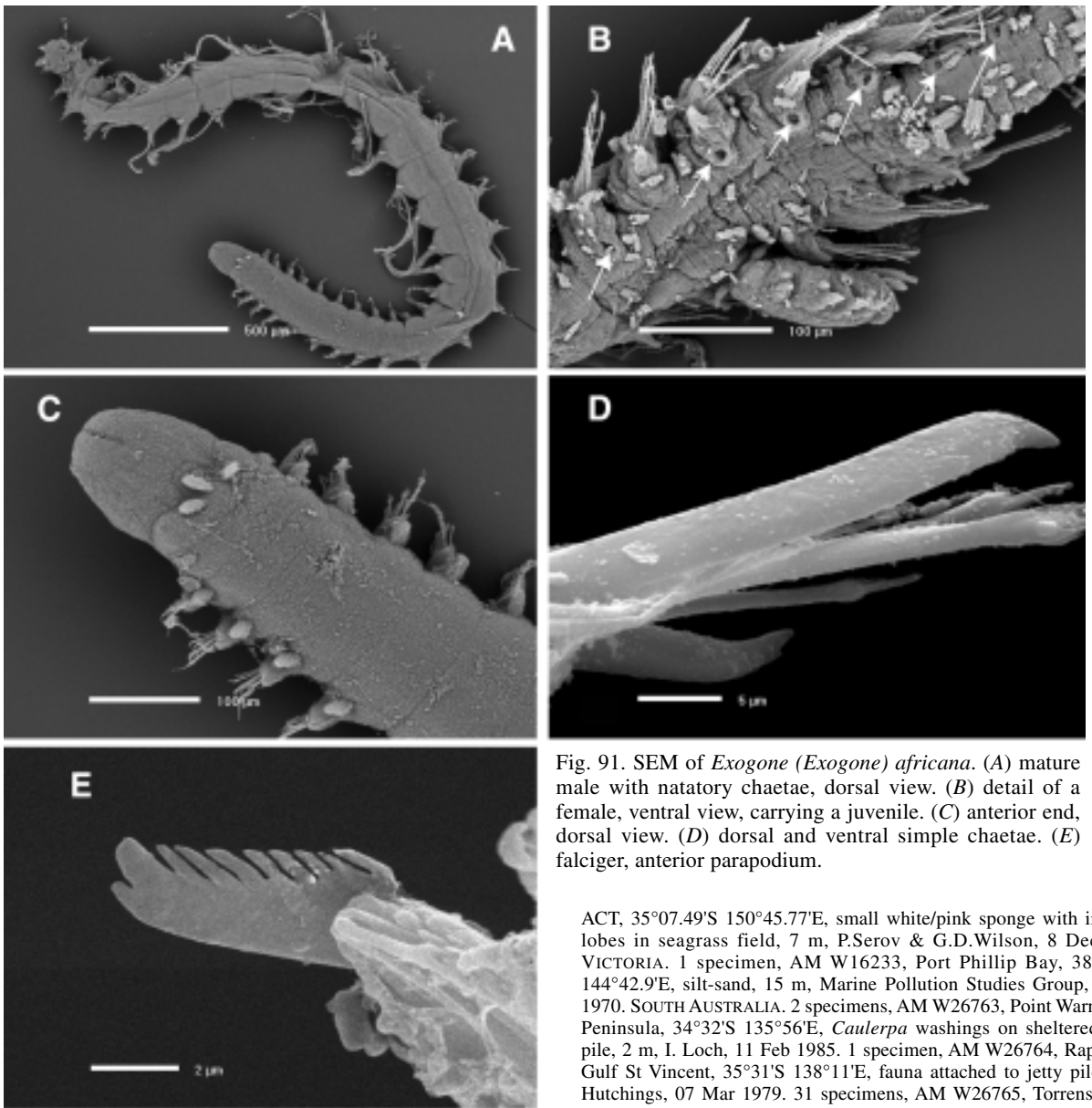


Fig. 91. SEM of *Exogone (Exogone) africana*. (*A*) mature male with natatory chaetae, dorsal view. (*B*) detail of a female, ventral view, carrying a juvenile. (*C*) anterior end, dorsal view. (*D*) dorsal and ventral simple chaetae. (*E*) falciger, anterior parapodium.

AM W26477, east of Malabar, Sydney, 33°58.68'S 151°17.85'E, 80.5 m, Fisheries Research Institute (NSW), 19 Dec 1995. 1 specimen, AM W26478, east of Malabar, Sydney, 33°58.60'S 151°18.00'E, 81.7 m, Fisheries Research Institute (NSW), 19 Dec 1995. 2 specimens, AM W26523, 100 m north west of Julian Rocks, Byron Bay, 28°36.8'S 153°37.8'E, shell and gravel, 15 m, E.L. Albertson *et al*., 3 Mar 1992. 1 specimen, AM W26526, north of Honeysuckle Point, Twofold Bay, 37°5'S 149°56'E, benthic sample, 31.1 m, S. Keable, P. Albertson, 21 Feb 1985. 1 specimen, AM W26528, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, gravel under rocks, 15 m, R. Gentle, Underwater Research Group, 7 Mar 1992. 1 specimen, AM W26616, Towlers Bay, Pittwater, 33°38'S 151°18'E, fine mud, 12 m, C. Rose, Dec 1992. 2 specimens, AM W26637, Bottle and Glass Rocks, Port Jackson, 33°50.9'S 151°16.2'E, airlift, 12 m, G. Clark, 11 Dec 1989. 1 specimen, AM W26639, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry *et al*., 22 Apr 1983. 1 specimen, AM W26651, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 1983. 3 specimens, AM W26663, off Bonna Point, Botany Bay, 34°0.5'S 151°11.0'E, NSW State Fisheries, 22 Jan 1975. 1 specimen, AM W195289, off Lilli Pilli Point, Port Hacking, 34°04.5'S 151°06.6'E, artificial reef, corer, NSW State Fisheries, 11 Oct 1974. 2 specimens, AM W26524, west side of Bowen Island, half way along, ACT, 35°06.91'S 150°45.91'E, grey sponge with orange flesh, large oscular chamber, 8 m, P.Serov & G.D. F. Wilson on "Sula", 7 Dec 1993. 1 specimen, AM W26527, southwest Bowen Island, ACT, 35°07.49'S 150°45.77'E, small white/pink sponge with irregular lobes in seagrass field, 7 m, P.Serov & G.D.Wilson, 8 Dec 1993. VICTORIA. 1 specimen, AM W16233, Port Phillip Bay, 38°04.7'S 144°42.9'E, silt-sand, 15 m, Marine Pollution Studies Group, 10 Feb 1970. SOUTH AUSTRALIA. 2 specimens, AM W26763, Point Warna, Eyre Peninsula, 34°32'S 135°56'E, *Caulerpa* washings on sheltered wharf pile, 2 m, I. Loch, 11 Feb 1985. 1 specimen, AM W26764, Rapid Bay, Gulf St Vincent, 35°31'S 138°11'E, fauna attached to jetty piles, P.A. Hutchings, 07 Mar 1979. 31 specimens, AM W26765, Torrens Island, Adelaide, 34°47'S 138°32'E, sievings from mudflats in front of mangroves, P.A. Hutchings, 07 Mar 1979. 1 specimen, AM W26766, Porter Bay, Port Lincoln, 34°44'S 135°53'E, *Zostera* sievings, P.A. Hutchings, 10 Mar 1979. 1 specimen, AM W26767, Pondalowie and Marion Bays, Yorke Peninsula, 35°14'S 136°50'E, *Caulerpa* and green algae washings, 3 m, I. Loch, 22 Feb 1985. 1 specimen, AM W26768, Cape du Couedic, Kangaroo Island, 36°03'S 136°41'E, algal holdfasts on exposed reef, Hutchings & Butler, Mar 1979. 3 specimens, AM W26769, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. 3 specimens, AM W26770, Elliston Reef, 33°39'S 134°53'E, algal washings, P.A. Hutchings, 11 Mar 1979. 1 specimen, AM W26771, Victor Harbour, 35°33'S 138°38'E, algal washings, P.A. Hutchings, 16 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W4342, Cottesloe Beach, 9.5 km west of Perth, 31°59'S 115°45'E, in calcareous algae and *Idanthyrsus* worm tubes, 0.5 m, H. Paxton, 14 Feb 1970. 1 specimen, AM W26409, Fenelon Island, Kimberleys, 14°8'S 125°41'E, limestone, P.A. Hutchings, 17 July 1988. 1 specimen, AM W26807, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sand from sandflats in vicinity of seagrass beds, 0.5 m, H.E. Stoddart, 6 Jan 1984. 1 specimen, AM W26808, Wallabi Group, 28°24.00'S 113°46.16'E, shell debris in scallop beds, 35 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 1 specimen on SEM stub, AM W26818, Ningaloo Reef, Ned's Camp, Cape Range National Park, 21°59'S 113°54.5'E, brown algae in channel, 6 m, R.T. Springthorpe, 31 Dec 1983. 1 specimen, AM W26822, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sponges with epiphytic algae from shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 1 specimen, AM W26828,

inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, coral rubble covered with algae, 1.5 m, J.K. Lowry, 2 Jan 1984. 2 specimens, AM W26976, East Montlivet Island, Bonaparte Archipelago, 15°06'S 125°18'E, 6 m, P.A. Hutchings, 15 July 1988. 2 specimens, AM W26977, Southwest corner of Lucas Island, Brunswick Bay, 15°13'S 124°31'E, 2 m, P.A. Hutchings, 24 July 1988. 1 specimen, AM W26978, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, sponges, 24 m, P.A. Hutchings, 21 May 1994. 3 specimens, AM W26979, Southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral substrate, embedded in calcareous substrate, 30 m, P.A. Hutchings, 22 May 1994. 3 specimens, AM W26980, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate, embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 6 specimens, AM W26981, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 5 specimens, AM W26982, North end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate covered in coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 3 specimens, AM W26983, Off jetty near Fisheries Hut, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate, plate-like coral spp., *Acropora*, 12 m, P.A. Hutchings, 23 May 1994. 4 specimens, AM W26984, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat, plus epifauna, 2 m, P.A. Hutchings, 26 May 1994. 1 specimen, AM W26985, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, underneath isolated boulders embedded in coral sand, 33 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W26986, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994. 1 specimen, AM W26987, Wallabi Island group, 28°23.61'S 113°43.09'E, scallop beds, sponge & shell debris, 35 m, P.A. Hutchings on FRV "Flinders", 30 May 1994. 7 specimens, AM W27431, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sand from seagrass beds on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 26 specimens, AM W27445, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 29 specimens, AM W27446, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, tufted balls of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 7 specimens, AM W27447, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, very fine sediment and sand from patches in reef, 1 m, H.E. Stoddart, 2 Jan 1984. 6 specimens, AM W27448, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, lumps of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 41 specimens, AM W27449, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa*, 1 m, J.K. Lowry, 2 Jan 1984. 1 specimen, AM W27450, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed brown algae from rocky shore, 4 m, R.T. Springthorpe, 10 Jan 1984. 9 specimens, AM W27453, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed coralline algae from rocky shore, 4 m, J.K. Lowry, 10 Jan 1984. 1 specimen, AM W27457, reef west of groyne, 2 km south of Cape Peron, 32°16'S 115°41'E, orange sponge in deep channel of limestone reef, 4.5 m, R.T. Springthorpe, 26 Dec 1983. 2 specimens, AM W27464, outer Ningaloo Reef, off Ned's Camp, Cape Range National Park, 21°59.5'S 113°54.5'E, airlift from living *Porites*, 2 m, R.T. Springthorpe & J.K. Lowry, 1 Jan 1984. 33 specimens, AM W27465, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 31 specimens, AM W27466, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, green algae, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 86 specimens, AM W27468, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 1 specimen, AM W27680, The Blow Holes, Point Quobba, 24°39'S 113°25'E, short green algae from rock platform edge, 0.5 m, J.K. Lowry *et al*., 7 Jan 1984. 1 specimen, AM W8474, Hawaii, USA, sponge, James Lloyd, 1 Sep 1972.

Description. Body long, slender, relatively broad, 4–5 mm long, 0.25–0.3 mm wide, 33–41 segments. Prostomium oval; 4 eyes in trapezoidal arrangement (Fig. 90A). Antennae short, oval, short, inserted close to each other, similar in size but median antenna slightly longer and thicker than lateral antennae (Figs. 90A, 91A,C). Palps broad, slightly longer than prostomium, fused along their length, with a dorsal furrow. Peristomium slightly shorter than following segments; tentacular cirri small, papilliform. Dorsal cirri similar to lateral antennae or slightly longer, present on all segments (Figs. 90A, 91A,C). Anterior parapodia each with 1–2 compound chaetae with spiniger-like blade, distally bifid, with short marginal spines (Fig. 90B), about 32 µm long, also 4–5 compound chaetae with falcigerous blades, bidentate, subdistal tooth long and distal tooth short, moderate marginal spines (Figs. 90C, 91E), about 8 µm long. Posteriorly diminishing number of compound chaetae to 1 spiniger-like and 2–3 falcigers; shafts and blades of posterior compound chaetae less spinulated (Fig. 90E,F); blades of spiniger-like chaetae about 30 µm and those of falcigers about 5–6 µm long. Dorsal simple chaetae from anterior segments, with rounded tips and finely spinulose subterminally (Figs. 90D, 91D), thicker posteriorly (Fig. 90G). Ventral simple chaetae on posterior parapodia, sigmoid, thick, smooth on margin, with some short spines on base of teeth, bidentate, subdistal tooth longer and thicker than distal tooth (Figs. 90I, 91D). Acicula solitary, slender, distally rounded (Fig. 90H). Pharynx long, through 4–5 segments; pharyngeal tooth located on anterior rim (Fig. 90A). Proventricle through 4 segments, with 16–21 muscle cell rows. Pygidium with 2 long anal cirri.

Remarks. This species is similar to the European species *Exogone verugera* (Claparède, 1868), but that species lacks dorsal cirri on chaetiger 2 (San Martín, 1984a, 2003).

Distribution. Angola, Namibia, Hawaii, Japan. Australia (all states).

Habitat. Present on all intertidal and shallow substrates.

Subgenus *Sylline* Claparède, 1864

Sylline Claparède, 1864: 550.

Diagnosis. Diagnosis as *Exogone*, except compound chaetae bayonet-shaped by partial fusion of shafts and blades or blades absent; simple chaetae generally sublaterally truncated and serrated.

Type species. *Sylline brevipes* Claparède, 1864.

Key to species of *Exogone (Sylline)* recorded from Australia

1 Chaetae without blades ..... *E. (S.) simplex*

—— Chaetae with blades fused to shafts 2

2 On midbody, chaetae with blades long, filiform, and others with short blades ..... *E. (S.) naidinoides*

—— Blades all long, filiform ..... *E. (S.) fustifera*

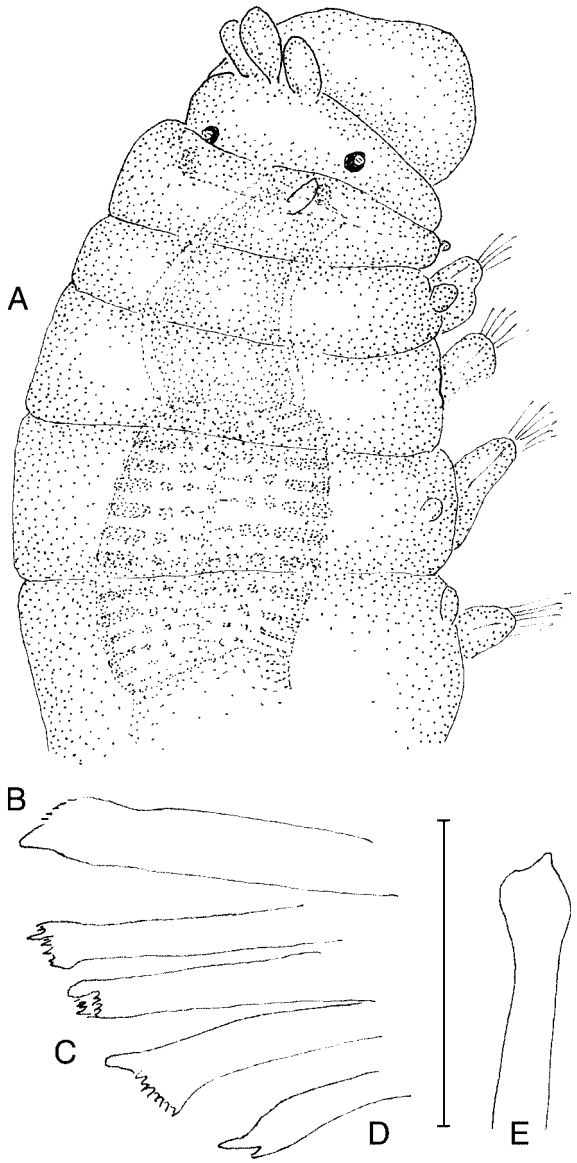


Fig. 92. *Exogone (Sylline) simplex*. (*A*) anterior end, dorsal view. (*B*) dorsal simple chaeta. (*C*) chaetae lacking blades. (*D*) ventral simple chaeta. (*E*) acicula. Scale A: 0.1 mm, B–E: 20 µm.

Exogone (Sylline) simplex Hartmann-Schröder, 1960

Fig. 92A–E

Exogone simplex Hartmann-Schröder, 1960: 107, figs. 134–136; 1979: 109, figs. 169–170; 1980a: 56; 1981: 38; 1990: 55.

Material examined. WESTERN AUSTRALIA. 1 specimen, Broome, ZHM, P-16703, intertidal sand, G. Hartmann-Schröder, 23 Sept 1975.

Description. Body small, filiform, up to 2.3 mm long, 0.4 mm wide, 21 chaetigers. Prostomium oval; 4 small eyes in trapezoidal arrangement. Antennae small, originating close to each other near middle of anterior margin of prostomium (Fig. 92A); lateral antennae papilliform, median antenna slightly longer than lateral antennae (Fig. 92A). Palps, broad, fused along their length (Fig. 92A). Peristomium similar in length to following segments, covering posterior part of prostomium; tentacular cirri minute, smaller than lateral antennae. Dorsal cirri ovoid, shorter than parapodial lobes, absent on chaetiger 2 (Fig. 92A). Parapodia each with 3 chaetae lacking blades, distally spinose (Fig. 92C). Dorsal simple chaetae from anterior parapodia, smooth, unidentate (Fig. 92B). Ventral simple chaetae sigmoid, bidentate, with distal tooth shorter than distal tooth, smooth (Fig. 92D). Acicula solitary, slender, distally rounded, provided with a short tip (Fig. 92E). Pharynx short and relatively wide, through 3 segments (Fig. 92A); pharyngeal tooth on anterior margin (Fig. 92A). Proventricle short, through 2 segments, with 12–16 muscle cell rows. Pygidium with 2 long anal cirri.

Distribution. Red Sea. Australia (Western Australia, New South Wales).

Habitat. On algae, fine sand. Intertidal and shallow water.

Exogone (Sylline) naidinoides Westheide, 1974

Figs. 93A–G, 94A–D

Exogone naidinoides Westheide, 1974: 301, figs. 50, 51 e-f; Russell, 1991: 57, fig. 3.
Exogone (Sylline) naidinoides.–San Martín, 1991a: 737, figs. 11 a–f; Ruíz-Ramírez & Salazar-Vallejo, 2001: 128, fig. 4 (66–76).

