



AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITIONS

ANARE RESEARCH NOTES 10

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

David O'Sullivan

ANTARCTIC DIVISION
DEPARTMENT OF SCIENCE AND TECHNOLOGY

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A N A R E

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

by

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ABSTRACT

Eleven species of pelagic nemerteans have been reported from the Southern Ocean. These are Korotkevitschia pelagicus (Korotkevitsch), Nectonemertes mirabilis Verrill, N. compacta Korotkevitsch, Pelagonemertes parvula Korotkevitsch, P. rollestoni Moseley, Obnemertes ramosa Korotkevitsch, O. maximovi Korotkevitsch, O. latilobata Korotkevitsch, O. solida Korotkevitsch, O. nana Korotkevitsch and Protopelagonemertes hubrechtii (Brinkmann). The diagnostic characters of each is given together with a distribution map and a diagram. Keys are given to the families, genera and species of pelagic nemerteans from the Southern Ocean and adjacent waters.

1. INTRODUCTION

Nemerteans, popularly known as ribbon worms, are characterised by elongated, soft, extensible bodies (Dawson, 1969). They have an eversible muscular proboscis which is used in capturing prey. Nemerteans are found on land, in freshwaters or brackish waters, a few are commensal or parasitic, but most are free living marine organisms occurring intertidally or sublittorally though one group is pelagic (Gibson, 1982).

The world fauna of polystyliferous hoplonemerteans, more often called the pelagic nemerteans, number 78 species, 21 of which are known from south of the equator (Dawson, 1969). Eleven pelagic species have been found in the Southern Ocean, though many of these have been reported only once or twice. This could be due to the scarcity of these animals or to the low numbers of plankton samples taken at the great depths which most of the pelagic nemerteans live. This lack of information on pelagic nemerteans is further illustrated by the fact that in some species either the male or the female have not yet been found and so are undescribed.

This guide summarises data on the pelagic nemerteans of the Southern Ocean, all that water between the Antarctic Continent and the Subtropical Convergence. This area is divided into two zones, the Subantarctic and the Antarctic, by the Antarctic Convergence.

For each of the Southern Ocean species the synonymy, diagnostic characters and bathymetric distribution are given together with a distribution map and an illustration of its external structure. In the synonymy only incorrect references from the Southern Ocean and adjacent waters are given. On the distribution maps given in this guide the positions of the Antarctic and Subtropical Convergences are from Lomakina (1960). On the maps a symbol may represent more than one sampling station.

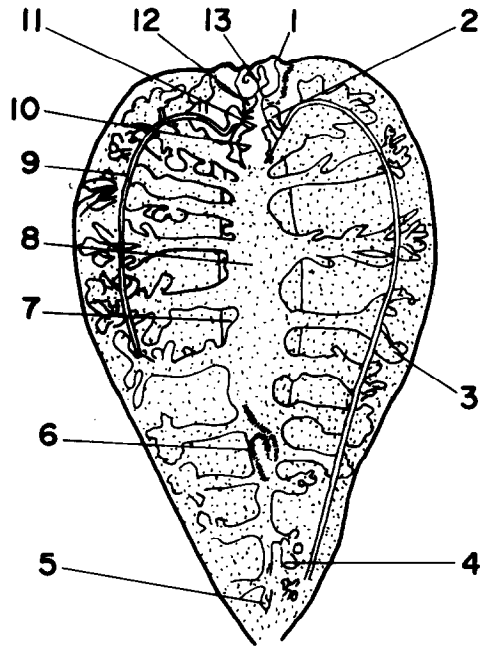
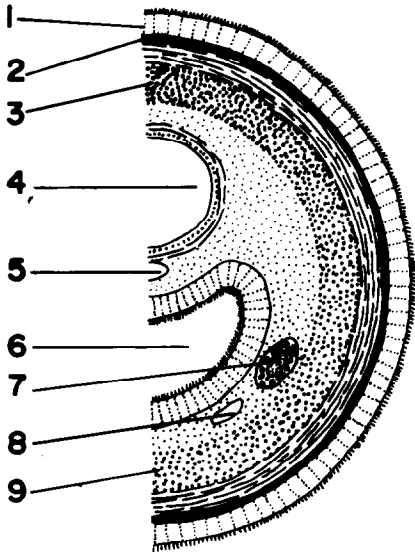
New students of this interesting group of zooplankton should consult Gibson (1972). This book provides details on all aspects of systematics, biology and ecology and is an excellent introduction to the nemerteans. A synthesis of nemertean classification is given in Gibson (1982). The orders, tribes, families and genera descriptions in this guide are taken from Gibson (1982) except where otherwise stated. Species diagnostic characters are mostly from Korothevitsch (1966). The keys have been constructed from information in Gibson (1982) unless otherwise stated.

Species of pelagic nemerteans which do not occur in the Southern Ocean but which are found in waters south of 30° South are included in the keys. The regions from which they were taken are given in brackets: (Au) for southern Australia, (NZ) for New Zealand, (Pa) for southern Pacific, (SAm) for South America, (At) for southern Atlantic Ocean, (SA) for southern Africa and (In) for southern Indian Ocean.

2. GENERAL STRUCTURE (Gibson, 1972)

In common with other members of the phylum Nemertea, the pelagic species have soft, elongated bodies which in life are covered with ciliated and glandular epithelium or epidermis (Figure 1a) containing sensory cells whose function

(a)



(b)

Figure 1(a). Transverse section of body of a generalised Hoplonemertean showing organisation of body wall layers and major organs . (1) epidermis, (2) dermis, (3) outer circular muscle, (4) rhynchocoel, (5) middorsal blood vessel, (6) alimentary canal, (7) lateral nerve chord, (8) lateral blood vessel, (9) longitudinal muscle. (b). A nemertean *Obnemeretes ramosa* showing the major structures. (1) cuticular fold, (2) brain, (3) lateral diverticula, (4) lateral diverticula, (5) rectum, (6) posterior part of proboscis, (7) proboscis sheath, (8) mid gut, (9) lateral nerve chord, (10) caecum, (11) stomach, (12) funnel of proboscis, (13) mouth.

remains unknown. The epithelium rests upon a thick basement membrane of firm gelatinous tissue called the dermis. Although the dermis is provided with deep corrugations to furnish a firm attachment for the epidermis, the latter is usually lost before the worms can be placed in the preserving fluid. When alive they may be brightly coloured, especially with shades of red, orange, yellow, green or brown (Dawson, 1969).

Beneath the dermis is a thin layer of circular muscles overlying the much thicker longitudinal musculature. The latter is best developed on the dorsal and ventral sides of the body in order to provide the vertical undulations which enable the worms to maintain their positions with a minimum of effort. Contractions of the bands of dorsoventral muscles which extend from the dorsal to ventral body walls, in the spaces between the pairs of intestinal diverticula, increase the flattening of the body and aid in the eversion of the proboscis.

The body is without segmentation, although some of the internal organs, particularly alimentary canal and ovaries, show distinct evidence of pseudo-metamerism. The alimentary canal extends the entire length of the body consisting of a mouth, stomach, caecum and a long intestine or midgut (Figure 1b). Both the caecum and midgut can possess paired lateral diverticula which often are lobed. The alimentary canal ends near the posterior of the animal at the rectum.

Ocelli are generally absent and no trace of specialised excretory organs has been found. The brain, lateral nerves, and peripheral nervous system are well developed. The vascular system consists of cephalic lacunae and three longitudinal vessels with their branches imbedded in the gelatinous parenchyma which fills all the spaces within the body not occupied by the organ systems.

Each individual is provided with a long, muscular proboscis which can be everted from the rhynchoceal opening on the head and used in the capture of small crustaceans and other organisms. This organ can be extended far in front of the head and coiled about the prey, which can then be held securely owing to a tenaceous and evidently paralyzing mucous secretion. Furthermore, the proboscis in all of these bathypelagic species is armed with a sickle-shaped basis bearing numerous minute, calcareous stylets. There are usually also several pouches of accessory stylets.

The sexes are separate and in some species distinctly dimorphic; the females have paired ovaries along the length of the body, whereas in the males the spermaries are limited to the anterior end of the body or are situated in the head, beside or in front of the brain.

The classification into families is based largely on internal organisation, but staining the body with alum carmine or similar in toto dye followed by clearing in oil, is sometimes sufficient to reveal the essential characteristics. Although the natural shape of the body changes considerably by contractions resulting from the killing fluid, the members of the different families can often be recognized by the shape of the body after preservation. For the identification of families it is necessary to determine whether the mouth has a separate opening from that of the rhynchodeum through which the proboscis is everted or whether both have a common opening. The number and configuration of the intestinal diverticula, the extent of the dorsal vessel, the length and characteristics of proboscis and proboscis sheath, the stylet apparatus and the number of proboscical nerves, as well as the number and position of the gonads, are other diagnostic features.

The species of bathypelagic nemerteans can seldom be identified by their external characteristics alone and usually require an examination of their external organisation by means of serial microscope sections. In this guide only the external characters are given. Korotkevitsch (1966) gives descriptions and diagrams of the internal organisation of most of the Southern Ocean species of pelagic nemerteans.

3. LIFE HISTORY AND BIOLOGY (Gibson, 1972)

Pelagic nemerteans are dioecious and oviparous (Gibson, 1982). Fertilisation can be external, the eggs and sperm being shed directly into the sea, but many of the bathypelagic species develop comparatively elaborate reproductive mechanisms in order to ensure successful fertilisation. For example mature male *Nectonemertes* possess a pair of cephalic tentacles that are used to hold the females during mating. In these forms the spermaries (testes) develop into protrusible penes which is indicative both of internal fertilisation and true copulatory behaviour. Coe (1926) observes that breeding in the abyssal species probably occurs only once in their lives, the adults dying after mating, and that under stable environmental conditions at such depths sexual reproduction is not likely to be seasonal.

Development is direct and the embryo grows straight into a miniature worm without metamorphosing as is characteristic of some other groups of nemerteans.

All nemerteans are carnivorous, feeding on protozoans, and various kinds of worms, molluscs, crustaceans and larval invertebrates although the only direct evidence as to the nature of food consists of the finding of crustacean exoskeletons in the intestine.

The proboscis is used in feeding and is everted rapidly and forcibly if a suitable organism comes into range. The stylets can be used to inflict a wound into the body of the catch. Some toxins may be pumped into the wound by muscular contractions of the powerful stylet bulb. Food is brought to the mouth by the retracting proboscis and is ingested. The digestive sequence in nemerteans commences with an extracellular acidic phase, during which the food is broken down to a size suitable for phagocytosis by the intestinal coluniar cells. Digestion is then completed intracellularly.

