Thalassema (Echiura) from southern Africa with the description of a new species

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Four species of *Thalassema* are currently known from southern Africa of which *T. jenniferae* is here described as new to science. *T. diaphanes* and *T. philostracum* are redescribed and figured. The discovery of *T. diaphanes* from the Natal coast marks an extension of its geographic range. *T. thalassemum* is briefly diagnosed but material of this species was not available. The taxonomic positions of two specimens of *Thalassema*, examined from the University of Cape Town collection, remain to be resolved. Adequate descriptions of both these specimens were not possible as the internal organs were badly damaged. A key for the identification of all the species in the genus is provided and the distribution of the southern African forms is discussed.

Vier *Thalassema*-soorte is tans uit suider-Afrika bekend. Een hiervan, *T. jenniferae*, word vir die eerste keer hier beskryf. *T. diaphanes* en *T. philostracum* word herbeskryf en geïllustreer. Die ontdekking van *T. diaphanes* langs die Natalse kus verteenwoordig 'n uitbreiding van hierdie dier se verspreidingsgebied. *T. thalassemum* word kortliks gediagnoseer maar materiaal van hierdie soort was nie beskikbaar nie. Die taksonomiese posisie van twee *Thalassema*-soorte wat in die versameling van die Universiteit van Kaapstad ondersoek is, is nog nie afgehandel nie. Bevredigende beskrywings van beide eksemplare was onmoontlik, daar hul inwendige organe sleg beskadig was. 'n Sleutel word voorsien vir die identifikasie van al die soorte van die genus, en die verspreiding van die suider-Afrikaanse vorme word bespreek.

There has been little previous work on the echiuran fauna of southern Africa. As echiurans are benthic animals occurring in concealed habitats such as burrows within sand, under rocks and in rock crevices, they are not readily available. This probably has deterred biologists in southern Africa from undertaking systematic studies on this group. Some of these habitats do not seem to have been sufficiently explored in the past. An attempt is being made to update the information on this group of animals by providing a comprehensive report on the recorded species. In an earlier paper (Biseswar 1985), the distribution of the genera and species of echiurans from this region was mapped and discussed.

The present paper deals with the species of the genus *Thalassema* from southern Africa. As some of the species described by the earlier authors are extremely brief, it was deemed advisable to re-examine and redescribe some of the species with the view of including a wider range of taxonomic characters. It was also felt that a single comprehensive report with a key to all the species would be useful to current and future workers in this field.

Materials and methods

Numerous collecting trips were undertaken, during spring low tide, to several rocky shores along the Natal and Cape coasts over a period extending from March 1981 to October 1985. Some material was also obtained from the Reference Collection of the University of Cape Town.

Information about the location and the nature of the sediment was noted and living animals were photographed. Narcotization of specimens was achieved by the addition of small quantities of magnesium sulphate to sea water over a period of three to four hours. Measurements were taken after the specimens were injected and preserved in 10% formalin. Descriptions and drawings of the external and internal anatomy were made under a dissecting microscope with a drawing tube attachment.

Systematic account

Key to worldwide species of the genus *Thalassema*

It is difficult to construct a satisfactory key as some of the species are very briefly described and lack useful taxonomic data which can be used to distinguish them. The taxonomic position of *T. marshalli*, described by Prashad (1935), is uncertain as no mention is made of the nature of the gonostomal lips. *T. marshalli* might well belong to the genus *Anelassorhynchus*. A description of the anatomical terminology is given in an earlier paper (Biseswar 1983).

Stephen & Edmonds (1972) have done little more than arrange the species on the basis of the number of gonoducts that they possess. The present key will need updating in the future as additional information becomes available from redescriptions of some of the species. Therefore, in the present key, other less rigorous characters have also been included to assist in the identification of single individuals.

Thalassema jenniferae sp. nov. can be easily distinguished from the others in the genus in possessing three pairs of gonoducts.

