



AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITIONS

# ANARE RESEARCH NOTES 3

A Guide to the Pelagic Polychaetes of the Southern Ocean  
and Adjacent Waters

David O'Sullivan

INFORMATION SERVICES SECTION  
ANTARCTIC DIVISION  
DEPARTMENT OF SCIENCE AND TECHNOLOGY

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N O T E S  
3

A Guide to the Pelagic Polychaetes of the Southern Ocean  
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Species found south of the Subtropical Convergence will be dealt with in detail. Those occurring in more northerly waters but likely to be encountered on Antarctic voyages are included in identification keys.

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A GUIDE TO THE PELAGIC POLYCHAETES  
OF THE SOUTHERN OCEAN AND ADJACENT WATERS

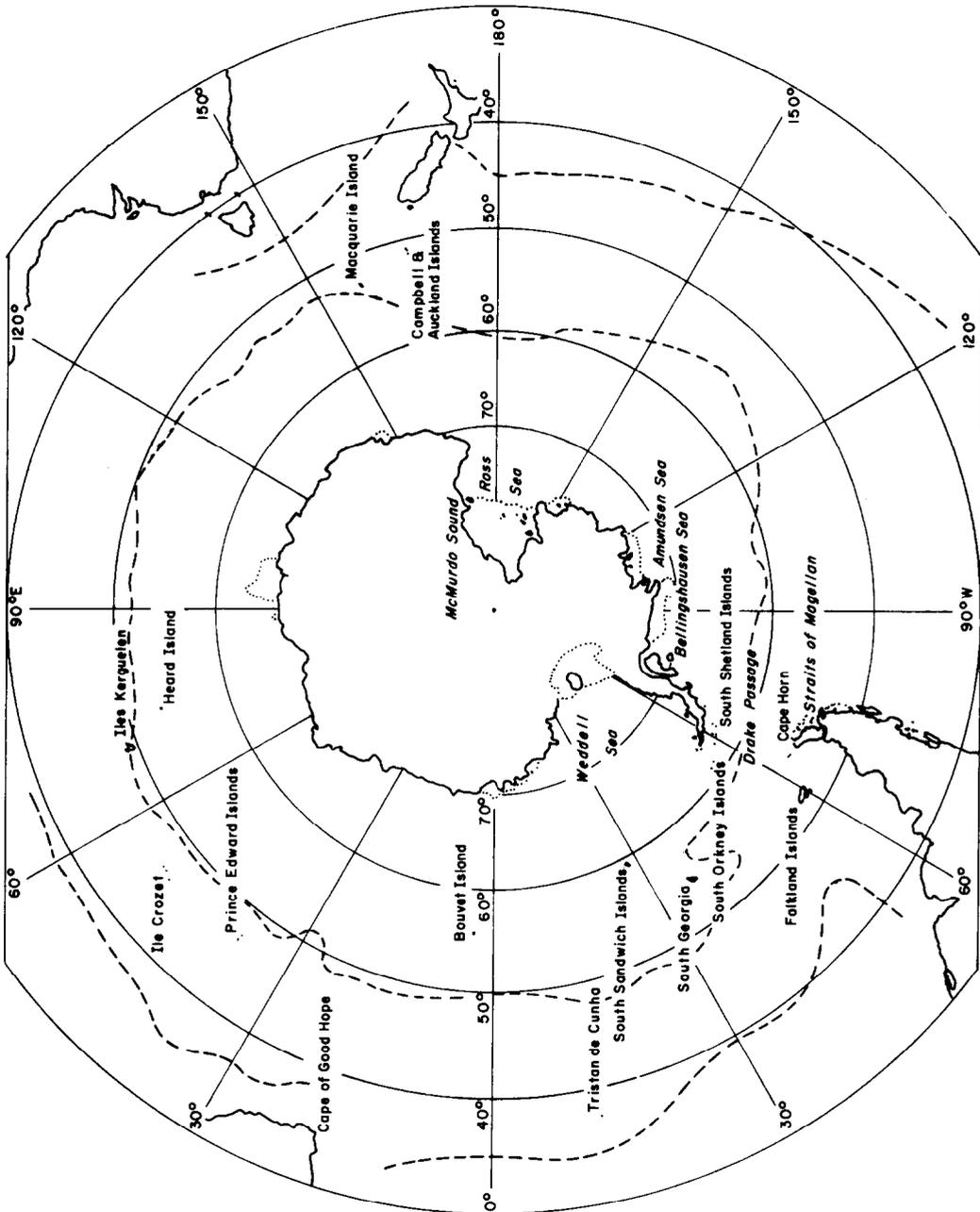
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ABSTRACT

The pelagic polychaetes of the Southern Ocean include Vanadis antarctica (McIntosh), V. longissima (Levinsen), Rhynchonerella bongraini (Gravier), R. petersii (Langerhans), Tomopteris carpenteri Quatrefages, T. cavallii Rosa, T. ligulata Rosa, T. planktonis Apstein, T. septentrionalis Steenstrup, Typhloscolex mulleri Busch, Sagitella kowalevskii (Wagner), Travisiopsis coniceps (Chamberlin), Tr. lobifera (Levinsen), Tr. levinseni (Southern), Tr. lanceolata Southern, Phalacrophorus pictus Greeff, Pelagobia longicirrata Greeff and Maupasia caeca Viguier.

The diagnostic characters, geographical and bathymetric distribution and synonymy of each of these polychaetes are given together with illustrations and distribution maps. A key is given for the identification of these polychaetes and species found in waters adjacent to the Southern Ocean.



Map of Southern Ocean showing places mentioned in text.

## 1. INTRODUCTION

Polychaetes can be divided into two groups: sedentary forms, and errant or free-moving forms including some strictly pelagic species. Although the great majority of adult polychaetes are benthonic, the larvae of most polychaetes are planktonic and the sexual stages of certain families such as the Syllidae and Nereidae are found at night in tow-netting over shallow water (Day, 1967).

Dales & Peters (1972) recognise six exclusively pelagic families: Lopadorhynchidae, Iospilidae, Pontodoridae, Alciopidae, Tomopteridae and Typhloscolecidae. Certain genera of the Polynoinae (for example, Dreischia) are considered holopelagic by some workers (i.e. Dales & Peters, 1972) but others (i.e. Day, 1967) consider them to be almost certainly late larval stages of a benthonic genus. Much work remains to be done to distinguish those species which are truly holopelagic from those that are merely late larvae of benthonic forms (Dales & Peter, 1972).

For this reason only the adult stages of the Southern Ocean holopelagic species will be dealt with in detail. The Southern Ocean is defined as all waters south of the Subtropical Convergence. This area can be divided into the Subantarctic and the Antarctic separated by the Antarctic Convergence. Pelagic species which occur in adjacent waters (south of 30° South but north of the Subtropical Convergence) are included in the keys. The regions they have been found in are given in brackets: (Au) for southern Australia; (NZ) for New Zealand; (Pa) for southern Pacific Ocean; (SAM) for South America; (At) for southern Atlantic Ocean, (SA) for southern Africa; (In) for southern Indian Ocean; (Co) for cosmopolitan in adjacent waters.

There have been a large number of investigators of Antarctic pelagic polychaetes (see Hartman, 1964 for most of the references) but apart from a monograph on southern African species (Day, 1967) and a study in the distribution of pelagic polychaetes in the South Atlantic Ocean (Tebble, 1960) very little has been done in adjacent waters. Benham (1929) described some polychaetes from north of New Zealand, while Augener (1927) included a few pelagic polychaetes from south-eastern Australia. Day & Hutchings (1979) list all the Australian species.

In this handbook the keys, family, genus and species descriptions are from Day (1967) except where otherwise mentioned. Where there are differing points of view I have tried to give both sides of the argument and in the synonymy I have followed Dales & Peter (1972) as it is the most recent paper. In the synonymy, only incorrect records from the Southern Ocean and adjacent waters are given. For each species a distribution map has been given. On these maps the symbols represent the location where a species has been found. In some cases they are only approximate as the author has specified a general area rather than an exact position. A question mark next to a symbol indicates that the identification was tentative or subsequent workers have questioned the validity of the identification. The positions of the Subtropical Convergence and the Antarctic Convergence on the distribution maps are from Lomakina (1960).

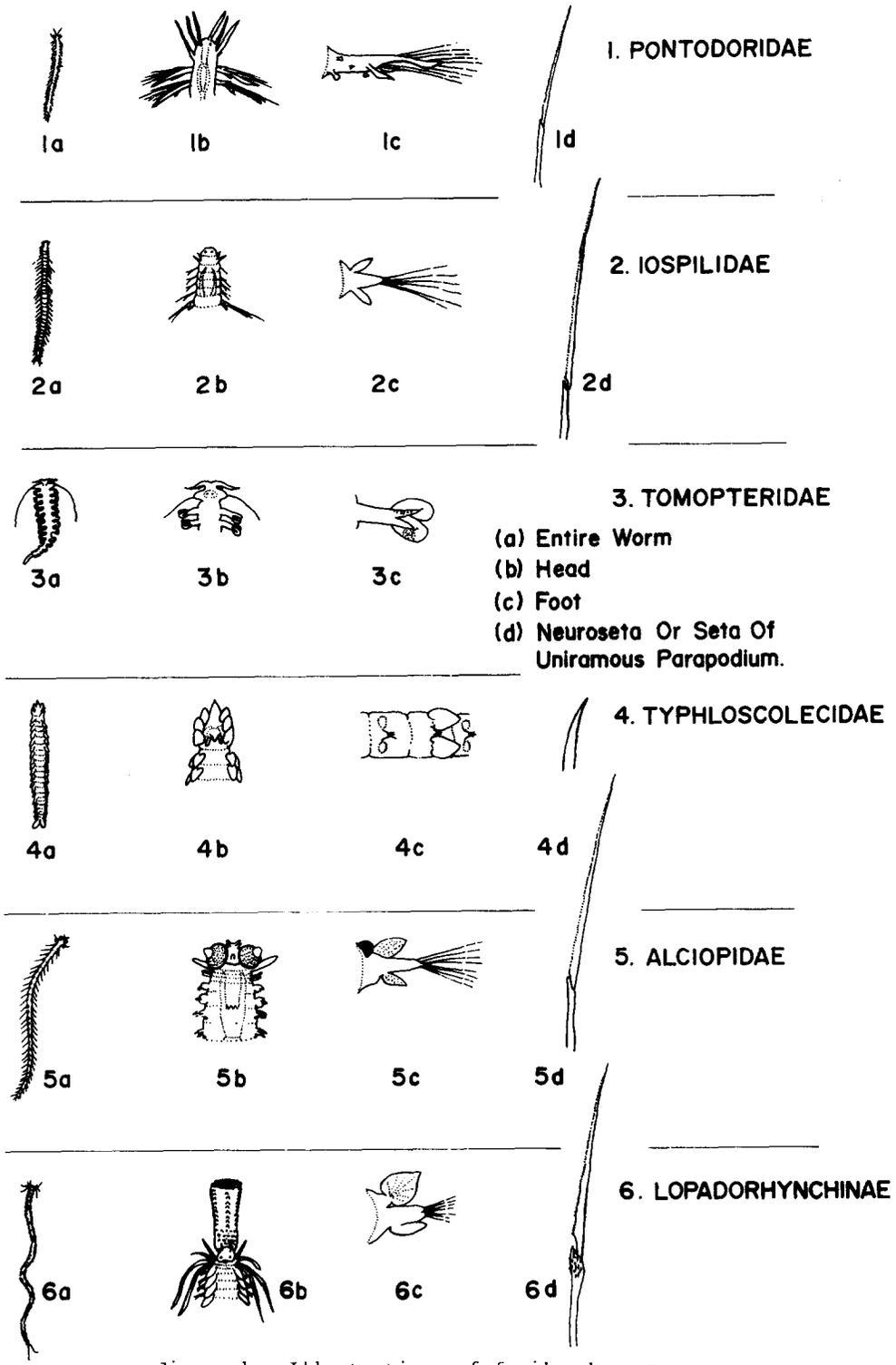


Figure 1. Illustrations of family characters.

2. KEY TO FAMILIES OF PELAGIC POLYCHAETES

(Figure 1)

- 1a) Eyes enormous ..... ALCIOPIDAE
- b) Eyes normal, rudimentary or absent ..... 2
  
- 2a) Parapodia of body segments lack setae but have  
    membraneous pinnules ..... TOMOPTERIDAE
- b) Parapodia of body segments have setae; membranous  
    pinnules absent ..... 3
  
- 3a) Setigerous lobe small and setae always simple and  
    acicular; large foliaceous dorsal and ventral cirri . TYPHLOSCOLECIDAE
- b) Setigerous lobe well developed and setae always  
    compound ..... 4
  
- 4a) Setigerous lobe produced as a slender thread among the  
    setae ..... PONTODORIDAE
- b) Setigerous lobe not so produced ..... 5
  
- 5a) Antennae absent; body cylindrical ..... IOSPILIDAE
- b) Four antennae; body usually flattened ..... LOPADORHYNCHINAE

### 3. FAMILY ALCIOPIDAE

Planktonic polychaetes with slender transparent bodies and segmented glands at the bases of the parapodia; prostomium roughly rectangular with two pairs of frontal antennae and a median dorsal antenna which is sometimes reduced or vestigial; eyes enormously developed with large crystalline lenses; proboscis eversible, without jaws but with marginal papillae or long lateral horns; three short tentacular segments bearing three to five tentacular cirri according to the formula  $1 + 1/0-1 + 1/0-(lorN)$  (see tentacular formula in the glossary); the parapodia of the next few segments may be reduced and lack setae and the dorsal cirri of segments 4 or 5 may be modified to form receptacula seminis in the female; normal body segments are uniramous, each with a conical setigerous lobe and foliaceous dorsal and ventral cirri; setae either simple or compound or both; segmental organs usually darkly pigmented; pygidium with a pair of anal cirri (Figure 3).

A beautifully illustrated account of this family will be found in Apstein (1900); a general discussion of morphology is given by Dales (1955) and important revisions of the genera and species were made by Greeff (1885) and Stop-Bowitz (1948). Useful keys and descriptions are given in Dales (1957) and Day (1967). Hartman (1964) gives all the previous Antarctic records for this family.

Twenty genera have been erected for this family. Hartman (1959) regards only nine of these as valid. She lists the following synonymies:

<u>Torea</u> , <u>Asterope</u> and <u>Liocapa</u>	as <u>Torrea</u>
<u>Callizona</u>	as <u>Rhynchonerella</u>
<u>Callizonella</u>	as <u>Krohnia</u>
<u>Mauita</u> and <u>Cleta</u>	as <u>Vanadis</u>
<u>Corynocephalus</u>	as <u>Alciopina</u>
<u>Greefia</u> , <u>Halodora</u> and <u>Nauphanta</u>	as <u>Alciopa</u> ,

so that the family comprises the above six genera plus Naiades, Plotohelmis, and Watelio. Dales & Peter (1972) prefer the variant spelling Rhynchonerella, amended by Claparede (1868) from Costa's (1862) original spelling. The principle diagnostic characters of the parapodia (see Table 1) can be used in separating genera in the Alciopidae (Tebble, 1962).

	No. of cirriform pedal appendages	Acicular setae	Capillary setae
<u>Naiades</u>	0	Absent	Simple
<u>Torrea</u>	0	Absent	Compound
<u>Alciopina</u>	0	Simple	Simple
<u>Plotohelmis</u>	0	Simple	Compound
<u>Watelio</u>	1	Absent	Simple
<u>Vanadis</u>	1	Absent	Compound
<u>Krohnia</u>	1	Simple	Simple
<u>Rhynchonerella</u>	1	Simple	Compound
<u>Alciopa</u>	2	Absent	Simple

Table 1. The principle diagnostic characters of the parapodia.

3.1 KEY TO GENERA\*:

- 1a) Setae all simple and mainly capillaries, though acicular setae may also occur ..... 2
- b) Setae mainly compound and spinigerous though simple or compound acicular setae may also occur 4
  
- 2a) Only simple capillary setae; prostomium not projecting in front eyes (Co) ..... Naiades cantraini  
Delle Chiaje
- b) Some simple acicular setae in anterior segments; prostomium projects in front of eyes ..... 3
  
- 3a) No cirriform appendage at the apex of the setigerous lobe; genital papillae below setigerous lobe; parapodia 10-18 (Pa,At,SA,In) . Alciopina parasitica  
Claparede & Panceri
- b) One short cirriform appendage at the apex of the setigerous lobe; no genital papillae (At,SA,In) Krohnia lepidota Krohn
  
- 4a) No acicular setae (apart from projecting aciculum) in anterior feet; prostomium not projecting in front of eyes ..... 5
- b) Acicular setae present in anterior feet at least; prostomium projecting in front of eyes ..... 7
  
- 5a) Simple as well as compound capillaries present; cirri strap-shaped and longer than the setigerous lobe; aciculum greatly elongated (NZ) ..... Watelio gravieri Benham
- b) Only compound capillaries present ..... 6
  
- 6a) Apex of setigerous lobe with two cirriform appendages; only the first segment behind the tentacular cirri reduced and lacks setae (Au,NZ,At,SA,In) ..... Alciopa reynaudii  
Audouin & Milne Edwards
- b) Apex of setigerous lobe with one cirriform appendage; the first one to six segments behind the tentacular cirri reduced and lack setae .... Vanadis
- c) Apex of setigerous lobe without a cirriform appendage; first segment behind the tentacular cirri with setae (Co) ..... Torrea canadida  
(Delle Chiaje)
  
- 7a) Apex of setigerous lobe with one cirriform appendage; acicular setae sometimes compound ... Rhynchonerella
- b) Apex of setigerous lobe without a cirriform appendage; acicular setae always simple ..... Plotohelmis

\*In the case of the monospecific genera the species name has been given.

Only five species, from two genera Vanadis and Rhynchonerella, are represented in the Antarctic alciopid fauna (Hartman, 1964), but a number of species are found in waters adjacent to the Southern Ocean especially from Southern Africa (see Day, 1967) and from Australia and New Zealand (see Day & Hutchings, 1979). These include Naiades contraini Delle Chiaje, Alciopina parastica Claparede & Panceri, Krohnia lepidota (Krohn), Alciopa reynaudii Audouin & Milne Edwards, Torrea candida (Delle Chiaje), Watelio gravieri (Benham), Plotohormis alata Chamberlin, P. capitata (Greeff), P. tenuis (Apstein), Vanadis formosa Claparede, V. crystallina Greeff, V. crystallina var. inornata Day, V. fuscipunctata Treadwell, V. minuta Treadwell, V. violacea Apstein, Rhynchonerella angelini (Kinberg), R. gracilis Costa and R. moebii (Apstein).

The first six species are from mono or bispecific genera and as such can be identified from the key to genera. Descriptions, diagrams and distributions of most of these species can be found in Tebble (1960) and Day (1967); for Watelio gravieri see Benham (1929) for description. Keys to the species of Vanadis and Rhynchonerella are given later while that for Plotohormis is given below.

Alciopids are almost always broken into fragments when collected. In identifying fragments it is generally necessary to have at least the head and anterior parapodia to make a reliable determination (Tebble, 1962).