The bathypelagic forms have been found in all the great oceans but not in shallow bays or inland seas. They usually have broad and flattened bodies (Coe, 1954). They are able to float freely, with little expenditure of muscular effort, since their extensive gelatinous parenchyma gives the body a low specific gravity. The buoyancy of some species is aided by minute lipid globules in the cells of the intestinal diverticula (Coe, 1954). Though they are generally very sluggish in their habits (Coe, 1935), in spite of their feeble musculature, some have the capacity for resisting currents that might carry them above or below the level of their natural habitat (Coe, 1945). In areas of great turbulence, however and in periods and regions of upwelling they may be carried to higher levels (Coe, 1954).

They generally float idly, usually at depths of 500 to 2000 metres or more, and the populations may be carried for thousands of kilometres by the deep ocean

currents, reproducing successive generations on the way (Coe, 1956). In the Antarctic zone, they rise closer to the surface than in other parts of the ocean, and can be caught in nets in less than 200 metres (Korotkevitsch, 1963). For a discussion on the distribution of pelagic nemerteans in the Antarctic and a comparison with Notal regions see Korotkevitsch (1963).

4. PREVIOUS RECORDS FROM THE SOUTHERN OCEAN

The pelagic nemerteans of the southern hemisphere have been studied very little. Some specimens were found in Subantarctic waters but it was not until very recently (Korotkevitsch 1960, 1961, 1966) that pelagic nemerteans were found in the Antarctic zone. Korotkevitsch (1963) points out that the species found in the Subantarctic are not found in the Antarctic and vice versa, stating that the Antarctic Convergence is an insurmountable obstacle which effectively prevents any exchange of pelagic nemertean faunas from the Notalion (Subantarctic) and Antarctic zones.

Workers who have studied Southern Ocean species include Moseley (1875), Hubrecht (1887; Challenger Expedition), Burger (1912; Tiefsee Expedition), Brinkmann (1915, 1921; Deutschen Sudpolar Expedition), Wheeler (1934, 1940; Discovery and BAZARE Expeditions respectively) and Korotkevitsch (1960, 1961, 1963, 1966; Soviet Antarctic Expeditions). Coe (1926, 1945, 1954, 1956) mentioned some Southern Ocean species in his papers on Pacific and Atlantic bathypelagic nemerteans. Hardy & Gunther (1935) reported one species from their South Georgia collections.

5. SYSTEMATIC NOTES

The Phylum Nemertea consists of two classes. The class Anopla comprises forms with a separate mouth and proboscis pore, an unarmed proboscis that is not regionally differentiated, and a simple alimentary canal. There are no pelagic members in this class so it will not be included in this guide. For a good summary of the orders, families and genera of the Anopla see Gibson (1982).

The class Enopla contains 2 orders: Bdellonemertea and Hoplonemertea. Bdellonemerteans are a small aberrant group of commensal nemerteans in which the proboscis has lost its armature and possess a uniform construction throughout its length. The Hoplonemertea, which contains the pelagic nemerteans, have an armed proboscis which is regionally differentiated and an alimentary canal which is usually divisible into oesophageal, stomach, pyloric and intestinal regions, and a straight intestine with paired lateral diverticula.

The order is divisible into 2 sub-orders (Monostilifera and Polystilifera) on the basis of the type of proboscis armature. The Polystilifera contains all the pelagic species except for Korotkevitschia pelagicus (Korotkevitsch) which is a monostiliferous hoplonemertean.

6. SUBORDER MONOSTILIFERA

Hoplomertean in which the proboscis armature consists of a single central stylet carried on a large cylindrical basis; stylet apparatus is housed in the middle (stylet bulb) portion of the proboscis and includes several accessory stylet pouches containing replacement stylets; the suborder contains 7 families but many genera are only provisionally included in particular families, and familiar groupings need to be revised (Gibson, 1982).

6.1 FAMILY CRATENEMERTIDAE

Amphiporid-like monostiliferous hoploneurteans in which the rhynchocoel wall musculature consists of a single layer of interwoven fibres; there are three probable genera, of which Korotkevitschia is pelagic.

The existence of a pelagic member of this family is interesting and, as Dawson (1969) points out, supports the hypotheses of the polyphyletic origin of the pelagic Nemertea proposed by Burger (1897-1907) and Korotkevitsch (1955, 1962) as opposed to the monophyletic theory postulated by Brinkmann (1917).

Genus Korotkevitschia Friedrich 1968

Mouth and proboscis pore are separate; cerebral organs are located behind the brain; there are no eyes, internal caecum, cephalic glands, or excretory system; monospecific for Korotkevitschia pelagicus.

Korotkevitschia pelagicus (Korotkevitsch 1961)

(Figure 2)

(Cratenemertes pelagicus Korotkevitsch, 1961)

Diagnostic characters:

Body: in form of clove or garlic, inflated dorsally, with a shallow transverse cuticular fold at the level of the brain

Colour: epidermis is not translucent

Mouth: separated from proboscis orifice

Proboscis: with 2 pouches with accessory stylets containing not less than 10 stylets each

Proboscis sheath: narrow, tubular, ends before caudal commissure

Oesophagus: present

Caecum: not present

Midgut: straight, lateral diverticula lobed with rudimentary ventral branches

Size: length up to 9 mm, width up to 4 mm, thickness up to 3 mm (after fixation).

This Antarctic species was originally described as Cratenemertes pelagicus but Friedrich (1968) proposed the new genus Korotkevitschia for it. Dawson (1969) includes K. pelagicus in the family Amphiporidae but Gibson (1982) placed it in the Cratenemertidae.

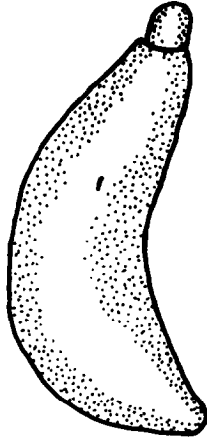
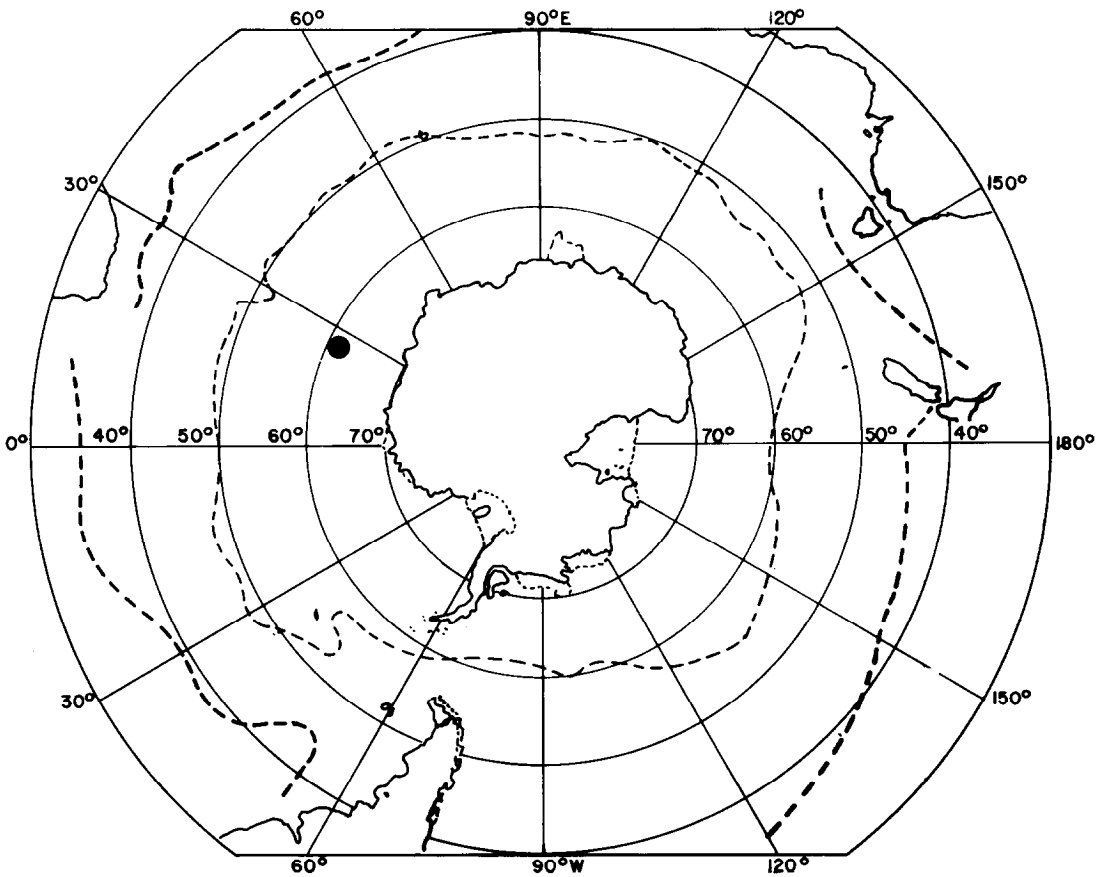


Figure 2. *Cratenemertes pelagicus* lateral view. Map of distribution.



7. SUBORDER POLYSTILIFERA

Hoploneurteans in which the proboscis armature consists of a sickle-shaped pad or shield bearing numerous small stylets; proboscis pore and mouth are separate or open independently into a common atrial chamber; rhynchocoel wall has interlaced muscular layers; the suborder is entirely marine with either crawling or burrowing (tribe Reptantia, 10 families) or pelagic (tribe Pelagica, 10 families) habits.

7.1 TRIBE PELAGICA

Tribe of deep-water pelagic forms with a body adapted for feeble swimming or passive floating; rhynchocoel lacks diverticular pouches; cerebral organs and an excretory system are missing; gonads are not arranged metamerically. The pelagic nemerteans comprise two subtribes, Archipelagica and Eupelagica. Two very different schemes for the classification are provided by Coe (1954) and Korotkevitch (1955). Under Coe's system, used here, 11 families and 34 genera are recognised, whereas Korotkevitch's classification reduces these to 3 families and 8 genera. In the following sections generic names used in Korotkevitch's scheme are shown in parentheses.