Material examined. AUSTRALIA: WESTERN AUSTRALIA. 3 specimens, AM W27429, inshore reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, very fine sediment and sand from patches in reef, 1 m, H.E. Stoddart, 2 Jan 1984. 26 specimens, AM W27434, limestone reef, off Ned's camp, Cape Range National Park, 21°59'S 113°55'E, sponge with epiphytic algae, and muddy worm tubes, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 6 specimens (2 specimens on SEM stub), AM W27436, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, brown algae with epiphytes, sediment, 2 m, H.E. Stoddart, 4 Jan 1984. 5 specimens (2 specimens on SEM stub), AM W27438, north end of beach, Bundegi Reef, Exmouth Gulf, 21°49'S 114°11'E, rocky rubble, coralline algae with green epiphyte, 2 m, H.E. Stoddart, 4 Jan 1984. 4 specimens (1 specimens on SEM stub), AM W27440, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, tufted balls of algae on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984. 5 specimens, AM W27444, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°59'E, frilly *Caulerpa*, 1 m, J.K. Lowry, 2 Jan 1984. 12 specimens, AM W27467, inshore reef off Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, green algae, 1.5 m, R.T. Springthorpe, 2 Jan 1984. 1 specimen, AM W27679, Bush Bay, 30 km south of Carnarvon, 25°10'S 113°39'E, sand from seagrass beds on shallow sandflats, 0.5 m, H.E. Stoddart, 6 Jan 1984.

Description. Body small, a female carrying juveniles ventrally is 1.5 mm long, 0.08 mm wide, 23 chaetigers. Prostomium ovate, wider than long; 4 eyes in trapezoidal arrangement. Antennae inserted in line anteriorly to anterior eyes; lateral antennae ovate, shorter than prostomium; median antenna longer than lateral antennae, longer than prostomium but shorter than prostomium and palps together (Figs. 93A, 94A). Palps broad, short, similar in length to prostomium, fused along their length, with dorsal groove and small distal notch (Figs. 93A, 94B). Peristomium shorter than following segments, usually covering dorsal posterior part of prostomium; tentacular cirri minute, papilliform. Dorsal cirri ovoid, larger than tentacular cirri, absent on chaetiger 2 (Figs. 93A, 94A). Parapodia of anterior 3 chaetigers each with 3–4 chaetae with blades fused to shafts, reduced to a thick spine, with a crown of shorter spines surrounding tip of shafts (Fig. 93B). Parapodia from chaetiger 4 each with 1 chaeta with a slender, filiform blade, partially fused with shaft, tip of shaft spinose (Fig. 93D),

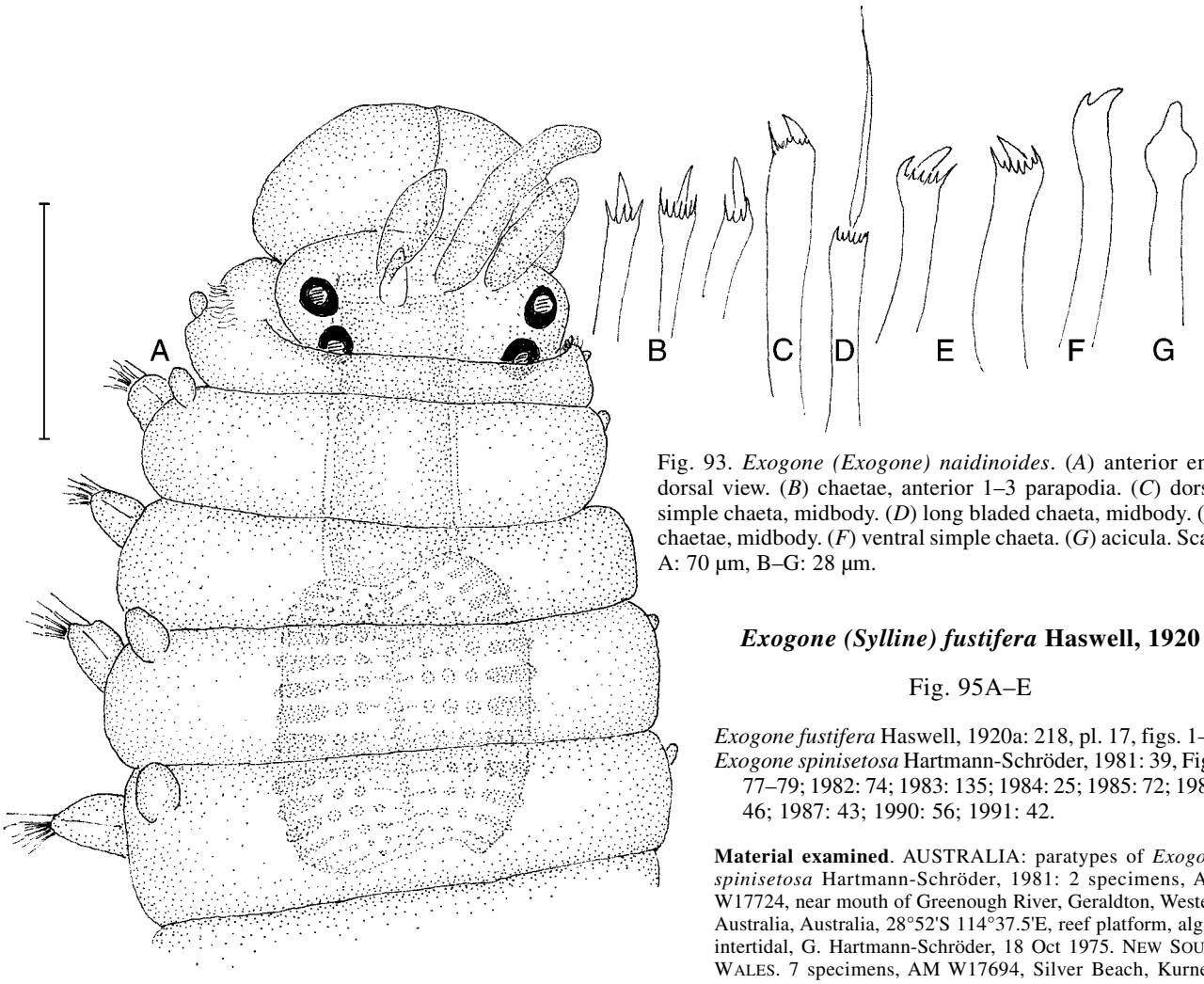


Fig. 93. *Exogone (Exogone) naidinoides*. (*A*) anterior end, dorsal view. (*B*) chaetae, anterior 1–3 parapodia. (*C*) dorsal simple chaeta, midbody. (*D*) long bladed chaeta, midbody. (*E*) chaetae, midbody. (*F*) ventral simple chaeta. (*G*) acicula. Scale A: 70 µm, B–G: 28 µm.

and 2 chaetae with shafts distally spinose; blades fused to shafts, reduced to a thick, short spine (Fig. 93E); only 1 of these chaetae on posterior parapodia. Dorsal simple chaetae from chaetiger 1, distally spinose, ending in acute tip, with a subdistal tooth, provided with a long, distinct inferior spine (Fig. 93C), becoming thicker posteriorly. Ventral simple chaetae from midbody, sigmoid, smooth, bidentate, subdistal tooth longer than distal tooth (Fig. 93F). Acicula solitary, proportionally thick, with a subdistal enlargement (Fig. 93G). Pharynx through 3–4 segments; pharyngeal tooth located on anterior rim (Fig. 93A). Proventricle short, through 2 segments, with about 17 muscle cell rows. Pygidium semi-circular, with 2 long anal cirri.

Remarks. *Exogone (Sylline) aquadulcensis* Pascual, *et al*. (1996), from Canary Islands, is similar, but that species has shorter proventricle, the median antenna is proportionally shorter, the dorsal simple chaetae lack the subdistal spine, and the ventral simple chaetae are unidentate (Pascual *et al*., 1996).

Distribution. Galápagos Islands, Caribbean Sea (Cuba, Belize). Australia (Western Australia).

Habitat. Interstitial in sand and fine sediments, on mangrove roots, dead corals, amongst algae, on shallow water.

Exogone (Sylline) fustifera Haswell, 1920

Fig. 95A–E

Exogone fustifera Haswell, 1920a: 218, pl. 17, figs. 1–6.
Exogone spinisetosa Hartmann-Schröder, 1981: 39, Figs. 77–79; 1982: 74; 1983: 135; 1984: 25; 1985: 72; 1986: 46; 1987: 43; 1990: 56; 1991: 42.

Material examined. AUSTRALIA: paratypes of *Exogone spinisetosa* Hartmann-Schröder, 1981: 2 specimens, AM W17724, near mouth of Greenough River, Geraldton, Western Australia, Australia, 28°52'S 114°37.5'E, reef platform, algae, intertidal, G. Hartmann-Schröder, 18 Oct 1975. NEW SOUTH WALES. 7 specimens, AM W17694, Silver Beach, Kurnell, 34°00.5'S 151°12'E, intertidal, 0 m, Rosalie Watkins, MSB, 18 Oct 1979. 5 specimens, AM W18851, off Bonna Point, Botany Bay, 34°00.5'S 151°11.0'E, NSW State Fisheries, 22 Jan 1975. 1 specimen, AM W20470, Hare Bay, Jervis Bay, 34°59.7'S 150°45.0'E, *Posidonia*, 3 m, P.A. Hutchings & party, Nov 1989. 1 specimen, AM W21619, 800 m off Port Botany, Botany Bay, 33°58.75'S 151°11.03'E, 7 m, Australian Museum party, 07 Apr 1992. 1 specimen, AM W21620, south of airport runway extension, Botany Bay, 33°58.13'S 151°11.16'E, 5 m, Australian Museum party, 7 Apr 1992. 1 specimen, AM W22984, east of Providential Head, Wattamolla, 34°08'S 151°08.5'E, 50 m, The Ecology Lab, 1 Feb 1990. 1 specimen, AM W23542, Weeney Bay, Botany Bay, 34°01.3'S 151°09.7'E, mud, 1 m, A. Roach & A. Jones, 30 Mar 1995. 1 specimen, AM W23912, Botany Bay, 33°58.78'S 151°11.84'E, sand, 18.4 m, AM party, 31 May 1994. 1 specimen, AM W26390, South Ledge, Cook Island, 28°11.65'S 153°34.63'E, yellow green sponge and crinoid, 12 m, A.R. Parker, 9 Jun 1993. 1 specimen, AM W26391, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, brown algae, 17 m, S.J. Keable, 7 Mar 1992. 1 specimen, AM W26392, 400 yards south of southern entrance to Jervis Bay, 35°7'S 150°46'E, 6.1 m, P.A. Hutchings, 20 July 1972. 1 specimen, AM W26394, Summer Cloud Bay, Wreck Bay, 35°10.5'S 150°41'E, large boulders, little algal cover, underside of rocks, 3 m, P.A. Hutchings, 26 Nov 1971. 1 specimen, AM W26412, North Ledge, Cook Island, 28°11.44'S 153°34.67'E, sponge, 10 m, A.R. Parker, 08 Jun 1993. 1 specimen, AM W26414, North Creek Canal, Richmond River, 28°52.1'S 153°32.8'E, mud, 3 m, P.B. Berents *et al*., 2 Mar 1992. 6 specimens, AM W26415, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, gravel under rocks, 15 m, R. Gentle, 7 Mar 1992. 1 specimen, AM W26428, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, dead bryozoan encrusted with algae, bryozoa and hydroids, 17 m, K. Attwood, 1 May 1997. 2 specimens, AM W26429, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 4 specimens, AM W26433, 100 m northwest of Split Solitary Island, 30°14.0'S 153°10.8'E, encrusting algae and ascidians, 15 m, E.L. Albertson, 7 May 1992. 1 specimen, AM W26467,