### 3.2 GENUS Plotohormis Chamberlin 1919

Key to species:

- 1a) Eyes directed forwards; tentacular cirrus  
D<sup>2</sup> longer than D<sup>3</sup>; median antenna digitiform  
(At,SA) ..... P. tenuis (Apstein)
- b) Eyes directed laterally; tentacular cirrus D<sup>2</sup>  
shorter than D<sup>3</sup>; dorsal antenna not digitiform .. 2
- 2a) Males with nine to ten genital papillae;  
chromatophores ventro-lateral but not branching  
(SA) ..... P. alata (Chamberlin)
- b) Males with three to four genital papillae;  
chromatophores ventro-lateral and branching on  
the ventrum (SA,In) ..... P. capitata (Greeff)

### 3.3 GENUS Vanadis Claparede 1870

Body long and slender; prostomium not extending in front of the eyes; median dorsal antenna sometimes absent; proboscis long, often with lateral horns; a pair of cylindrical tentacular cirri are on each of the first three segments (tentacular formulae 1+1+1); the first one to six parapodia (on segments 4-10) are reduced and may lack setae or even setigerous lobes; dorsal cirri of segments 4 or 5 both enlarged in the female to act as receptacula seminis; normal parapodia of later segments have foliaceous dorsal and ventral cirri and a long setigerous lobe ending in one cirriform appendage; apart from the projecting aciculum, the setae are all compound and spinigerous; segmental organs usually pigmented on normal body segments; eleven valid species of which nine have been reported from the Southern Ocean or adjacent waters.

Key to species:

- 1a) Proboscis with lateral horns ..... 2
- b) Proboscis without lateral horns ..... 7
  
- 2a) Proboscis with two pairs of lateral horns ... V. tagensis Dales
- b) Proboscis with one pair of lateral horns .... 3
  
- 3a) Setae start on segment 6 (third foot);  
  median antenna digitform (SA,At,SA,In) ..... V. formosa Claparede
- b) Setae start on segment 9-10 (sixth to seventh  
  foot); median antenna may be absent ..... 4
  
- 4a) Median antenna digitform; females with  
  receptacula seminis in the dorsal cirri of  
  segments 4 and 5 ..... 5
- b) Median antenna indistinct or absent; females  
  with receptacula seminis in segment 5 only .. 6
  
- 5a) Segmental organs pigmented from about segment  
  11; ventral cirri two-thirds the size of  
  the dorsals (NZ,At,SA,In) ..... V. crystallina crystallina  
  Greiff
- b) Segmental organs not pigmented at all;  
  ventral cirri less than one-third the size of  
  the dorsals (SA) ..... V. crystallina inornata Day
  
- 6a) Dorsal cirri hastate; segmental organs  
  forming dark vertical bars behind the  
  parapodia from segment 7 onwards (SA,In) .... V. fuscipunctata  
  Treadwell
- b) Dorsal cirri ovate; segmental organs not  
  pigmented before segment 12 if at all  
  (Pa,At,SA,In) ..... V. minuta Treadwell
  
- 7a) Segmental organs not pigmented; body uniform  
  violet when fresh (At,SA) ..... V. violacea Apstein
- b) Segmental organs and body strongly pigmented  
  at intervals ..... 8
  
- 8a) Dark bars across the dorsum every five or ten  
  segments ..... V. longissima Levinsen
- b) Dark bars across dorsum at intervals of two  
  or three segments ..... V. antarctica McIntosh

Vanadis antarctica (McIntosh 1885)

(Figure 2, Map 1)

(Alciopa antarctica McIntosh, 1885; Gravier, 1911b)

Diagnostic Characters (Tebble, 1960; Hartman, 1964):

Length 73 to 230 mm

Antennae 2 anterior pairs are ovate, single posterior antenna is digitform.  
Eyes large, oblique, at sides of prostomium, prominent all round

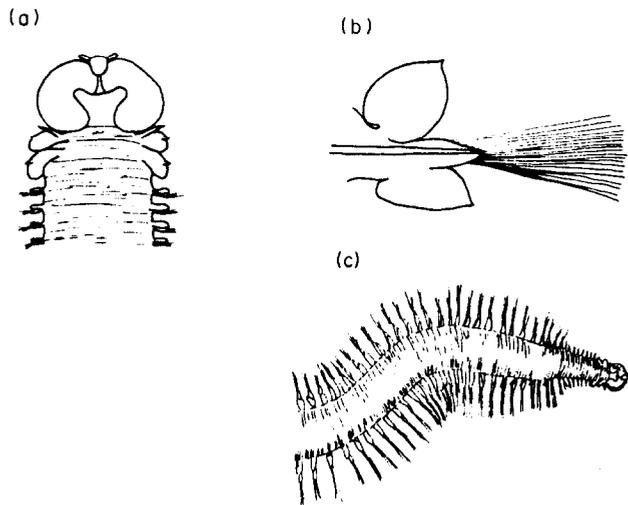
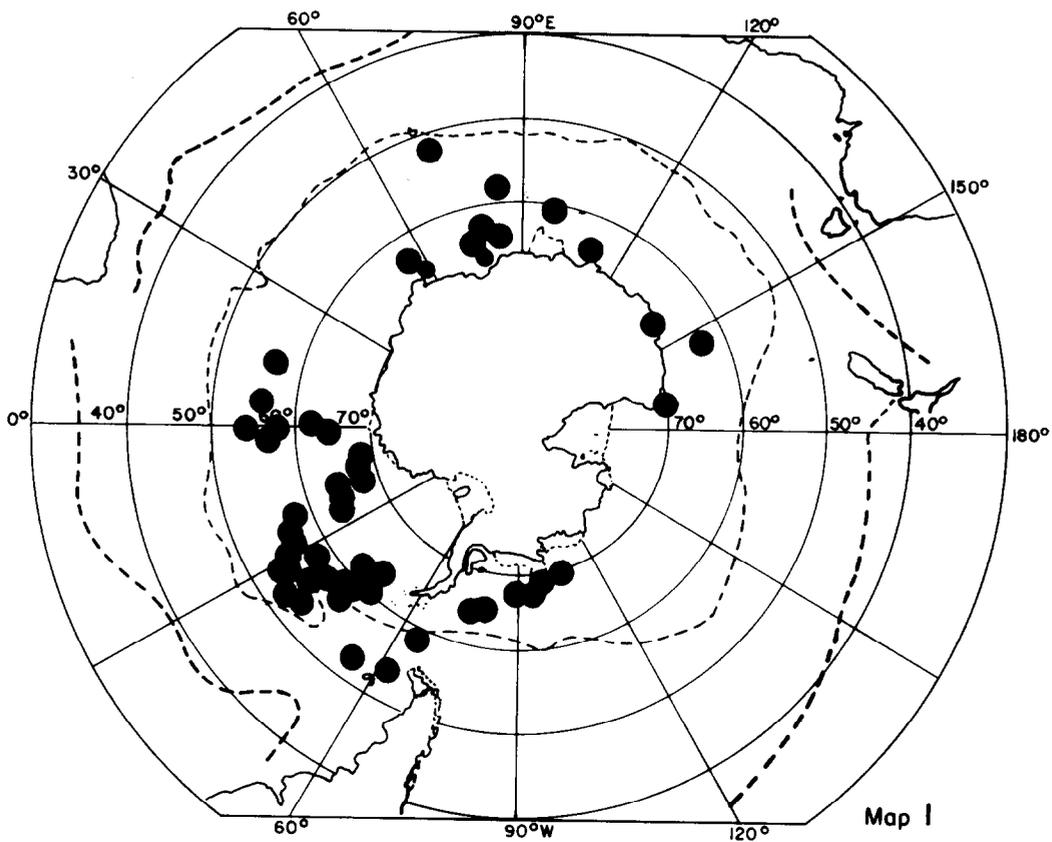


Figure 2. Vanadis antarctica (a) head; (b) median foot; (c) anterior end of body.



Map 1. Distribution of Vanadis antarctica.

Proboscis terminated by a circlet of twelve separate papillae which are normally equal in length but sometimes a few of them are slightly longer than the others

Tentacular cirri long and slender, 3 pairs arranged 1+1+1, 1 pair on each of the three successive segments behind the prostomium, of which the first are joined ventrally by basal ceratophores.

Parapodia first pair have prominent foliaceous cirri (which have frequently been mistaken for a fourth pair of tentacular cirri) and tiny ventral cirri, which are always difficult to see; in female the dorsal cirri of the next two parapodia are modified as receptacula seminis; subsequently there is a group of seven to ten parapodia which are small though fully developed, each with a pedal lobe and appendage, compound setae and dorsal and ventral cirri; thereafter the parapodia are much larger with the pedal lobes very much longer than the foliaceous cirri and with exceedingly long setae.

Segmental glands strongly pigmented, always present anteriorly giving the appearance of having a pigmented neck, may be absent in the middle body region, but beyond a certain part on the body, varying between the twenty-third and fiftieth parapodia, the glands are present on every segment (in contrast to V. longissima where beyond the fiftieth segment glands are missing from some chaetiges).

Setae are all long, translucent and simple.

This species is closely related to V. longissima, and Tebble (1960) discusses the possibility of their being geographical races of one species. V. antarctica is endemic to the Antarctic zone, circumpolar in distribution, and found in depths to 2000 m (Hartman, 1964). It is only found south of the Antarctic Convergence (Tebble, 1960), and Hartman (1964) gives the previous records from the Southern Ocean.

#### Vanadis longissima (Levinsen 1885)

(Figure 3, Map 2)

(Vanadis formosa Monro, 1930 in part)

(Vanadis antarctica Monro, 1936 in part)

Diagnostic Characters (Tebble, 1960; Day, 1967):

Length up to 200 mm

Antennae median one digitiform and equal to paired anterior group

Eyes directed obliquely downwards and outwards

Proboscis without lateral horns but with 12 conical marginal papillae

Tentacular cirri three pairs arranged 1+1+1 on first three segments, first is stout and mounted on a broad cirrophore attached to the lower surface of the eye and its tip just reaches the outer margin; the second is shorter and more slender and the third shorter still

Parapodia of segments 4 and 5 swollen to act as receptacula seminis in the female; those of segments 4-8 are reduced and lack setigerous lobes and setae which first appear on segment 7-9; ventral cirri are all small and that on segment 4 is a mere papilla; they reach full size about segment 10 and each parapodium then has a lamellar dorsal cirrus 2.5 times as long as broad, a longer setigerous lobe with a long cirriform appendage and a smaller ventral cirrus essentially similar to the dorsal one.

Segmental glands on 1-2 segments at intervals to 5-10 segments giving a barred appearance to the whole worm

Setae fine spinigers with blunt shaft-heads.

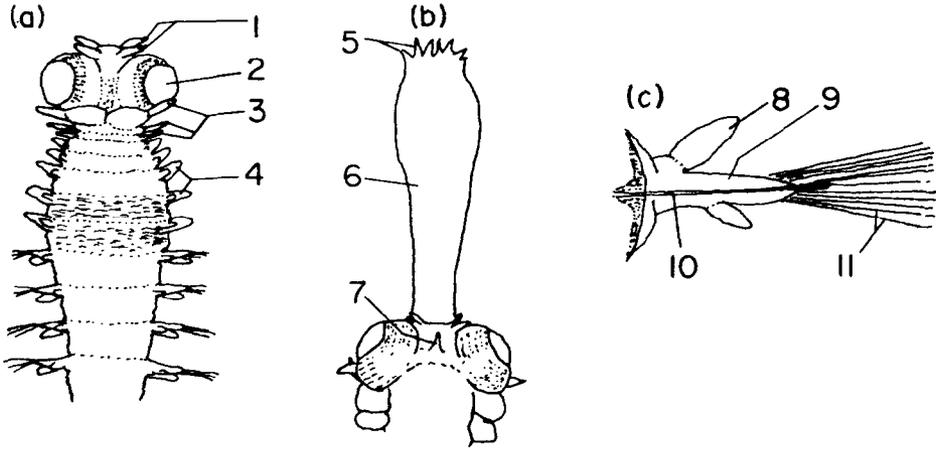
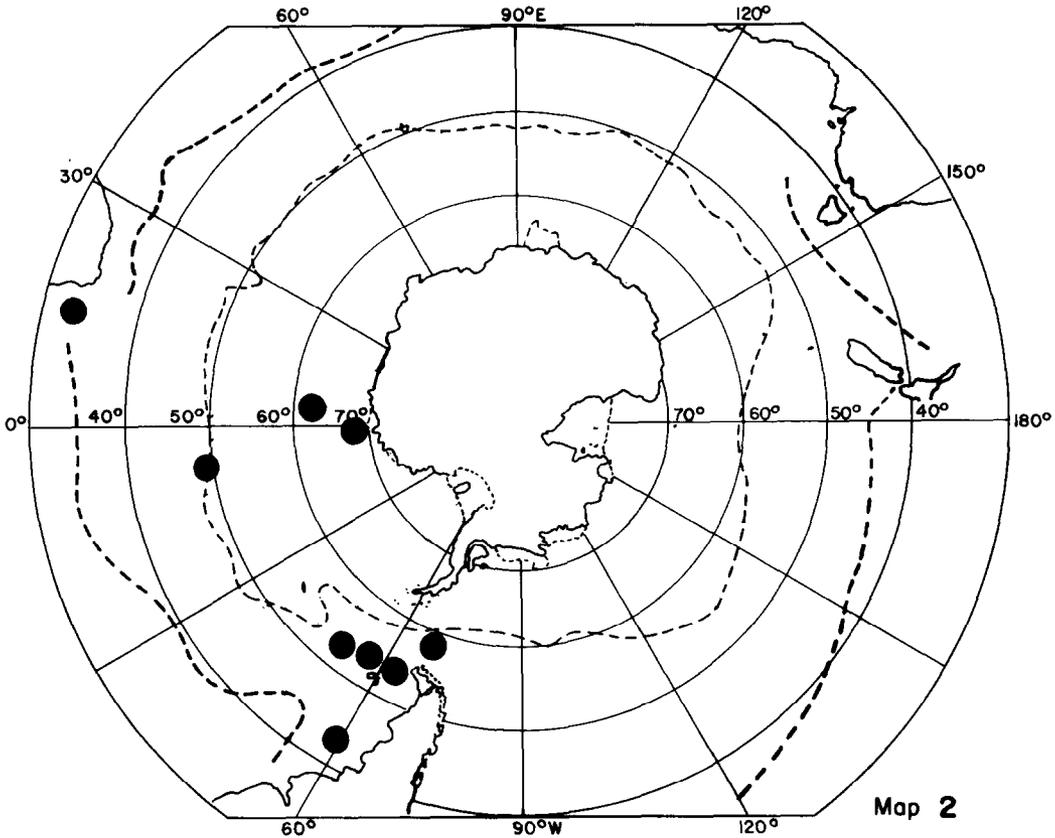


Figure 3. *Vanadis longissima* (a) anterior end of male, ventral view; (b) head showing proboscis, dorsal view; (c) foot.  
 (1) frontal antennae, (2) eye, (3) tentacular cirri, (4) reduced parapodia, (5) marginal papillae, (6) proboscis, (7) median antennae, (8) dorsal cirri, (9) setigerous lobe, (10) acicula, (11) compound setae.



Map 2. Distribution of *Vanadis longissima*.

Tebble (1960) re-examined Monro's (1930) specimens of V. formosa from "Discovery" stations 270 and 282, and his 1936 material of V. antarctica from "William Scoresby" stations WS408 and WS411 and considered them all to be V. longissima.

Its distribution is given as cosmopolitan in tropical and Subantarctic waters (Hartman, 1964) and in the Atlantic its southern limit of distribution is probably at the Antarctic Convergence (Tebble, 1960).

Vanadis tagensis (Dales 1955)

A good description of this species is given by Tebble (1962). Its distribution is given as the deep waters of N.E. Pacific and the Antarctic (Dales & Peter, 1972), but I can find no records from the Southern Ocean so I think there may be a typographical error replacing Arctic with Antarctic in Dales & Peter (1972).

3.4 GENUS Rhynchonerella Costa 1866

Body long and slender; prostomium extending forwards in front of eyes; proboscis short with small marginal papillae, but no lateral horns; segments 1-3 with four or five tentacular cirri according to the formula 1+1/1+1/lorN. from segment 4 onwards the parapodia are fully developed, each with a foliaceous dorsal cirrus, a setigerous lobe ending in one cirriform appendage and a foliaceous ventral cirrus; the setae are mainly compound and spinigerous but simple or compound acicular setae are also present at least in the anterior setigers; all five species have been recorded from the Southern Ocean or adjacent waters.

Key to species:

- 1a) Acicular setae simple ..... 2
- b) Acicular setae compound ..... 3
  
- 2a) Segments 4-6 with two to seven simple acicular setae and their dorsal cirri much larger and more rounded than the later ones (At,SA,In) ..... R. moebii (Apstein)
- b) Segments 4-6 with one to two simple acicular setae and a few spinigers; the first few dorsal cirri not obviously different from later ones (At,SA,In) ..... R. gracilis Costa
  
- 3a) Blades of acicular setae smooth; body very large reaching 120 mm; prostomium and anterior dorsum dark (Pa,At) ..... R. angelini (Kinberg)
- b) Blades of acicular setae saw-edged; body small not exceeding 30 mm; head not pigmented ..... 4
  
- 4a) Proboscis terminated by 12 blunt papillae; 2nd ventral tentacular cirrus (V3) cylindrical; single median antenna in groove between the two eyes ... R. bongraini (Gravier)
- b) Proboscis terminated by 10 marginal papillae; 2nd ventral tentacular cirrus foliaceous; single dorsal antenna not in groove ..... R. petersii (Laugerhans)

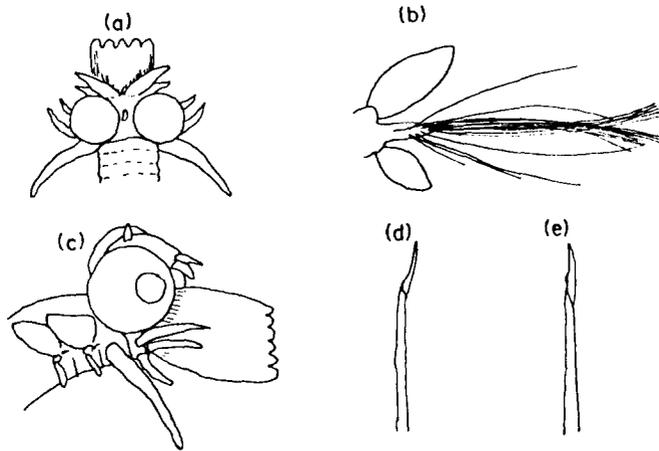
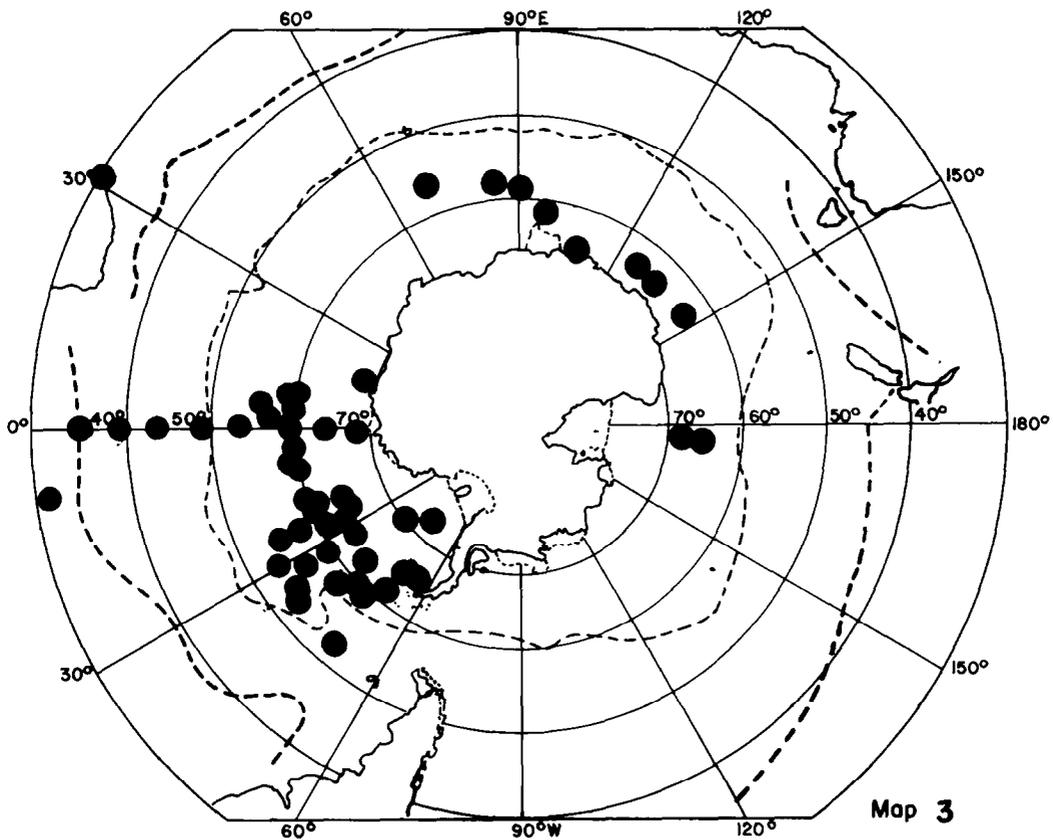


Figure 4. Rhynchonerella bongraini (a) head, dorsal view; (b) anterior end with protruded proboscis, side view; (c) median foot; (d) composite setae, curved; (e) composite setae, straight.



