

## Sphaerodoridae (Polychaeta: Errantia) from world-wide areas

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### Introduction

The sphaerodorids are small, benthic polychaetes with series of epidermal protuberances in the form of tubercles or papillae covering the dorsum and usually also the ventrum. The prostomium and the peristomium are not clearly separated from each other or from the remainder of the body. The anterior end has three to seven prostomial antennae; a pair of peristomial cirri are usually present. The unarmed proboscis is eversible. The uniramous parapodia are usually equipped with single acicula. Setae may be composite or simple. A complete survey of all original descriptions with re-distribution of the species into the several genera is given in Appendix A. A diagnosis is given for each species seen by the present author.

### Material

The present survey treats material from world-wide areas, deposited in or on loan to the Allan Hancock Foundation.

(1) Collections taken with the *R/V Velero III* and the *R/V Velero IV* of the Allan Hancock Foundation. Stations are listed without any preceding letters. All material is from California and western Mexico and complete data for all stations are given in Appendix B.

(2) Collections from the Antarctic Ocean taken by the *R/V Elltanin* and the *R/V Staten Island*. Part of this material was treated by Hartman (1967). Station numbers are prefixed with *Elt.* or *St. Isl.* Complete data are given in Appendix B.

(3) Collections from inshore waters off Chile taken by the Lund University Chile Expedition, 1947-48. Station numbers are prefixed *M*; complete data are given in Appendix B. This material was published by Wesenberg-Lund (1962).

(4) Other collections come from the Indian Ocean, South Vietnam, Chile-Peru Trench, Greenland and Denmark. Each of these collections contribute one or a few stations and complete data are given in the text.

### Review of the taxonomy

The first sphaerodorids mentioned in the literature were *Ephesia gracilis* Rathke (1843) from Norway and *Sphaerodorum flavum* Ørsted (1843) from Denmark. Johnston (1844) described *Bebryce peripatus* from England; a year later he replaced the generic name of his species with *Pollicita* because *Bebryce* was pre-occupied. Grube (1850, p. 315) referred *peripatus* Johnston to *Sphaerodorum* and treated *Pollicita* as a junior synonym of that genus. All names and combinations referred to above concern the same species. Rathke (1843) was published a few months before Ørsted (1843). The generic names

*Ephesi* and *Bebryce* are both pre-occupied (Fauvel, 1911, pp. 13–15). The valid name for the species thus becomes *gracilis* Rathke (1843) and the generic name should be *Sphaerodorum* as pointed out by Lützen (1961). *Sphaerodorum gracilis* (Rathke, 1843) is thus the type-species of the genus and the first described species in the family.

The sphaerodorids were first placed among Ørsted's *Aricia verae* which contained cirratulids, orbiniids and spionids in addition to the single known sphaerodorid. Malmgren (1867, p. 79) recognized a distinct family for the sphaerodorids; this has been followed by all later authors.

Some sphaerodorids have long, cylindrical bodies, others are short and tumid. *Sphaerodorum gracilis* is long-bodied. The first short-bodied sphaerodorid described was *S. clapedii* Greff (1866). The generic name *Sphaerodorum* has thus been applied to both long- and short-bodied species.

Levinsen (1883, pp. 92–95) reviewed the nordic sphaerodorids and recognized two different genera. He limited *Ephesia* to species with two rows of macro-tubercles with terminal filaments (a discussion of the terminology is given below) and the anterior end should have a pair of 'similar' appendages; all species of *Ephesia* should be long and slender. *Sphaerodorum* was defined by Levinsen for sphaerodorids with six rows of dorsal and four rows of ventral macro-tubercles; the anterior end should have a pair of clavate appendages and all species should be short and wide. These definitions were extended by Fauvel (1911, pp. 13–15) to include the character of the proboscis: *Ephesia* should have a long, cylindrical proboscis without a distinctly muscularized area and *Sphaerodorum* should have a short, strongly muscular proboscis. According to Fauvel, species of *Sphaerodorum* should have more than two rows of macro-tubercles, but the number was not specified.

The pre-occupied *Ephesia* was suppressed by Lützen (1961, pp. 414–415) who restored *Sphaerodorum* Ørsted to its original sense, i.e. as used for long-bodied species. A new name, *Sphaerodoridium*, was proposed for the short-bodied species. Lützen did not change the concept of two genera separated on differences in the shape of the body. These generic definitions were retained by Hartman (1964, 1965, 1967, 1968) and Imajima (1969); through a *lapsus* the two generic names were exchanged in Hartman (1964, p. 106, 1967, pp. 83–87).

Day (1967, pp. 288–289) used the two names, *Sphaerodorum* and *Sphaerodoridium*, but changed the definition of the genera. According to Day, all species with simple setae belonged to *Sphaerodorum* and all species with composite setae to *Sphaerodoridium*. Pettibone (1963, pp. 206–208) restricted *Sphaerodorum* to the long-bodied species with simple setae and used the name *Ephesiella* Chamberlin (1919) for all species with composite setae, whether long- or short-bodied.

Attempts were made by Perrier (1897) and Chamberlin (1919) to subdivide the long-bodied sphaerodorids on differences in the setal structures. *Hypephesia* Perrier (1897) should include the long-bodied sphaerodorids with simple setae with *gracilis* Rathke (1843) as type-species. Perrier retained *Ephesia* for species with composite setae. Fauvel (1911, p. 14) pointed out that *Ephesia*, if valid, would have to be retained for the species originally described in it and consequently submerged *Hypephesia*. Chamberlin (1919, pp. 182–183) retained *Hypephesia* since, as he noted, *Ephesia* was preoccupied; he proposed a new

name, *Ephesiella*, for the long-bodied forms with composite setae. This name was taken up by Pettibone (1963), but with an emended definition. The distinction between two groups of long-bodied sphaerodorids has not been retained by later authors.

It is worth noticing that each of the authors mentioned above recognized only two genera; the names and definitions have kept changing.

An aberrant genus, *Levidorum*, was described by Hartman (1967, p. 84); the relationship between this and other sphaerodorids is discussed below.

### Discussion of the taxonomic characters

#### *Body shape*

Short-bodied species have less than 30 segments; their bodies are usually thick and grub-like, but slender species are known. The long-bodied species have more than 50 segments and are usually slender. A number of species described or diagnosed below have 30 to 50 segments and juveniles of the long-bodied species may be rather thick. The character is useful only within a limited geographical area where the fauna is well known.

#### *Tubercles*

There are several different kinds of epithelial protuberances. The terminology is confused: the large spherical protuberances on the dorsal side have been called macrotubercles (Hartman, 1965, p. 95), capsules (Hartman, 1965, p. 94, 1967, p. 84), papillae (Hartman, 1967, p. 84), spherical glandular capsules (Pettibone, 1963, p. 208), dorsal glandular capsules (Pettibone, 1963, p. 207) and spherical bodies (Moore, 1909, p. 332). The smaller kinds of protuberances are usually called papillae, but other terms may be found.

Three different kinds of protuberances may be recognized:

(1) Macrotubercles (figs. 1.3, 2.6, 3.3) are large, spherical protuberances that appear to be secretory in function (Reimers, 1933, pp. 61-63). The number and arrangement of these tubercles appear to be valid generic and specific characters. Two different kinds of macrotubercles can be recognized. One kind has a terminal papilla where ducts from the gland-cells in the interior of the tubercle terminate (fig. 2.6). The other kind lacks a terminal papilla (figs. 1.3 and 3.3) and the gland ducts terminate in a thin-walled area at the distal end of the tubercle. The presence or absence of a terminal papilla is easily recognized and is here used as a generic character.

The macrotubercles are stalked in some genera (*Clavodorum* and *Sphaerodoridium*, figs. 1.3, 1.7 and 1.9). The stalk is a contractile cylinder that distally is expanded into the tubercle proper. Stalked tubercles are present only in species with more than two rows of dorsal macrotubercles; they always lack terminal papillae.

Macrotubercles are absent from the peristomium in all species examined and are absent from the first setiger in species with only two rows of tubercles. In species with more than two rows, the outermost pair is usually absent in the first setiger. The number of rows may be reduced in the last five or six setigers.

The glandular cells appear similar in all macrotubercles from one species.

(2) Microtubercles (fig. 2.4) are found in all species that have only two rows of macrotubercles and in one species with four rows of such tubercles. They are present only in species that have terminal papillae. Each microtubercle

has a basal collar and an upper terminal papilla. Microtubercles are usually on the dorsum some distance above the macrotubercles, but are partially fused with the macrotubercles in one species of *Ephesiella* and are found between the parapodia in one species (*Sphaerephesia longisetis*).

(3) Papillae (figs. 4.2 and 4.8) are simple, cylindrical or conical protuberances; they are usually found in large numbers on the prostomium and on the ventral side of the body, and may be present on any part of the body. The number and arrangement of papillae on the parapodia and along the anterior margin of the prostomium appears constant varying only with the size of the specimens. Some species lack papillae.

*Cephalic appendages* include a median antenna, one to three pairs of lateral antennae and a pair of peristomial cirri. The base of the median antenna is usually somewhat behind the level of the superior lateral antennae; it is often clavate and shorter than the other antennae. The lateral antennae are usually digitate. Claparède (1863, p. 50) and several later authors have stated that the number of antennae was not defined in the sphaerodorids and that these organs were simulated by some of the anterior papillae. The antennae differ, however, histologically from the papillae.

The median antenna is long and digitate in species of *Clavodorum*; the lateral antennae may be furcate or antler-shaped in species of *Clavodorum* and *Sphaerodoropsis* (figs. 1.1, 3.14 and 3.19).

The peristomial cirri are usually on a short boss. In *Sphaerodoropsis elegans*, this boss is a rudimentary parapodium with a short, papillar setal lobe, but without setae.

*The eyes* have often been described as two pairs of crescent-shaped eyes. All eyed species in the present collections have only one pair; each eye may consist of two crescent-shaped pigmented areas which together outline the single, circular or oval eye or the whole eye may be pigmented.

*Proboscis* is well developed and eversible in all species examined. It is usually long and cylindrical in the long-bodied species and shorter in the short-bodied species. The degree of development of the musculature varies independently of the length of the proboscis and does not appear to be of any value as a generic character.

*Parapodia* are uniramous in all species. Each parapodium has a single, stout aciculum, except in *Levidorum* where each parapodium has two or three acicula. A clavate or digitate ventral cirrus is present in all species. Pre- and postsetal lobes may be present. The parapodial lobes differ histologically from the papillae on the parapodia in most cases, but in some, papillae and lobes cannot be distinguished.

*Setae* are usually all of one kind in all setigers except for the first one. Most of the short-bodied species have composite setae (figs. 3.16 and 3.18). Each seta has a slightly inflated shaft and a falcate appendage. Shaft and appendage are smooth in most species, but the cutting edge of the appendage and the distal end of the shaft may be dentate (fig. 3.6). Simple setae (figs. 4.3 and 4.10) are found in some species; each is usually slightly curved and has a definite subdistal swelling or boss. One or two pairs of simple, strongly recurved hooks (fig. 4.5) are found in each of the first parapodia in most of the long-bodied species. The distribution and shape of the different kinds of setae are here used as generic and specific characters.

## Definitions of the genera

*Clavodorum* Hartman and Fauchald, 1971, p. 63. Stalked dorsal macro-tubercles in six or eight rows; macro-tubercles without terminal papillae. Anterior end with a long median antennae and two pairs of lateral antennae. Setae composite. Type-species: *C. atlanticum* Hartman and Fauchald, 1971.

*Commensodorum*, new genus. Sessile dorsal macro-tubercles in four rows; macro-tubercles without terminal papillae. Anterior end with a median and two pairs of lateral antennae; all anterior appendages short. Setae simple. Type-species: *C. commensalis* (Lützen, 1961, pp. 409-416, 1 fig., as *Sphaerodoridium*).

*Ephesiella* Chamberlin, 1919, *sensu* Hartman and Fauchald, 1971, pp. 64-65. Two rows of macro- and two rows of micro-tubercles on the dorsum; the sessile macro-tubercles with terminal papillae. Anterior end with a median and one or two pairs of lateral antennae. A large recurved hook present in the first setiger in most species; all other setae composite. Type-species: *E. abyssorum* (Hansen, 1878, p. 9, pl. 6, figs. 9-12, as *Sphaerodorum*).

*Ephesiopsis* Hartman and Fauchald, 1971, pp. 67-68. Two rows of macro- and two rows of micro-tubercles on the dorsum; the sessile macro-tubercles with terminal papillae. Anterior end with a median and two pairs of lateral antennae. A large recurved hook in the first setiger; setae in other setiger; setae in other setigers both simple and composite. Type-species: *E. guayanae* Hartman and Fauchald, 1971.