1	Gonoducts one or two pairs	2
–	Gonoducts three pairs, first pair presetal	*T. jenniferae* sp. nov.
2	Gonoducts one pair	3
–	Gonoducts two pairs	10
3	Anal vesicles lacking	4
–	Anal vesicles present	5

4 Body smooth, microscopic papillae only in middle of body. Proboscis ribbon-like, longer than trunk ..... *T. antarcticum* Stephen, 1941.
– Body not smooth; papillae over entire body surface. Proboscis small, about one-third trunk length ..... *T. ovatum* Sluiter, 1902.
5 Gonostomal lips folded or crumpled ..... *T. elapsum* Sluiter, 1912.
– Gonostomal lips not folded or crumpled 6
6 Interbasal muscle present 7
– Interbasal muscle absent 9
7 Papillae swollen, scale-like and bent forwards; gonostomes located on stalks ..... *T. hartmani* Fisher, 1947.
– Papillae not swollen and scale-like; gonostomes not stalked 8
8 Skin thin and transparent; papillae of uniform size distributed over entire body surface but more concentrated at anterior and posterior ends ..... *T. diaphanes* Sluiter, 1888.
– Skin thick and opaque; body smooth except at extremities where papillae are prominent ..... *T. owstoni* Ikeda, 1904.
9 Papillae overlapping, arranged in regular rows ..... *T. mortenseni* Fischer, 1923.
– Papillae not overlapping, irregularly distributed, more closely packed at anterior and posterior ends; anal vesicles long ..... *T. arcassonense* Cueot, 1902.
10 Proboscis with branching gill-like structures ..... *T. marshalli* Prashad, 1935.
– Proboscis without gill-like structures 11
11 Opening of gonostome on a peduncle; no rectal caecum ..... *T. sydniense* Edmonds, 1960.
– Opening of gonostome not on a peduncle; rectal caecum present 12
12 Gonostome fan-shaped. Papillae arranged in transverse series ..... *T. philostracum* Fisher, 1947.
– Gonostome not fan-shaped; papillae irregularly distributed 13
13 Gonostomal lips semicircular and frilled; papillae largest and most densely packed in posterior region of trunk ..... *T. thalassemum* (Pallas, 1766).
– Gonostomal lips smooth, forming an incomplete circle; papillae largest just behind proboscis ..... *T. steinbecki* Fisher, 1946.

Genus *Thalassema* Lamarck

Generic diagnosis

Longitudinal and inner oblique layers of muscle continuous and not grouped into bands or fascicles. Proboscis well-developed but anal setae absent. Gonoducts from one to three pairs; gonostomal lips not elongate and not spirally coiled. No sexual dimorphism.

Type species (From Stephen & Edmonds 1972).

Lumbricus thalassema Pallas, 1766: 8 (= *Thalassema neptuni* Gaertner of Pallas, 1774, and other authors).

Remarks

The genus *Thalassema* comprises about 14 species although some of the species may be synonymous. The descriptions of some of the species by the earlier authors are very brief and lack information on several characters which can be used to distinguish them. Stephen . Edmonds (1972) have separated the species into two groups, one possessing one pair of gonoducts and the other two pairs. An interbasal muscle and a rectal caecum are present in many species.

Two other genera, namely, *Anelassorhynchus* and *Arhynchite* are close to *Thalassema* in having longitudinal and oblique muscle layers that are continuous and not aggregated into bands or fascicles. The distinction between *Anelassorhynchus* and *Thalassema* is based on the shape of the gonostomes which in the former are elongate and spirally coiled. *Arhynchite*, on the other hand, is distinguished by the presence of a slender, ribbon-like proboscis with a small expanded or fan-like extremity. The latter genus possesses a single pair of gonoducts with gonostomes having a single lip produced into a leaf-like organ, the margins of which are irregularly sculptured.

Distribution of *Thalassema*

Although many spccies have been recorded from warmer tropical and subtropical waters of the Indian, Atlantic and Pacific Oceans, a few are either restricted to or have extended into temperate or cold waters. The recorded localities of the species in the latter category include the Falkland Islands in the south and the coasts of England, Ireland, France and the Mediterranean in the northern hemisphere. Most of the species appear to be inhabitants of shallow waters of the intertidal zone with only a few having been reported from considerable depths. In their monograph, Stephen . Edmonds (1972) give the range of distribution of each species.

***Thalassema jenniferae* sp. nov.** Figures 1-6

Records

Four specimens collected from Park Rynie Beach (31°19'S 30°44'E), Natal coast (Type locality).

Holotype

One sexually mature specimen, in the Natal Museum, Pietermaritzburg, Republic of South Africa No 3330, collected by author from the intertidal area close to the high water mark, 7 June 1982. The specimen occurred in fairly coarse sand, under small stones beneath a projecting ledge of rock facing the shore.