7.2 KEY TO FAMILIES

- 1a) Lateral muscles present; intestine with few lateral diverticula (Tribe Archipelagica) 2
- b) Lateral muscles absent; intestine with numerous lateral diverticula which are frequently deeply branched and lobed (Tribe Eupelagica) 3

- 2a) Body slender; anterior tentacles present in adult males; caudal fin well-developed Nectonemertidae
- b) Body broad and flat; no tentacles present; caudal fin present Pelagonemertidae

- 3a) Posterior end of body not clearly differentiated into a caudal fin Protopelagonemertidae
- b) Posterior end of body clearly differentiated into a caudal fin Planktonemertidae

7.3 SUBTRIBE ARCHIPELAGICA

Members of this subtribe have lateral muscles; rhynchocoel wall has distinct muscle layers that do not form an interwoven meshwork; intestine generally has few lateral diverticula; testes are irregularly distributed but are often clustered in the brain region. There are 5 families: Armaueriidae, Balaenanemertidae, Buergeriellidae, Nectonemertidae, and Pelagonemertidae. Some authorities include Balaenanemertidae with Pelagonemertidae and unite the 6 eupelagic families with the Nectonemertidae. Such taxonomic schemes do not recognise subtribe taxa.

7.4 FAMILY NECTONEMERTIDAE

Monogeneric (Nectonemertes) family whose members have slender and moderately or much flattened bodies, anterior tentacles are present in adult males only, well-developed caudal fin is clearly demarcated from the body; it is often posteriorly bilobed, middorsal blood vessel extends the full length of the body; rhynchocoel is nearly as long as the body; intestinal diverticula lack a ventral branch reaching to the lateral nerves; spermaries are numerous, occurring in two groups alongside or posterior to the brain.

Genus Nectonemertes (Nectonemertes) Verrill 1892

Body is slender and only moderately flattened; well-developed caudal fin, distinctly demarcated from body, often bilobed posteriorly; intestinal diverticula without ventral branch beneath lateral nerve; tentacles present in adult males only. The species of this genus are sexually dimorphic. At the approach of sexual maturity of the males a pair of long muscular tentacles develop on the lateral margins of the body just behind the brain. These appendages may reach a length far exceeding the diameter of the body and as they are associated with cephalic spermaries give this sex an appearance very different from that of the female. There are 11 species, 5 of which have been found in the Southern Ocean or adjacent waters.

KEY TO SPECIES:

- 1a) Caecum with one pair of lateral diverticula,
midgut with 45 pairs N. compacta Korotkevitch
- b) Caecum with more than one pair of lateral
 diverticula 2
- 2a) Caecum with 6 pairs of lateral diverticula,
midgut with less than 50 pairs (SAm) N. acutilobata Korotkevitch
- b) Caecum with less than 6 pairs of lateral
 diverticula 3
- 3a) Caecum with 3 pairs of lateral diverticula .. 4
- b) Caecum with 4 pairs of lateral diverticula,
midgut with 43 pairs (SA) N. tenuis Korotkevitch
- 4a) Males with 6-7 pairs of spermaries; midgut
with 45 pairs lateral diverticula; colour
yellowish-red (At) N. minima Brinkmann
- b) Males with 11-24 pairs of spermaries,
midgut with 30 to 60 pairs lateral
diverticula; pink, red to orange red N. mirabilis Verrill

Nectonemertes mirabilis Verrill 1892

(Figure 3)

Diagnostic characters (Coe & Ball, 1920; Coe, 1954):

Body: much flattened, with lateral margins in posterior end of body projected as a pair of thin horizontal fins and posterior extremity modified to form thin caudal fin

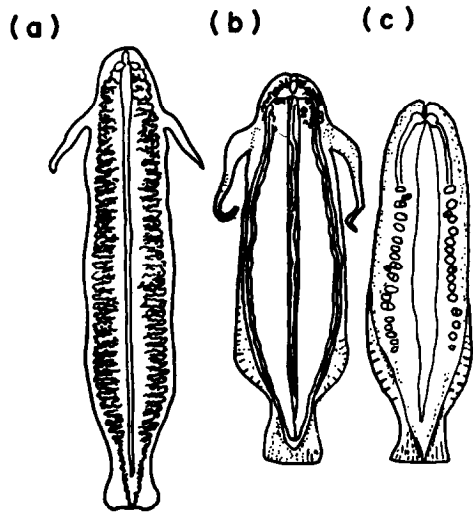
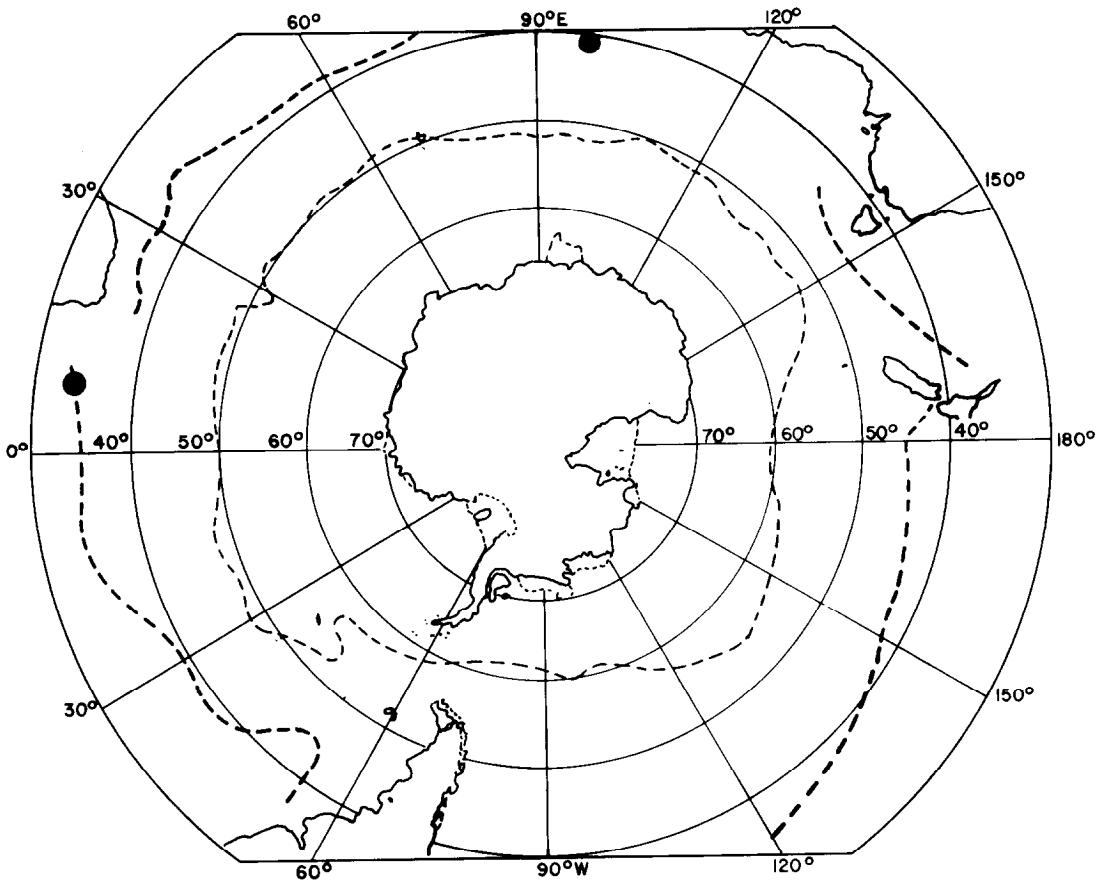


Figure 3. *Nectonemertes mirabilis* (a) male showing arrangement of lobed intestinal diverticula, (b) male showing spermaries and extent of proboscis and proboscis sheath, (c) female with 16 pairs of ovaries. Map of distribution.



Colour: varies from flesh colour to red, orange and bright scarlet, young individuals pale grey or colourless
Proboscis orifice: on dorsomedian part of tip of head
Proboscis funnel: not described
Proboscis: nearly as long as body when well extended
Stylets: conical, about ten to twenty
Proboscis sheath: has inner layer of longitudinal muscles and an outer layer of circular fibres, extends about nine-tenths the length of body, terminating just beyond base of caudal fin
Mouth: opens on ventral side of anterior end of body, widely separated from proboscis opening
Stomach: narrow, tubelike
Pyloric tube: slender, leads backwards for a short distance and opens into dorsal wall of midgut or intestine
Caecum: with 6 to 8 pairs of diverticula
Midgut: with 30 to 60 pairs diverticula each with lobed dorsal branches but no ventral branches
Rectum: short and narrow, opens at very extremity of body
Size: up to 60 mm long, 10 mm wide, 2 mm thick.

This is one of most abundant pelagic species occurring mostly in water 200 to 2000 m deep with a temperature of 3.5 to 5°C and 35‰ salinity, though it has been taken from depths of 4000 m or more in the Pacific and Atlantic Oceans (Gibson, 1982). It has a geographical range of nearly 100° of latitude from 34°S latitude to 64°N latitude (Coe, 1945). The internal and external anatomy of Nectonemertes mirabilis is studied in detail by Coe and Ball (1920). The sexes are distinctly dimorphic, the mature males being distinguished by having a pair of slender muscular tentacles a short distance back of the head (Coe, 1954). For a further description of the female and male sex glands and fertilisation see Coe (1954).

Nectonemertes compacta Korotkevitch 1966

(Figure 4)

Diagnostic characters:

Body: narrow, long, slightly flattened, with almost parallel lateral sides, anterior end thickened and rounded, posterior one is bilobated, slightly tapering and very flat, caudal fin not distinct
Colour: epidermis yellowish, not translucent
Proboscis orifice: situated on dorsal side of anterior body end
Proboscis funnel: long and narrow
Proboscis: long, exceeds length of body, inserted into dorsal face of sheath wall
Stylets: with sickle-shaped base, pouches with accessory stylet have not been investigated
Proboscis sheath: narrow, fusiform, ending at a considerable distance from the hind end of the body
Mouth: situated at anterior end of body
Stomach: voluminous
Pyloric tube: flat and broad
Caecum: wide, with an odd anterior process and one pair of lateral diverticula which have lobes, and rudimentary abdominal branches
Midgut: narrow, oval with 45 pairs of lateral lobated diverticula, without any trace of ventral branching