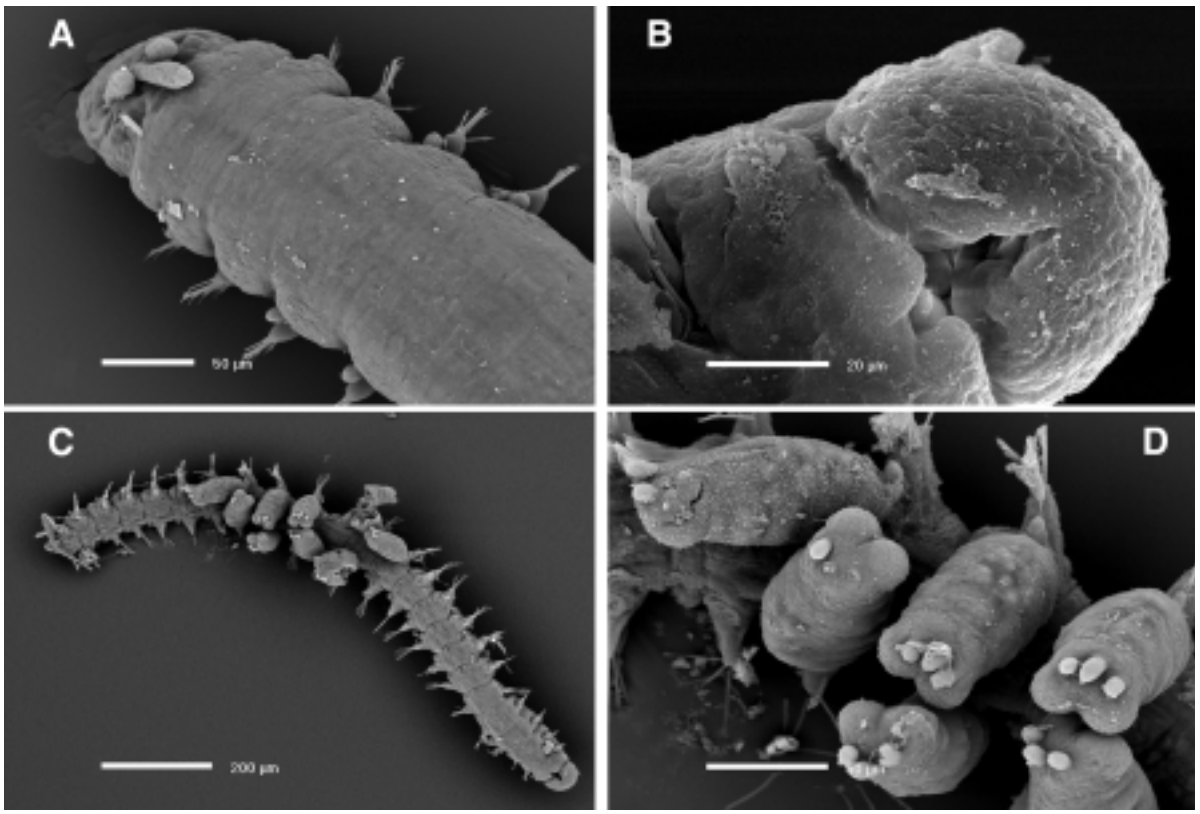


Fig. 94. SEM of *Exogone (Exogone) naidinoides*. (*A*) anterior end, dorsal view. (*B*) anterior end, ventral view. (*C*) mature female carrying juveniles, ventral view. (*D*) detail of the juveniles.

500 m west of northern-most part of Port Botany, Botany Bay, 33°58.28'S 151°11.98'E, 7 m, AM party, 27 July 1992. 2 specimens, AM W26534, northern side of Bannister Head, 35°19.15'S 150°29.12'E, grey sponge from top of boulder, 18 m, K. Attwood, 6 May 1997. 3 specimens, AM W26535, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, mixed red algae, 15 m, S.J. Keable, 7 Mar 1992. 6 specimens, AM W26541, 150 m east of Burrill Rocks, 35°23.41'S 150°28.18'E, surface of sponges, 19 m, K. Attwood *et al*., 1 May 1997. 3 specimens, AM W26542, southwest side of South Solitary Island, 30°12.0'S 153°16.0'E, coral rubble, 18 m, R.T. Springthorpe, 24 Jun 1992. 1 specimen, AM W26548, Burrill Rocks, Ulladulla, 35°23.39'S 150°28.24'E, gorgonacean, 24 m, R.T. Springthorpe, 7 Mar 1997. 125 specimens, AM W26634, Barrenjoey Head, Broken Bay, 33°35'S 151°20'E, algae on rocky substrate, 5 m, J.K. Lowry *et al*., 22 Apr 1983. 9 specimens, AM W26635, north east corner of Clark Island, 33°51.85'S 151°14.47'E, *Ecklonia* holdfast, 5 m, P.A. Hutchings, 17 Apr 1996. 22 specimens, AM W26640, Crowdy Head, 31°50'S 152°45'E, brown algae in rock pools, J.K. Lowry, 13 Jan 1982. 27 specimens, AM W26648, Grotto Point, Port Jackson, 33°49'S 151°15'E, algae, 4 m, P. Colman, 18 July 2000. 1 specimen, AM W26657, north east corner of Clark Island, 33°51.85'S 151°14.47'E, *Sargassum* sp., 2 m, I. Takeuchi & D. Bray, 17 Apr 1996. 1 specimen, AM W26393, southwest Bowen Island, ACT, 35°07.49'S 150°45.77'E, rock on sandy bottom with bryozoans and encrusting polychaetes, 8 m, P.Serov & G.D.F. Wilson, 8 Dec 1993. 1 specimen, AM W26395, Murrays Beach, Jervis Bay, ACT, 35°07.5'S 150°45.5'E, 9 m, P.A. Hutchings, 23 Jan 1973. 1 specimen, AM W26396, west side of Bowen Island, half way along, ACT, 35°06.91'S 150°45.91'E, light-grey sponge, 6 m, P.Serov & G.D.F. Wilson, 7 Dec 1993. 1 specimen, AM W26397, west side of Bowen Island, half way along, ACT, 35°06.91'S 150°45.91'E, grey sponge with orange flesh, large oscular chamber, 8 m, P.Serov & G.D.F. Wilson on "Sula", 7 Dec 1993. VICTORIA. 1 specimen, MV F87424, Geelong Arm, Port Phillip Bay, 38°09.3'S 144°42.7'E, sand and seagrass, 3 m depth, 11 Jun 1971. 8 specimens, MV F62033, Eastern Bass Strait, 11.7 km W of Pt. Ricardo, coarse sand, 5 m depth, 4 Jun 1991. TASMANIA. 1 specimen, AM W18197, Fancy Point, Bruny Island, 43°16'S 147°19'E, in algae, 3–6 m, G. Edgar, 10 Nov 1980. 2 specimens, AM W18196, Fancy Point, Bruny Island, 43°16'S 147°19'E, in algae, 3–6 m, G. Edgar, 05 Mar 1979. SOUTH AUSTRALIA. 1 specimen, AM W26751, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. 1 specimen, AM W26752, Victor Harbour, 35°33'S 138°38'E, algae, P.A. Hutchings, 16 Mar 1979. 1 specimen, AM W26753, Victor Harbour, 35°33'S 138°38'E, Zostera washings, P.A. Hutchings, 16 Mar 1979. 3 specimens, AM W26756, Elliston Reef, 33°39'S 134°53'E, algae from reef flat at low tide, P.A. Hutchings, 11 Mar 1979. WESTERN AUSTRALIA. 1 specimen, AM W26413, off end of South Mole, Arthur Head, Fremantle, 32°03'S 115°44'E, orange tunicates, 6 m, J.K. Lowry, 25 Dec 1983. 4 specimens, AM W26801, Red Bluff, Kalbarri, 27°42'S 114°09'E, rocky shore, dictyotalean from cave, 4 m, J.K. Lowry, 10 Jan 1984. 1 specimen, AM W26824, Red Bluff, Kalbarri, 27°42'S 114°09'E, mixed brown algae from rocky shore, 4 m, R.T. Springthorpe, 10 Jan 1984. 1 specimen, AM W26827, Red Bluff, Kalbarri, 27°42'S 114°09'E, round-leaved seagrass in shallow sand on rock, 4 m, R.T. Springthorpe, 10 Jan 1984. 1 specimen, AM W26836, west of Penguin Island, Warnbro Sound, 32°20'S 115°43'E, dead reef sponges, 5 m, P.A. Hutchings, 21 Mar 1993. 2 specimens, AM W27025, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead branching coral substrate covered in coralline algae, 10 m, P.A. Hutchings, 18 May 1994. 1 specimen, AM W27026, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* with sponges, ascidians, coralline algae, 32 m, P.A. Hutchings, 19 May 1994. 4 specimens, AM W27027, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* with sponges, ascidians, coralline algae, 23 m, P.A. Hutchings, 19 May 1994. 49 specimens, AM W27028, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 8 m, P.A. Hutchings, 19 May 1994. 10 specimens, AM W27029, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead *Acropora* plates covered in coralline algae, 20 m, P.A. Hutchings, 20 May 1994. 15 specimens, AM W27030, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral plates covered in coralline algae, 20 m, P.A. Hutchings, 22 May 1994. 2 specimens, AM W27031, north end of Long Island, Goss Passage, 28°28.3'S 113°46.3'E, dead coral covered with coralline algae & boring bivalves, 8 m, C. Bryce, 22 May 1994. 6 specimens, AM W27032, north end of Long Island, 28°27.9'S 113°46.3'E, dead coral substrate with coralline & brown algae, 6 m, C. Bryce, 22 May 1994. 1 specimen, AM W27033, southeast end of Long Island, 28°28.8'S 113°46.5'E, dead coral substrate with coralline algae, 8 m, P.A. Hutchings, 22 May 1994. 1 specimen, AM W27034, Goss Passage, Beacon Island, 28°25.5'S 113°47.0'E, dead coral substrate embedded in fine sediment, 33 m, P.A. Hutchings, 23 May 1994. 2 specimens, AM W27035, off jetty near Fisheries Hut, Beacon Island,