Paratype

One sexually mature specimen, in the Natal Museum, collected from the same locality. Museum number same as for holotype.

Etymology

The species is named after Dr Jennifer A. Day of the

Department of Zoology, University of Cape Town in appreciation of the assistance given during the course of this research.

Description

Size

Measurements were made after narcotization with magnesium sulphate and preservation in 10% formalin. Length of proboscis of holotype 19 mm, trunk 33 mm long, greatest diameter of trunk about 8 mm. Length of proboscis of paratype 16 mm, trunk 31 mm long. Hence length of proboscis ranges from one-half to two thirds trunk length.

Colour in life

Trunk reddish-pink, proboscis pale yellow. Colour of specimens preserved in formalin, off-white.

External features

Proboscis. Proboscis elongate, non-deciduous, slightly expanded at distal end, anterior and lateral margins smooth (Figure 1). In preserved condition, lateral edges curl inwards forming a tube. Lateral margins of proboscis unite at base forming a narrow lower lip.

Trunk. Trunk cylindrical or sausage-shaped, tapering towards posterior end (Figure 1). Longitudinal and inner oblique muscle layers continuous without any tendency of aggregating into bands or fascicles. Body wall extremely thin and transparent throughout, with the result that internal organs and contents of gut visible. Papillae minute, round, irregularly distributed over entire surface of trunk. Papillae slightly larger and more closely arranged at extremities of trunk. In living specimen, papillae appear as white spots. Ventral setae small, located a few millimetres posterior to junction of proboscis and trunk. Genital pores 3 pairs, first pair located anterior to setae while remaining two pairs postsetal in position.

Setae. Setae hook-like, golden yellow in colour. Each consisting of a cylindrical shaft with a curved terminal end (Figure 2A). Terminal bent end slightly flattened. Fine concentric markings present mainly on cylindrical part of shaft. Replacement setae (Figure 2B) also found in close association with functional ones. Internally, bases of setae located in cone-shaped setal sacs supported by a number of thin muscle strands. Interbasal muscle absent.

Internal anatomy

Alimentary canal. Alimentary canal extremely long and

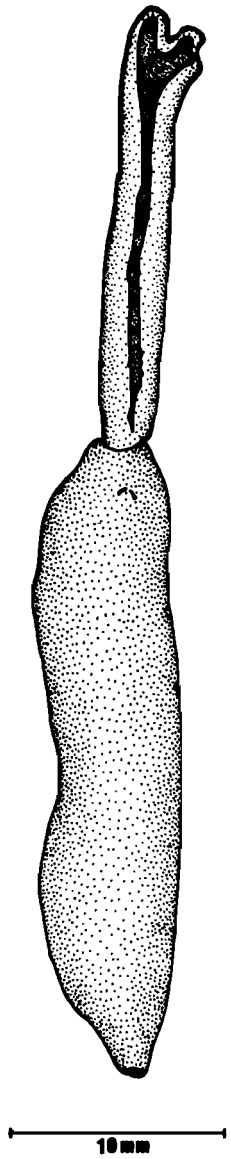

Figure 1 Ventral aspect of *Thalassema jenniferae* sp. nov.

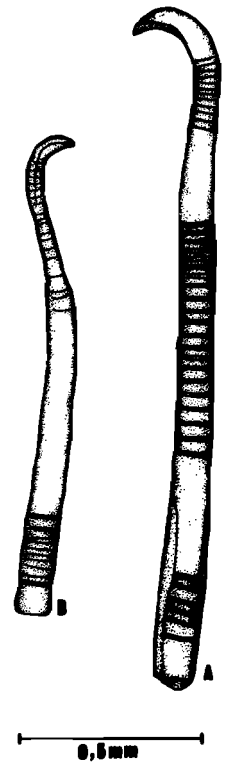

Figure 2 (A) The left functional seta and (B), the left non-functional (replacement) seta of *T. jenniferae* sp. nov.

coiled, about nine times the trunk length, attached to body wall by few, thin and delicate mesenteric strands (Figure 3). Foregut small, terminating at ring sinus. Presiphonal region of intestine with a ciliated groove. Intestine thin-walled, transparent, containing shell fragments and coarse sand particles, not moulded into pellets. Rectal caecum small, spherical.