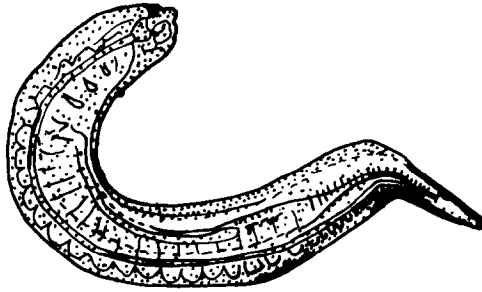
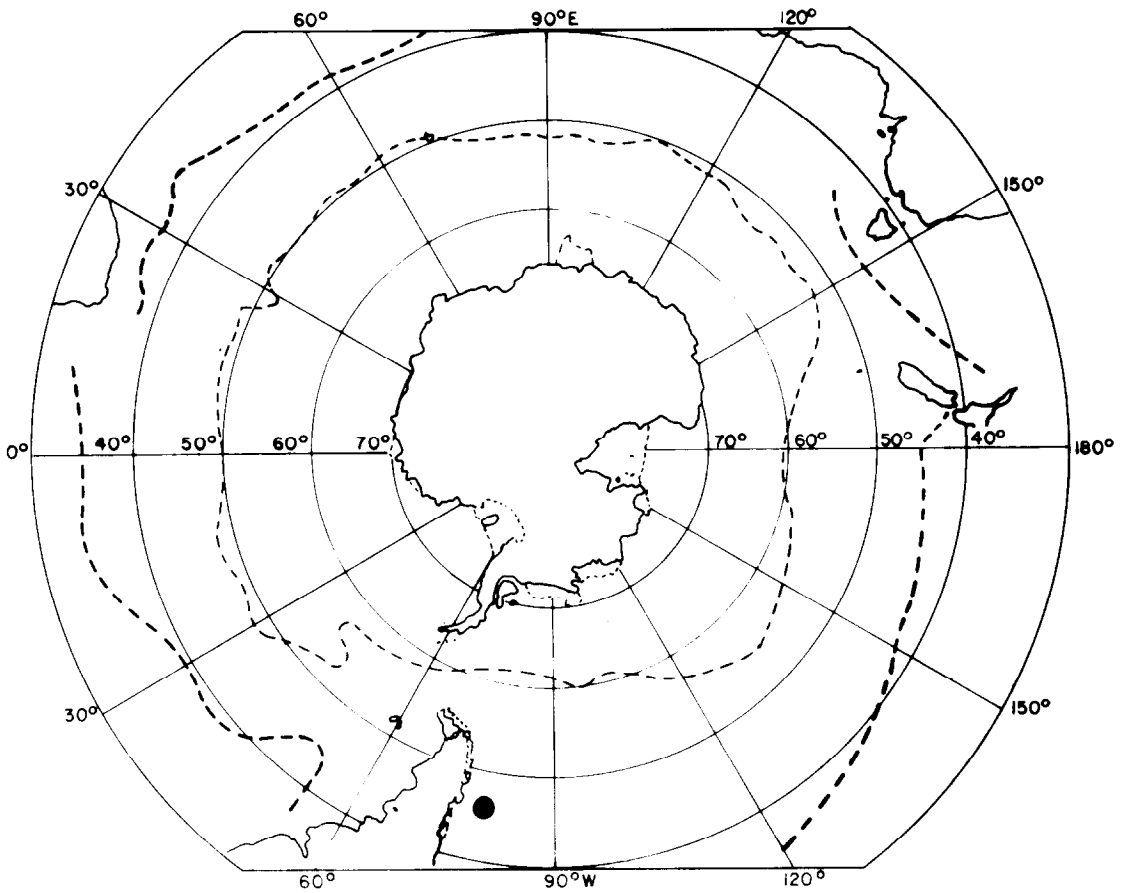


Figure 4. Nectonemertes compacta male, lateral view. Map of distribution.



Rectum: long and narrow

Size: length up to 11 mm, width up to 3 mm, thickness up to 2 mm (after fixation).

This species was described from a single specimen (male) caught in the Pacific sector of the Subantarctic.

7.5 FAMILY PELAGONEMERTIDAE

The body is broad and usually flat; there are no tentacles; some genera have a broad, well-developed caudal fin; cephalic blood supply has both dorsal and ventral anastomoses; middorsal vessel is rudimentary and ends blindly in the wall of the rhynchocoel, a short distance behind the brain; rhynchocoel is as long as the body; intestinal diverticula are branched and usually have a ventral branch which may reach the lateral nerves; spermaries, mostly few in number, occur in two groups behind, beside, or anterior to the brain; 8 genera, 3 of which occur in the Southern Ocean or adjacent waters.

KEY TO GENERA:

- 1a) Lacks a distinct caudal fin Obnemeretes
- b) Caudal fin distinct 2

- 2a) Intestinal diverticula not widely separated (SAM) Probalaenanemeretes
- b) Intestinal diverticula widely separated Pelagonemeretes

Genus Pelagonemeretes (Pelagonemeretes) Moseley 1875

Body usually flat and hyaline; with much parenchyma between the organs; body-walls extremely thin, muscular layers consisting mainly of isolated bundles; mouth and rhynchoceal opening separate; intestinal diverticula few (four to twenty-five pairs); dorsal blood-vessel rudimentary; gonads of male in front of brain (Coe, 1926); 9 species, 2 of which occur in the Southern Ocean.

Key to species (Korotkevitch, 1966):

Midgut wide with 12 pairs of faintly lobate lateral diverticula; wall of anterior part of the proboscis has 1 longitudinal muscular layer; 12 large and 12 small proboscis nerves P. parvula Korotkevitch

Midgut narrow, with 12 to 25 pairs of lateral diverticula showing well-pronounced lobes; wall of anterior part of proboscis has 3 muscle layers; 15 to 16 large and 18 small proboscis nerves ... P. rollestoni Moseley

Pelagonemeretes parvula Korotkevitch 1966

(Figure 5)

Diagnostic characters:

Body: elongated, flat, with a bilobated caudal fin, on sides of anterior end are a few small cirri

Colour: epidermis colourless and translucent after fixation, intestine light brown

Proboscis orifice: situated terminally at anterior end of body

Proboscis funnel: short and wide

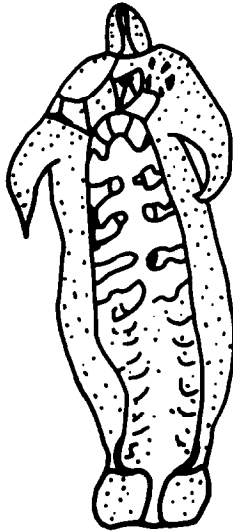
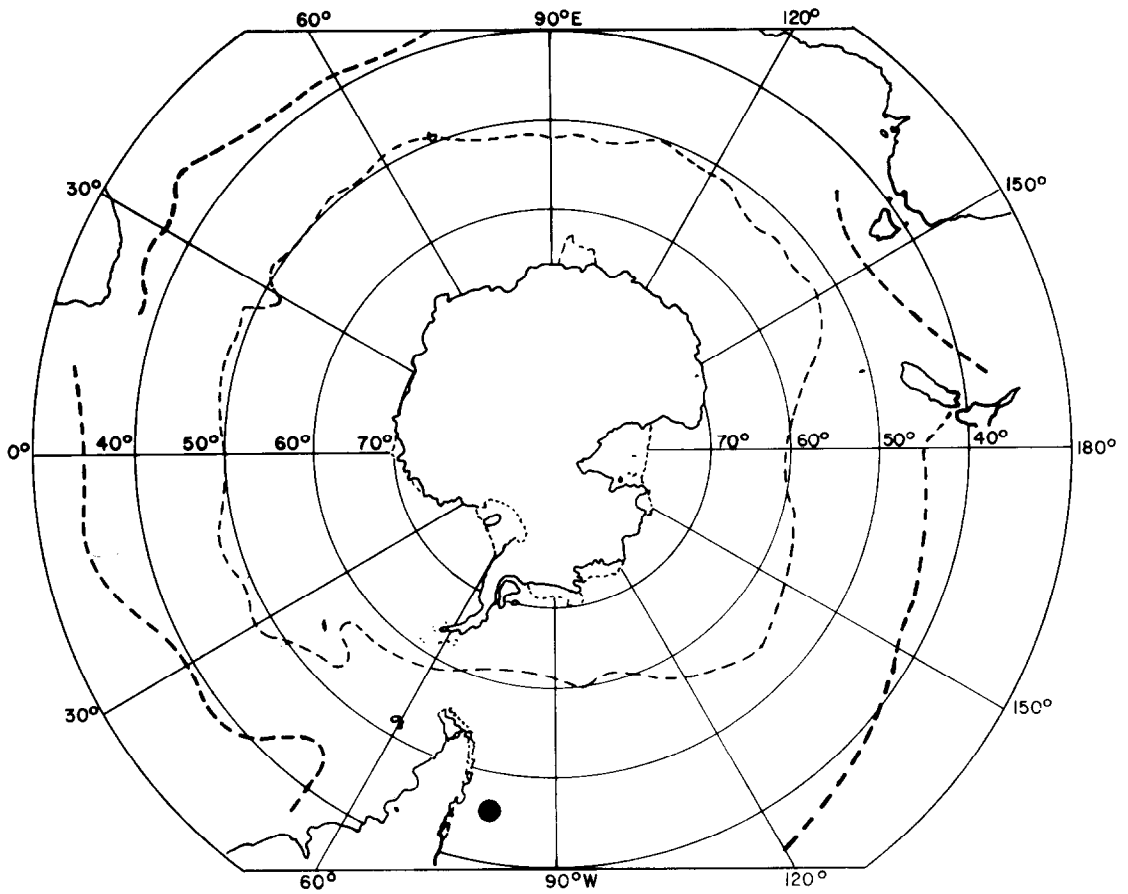


Figure 5. Pelagonemertes parvula male, ventral view. Map of distribution.



Proboscis: somewhat longer than body, fixed to dorsal wall of sheath by means of two muscular fascicles at some distance from posterior end of sheath
Stylets: with small sickle-shaped base, with a few supplementary conical stylets, no pouches with accessory stylets have been found
Proboscis sheath: narrow with two spherical expansions in anterior part, extends almost to posterior end of body;
Mouth: situated on ventral surface of anterior end of body in front of brain
Stomach: small with undulated walls
Pyloric tube: short, flat and broad
Caecum: short, devoid of lateral diverticula
Midgut: wide, with 12 pairs of lateral diverticula slightly lobated but without ventral branches
Rectum: long and narrow
Size: length up to 6 mm, width up to 2 mm, thickness up to 1 mm.

The single specimen (a male) was collected in the Pacific sector of the Subantarctic. Korotkevitch (1966) discusses the differences between this species and the others in the genus.