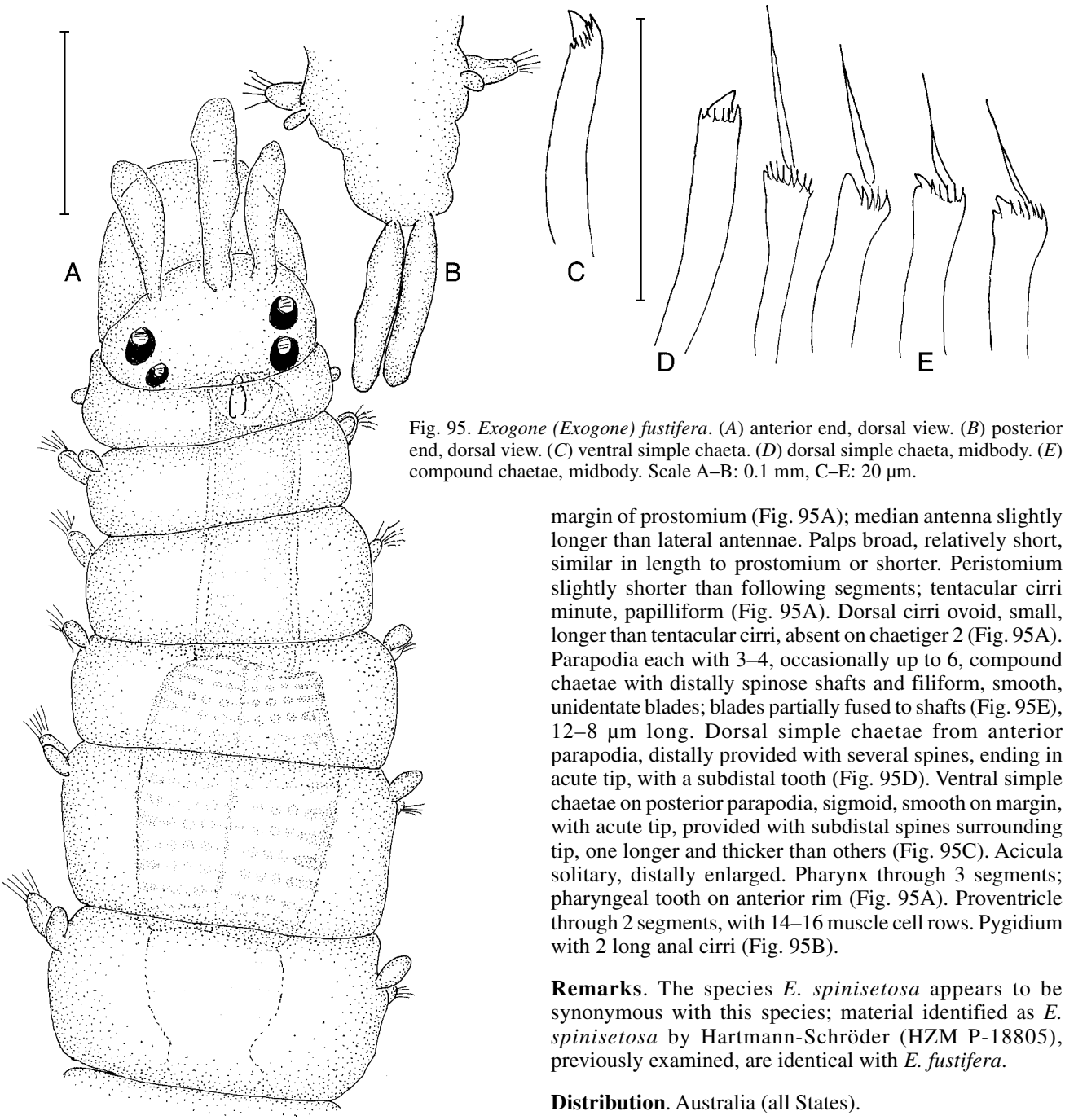


Fig. 95. *Exogone (Exogone) fustifera*. (*A*) anterior end, dorsal view. (*B*) posterior end, dorsal view. (*C*) ventral simple chaeta. (*D*) dorsal simple chaeta, midbody. (*E*) compound chaetae, midbody. Scale A–B: 0.1 mm, C–E: 20 μm.

28°25.5'S 113°47.0'E, dead plate coral substrate—*Acropora, Montipora* spp., 12 m, P.A. Hutchings, 23 May 1994. 4 specimens, AM W27036, east side of West Wallabi Island, 28°27.9'S 113°40.9'E, in *Posidonia australis* root mat with epifauna, 2 m, P.A. Hutchings, 26 May 1994. 1 specimen, AM W27037, northeast entrance to Goss Passage, Beacon Island, 28°27.8'S 113°46.7'E, dead branching *Acropora* substrate covered with algae, 24 m, P.A. Hutchings, 25 May 1994. 9 specimens, AM W27038, northeast entrance to Goss Passage, Beacon Island, 28°27.9'S 113°46.7'E, dead plate-like *Acropora* covered with coralline algae, 8 m, P.A. Hutchings, 25 May 1994. 8 specimens, AM W27039, off south end of Long Island, Beacon Island, 28°28.8'S 113°46.3'E, dead coral substrate covered in coralline algae, 5 m, P.A. Hutchings, 25 May 1994.

Description. Body long, slender, filiform, 7 mm long, 0.11–0.12 mm wide, 43 chaetigers. Prostomium ovate to semi-circular; 4 eyes in trapezoidal arrangement. Antennae longer than palps and longer than prostomium but shorter than prostomium and palps together, cylindrical to claviform, slightly enlarged distally, inserted separately near anterior margin of prostomium (Fig. 95A); median antenna slightly longer than lateral antennae. Palps broad, relatively short, similar in length to prostomium or shorter. Peristomium slightly shorter than following segments; tentacular cirri minute, papilliform (Fig. 95A). Dorsal cirri ovoid, small, longer than tentacular cirri, absent on chaetiger 2 (Fig. 95A). Parapodia each with 3–4, occasionally up to 6, compound chaetae with distally spinose shafts and filiform, smooth, unidentate blades; blades partially fused to shafts (Fig. 95E), 12–8 μm long. Dorsal simple chaetae from anterior parapodia, distally provided with several spines, ending in acute tip, with a subdistal tooth (Fig. 95D). Ventral simple chaetae on posterior parapodia, sigmoid, smooth on margin, with acute tip, provided with subdistal spines surrounding tip, one longer and thicker than others (Fig. 95C). Acicula solitary, distally enlarged. Pharynx through 3 segments; pharyngeal tooth on anterior rim (Fig. 95A). Proventricle through 2 segments, with 14–16 muscle cell rows. Pygidium with 2 long anal cirri (Fig. 95B).

Remarks. The species *E. spinisetosa* appears to be synonymous with this species; material identified as *E. spinisetosa* by Hartmann-Schröder (HZM P-18805), previously examined, are identical with *E. fustifera*.

Distribution. Australia (all States).

Habitat. Present on all substrates on intertidal and shallow waters.

ACKNOWLEDGMENTS. This paper was possible by a grant of Visitor Fellowship of The Australian Museum; I want to express my gratitude to the Museum authorities for the grant, and all colleagues that gave their help and assistance during, before and after my stay in Sydney. Also, funds of my own Institution (Universidad Autónoma de Madrid, Spain) helped in the travel and stay. A grant from the "Dirección General de Investigación", Spanish Ministry of Science and Technology, "Acción Especial PGC2000-2919-E" provided important monetary support. Drs Pat Hutchings and Penny Berents encouraged me to apply for the Fellowship, and facilitated my study. Kate Attwood and Anna Murray did the rough sorting of the material, previously only identified to family level, and extracted the specimens of the

subfamily Exogoninae, and, together with Keyne Monro, managed the collection. Previous work extracting syllids was mostly done by volunteers. Richard Johnson helped me with the literature. Dr Pat Hutchings and Anna Murray helped me with the editing of the manuscript and offered valuable suggestions. All of them also gave me their generosity and friendship. The comments and suggestions of two anonymous referees, as well as the efforts of the editor, greatly improved the quality of the paper. Also, thanks to the Museum of Victoria, especially Ms Melanie McKenzie and Mr Chris Rowe, for the loan of some specimens and their assistance. Ms Miranda Lowe, British Museum Natural History, London (UK), Dr Angelika Brandt and Gisella Wegener, Hamburgische Zoologische Museum, Hamburg (Germany), Professor Nathan W. Riser, Nahant University (USA), and Professor Wilfried Westheide, University of Osnabrück (Germany) kindly loaned specimens for comparison. I want to express also my gratitude to Miss Ingrid Skirka and Mr Ettienne Fourie, who contributed greatly to a pleasant stay in Sydney. Dr Esperanza Salvador and Miss Laura Tormo (SIDI of the UAM) assisted me with the SEM study and photographs, and Mr Francisco Simón Madero helped me in the preparation of the plates.