Anal vesicles. Anal vesicles thin-walled, about one-half length of trunk, narrow distally but becoming slightly distended towards proximal end (Figure 4). Ciliated funnels minute, unstalked, sparsely distributed over surface of both vesicles.

Gonoducts. Gonoducts three pairs, small, spherical to somewhat oval in shape (Figure 5). First pair located anterior to ventral setae, second pair largest of all. Gonostomes sac-like, larger than gonoducts, directed anteriorly (Figure 5). Gonostomal lips not spirally coiled. In holotype, gonostomal lips are small while in paratype they are somewhat elongate. Gonoducts of both specimens distended, white in colour due to presence of sexual cells.

Blood system. Intestinal ring sinus in the form of an

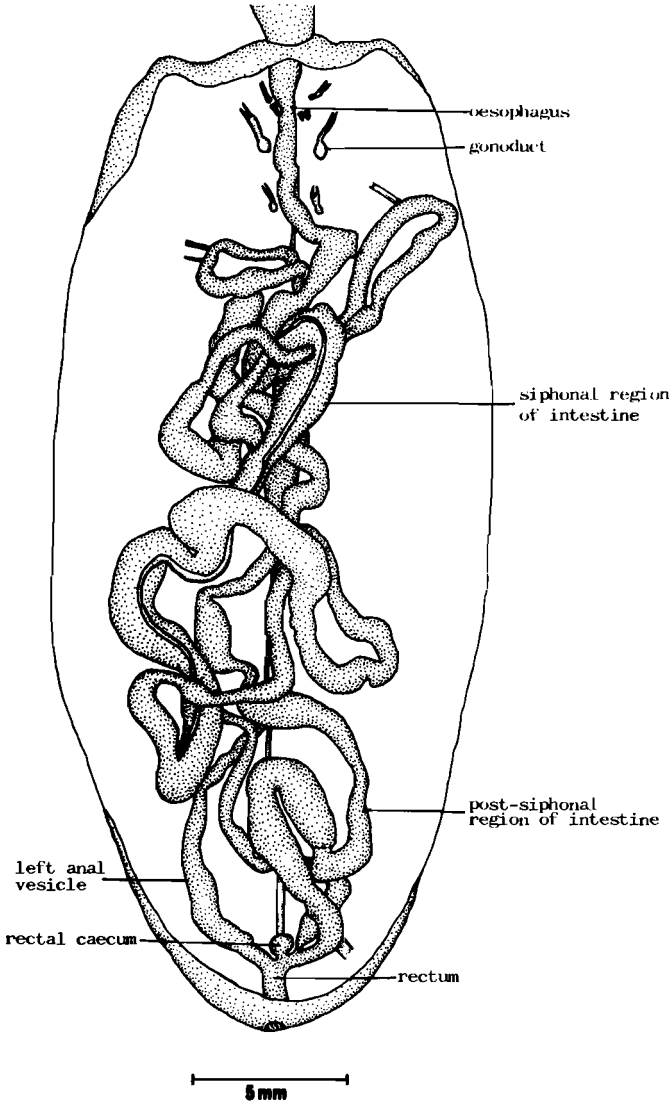

Figure 3 Dorsal dissection of the trunk of *T. jenniferae* sp. nov. showing the alimentary system, gonoducts and anal vesicles.

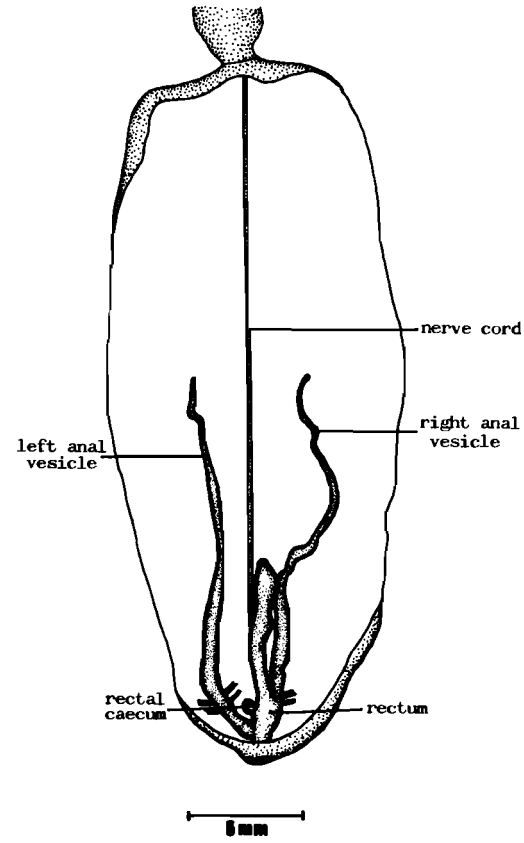

Figure 4 Dorsal dissection of the trunk of *T. jenniferae* sp. nov. showing the anal vesicles.