*Levidorum* Hartman, 1967, pp. 83-84. All tubercles and papillae absent. Anterior end blunt; anterior appendages absent. Parapodia with two or three acieula; setae semicomposite or simple. Type-species: *L. scotiarum* Hartman (1967, p. 84, pl. 28).

*Sphaerodoridium* Lützen, 1961, restricted. Stalked dorsal macro-tubercles without terminal papillae. Anterior end with a short median and two pairs of lateral antennae. Setae composite. Type-species: *S. claparedii* (Greeff, 1866, pp. 338-351, 14 figs., as *Sphaerodorum*).

*Sphaerodoropsis* Hartman and Fauchald, 1971, p. 69. Four or more rows of dorsal macro-tubercles without terminal papillae. Anterior end with a median and two or three pairs of lateral antennae. Setae composite. Type-species: *S. sphaerulifer* (Moore, 1909, p. 336, as *Sphaerodorum*).

*Sphaerodorum* Ørsted, 1843, restricted. Two rows of macro- and two rows of micro-tubercles on the dorsum; the sessile macro-tubercles have terminal papillae. Anterior end with a median and two pairs of lateral antennae. Setae simple, including in most species, large recurved hooks in the first setiger. Type-species: *S. gracilis* (Rathke, 1843, p. 176, pl. 7, figs. 5-8, as *Ephesia*).

*Sphaerephesia* Fauchald, 1972, p. 97. Four rows of sessile, dorsal macro-tubercles with short terminal papillae. Anterior end with a median and two or three pairs of lateral antennae. Setae composite. Type-species: *S. longisetis* Fauchald, 1972, pp. 97-98, pl. 20, figs. a-e.

## Key to genera

- |   |                  |
|---|------------------|
| 1 Both dorsal and ventral surfaces smooth . . . . .     | <i>Levidorum</i> |
| - At least two rows of dorsal macro-tubercles . . . . . | 2                |
| 2 Macro-tubercles with terminal papillae . . . . .      | 3                |
| - Macro-tubercles distally rounded . . . . .            | 6                |

3	Macrotubercles in four rows; terminal papillae very short . . . . .	<i>Sphaerephesia</i>
-	Macrotubercles in two rows; terminal papillae long . . . . .	4
4	All setae simple . . . . .	<i>Sphaerodorium</i>
-	At least some setae composite . . . . .	5
5	All setae composite apart from the recurved hooks in the first setiger . . . . .	<i>Ephesiella</i>
-	Both composite and simple setae in all setigers, apart from the first . . . . .	<i>Ephesiopsis</i>
6	Macrotubercles stalked . . . . .	7
-	Macrotubercles sessile . . . . .	8
7	Median antenna as long as, or longer than the lateral antennae . . . . .	<i>Clavodorium</i>
-	Median antennae shorter than the lateral antennae . . . . .	<i>Sphaerodoridium</i>
8	All setae composite . . . . .	<i>Sphaerodoropsis</i>
-	All setae simple . . . . .	<i>Commensodorum</i>

### Biological notes

Most sphaerodorids seem to have demersal larvae; ovigerous females with very large eggs are present in most species seen. *Ephesiella mixta* appears to be hermaphroditic; it has an anterior region with eggs and a posterior region filled with developing male cells; what appear to be embryos with 16–32 cells were arranged more or less segmentally in a median portion of the specimen; these embryos appear to float freely in the coelom.

Most sphaerodorids have been reported either from boreal or antiboreal regions or from deep water. The abyssal regions of the Atlantic Ocean have presently more species than any other area of similar size; this is probably due to the excellent sampling in the area.

Sphaerodorids are most common in sandy or muddy bottoms, but some species are found in shallow water in hard bottoms. The most commonly reported species from European waters, *Sphaerodorium gracilis*, may even be found intertidally.

Sphaerodorids are usually rather small; ovigerous females of not more than 1.2 mm in length are reported below. The giant among sphaerodorids, *Ephesiella antarctica*, may be as long as 45–50 mm (Hartman, 1967, p. 85). Ovigerous females are usually 2–5 mm in length in the short-bodied species and even the long-bodied forms rarely become more than 10–15 mm in length.

### Descriptions and diagnosis of species investigated

#### *CLAVODORUM* Hartman and Fauchald, 1971

The genus was defined above. Stalked macrotubercles are also known in *Sphaerodoridium claparedii* (Greeff, 1866). The genus *Sphaerodoridium* differs from *Clavodorium* in that the median antenna is short in the former and long in the latter. The median antenna is short in all sphaerodorids examined except for the five species here assigned to *Clavodorium*.

Specific characters include the number and arrangement of macrotubercles, the development of the different parapodial lobes, the length and shape of the composite setae and the development of the lateral antennae.

Type-species is *C. atlanticum* Hartman and Fauchald, 1971; four other species are here assigned to the genus.

#### Key to species of *Clavodorium*

1	Eight rows of dorsal macrotubercles . . . . .	<i>bengalorum</i>
-	Six rows of dorsal macrotubercles . . . . .	2
2	Postsetal lobes present at least in anterior setigers . . . . .	4
-	Postsetal lobes absent in all setigers . . . . .	3

3 Superior lateral antennae bifid . . . . .	<i>clavatum</i>
- Superior lateral antennae with four branches . . . . .	<i>fusum</i>
4 Postsetal lobes present in all setigers; posterior parapodia not noticeably prolonged . . . . .	<i>atlanticum</i>
- Postsetal lobes absent in posterior setigers; posterior parapodia strongly prolonged . . . . .	<i>longpipes</i>

(1) *Clavodorum atlanticum* Hartman and Fauchald, 1971

*Clavodorum atlanticum*, Hartman and Fauchald, 1971, pp. 63-64, pl. 32, figs. (a)-(d).

DIAGNOSIS: *Clavodorum* with six rows of dorsal macrotubercles. Postsetal lobes present in all setigers and posterior parapodia not prolonged. Superior lateral antennae with two short papillae.

DISTRIBUTION: *C. atlanticum* is known from deep water near the Bermuda Islands.

(2) *Clavodorum bengalorum*, new species

(Fig. 1.5-8)

DESCRIPTION: The type is a complete specimen 1.2 mm long and 0.5 mm wide, with 16 setigers and setae. It is white and lacks colour patterns. The body is strongly curved, thick and grub-like. The anterior end is partially retracted.

The anterior end appears to be broadly rounded; the digitate median antenna is longer than the lateral ones. The superior lateral antennae have short spurs near the bases. The inferior lateral antennae are somewhat shorter and thicker than the superior ones and lack the basal spurs. A pair of eyes is present at the level of the first setiger. The proboscis is short and strongly muscular and fills the body cavity of the four first setigers.

All parapodia (fig. 1.8) are similar; each has a short, bluntly conical acicular lobe. The long presetal lobe is truncate. Postsetal lobes are absent. The ventral cirrus is a little longer than the presetal lobe; it is nearly terminal in all setigers. Nephridial papillae are present on all parapodia except the first one; each is very long and distally truncate. The surface of the parapodia is wrinkled; papillae are absent.

The dorsum is covered with eight rows of macrotubercles; each has a slender, smooth or wrinkled stalk and a pear-shaped head (fig. 1.7). Two rows of tubercles are present on the ventrum; each tubercle is stalked and has a small, pear-shaped head. Papillae are absent except on the prostomium.

All setae are composite falcigers; a single short seta (fig. 1.5) with a strongly inflated shaft and a short, strongly falcate appendage is in ventral positions. Dorsally are found two or three longer setae (fig. 1.6) with evenly tapering shafts and long, slender appendages. All setae are smooth.

*C. bengalorum* resembles *C. clavatum* and *C. fusum* in that all three species lack postsetal lobes in all setigers. Eight rows of macrotubercles are present on the dorsum of *C. bengalorum* and six on the two other species mentioned. Two kinds of composite falcigers are present in *C. bengalorum* and one kind in both the other species.

The holotype and only known specimen (AHF POLY 0946) comes from st. RH-28, Porto Novo, Madras, India,  $\frac{1}{2}$  mile from the mouth of the Vellar distributary of the Coleroon River, 14 March 1964, 1.5 m depth, coll. Howard Sanders.

(3) *Clavodorum clavatum* Fauchald, 1972

*Clavodorum clavatum* Fauchald, 1972, pp. 94–95, pl. 18.

DIAGNOSIS: *Clavodorum* with six rows of dorsal macrotubercles. Postsetal lobes absent and posterior parapodia not prolonged. Superior lateral antennae bifid.

DISTRIBUTION: Southern California and western Mexico in shelf and slope depths.

(4) *Clavodorum fusum* (Hartman, 1967)

(Figs. 1.1–4)

*Sphaerodorum fusum*, Hartman, 1967, pp. 85–86, partim.

DIAGNOSIS AND REMARKS: *Clavodorum* with six rows of dorsal macrotubercles. Postsetal lobes absent and posterior parapodia not prolonged. Superior lateral antennae quadrifid.

All material reported by Hartman (1967) has been re-examined. The specimens from stations Elt. 1084 and Elt. 412 are here referred to two different species of *Sphaerodoropsis*.

The type is a complete specimen with 20 setigers that is 2 mm long and 0.5 mm wide. It is as described by Hartman (1967, pp. 85–86), but the following notes may be added.

The prostomium (fig. 1.1) has a large median antenna and two pairs of lateral antennae. The superior lateral antennae have three short, digitate

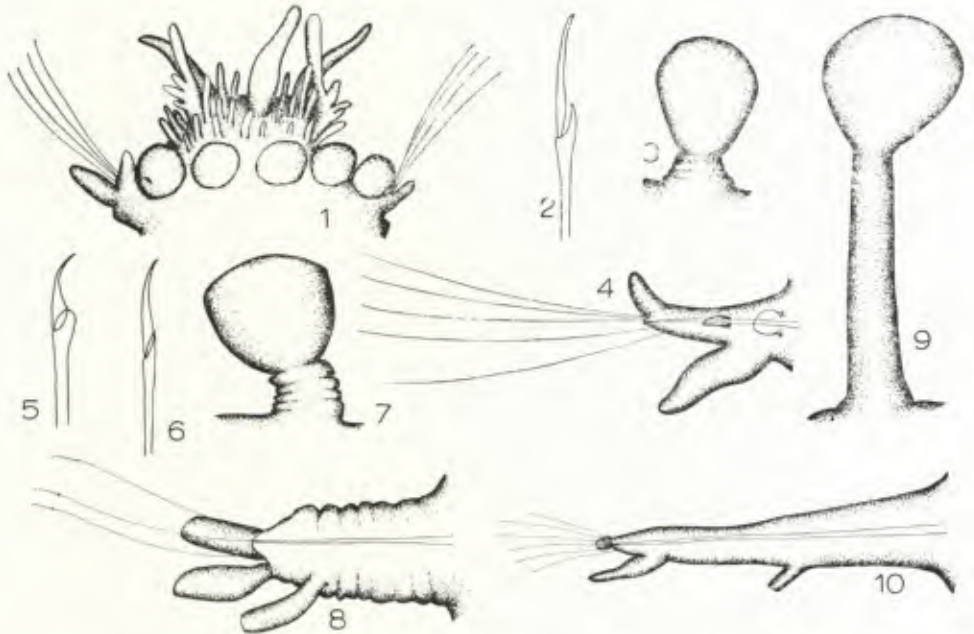


FIG. 1. *Clavodorum fusum*. (1) Anterior end, farsal view, 285 $\times$ . (2) Composite seta, median parapodium, 570 $\times$ . (3) Macrotubercle, 285 $\times$ . (4) Posterior parapodium, anterior view, 285 $\times$ . *Clavodorum bengalorum*: (5) Ventral composite seta, median parapodium, 420 $\times$ . (6) Median composite seta, median parapodium, 420 $\times$ . (7) Macrotubercle, 420 $\times$ . (8) Posterior parapodium, posterior view, 212.5 $\times$ . *Clavodorum longipes*: (9) Macrotubercle, 420 $\times$ . (10) Posterior parapodium, posterior view, 420 $\times$ .



processes near the bases, so the antennae appear quadrifid. All macrotubercles (fig. 1.3) have short stalks. Each parapodium (fig. 1.4) has a slender, conical acicular lobe. The ventral cirrus is very large in all setigers; each posterior parapodium has in addition a short, erect papilla on the superior edge. All setae are long and slender with short, slightly falcate appendages (fig. 1.2).

**MATERIAL:** Elt. 410 (6, paratypes); Elt. 439 (1, holotype, AHF, POLY 0774); Elt. 1003 (1).

**DISTRIBUTION:** Vicinity of the South Shetland Islands in the Antarctic Ocean.

(5) *Clavodorum longipes*, new species

(Fig. 1.9-10)

**DESCRIPTION:** The type is a complete specimen, 2 mm long and 0.65 mm wide, with 20 setigers and setae. It is white and lacks colour patterns. The body is thick with nearly parallel sides and blunt anterior and posterior ends.