Map 3. Distribution of Rhynchonerella bongraini.

Rhynchonerella bongraini (Gravier 1911)

(Figure 4, Map 3)

Diagnostic Characters (Tebble, 1960; Hartman, 1964):

(Callizona bongraini Gravier, 1911a; Benham, 1929; Monroe, 1936)  
(Rhynchonerella fulgens Ehlers, 1913; Monroe, 1930)  
(Callizonella bongraini Augener, 1929; Fauvel, 1936; Monroe, 1936)  
(Alciopid larvae Hardy & Gunther, 1935)  
(Krohnia bongraini Stop-Bowitz, 1949, 1951)  
(? Callizona ? Angelini Villwock, 1958)

Length to about 15 mm, segments number 25-59

Prosomium extends forward beyond the eyes

Antennae 2 pairs short, foliaceous, set close together at the frontal margin, a single median subulate antenna in groove between the 2 eyes

Eyes cover most of prostomial surface

Proboscis terminated by twelve blunt papillae

Parapodia have large foliaceous dorsal cirri and smaller ventral foliaceous cirri, the cirriform appendage on the pedal lobe is very small; first 7 or 8 segments with short compound setae, other segments with longer, simple setae

Segmental glands rarely present before parapodium 10, and seldom pigmented  
Setae compound with smooth or denticulated terminal articles, and simple ones on posterior segments.

Stop-Bowitz (1949, 1951) placed this species in Krohnia Quatrefages, a genus having only simple setae. Tebble (1960) pointed out that this species clearly must be included in Rhynchonerella which it approaches in having compound setae in its cephalic appendages and in having an appendage on the pedal lobe.

Tebble (1960) re-examined the specimens described by Monroe (1930) as R. fulgens from Stations SS33 and SS53 and considers them to be R. bongraini. He considers all the material reported by Hardy & Gunther (1935) as Alciopid larvae, to almost certainly be R. bongraini. The animal identified as Callizona ? Angelini (Klinberg) by Villwock (1958) may be either bongraini or petersii but no description was given.

This species is endemic to the Antarctic Ocean (Dales & Peter, 1972) and is only found south of the Antarctic Convergence in the top 500 m of water (Tebble, 1960).

Rhynchonerella petersii (Langerhans 1880)

(Figure 5, Map 4)

(Alciopie cari Ehlers, 1912)

(Alciopie (Halodora) petersi Ehlers, 1913)

(Callizona petersii Monroe, 1939)

Diagnostic Characters:

Length about 23 mm for 65 segments

Prosomium projecting slightly in front of eyes

Antennae 2 pairs, stout, frontal, arising close together from the apex and a single small dorsal one further back

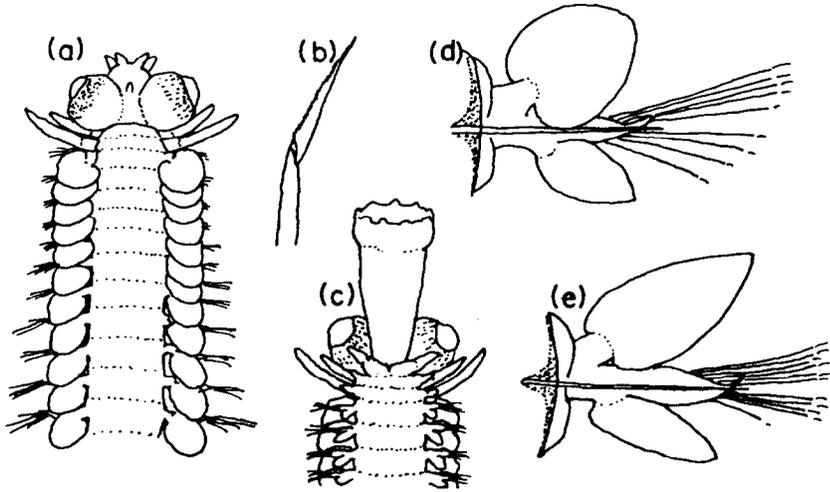
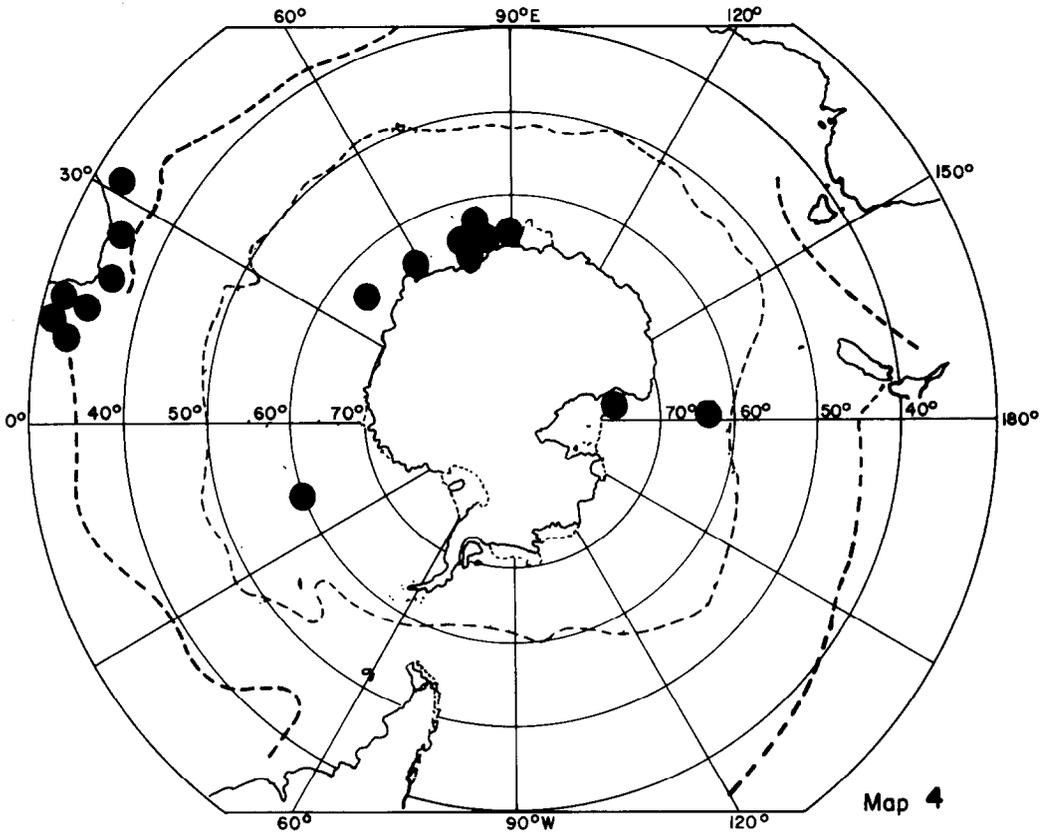


Figure 5. *Rhynchonerella petersii* (a) anterior end, dorsal view; (b) tip of acicular setae; (c) head with proboscis extruded, ventral view; (d) third foot, posterior view; (e) foot from mid-region, posterior view.



Map 4. Distribution of *Rhynchonerella petersii*.

Eyes directed obliquely forwards and slightly down

Proboscis short with 10 low marginal papillae

Tentacular cirri arranged 1+1/1+1/N with  $D_3$  equal to the segmental width and longer than  $D_2$  and this is longer than  $D_1$ ;  $V_2$  short,  $V_3$  foliaceous

Parapodia all with one short cirriform appendage; anterior feet with a large cordate cirrus and a smaller ventral one; middle feet with more elongate cirri

Segmental glands not pigmented until 12th foot and are then lateral bars between parapodia

Setae include (a) a fan of fine compound spinigers with blunt shaft-heads and at first short but later long fine blades and (b) one or two inferior acicular setae which are compound, having blunt shaft-heads and dagger like blades with oblique striations and a serrated edge. In the first few feet, these acicular setae form a graded series with the spinigers, but in later feet the single acicular seta is quite distinct.

This species is cosmopolitan, being found from tropical to Antarctic waters (Hartman, 1964).

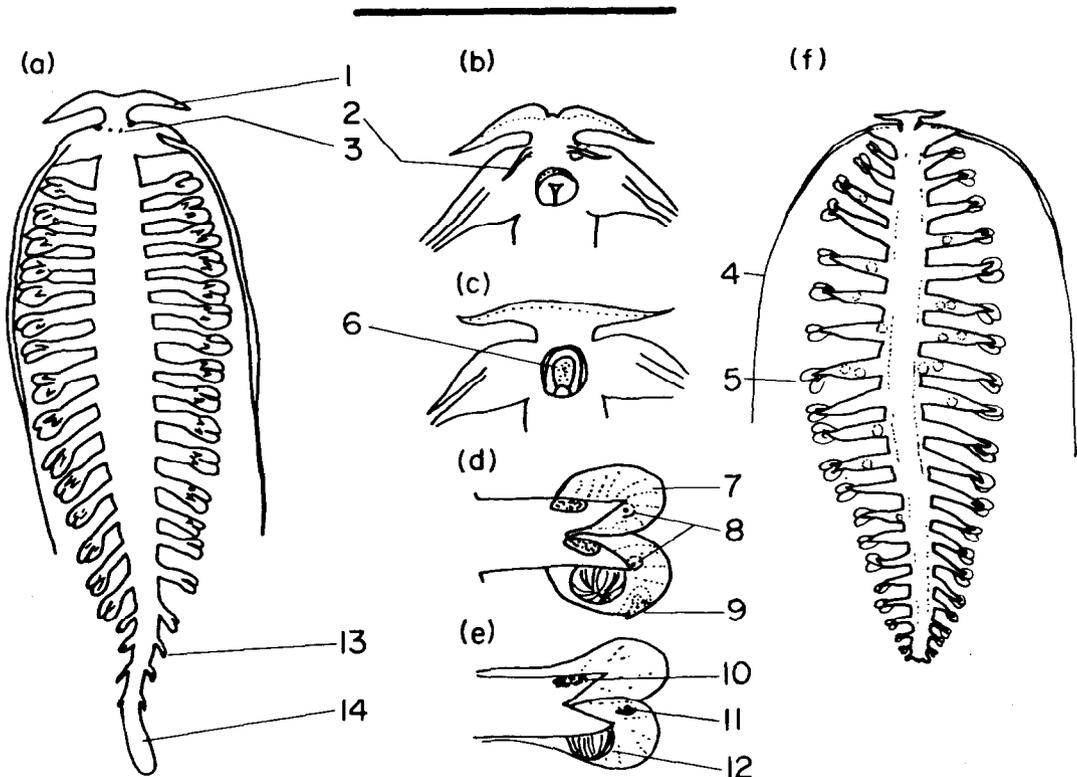


Figure 6. Principal parts of Tomopterids (a) Tomopteris helgolandica whole body; (b) T. apsteini head; (c) T. carpenteri head; (d) T. nationalis second foot; (e) T. ligulata fifth foot; (f) T. septentrionalis whole body.

(1) antennae, (2) first cirrus, (3) eyes, (4) second cirrus, (5) foot, (6) nuchal epaulettes, (7) pinnule, (8) rosette glands, (9) spur gland, (10) gonad, (11) hyaline gland, (12) chromophil gland, (13) reduced foot, (14) tail.

#### 4. FAMILY TOMOPTERIDAE

These easily recognised and transparent worms with the setae limited to the first two segments are exclusively pelagic; the prostomium bears a pair of laterally directed hornlike antennae which together form its anterior border, a pair of nuchal epaulettes or organs, and usually a pair of eyes; it is fused to the first two segments, each of which can bear a pair of cirriform appendages or lateral chaetigate processes with an internal aciculum, though usually the small anterior pair are lost leaving the posterior of 2nd pair or chaetigers which may grow as long as the body; body of 12-40 segments and sometimes a tail region with rudimentary parapodia; the parapodia are biramous and achaetous, with the notopodial and neuropodial ramis bordered by a membraneous pinnule, these pinnules carry various glands of unknown functions: chromophil, hyaline, rosette and spur glands; gonads are always present in the dorsal ramis and sometimes in the ventral rami too (Figure 6).

Gosse (1855) erected the subgenus Johnstonella for the tailed species, leaving the tail-less species to T. tomopteris and this was followed by Dales (1957). Hartman (1959) lists five genera: Briaraea, Enapteris, Escholtzia, Johnstonella and Tomopteris, but of these Briaraea, Escholtzia and Johnstonella are synonymous with Tomopteris (Dales & Peter, 1972). In this handbook the synonymies are from Dales & Peter (1972) and the sub-generic designations when used by previous authors have been omitted. Dales & Peter (1972) follow Rosa (1908b) in including the species euchaeta in a separate genus (Enapteris) but Day (1967) includes it with the genus Tomopteris.

Rosa (1907, 1908a) has given a well illustrated account of this family. Revised descriptions of several species will be found in Stop-Bowitz (1948) and useful keys in Dales (1957). Day's (1967) monograph on the Polychaeta of Southern Africa provides an adequate description of all the species known from this area with pictures and keys for rapid identification.

##### 4.1 IDENTIFICATION OF TOMOPTERIDS

The great uniformity in appearance of the members of this group necessitates care and some practice in identification. The most important characters distinguishing the different species are (1) the presence or absence of a small cirrus between the prostomial horns and the large acicular streamers (most easily seen in ventral view), (2) the disposition and occurrence of various glands in the parapodia (see Glossary for a description of these glands), (3) the presence or absence of reduced posterior segments forming a tail and (4) number of pairs of parapodia on body and tail (Dales, 1957). Table 2 indicates the presence or absence of the more important diagnostic characters of species found in the Southern Ocean or adjacent waters.

The parapodial glands may have to be stained to be certain of their distribution: staining in dilute haematoxylin and examining the whole specimen in acid alcohol during differentiation was found to be the quickest and most satisfactory method, but with practice many details may be seen without staining by arrangement of the lighting (Dales, 1957).

Key to species:

- 1a) Parapodia with rectangular pinnules which do not border the inner edges of the rami (At,SA,In) ..... Enapteris euchaeta Chun
- b) Parapodia with rounded pinnules bordering both inner and outer edges of rami ..... 2
- 2a) With a distinct tail, or with short tail-like region bearing reduced parapodia ..... 3
- b) Without a tail ..... 10
- 3a) Anterior cirrus present ..... 4
- b) Anterior cirrus absent ..... 6
- 4a) With spur glands ..... 5
- b) Without spur glands ..... 9
- 5a) With rosettes near the tips of the rami in the mid-body region, and on the parapodial trunks of the first two pairs of parapodia (At,SA) ..... Tomopteris nationalis Apstein
- b) Apparently without rosettes either on the trunks of the first two pairs of parapodia or in the pinnules in the mid-body region (At) . Tomopteris apsteini Rosa
- 6a) With spur glands (SA) ..... Tomopteris dunckeri Rosa
- b) Without spur glands ..... 7
- 7a) Gonads present in both dorsal and ventral rami, chromophile glands from first parapodium (SA) ..... Tomopteris helgolandica Greeff
- b) Gonads present in dorsal rami only ..... 8
- 8a) Hyaline glands very large; chromophile glands gobular; body rather inflated, often large (At,SA) ..... Tomopteris nisseni Rosa
- b) Hyaline glands not recognisable; rosettes only at the tips of the pinnules, from third parapodium (At) ..... Tomopteris kempi Monro
- 9a) With rosettes in the pinnules (SA) ..... Tomopteris pacifica Izuka
- b) Without rosettes (At) ..... Tomopteris krampi Wesenburg-Lund
- 10a) Anterior cirri present (NZ,At,SA,In) ..... Tomopteris elegans Chun
- b) Anterior cirri absent ..... 11
- 11a) Pinnules adnate to the trunks of the parapodia ..... Tomopteris ligulata Rosa
- b) Pinnules not adnate ..... 12

Table 2. The important diagnostic characters of Tomopteridae (after Dales, 1957; Tebble, 1960; Day, 1967).

	First cirrus	Hyaline glands				Rosette glands	Chromophil glands			Pinnules extend to body wall	Number of pairs of parapodia		Gonads		Prostomium notched between antennae	Maximum length (mm)
		Apical	Dorsal	On most feet	On 3rd & 4th feet only		Compact	Diffuse	With spur		Body	Tail <sup>2</sup>	Both rami	Dorsal rami only		
<u>T. planktonis</u>	-	x	-	x	-	-	x	-	-	-	13-18	-	-	x	-	7
<u>T. carpenteri</u>	-	-	-	x	-	-	x	-	-	-	35	-	x	-	-	90
<u>T. septentrionalis</u>	-	x	-	x	-	-	-	x	-	-	20-24	-	-	x	x	26
<u>T. ligulata</u>	-	-	x	x	-	-	x	-	-	x	24	-	-	x	-	10
<u>T. elegans</u>	x	-	x	-	x	-	x	-	-	-	14	-	-	x	x	10
<u>T. nisseni</u>	-	x	-	x	-	-	x	-	-	-	25	x	-	x	x	100
<u>T. krampi</u>	x	x	-	x	-	-	x	-	-	-	21	x	-	x	-	26
<u>T. kempi</u>	-	-	-	-	-	x	x	-	-	-	16	7	-	x	x	55
<u>T. apsteini</u>	x	-	-	-	-	-	x	-	x	-	18-24	4	x	-	x	20
<u>T. cavallii</u>	x	-	-	-	-	-	x	-	-	-	17	-	-	x	x	5
<u>T. nationalis</u>	x	-	-	-	-	x	x	-	x	-	17	3-4	x	-	x	20
<u>T. dunckeri</u>	x1	-	-	-	-	x	x	-	x	-	16-17	9-10	-	x	x	15
<u>T. helgolandica</u>	-	-	-	-	-	x	-	x	-	-	14-16	3-4	x	-	x	12
<u>T. pacifica</u>	x	-	-	-	-	x	x	-	-	-	14	x	x	-	-	30
<u>E. euchaeta</u>	-	-	x	x	-	-	x	-	-	-	39	7	-	x	x	150

1. stumpy, only visible in adult. 2. x = several

In this table the presence (x) or absence (-) of the more important diagnostic characters of the species given above is indicated (Dales, 1957; Tebble, 1960; Day, 1967).