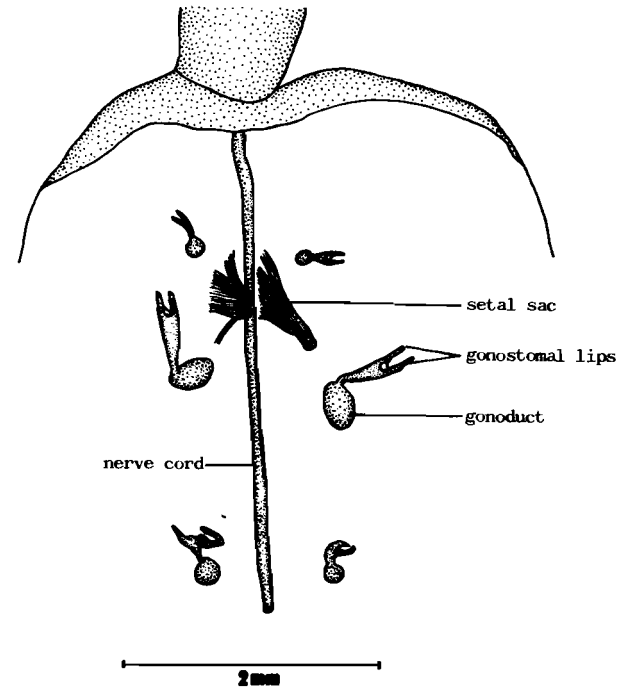

Figure 5 Anterior end of trunk cavity of *T. jenniferae* sp. nov. illustrating the gonoducts.

incomplete vascular ring around posterior end of foregut (Figure 6). Neuro-intestinal vessel paired but uniting before opening into ventral vessel. Dorsal vessel short, passing forwards into proboscis.

Remarks

Some of the important characters used for the identification of species in the genus *Thalassema* are the number as well as the location of the gonoducts in relation to the ventral setae, the shape of the gonostomes, the structure of the proboscis and the presence or absence of the interbasal muscle, anal vesicles and rectal caecum.

Important distinguishing features of the new species from Park Rynie Beach are the presence of three pairs of gonoducts, the sac-like gonostomes with gonostomal lips that are not spirally coiled and the extremely thin and glass-like integument. Other distinguishing characters include the presence of a narrow lower lip to the proboscis, the characteristic shape and distribution of the dermal papillae, the small, spherical to somewhat oval gonoducts and the small size of the sexually mature specimens. The gonostomal lips in the new species are unlike the spirally coiled and thread-like structures characteristic of the genus *Anelassorhynchus*.

Stephen & Edmonds (1972), in their monograph on the phyla Sipuncula and Echiura, ascribe one or two pairs of gonoducts to the genus *Thalassema*. However, in view of the number present in the new species, their diagnosis of the genus requires emendation.

According to Datta Gupta (1976) the number of gonoducts is fairly constant within a species. Saxena (1983) also, assessed the reliability of this organ as a taxonomic character in echiurans and concluded that the number as well as their location in relation to the ventral setae are useful characters for separating species. The presence of three pairs of gonoducts in the new species thus separates it from all the other species of *Thalassema* that have been described to date.

The gonostomes of the new species are almost identical to those of *T. philostracum*, described by Wesenberg-Lund (1959a, 1963) from material collected from Tropical West Africa and the Natal coast. The latter species, however, differs markedly in possessing two pairs of postsetal gonoducts and an interbasal muscle. Other differences between the two species lie in the distribution of the papillae, in the nature of the body wall and in the structure of the probosces.