The anterior end is truncate; the long median antenna is slender. Each of the two slender superior lateral antennae has a short basal spur. The long inferior lateral antennae are slender.

The anterior parapodia are comparatively short; each is conical and has a short, rounded presetal lobe and a similar, somewhat longer postsetal lobe. The digitate ventral cirrus projects well beyond the tips of the other parapodial lobes. The parapodia become increasingly prolonged in the posterior part of the body and are very long and slender in the posterior-most setigers (fig. 1.10). Postsetal lobes are absent from the last eight or nine parapodia. The presetal lobes are similar in all parapodia; ventral cirri become shorter in posterior setigers.

Six rows of dorsal macrotubercles are present; each tubercle (fig. 1.9) has a very long, slender stalk and a pear-shaped head. Two alternating rows of tubercles are present on the ventrum; each is less than one-quarter of the length of the dorsal macrotubercles, but is similar in shape. Papillae are present on the prostomium, but are absent elsewhere on the body.

All setae are similar; each is composite with a comparatively short shaft and a long, slightly curved appendage. All setae are smooth.

*C. longipes* resembles *C. atlanticum* closely. Postsetal lobes are present only in anterior setigers in *C. longipes* and in all setigers in *C. atlanticum*. Parapodia are distinctly prolonged in posterior setigers in *C. longipes*; they are long in all setigers in *C. atlanticum*, but are not prolonged in posterior setigers.

The holotype and only known specimen (AHF POLY 0947) comes from ANTON BRUUN Cruise 7 to the Indian Ocean, st. AB 376 D, Natal Basin, 20°20'-19'S, 37°26'-25'E, 5119 m, Menzies trawl, fine clay and sandy quartz grains. 26 August 1964.

**COMMENSODORUM**, new genus

The genus differs from the similar *Sphaerodoropsis* in that it has exclusively simple setae; *Sphaerodoropsis* has only composite setae. Other details are given in the generic diagnosis above.

*Commensodorum* is recognized for *C. commensalis* (Lützen, 1961, pp. 409-416, 1 fig.) which was originally described in *Sphaerodoridium*. Lützen (1961, p. 415)

named *S. claparedii* (Greeff, 1866) as genotype for his genus *Sphaerodoridium*. *S. claparedii* differs generically from *Commensodorum commensalis* in that the macrotubercles are stalked in the former and sessile in the latter. Setae are composite in *S. claparedii* and simple in *C. commensalis*.

*Ephesiella* Chamberlin, 1919

sensu Hartman and Fauchald, 1971

The restricted genus is defined above. Specific characters include the shape and distribution of macro- and microtubercles, the presence or absence of recurved hooks in the first setiger, the shape of the lateral antennae and the development of parapodial lobes and papillae. Eight species are presently known.

The type-species by original designation is *E. peripatus* (Claparède, 1863, see Chamberlin, 1919, p. 182); the specific name of this species is invalid as discussed by Hartman and Fauchald (1971, p. 65, see also Pettibone, 1963, p. 208). The valid name for the type-species is *E. abyssorum* (Hansen, 1878).

Key to species of *Ephesiella*

1	Macro- and microtubercles partially fused . . . . .	<i>mammifera</i>
–	Macro- and microtubercles free and separated on the dorsum . . . . .	2
2	Recurved hooks present in the first parapodium . . . . .	3
–	Recurved hooks absent . . . . .	<i>gallardi</i>
3	Two pairs of lateral antennae present . . . . .	4
–	One pair of lateral antennae present . . . . .	<i>pallida</i>
4	Superior lateral antennae distinctly shorter than all other antennae . . . . .	<i>antarctica</i>
–	Superior lateral antennae at least as long as the other antennae . . . . .	5
5	Ventral cirrus projecting beyond the parapodial lobes . . . . .	6
–	Ventral cirrus not projecting beyond parapodial lobes . . . . .	7
6	Parapodia with one or two distal papillae . . . . .	<i>abyssorum</i>
–	Parapodia with five or six distal papillae . . . . .	<i>macrocirris</i>
7	An erect papilla on the superior edge of each parapodium . . . . .	<i>mixta</i>
–	Superior edge of parapodia without erect papillae . . . . .	<i>brevicapitis</i>

(6) *Ephesiella abyssorum* (Hansen, 1878)

*Sphaerodorium abyssorum* Hansen, 1878, p. 9, pl. 6, figs. 9–12.

*Sphaerodorium peripatus* Claparède, 1863, pp. 50–53, pl. 11, figs. 8–18 [not *Bebryce* (= *Pollicita* = *Sphaerodorium*) *peripatus* Johnston, 1844]

*Ephesiella peripatus* Pettibone, 1963, p. 208.

*Ephesiella abyssorum* Hartman, and Fauchald, 1971, p. 65.

DIAGNOSIS AND REMARKS: *Ephesiella* with recurved hooks in the first setiger; two pairs of lateral antennae of similar sizes. Ventral cirri projecting beyond the parapodial lobes and maximally two distal papilla on the parapodia.

The description given by Hansen (1878, repeated in Hansen, 1882, p. 37) is brief. It is not clear from these descriptions nor from the description given by Claparède (1863) of the same species, whether recurved hooks are present or not. Hooks have been assumed present in the key to species above. If hooks should be absent, *E. abyssorum* can be separated from *E. gallardi* as follows. The ventral cirrus is nearly basal in *E. gallardi* and nearly terminal in *E. abyssorum*. A parapodial subdistal papilla is present in *E. gallardi* and absent in *E. abyssorum*.

DISTRIBUTION: Generally eastern Atlantic Ocean; Mediterranean Sea; Kara Sea.

(7) *Ephesiella antarctica* (McIntosh, 1885)

(Fig. 2.1-4)

*Ephesia antarctica* McIntosh, 1885, pp. 361-362, pl. 44, fig. 5, pl. 22A, figs. 22-23.*Sphaerodoridium antarcticum* Hartman, 1964, p. 106, pl. 33, figs. 1-3; Hartman, 1967, p. 85, partim.

DIAGNOSIS AND REMARKS: *Ephesiella* with macro- and microtubercles separated on the dorsum. Two pairs of smooth lateral antennae; recurved hooks present and ventral cirri shorter than the parapodial lobes. Superior lateral antennae very short and slender.

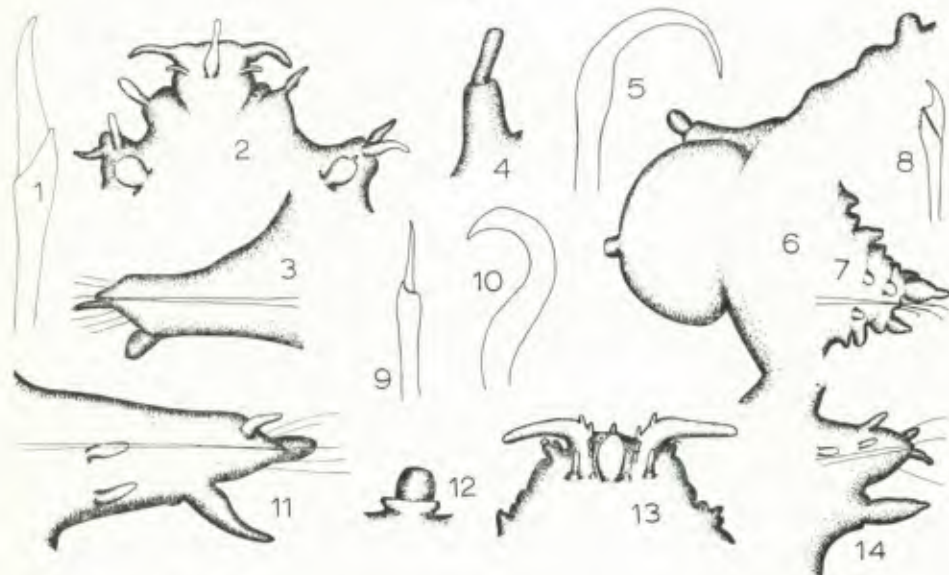


FIG. 2. *Ephesiella antarctica*: (1) Composite seta, median parapodium, 420 $\times$ . (2) Anterior end, dorsal view, 25 $\times$ . (3) Median parapodium, anterior view, 25 $\times$ . (4) Microtubercle, 130 $\times$ . *Ephesiella mammifera*: (5) Recurved hook, first setiger, 570 $\times$ . (6) Dorsolateral portion of body-wall, showing the relationship between macro- and microtubercles, 285 $\times$ . (7) Median parapodium, anterior view, 285 $\times$ . (8) Composite seta, median setiger, 570 $\times$ . *Ephesiella pallida*: (9) Composite seta, median parapodium, 635 $\times$ . (10) Recurved hook, first setiger, 285 $\times$ . (11) Median parapodium, anterior view, 285 $\times$ . (12) Microtubercle, 285 $\times$ . (13) Anterior end, dorsal view, 130 $\times$ . *Ephesiella gallardi*: (14) Median parapodium, anterior view, 285 $\times$ .

The microtubercles (fig. 2.4) are slender with the basal and distal portions of the same length. The nearly smooth parapodia (fig. 2.3) have short, slender postsetal lobes. The short ventral cirri are blunt. All setae (fig. 2.1) are composite with short, falcate appendages. The prostomium (fig. 2.2) has a pair of large inferior lateral antennae and short, slender superior ones. The median antenna is rather long, but distinctly shorter than the interior lateral antennae.

MATERIAL: Elt. 410 (1); Elt. 432 (10); Elt. 439 (1); Elt. 724 (1).

DISTRIBUTION: Shelf, slope and abyssal regions of the Antarctic Ocean.

(8) *Ephesiella brevicapitis* (Moore, 1909)*Sphaerodorum brevicapitis* Moore, 1909, pp. 335-336, pl. 15, figs. 13-14; Hartman, 1968, p. 607.*Ephesiella brevicapitis* Fauchald, 1972, p. 96, pl. 19.

DIAGNOSIS: *Ephesiella* with recurved hooks in the first setiger; macro- and microtubercles separated on the dorsum. Two pairs of lateral antennae of

similar size and ventral cirri not projecting beyond the parapodial lobes. Erect lobes on superior edge of parapodia absent.

DISTRIBUTION: Shelf and canyon depths off southern California and western Mexico.

*Ephesiella gallardi*, new name

(Fig. 2.14)

*Sphaerodorum* sp. B, Gallardo, 1968, pp. 67-68, pl. 16, figs. 6-9.

DIAGNOSIS AND REMARKS: *Ephesiella* without recurved hooks in the first setiger; macro- and microtubercles separated on the dorsum. Setae of two kinds; one with inflated shafts, the other with slender shafts.

*E. gallardi* was given a detailed description by Gallardo (1968). Here are added some notes on the parapodia and setae. Each parapodium (fig. 2.14) has a bluntly conical acicular lobe. Pre- and postsetal lobes are absent. Four or five papillae are found on each face of the parapodia. A slender digitate papilla with a subterminal constriction is present just ventral to the tip of the acicular lobe. Recurved hooks are absent. Setae are of two kinds; one has inflated shafts and short, recurved appendages as illustrated by Gallardo (1968, pl. 16, fig. 9); the other kind has slender shafts and long, gently curved appendages.

The holotype and only known specimen (AHF POLY 0934) comes from the Bay of Nha Trang, South Vietnam, st. 259, 1 mile SE of Grand Banc, 19 m, sandy mud, van Veen grab, 18 March 1960, coll. V. A. Gallardo.

(10) *Ephesiella macrocirris* Hartman and Fauchald, 1971

*Sphaerodorum* sp. A, Hartman, 1965, p. 95, pl. 14, fig. (d).

*Ephesiella macrocirris* Hartman and Fauchald, 1971, pp. 65-66, pl. 32, figs. (e)-(h).

DIAGNOSIS: *Ephesiella* with recurved hooks in the first setiger; two pairs of lateral antennae of similar sizes. Ventral cirri long and projecting well beyond the parapodial lobes; each parapodial face with at least five papillae.

DISTRIBUTION: Slope and abyssal depth off New York, in the Atlantic Ocean.

(11) *Ephesiella mammifera*, new species

(Fig. 2.5-8)

DESCRIPTION: The type is a complete specimen 6.5 mm long and 0.5 mm wide, with approximately 70 setigers and setae. It is white and lacks colour patterns.

The anterior end is blunt; both pairs of lateral antennae are short and digitate. The short median antenna is thick.

All parapodia are similar except the first one which is blunt with a poorly developed ventral cirrus. Each parapodium (fig. 2.7) has a short, truncate acicular lobe; pre- and postsetal lobes are absent. The ventral cirrus is nearly terminal; it is clavate and has a distinct digitate tip. Each face of the parapodia has approximately 10 papillae and is heavily wrinkled in all specimens.