Pelagonemertes rollestoni Moseley 1875

(Figure 6)

Diagnostic characters (Coe, 1926, 1954):

Body: of firm gelatinous consistency broadly oval, tapering posteriorly to pointed extremity, about half as wide as long;
Colour: translucent except for opaque proboscis, intestine, brain, nerves and gonads, intestinal diverticula filled with deep yellow, red or brown globules
Proboscis orifice: subterminal and separate from mouth
Proboscis funnel: not described
Proboscis: much longer than body, with greatly thickened basement layer supporting outer epithelium
Stylets: 9, minute, conical, on sickle-shaped basis, 6 or more pouches of accessory stylets
Proboscis sheath: nearly as long as body
Mouth: not described
Stomach: not described
Pyloric Tube: not described
Caecum: not described
Midgut: with 12 to 20 or more much branched and lobed diverticula which extend into lateral margins of the body, anterior pair is largest
Rectum: not described
Size: up to 45 mm long, 23 mm wide, 3 mm thick.

Males have a cluster of 5 to 8 oval spermaries on each side of head beside and anterior to brain, females have 4 to 13 ovaries on each side of body (Coe, 1954). The species has been described in detail by Burger (1912), Brinkmann (1915) and Coe (1926).

This species has widespread distribution in the northern and southern Atlantic and Pacific, and in the Indian and Antarctic Oceans, at 700 to 950 m depth or more (Gibson, 1982). The range covers nearly 180 degrees of longitude and 55 degrees of latitude (Coe, 1945). It has been found by several workers in the Southern Ocean indicating that it may be more common and widespread than other Antarctic species. Hardy and Gunther (1935) reported an unidentified species of Pelagonemertes from South Georgia which may be P. rollestoni.

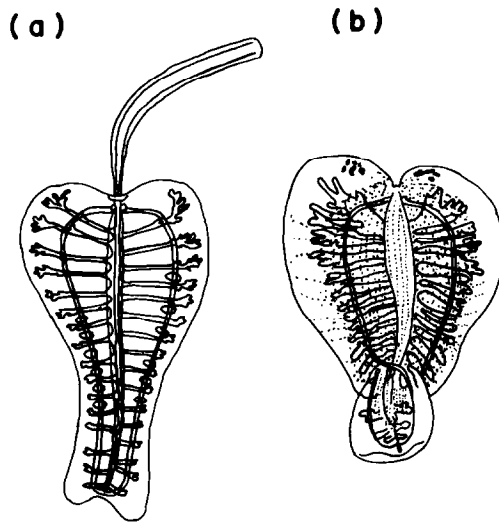
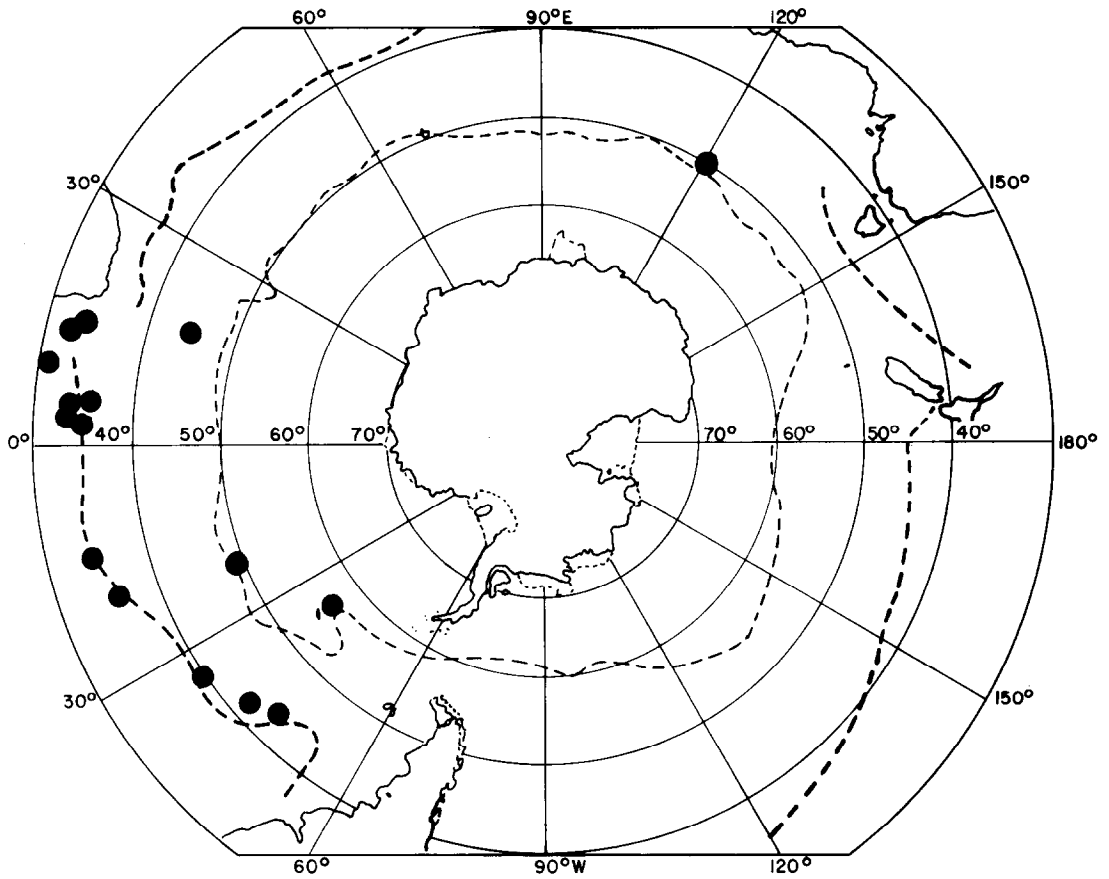


Figure 6. Pelagonemertes rollestoni (a) female, (b) male. Map of distribution.



Genus Obnemertes (Obnemertes) Korotkevitsch 1960

Lack a distinct caudal fin, intestine has 9 to 17 pairs of diverticula which may be lobate but usually lack a ventral branch; intestinal caecum lacks diverticula; 5 species all of which have been reported from the Southern Ocean.

Key to species (Korotkevitsch, 1966):

- 1a) Narrow and long lateral intestinal diverticula with numerous long, slender lobes 2
- b) Broad and short lateral intestinal diverticula with or without a few thick lobes 3

- 2a) Midgut with 9 lateral diverticula; funnel of proboscis long and broad O. ramosa Korotkevitsch
- b) Midgut with 14-19 lateral diverticula; funnel of proboscis short and broad O. maximovi Korotkevitsch

- 3a) Width of proboscis sheath less than half maximum width of body; anterior pairs of lateral diverticula lobated O. latilobata Korotkevitsch
- b) Width of proboscis sheath more than half maximum width of body; lateral diverticula with or without lobes 4

- 4a) 9 pairs of lateral diverticula with large lobes; indistinct caudal fin; large forms ... O. solida Korotkevitsch
- b) 15 pairs of lateral diverticula, only first pair has lobes; no caudal fin; small forms .. O. nana Korotkevitsch

Obnemertes ramosa Korotkevitsch 1966

(Figure 7)

Diagnostic characters:

Body: broad, flat, strongly tapering posteriorly, without indication of a caudal fin

Colour: anterior part of body translucent to pink, posterior end is opaque to milk-white

Proboscis orifice: situated at apical end, in small depression above mouth

Proboscis funnel: long and broad

Proboscis and Stylets: not described

Proboscis sheath: narrow, fusiform, reaches posterior end of body

Mouth: situated at anterior end of body below proboscis orifice, surrounded by cuticular fold

Stomach: wide with folded walls

Pyloric tube: short

Caecum: appears as long, broad lobe without lateral diverticula

Midgut: wide, flattened to varying extents, with 9 pairs of long, narrow lateral diverticula provided with many long, thin lobes

Size: length up 19.5 mm, width up to 12 mm, thickness up to 2.5 mm (after fixation).

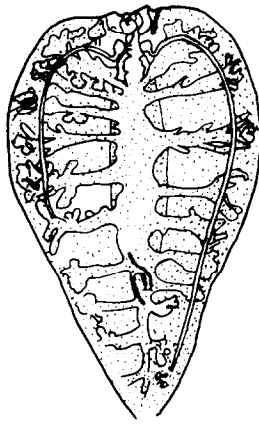
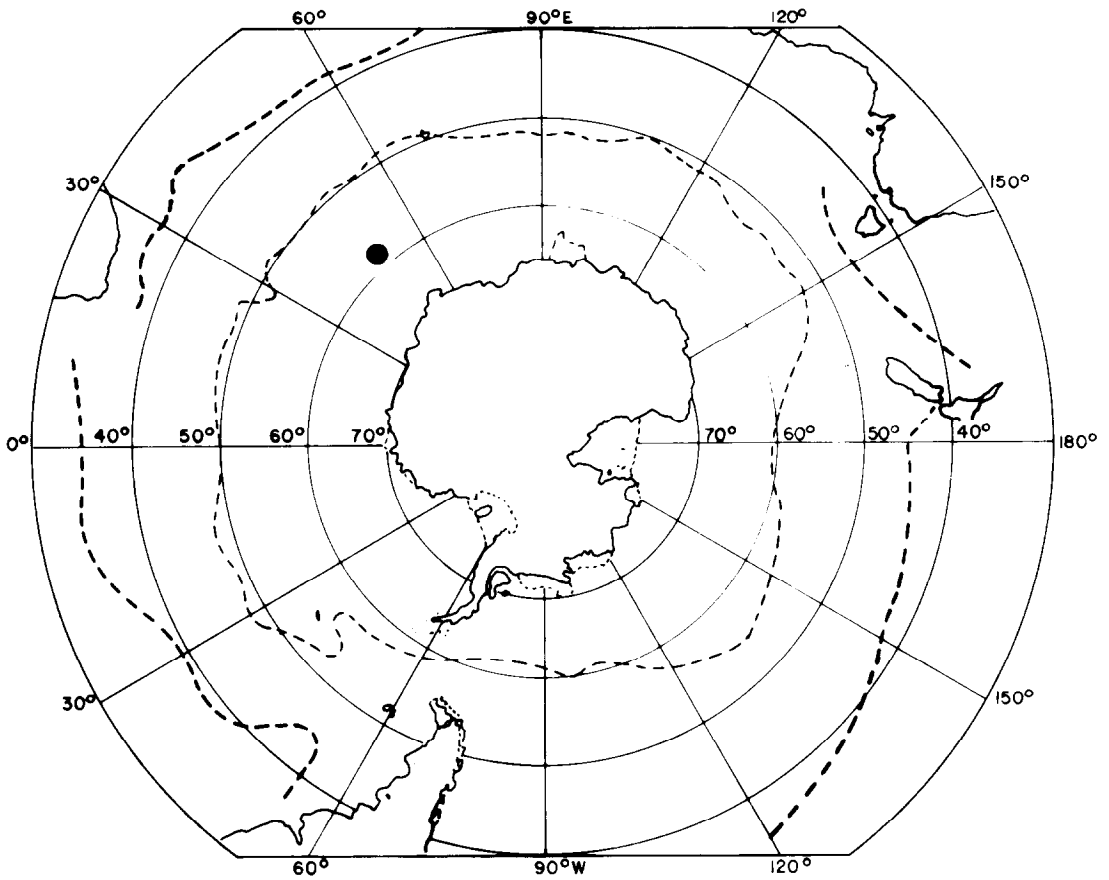


Figure 7. *Obnemeretes ramosa* dorsal view. Map of distribution.