- 12a) Chromophile glands not clearly differentiated; hyaline glands more distinct and situated at the tips of the ventral rami; no glands in the dorsal rami ..... Tomopteris septentrionalis Steenstrup
- b) Chromophile glands more or less clearly differentiated and compact ..... 13
- 13a) Gonads in both dorsal and ventral rami ..... Tomopteris carpenteri Quatrefages
- b) Gonads in dorsal rami only ..... 14
- 14a) Base of the ventral ramus not bordered by the pinnule that terminates at the proximal end of the chromophile gland ..... Tomopteris planktonis Apstein
- b) Pinnule extending to base of the ventral ramus ..... Tomopteris cavallii Rosa

#### 4.3 GENUS Enapteris Rosa 1908

In Enapteris the pinnules do not extend along the inner borders of the rami (Dales, 1957). This genus is represented by only one species, E. euchaeta, which has not been recorded from the Southern Ocean but is found off southern Africa (Day, 1967 - as Tomopteris euchaeta).

#### 4.4 GENUS Tomopteris Eschscholtz 1825

In Tomopteris the parapodial rami are completely bordered by the pinnules (Dales, 1957). Nearly forty species were recognised by Dales & Peter (1972) of which five have been reported from the Southern Ocean. A further eleven species are found in waters adjacent to the Southern Ocean. Tomopteris australiensis and T. mortenseni described by Augener (1927) from south-eastern Australian waters are difficult to define from published descriptions and Augener's rather inadequate figures (Dales & Peter, 1972). Fauvel (1932, 1953) has since reported T. mortenseni from the same area and ascribed specimens of T. australensis to T. mortensi. At present both will be treated as doubtful species. Ehlers (1912), Fauvel (1936) and Villwock (1958) all found various tomopterids in the Antarctic but did not specify the species names.

#### Tomopteris carpenteri Quatrefages 1865

(Figure 7, Map 5)

Diagnostic Characters (Tebble, 1960; Day, 1967):

Length reaching 90 mm, normally 55 mm

Parapodia 33-35 pairs

Tail absent

Prostomium not notched

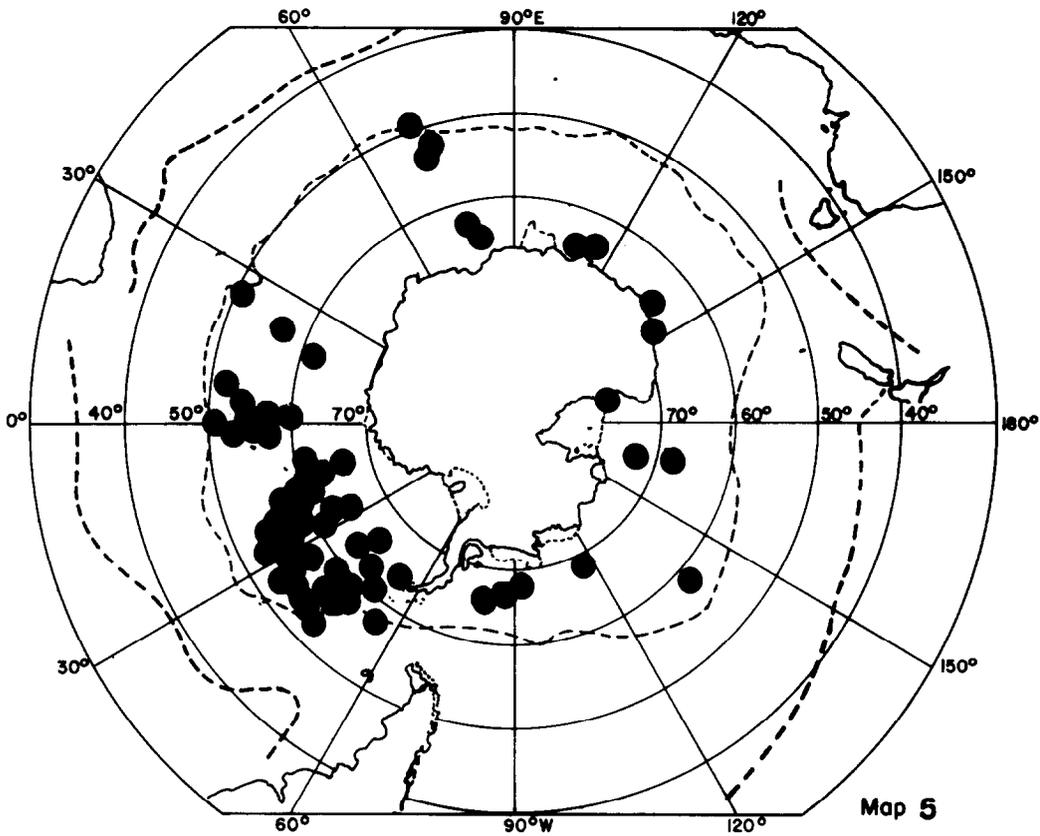
Eyes always visible on dorsal surface of prostomium, but less distinct in adult

Neck short and broad

First cirrus always absent



Figure 7. *Tomopteris carpenteri* (a) head, ventral view; (b) fifth foot.



Map 5. Distribution of *Tomopteris carpenteri*.

Second cirrus may reach back to 3/4 length of body  
Pinnules oval, frilly and extend to distal ends of the parapodial trunks  
Chromophil glands from fourth foot onwards, large and voluminous, located on the inferior half of the ventral pinnule  
Spur gland not present  
Hyaline glands deeply pigmented, first appear in third foot in superior half of ventral pinnule and are present in all subsequent feet  
Gonads in both dorsal and ventral rami from the first or second foot onwards.

Monro (1930) suggested that T. planktonis was probably the young form of T. carpenteri, but Augener (1929) had already demonstrated that this could not be correct. Tebble (1960) also supports this view pointing out that in T. planktonis the hyaline gland is normally unpigmented and apical on the neuropodium, whereas in T. carpenteri it is dorsal and always distinctly pigmented even in the very smallest specimens.

T. carpenteri is known only from the Subantarctic and Antarctic zones (Day, 1967) where the adult has been recorded from all explored depths (Tebble, 1960). It has been reported from the Southern Ocean by numerous workers (see Hartman, 1964 for references).

Tomopteris cavallii Rosa 1907

(Figure 8, Map 6)

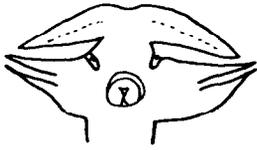
Diagnostic Characters (Hartman, 1964; Day, 1967):

Length to about 12 mm long  
Parapodia 13 to 20 pairs  
Tail absent  
Prostomium deeply notched between the short antennae  
Eyes brown  
Neck short and broad  
First cirrus absent in the adult  
Second cirrus 2/3 the length of body  
Pinnules broadly rounded, restricted to parapodial rami which are not widely separated, first two to three parapodia with diffuse tubular glands in the dorsal pinnules  
Chromophil glands large and start on the fourth foot and located in the middle of the inferior half of the ventral pinnule  
Spur gland absent  
Hyaline gland absent  
Rosette gland absent  
Gonads in dorsal rami from the second or first foot.

Tebble (1960) doubts if this species is valid as it is very close to T. planktonis, differing only in being without hyaline glands, and in having a mid-ventral chromophil gland. Tebble (1960) states that T. cavallii (Monro, 1930) is actually T. krampi and T. cavallii (Monro, 1936) is T. planktonis. Dales (1957) and Dales & Peter (1972) consider it a valid species and give Monro's identification as correct, but give T. cavallii (Monro, 1939) as synonymous with T. planktonis.

Its distribution is given as north-western Atlantic, Indian Ocean, western Pacific (Day, 1967); and South Atlantic Ocean into Antarctic seas from surface to 3000 m (Hartman, 1964).

(a)



(b)

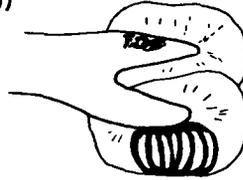
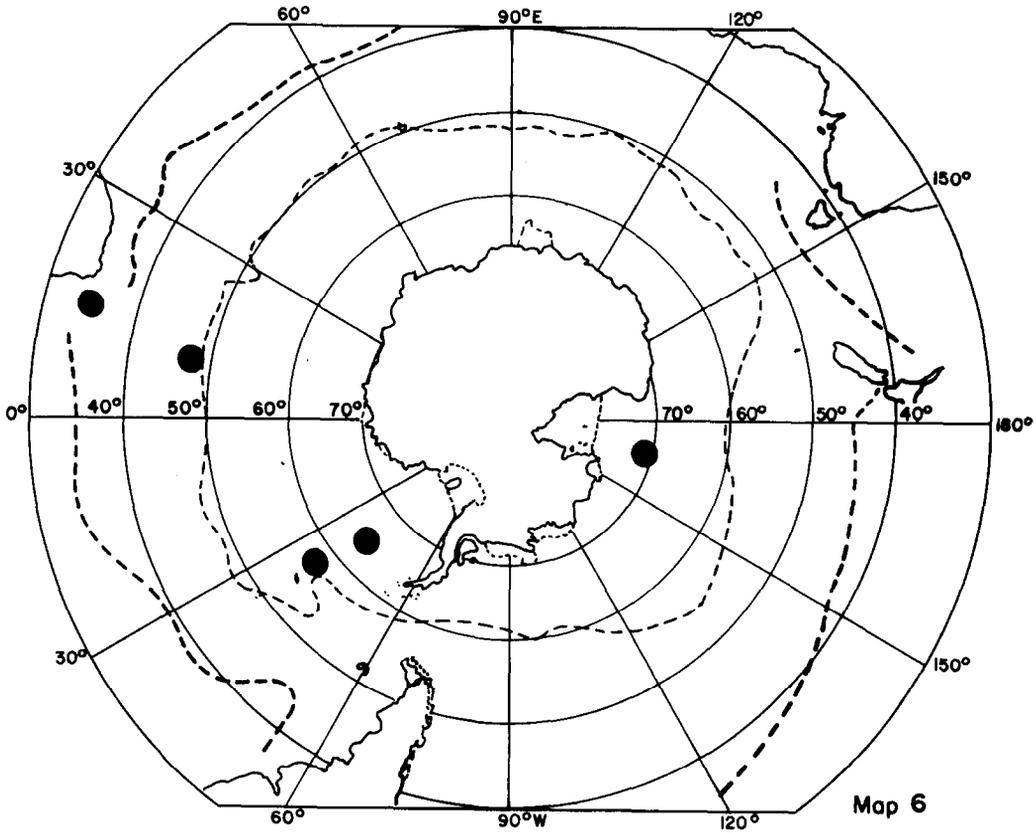


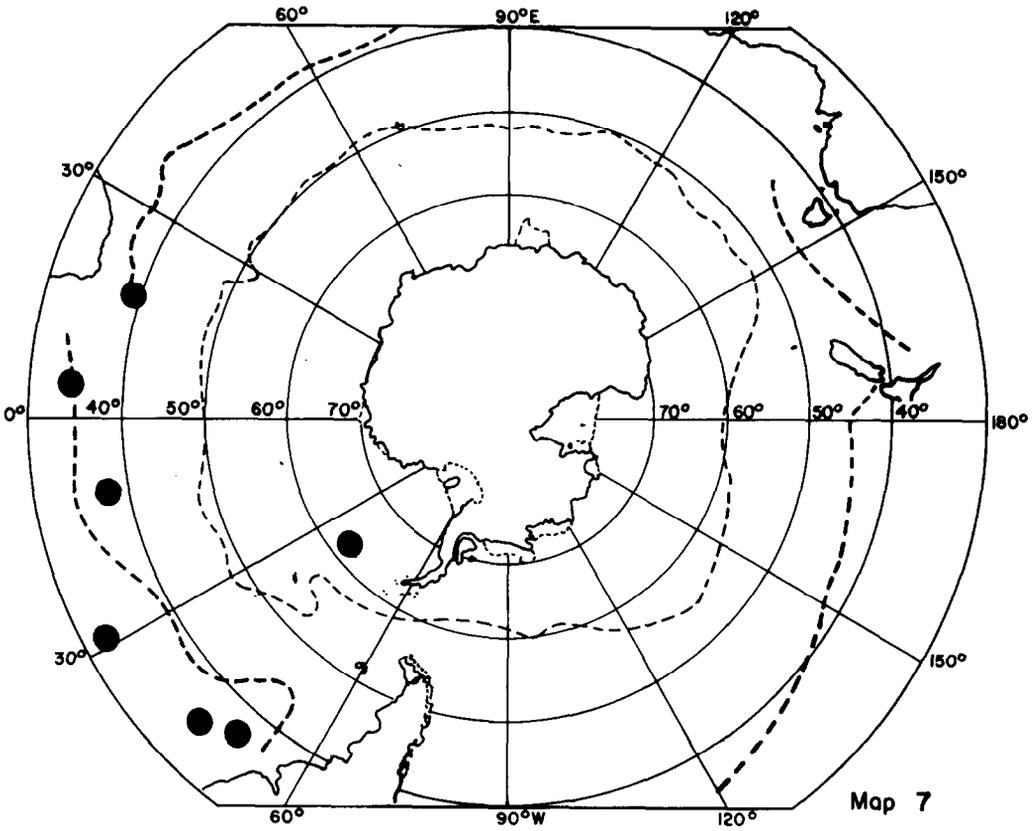
Figure 8. *Tomopteris cavallii* (a) head, ventral view; (b) fifth foot.



Map 6. Distribution of *Tomopteris cavallii*.



Figure 9. Tomopteris ligulata (a) head, ventral view; (b) fifth foot.



Tomopteris ligulata Rosa 1908

(Figure 9, Map 7)

(Tomopteris planktonis Monro, 1936 part)

Diagnostic Characters (Tebble, 1960; Day, 1967):

Length about 10 mm

Parapodia 24 pairs

Tail absent

Prostomium not notched between the antennae

Eyes prominent

Neck short

Pinnules extend from the rami along the whole length of the parapodial trunks as dorsal and ventral ridges, this is characteristic of the species

Chromophil glands large from fourth foot onwards and are located in the inferior part of the ventral pinnule

Spur gland absent

Hyaline glands present in the superior part of the ventral pinnule from the third to seventh foot at least

Gonads in the dorsal rami from the third foot onwards.

On re-examination of the four specimens reported by Monro (1936) as T. planktonis, Tebble (1960) found three of them to be T. ligulata. Tebble (1960) gives its southern limit of distribution in the South Atlantic as the Subtropical Convergence. Hartman (1964) gives the distribution of T. ligulata as questionably into Antarctic waters for Ehlers (1917, in part) reported some specimens from 63°42'S, 82°0'W.

Tomopteris planktonis Apstein 1900

(Figure 10, Map 8)

(Tomopteris ligulata Ehlers, 1917 in part)

(Tomopteris cavallii Monro, 1936)

(Tomopteris septentrionalis Monro, 1936 in part)

(Tomopteris carpenteri Monro, 1930 in part)

Diagnostic Characters (Tebble, 1960; Day, 1967):

Length about 7 mm

Parapodia 13 to 18 pairs

Tail absent

Prostomium not notched between the antennae

Eyes prominent

Neck broad and short

First cirrus absent in the adult

Second cirrus up to 3/4 of body length

Pinnules restricted to parapodial rami

Chromophil glands from the fourth foot onwards and are located at the proximal end of the inferior half of the ventral pinnule where they cause an obvious swelling

Spur gland absent

Hyaline glands indistinct but present at the apices of the ventral pinnules from the first foot onwards

Gonads in the dorsal rami from the second or third foot onwards.

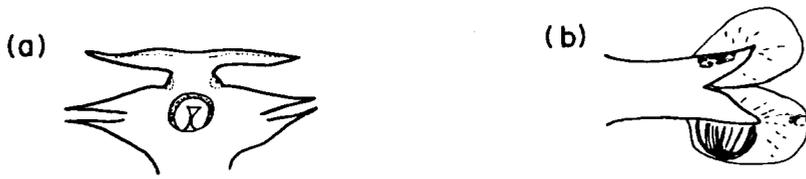
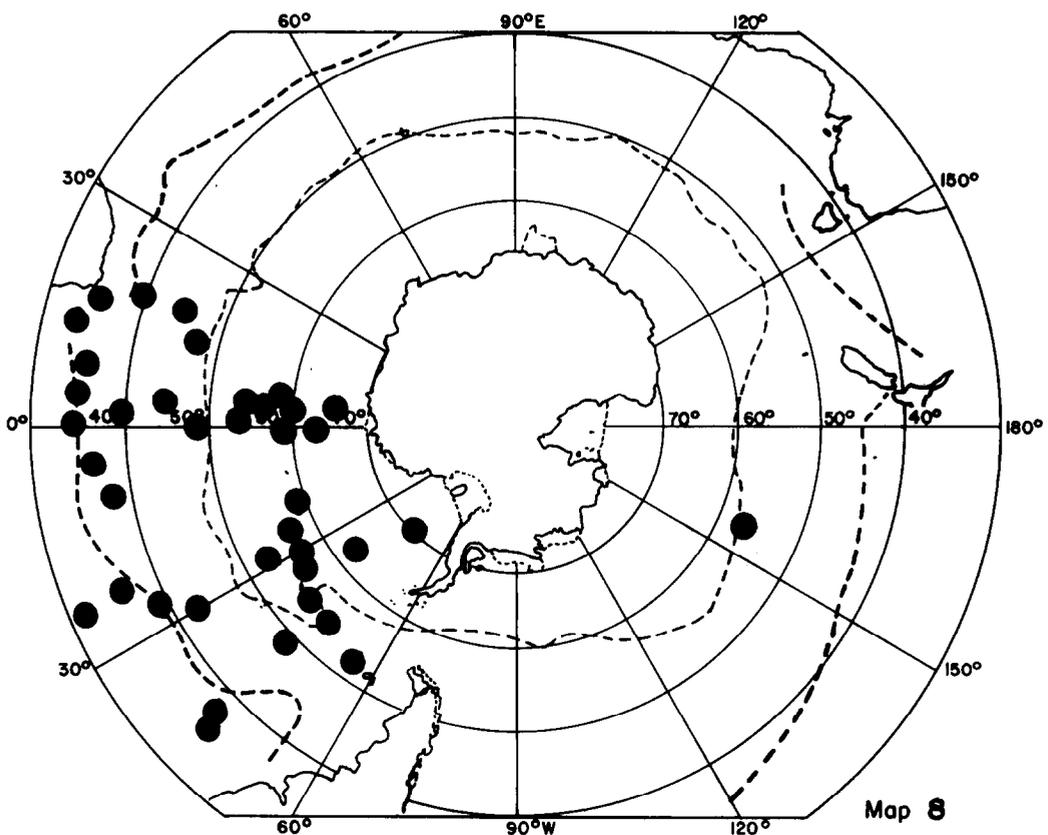


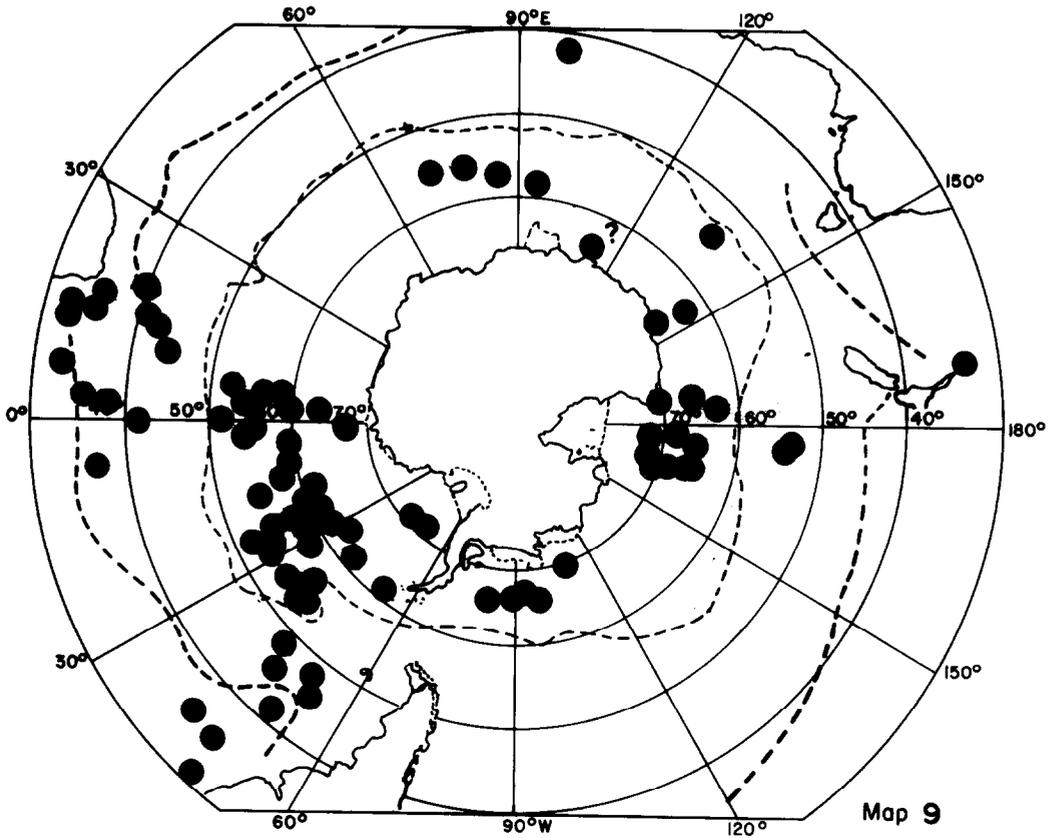
Figure 10. *Tomopteris planktonis* (a) head, ventral view; (b) fifth foot.