Two rows of large, spherical macrotubercles (fig. 2.6) with well developed terminal papillae are present. The microtubercles are partially fused to the dorsal side of the macrotubercles. Each microtubercle has a long basal portion

and a short terminal papilla. The dorsum between the macrotubercles has 12–15 papillae and the ventrum is densely studded with similar papillae.

Two large, recurved hooks (fig. 2.5) are present in each of the first setigers. All other setigers have composite falcigers. Each falciger (fig. 2.8) has a distally inflated shaft and short, strongly curved appendage. The distal ends of the shafts are finely dentate; the appendages are smooth.

*E. mammifera* is very long and slender like *E. brevicapitis*. The microtubercles are fused with the macrotubercles in *E. mammifera* and free in *E. brevicapitis*. The parapodia are short and densely studded with papillae in *E. mammifera* and conical with a few papillae in *E. brevicapitis*.

MATERIAL: 2080 (1, Holotype, AHF POLY 0935); At Old English Mill, Bahia de San Quintin, Mexico, offshore dredging, gravelly mud, 6 April 1950, coll. D. J. Reish (1); Isla Cedros, Mexico, intertidal, 21 March 1959 (1).

DISTRIBUTION: Intertidal and shelf areas in western Mexico.

### (12) *Ephesiella mixta* Hartman and Fauchald, 1971

*Ephesiella mixta* Hartman and Fauchald, 1971, pp. 66–67, pl. 32, figs. (i)–(n).

DIAGNOSIS: *Ephesiella* with recurved hooks in the first setiger; macro- and microtubercles free from each other; superior lateral antennae as long as the inferior ones. Ventral cirri do not project beyond the parapodial lobes; an erect papilla present on the superior edge of each parapodium.

DISTRIBUTION: Atlantic Ocean off New York in abyssal depths.

### (13) *Ephesiella pallida*, new species

(Fig. 2.9–13)

*Sphaerodoridium antarcticum* Hartman, 1967, p. 85, partim (not McIntosh, 1885).

DESCRIPTION: The type is a complete specimen 12 mm long and 1 mm wide, with 49 setigers and setae. It is light brown and lacks colour patterns.

The anterior end (fig. 2.13) is bluntly rounded; the short median antenna is thick. One pair of lateral antennae is present; each is long and digitate and has four smaller papillae along the median edge. A small papilla is in front of the median antenna and a pair of minute papillae is near the base of the same antenna. The peristomial cirri are near the bases of the lateral antennae; each is short and slender and has a distinct lateral boss. Eyes are absent in the type; a single pair of eyes is present in other specimens; they are weakly pigmented and may have faded in the type.

All parapodia are similar except the first pair which is short and blunt. A median parapodium (fig. 2.11) has a long, conical acicular lobe; the short presetal lobe is conical; the postsetal lobe is somewhat longer than the presetal one and distinctly thicker. The long ventral cirrus is slender. A pair of small papillae is on the anterior face near the base of the parapodium and a similar pair is on the posterior face.

Two rows of macrotubercles are present; each tubercle is spherical with a distinct digitiform terminal papilla. Dorsal to each macrotubercle is found a microtubercle (fig. 2.12); it has a very short basal collar and a short, spherical terminal papilla. Other papillae are nearly absent.

Each of the first parapodia appear as two recurved, simple hooks (fig. 2.10).

All other parapodia have composite setae. Each seta (fig. 2.9) has a slightly inflated shaft and a short, slender, slightly falcate appendage.

*E. pallida* resembles *E. antarctica* in that both are large, slender species. It differs from all other members of the genus in that it has only one pair of lateral antennae and in the shape of the appendage of the composite setae.

**MATERIAL:** *Elt.* 127 (7); *Elt.* 138 (3, Holotype AHF POLY 0938, Paratypes AHF POLY 0939); *Elt.* 272 (2); *Elt.* 412 (1); *Elt.* 416 (3); *Elt.* 1003 (6); *Elt.* 1549 (1).<sup>7</sup>

**DISTRIBUTION:** Slope and abyssal depths in the Antarctic Ocean.

#### ***EPHESIOPSIS* Hartman and Fauchald, 1971**

The genus is defined above. *Ephesiopsis* differs from the closely similar *Sphaerodorum* and *Ephesiella* in that it has both composite and simple setae in the parapodia. *Sphaerodorum* has only simple setae, *Ephesiella* only composite setae, apart from the recurved hooks.

#### (14) *Ephesiopsis guayanae* Hartman and Fauchald, 1971

*Sphaerodorum* sp. C, Hartman, 1965, p. 96, pl. 14, figs. (a)–(b).

*Ephesiopsis guayanae* Hartman and Fauchald, 1971, pp. 68–69, pl. 33, figs. (a)–(g).

**REMARKS:** *E. guayanae* is the only species known in the genus; the relationship to other sphaerodorids is as discussed for the genus.

**DISTRIBUTION:** Atlantic Ocean off Guayana, South America in slope depths.

#### ***LEVIDORUM* Hartman, 1967**

The genus is defined above. It differs sharply from the other sphaerodorids and is considered a member of this family for the following reasons. It has the same general body-shape, there is only one peristomial segment and the parapodia are uniramous. The muscular, unarmed proboscis also allies it with the sphaerodorids.

*Levidorum* is probably only remotely related to the other sphaerodorids and should perhaps be considered in a separate family in a super-family complex including both groups.

Type-species and only known species is *L. scotiarum* Hartman (1967, p. 84, pl. 28).

#### ***SPHAERODORIDIUM* Lützen, 1961, restricted**

This genus was defined by Lützen (1961, p. 415) for all short-bodied sphaerodorids. These species do not, however, form a single uniform group and the present revision has resulted in a restriction of *Sphaerodoridium* to include only the species Lützen proposed as type-species. It has been defined above in the restricted sense.

The genus is closely allied with *Clavodorum* in that the macrotubercles are stalked in both genera. The two genera differ in that *Sphaerodoridium* has a short median antenna; this antenna is at least as long as the other antennae in *Clavodorum*.

Type-series, by original designation, is *S. clapedii* (Greeff, 1866).

#### ***SPHAERODOROPSIS* Hartman and Fauchald, 1971**

The genus is defined above. It is the largest of all sphaerodorid genera and contains presently twenty species.

The short-bodied sphaerodorids are here separated into four genera. The macrotubercles are stalked in *Clavodorum* and *Sphaerodoridium* and sessile in *Commensodorum* and *Sphaerodoropsis*. All setae are simple in *Commensodorum* and composite in *Sphaerodoropsis*.

All known species are included in the key below. *S. balticum*, *S. benguellarum*, *S. capense*, *S. distichum*, *S. malayana*, *S. octopapillata*, *S. philippi* and *S. spissum* have not been recovered in the present material and are not diagnosed below. The key must be considered temporary since the characters for these species were taken from the original descriptions and illustrations. Most descriptions appear accurate and any great changes are not expected; no assumptions were made as to the presence or absence of any character.

Type-species is *S. sphaerulifer* (Moore, 1909, p. 336).

### Key to species of *Sphaerodoropsis*

- |    |  |                      |
|----|--|----------------------|
| 1  | Four rows of dorsal macrotubercles . . . . .   | 2                    |
| —  | At least six rows of dorsal macrotubercles . . . . .   | 11                   |
| 2  | A single row of ventral macrotubercles . . . . .   | <i>malayana</i>      |
| —  | No ventral macrotubercles . . . . .  | 3                    |
| 3  | Three pairs of lateral antennae . . . . .  | 4                    |
| —  | Two pairs of lateral antennae . . . . .  | 7                    |
| 4  | Papillae absent except for a few on the prostomium . . . . .   | <i>laevis</i>        |
| —  | Papillae present on the parapodia and on the ventrum . . . . .   | 5                    |
| 5  | Parapodia two or three times as long as wide . . . . .   | <i>elegans</i>       |
| —  | Parapodia less than twice as long as wide . . . . .  | 6                    |
| 6  | One papilla on each face of the parapodia; superior lateral antennae bifurcated . . . . .  | <i>furca</i>         |
| —  | At least three papillae on each face of the parapodia; superior lateral antennae simple . . . . .                                  | <i>parva</i>         |
| 7  | Parapodia with both pre- and postsetal lobes . . . . .   | <i>longipalpa</i>    |
| —  | Parapodia without lobes or with presetal lobes only . . . . .  | 8                    |
| 8  | Parapodia with a large truncate papilla on the superior edge . . . . .   | 9                    |
| —  | No truncate papilla on the superior edge . . . . .   | 10                   |
| 9  | Parapodia with a thick presetal lobe . . . . .   | <i>biserialis</i>    |
| —  | Parapodia without a presetal lobe, but with a slender erect lobe on the superior edge . . . . .                                    | <i>corrugata</i>     |
| 10 | Ventral cirri project well beyond the tip of the acicular lobe; two large papillae on the superior edge of the parapodia . . . . . | <i>triplicatu</i>    |
| —  | Ventral cirri do not project beyond the acicular lobe; parapodia with ten or eleven slender papillae . . . . .                     | <i>philippi</i>      |
| 11 | All tubercles of the same size; twelve-fifteen rows on the dorsum and five on the ventrum . . . . .                                | <i>spissum</i>       |
| —  | Two different kinds of tubercles and papillae . . . . .  | 12                   |
| 12 | Antennae absent; six rows of dorsal macrotubercles . . . . .   | <i>distichum</i>     |
| —  | Antennae present; at least seven rows of dorsal macrotubercles . . . . .   | 13                   |
| 13 | Seven to nine rows of dorsal macrotubercles . . . . .  | 14                   |
| —  | Ten or more rows of dorsal macrotubercles . . . . .  | 17                   |
| 14 | Parapodia with two presetal and two postsetal lobes . . . . .  | 15                   |
| —  | Parapodia with a single presetal and no defined postsetal lobe . . . . .   | 16                   |
| 15 | Parapodia with two papillae . . . . .  | <i>octopapillata</i> |
| —  | Parapodia with at least six papillae . . . . .   | <i>balticum</i>      |
| 16 | Ventral cirrus distinctly different from the papillae and projecting beyond the presetal lobe . . . . .                            | <i>sphaerulifer</i>  |
| —  | Ventral cirrus similar to the papillae and not projecting beyond the presetal lobe . . . . .                                       | <i>benguellarum</i>  |
| 17 | Eighteen rows of dorsal macrotubercles . . . . .   | <i>capense</i>       |
| —  | Eleven to fourteen rows of dorsal macrotubercles . . . . .   | 18                   |
| 18 | Postsetal lobes absent . . . . .   | 19                   |
| —  | Two short postsetal lobes present . . . . .  | <i>minuta</i>        |
| 19 | Presetal lobe large and foliose; eyes absent . . . . .   | <i>pycnos</i>        |
| —  | Presetal lobe digitiform and erect; large eyes present . . . . .   | <i>oculata</i>       |

(15) *Sphaerodoropsis biserialis* (Berkeley and Berkeley, 1944)

(Fig. 3.17)

*Sphaerodorum biserialis* Berkeley and Berkeley, 1944, p. 3, figs. 1-3.*Sphaerodoridium biserialis* Lützen, 1961, p. 415; Hartman, 1968, p. 601; Imajima, 1969, pp. 154-155, figs. 3 (a)-(d).

DIAGNOSIS: *Sphaerodoropsis* with four rows of dorsal macrotubercles and scattered ventral papillae. Two pairs of lateral antennae. All parapodia (fig. 3.17) with bluntly conical acicular lobes and large, clavate presetal lobes. Ventral cirrus similar to the presetal lobe, but somewhat smaller. Each face of the parapodium with a single papilla near the base and the superior edge with two papillae of which the distal is the larger and distinctly truncate.

MATERIAL: 5190 (4); 6179 (1); 6994 (3).

DISTRIBUTION: Japan to western Mexico, mainly in shelf depths.

(16) *Sphaerodoropsis corrugata* Hartman and Fauchald, 1971*Sphaerodoridium* sp. A, Hartman, 1965, p. 94, pl. 14, fig. (f).*Sphaerodoropsis corrugata* Hartman and Fauchald, 1971, pp. 69-71, pl. 34, figs. (a)-(b).

DIAGNOSIS: *Sphaerodoropsis* with four rows of dorsal macrotubercles and two pairs of lateral antennae. Pre- and postsetal lobes absent; the superior edge of each parapodium with a truncate papilla and otherwise a single papilla on each face of the parapodium. Ventral cirrus not projecting beyond the acicular lobe.

DISTRIBUTION: Atlantic Ocean off New England and New York in slope and abyssal depths.

(17) *Sphaerodoropsis elegans* Hartman and Fauchald, 1971*Sphaerodoropsis elegans* Hartman and Fauchald, 1971, pp. 71-72, pl. 34, figs. (c)-(e).