This species was described from a single specimen (sex unknown) caught in the Indian Ocean sector of the Antarctic with a ring-trawl hauled from 5000 m to the surface. Obnemertes ramosa differs from the other species of this genus by the structure of the intestine, the larger size, and the general shape of the body (Korotkevitch, 1966).

Obnemertes maximovi Korotkevitch 1960

(Figure 8)

Diagnostic characters:

Body: short, anteriorly broadened, with inflated trunk, posterior part flattened and narrowed, with an indistinct caudal fin
Colour: epidermis transparent with longitudinal milky stripes, intestine orange coloured
Proboscis orifice: at anterior body end on small tubercle above mouth
Proboscis funnel: short and wide
Proboscis: much longer than body, fixed to dorsal wall of sheath at a considerable distance from its posterior end
Stylets: base bear several small conical secondary stylets
Proboscis sheath: fusiform and narrow, ends in a gradually narrowing tube not far from posterior end of body;
Mouth: situated in small depression below proboscis orifice, surrounded by small glandular collar
Stomach: voluminous with folded walls
Pyloric tube: short and wide
Caecum: narrow and fairly long, without lateral diverticula
Midgut: narrow, flat, with 14-19 pairs of narrow and very lobated lateral diverticula, lobes of first 2 pairs are especially numerous and long
Rectum: short and narrow
Size: length up to 38 mm, width up to 24 mm, thickness up to 13 mm.

In this species the females grow much larger than the males. Five specimens have been found in the Indian and Pacific sectors of the Antarctic. Korotkevitch (1966) gives details on the gonads and internal structure.

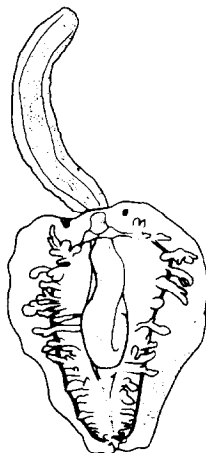
Obnemertes latilobata Korotkevitch 1960

(Figure 9)

Diagnostic characters:

Body: broad, moderately flattened, posterior end narrowed and strongly flattened, with indistinct caudal fin
Colour: epidermis translucent, intestine light-orange
Proboscis orifice: situated terminally at anterior end of body
Proboscis funnel: short and wide
Proboscis and stylets: not described
Proboscis sheath: fusiform extends to posterior end of body, width less than half maximum width of body
Mouth: situated below proboscis orifice
Stomach: wide with folded walls

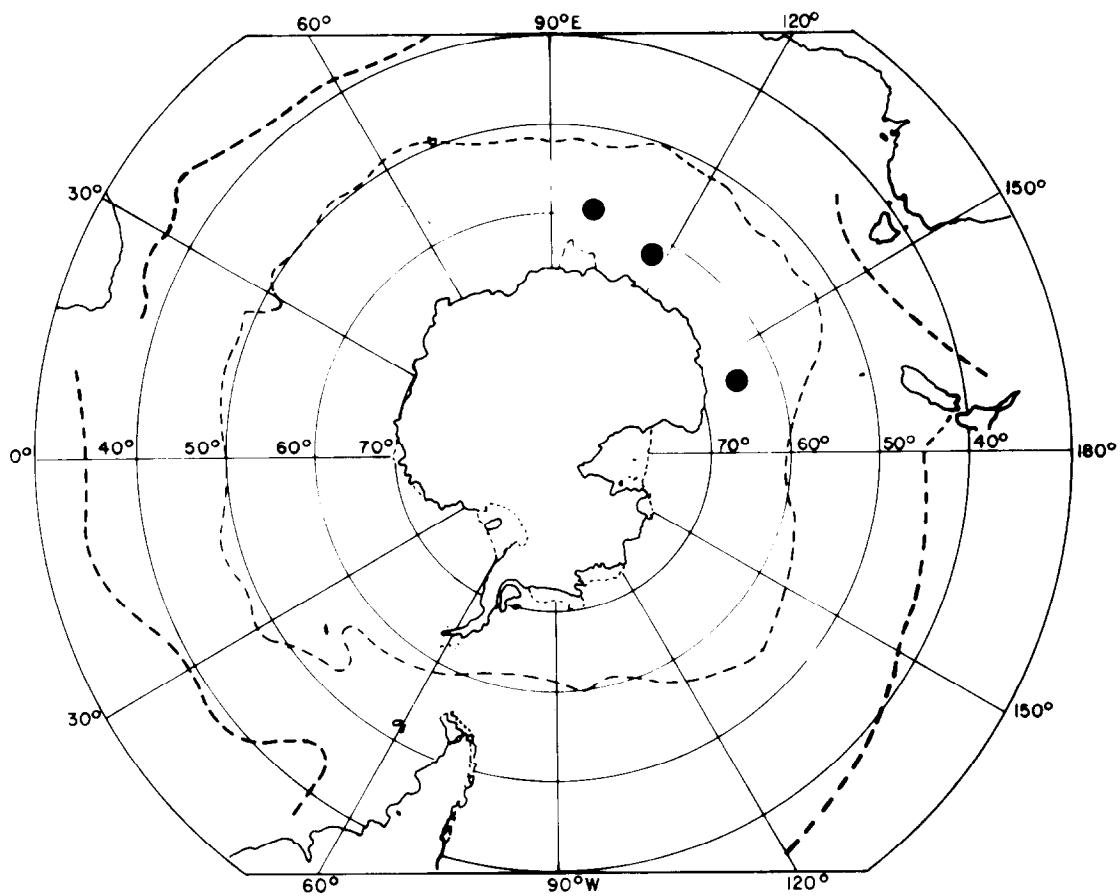
(a)



(b)



Figure 8. *Obnemesertes maximovi* (a) male, dorsal view, (b) female, dorsal view. Map of distribution.



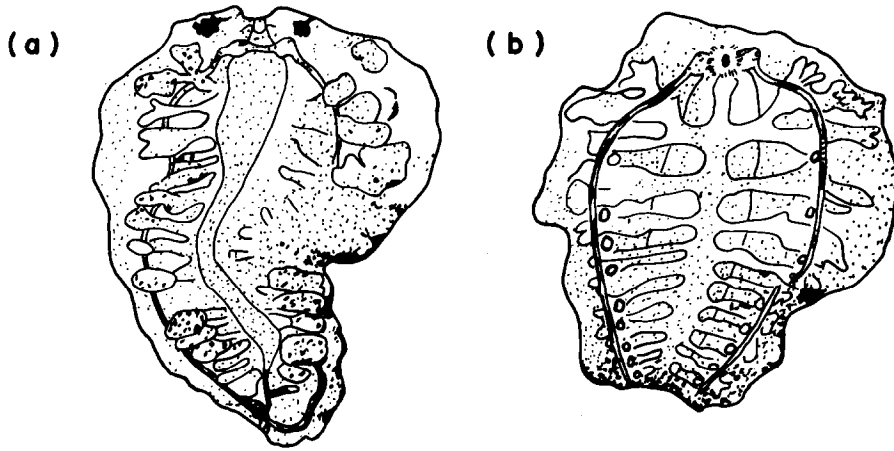
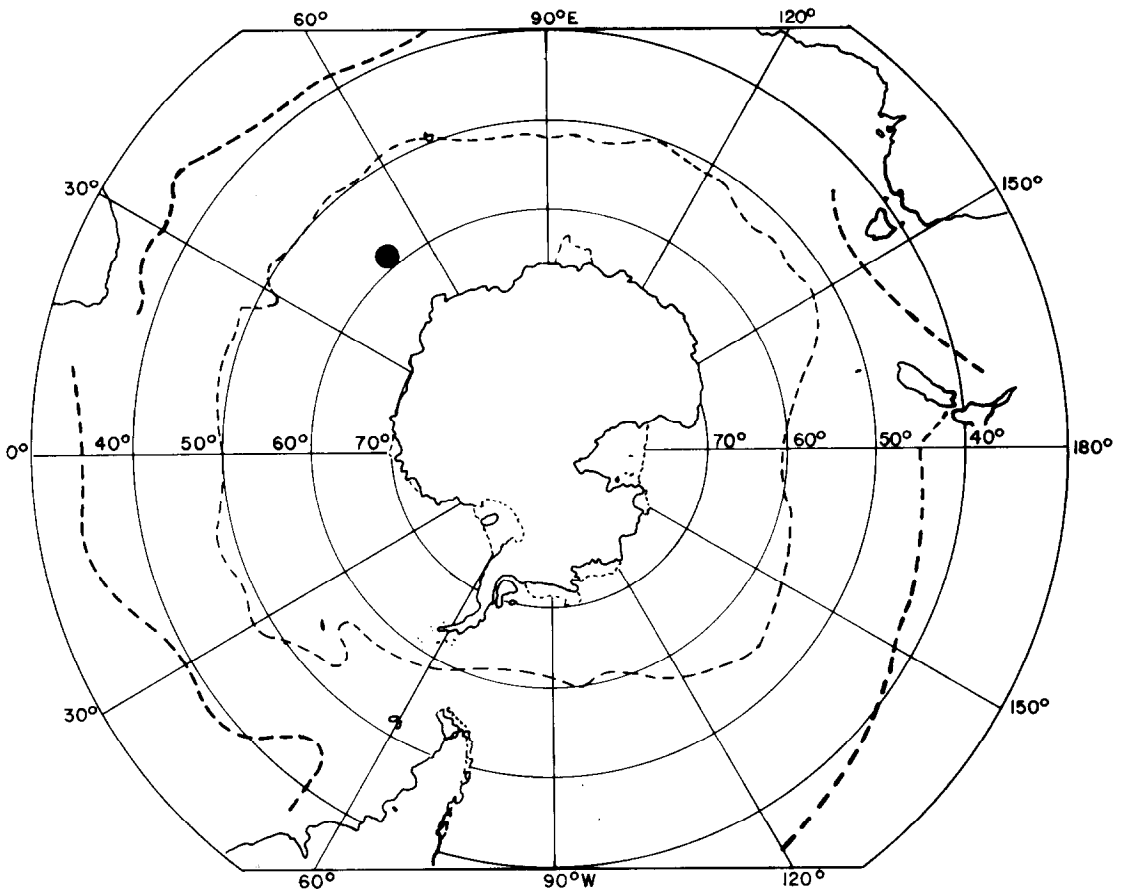


Figure 9. Obnemertes latilobata (a) male, dorsal view, (b) female, ventral view. Map of distribution.