Map 8. Distribution of *Tomopteris planktonis*.



Figure 11. *Tomopteris septentrionalis* (a) head, ventral view; (b) fifth foot.



Map 9. Distribution of *Tomopteris septentrionalis*.

The difference between T. planktonis and T. cavallii have already been discussed in a previous section.

T. planktonis has been widely reported from the Atlantic at all explored depths, it is circumpolar in Antarctic waters and almost certainly cosmopolitan (Tebble, 1960). Hartman (1964) lists the Antarctic records.

Tomopteris septentrionalis Steenstrup 1849

(Figure 11, Map 9)

Diagnostic Characters (Tebble, 1960; Day, 1967):

Length up to 26 mm

Parapodia 20-24 pairs

Tail absent

Prostomium notched between the antennae

Eyes present

Neck very short and broad

First cirrus absent in the adult

Second cirrus 3/4 the length of body

Pinnules oval, the dorsal one on anterior feet extending onto the distal end of the parapodial trunk, tubular glands in both pinnules from the first foot onwards so that the posterior pinnules are often opaque

Chromophil glands not well developed but present at apex of ventral pinnule from the second to fourth foot but indistinct in later feet

Hyaline gland ventral and apical, present on most parapodia

Gonads in the dorsal rami from the second foot to about the 14th.

T. septentrionalis is cosmopolitan in cold water masses (Day, 1967) and Hartman (1964) lists the records from the Antarctic.

## 5. FAMILY TYPHLOSCOLECIDAE

Transparent planktonic worms with fusiform bodies; head conical or blunt, without eyes, sometimes with a dorsal caruncle but always with an internal retort organ above the pharynx, an anterior palpode and a pair of well developed nuchal organs which often form free posterior projections; the larval stage has a ciliated ridge or prototroch encircling the head in front of the mouth and in the neotenic genus Typhloscolex this ridge is expanded to form large dorsal and ventral lobes; the first three segments are fused to the prostomium and each bears a single pair of lamellar cirri which enfold the head; normal body segments are uniramous with large foliaceous dorsal and ventral cirri which lie against the body but there is only a rudimentary setigerous lobe bearing a few simple acicular setae; pygidium with a pair of large flattened anal cirri (Figure 15).

Important taxonomic references include Southern (1911), Fauvel (1923), Stop-Bowitz (1948) and Dales (1957). Day (1967) gives good descriptions and a key for the southern African species. Hartman (1964) lists the Antarctic records of this family. The important diagnostic characters of this family are given in Table 3.

There has been much confusion with the taxonomy of this family and many authors cannot agree on synonymy so in this handbook I have followed the synonymy of Dales & Peter (1972) as it is the most recent paper.

Six genera have been proposed for this family but Hartman (1959) points out that Acicularia is synonymous with Sagitella, while Nuchubranchia and Plotobia are synonymous with Travisioopsis so that there are, in reality, only three genera (Sagitella, Travisioopsis and Typhloscolex) within this family (Dales & Peter, 1972). This view was also followed by Day (1967) but Tebble (1960) and Hartman (1964) include Sagitella within Travisioopsis.

### 5.1 KEY TO GENERA:

- 1a) Prostomium with large tranverse ciliated lobes dorsally and ventrally ..... Typhloscolex
- b) Prostomium without large transverse ciliated lobes ..... 2
- 2a) Nuchal organs with freely projecting lobes; a caruncle usually present ..... Travisioopsis
- b) Nuchal organs as curved ridges without freely projecting lobes, no projecting caruncle ..... Sagitella

### 5.2 GENUS Typhloscolex Busch 1851

Body 3-5 mm long, markedly tapered posteriorly and with less than 25 segments, prostomium rounded in front and with an asymmetrical palpode (? fused apical cilia) and large dorsal and ventral ciliated lobes; a pair of free nuchal lobes borne on the sides of the dorsal ciliated lobe; a large retort organ above the pharynx; three pairs of lamellar cirri enfold the head; each body segment with a large lamellar dorsal and ventral cirrus and a poorly marked setigerous lobe; two to three acicular setae appear after the first few segments; anal cirri small; four species of which three may be doubtful.

Table 3. The important diagnostic characters of Typhloscollecidae.

	Maximum length (mm)	Number of Segments	Caruncle	Nuchal Organs	Cirrus Shape		
					Head	Body	Anus
<u>Typhloscolex mulleri</u>	2-3	20-24	not present	small lappets	flattened	cordate to square	ovate
<u>Sagitella kowalevskii</u>	5-15	28-38	not present	semi-circular ridges	cordate	quadrangular	subtriangular
<u>Travisiopsis coniceps</u>	18	22	erect tongue-shaped lobe	free, branching lobes	cordate	cordate	spathulate
<u>Travisiopsis lanceolata</u>	30	22	T-shaped with lobe	free, digitiform lobes	reniform, lamellar	quadrangular to cordate	ovate to lanceolate
<u>Travisiopsis dubia</u>	6	22-28	not projecting	freely projecting, rounded lobes	cordate, lamellar	cordate	oval
<u>Travisiopsis lobifera</u>	25	21	oval, but no projecting lobe	semi-circular ridges with digitiform lobes	lamellar	cordate	subtriangular
<u>Travisiopsis levinseni</u>	13-24	25	almost rectangular, no free lobes	semi-circular projecting lobes	lamellar	cordate	ovate to triangular

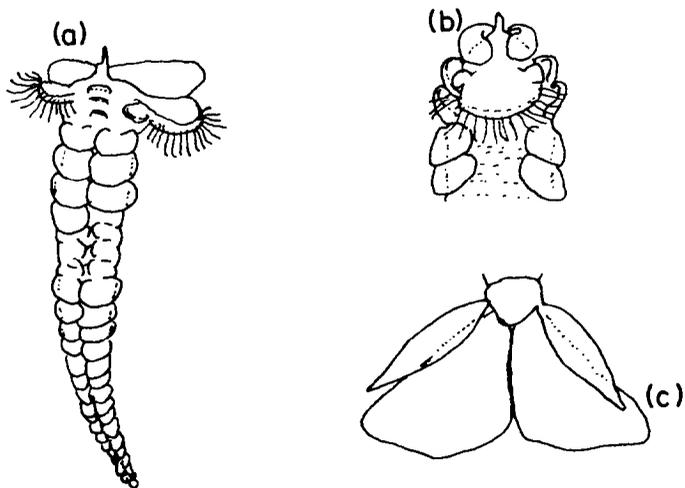
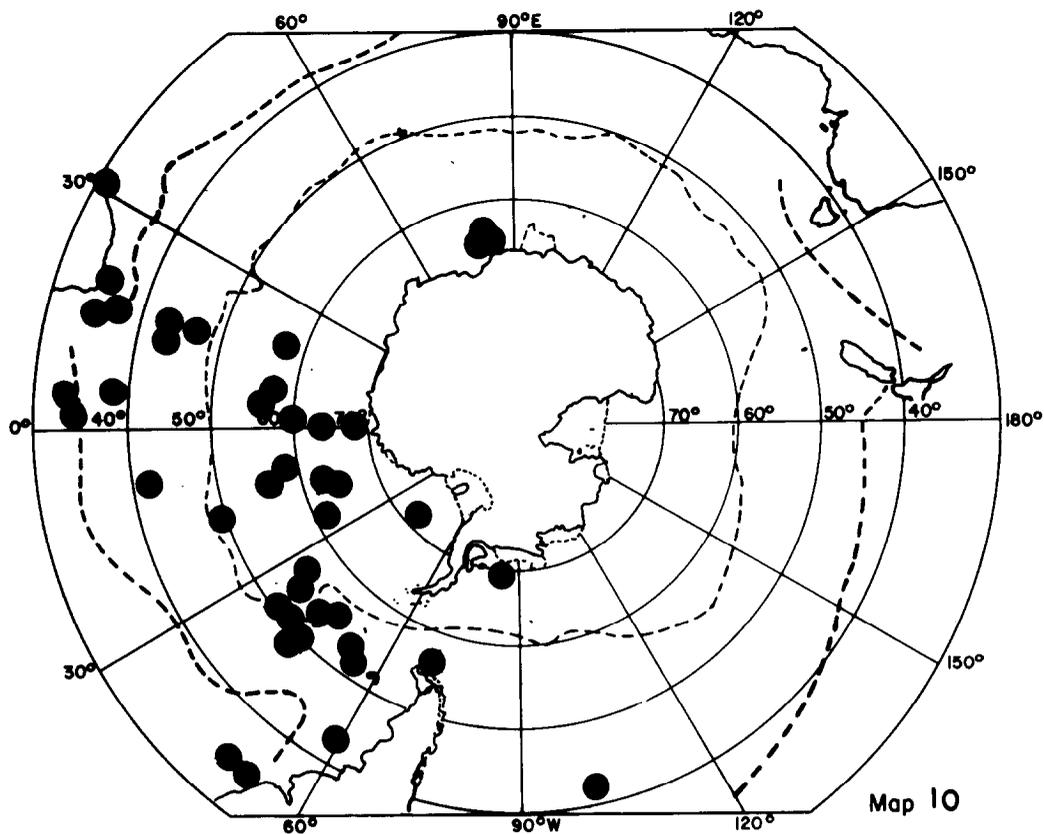


Figure 12. *Typhloscolex mulleri* (a) entire worm, lateral view; (b) head, dorsal view; (c) anal cirri, dorsal view.



Map 10. Distribution of *Typhloscolex mulleri*.

Its small size, pear-shaped form and the ciliated lobes on the head are reminiscent of a trochophore larva and it is possible that Typhloscolex is a neotenic genus (Day, 1967). Certainly the larvae of other genera show resemblances to it.

Typhloscolex mulleri Busch 1851

(Figure 12, Map 10)

(Sagitella cornuta Hardy & Gunther, 1935)

(Typhloscolex phyllodes Ehlers, 1913)

(T. leuckarti Ehlers, 1913)

(Typhloscolex sp. Hardy & Gunther, 1935)

Diagnostic Characters:

Body tapered, 2-3 mm long for 20-24 segments

Prostomium blunt and bearing a small, asymmetrical palpode with a ventral swelling

Retort organ obvious internally

Ciliated lobes almost as broad as the head, the dorsal one bearing a pair of small nuchal lappets at the sides

Head enfolded along sides by three pairs of flattened cirri the first of which is elongated in a dorso-ventral direction

Body cirri on eighteen segments are cordate to square, dorsal and ventral

Posterior cirri more pointed

Anal cirri small and ovate.

Friedrich (1950) recognised five species in this genus: T. mulleri Uljanin, T. praecox Uljanin, T. leuckarti Reibisch, T. reibischi Friedrich and T. robusta Friedrich on the basis of the form of the prostomial lobes and the position of the nuchal organs. Reibisch (1895) also described another species T. phyllodes. Tebble (1960) suggests that T. phyllodes and T. leuckarti may represent the sexually maturing members of a population, and observations on living animals may show them to be synonymous with T. mulleri. Dales & Peter (1972) also incline to the view that there is but one species, T. mulleri, but were not in any position to pronounce with any certainty on the validity of the different species of Typhloscolex, and so listed T. leuckarti, T. phyllodes and T. grandis Stop-Bowitz separately. T. phyllodes has been reported from southern Africa by Day (1965) who considered it a doubtful species, saying it was possibly a larval stage of Travisiopsis sp.

T. mulleri has been reported from the Antarctic by many authors (see Hartman, 1964). It is cosmopolitan (Dales & Peter, 1972) and is found from the surface down to 3000 m.

5.3 GENUS Sagitella Wagner 1872

Body slender fusiform and very transparent, 5-15 mm long for 28-38 segments; head without ciliated lobes or projecting caruncle; a pair of semi-circular nuchal ridges on the posterior part of the prostomium but no free nuchal lobes; sides of head enfolded by three pairs of lamellar cirri; body segments with both dorsal and ventral lamellar cirri and a rudimentary setigerous lobe which bears acicular setae after the first few segments; anal cirri flattened and expanded; this genus is monospecific.

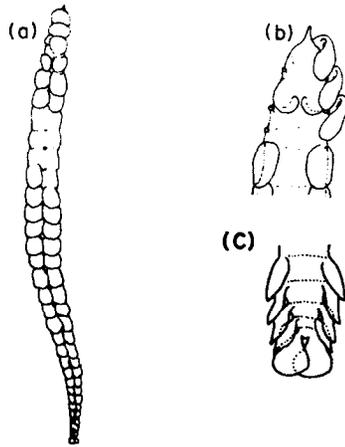
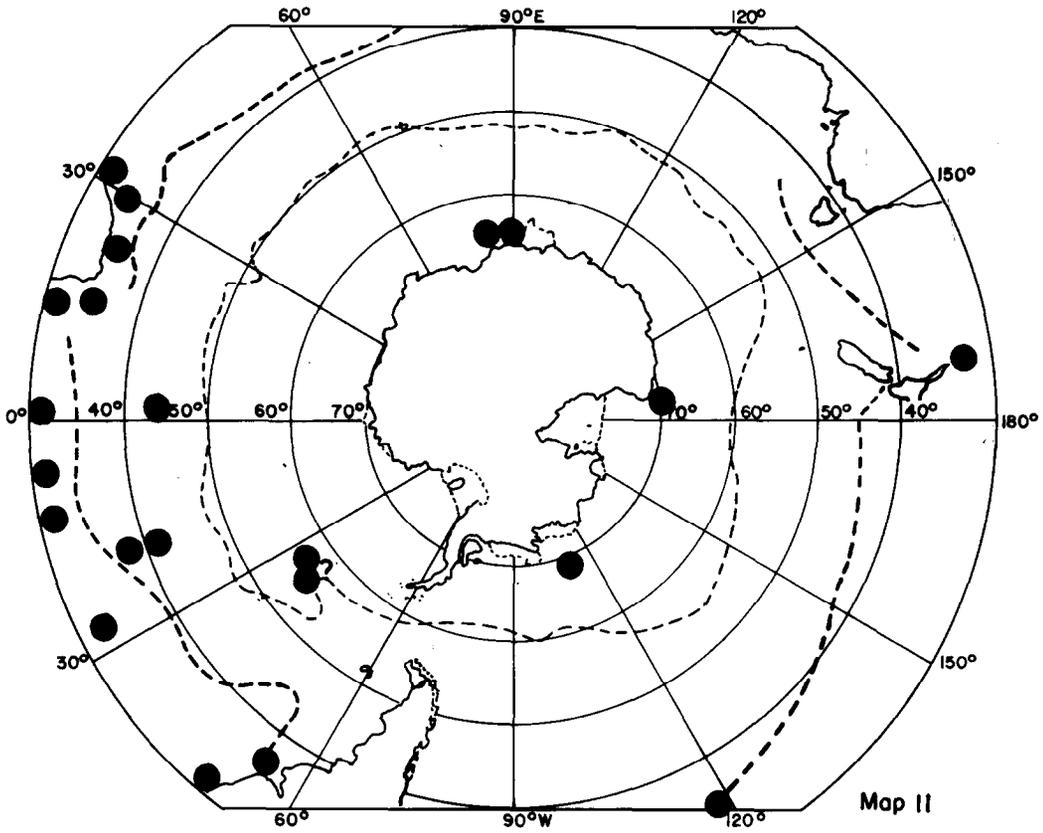


Figure 13. Sagitella kowalevskii (a) entire worm, lateral view; (b) head, dorsal view; (c) tail end.



Map II. Distribution of Sagitella kowalevskii.

Sagitella kowalevskii Wagner 1872

(Figure 13, Map 11)

Diagnostic Characters:

Body from 5 to 15 mm long, fusiform in shape and very transparent so that the inter-segmental septa are visible, 25-35 body segments

Prostomium conical and produced forward as a slender palpode

Nuchal ridges semicircular, outline the occipital region of the head

Head 3 segments, swollen dorsally but no projecting caruncle; cirri enfolding head cordate

Body cirri quadrangular, broader than long and pressed close against the sides of the body

Posterior cirri more cordate and the last few acuminate

Setigerous lobes vestigial

Acicular setae minute

Anal cirri subtriangular, broader than long.

Hartman (1964) included S. kowalevskii in her synonymy for Travisiopsis levinseni and Typhloscolex mulleri but I will follow Dales & Peter (1972) who recognised S. kowalevskii as a valid species. Some authors have employed the name kowalevskii spelt with a "w" instead of kowalevskii spelt with a "v" as used by Wagner (1872). The first published orthography kowalevskii must stand.

This is a cosmopolitan species (Dales & Peter, 1972) but has only been reported from the Antarctic by Gravier (1911a) and Ehlers (1913) between the surface and 950 m. Day (1967) reported S. kowalevskii in the waters around southern Africa and Benham (1929) reported it from north of New Zealand.