DIAGNOSIS: *Sphaerodoropsis* with four rows of dorsal macrotubercles and three pairs of lateral antennae. Papillae present on dorsum and ventrum and parapodia two-three times as long as wide. Presetal lobes absent; postsetal lobes digitiform.

DISTRIBUTION: Abyssal depths in the Atlantic Ocean.

(18) *Sphaerodoropsis furca* new species

(Figs. 3.14-16)

DESCRIPTION: The type is a complete, ovigerous female, 2.2 mm long and 0.7 mm wide, with 19 setigers and setae. It is white and lacks colour patterns. The body is short and tumid.

The anterior end (fig. 3.14) is bluntly rounded. Three pairs of lateral antennae are present; they decrease in length from the inferior to the superior ones. The superior ones are slender with a basal spur; the intermediate and inferior ones are smooth; the intermediate ones are slightly thicker than the inferior ones and both are about twice as thick as the superior lateral antennae. The median antenna is very short and thick. The short peristomial cirri are slender. The whole anterior end is covered with short, blunt papillae.

All parapodia (fig. 3.15) are similar; each has a truncate acicular lobe and a long, digitate presetal lobe; postsetal lobes are absent. The ventral cirrus is digitate. A truncate papilla is near the tip on the superior edge of the



parapodium. Each parapodial face has a single rounded papilla near the superior edge; other papillae are absent. The skin of the parapodia is heavily wrinkled.

Four rows of macrotubercles are present; each is spherical and lacks a terminal papilla. Papillae are found scattered on the ventrum and between the rows of macrotubercles.

All setae are composite falcigers (fig. 3.16); each has a slightly inflated shaft and a slender, falcate appendage.

*S. furca* resembles *S. parva* closely. The superior antennae are furcate in *S. furca* and smooth in *S. parva*. Each face of the parapodium has a single papilla in *S. furca* and at least three in *S. parva*.

The holotype and only known specimen (AHF POLY 0951) was collected by the *Anton Bruun* in the Chile-Peru Trench, off Trujillo, Peru, 8°21'S, 81°25'W, 1296-1317 m depth, 14 October 1965, Menzies trawl, AB II st. 94.

(19) *Sphaerodoropsis laevis* new species

(Figs. 3.10-13)

DESCRIPTION: The type is a complete specimen, 1.7 mm long and 0.5 mm wide, with 12 setigers and setae. The other specimen is an ovigerous female with 15 setigers that is 1.9 mm long and 0.8 mm wide. Both specimens are white and lack colour patterns. The type is comparatively slender whereas the other specimen is distended by the large eggs.

The anterior end (fig. 3.12) is bluntly truncate; three pairs of lateral antennae are present. The short inferior antennae are digitate; the long intermediate ones are basally somewhat inflated and the short superior antennae are digitate. The median antenna is clavate. Three short, blunt papillae are on the anterior margin between the bases of the lateral antennae. The peristomial cirri are digitate and the peristomial bosses are covered with small, blunt papillae. The peristomium between the peristomial bosses has three or four transverse ridges; each of the median ridges has a small, clavate papilla.

All parapodia (fig. 3.13) are similar; each has a blunt acicular lobe, a long, thick ventral cirrus and a short, blunt postsetal lobe. Presetal lobes are absent. Papillae are absent from the parapodia.

Four rows of macrotubercles are present; each in the superior row has a very broad, transverse base and appears as a swelling of the dorsal epithelium (figs. 3.10 and 12). The lateral macrotubercles are hemispherical. Papillae are present on the prostomium and on the peristomial bosses, but are otherwise absent.

All setae are composite falcigers (fig. 3.11); each has a distinctly inflated shaft and a short, falcate appendage. A thin membrane covers the base of the appendage.

*S. laevis* differs sharply from all known sphaerodorids in the poorly defined macrotubercles. The lack of papillae makes the epithelium slightly iridescent.

Both specimens (Holotype: AHF POLY 0952; paratype: AHF POLY 0953) come from the same station in the Chile-Peru Trench: AB II st. 94, 8°21'S, 81°25'W, 1296-1317 m, 14 October 1965, Menzies trawl.



FIG. 3. *Sphaerodoropsis sphaerulifer*: (1) Microtubercle, 280 $\times$ . (2) Anterior end, dorsal view, 285 $\times$ . (3) Macrotubercle, 280 $\times$ . (4) Median parapodium, anterior view, 420 $\times$ . *Sphaerodoropsis pycnos*: (5) Median parapodium, posterior view, 285 $\times$ . (6) Composite seta, median parapodium, 570 $\times$ . *Sphaerodoropsis minuta*: (7) Median parapodium, anterior view, 420 $\times$ . *Sphaerodoropsis parvum*: (8) Anterior end, 130 $\times$ . (9) Median parapodium, anterior view, 285 $\times$ . *Sphaerodoropsis laevis*: (10) Diagram showing the relationship between the two rows of macrotubercles, appr. 200 $\times$ . (11) Composite seta, median parapodium, 570 $\times$ . (12) Anterior end, dorsal view, 130 $\times$ . (13) Median parapodium, anterior view, 285 $\times$ . *Sphaerodoropsis furca*: (14) Anterior end, dorsal view, 130 $\times$ . (15) Median parapodium, anterior view, 285 $\times$ . (16) Composite seta, median parapodium, 635 $\times$ . *Sphaerodoropsis biserialis*: (17) Median parapodium, anterior view, 285 $\times$ . *Sphaerodoropsis oculata*: (18) Composite seta, median parapodium, 570 $\times$ . (19) Anterior end, dorsal view, 130 $\times$ . (20) Median parapodium, posterior view, 285 $\times$ . *Sphaerodoropsis triplicata*: (21) Median parapodium, anterior view, 420 $\times$ . (22) Composite seta, median parapodium, 635 $\times$ .

(20) *Sphaerodoropsis longipalpa* Hartman and Fauchald, 1971

*Sphaerodoridium* sp. B, Hartman, 1965, p. 95, pl. 14, fig. (e).

*Sphaerodoropsis longipalpa* Hartman and Fauchald, 1971, pp. 72-73, pl. 34, figs. (f)-(g).

DIAGNOSIS: *Sphaerodoropsis* with four rows of dorsal macrotubercles and two pairs of lateral antennae. Both pre- and postsetal lobes present; ventral cirrus projects beyond the tip of the acicular lobe.

DISTRIBUTION: Atlantic Ocean from New England to Brazil in slope and abyssal depths.

(21) *Sphaerodoropsis minuta* (Webster and Benedict, 1887)

(Fig. 3.7)

*Ephesia minuta* Webster and Benedict, 1887, pp. 728-729, pl. 4, figs. 64-66.

*Ephesiella minuta* Pettibone, 1963, p. 208.

*Sphaerodoridium minutum* Hartman, 1968, p. 603.

DIAGNOSIS: *Sphaerodoropsis* with several, usually between ten and twelve, rows of small dorsal macrotubercles and the ventrum completely covered with small papillae. Each parapodium (fig. 3.7) with a bluntly rounded acicular lobe, a single digitate presetal lobe and two nearly spherical postsetal lobes. A single papilla on each face of the parapodia; ventral cirrus long, but does not project beyond the tip of the other lobes.

MATERIAL: 2114 (1); 4820 (1); 4842 (1); 4910 (6); 4941 (1); 5258 (1); 5743 (1); 5752 (1); Seal Cove, Moss Beach, California, 2 August 1933, from coralline holdfast (2).

DISTRIBUTION: Atlantic Ocean off New England; Pacific Ocean from western Canada to California, mainly in shelf depths.

(22) *Sphaerodoropsis oculata* new species

(Fig. 3.18-20)

*Sphaerodoridium minutum* Hartman, 1967, p. 86, partim (not Webster and Benedict, 1887).

DESCRIPTION: The type is a complete specimen, 2.1 mm long and 1 mm wide, with 27 setigers and setae. It is white and lacks colour patterns. The body is filled with a number of large eggs, but the anterior and posterior ends are distinctly slimmer than the distended middle part of the specimen.

The anterior end (fig. 3.19) is bluntly rounded. Two pairs of lateral antennae are present; each of the inferior ones is long and digitate and has one or two smaller papillae along the outer margin. Each of the superior antennae is basally somewhat swollen with a long slender tip and has two short papillae along the median edge. The median antenna is long and basally inflated. The peristomial cirri are digitate. The margin between the peristomial cirri and the bases of the lateral antennae is densely covered with long, slender papillae, but the rest of the anterior end is smooth. A single pair of very large, circular eyes is posterior to the bases of the lateral antennae.

All parapodia (fig. 3.20) are similar; each has a slender, bluntly conical acicular lobe and a long erect presetal lobe. Postsetal lobes are absent. The ventral cirrus is slender and projects beyond the tip of the acicular lobe. Each face of the parapodium has a single, round papilla near the middle of the parapodium. A pair of similar papillae is present on the superior and inferior edges near the base of the parapodium.

Ten or eleven rows of macrotubercles are present; these are arranged in transverse rows so that each segment has ten or eleven tubercles in a zig-zag pattern. Papillae cover the ventrum and are found between the rows of macrotubercles; each is short and blunt.

All setae are composite falcigers (fig. 3.18) each has a slender, slightly inflated shaft and a short, falcate appendage.

*S. oculata* resembles *S. pycnos*, new species, in that both have approximately eleven rows of macrotubercles. The presetal lobes are digitate in *S. oculata* and foliose in *S. pycnos*. A pair of very prominent eyes are present in *S. oculata* and absent in *S. pycnos*.

The holotype (AHF POLY 0956) and five paratypes (AHF POLY 0957) come from the same station, Elt. 272, off the Antarctic Peninsula in 412 m depth. Complete data can be found in the station list.

(23) *Sphaerodoropsis parva* (Ehlers, 1913)

(Fig. 3.8-9)

*Sphaerodorum parvum* Ehlers, 1913, pp. 504-507, pl. 35, figs. 7-12; Hartman, 1964, p. 107, pl. 33, figs. 4-5; Hartman, 1967, pp. 86-87.

DIAGNOSIS: *Sphaerodoropsis* with four rows of dorsal macrotubercles and three pairs of lateral antennae of which the inferior are the longer and the superior the shorter (fig. 3.8). The whole anterior end densely covered with papillae increasing in length towards the lateral and anterior margins.

Each parapodium (fig. 3.9) with a truncate acicular lobe, a long, slender presetal lobe and a somewhat shorter ventral cirrus. Each parapodial face with three or four small, blunt papillae and a similar number of papillae is on the inferior and superior margins.

MATERIAL: Elt. 127 (3); Elt. 250 (1); Elt. 272 (1); Elt. 350 (6); Elt. 394 (8); Elt. 418 (1); Elt. 439 (1); Elt. 480 (2); Elt. 740 (3); Elt. 939 (1); Elt. 1003 (3); Elt. 1053 (3); Elt. 1084 (1); Elt. 1248 (1); St. Isl. 9-63 (1).

DISTRIBUTION: Antarctic and sub-Antarctic Seas in all depths.

(24) *Sphaerodoropsis pycnos* new species

(Fig. 3.5-6)

*Sphaerodorum minutum* Hartman, 1967, p. 86, partim (not Webster and Benedict, 1887).

DESCRIPTION: The type is a complete specimen, 1.2 mm long and 0.5 mm wide, with 18 setigers and setae. It is an ovigerous female and is white and lacks colour patterns.

The anterior end is bluntly rounded; two pairs of lateral antennae are present; both pairs and the median antenna are short and blunt. The whole anterior end is covered with short, blunt papillae. The peristomial cirri are digitate.

All parapodia (fig. 3.5) are similar; each has a short, conical acicular lobe and a very large, foliose presetal lobe that covers the whole anterior face of the parapodium. Postsetal lobes are absent. The clavate ventral cirrus reaches the tip of the acicular lobe.

Eleven rows of macrotubercles are present; they are arranged in a zig-zag pattern across each segment so that there are five in an anterior transverse row

and six in a similar posterior row. The ventrum is densely covered with short papillae and similar papillae are found between the rows of macrotubercles on the dorsum.

All setae are composite falcigers (fig. 3.6); each has a distinctly inflated shaft and a short, falcate appendage. The upper end of the shafts and the cutting edge of the appendages have fine teeth.

*S. pycnos* is the only known sphaerodorid that has large, foliose presetal lobes.

The holotype (AHF, POLY 0949) comes from Elt. st. 1084; the paratype and only other specimen comes from St. Isl. 6-63. Complete data can be found in the station list.

DISTRIBUTION: Antarctic Ocean near the Antarctic Peninsula and the South Orkney Islands in shelf and upper slope depths.

(25) *Sphaerodoropsis sphaerulifer* (Moore, 1909)

(Fig. 3.1-4)

*Sphaerodorum sphaerulifer* Moore, 1909, p. 336.

*Sphaerodoridium sphaerulifer* Lützen, 1961, p. 415; Hartman, 1968, p. 605.