References

Alós, C., G. San Martín & R. Sardá, 1983. Tres nuevos Síllidos para el litoral ibérico: *Exogone rostrata* (Naville, 1933), *Parapionosyllis brevicirra* (Day, 1954) y *Pseudobrania balani* (Hartmann-Schröder, 1960). *Investigación Pesquera* 47(2): 285–294.

Augener, H., 1913. Polychaeta I, Errantia. Die Fauna Südwest-Australiens. *Ergebnisse des Hamburger Südwest-australischen Forschungreise* 1905 4(5): 65–304.

Augener, H., 1927. Polychaeten von Südost- und Süd-Australien. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16. XXXVIII, 34. *Videnskabelige Meddelelser fra Dansk naturhistorisk Foreining i København* 83: 71–275.

Banse, K., 1972. On some species of Phyllodocidae, Syllidae, Nephtyidae, Goniadidae, Apistobranchidae and Spionidae (Polychaeta) from the northeast Pacific Ocean. *Pacific Science* 26: 191–222.

Ben-Eliahu, N.M., 1977. Polychaete Cryptofauna from Rims of Similar Intertidal Vermetid Reefs on the Mediterranean Coast of Israel and in the Gulf of Elat: Exogoninae and Autolytinae. *Israel Journal of Zoology* 26: 1–58.

Benham, W.B., 1921. Polychaeta. Australasian Antarctic Expedition 1911–14 under the leadership of Sir Douglas Mawson, D.Sc. B. E., *Scientific Reports, Ser. C* 6: 1–128.

Berkeley, E., & C. Berkeley, 1938. Notes on Polychaeta from the coast of western Canada. 2. Syllidae. *Annals and Magazine of Natural History, London* ser. 11, 1: 33–49.

Berkeley, E., & C. Berkeley, 1948. *Annelida. 9b (1). Polychaeta Errantia. Canadian Pacific Fauna, Toronto, Canada* 100 pp.

Blankensteyn, A. & P.C. Lana, 1986. Anelideos Poliquetas das Expedições Antarcticas Brasileiras de 1982/1983, 1983/1984 e 1984/1985. *Neritica* 1: 49–77.

Brito, M.C., J. Núñez & G. San Martín, 2000. *Parapionosyllis macaronesiaensis*, a new species of Exogoninae (Polychaeta: Syllidae) from the Macaronesian Region. *Proceedings of the Biological Society of Washington* 113(4): 1150–2000.

Brown, R.W., 1956. *Composition of Scientific Words*, revised edition. Washington: Smithsonian Institution.

Campoy, A., 1982. *Fauna de España. Fauna de Anélidos Poliquetos de la Península Ibérica*. EUNSA (Ediciones de la Universidad de Navarra, S. A.), serie biológica. Pamplona 781 pp.

Claparède, E., 1863. *Beobachtungen über Anatomie und Entwicklungsgeschichte wirbelloser Thiere an der Küste von Normandie angestellt*, 120 pp. Leipzig: Wilhelm Engelmann.

Claparède, E., 1864. Glanures Zootomiques parmi les Annélides de Port-Vendres (Pyrenés Orientales). *Mémoires de la Société de Physique et Sciences Naturelles de Genève* 17(2): 463–600.

Claparède, E., 1868. Les Annélides Chétopodes du Golfe de Naples. *Mémoires de la Société de Physique et Sciences Naturelles de Genève* 19(2): 1–500.

Czerniavsky, V., 1881. Materalia ad zoographiam Ponticam comparatam. *Bulletin de la Societé imperial de Ciences Naturelles, Moscou*, 55: 213–363.

Day, J.H., 1953. The polychaete fauna of South Africa. Part 2: Errant species from Cape shores and estuaries. *Annals of Natal Museum* 12: 397–441.

Day, J.H., 1967. *A Monograph on the Polychaeta of Southern Africa*, vol. 29, 878 pp. London: Trustees of the British Museum (Natural History).

Day, J.H., & P. Hutchings, 1979. An annotated check-list of Australian and New Zealand Polychaeta, Archiannelida and Myzostomida. *Records of the Australian Museum* 32(3): 80–161.

Díaz-Castañeda, V., & G. San Martín, 2001. Syllidae (Polychaeta) from San Quintín Bay, Baja California, México, with descriptions of a new genus. *Proceedings of the Biological Society of Washington* 114(3): 708–719.

Dujardin, F., 1839. Sur une Annèlide (*Exogone pusilla*) qui porte à la fois des oeufs et des spermatozoïdes. *Annales des Sciences Naturelles* 15: 298–301.

Ehlers, E., 1897. *Polychaeten*. Hamburger Magalhaenischen Sammelreise, Hamburg, Friedrischen & Co. pp. 1–148.

Ehlers, E., 1908. Die bodensässigen Anneliden aus den Sammlungen der deutschen Tiefsee-Expedition. *Wiss. Ergebn. deutsch. Tiefsee-Expedition VALDIVIA* 1898–1899 16(1): 1–168.

Ehlers, E., 1913. Die Polychaeten-Sammlungen der deutschen Südpolar-Expedition, 1901–1903. *Deutsche Südpolar Expedition* 13: 397–598.

Endacott, S.J., 1973. *Australian Aboriginal words and Place Names and Their Meanings*. 10th edition, 64 pp. Melbourne: Acacia Press.

Fan, M., D. Zhihu, Z. Jing & B.L. Wu, 1993. A preliminary study on small syllides from the Huanghai Sea (Yellow Sea). *Journal of Oceanography of Huanghai & Bohai Seas* 11(1): 19–36. (In Chinese).

Fauvel, P., 1917. Annélides polychètes de l'Australie meridionale. *Archives de Zoologie Expérimentale et Génerale* 56: 159–278.

Fauvel, P., 1923. *Faune de France 5. Polychètes Errantes*, 486 pp. Paris: Le Chevalier Eds.

Franke, H.D., 1999. Reproduction of the Syllidae. In: *Reproductive Strategies and Developmental patterns in Annelids*, ed. A. Dorresteijn & W. Westheide. *Hydrobiologia* 402: 39–55.

Gardiner, S.L., 1976. Errant polychaete annelids from North Carolina. *Journal of the Elisha Mitchell Scientific Society* 91(3): 77–220.

Garwood, P.R., 1991. Reproduction and the classification of the family Syllidae (Polychaeta). *Ophelia* suppl. 5: 81–87.

Gidholm, L., 1962. Sur quelques polychètes syllidiens des sables de la région de Roscoff avec la description de deux nouvelles espèces. *Cahiers de Biologie Marine* 3: 249–260.

Glasby, C., 2000. Family Syllidae. Pp. 161–167, in *Polychaetes & Allies: The Southern Synthesis. Fauna of Australia. Vol. 4a Polychaeta, Myzostomida, Pogonophora, Echiura, Sipuncula*, ed. P.L. Beesley, G.J.B. Ross & C.J. Glasby, 465 pp. Melbourne: CSIRO Publishing.

Glasby, C.J., & C. Watson, 2001. A new genus and species of Syllidae (Annelida: Polychaeta) commensal with octocorals. *The Beagle, Records of the Museum and Art Galleries of the Northern Territory* 17: 43–51.

Grube, A.E., 1850. Die Familien der Anneliden. *Archiv für Naturgeschichte, Berlin* 16: 249–364.

Hartman, O., 1959. Catalogue of the polychaetous annelids of the world. Parts I, II (1959), and Supplement (1965). *Allan Hancock Foundation Occasional Papers* 23: 1–828.

Hartman, O., 1964. Polychaeta Errantia of Antarctica. *Antarctic Research Series* 3: 1–131.

Hartman, O., 1968. *Atlas of Errantiate Polychaetous Annelids from Southern California*. Los Angeles: Allan Hancock Foundation, University of Southern California, 828 pp.

Hartmann-Schröder, G., 1958. Einige Polychaeten aus dem Küstengrundwasser der Bimini-Inseln (Bahamas). *Kieler Meeresforschungen* 14(2): 233–240.

Hartmann-Schröder, G., 1959. Zur Okologie der Polychaeten des Mangrove-Estero-Gebiets von El Salvador. *Beitrage zur Neotropical Fauna* 1: 70–183.

Hartmann-Schröder, G., 1960. Polychaeten aus dem Roten Meer. *Kieler Meeresforschungen* 16: 69–125.

Hartmann-Schröder, G., 1965a. Zur Kenntnis der eulitoralen Polychaetenfauna von Hawaii, Palmyra und Samoa. *Abhandlungen und Verhandlungen des Naturwissensschaflichen Vereins in Hamburg* 9: 81–161.

Hartmann-Schröder, G., 1965b. Zur Kenntnis des Sublitorals der chilenischen Küste, unter besonderer Berücksichtigung der Polychaeten und Ostracoden. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 62: 59–305.

Hartmann-Schröder, G., 1971. *Annelida, Borstenwürmer, Polychaeta. Die Tierwelt Deutschlands*, vol. 58. Jena: Gustav Fischer Veerlag, 594 pp.

Hartmann-Schröder, G., 1973. Die Polychaeten der Biospeologischen Expedition nach Kuba 1969. *Résultés de l'Expedition Biospéologique Cubano-Roumaine dans Cuba* 1: 89–98.

Hartmann-Schröder, G., 1974a. Zur Kenntnis des Eulitorals der afrikanischen Westküste zwischen Angola und Kap der Guten Hoffnung und der afrikanischen Ostküste von Südafrika und Mocambique unter besonder Berücksichtigung der Polychaeten und Ostracoden. Die Polychaeten des Untersuchungebietes. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 69: 95–228.