5.4 GENUS Travisiopsis Levinsen 1885

Body fusiform with 18-22 setigerous segments; skin rather thick so that intersegmental septa are not easily visible; prostomium conical with an anterior palpode; usually a projecting dorsal lobe or caruncle on the head; a pair of nuchal organs always with free posterior lobes; three pairs of lamellar cirri enfolding the sides of the head; body segments with both dorsal and ventral foliaceous cirri and a small setigerous lobe bearing a few acicular setae; pygidium with foliaceous anal cirri; five valid species all of which have been found in the Southern Ocean or adjacent waters.

Key to species:

- 1a) A freely projecting lobe or caruncle on head ..... 2
- b) Caruncle not freely projecting, merely an oval swelling on head ..... 3
  
- 2a) Nuchal lobes branched; anal cirri spatulate ..... T. coniceps (Chamberlin)
- b) Nuchal lobes simple and digitiform; anal cirri long and ovate ..... T. lanceolata Southern

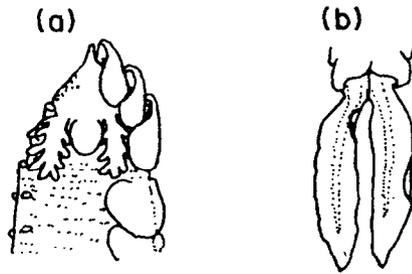
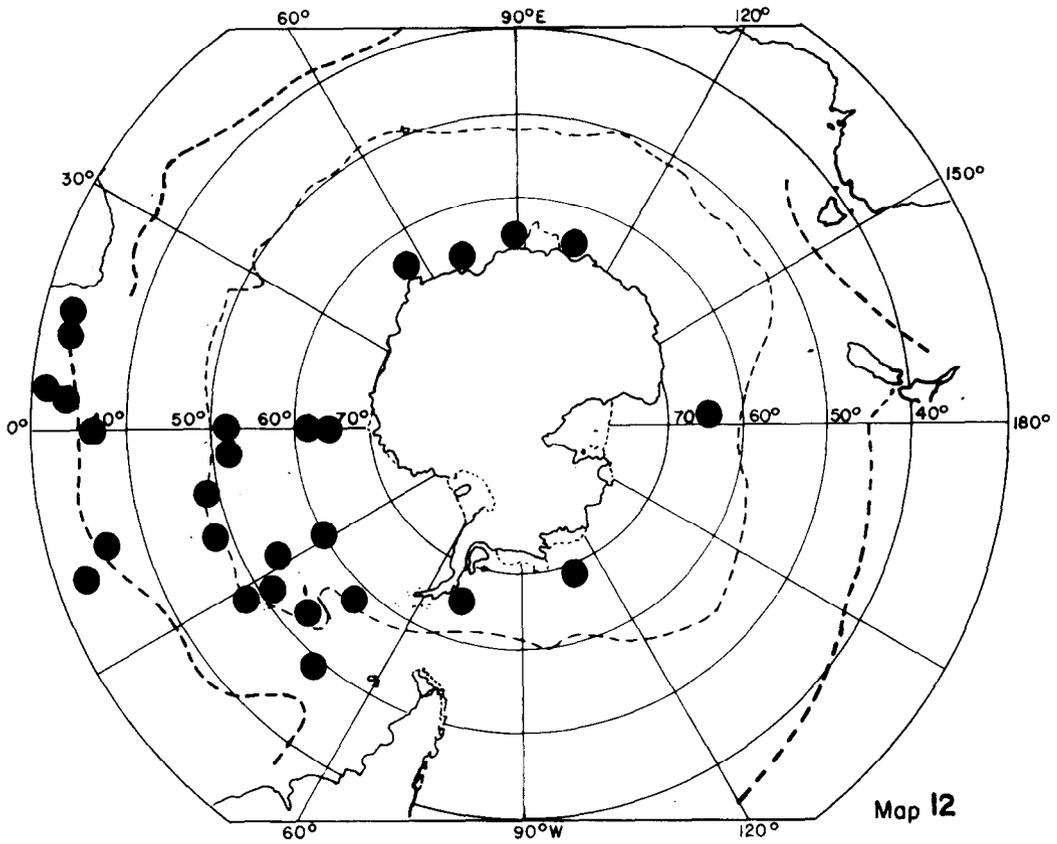


Figure 14. *Travisioipsis coniceps* (a) head, dorsal view; (b) anal cirri.



Map 12. Distribution of *Travisioipsis coniceps*.

- 3a) Anal cirri oval; nineteen to twenty-five body segments; nuchal lobes rounded (At,SA,In) ..... T. dubia Stop-Bowitz
- b) Anal cirri subtriangular; eighteen body segments; nuchal lobe digitiform ..... T. lobifera (Levinsen)
- c) Anal cirri spathulate; twenty-two body segments; nuchal lobes semicircular ..... T. levinseni (Southern)

Travisioopsis coniceps (Chamberlin 1919)

(Figure 14, Map 12)

(Sagitella lobifera Ehlers, 1912; Monro, 1930, 1936, 1939)

Diagnostic Characters:

Body fusiform, up to 18 mm long, 19 body segments  
Head region of three segments each bearing a single pair of lamellar cirri  
Prostomium conical with a stout palpode  
Caruncle an erect, tongue-shaped lobe  
Nuchal organs extending back as a pair of free, branching lobes  
Body cirri both dorsal and ventral are cordate anteriorly but more pointed anteriorly  
Anal cirri spathulate with a strengthening rib.

Tebble (1960) re-examined the holotype of Sagitella lobifera Ehlers and found it identical with Travisioopsis coniceps. He refers to Stop-Bowitz (1948) who pointed out the name lobifera is preoccupied in the genus Travisioopsis by Levinsen's species, so the next name available is coniceps (from Plotobia coniceps Chamberlin, 1919). Tebble also re-examined Monro's (1930, 1936) 'Discovery' and (1939) B.A.N.Z.A.R.E. specimens of S. lobifera and considered them all to be T. coniceps.

This deepwater species (Day, 1967) has been reported from the Antarctic by Stop-Bowitz (1951) and as S. lobifera by Ehlers (1912) and Monro (1930, 1936, 1939). Hartman (1964) included these S. lobifera records in her Travisioopsis levinseni synonymy. Tebble (1960) reported that T. coniceps was widely distributed in the South Atlantic Ocean including south of the Antarctic Convergence in waters down to 3000 m. From the distribution map it would appear that this species is circumpolar in distribution.

Travisioopsis lobifera (Levinsen 1885)

(Figure 15, Map 13)

(Sagitella kowalevskii Benham, 1929)  
(S. lobifera Monro, 1939)

Diagnostic Characters:

Body fusiform, up to 25 mm long, 18 body segments  
Head region with three segments each bearing a pair of lamellar cirri  
Prostomium conical with a large anterior palpode  
Caruncle oval without freely projecting lobe

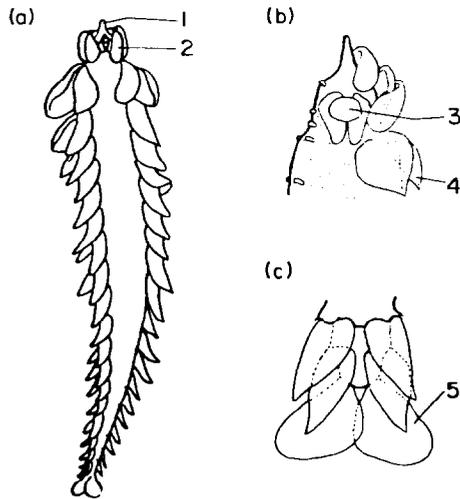
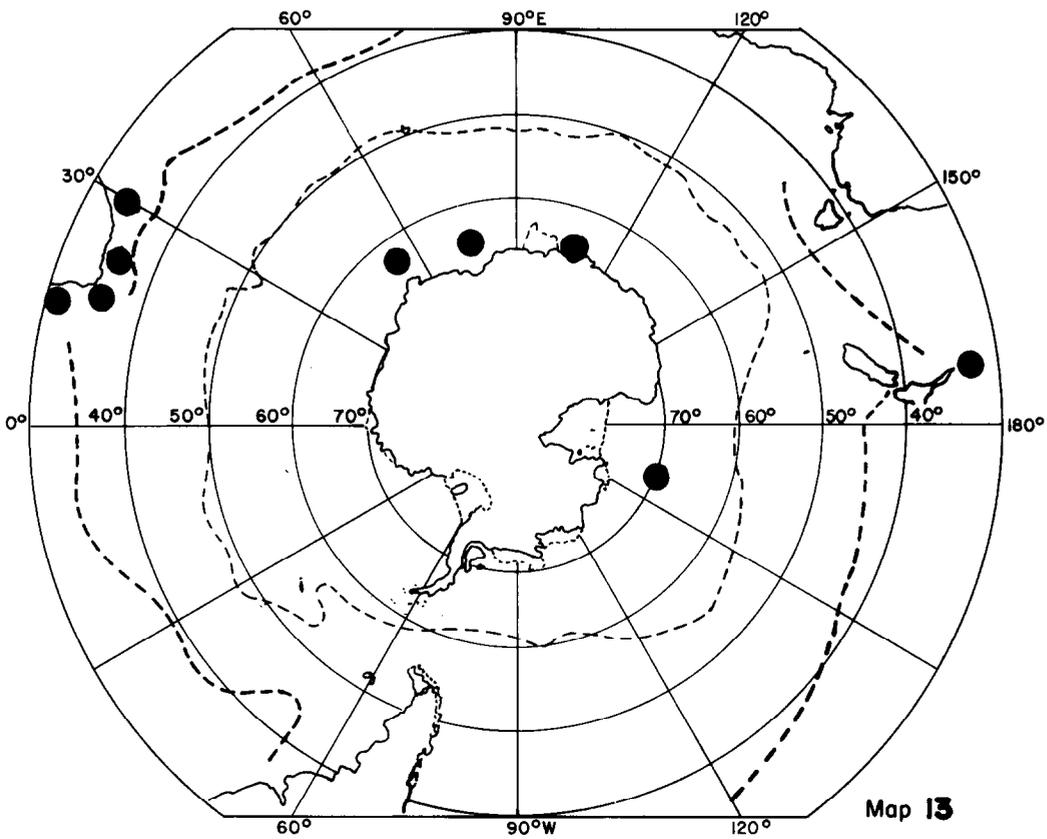


Figure 15. *Traviopsis lobifera* (a) entire worm, dorsal view; (b) head, dorsal view; (c) tail end.  
 (1) palpode, (2) lamellar cirrus, (3) caruncle, (4) body cirrus, (5) anal cirrus.



Map 13. Distribution of *Traviopsis lobifera*.

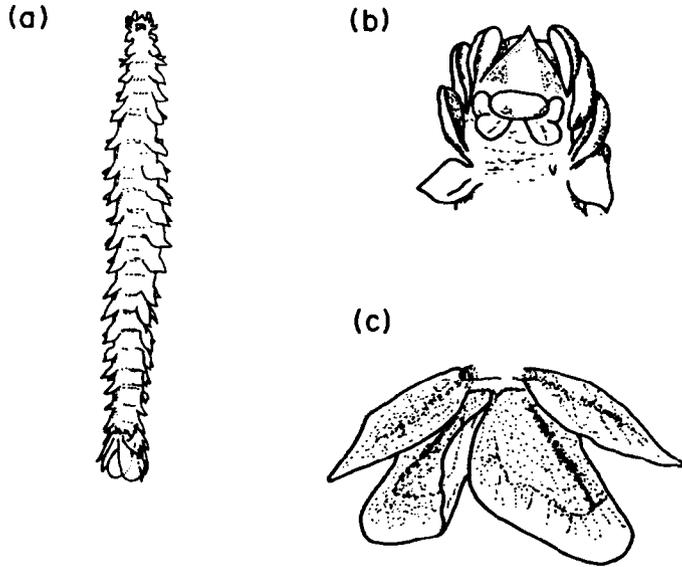
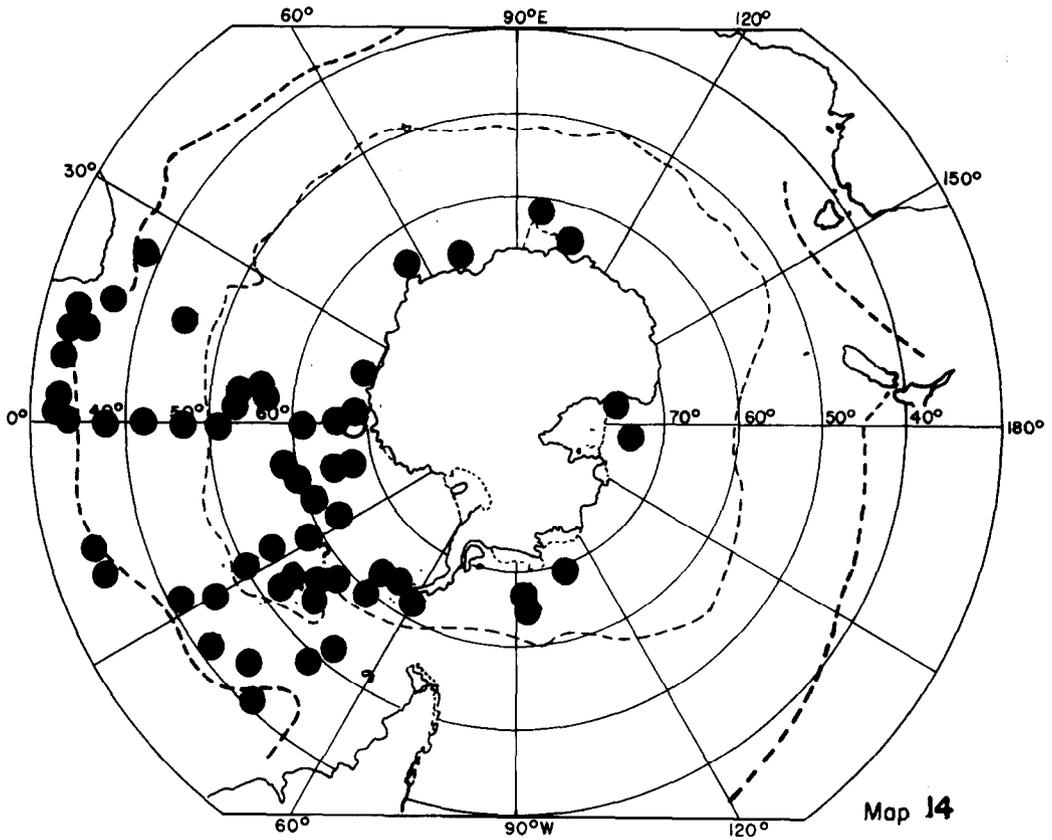


Figure 16. Traviopsis levinseni (a) entire worm, dorsal view; (b) head, dorsal view; (c) anal cirri.



Map 14. Distribution of Traviopsis levinseni.

Nuchal organs as a pair of semicircular ridges embracing the caruncle and continuous with a pair of digitiform posterior lobes  
Body cirri both dorsal and ventral are cordate in the middle but become pointed posteriorly  
Anal cirri subtriangular and expanded distally, about as broad as long  
Setigerous lobes and setae well marked on posterior segments.

Tebble (1960) re-examined Benham's (1929) specimens of Sagitella kowalevskii from the Ross Sea and found them to be Travisiopsis lobifera. Hartman (1964) included this species in the synonymy for T. levinseni but Dales & Peter (1972) considered it a valid species. In the South Atlantic it has only been found north of the Subtropical Convergence (Tebble, 1960). In the Pacific T. lobifera is not found south of 38° South (Dales, 1957). It has been reported from New Zealand (Benham, 1929) and off southern Africa (Day, 1967).

### Travisiopsis levinseni (Southern 1910)

(Figure 16, Map 14)

(Sagitella cornuta Ehlers, 1912)

(Sagitella kowalavskii Gravier, 1911b; Benham, 1927; Monro, 1930)

(Travisiopsis benhami Monro, 1936; Villwock, 1958)

(?Travisiopsis sp. Villwock, 1958)

#### Diagnostic Characters:

Body fusiform, up to 24 mm, 22 body segments

Head region of three segments each bearing one pair of lamellar cirri which enfold the head

Prostomium conical with a small palpode

Caruncle flattened, almost rectangular, without any free lobe

Nuchal organ as a pair of short, semicircular, freely projecting lobes whose bases extend forward as narrow ridges on either side of the caruncle to join a pair of small wart-like lobes

Body cirri cordate with a broad area of attachment, posterior ones become long and tapered

Anal cirri ovate-triangular being narrower proximally than distally.

According to Tebble (1960) T. cornuta Ehlers (1912), Sagitella kowalevskii (Benham, 1929; Monro, 1930), Travisiopsis sp. (Monro, 1930) and T. benhami (Monro, 1936) are synonymous with T. levinseni but T. cornuta (Ehlers, 1913) is identical with T. lanceolata and Sagitella kowalevskii (Benham, 1927) is actually T. lobifera.

Hartman (1964) lists the Antarctic records for this species but also includes Sagitella lobifera in her synonymy for T. levinseni but it is actually synonymous with T. coniceps (Dales & Peter, 1972). Stop-Bowitz (1949, 1951) and Tebble (1960) both reported T. levinseni from the Antarctic. A deep water species (Day, 1967), T. levinseni is found in the North and South Atlantic and in Antarctic waters (Dales & Peter, 1972).

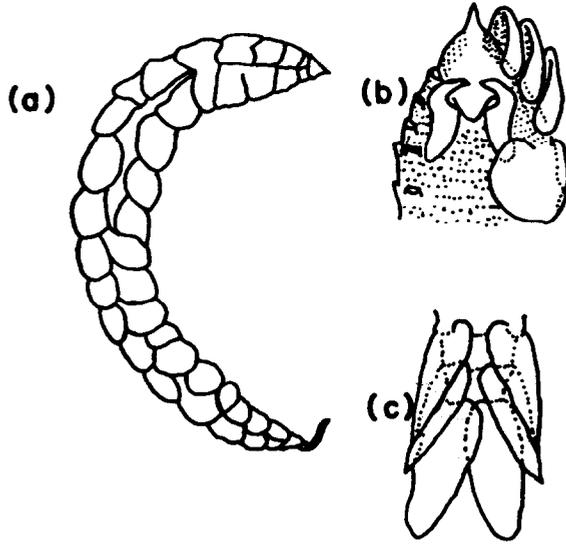
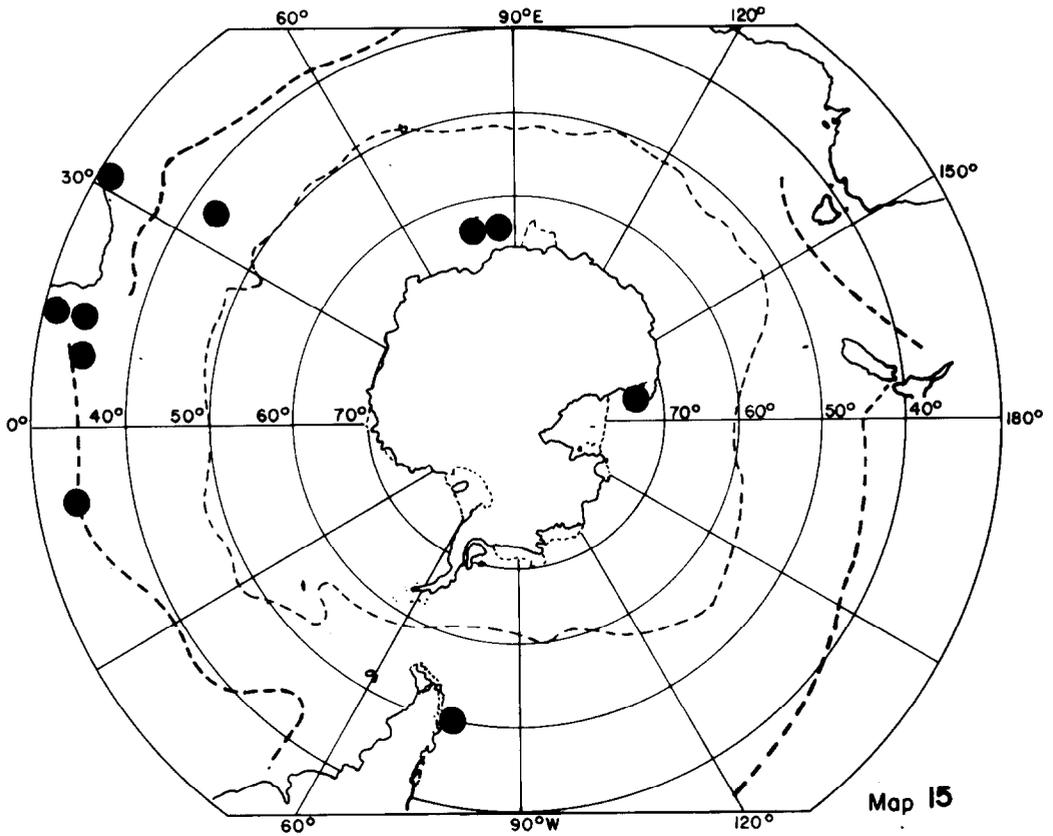


Figure 17. Traviisiopsis lanceolata (a) entire worm, dorsal view; (b) head, dorsal view; (c) tail end.