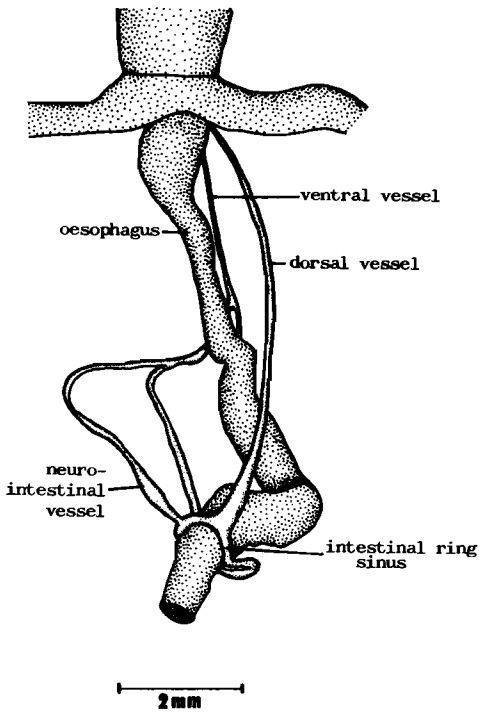

Figure 6 Anterior end of trunk cavity of *T. jenniferae* sp. nov. illustrating the blood vessels.

***Thalassema diaphanes* Sluiter, 1888** Figures 7–10

Thalassema diaphanes Sluiter, 1888: 244–248, pl.3, figs 1–7; 1891: 111; 1902: 49. Shipley, 1899: 336–337, pl.33, fig.2; 1902: 128, pl.6, fig.2. Wharton, 1913: 261. Prashad, 1935: 41. Wesenberg-Lund, 1959a: 199; 1959b: 214–216. Stephen & Edmonds, 1972: 455.

Present records

Two specimens, Natal dredgings, collected by UCT ecological survey, 9 September 1964. Exact locality not given. Determined as *Thalassema neptuni* in UCT collection (NAD 47 U/C).

Previous records

West coast of Africa; Ivory coast; Cape Town; Andaman Islands; Maldive and Laccadive Islands; Bay of Batavia, Indonesia.

Type locality

Bay of Batavia, at depth of 17–19 m.

Distribution

Circumtropical, ranges from Indonesia through the Andaman, Maldive and Laccadive Islands south-westwards to the Natal coast. From the Natal coast it extends southwards into temperate waters in the vicinity of Cape Town and then reappears along the west African coast. No records are as yet available from the coast of South West Africa.

Description

The larger specimen with a trunk length of about 36 mm was dissected and the proboscis was missing. Trunk length of small intact specimen 9 mm; proboscis 4 mm long, about half the trunk length.

Colour

Colour of specimens preserved in alcohol, uniform light brown.

External features

Proboscis. Proboscis contracted, tapering towards tip (Figure 7). Lateral edges wrinkled but without

modifications, ventral surface with a series of ridges, dorsal surface smooth. Proboscis more or less flat distally but at proximal end lateral edges curl inwards to form a funnel around mouth. Lateral edges free at base of proboscis.

Trunk. Trunk cylindrical, tapering slightly towards posterior end (Figure 7). Papillae small, elongate, irregularly distributed over most of trunk, visible with unaided eye. Papillae larger at posterior end of trunk and somewhat rounded. Body wall thin and transparent.

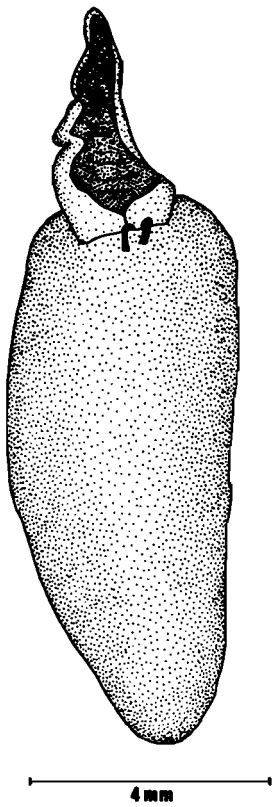

Figure 7 Ventral aspect of *T. diaphanes*.

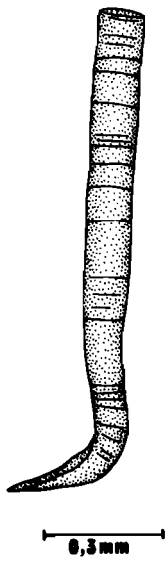

Figure 8 Right functional seta of *T. diaphanes*.

Ventral setae large, situated close to junction of proboscis and trunk. Genital pores one pair, postsetal.