Hartmann-Schröder, G., 1974b. Zur Polychaetenfauna von Natal (Südafrika). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 71: 35–73.

Hartmann-Schröder, G., 1974c. Weitere Polychaeten von Ostafrika (Mocambique und Tansania). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 71: 23–33.

Hartmann-Schröder, G., 1979. Teil 2. Die Polychaeten der tropischen Nordwestküste Australiens (Zwischen Port Samson in Norden und Port Hedland in Süden). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 76: 75–218.

Hartmann-Schröder, G., 1980a. Teil 4. Die Polychaeten der tropischen Nordwestküste Australiens (Zwischen Port Samson in Norden und Exmouth im Süden). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 77: 41–110.

Hartmann-Schröder, G., 1980b. Amsterdam Expeditions to the West Indian Islands, Die Polychaeten der Amsterdam-Expeditionen nach Westindien. *Bijdragen tot der Dierkunde* 50(2): 387–401.

Hartmann-Schröder, G., 1981. Teil 6. Die Polychaeten der tropisch-subtropischen Westküste Australiens (zwischen Exmouth im Norden und Cervantes im Süden). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 78: 19- 96.

Hartmann-Schröder, G., 1982. Teil 8. Die Polychaeten der subtropischen-antiborealen Westküste Australiens (zwischen Cervantes im Norden und Cape Naturaliste im Süden). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 79: 51–118.

Hartmann-Schröder, G., 1983. Teil 9. Die Polychaeten der antiborealen Südwestküste Australiens (zwischen Dunsborough im Norden und Denmark im Süden). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 80: 123–167.

Hartmann-Schröder, G., 1984. Teil 10. Die Polychaeten der antiborealen Südküste Australiens (zwischen Albany im Westen und Ceduna im Osten). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 81: 7–62.

Hartmann-Schröder, G., 1985. Teil 11. Die Polychaeten der antiborealen Südküste Australiens (zwischen Port Lincoln im Westen und Port Augusta im Osten). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 82: 61–99.

Hartmann-Schröder, G., 1986. Teil 12. Die Polychaeten der antiborealen Südküste Australiens (zwischen Wallaroo im Westen und Port MacDonnell im Osten). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 83: 31–70.

Hartmann-Schröder, G., 1987. Teil 13. Die Polychaeten der antiborealen Küste von Victoria (Australien) (zwischen Warrnambool im Westen und Port Welshpool im Osten). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 84: 27–66.

Hartmann-Schröder, G., 1989. Teil 14. Die Polychaeten der antiborealen und subtropisch-tropischen Küste Südost-Australien zwischen Lakes Entrance (Victoria) im Süden und Maclean (New South Wales) im Norden. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 86: 11–63.

Hartmann-Schröder, G., 1990. Teil 15. Die Polychaeten der subtropisch-tropischen und tropischen Ostküste Australiens zwischen Lake Macquarie (New South Wales) im Süden und Gladstone (Queensland) im Norden. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 87: 41–87.

Hartmann-Schröder, G., 1991. Teil 16. Die Polychaeten der subtropisch-tropischen bis tropischen Ostküste Australiens zwischen Maclean (New South Wales) und Gladstone (Queensland) sowie von Heron Island (Großes Barriere-Riff). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 88: 17–71.

Hartmann-Schröder, G., 1992a. Zur Polychaetenfauna der Polynesischen Inseln Huahiné (Gesellschaftsinseln) und Rangiroa (Tuamotu-Inseln). *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 89: 49–84.

Hartmann-Schröder, G., 1992b. Die Polychaeten der Amsterdam-Expedition nach Inseln Ascension (Zentral-Atlantik). *Bijdragen tot de Dierkunde* 61(4): 219–235.

Hartmann-Schröder, G., 1992c. Die Polychaeten der "Polarstern"- Reise ANT V/1 in die Antarktis 1986. Teil 1: Euphrosinidae bis Iphitimidae. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 89: 85–124.

Hartmann-Schröder, G., 1996. *Annelida, Borstenwürmer, Polychaeta. Die Tierwelt Deutschlands*, vol. 58. Jena: Gustav Fischer Veerlag, 648 pp.

Hartmann-Schröder, G., & P. Rosenfeldt, 1988. Die Polychaeten der "Polarstern"-Reise ANT III/2 in die Antarktis 1984. Teil 1: Euphrosinidae bis Chaetopteridae. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 85: 25–72.

Haswell, W.A., 1886. Observations on some Australian Polychaeta. Part I. Syllidae. *Proceedings of the Linnean Society of New South Wales* 10: 733–756.

Haswell, W.A., 1920a. The Exogonea. *Journal of the Linnean Zoological Society*, 34: 217–241.

Haswell, W.A., 1920b. Australian Syllidae, Eusyllidae and Autolytidae. *Proceedings of the Linnean Society of New South Wales* 45: 90–112.

Heacox, A.E., & P. Schröder, 1978. First report of brooding in *Syllides japonica* Imajima (Syllidae: Polychaeta). *Bulletin of the Southern California Academy of Sciences* 77: 142–144.

Hutchings, P., & A. Murray, 1984. Taxonomy of polychaetes from the Hawkesbury River and the southern estuaries of New South Wales, Australia. *Records of the Australian Museum, Supplement* 3, pp. 1–118.

Hutchings, P., & S. Rainer, 1979. The polychaete fauna of Careel Bay, Pittwater, New South Wales, Australia. *Journal of Natural History* 13: 745–796.

Hutchings, P., & S. Rainer, 1980. A Key to Estuarine Polychaetes in New South Wales. *Proceedings of the Linnean Society of New South Wales* 104(1): 35–48.

Imajima, M., 1966. The Syllidae (Polychaetous Annelids) from Japan. I. Exogoninae. *Publications of Seto Marine Biological Laboratory* 13: 385–404.

Imajima, M., & O. Hartman, 1964. *The Polychaetous Annelids of Japan. Part I*. Allan Hancock Foundation Publication Occasional Paper 26(I), 237 pp.

Jing, Z., & B. Wu, 1991. Two species of *Exogone* and *Sphaerosyllis* (Polychaeta, Syllidae) from the Huanghai Sea. *Acta Oceanologica Sinica* 11(1): 131–137.

Kisseleva, M.I., 1986. Some data on *Brania clavata* Biology (Polychaeta, Syllidae) in the Black Sea. *Zoologichesky Zhurnal* 3: 449–453. (In Russian).

Kudenov, J., & L. Harris, 1995. Family Syllidae Grube, 1850. In: *Taxonomic Atlas of Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel*, ed. J. Blake, B. Hilbig, & P.H. Scott, pp. 1–97. Santa Barbara, California: Santa Barbara Museum of Natural History.

Kuper, M., & W. Westheide, 1998. External gestation in exogonine syllids (Annelida: Polychaeta): dorsal egg attachment by means of epitoke chaetae. *Invertebrate Biology* 117(4): 299–306.

Lanera, P., P. Sordino & G. San Martín, 1994. *Exogone (Parexogone) gambiae*, a new species of Exogoninae (Polychaeta, Syllidae) from the Mediterranean Sea. *Bolletino Zoologico* 61: 235–240.

Langerhans, P., 1879. Die Würmfauna von Madeira. *Zeitschrift für Wissenschaftliche Zoologie* 33: 267–316.

Langerhans, P., 1881. Ueber einige canarische Anneliden. *Nova Acta Leopoldina* 42: 93–124.

Lewbart, G.A., & N.W. Riser, 1996. Nuchal organs of the polychaete *Parapionosyllis manca* (Syllidae). *Invertebrate Biology* 115(4): 286–298.

Malaquin, A., 1893. Recherches sur les syllidiens. *Mémoires de la Societé Scientifique de Lille 4ème série* 18: 1–477.

Martín, D., & T. Britayev, 1998. Symbiotic Polychaetes: Review of known species. *Oceanography and Marine Biology: An Annual Review* 36: 217–340.

Martínez, J., I. Adarraga & G. San Martín, 2002. *Exogone (Exogone) mompasensis* (Exogoninae: Syllidae: Polychaeta), a new species from the Iberian Peninsula. *Proceedings of the Biological Society of Washington* 115(3): 676–680.

Mastrodonato, M., M. Sciscioli, E. Lepore, M. Gherardi, A. Giangrande, D. Mercati, R. Dallai & P. Lupetti, 2003. External gestation of *Exogone naidina* Örsted, 1845 (Polychaeta: Syllidae): ventral attachment of egg and embryos. *Tissue & Cell* 35: 297–305.

McIntosh, W.C., 1885. Report on the Annelida Polychaeta collected by H.M.S. Challenger during the years 1873–76. *Challenger Reports* 12: 1–554.

Mesnil, F., & M. Caullery, 1918. Sur l'organisation et la biologie d'un Syllidien *Exogone (Parexogone) hebes* Webster et Benedict, var. *hibernica* Southern, habitant un sable compacte. *Bulletin de la Société Zoologique de la France* 42: 126–132.

Monro, C.C.A., 1931. Polychaeta, Oligochaeta, Echiuroidea and Sipunculoidea. *British Museum (Natural History) Great Barrier Reef Expedition 1928–29* IV(1): 1–37.

Monro, C.C.A., 1939. Polychaeta. In *Antarctic Research Expedition, 1929–31*. Adelaide: Australia, Report series B (Zoology and Botany) 4(4): 89–156.

Naville, A., 1933. Quelques formes épitoques d'Annélides Polychètes nouvelles ou peu connues pêchées à la lumière dans la baie de Banyuls. *Annales des Sciences Naturelles Zoologie* 10(2): 169–208.

Nogueira, J.M., G. San Martín & A.C.Z. Amaral, 2001. Description of five new species of Exogoninae Rioja, 1925 (Polychaeta: Syllidae) associated with the stony coral *Mussismilia hispida* (Verrill, 1868) in São Paulo State, Brazil. *Journal of Natural History* 35(12): 1773–1794.