Map 15. Distribution of Traviisiopsis lanceolata.

Travisiopsis lanceolata Southern 1910

(Figure 17, Map 15)

(Sagitella cornuta Ehlers, 1912, 1913; Monro, 1930)

Diagnostic Characters:

Body fusiform, up to 30 mm long, 19 body segments

Head region with three segments, each bearing a single pair of reniform lamellar cirri enfolding the head

Prostomium conical with a stout palpode

Caruncle with a transversely oval base produced back as freely projecting tongue-shaped lobe, the whole forming a broad T

Nuchal organs in the form of ridges embracing the caruncle and extending back as a pair of free digitiform lobes twice as long as caruncle

Body cirri both dorsal and ventral are quadrangular to cordate in the middle of the body but elongated posteriorly so that the last few pairs are lanceolate

Anal cirri ovate-lanceolate, broader basally than distally and strengthened by a median rib.

According to Tebble (1960), Sagitella cornuta (Ehlers 1912, 1913) is Travisiopsis lanceolata. Although Tebble (1960) gave to the southern limit of distribution of this in the Atlantic Ocean as at the Subtropical Convergence it has been reported from further south.

## 6. FAMILY PONTODORIDAE

Small planktonic worms with few segments; prostomium rounded with rudimentary palps, small eyes and one pair of slender antennae; pharynx unarmed, papillose and followed by a muscular gizzard; tentacular segment with two pairs of tentacular cirri with internal acicula in the lower pair; body elongate with numerous uniramous parapodia each having an elongated setigerous lobe and small glandular dorsal and ventral cirri; setae compound and spinigerous.

### 6.1 GENUS Pontodora Greeff 1879

The single genus has the characters of the family. The only species in this genus is Pontodora pelagica Greeff which has not been found in the Southern Ocean but it has been reported off the coast of southern Africa (Friedrich, 1950; Day, 1967).

## 7. FAMILY IOSPILIDAE

Small elongate planktonic worms; no antennae; prostomium rounded; two eyes; two minute palps; two fused tentacular segments with two pairs of tentacular cirri and setae accompanying the second pair; the next two to ten segments with reduced parapodia; later parapodia uniramous with short dorsal and ventral cirri, a longer setigerous lobe and compound spinigerous setae; proboscis eversible, with or without a pair of lateral jaws (Figure 18).

Hartman (1959) lists four genera: Iospilopsis, Iospilus, Paraiospilus and Phalacrophorus. Dales & Peter (1972) suggest that Iospilopsis antillensis Augener is probably Phalacrophorus uniformis and Paraiospilus affinis Viguiier may be synonymous with Iospilus phalacroides Viguiier so that Iospilus and Phalacrophorus may be the only real and distinct genera.

### 7.1 KEY TO GENERA:

Proboscis unarmed ..... Iospilus  
Proboscis with a pair of long chitinous jaws ..... Phalacrophorus

### 7.2 Genus Iospilus Viguiier 1886 (including Paraiospilus Viguiier 1911)

Prostomium rounded, without antennae but with a pair of eyes; two minute ventral palps on the outer edges of the mouth; proboscis unarmed; two pairs of small tentacular cirri on the first two fused segments of which the first is achaetous and the second bears setae; dorsal and ventral cirri of segments 3 and 4 rudimentary but small setigerous lobes and setae present; segment 5 and succeeding segments with fully developed parapodia having small lamellar dorsal and ventral cirri and a long setigerous lobe bearing compound setae; pygidium glandular, without anal cirri.

The genus Iospilus is probably not as rare as the number of published records would suggest, for it is easily mistaken for the larva of some benthonic form such as a spionid as it is one of the few holoplanktonic polychaetes which feeds on diatoms (Day 1967). All iospilids have well marked branching chromatophores and are probably phosphorescent in life.

The only species, Iospilus phalacroides Viguiier, has been found off southern Africa (Day, 1967) and in the southern waters of the Pacific Ocean (Dales, 1957), but not in the Southern Ocean.

### 7.3 GENUS Phalacrophorus Greeff 1879

Body elongate, cylindrical and transparent; prostomium small, rounded and without antennae but with a pair of small palps ventrally; proboscis large, eversible and armed with a pair of long curved and pointed jaws; two pairs of small tentacular cirri on the first two segments of which the second bears setae, the next few segments have reduced parapodia but thereafter each parapodium has ovoid dorsal and ventral cirri and a conical setigerous lobe bearing compound spinigerous setae; pygidium glandular, without appendages; 2 species.

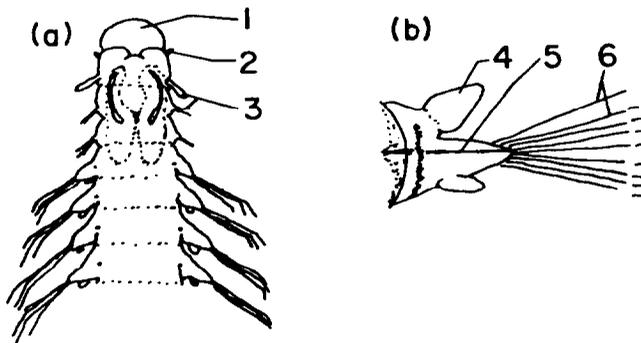
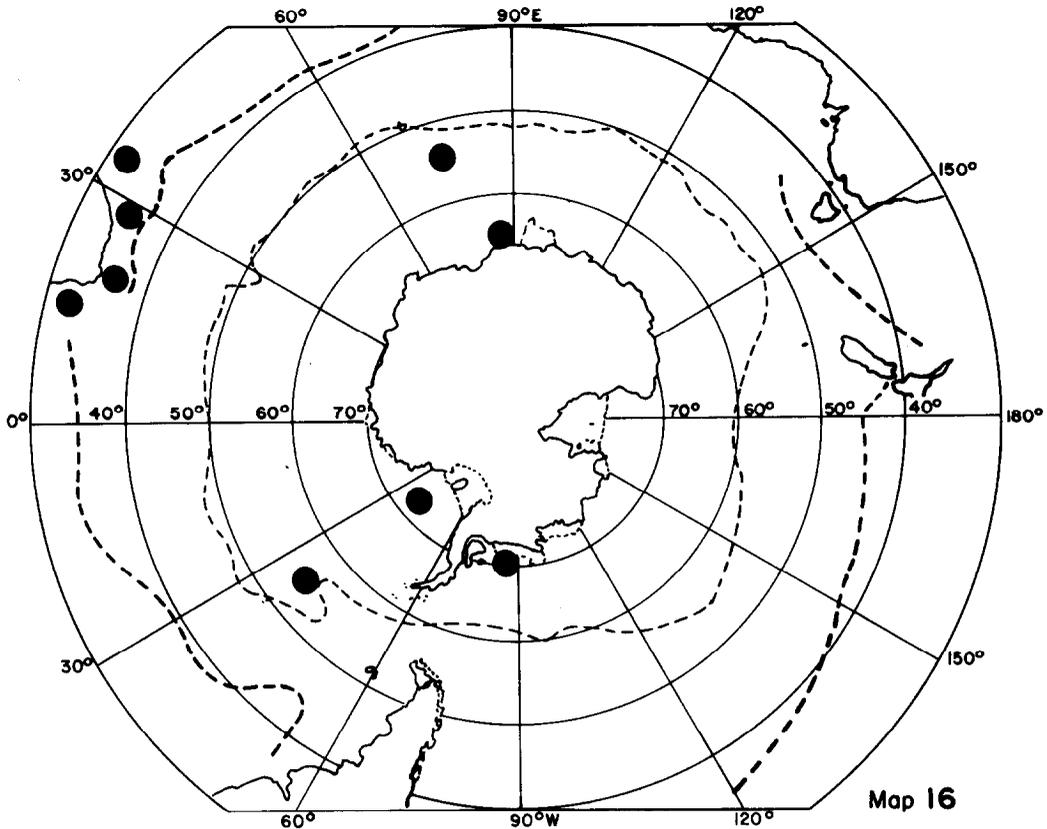


Figure 18. *Phalacrophorus pictus* (a) head, ventral view; (b) foot, posterior view showing chromatophores.

(1) prostomium, (2) palp, (3) tentacular cirri, (4) dorsal cirrus, (5) setigerous lobe, (6) compound spinigerous setae.



Map 16. Distribution of *Phalacrophorus pictus*.

Key to species:

First two to three parapodia rudimentary ..... P. pictus Greeff  
First eight to ten parapodia rudimentary  
(Pa,At,SA,In) ..... P. uniformis Reibisch

Phalacrophorus pictus Greeff 1879

(Figure 18, Map 16)

(Phalacrophorus c.f. pictus Ealey & Chittleborough, 1956)

Diagnostic Characters:

Body cylindrical, up to 6 mm long for 30 segments

Colour pale orange and translucent (Hartman, 1964)

Prostomium rounded in front with two eyes and a pair of minute palps

Proboscis large and eversible, with a lobed margin and a pair of chitinous pointed jaws

Tentacular cirri first is a mere dorsal papilla, the second longer, ventral and digitiform

Parapodia and setae of segments 3 and 4 poorly developed

Subsequent parapodia and setae are all equally large, each with a well developed conical setigerous lobe, a bluntly triangular dorsal cirrus and a smaller ventral cirrus

Segmental chromatophores ventral to parapodia, not developed in juveniles but in the adults branching chromatophores develop on and between the parapodia.

Setae slender with long pointed shaft-heads and slender blades.

This cosmopolitan species (Dales & Peter, 1972) has been recorded from the Antarctic (see Hartman, 1964 for references). Tebble (1962) thinks the Antarctic populations may be separate.

## 8. FAMILY LOPADORHYNCHINAE

Entirely planktonic; body small and rather flattened; prostomium broad with four antennae, no palps and poorly developed eyes; proboscis unarmed and seldom everted; two to three tentacular cirri on the first one or two segments which may lack setae; parapodia uniramous with dorsal and ventral cirri; setae mainly compound (Figure 19).

While Day (1967) includes the Lopadorhynchinae in the Family Phyllococinae Hartman (1959) gives this group of exclusively pelagic genera family status and lists five genera: Lopadorhynchus, Maupasia, Pedinosoma, Pelagobia and Prolopadorhynchus. The other genera described by Hartman, namely Haliphanelia Treadwell, Halyplanes Reibisch, Haliplanes Reibisch, Hydroplanes Claparede, Mastigethus Chamberlin, Nans Chamberlin and Reibischia Bergstrom are, as Hartman rightly states, all synonyms of species belonging to these five genera (Dales & Peter, 1972). Tebble (1960) and Dales & Peter (1972) suggest that the family is best regarded as including four genera only: Maupasia, Pedinosoma, Pelagobia and Lopadorhynchus (includes Prolopadorhynchus). In this handbook, the variant spelling of Lopadorhynchus with one 'r' has been used after Dales & Peter (1972).

Dales (1957) provides a key to the identification of genera and species. Hartman (1964) lists the Antarctic records for this family. Tebble (1960) discussed the distribution of this family in the South Atlantic Ocean. Day (1967) gives good notes on identification of the species found in the waters off southern Africa. Other useful references regarding this group will be found in Greeff (1879), Reibisch (1893, 1895) and Southern (1909). Revised descriptions are given by Stop-Bowitz (1948).

### 8.1 KEY TO GENERA:

- 1a) Tentacular segments with setae ..... 2
- b) Tentacular segments without setae ..... 3
  
- 2a) Two tentacular cirri on the first segment; next  
  segment without a dorsal cirrus ..... Pelagobia
- b) Three tentacular cirri on two segments; next segment  
  with a dorsal cirrus ..... Maupasia
  
- 3a) Two tentacular cirri on the first segment; next two to  
  three segments normal with compound setae ..... Pedinosoma
- b) Two to three tentacular cirri on the first segment; next  
  two to three segments modified with curved acicular setae Lopadorhynchus

### 8.2 GENUS Lopadorhynchus Grube 1855

Body broad and flattened; four antennae; two to three tentacular cirri but no setae on the first segment which has the three cirri in a vertical series; proboscis with three glands; segments 2, 3 and sometimes 4 are stout, have acicular setae and may lack ventral cirri; each body segment with a foliaceous dorsal cirrus, a setigerous lobe with a rounded presetal lamella, numerous compound setae and sometimes a few simple acicular ones; ventral cirri often subulate; seven valid species of which five are found in waters adjacent to the Southern Ocean.

Key to species:

- 1a) Compound setae start on setiger 3 ..... 2
- b) Compound setae start on setiger 4 (one to two acicular setae persist to the fourth foot or later) ..... 5
  
- 2a) Setigers 1 and 2 without ventral cirri in the adult; fourth and later setigers with or without an acicular seta among the compound forms ..... 3
- b) Setigers 1 and 2 with ventral cirri partially fused to the inferior margins of the setigerous lobes; fourth and later setigers without acicular setae among the compound forms .... 4
  
- 3a) Only compound setae after the third foot, setigers 1 and 2 with a collar-like expansion at the base of the setae (At) ..... L. uncinatus Fauvel
- b) Compound setae accompanied by one inferior acicular seta in the fourth and subsequent feet (At,SA,In) ..... L. krohni (Claparede)
  
- 4a) Ventral cirri with long filiform tips (SA,In) L. appendiculatus Southern
- b) Ventral cirri without filiform tips (At,SA) . L. henseni
  
- 5a) Setigers 1-3 without ventral cirri (At) ..... L. brevis Grube
- b) Setigers 1-3 with ventral cirri partially fused to the inferior margins of the setigerous lobes (Pa,At,SA) ..... L. nationalis Reibisch

No members of this genus have been reported from the Southern Ocean. Day (1967) gives descriptions of the species found off the coast of southern Africa and Dales (1957) provides a useful key. Tebble (1960) reports that in the South Atlantic Ocean the southern limit of distribution of L. brevis, L. uncinatus and L. krohni is the Subtropical Convergence.

### 8.3 GENUS Pelagobia Greeff 1879

Body small and rather flattened; four antennae; two pairs of tentacular cirri on the first segment which also bears setae; dorsal cirrus absent from the next segment, later parapodia with long tapered dorsal and ventral cirri and conical setigerous lobes; setae compound; one valid species.

#### Pelagobia longicirrata Greeff 1879

(Figure 19, Map 17)

(Pelagobia viguieri Gravier, 1911a; Benham, 1921, 1929)

#### Diagnostic Characters:

Body about 5 mm long with 20 segments

Prostomium bluntly triangular with a pair of small indistinct eyes and four antennae which are slender, subequal and less than the width of the prostomium

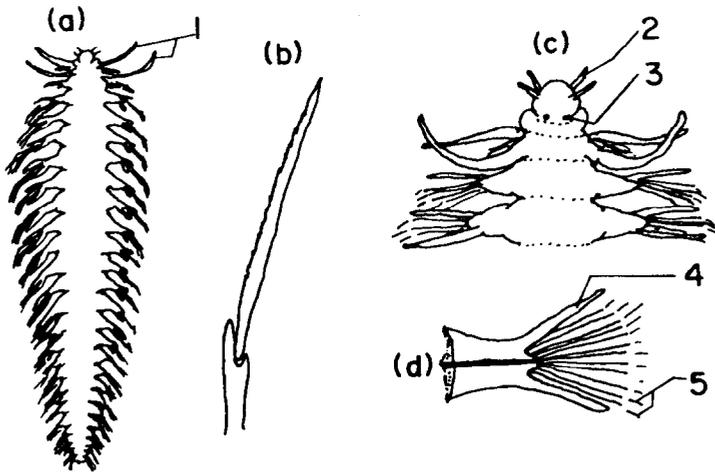
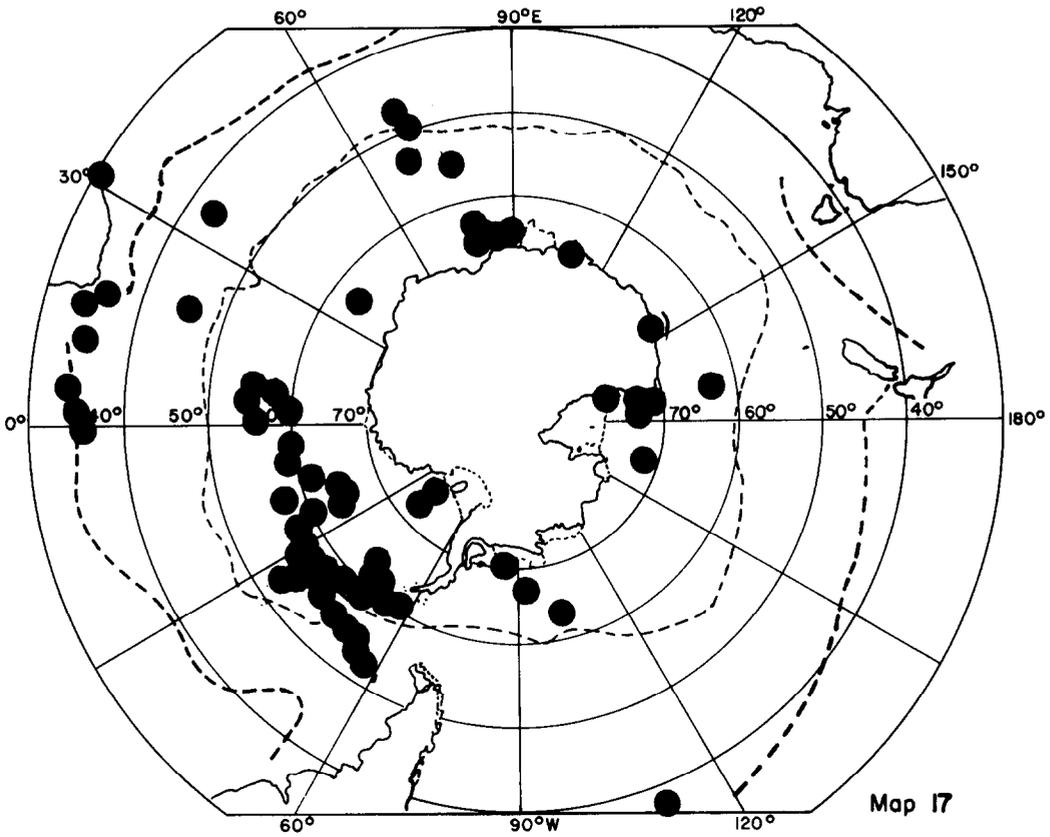


Figure 19. Pelagobia longicirrata (a) entire worm; (b) seta; (c) head, dorsal view; (d) foot.