Pyloric tube: short, broad, flat, with an undulating wall
Caecum: is small tube without lateral diverticula
Midgut: broad and flat, with 11 to 15 pairs of diverticula, diverticula are relatively broad and short, usually without ventral branches, anterior pair have several thick and short lobes
Rectum: long and narrow
Size: length up to 10 mm, width up to 8 mm, thickness up to 3 mm (after fixation).

Obnemertes latilobata differs from the other species of the genus by the shape of the body, of the proboscis sheath and of the testes and the structure of the intestine (Korotkevitch, 1966).

Obnemertes solida Korotkevitch 1966

(Figure 10)

Diagnostic characters:

Body: elongated, moderately flat, anterior end slightly broadened, the posterior bilobated and flattened to form an indistinct caudal fin
Colour: epidermis colourless and transparent
Proboscis orifice: situated terminally at anterior end of body
Proboscis funnel: short and broad
Proboscis: much longer than body
Stylets: sickle-shaped base with small conical stylets disposed in single row
Proboscis sheath: fusiform and broad, reaches posterior end of body
Mouth: situated below proboscis orifice
Stomach: wide with folded walls
Pyloric tube: long, wide, flat, with an undulated lateral wall
Caecum: short and wide without lateral diverticula
Midgut: wide and flat, with 9 pairs of broad and short lateral diverticula with short, thick lobes
Rectum: fairly long and wide
Size: length up to 12 mm, width up to 8 mm, thickness up to 6 mm (live specimen).

This species is most closely related to Obnemertes latilobata of all the species, but it differs radically from this species in body shape and in arrangement of muscle fibres in sheath wall (Korotkevitch, 1966).

Obnemertes nana Korotkevitch 1966

(Figure 11)

Diagnostic characters:

Body: oval, moderately flattened, posterior end narrowed, flattened and bilobate, no well defined caudal fin
Colour: epidermis colourless and transparent
Proboscis orifice: situated in terminal depression at anterior end of body;
Proboscis funnel: short and wide
Proboscis: longer than body, fixed to dorsal wall of sheath
Stylets: with broad base
Proboscis sheath: fusiform and broad, with narrow terminal channel which reaches to posterior end of body

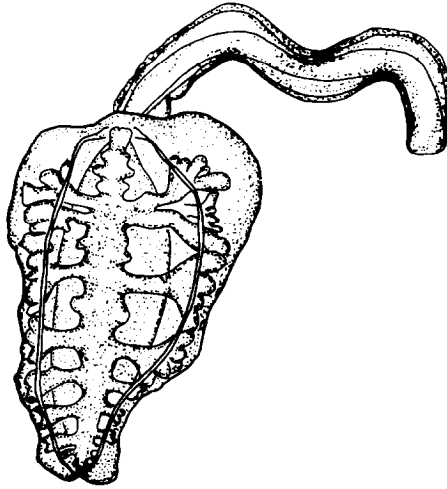
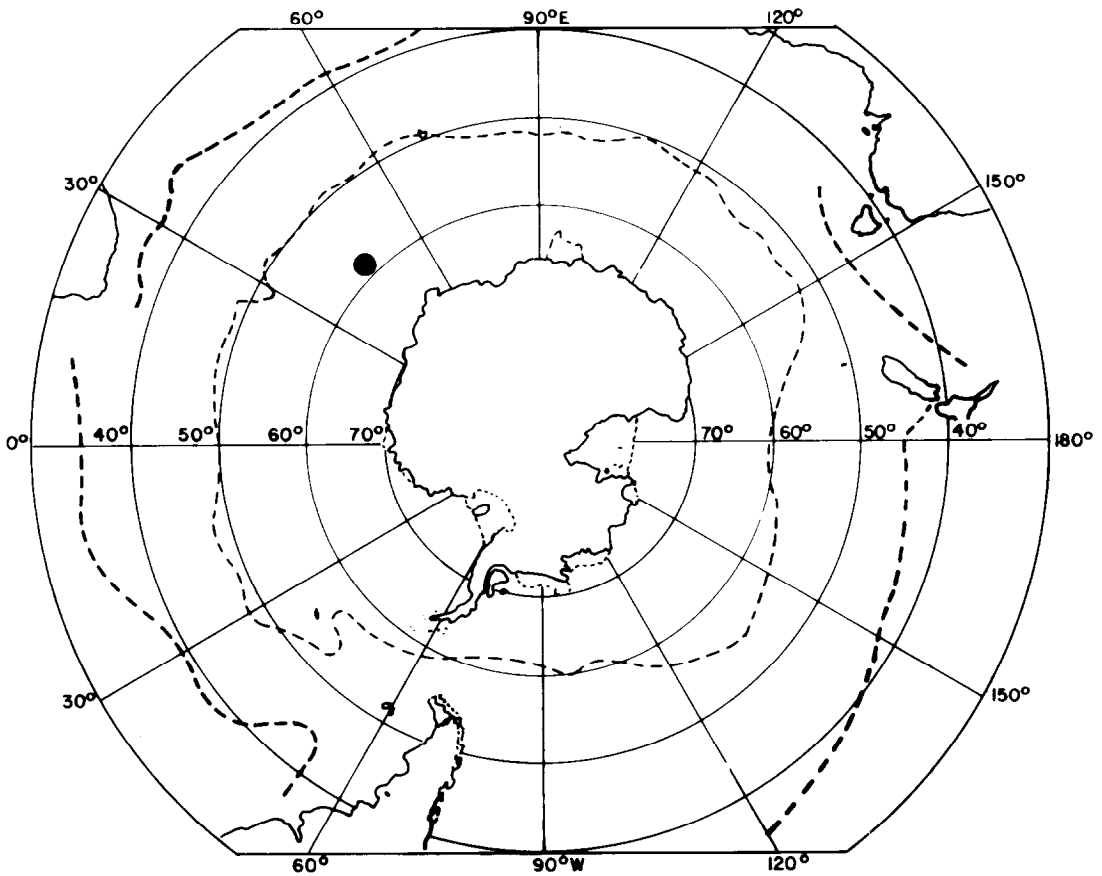


Figure 10. *Obnemetes solida* female, lateral view. Map of distribution.



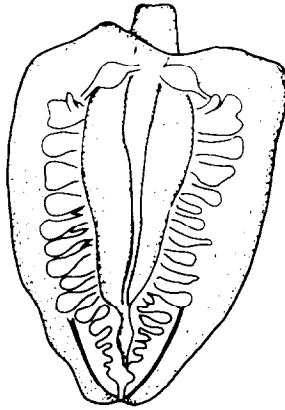
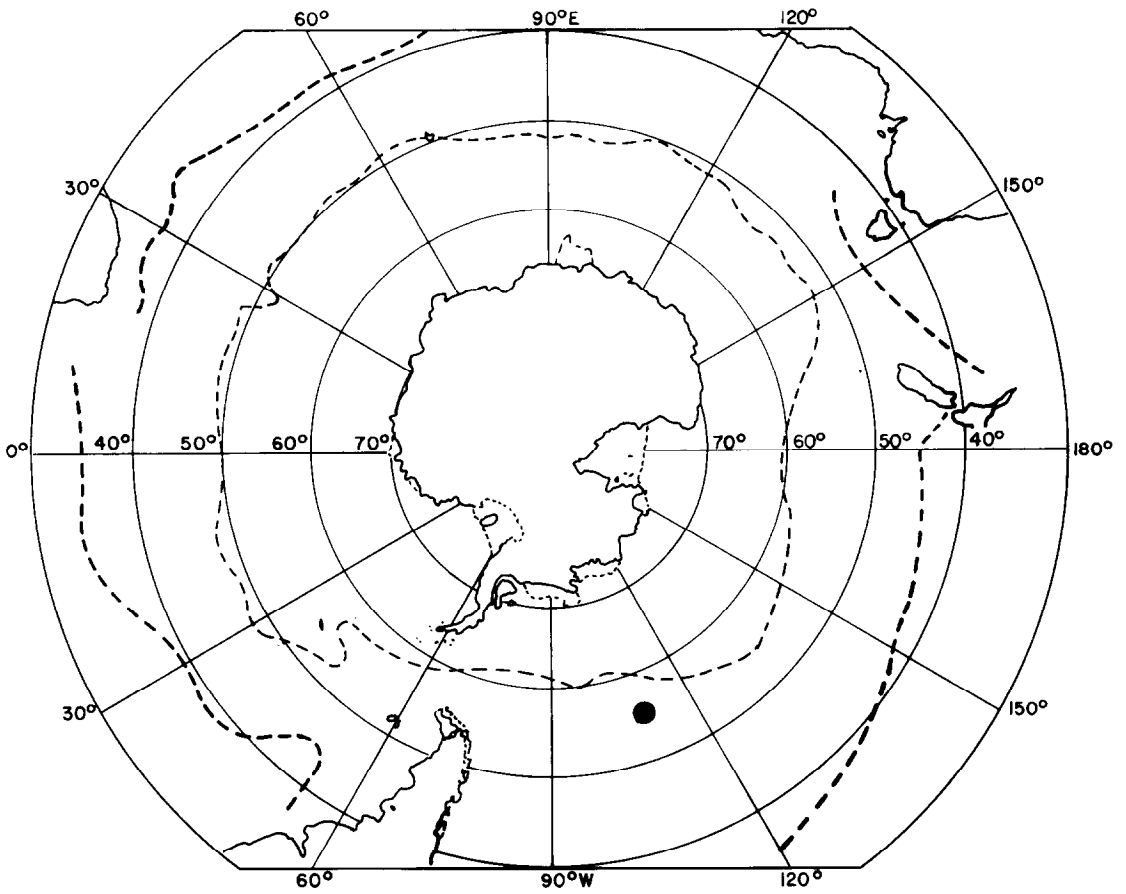


Figure 11. *Obnemeretes nana* female, dorsal view. Map of distribution.



Mouth: situated in depression with proboscis orifice
 Stomach: long, narrow with smooth walls
 Pyloric tube: narrow and short
 Caecum: a narrow outgrowth without lateral diverticula
 Midgut: wide and flat, with 15 pairs of broad and short lateral diverticula, no ventral branches, first pair largest with few small lobes, rest of diverticula do not have lobes
 Rectum: long and narrow
 Size: length up to 4 mm, width up to 2.5 mm, thickness up to 1.2 mm (after fixation).