Núñez, J., G. San Martín & M.C. Brito, 1992. Exogoninae (Polychaeta: Syllidae) from the Canary Islands. *Scientia Marina* 56(1): 43–52.

Olano, M.L., E. López & G. San Martín, 1998. Dos especies nuevas de Sílidos (Polychaeta: Syllidae: Exogoninae) para el litoral ibérico: *Sphaerosyllis belizensis* Russell, 1989 y *Exogone (Parexogone) cognetti* Castelli, Badalamenti, Lardicci, 1987. *Boletín de la Real Sociedad Española de Historia Natural (Sección Biología)* 94: 83–88.

Örsted, A.E., 1845. Ueber die Entwicklung der Jungen bei einer Annelide und über änveren Untersuchiede zwischen beiden Geschlechtern. *Archiv für Naturgeschichte Berlin* 11(1): 20–23.

Parapar, J., & G. San Martín, 1992. *Grubeosyllis celiae*, a new species of Exogoninae (Syllidae: Polychaeta) from off Ceuta, Spain. *Proceedings of the Biological Society of Washington* 105(1): 111–115.

Pascual, M., & J. Núñez, 1999. Sílidos (Polychaeta: Annelida) endobiontes de esponjas de Canarias y Madeira. *Avicennia* 10/11: 73–90.

Pascual, M., J. Núñez & G. San Martín, 1996. *Exogone* (Polychaeta: Syllidae: Exogoninae) endobionts of sponges from the Canary and Madeira Islands with descriptions of two new species. *Ophelia* 45(1): 67–80.

Perkins, T.H., 1981. Syllidae (Polychaeta), principally from Florida, with descriptions of a new genus and twenty-one new species. *Proceedings of the Biological Society of Washington* 93(4): 1080–1172.

Pierantoni, U., 1903. La Gestazione esterna (Contributo alla biologia e alla embriologia dei Sillidi). *Archivo Zoologico de Torino* 1: 231–252.

Pierantoni, U., 1905. Una nuova maniera di gestazione esterna della *Pionosyllis pulligera* Krohn. *Annales del Museo zoologico dell'Universitá di Napoli, Nuova Serie* 2: 1–10.

Pocklington, P., & M.S. Hutchenson, 1983. New record of viviparity for the dominant benthic invertebrate *Exogone hebes* (Polychaeta: Syllidae) from the Grand Banks of Newfoundland. *Marine Ecology Progress Series* 11: 239–244.

Quatrefages, A. de, 1866. *Histoire naturelle des annelés marins et d'eau douce. Annélides et Géphryriens*. Paris 1: Librarie encyclopédique de Roret, 588 pp.

Rioja, E., 1925. Anélidos Poliquetos de San Vicente de la Barquera (Cantábrico). *Trabajos del Museo Nacional de Ciencias Naturales* 53: 5–62.

Rioja, E., 1941. Estudios Anelidológicos. II. Datos para el conocimiento de la fauna de Poliquetos de las costas del Pacífico de México. *Anales del Instituto de Biología de la Universidad Nacional de México* 12: 669–746.

Rioja, E., 1943. Estudios anelidológicos. VII. Aportaciones al conocimiento de los Exogoninos (Anélidos Poliquetos) de las costas del Pacífico de México. *Anales del Instituto de Biología de México* 14: 669–746.

Riser, N.W., 1991. An evaluation of taxonomic characters in the genus *Sphaerosyllis* (Polychaeta: Syllidae). In *Systematics, Biology and Morphology of World Polychaeta. Proceedings of the Second International Polychaete Conference, Copenhagen*, ed. M.E. Petersen & J.B. Kirkegaard, pp. 209–217. *Ophelia Suppl.* 5: 1–723.

Rouse, G., & F. Pleijel, 2001. *Polychaetes*. Oxford University Press, 354 pp.

Ruíz-Ramírez, J., & S.I. Salazar-Vallejo, 2001. Exogoninae (Polychaeta, Syllidae) del Caribe mexicano con una clave para las especies del Gran Caribe. *Revista de Biología Tropical* 49(1): 117–140.

Russell, D.E., 1989. Three new species of *Sphaerosyllis* (Polychaeta, Syllidae) from mangrove habitats in Belize. *Zoologica Scripta* 18(3): 375–380.

Russell, D.E., 1991. Exogoninae (Polychaeta: Syllidae) from the Belizean barrier reef with a key to species of *Sphaerosyllis. Journal of Natural History* 25: 49–74.

San Martín, G., 1984a. *Estudio biogeográfico, faunístico y sistemático de los Poliquetos de la familia Sílidos (Polychaeta: Syllidae) en Baleares*. Publicaciones de la Universidad Complutense de Madrid 187, 581 pp.

San Martín, G., 1984b. Descripción de una nueva especie y revisión del género *Sphaerosyllis* (Polychaeta: Syllidae). *Cahiers de Biologie Marine* 25: 375–391.

San Martín, G., 1991a. *Grubeosyllis* and *Exogone* from Cuba, Puerto Rico, Florida and the Gulf of Mexico, with a revision of *Exogone. Bulletin of Marine Science* 49: 715–740.

San Martín, G., 1991b. *Sphaerosyllis* and *Parapionosyllis* (Polychaeta: Syllidae) from Cuba and Florida. In *Systematics, Biology and Morphology of World Polychaeta. Proceedings of the Second International Polychaete Conference, Copenhagen*, ed. M.E. Petersen & J.B. Kirkegaard, pp. 231–238. *Ophelia Suppl.* 5: 1–723.

San Martín, G., 2002. A new genus and species of Syllidae (Polychaeta) from Australia brooding eggs dorsally by means of compound notochaetae. *Proceedings of the Biological Society of Washington* 115(2): 333–340.

San Martín, G., 2003. *Anélidos Poliquetos. Familia Syllidae Grube, 1850*. En: *Fauna Ibérica*, Ramos, M.A. *et al*. (Eds.). Museo Nacional de Ciencias Naturales. Madrid, Spain: CSIC, 554 pp.

San Martín, G., & E. López, 1998. Description of a new species of *Sphaerosyllis* from Australia and New Zealand (Polychaeta: Syllidae: Exogoninae). *Proceedings of the Biological Society of Washington* 111(1): 241–245.

San Martín, G., & E. López, 2003. A new genus of Syllidae (Polychaeta) from Western Australia. *Hydrobiologia* 496: 191–197.

San Martín, G., & J. Parapar, 1990. *Exogone acerata* (Exogonina: Syllidae: Polychaeta), a new species without antennae from the Mediterranean Sea. *Proceedings of the Biological Society of Washington* 103(3): 687–690.

San Martín, G., & J. Parapar, 1997. "Errant" polychaetes of the Livingston Island shelf (South Shetlands, Antarctica), with the description of a new species. *Polar Biology* 17: 285–29.

San Martín, G., M.I. Acero, M. Contonente & J.J. Gómez, 1982. Una colección de anélidos poliquetos de las costas mediterráneas andaluzas. *Actas II Simposio Ibérico de Estudios del Bentos Marino, Barcelona* 3: 171–182.

San Martín, G., A. Ceberio & F. Aguirrezabalaga, 1996. *Exogone* species (Polychaeta: Syllidae: Exogoninae) from the Capbreton Canyon (Bay of Biscay, NE Atlantic). *Cahiers de Biologie Marine* 37: 249–258.

Sardá, R., 1984. La subfamilia Exogoninae (Polychaeta: Syllidae) de Gibraltar, con la descripción de *Pseudobrania euritmica* n.sp. *Publicaciones del Departamento de Zoología, Barcelona* 10: 7–13.

Uebelacker, J.M., 1984. Family Syllidae Grube, 1850. In *Taxonomic guide to the polychaetes of the northern Gulf of Mexico*, ed. J.M. Uebelacker & P.G. Johnson, vol. IV, pp. 1–151. Mobile, Alabama: Barry A. Vittor and Associates.

Uschakov, P.V., 1955. *Polychaeta of the Far Eastern Seas of the U.S.S.R*. Academy of Sciences of the Union of Soviet Socialist Republics, 433 pp. (Translated to English in 1965 by Israel Program for Scientific Translations, Jerusalem).

Verrill, A.E., 1900. Additions to the Turbellaria, Nemertina and Annelida of the Bermudas with revisions of some New England genera and species. *Transactions of the Connecticut Academy of Arts and Sciences* 10: 595–671.

Webster, H.E., 1879. Annelida Chaetopoda of the Virginian coast. *Transactions of the Albany Institut* 9: 201–272.

Webster, H.E., & J.E. Benedict, 1884. The Annelida Chaetopoda from Provincetown and Wellfleet, Massachusetts. *Reports of the United States Commissioner of Fish and Fisheries for 1881*, pp. 699–747.

Westheide, W., 1974. Interstitielle Fauna von Galapagos. XI. Pisionidae, Pilargidae, Syllidae. *Mikrofauna Meeresbodens* 44: 195–338.

Westheide, W., 1984. The concept of reproduction in polychaetes with small body size: adaptations in interstitial species. In *Polychaete Reproduction*, ed. A. Fischer & H.D. Pfannenstiel, pp. 265–287, *Forschritte der Zoologie* 29. Stuttgart: Fischer.

Westheide, W., 1987. Progenesis as a principle in meiofauna evolution. *Journal of Natural History* 21: 843–854.

Westheide, W., 1990. A hermaphroditic *Sphaerosyllis* (Polychaeta: Syllidae) with epitokous genital chaetae from intertidal sands of the Island of Phuket (Thailand). *Canadian Journal of Zoology* 68: 2360–2363.

Zottoli, R., & C.D. Long, 2000. *Exogone breviantennata* Hartmann-Schröder, 1959 (characters emended) (Annelida: Polychaeta: Syllidae), a new record for the Bahamas with a key to selected *Exogone* species. *Proceedings of the Biological Society of Washington* 113(2): 500–513.

Manuscript received 14 August 2002, revised 3 October 2003 and accepted 18 November 2003.

Associate Editor: G.D.F. Wilson.