REMARKS: *S. sphaerulifer* is the type-species of the genus; it has been poorly known and a somewhat extended description is given below.

The body is short and tumid with 25-26 setigers; it has 7-8 rows of sessile dorsal macrotubercles (fig. 3.3). The papillae (fig. 3.1) are also spherical and cover the ventrum completely and are found in large numbers between the macrotubercles and on the anterior end.

The anterior end (fig. 3.2) is bluntly rounded; two pairs of lateral antennae are present; each antenna is short and truncate. The short median antenna is strongly inflated distally. All parapodia (fig. 3.4) are similar; each has a truncate acicular lobe and a short, digitate presetal lobe. The digitate ventral cirrus is terminal in position and is twice as long as the presetal lobe. A small papilla is on each face of the parapodium. The setae are short with a strongly inflated shaft and a short, falcate appendage.

MATERIAL: 2292 (1); 2294 (1); 2448 (4); 2451 (2); 2646 (1); 2725 (4); 3203 (4); 3204 (2); 3385 (4); 4824 (4); 4835 (1); 4983 (1); 5255 (1); 5402 (1); 5632 (1); 5828 (1); 5886 (2); 6846 (1); 7038 (1); 7161 (5).

DISTRIBUTION: Central and southern California in shelf and slope depths.

(26) *Sphaerodoropsis triplicata* new species

(Fig. 3.21-22)

DESCRIPTION: The type is a complete specimen, 3.5 mm long and 1 mm wide, with 23 setigers and setae. It is light brown and lacks colour patterns. The body is short and plump.

The bluntly truncate anterior end has two pairs of lateral antennae; the long inferior ones are digitate, the short superior antennae are slender. The median antenna is a little shorter than the inferior lateral ones. The peristomial cirri are slender. The surface of the prostomium is covered with short, blunt papillae.

All parapodia (fig. 3.21) are similar; each has a conical acicular lobe and a long, digitate presetal lobe; postsetal lobes are absent. The large ventral cirrus is distally somewhat inflated. The skin is strongly wrinkled. Two large

papillae are near the tip of the acicular lobe on the superior edge; otherwise the parapodia are smooth.

Four rows of macrotubercles are present; each is spherical and lacks a terminal papilla. Papillae are found scattered on the ventrum and among the rows of macrotubercles; each is short and blunt.

All setae are composite falcigers (fig. 3.22); each has a slender shaft and a long, distally falcate appendage.

*S. triplicata* differs from the similar *S. philippi* (Fauvel, 1911) in that it has smooth parapodia except for two very large papillae on the superior edge. *S. philippi* has digitate papillae scattered on both parapodial faces. The ventral cirrus projects beyond the tip of the acicular lobe in *S. triplicata* and is relatively short in *S. philippi*.

Both the holotype (AHF, POLY 0958) and the only other specimen, the paratype (AHF, POLY 0959) come from one station taken by the *Anton Bruun* Cruise 7 to the Indian Ocean. This station is off Durban, st. 389 G, 29°57'–55'S, 31°31'–39'E, 715–675 m depth, mud bottom, 8 September 1964, Llano-trawl.

#### *SPHAERODOROPSIS* species indeterminable

REMARKS: This specimen was reported as *Sphaerodorum fusum* by Hartman (1967, p. 85). It resembles *Sphaerodoropsis pycnos*, but cannot be positively identified.

MATERIAL: Eln. 412 (1).

#### *SPHAERODORUM* Ørsted, 1843, restricted

*Sphaerodorum* is here retained for *S. gracilis* (Rathke, 1843) and related species as the earliest available generic name. The tangled synonymy has been reviewed above and a definition of the genus as accepted here has been given.

Type-species is *S. gracilis* as indicated above; four other species are considered belonging to this genus.

#### Key to species of *Sphaerodorum*

- |   |   |                    |
|---|---|--------------------|
| 1 | First setiger with recurved hooks . . . . .   | 2                  |
| – | First setiger with setae similar to those in the other setigers . . . . .               | 4                  |
| 2 | Parapodia with numerous very large papillae . . . . .                                   | <i>indutum</i>     |
| – | Parapodia with short and scattered papillae . . . . .                                   | 3                  |
| 3 | Parapodia conical; each parapodial face with five or six papillae . . . . .             | <i>gracilis</i>    |
| – | Parapodia with nearly parallel sides; each face with at least twelve papillae . . . . . | <i>papillifer</i>  |
| 4 | All setae curved with a basal spur . . . . .  | <i>recurvatum</i>  |
| – | One or two curved, spurred setae in a parapodium; most setae slender with no spur       | <i>vietnamense</i> |

#### (27) *Sphaerodorum gracilis* (Rathke, 1843)

(fig. 4.1–5)

*Ephesia gracilis* Fauvel, 1923, pp. 377–378, fig. 148 (a)–(f).

*Sphaerodorum gracilis* Pettibone, 1963, pp. 207–208, fig. 52 (a)–(c); Inajima, 1969, pp. 152–153, fig. 1 (a)–(c).

DIAGNOSIS AND REMARKS: *Sphaerodorum* with recurved hooks in the first setiger; conical parapodia with five to six papillae on each face. Microtubercles

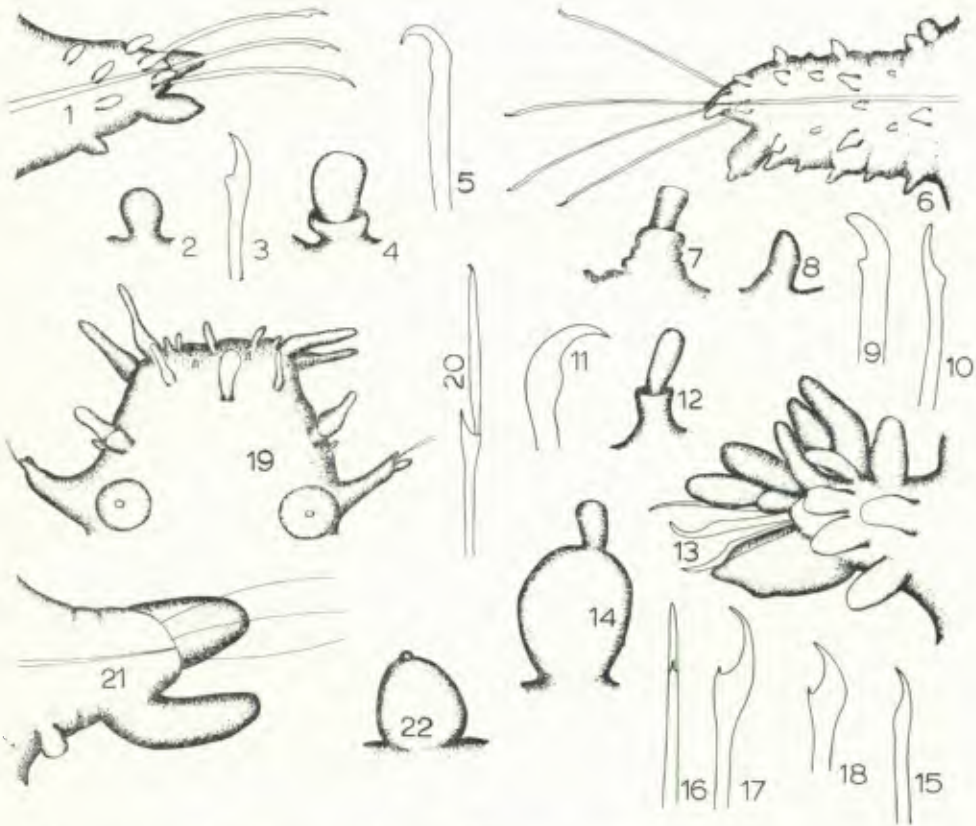


FIG. 4. *Sphaerodorum gracilis*: (1) Median parapodium, anterior view, 212.5 $\times$ . (2) Papilla, 420 $\times$ . (3) Simple seta, median parapodium, 420 $\times$ . (4) Microtubercle, 420 $\times$ . (5) Recurved hook, first setiger, 420 $\times$ . *Sphaerodorum papillifer*: (6) Median parapodium, anterior view, 130 $\times$ . (7) Microtubercle, 420 $\times$ . (8) Papilla, 420 $\times$ . (9) Recurved hook, first setiger, 570 $\times$ . (10) Simple seta, median parapodium, 570 $\times$ . *Sphaerodorum indutum*: (11) Recurved hook, first setiger, 420 $\times$ . (12) Microtubercle, 285 $\times$ . (13) Median parapodium, anterior view, 420 $\times$ . (14) Macrotubercle, 285 $\times$ . (15) Simple seta, median parapodium, 420 $\times$ . *Sphaerodorum recurvatum*: (16) Simple seta, median parapodium, frontal view, 570 $\times$ . (17) Simple seta, median parapodium, lateral view, 570 $\times$ . *Sphaerodorum vietnamense*: (18) Simple seta, median parapodium, lateral view, 570 $\times$ . *Sphaerephesia chilensis*: (19) Anterior end, dorsal view, 130 $\times$ . (20) Composite seta, median parapodium, 635 $\times$ . (21) Median parapodium, posterior view, 420 $\times$ . (22) Macrotubercle, 285 $\times$ .

with short and wide collars and long terminal papillae. Setae with distinct subdistal bosses.

*S. gracilis* differs from *S. papillifer* mostly in the disposition of papillae on the parapodia (fig. 4.1), in the shape of the microtubercles (fig. 4.4) and the two kinds of setae (figs. 4.3 and 5).

DISTRIBUTION: Atlantic Ocean off Europe and America; Japan, Atlantic Ocean. Some of these reports probably concern similar species.

(28) *Sphaerodorum indutum* new species

(Fig. 4.11–15)

*Sphaerodoridium antarcticum* Hartman, 1967, p. 85, partim (not McIntosh, 1885).

DESCRIPTION: The type is a complete specimen, 10 mm long and 0.7 mm wide, with 74 setigers and setae. It is white and lacks colour patterns. The body is cylindrical.

The anterior end is blunt; two pairs of short, blunt lateral antennae are present. The median antenna is similar to the lateral ones, but is somewhat longer. The peristomial cirri are short. The whole anterior is covered with long papillae.

All parapodia (fig. 4.13) are similar; the anterior ones are somewhat shorter than the median and posterior parapodia. Each has a conical acicular lobe and a very large, thick ventral cirrus. Other lobes cannot be distinguished since the whole parapodium is covered with very large papillae; the number of papillae seems to vary between fifteen and twenty, but can be ascertained only with difficulty.

Two rows of macrotubercles are present; each (fig. 4.14) is pear-shaped and has a long, cylindrical terminal papilla. Each microtubercle (fig. 4.12) has a long, slender basal collar and a long, digitate terminal papilla. Papillae cover the ventrum completely and are present in large numbers between the rows of macro- and microtubercles on the dorsum.

Each of the first parapodia has two large, recurved hooks (fig. 4.11). All other setae (fig. 4.15) are simple, slightly curved and have distinct subdistal swellings.

The large number of very large papillae on the parapodia and elsewhere are features not found in any other species of *Sphaerodorum*.

**MATERIAL:** Eln. 410 (8); Eln. 418 (7); Eln. 437 (1); Eln. 480 (5); Eln. 678 (1); Eln. 939 (1); Eln. 993 (1, Holotype AHF, POLY 0960); Eln. 1081 (11); Eln. 1082 (2).

**DISTRIBUTION:** Antarctic Ocean from the Scotia Sea to Peter I Island in slope and abyssal depths.

(29) *Sphaerodorum papillifer* Moore, 1909

(Fig. 4.6–10)

*Sphaerodorum papillifer* Moore, 1909, pp. 333–335, pl. 15, figs. 11–12; Hartman, 1968, p. 609.

**DIAGNOSIS:** *Sphaerodorum* with recurved hooks (fig. 4.9) and parapodia (fig. 4.6) with parallel sides; each face with numerous small, conical papillae. Microtubercles (fig. 4.7) with the basal portion as long as the terminal papilla. Setae with an indistinct lateral boss (fig. 4.10).

**MATERIAL:** 1191 (3); 1267 (2); 1268 (5); 1289 (2); 1295 (1); 1416 (1); 2052 (1); 2053 (1); 2126 (1); 2128 (2); 2414 (2); 2996 (2); 3033 (1); 3538 (1); 4941 (22); 5614A (1); 6348 (3); 6806 (1); 6819 (1); 6836 (3); Monterey, California, in shale. 11–14 m, 3 June 1934, coll. E. F. Ricketts (1). Between Hyperion and El Segundo Pier, El Segundo, California, 18–45 m, sand, 23 November 1941, coll. Burch (1); Santa Monica Canyon, California, 180 m, November 1958 (1).