Setae. Setae one pair, golden yellow in colour. Each consisting of a cylindrical shaft with curved distal end terminating in a sharp point (Figure 8). Distal curved end slightly flattened. Faint concentric markings present mainly on cylindrical part of the shaft. Replacement setae also present in close association with functional ones. Internally, setae invested in connective tissue with numerous muscle strands arising from base. Cylindrical interbasal muscle passes through loop of neuro-intestinal vessel.

Internal anatomy

Alimentary canal. Alimentary canal long, highly coiled, attached to body wall at several points by thin mesenteric strands. Oesophagus narrow, more or less of uniform diameter with thick muscular walls. Foregut small, terminates where neuro-intestinal vessel joins dorsal vessel. Presiphonal region of intestine with ciliated groove. Intestine delicate, extremely thin-walled and transparent. Entire intestine compactly filled with small, sausage-shaped faecal pellets consisting of very fine sand particles. Intestinal siphon extremely narrow and indistinct. Rectal caecum absent.

Anal vesicles. Anal vesicles thin-walled and transparent, narrow anteriorly but considerably dilated and sac-like posteriorly (Figure 9). Ciliated funnels minute, stalked and sparsely distributed over surface of both vesicles.

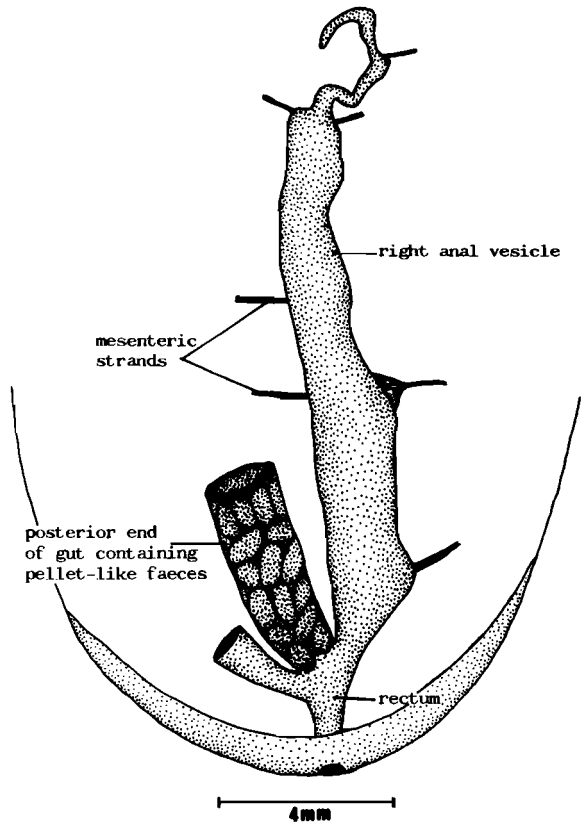

Figure 9 Right anal vesicle of *T. diaphanes*.

Gonoducts. Gonoducts one pair, elongate, tubular and swollen at base. Gonoducts located posterior to ventral setae (Figure 10). Gonostomes oval with smooth margins. Margins unite to form a funnel-shaped structure before opening into base of gonoduct.

Blood system. Only ventral blood vessel and parts of neuro-intestinal vessels visible, the remainder damaged in both specimens. Neuro-intestinal vessel forms a small loop around interbasal muscle.

Remarks

Thalassema diaphanes, described originally from a single specimen from the Bay of Batavia, in Indonesia by Sluiter (1888), was later recorded and redescribed from several other localities in the Indo-West-Pacific and east Atlantic Oceans. In southern Africa this species was last recorded by Wesenberg-Lund (1959a) from the vicinity of Cape Town. The single specimen was obtained from a depth of 28 m. Its discovery from the Natal coast now extends the range of distribution along the southern African coastline. Although this species is fairly well known, a few taxonomic problems still require elucidation.

The most important distinguishing features of *T. diaphanes* are: the presence of one pair of postsetal gonoducts with flat, oval gonostomes; a thin and transparent integument covered with minute papillae; a cylindrical interbasal muscle which passes through a small loop of the neuro-intestinal vessel; the distended sac-like anal vesicles and the absence of a rectal caecum.

It is rather surprising to note that with the exception of Wesenberg-Lund (1959a), none of the other authors have mentiond the presence of an interbasal muscle in this species.