Map 17. Distribution of Pelagobia longicirrata.

Tentacular segment with a few setae and two pairs of tapered tentacular cirri longer than the width of the body  
Second setiger without a dorsal cirrus  
Later parapodia each with a conical setigerous lobe and much longer, subequal, dorsal and ventral cirri  
Setae with asymmetrical shaft-heads having a long tooth on one side, blades toothed with faintly hooked tips  
Middle parapodia often yellowish brown

Hartman (1964) retains P. viguieri as a species separate from P. longicirrata but Dales & Peter (1972) agree with Tebble (1960) that viguieri and longicirrata are synonymous. The North Atlantic species, P. serrata, is clearly different from P. longicirrata in the shape of the setae but whether or not this difference warrants specific status depends on an examination of many more specimens than are now available (Tebble, 1960).

P. longicirrata is found in "almost all explored water masses" in a known depth range from 50 m to 1000 m (Day, 1967). Hartman (1964) lists the Antarctic records for this species and its synonym P. viguieri. Within the Antarctic and Subantarctic zones P. longicirrata exhibits important geographical and seasonal patterns of distribution (Hartman, 1964).

#### 8.4 GENUS Maupasia Viguier 1886

Body broad and short, usually less than 5 mm long with 15-25 segments; four antennae; three pairs of tentacular cirri and setae on the first two segments; parapodia uniramous, each with a conical setigerous lobe and acorn-shaped to cylindrical dorsal and ventral cirri; setae compound; three valid species of which one is found in the Southern Ocean.

Key to species:

- 1a) Dorsal cirri acorn- or flask-shaped; ventral cirri markedly tapered ..... M. caeca Viguier
- b) Dorsal cirri digitiform or subulate; ventral cirri blunt ..... 2
- 2a) Tentacular cirrus D2 longer than twice the body width (SA) ..... M. gracilis (Reibisch)
- b) Tentacular cirrus D2 less than twice the body width ..... M. isochaeta\* (Reibisch)

Note: \*Northern Hemisphere species.

#### Maupasia caeca Viguier 1886

(Figure 20, Map 18)

(Maupasia sp. Ealey & Chittleborough, 1956)

Diagnostic Characters:

Body 3-5 mm long with about 15 segments  
Prostomium square or faintly curved in front and without eyes

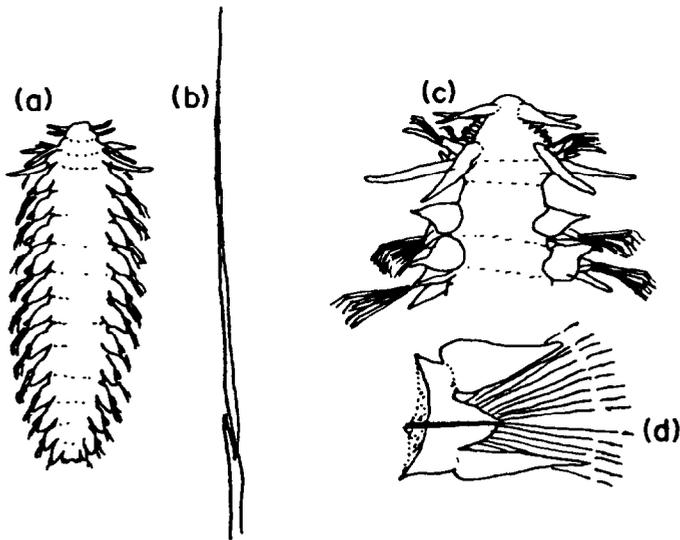
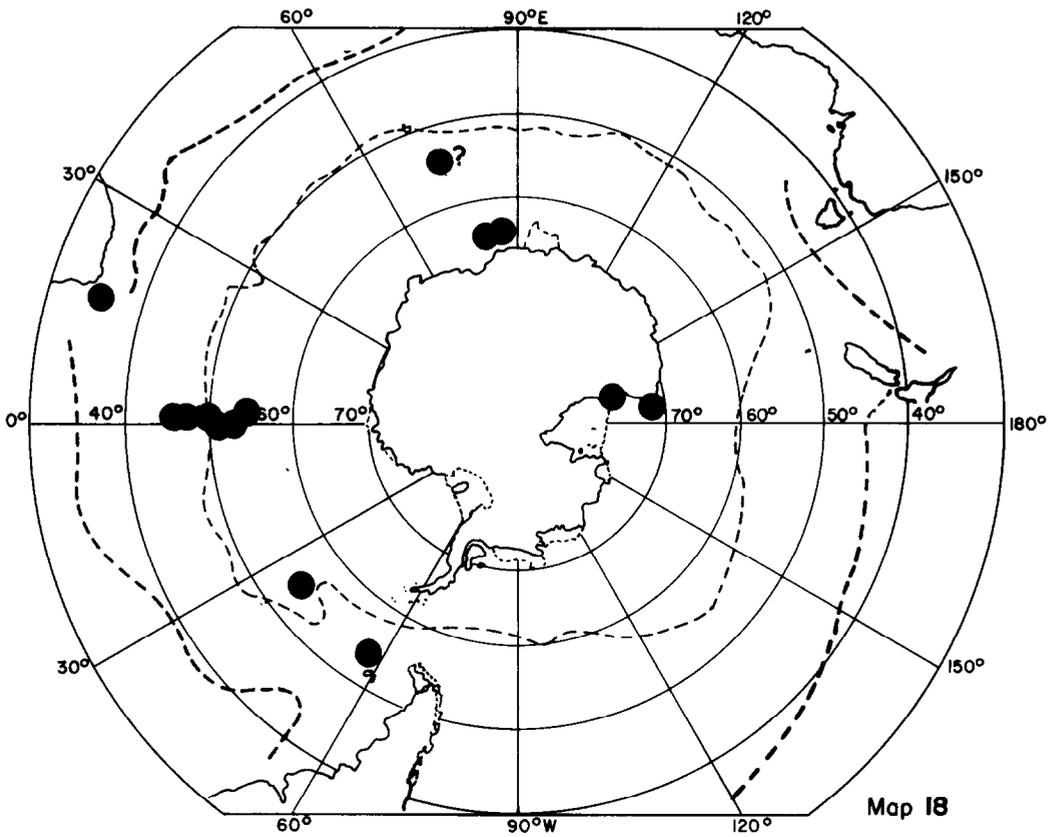


Figure 20. Maupasias caeca (a) entire worm, (b) seta; (c) head, dorsal view; (d) foot.



Map 18. Distribution of Maupasias caeca.

Antennae 2 pairs, subequal, equal to width of prostomium

First tentacular segment bearing a few setae and two tapered tentacular cirri of which the dorsal is rather longer than the ventral

Second tentacular segment with a long dorsal cirrus equal to two-thirds the body width, a few setae and a normal ventral cirrus slightly shorter than those of the body

Middle segments each with a swollen flask-shaped dorsal cirrus, a conical setigerous lobe and a markedly tapered ventral cirrus a little longer than the dorsal one

Setae with one side of the shaft-head ending in a long point and bearing a very long fine blade.

Dales & Peter (1972) point out that Viguier (1886) used *oe* in spelling "caeca" although *ae* (Lat. "blind") is perhaps more correct, and since subsequent authors (and printers) have used both spellings somewhat inconsistently, these differences are not distinguished in the synonymy.

Hartman (1964) reports Maupasia caeca to be cosmopolitan, in surface depths to 750 m and she also gives the Antarctic records for this species.

#### 8.5 GENUS Pedinosoma Reibisch 1895

Body small and flattened with few segments; four antennae; proboscis short with three glands; two pairs of tentacular cirri but no setae on the first segment (formula 0/1/1); all subsequent parapodia with cordate dorsal cirri conical setigerous lobes and lanceolate ventral cirri; setae all fine and compound.

The single species in this genus, Pedinosoma curtum Reibisch has been found around southern Africa (Day, 1967) but is yet to be recorded from the Southern Ocean.

## 9. NON HOLOPELAGIC SPECIES

There are numerous records of polychaetes from non holopelagic families being found in the plankton of the Southern Ocean, especially in inshore areas. Many of these records are considered to be the larvae or immature stages of some benthonic form, for example Hartman (1964) feels that Antinoella pelagica (Monro) may represent a pelagic stage of Herdmanella gracilis (Ehlers). Others may be the sexually reproducing stages which swim off the bottom for mating. More work needs to be done on the life histories of these polychaetes before a decision can be made on their mode of life (benthonic or pelagic) but those adult forms caught by pelagic nets in the Southern Ocean are listed in Table 4.

FAMILY	GENUS AND SPECIES	AUTHOR	LOCALITY	NOTES
Polynoidae	<u>Antinoella pelagica</u>	Monro 1930 Stop-Bowitz 1951	South Georgia South Georgia	as <u>Antinoe pelagica</u> as <u>Antinoe pelagica</u>
	<u>Harmothoe benthophila</u> <u>intermedia</u>	Stop-Bowitz 1951	South Georgia	
	<u>Harmothoe benthophila</u>	Ehlers 1913 Monro 1936	Cape Verde Cape Verde	
	<u>Harmothoe benthophila</u> var. <u>bimucronata</u>	Hardy & Gunther 1935	South Georgia	
	<u>Lagisca hubrechtii</u>	Monro 1930	South Shetland Is.	
	<u>Macellicephala mirabilis</u>	Monro 1930	South Georgia	as <u>Macellicephala</u> sp.
Lacydoniidae	<u>Lacydonia mikrops</u>	Ehlers 1913	Wilhelm II Coast	
Syllidae	<u>Autolytus charcoti</u>	Benham 1921 Ealey & Chittleborough 1956	South Georgia Heard Island	handnet
	<u>Autolytus gibber</u>	Ealey & Chittleborough 1956	Heard Island	epitokous specimen
	<u>Autolytus simplex</u>	Ealey & Chittleborough 1956	Heard Island	epitokous and non- breeding
Nephtydidae	<u>Nephtys macroura</u>	Stop-Bowitz 1949	Bouvet Island	
Spionidae	<u>Nerinopsis hystricosa</u>	Ehlers 1913	Wilhelm II Coast	
Sphaerodoridae	<u>Sphaerodorum parvum</u>	Ehlers 1913	Wilhelm II Coast	

Table 4. The non-holopelagic polychaetes from the Southern Ocean.

10. SOURCES OF FIGURES AND MAPS

<u>Source</u>	<u>Figures</u>
McIntosh (1885)	2
Viguiier (1886)	20c
Gravier (1911a)	4c,d,e
Ehlers (1913)	17a
Benham (1929)	4a,b
Monro (1930)	3,b
Monro (1936)	14b
Stop-Bowitz (1948)	12c
Muus (1953)	16
Dales (1957)	8
Day (1967)	1, 3a,c,d, 5, 6, 7, 9, 10, 11, 12a,b, 13, 14a, 15b,c, 17b,c, 18, 19, 20a,b,c
Fauchald (1977)	15a

<u>Source</u>	<u>Maps</u>
Quatrefages (1865)	5
McIntosh (1885)	1, 5
Willey (1902)	1
Gravier (1911)	1, 3, 9, 11, 13, 17
Ehlers (1912b)	4, 12, 13, 15, 17, 18
Ehlers (1913)	1, 3, 4, 10, 11, 15, 16, 17, 18
Ehlers (1917)	5, 6, 7, 8, 9
Benham (1921)	1, 5, 9, 17
Benham (1927)	13, 17, 18
Augener (1929)	3, 8, 9, 10, 16, 17
Benham (1929)	3, 5, 6, 9, 11, 14, 17
Augener (1932)	1, 5
Monro (1930)	2, 3, 5, 6, 8, 9, 10, 12, 13, 15
Villwock (1958)	2, 3, 10, 13
Hardy & Gunther (1935)	3, 5, 9, 10, 11, 13, 16, 17, 18
Fauvel (1936)	1, 3, 10, 16, 17
Monro (1936)	1, 2, 4, 5, 6, 7, 8, 12, 13, 17
Monro (1939)	1, 4, 5, 9, 12, 14
Stop-Bowitz (1949)	1, 3, 5, 8, 9, 10, 12, 13, 17
Friedrich (1950)	10, 11, 18
Stop-Bowitz (1951)	1, 3, 5, 8, 9, 10, 13, 17
Fauvel (1953)	5
Ealey & Chittleborough (1956)	5, 16, 17, 18
Tebble (1960)	1, 2, 3, 5, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18
Dales & Peter (1972)	18
Day (1967)	4, 11, 13, 14, 15, 16

11. GLOSSARY  
(Dales, 1957; Day, 1967)

<u>achaetous</u>	without setae
<u>acicular seta</u>	a very stout projecting seta homologous with other setae but similar in thickness to an internal aciculum
<u>aciculum (a)</u>	a stout internal chitinous rod which supports each of the two lobes of a parapodium
<u>anal cirrus(i)</u>	one or more elongated projections from the pygidium or terminal segment on which the anus open
<u>biramous</u>	having two rami or forks
<u>biramous parapodium</u>	a foot or parapodium with two rami, one is the notopodium (dorsal) and one is the neuropodium (ventral)
<u>capillary seta</u>	hair-like bristle, sometimes used to cover all long slender tapering setae
<u>caruncle</u>	a sensory lobe extending behind the prostomium in the Typhloscolecidae
<u>cephalic</u>	pertaining to the head region
<u>ceratophore</u>	the basal joint of an antenna
<u>chaetae</u>	setae
<u>chromatophil gland</u>	a densely staining gland in the ventral pinnule, most commonly present in the third or fourth parapodia posteriorly, can be compact or diffuse; found in the Tomopteridae
<u>chromatophore</u>	a special cell or group of cells carrying pigment; found in the Lopadorhynchinae
<u>cirriform</u>	shaped like a cirrus
<u>cirrus(i)</u>	a sensory projection (usually tapered) derived from the superior part of the notopodium (dorsal cirrus) or the inferior part of the neuropodium (ventral cirrus). In the Tomopteridae they are also called chaetigers or cirriform appendages.
<u>compound (seta)</u>	a jointed seta
<u>cordate or cordiform</u>	heart-shaped
<u>digitiform</u>	finger-shaped
<u>eversible (proboscis)</u>	capable of being extended by turning the inner part outwards
<u>foliaceous</u>	leaf-like

<u>fusiform</u>	spindle-shaped or cigar-shaped
<u>glabrous</u>	smooth and glistening
<u>genital papilla</u>	projection below the neuropodium on which a reproductive duct opens
<u>hastate</u>	shaped like the blade of a spear
<u>hyaline gland</u>	a gland which occurs in the pinnules of some species of Tomopteridae and appears relatively transparent, sometimes with yellow spot in the centre; may occur in either dorsal or ventral pinnule or in both; homologous with rosette glands (Malaquin & Carin, 1922) though only one form ever occurs in any species.
<u>lamella</u>	a flattened or plate-like structure
<u>membraneous</u>	thin and flattened like a membrane
<u>neotenic</u>	pertaining to a young or immature stage which reproduced sexually
<u>neuropodium</u>	the lower or ventral part of a parapodium
<u>notopodium</u>	the upper or dorsal part of a biramous parapodium
<u>nuchal epaulette</u>	a raised and elongated sensory organ projecting postero-laterally to the prostomium; found in the Tomopteridae and the Typhloscolecidae.
<u>ovate</u>	oval-shaped
<u>ovoid</u>	egg-shaped
<u>palpode</u>	a tapering anterior projection of the prostomium in the Typhloscolecidae
<u>palps or palpi</u>	paired projections growing out from the sides of the head
<u>papillose</u>	with papillae
<u>pedal lobe</u>	setigerous lobe
<u>peristomium (peristome)</u>	the segment behind the prostomium, which is modified to form part of the head and surrounds the mouth. Only the first segment forms the true peristomium but in the Alciopidae the possession of more than two pairs of tentacular cirri shows that two or more segments have fused to form the head
<u>pharynx</u>	the anterior part of the mouth cavity leading on to the oesophagus
<u>pinnules</u>	membraneous side branches of the notopodium and neuropodium in the Tomopteridae; bear various glands, usually confined to the parapodial rami but in <u>T. ligulata</u> they extend along the trunks of the parapodia

<u>proboscis</u>	the anterior part of the alimentary canal derived from the stomodaem which can be everted to project forwards
<u>prostomium</u>	the anterior lobe in front of the mouth bearing eyes and antennae
<u>pygidium</u>	the anal segment or terminal part of the body
<u>ramus</u>	a branch or prong; the notopodium and neuropodium which form the two parts of a parapodium are often termed the two rami
<u>receptaculum seminis</u>	a female organ to contain recieved spermatozoa, (seminal receptacle)
<u>reniform</u>	kidney-shaped
<u>retort organ</u>	a clear club-shaped gland which opens on the roof of the buccal cavity, only in the Typhloscolecidae
<u>rosette gland</u>	yellowish star-shaped glands in the pinnules of some species of Tomopteridae, (see hyaline gland)
<u>segmental gland</u>	swellings (often pigmented) at the bases of the parapodia
<u>seta(e)</u>	secretion from the parapodia forming the armature of these structures (=chaetae)
<u>setiger</u>	segment carrying seta
<u>setigerous lobe</u>	that projection or part of the notopodium or neuropodium which bears the setae
<u>simple seta</u>	an unjointed seta
<u>spathulate</u>	like a spathula, flattened and blade-like with a blunt tip
<u>spindle-shaped</u>	elipsoid, cigar-shaped with pointed end
<u>spiniger or spinigerous (seta)</u>	a compound seta whose blade tapers to a fine point
<u>spur gland</u>	a gland found in some species of Tomopteridae whose pointed end projects from the edge of the pinnule usually next to the chromophil gland
<u>tentacular cirrus</u>	a cirrus arising from the peristome which is elongated to act as a tactile organ
<u>tentacular formula</u>	a series of letters and numbers used to indicate the arrangement of the tentacular cirri. In the Alciopidae there are always three tentacular segments without setae or setigerous lobes. These segments have their cirri elongated and cylindrical forming tentacular cirri. The symbol l is used to represent a cylindrical tentacular cirrus and N for a

normal lamellar cirrus. Thus Vanadis which has a single tentacular cirrus on each of the first three segments has the formula  $1 + 1 + 1$  and Rhynchonerella petersi which has four tentacular cirri spread over the first three segments and a normal ventral cirrus on segment 3 has the formula  $1 + 1/1 + 1/N$ . D stands for dorsal cirrus and V for ventral cirrus.

uniramous

with a single lobe or prong where two might be expected (uniramous parapodia lack one of the two setigerous lobes)

vermiform

worm-like

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