**DISTRIBUTION:** Pacific Ocean from southern California to western Mexico in shelf and slope depths.

(30) *Sphaerodorum recurvatum* new species

(Fig. 4.16–17)

**DESCRIPTION:** This description is based on three fragments, none of which are complete anteriorly, so the prostomial features are unknown. The smaller fragment has 45 setigers and is 5.2 mm long and 1 mm wide with setae, so the



species definitely belong to the larger sphaerodorids. The body is cylindrical and the skin is strongly wrinkled. Colour patterns are absent.

The parapodia are prominent and have conical acicular lobes. The short presetal lobes are digitate; postsetal lobes are absent. The ventral cirrus has a distinct digitiform tip and projects well beyond the tip of the acicular lobe. The surface of the parapodium is wrinkled; papillae are absent.

Two rows of macro- and two rows of microtubercles are present; each macrotubercle is ovate and has a short, digitate terminal papilla. Papillae are scattered on the ventrum; each segment has two or three; papillae are absent from the dorsum.

All setae (fig. 4.16–17) are similar; each is strongly recurved with a widened subdistal portion; a small spur is present on the concave side of the curve. In frontal view the setae are narrowing evenly from the base and the spur can be seen to be definitely narrower than the rest of the setae.

*S. recurvatum* resembles *S. vietnamense*, new name, in having spurred, recurved setae. All setae are of this kind in *S. recurvatum*, *S. vietnamense* has also a series of normal, nearly straight simple setae of the kind usually found in the genus. Papillae are limited to a few on the ventral side in *S. recurvatum* and are found on both sides of the body in *S. vietnamense*.

All three fragments (AHF, POLY 0962 has been designed as holotype; AHF POLY 0963 is the two paratype-fragments) are from one station in the Indian Ocean off Durban, taken by the *Anton Bruun* on Cruise 7 at st. AB 390 C, 29°45'S, 31°40–39'E, 445–430 m depth, 8 September 1964, Agassiz trawl.

(31) *Sphaerodorum vietnamense*, new name

(Fig. 4.18)

*Sphaerodorum* sp. A, Gallardo, 1968, p. 67, pl. 16, figs. 4–5.

DIAGNOSIS AND REMARKS: *Sphaerodorum* without recurved hooks in the first setiger. Parapodia with short, blunt presetal lobes ventral cirri very long and slender. Setae of two kinds, either strongly recurved and spurred (fig. 4.18) or, more numerous, slender with a subdistal boss.

This species was described, but not named by Gallardo (1968).

The holotype and only known specimen (AHF, POLY 0961) is from st. 175/p 4, 2 miles N of Mui Tre, Hon Lon, Bay of Nha Trang, South Vietnam, 32 m, van Veen grab in slightly muddy sand with pebbles, 25 February 1960, coll. V. A. Gallardo.

**SPHAEREPHESIA** Fauchald, 1972

The genus is defined above. It differs from all four genera of short-bodied sphaerodorids in that it has terminal papillae on the macro-tubercles. Four genera with such papillae on the macro-tubercles are known; three of these, *Ephesiella*, *Ephesiopsis* and *Sphaerodorum* have only two rows of macro-tubercles and the terminal papillae are long. *Sphaerephesia* has four rows of macro-tubercles and the terminal papillae are short.

Three species are assigned to the genus; type-species is *S. longisetis* Fauchald (1972, pp. 97–98, pl. 20, figs. (a)–(c)).

Key to species of *Sphaerephesia*

- |   |  |                    |
|---|--|--------------------|
| 1 | Setae more than twice as long as the parapodia; microtubercles present between the parapodia . . . . . | <i>longisetis</i>  |
| - | Setae no longer than the parapodia; microtubercles absent . . . . .                                    | 2                  |
| 2 | Two pairs of lateral antennae; parapodia with numerous short papillae . . . . .                        | <i>similisetis</i> |
| - | Three pairs of lateral antennae; parapodia with one or two large papillae . . . . .                    | <i>chilensis</i>   |

(32) *Sphaerephesia chilensis*, new species

(Fig. 4.19-22)

*Sphaerodorum parvum* Wesenberg-Lund, 1962, pp. 106-108, figs. 48-49 (not Ehlers, 1913).

DESCRIPTION: The type is a complete specimen, 1.5 mm long and 0.5 mm wide, with 12 setigers and setae. Other, larger specimens are available; the largest is an ovigerous female with 20 setigers that is 2.1 mm long. All specimens are white and lack colour patterns.

The anterior end (fig. 4.19) is broadly truncate; three pairs of lateral antennae are present. The inferior two pairs are similar, each is long and slender with a basal inflation. The superior lateral antennae are less than half the length of the other ones and slender. The short median antenna is distally inflated. The short peristomial cirri have basal inflations. Small papillae are near the bases of the peristomial cirri and eight papillae are within the space formed by the antennae; otherwise the anterior end is smooth.

All parapodia (fig. 4.21) are similar; each has a short, broadly rounded acicular lobe, a large, digitiform presetal lobe and a very large, digitiform ventral cirrus. A papilla is on the ventral side near the base and the skin is faintly wrinkled.

Four rows of macrotubercles are present; each tubercle (fig. 4.22) is spherical and has a short, distinct terminal papilla. The ventrum is densely studded with papillae in the larger specimens; the smaller specimens, including the type, have a sparse cover of papillae.

All setae are composite falcigers (fig. 4.20); each has a slender shaft and a long, slightly falcate appendage.

Three pairs of antennae are present in *S. chilensis*; both the other species in the genus have only two pairs.

MATERIAL: M4B (1); M29B (6), Holotype, deposited in Riksmuseet, Stockholm, Sweden, paratypes at the same location and in the AHF, POLY 0968; M70B (no specimen recovered); M123 (6); M145A (10); M147A (1).

DISTRIBUTION: Central and southern Chile in intertidal and shallow subtidal areas.

(33) *Sphaerephesia longisetis* Fauchald, 1972*Sphaerephesia longisetis* Fauchald, 1972, pp. 97-98, pl. 20, figs. (a)-(e).

DIAGNOSIS: *Sphaerephesia* with two pairs of lateral antennae. Microtubercles present and setae greatly prolonged.

DISTRIBUTION: Southern California and western Mexico in slope depths.

(34) *Sphaerephesia similisetis* Fauchald, 1972*Sphaerephesia similisetis* Fauchald, 1972, pp. 98-99, pl. 21, figs. (a)-(c).

DIAGNOSIS: *Sphaerephesia* with two pairs of lateral antennae. Microtubercles absent and setae short.

DISTRIBUTION: Southern California and western Mexico in shelf and slope depths.

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This study would have been impossible without the constant advice and encouragement of Dr. Olga Hartman.

### Appendix A: Survey of genera and species of *Sphaerodoridae*

Reference to the original descriptions, the generic names under which each species was originally described and a general reference to the type locality is given for each species.

*Clavodorum* Hartman and Fauchald, 1971

*atlanticum* Hartman and Fauchald, 1971, pp. 63–64, pl. 32, figs. (a)–(d); Atlantic Ocean, type-species.

*bengalorum*, new species; Bay of Bengal.

*clavatum* Fauchald, 1972, pp. 94–95, pl. 18, figs. (a)–(c); California.

*fusum* (Hartman, 1967, pp. 85–86, as *Sphaerodorum*); Antarctic Ocean.

*longipes*, new species; Indian Ocean off Durban.

*Commensodorum*, new genus

*commensalis* (Lützen, 1961, pp. 409–416, 1 fig., as *Sphaerodorum*), type-species; Denmark.

*Ephesiella* Chamberlin, 1919, p. 182, *sensu* Hartman and Fauchald, 1971

*abyssorum* (Hansen, 1878, p. 9, pl. 6, figs. 9–12, as *Sphaerodorum*), type-species; Norwegian Sea.

*antarctica* (McIntosh, 1885, pp. 361–362, pl. 44, fig. 5, pl. 22A, figs. 22–23, as *Ephesia*); Antarctic Ocean.

*brevicapitis* (Moore, 1909, pp. 335–336, pl. 15, figs. 13–14, as *Sphaerodorum*); California.

*gallardi*, new name for *Sphaerodorum* sp. B, Gallardo (1968, pp. 67–68, pl. 16, figs. 6–9); South Vietnam.

*macrocirris* Hartman and Fauchald, 1971, pp. 65–66, pl. 32, figs. (e)–(h); Atlantic Ocean.

*manmifera*, new species, western Mexico.

*mixta* Hartman and Fauchald, 1971, pp. 66–67, pl. 32, figs. (i)–(n); Atlantic Ocean.

*pallida*, new species; Antarctic Ocean.

*Ephesiopsis* Hartman and Fauchald, 1971

- guayanae* Hartman and Fauchald, 1971, pp. 68–69, pl. 33, figs. (a)–(g), type-species; Atlantic Ocean.
- Levidorum* Hartman, 1967
- scotiarum* Hartman, 1967, pp. 83–84, pl. 28, type-species; Antarctic Ocean.
- Sphaerodoridium* Lützen, 1961
- claparedii* (Greff, 1866, pp. 338–351, 14 figs. as *Sphaerodorum*), type-species, *sensu* Lützen (1961, p. 415); English Channel.
- Sphaerodoropsis* Hartman and Fauchald, 1971
- balticum* (Reimers, 1933, pp. 41–110, 45 figs., as *Sphaerodorum*); Baltic Sea.
- benguellarum* (Day, 1963, p. 407, figs. 7 (a)–(c), as *Sphaerodorum*); South Africa.
- biserialis* (Berkeley and Berkeley, 1944, p. 3, figs. 1–3, as *Sphaerodorum*); western Canada.
- capense* (Day, 1963, pp. 407–408, figs. 7 (d)–(f), as *Sphaerodorum*); South Africa.
- corrugata* Hartman and Fauchald, 1971, pp. 69–71, pl. 34, figs. (u)–(b); Atlantic Ocean.
- distichum* (Eliason, 1962, pp. 247–248, figs. 12 (a)–(d), as *Sphaerodorum*); Skagerrack.
- elegans* Hartman and Fauchald, 1971, pp. 71–72, pl. 34, figs. (c)–(e); Atlantic Ocean.
- furca*, new species; off Peru.
- laevis*, new species; off Peru.
- longipalpa* Hartman and Fauchald, 1971, pp. 72–73, pl. 34, figs. (f)–(g); Atlantic Ocean.
- malayana* (Augener, 1933, pp. 243–245, as *Sphaerodorum philippi malayana*); Banda, Indonesia.
- minuta* (Webster and Benedict, 1887, pp. 728–729, pl. 4, figs. 64–66, as *Ephesia*); off New England.
- octopapillata* (Hartmann-Schröder, 1965, pp. 152–154, figs. 122–125, as *Sphaerodoridium*); Chile.
- oculata*, new species; Antarctic Ocean.
- parva* (Ehlers, 1913, pp. 504–507, pl. 35, figs. 7–12, as *Sphaerodorum*); Antarctic Ocean.
- philippi* (Fauvel, 1911, pp. 19–21, pl. 1, figs. 16–20, as *Sphaerodorum*); Kara Sea.
- pycnos*, new species; Antarctic Ocean.
- sphaerulifer* (Moore, 1909, p. 336, as *Sphaerodorum*); type-species; California.
- spissum* (Benham, 1921, pp. 74–77, pl. 9, figs. 82–89, as *Sphaerodorum*); Sub-Antarctic Ocean.
- triplicata*, new species; Indian Ocean off Durban.
- Sphaerodorum* Ørsted, 1843, p. 42
- gracilis* (Rathke, 1843, p. 176, pl. 7, figs. 5–8, as *Ephesia*); type-species, Norway.
- indutum*, new species; Antarctic Ocean.
- papillifer* Moore, 1909, pp. 333–335, pl. 15, figs. 11–12; California.
- recurvatum*, new species; Indian Ocean off Durban.
- vietnamense*, new name for *Sphaerodorum* sp. A, Gallardo, 1968, p. 67, pl. 16, figs. 4–5; South Vietnam.