This is the only species of this genus that has been found north of the Antarctic Convergence. This separation further confirms the opinion expressed by Burger (1897-1907) and Korotkevitch (1955) on the polyphyletic origin of this animal group and refutes the monophyletic hypothesis supported by Brinkmann (1917). The problem is discussed further in Korotkevitch (1962). Obnemertes nana differs from the other species of the genus in body form and shape of the proboscis sheath and of the intestine (Korotkevitch, 1966).

Genus Probalaenanemertes (Pelagonemertes) Brinkmann 1917

Generally resemble Pelagonemertes but possesses closely opposed intestinal diverticula that lack intervening gelatinous connective tissue; the diverticula have distinct dorsal and ventral branches; caudal fin well-developed, two species of which P. irenae (Wheeler) has been found off South America.

7.6 SUBTRIBE EUPELAGICA

Subtribe whose members generally lack lateral muscles; wall of the rhynchocoel is composed mainly of a muscle fiber meshwork; a few genera have separate muscle layers, and are included in the subtribe on other grounds; intestine mostly have numerous lateral diverticula, fequently deeply branched and lobed, testes are more or less regularly distributed behind the brain; there are 6 families, Chuniellidae, Dinonemertidae, Pachynemertidae, Phallonemertidae, Planktonemertidae and Protipelagonemertidae of which the latter two are found in the Southern Ocean and adjacent waters.

7.7 KEY TO FAMILIES:

Body slender, not much flattened, narrowed at both ends, caudal fin is not clearly differentiated Protipelagonemertidae

Body usually broad, with distinct caudal fin Planktonemertidae

7.8 FAMILY PLANKTONEMERTIDAE

Tentacles are absent, and the body is usually broad and flat, with a caudal fin; rhynchocoel musculature is composed of intermeshed fibers; a dorsal anastomosis of the cephalic blood system is present; middorsal blood vessel enters the wall of the rhynchocoel for a short distance behind the brain, and then extends the remaining body length below the rhynchocoel, intestinal

diverticula are much divided, usually with distinct dorsal and ventral branches, the ventral branches reaching beneath the nerve cords. The spermaries are in two longitudinal groups or rows immediately behind the brain; the family contains 7 genera of which Planktonemertes is found in waters adjacent to the Southern Ocean.

Genus Planktonemertes (Planktonemertes) Woodworth 1899

Body broad and very flat; mouth and proboscis opening united; proboscis sheath extends almost the entire length of body; musculature of proboscis sheath of interwoven fibres; intestinal diverticula very numerous, much branched, with ventral branch beneath lateral nerve; lateral nerve has but a single fibrous core; spermaries in two elongated groups or irregular rows posterior to brain (Coe, 1926); 3 species of which 2 are found in waters adjacent to the Southern Ocean.

Key to Species (Korotkevitch, 1966):

Epitheliomuscular sac poorly developed; proboscis sheath extending almost to the end of body; mouth and proboscis orifice opening in a common dorsal depression at the anterior end; stomach voluminous; caecum with 5 pairs of lateral diverticula and with an odd anterior process; midgut narrow; males unknown (SA) P. vanhoffeni
Brinkmann

Epitheliomuscular sac well-developed; sheath of proboscis 3/4 of body length; mouth well separated from proboscis orifice; stomach small; caecum with 7 pairs of lateral diverticula, without an odd anterior one; midgut wide; females unknown (SAm) P. curvicephala Korotkevitch

7.9 FAMILY PROTOPELAGONEMERTIDAE

The body is slender, not much flattened, and narrowed at both ends; tentacles are absent, and the caudal fin is not clearly differentiated; wall of the rhynchocoel is composed of intermeshed muscle fibres; intestinal diverticula have distinct dorsal and ventral branches, the latter extending ventrally between the nerve cords and the body wall; spermaries are in two simple rows behind the brain; dorsal blood vessel is nearly as long as the body; the family contains 4 genera of which two occur in the Southern Ocean and adjacent waters.

Key to Genera:

Mouth and proboscis pore separate (At) Calonemertes
Mouth and proboscis pore united Protopelagonemertes

Genus Protopelagonemertes (Planktonemertes) Brinkmann 1917

Body is narrowed both anteriorly and posteriorly, and little flattened; mouth and proboscis-opening are united; proboscis sheath extends nearly the entire length of the body, its walls being composed of interlaced circular (or spiral) and longitudinal muscles, intestinal diverticula with both dorsal and ventral branches, the latter extending beyond the nerve cords; ovaries with many small ova (Coe, 1954); 2 species of which one has been found in the Southern Ocean.

Protopelagonemertes hubrechtii (Brinkmann 1917)

(Figure 12)

(Bathynemertes hubrechtii Wheeler, 1934, 1940)

Diagnostic characters (Coe, 1954):

Body: large, narrowed at both ends, without caudal fin, more slender and thicker than in most bathypelagic species

Colour: in life red, scarlet, or orange; paler at either end of body

Proboscis orifice: united with mouth

Proboscis funnel: not described

Proboscis: of large diameter, but shorter than in many bathypelagic species, since it is contained in a sheath without distinct convolutions

Stylets: sharply conical, basis slender and sharply curved, 6 small pouches of accessory stylets

Proboscis sheath: nearly as long as body, without distinct convolutions

Mouth: united with proboscis opening

Stomach: not described

Pyloric tube: not described

Caecum: with 5 pairs of branched diverticula

Midgut: with 30 to 40 pairs of profusely branched diverticula, the branches extending above and below the lateral nerves

Rectum: not described;

Size: length up to 105 mm, width up to 25 mm, thickness up to 10 mm.

The male is yet unknown, but the females have about 30 pairs of ovaries, each of which produces many small ova, the preformed oviducts open lateroventrally (Coe, 1954). This species has been found in both the North and South Atlantic oceans indicating a very wide geographical distribution.

Genus Calonemertes (Planktonemertes) Coe 1945

Body narrowed at both ends, rounded and moderately slender, without indication of lateral or caudal fins; mouth separate from rhynchoceal opening, provided with frilled lips when opened; oesophagus absent; proboscis sheath extends entire length of body, musculature of interlaced longitudinal and circular fibres (Coe, 1945); monospecific for Calonemertes hardyi (Wheeler) which has been reported (as Bathynemertes hardyi) from the southern Atlantic by Wheeler (1934).

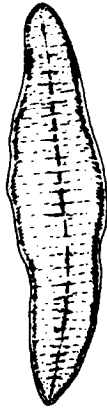
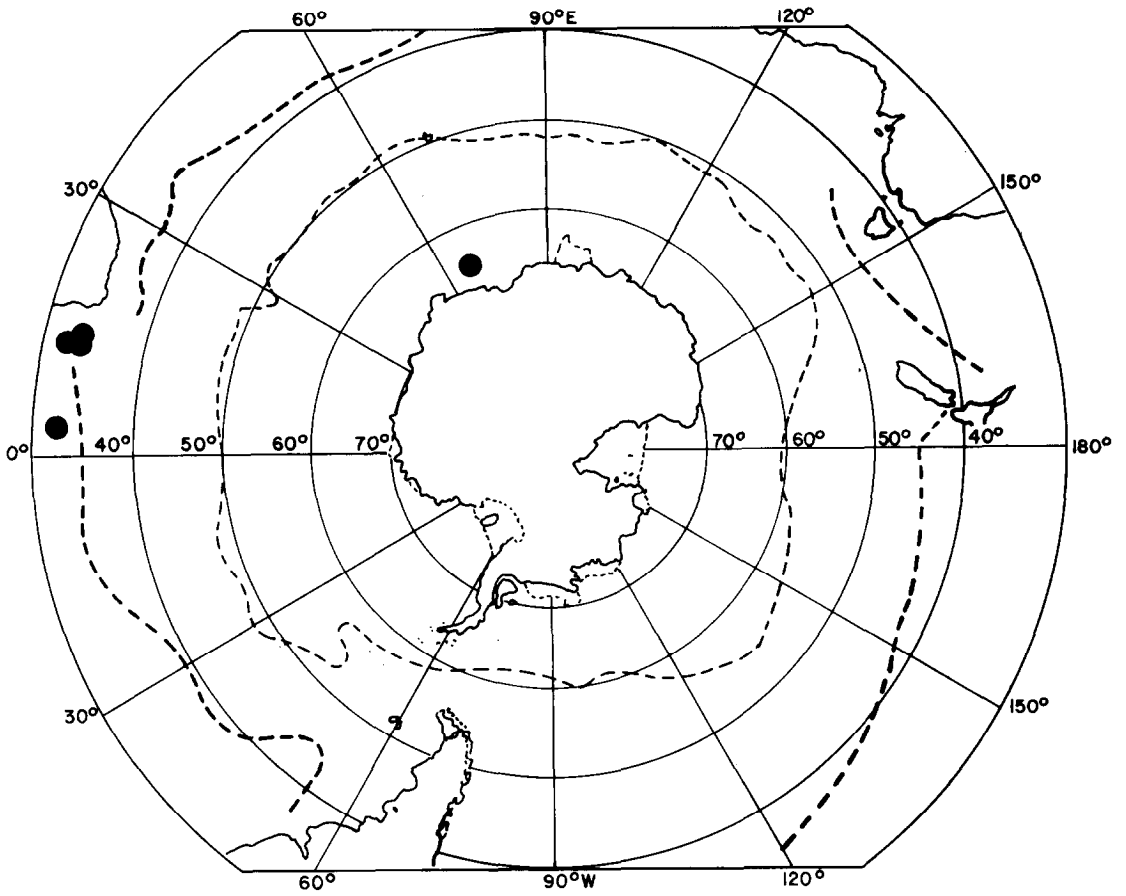


Figure 12. Protodelagoneustes hubrechtii. Map of distribution.



8. SOURCES OF FIGURES AND MAPS

<u>Sources</u>	<u>Figures</u>
Wheeler (1934)	6
Coe (1945)	12
Coe (1956)	3
Korotkevitsch (1966)	1b, 2, 4, 5, 7, 8, 9, 10, 11
Gibson (1982)	1a

<u>Sources</u>	<u>Maps</u>
Moseley (1875)	6
Hubrecht (1887)	6
Binkmann (1915)	6
Wheeler (1934)	3, 6, 12
Hardy and Gunther (1935)	6
Wheeler (1940)	3, 12
Korotkevitsch (1966)	2, 4, 5, 6, 7, 8, 9, 10, 11

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