*Sphaerephesia* Fauchald, 1972*chilensis*, new species; Chile.*longisetis* Fauchald, 1972, pp. 97–98, pl. 20, figs. (a)–(e); type-species; Mexico.*similisetis* Fauchald, 1972, pp. 98–99, pl. 21, figs. (a)–(c); western Mexico.**Appendix B. Station lists**1. *Collections of the Velero III and Velero IV of the Allan Hancock Foundation*

1191. 30 October 1940. S. side of Santa Cruz Island, from 33°58'10"N, 119°37'40"W to 33°57'45"N, 119°38'20"W, 67–72 m, grey sand and shell.
1267. 16 March 1941. 2½–3 miles NW of Anacapa Island Light, from 34°02'30"N, 119°23'35"W to 34°03'00"N, 119°24'30"W, 85–94 m, grey-green sand.
1268. 16 March 1941. 2½ miles NW of Anacapa Island Light, 34°03'00"N, 119°23'50"W, 87–92 m, grey-green sand.
1289. 11 April 1941. 2.6 miles E of E. point, Santa Rosa Island, from 33°56'05"N, 119°54'50"W to 33°55'50"N, 119°55'00"W, 85–90 m, green mud.
1295. 12 April 1941. 1 mile SE of Smugglers Cove, Santa Cruz Island, from 34°05'25"N, 119°31'30"W to 34°00'40"N, 119°31'35"W, 31–34 m, coralline, sand, pebbles.
1416. 16 September 1941. 2½ miles NE of Cardwell Point, San Miguel Island, from 34°02'45"N, 120°16'00"W to 34°03'15"N, 120°16'00"W, 41–54 m, sand and rocks.
2052. 8 September 1951. 2.7 miles SSE of Long Beach Light, 160°T, from 33°41'05"N, 118°10'36"W to 33°40'40"N, 118°12'03"W, 23–25 m, sand, mud, kelp and red algae.
2053. 8 September 1951. 2.6 miles SE of Los Angeles Light, 137°T, from 33°40'27"N, 118°13'20"W to 33°40'42"W, 118°12'03"W, 21–22 m, rock, kelp with holdfasts.
2080. 2 November 1951. Hancock Cove, 20 miles E of Punta Eugenia, Baja California, 27°48'47"N, 114°43'07"W, shore, rock.
2114. 18 June 1952. 1.9 miles WSW of Newport Beach Pier, 252°T, 33°35'45"N, 117°57'57"W, 31 m, mud and sand.
2126. 25 June 1952. 9.2 miles SSE of Los Angeles Lighthouse, 156.5°T, 33°34'05"N, 118°10'04"W, 86 m, mud, coralline clumps.
2128. 25 June 1952. 0.3 miles E of Long Point Light, Santa Catalina Island, from 33°24'30"N, 118°21'33"W to 33°24'15"N, 118°21'35"W, 76–121 m, sand.
2292. 24 April 1953. 10.6 miles SE of Los Angeles Breakwater, 131°T, 33°35'30"N, 118°05'30"W, 108 m, mud.
2294. 24 April 1953. 1.45 miles SSE of Newport West Jetty Light, 157°T, 33°33'56"N, 117°52'00"W, 87 m, fine grey and green mud.
2414. 17 September 1953. 12.9 miles ENE of Long Point, Santa Catalina Island Light, 064°T, 33°30'00"N, 118°08'00"W, 319 m, sand and rock.
2448. 14 October 1953. 3.5 miles NW of Dana Point, 313°T, 33°30'00"N, 117°46'00"W, 54 m, grey mud.
2451. 15 October 1953. 2.35 miles NW of Long Point Light, Santa Catalina Island, 313°T, 33°26'02"N, 118°24'00"W, 200 m, grey sand, clay.

2646. 25 April 1954. 1.8 miles SW of the end of Huntington Beach Pier, 228°T, 33°37'58"N, 118°01'57"W, 22 m.
2725. 8 May 1954. 4.1 miles NW of Palos Verdes Point, 331°T, 33°50'00"N, 118°28'00"W, 105 m, coarse green mud.
2996. 5 February 1955. 6.25 miles W of base of El Segundo Pier, 272°T, 33°55'03"N, 118°33'04"W, 90 m, rock.
3033. 7 May 1955, 12.7 miles NW of San Nicholas Island, 333°T, 33°25'45"N, 119°37'00"W, 135 m, rock, gravel.
3203. 7 July 1955. 2.4 miles SE of Malibu Pier, 146°T, 34°00'00"N, 118°39'13"W, 61 m, fine green sand.
3204. 7 July 1955. 4.0 miles SSE of Malibu Point, 160°T, 33°58'10"N, 118°39'10"W, 207 m, green silty mud.
3385. 23 August 1955. 7.4 miles SW of end of El Segundo Pier, 229°T, 33°50'00"N, 118°32'23"W, 117 m, fine sandy mud.
3538. 8 October 1955. 4.3 miles ENE of Long Point Light, Santa Catalina Island, from 33°26'20"N, 118°18'45"W to 33°24'40"N, 118°17'15"W, 756 m, mud rock.
4824. 17 January 1957. 15.9 miles 276°T from Santa Barbara Point Light, 34°25'28"N, 120°02'35"W, 68 m.
4835. 6 February 1957. 11 miles 271°T from Port Hueneme Light, 34°02'15"N, 119°01'45"W, 139 m.
4840. 6 February 1957. 3.4 miles 184°T from Ventura Pier Light, 34°13'00"N, 119°17'50"W, 20 m.
4842. 7 February 1957. 4.2 miles, 311.5°T from Port Hueneme Light, 34°11'10"N, 119°15'50"W, 20 m.
4910. 26 March 1957. 10 miles 174°T from Point Loma Light, 32°30'00"N, 117°13'15"W, 40 m.
4941. 9 April 1957. 3.3 miles 103°T from Point Concepcion Light, 34°26'10"N, 120°24'20"W, 22 m.
4983. 11 April 1957. 5.9 miles 110.5°T from Santa Barbara Breakwater Light, 34°22'12"N, 119°34'35"W, 38 m.
5190. 14 August 1957. 7.25 miles 171°T from Point Loma Light, 32°32'45"N, 117°13'20"W, 41 m, red sand.
5255. 17 September 1957. 3 miles 282°T from Point Dume Buoy, 34°00'05"N, 118°52'00"W, 88 m, green mud.
5258. 18 September 1957. 10.5 miles 248°T from Ventura Pier Light, 34°12'17"N, 119°29'15"W, 92 m, green silty sand.
5402. 21 November 1957. 5.4 miles 087.5°T from Santa Barbara Point Light, 34°24'15"N, 119°36'45"W, 25 m, green mud.
- 5614A. 18 February 1958. 1.7 miles 302°T from Point Loma Light, 32°40'45"N, 117°16'15"W, 32 m, medium grey sand.
5632. 22 February 1958. 2.7 miles 214°T from San Clemente Pier, 33°22'50"N, 117°39'00"W, 58 m, fine green sand.
5743. 16 May 1958. 7.2 miles 125°T from Los Angeles Harbor Light, 33°38'20"N, 118°07'47"W, 34 m, fine green sand.
5752. 16 May 1958. 5 miles 113.5°T from Los Angeles Harbor Light, 33°40'30"N, 118°09'30"W, 26 m, fine green sand.
5828. 21 August 1958. 10 miles 231.5°T from Ventura Pier Light, 34°10'00"N, 118°26'57"W, 151 m, olive green silty sand with shells.

5886. 14 October 1958. 4.8 miles 321°T from La Jolla Pier, 32°55'50"N, 117°18'48"W, 85 m, silty coarse sand.
6179. 22 March 1959. 9 miles 159°T from Morro Hermosa Point, Baja California. 27°23'15"N, 114°40'45"W, 74 m, pulverized shell and glauconitic sand.
6348. 16 August 1959. 37 miles 177°T from San Nicholas Island, 32°37'30"N, 119°27'50"W, 1246 m, glauconitic sand.
6806. 22 December 1959. 2.45 miles 249.5°T from Gull Island, Santa Cruz Channel, 33°56'06"N, 118°52'17"W, 202 m, rocks, glauconitic sand.
6819. 27 January 1960. 2.35 miles 186.5°T from Catalina Head, Santa Catalina Island, 33°22'54"N, 118°31'07"W, 337 m, green mud.
6836. 29 January 1960. 35.3 miles 249°T from China Point Light, San Clemente Island, 32°35'48"N, 119°04'55"W, 409 m, coarse muddy sand.
6841. 30 January 1960. 8.2 miles 123°T from Pyramid Head Light, San Clemente Island, 32°44'29"N, 118°12'30"W, approximately 1350 m, rocks and green sand.
6846. 1 February 1960. 3.85 miles 024°T from North Coronado Island, 32°30'05"N, 117°16'04"W, 106 m, green sandy mud.
6994. 13 April 1960. 2.2 miles 326°T from Point Vicente Light, 33°46'28"N, 118°26'15"W, 31 m.
7038. 6 May 1960. 1.6 miles 354.5°T from Point La Jolla, 32°52'48"N, 117°16'32"W, 103 m, green muddy silt.
7161. 8 October 1960. 4.7 miles 349.5°T from Point Fermin Light to mid-point, from 33°37'50"N, 118°16'44"W to 33°37'27"N, 118°16'18"W, 90–252 m.

2. *Collections made by the Eltanin and the Staten Island in the Antarctic Ocean*

- Elt. 127. 1 August 1962. 61°45'S, 61°14'W, 4758 m.
- Elt. 138. 8 August 1962. 62°00' to 62°05'S, 61°09' to 61°08'W, 1437 m.
- Elt. 250. 6 October 1962. 59°14'S, 69°13' to 68°57'W, 3678–3803 m.
- Elt. 272. 21 October 1962. 64°54'S, 68°21' to 68°18'W, 412 m.
- Elt. 350. 4 December 1962. 55°03' to 55°00'S, 58°57' to 58°51'W, 2452 m.
- Elt. 394. 29 December 1962. 59°00' to 58°55'S, 56°04' to 56°02'W, 3724–3825 m.
- Elt. 410. 31 December 1962. 61°18' to 61°20'S, 56°09' to 56°10'W, 220–240 m.
- Elt. 412. 1 January 1963. 62°06'S, 56°00' to 55°59'W, 1180 m.
- Elt. 416. 2 January 1963. 62°40' to 62°39'S, 56°13'W, 494–507 m.
- Elt. 418. 2 January 1963. 62°39' to 62°40'S, 56°10' to 56°08'W, 426–311 m.
- Elt. 432. 7 January 1963. 62°52' to 62°55'S, 59°27' to 59°15'W, 935–884 m.
- Elt. 437. 9 January 1963. 62°50' to 62°51'S, 60°40' to 60°35'W, 267–311 m.
- Elt. 439. 9 January 1963. 63°51' to 63°50'S, 62°38' to 62°35'W, 128–165 m.
- Elt. 480. 15 February 1963. 58°06' to 58°10'S, 44°56' to 44°47'W, 2800 m.
- Elt. 678. 24 August 1963. 54°49' to 54°48'S, 38°01' to 37°53'W, 732–814 m.
- Elt. 724. 9–10 September 1963. 54°05' to 54°04'S, 33°43' to 33°37'W, 2714–2727 m.
- Elt. 740. 18 September 1963. 56°06' to 56°07'S, 66°19' to 66°30'W, 384–494 m.

- Elt. 939. 22 January 1964. 70°20' to 70°13'S, 99°10' to 98°57'W, 3848–3980 m.  
 Elt. 993. 13 March 1964. 61°25'S, 56°30' to 56°32'W, 300 m.  
 Elt. 1003. 15 March 1964. 62°41'S, 54°43'W, 210–220 m.  
 Elt. 1058. 4 April 1964. 59°50' to 59°52'S, 32°27' to 32°23'W, 650–659 m.  
 Elt. 1084. 13 April 1964. 60°35' to 60°34'S, 40°44'W, 631–641 m.  
 Elt. 1082. 14 April 1964. 60°50' to 60°52'S, 42°55' to 43°56'W, 298–302 m.  
 Elt. 1084. 15 April 1964. 60°22' to 60°23'S, 46°50' to 46°52'W, 298–403 m.  
 Elt. 1248. 25 August 1964. 59°57'S, 136°37' to 136°40'W, 3386–3477 m.  
 Elt. 1549. 13 February 1966. 63°10' to 63°19'S, 39°40' to 39°50'W, 4236–4301 m.  
 St. Isl. 6–63. 24 January 1963. 64°46'S, 64°04'W, 7.2 m, in fish-trap.  
 St. Isl. 9–63. 26 January 1963. 64°48'S, 63°30'W, 56 m, mud.

### 3. Collections made by the Lund University Chile Expedition, 1948–1949

- M4B. 11 November 1948. Off Puerto Montt, 41°28'54"S, 72°57'24"W, 13–16 m, coarse grey sand with pieces of clinker.  
 M29B. 4 January 1949. Bahia Ralun, 41°24'30"S, 72°19'45"W, 35–40 m, fine sand with mud and plant debris.  
 M70B. 19 February 1949. Isla Gnafo, 43°33'00"S, 74°49'00"W, 25 m, rather coarse sand with some stones.  
 M123. September 1948–June 1949. Estacion de biologia marina, Montemar, 32°57'24"S, 71°33'25"W, intertidal, rock and rock pools.  
 M145A. 16 July 1949. Bahia Chincui, 41°32'00"S, 73°01'30"W, 70–80 m, fine soft grey sand with small stones.  
 M147A. 16 July 1949. Isla Maillen, 41°35'40"S, 72°58'15"W, 40–45 m, coarse sand.

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