According to Sluiter's description (1888), the proboscis is 30 mm long and equals the length of the trunk. The integument is thin and transparent and the papillae are small white specks scattered over the body, more concentrated at the anterior and posterior ends. A rectal caecum is lacking. The anal vesicles are small and transparent, about 5 mm long. The descriptions provided by Shipley (1899) and Prashad (1935) mention that the proboscis forms a tube before joining the trunk, although otherwise they do not add much to Sluiter's original description of the species.

The single specimen described by Wesenberg-Lund (1959a) from the Cape Town area was badly preserved and the proboscis was missing. According to the latter author, the papillae are densely crowded at both ends of the trunk, especially posteriorly, where they are annularly arranged.

Wesenberg-Lund (1959b) examined three further specimens of *T. diaphanes* from Tropical West Africa. The trunk length of the largest specimen was 34 mm but the probosces were missing in all three specimens. According to the latter author, the integument is thin, tough but not transparent. The gonostomes are large, stalked with ovoid apertures and the anal vesicles are slightly more than half the length of the trunk with extremely thin walls. With the exception of Wesenberg-Lund (1959b), none of the other authors give any details regarding the shape of the gonostomes.

The present specimens from Natal conform closely with Sluiter's description except that the lateral margins of the proboscis do not unite posteriorly to form a tube before joining the trunk. The present investigation sheds more light on the shape and structure of the gonostomes and confirms the presence of an interbasal muscle in this species.

The species most nearly related to *T. diaphanes* seems to be *T. owstoni*, described from the Uraga Channel, Japan, by Ikeda (1904). Ikeda had doubts in erecting this species because of its close resemblance to *T. diaphanes*. However, he distinguished the Japanese specimen from *T. diaphanes* because of the thicker body wall and on differences in the distribution of the dermal papillae. From his illustration of the segmental organs it is also apparent that the gonostomes differ in the two specics. The gonostomes of *T. owstoni* are ciliated, funnel-shaped structures located on small stalks. In view of the above differences, it is probably best to consider the two species distinct, at least until more material becomes available.

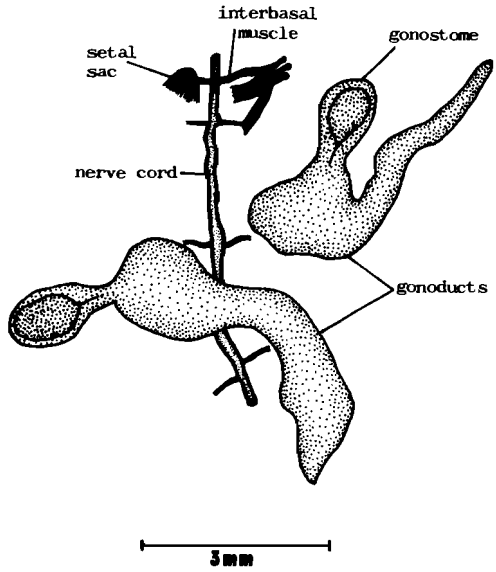

Figure 10 Diagram illustrating the gonoducts and setal sacs of *T. diaphanes*.

***Thalassema philostracum* Fisher, 1947** Figures 11–13

Thalassema philostracum Fisher, 1947: 351–353, pl.8. Wesenberg-Lund, 1959a: 199–201, fig.12; 1963: 139. Stephen & Edmonds, 1972: 458.

Present records

One specimen, Kosi Bay estuary, collected by UCT ecological survey. Specimen dissected and identified by Wesenberg-Lund (1963).

Previous records

Gulf of Florida, and Beaufort, North Carolina: Tropical West Africa.

Type Locality

Lemon Flats, Florida. Holotype. U.S.N.M. No. 20802

Distribution

T. philostracum seems to have a predominantly north Atlantic distribution having been recorded from the coasts of Florida, the Caribbean and Tropical West Africa north of the equator. It also occurs on the east coast of southern Africa as far north as Kosi Bay on the Natal coast.

Description

Size

Trunk 12 mm in length; proboscis 6 mm, one-half as long as trunk.

Colour

Colour of specimen preserved in alcohol, beige.

External features

Proboscis. Proboscis fleshy, contracted, lateral edges curled inwards with a series of tight ridges. Distal end damaged, ventral groove with transverse wrinkles due to contraction, dorsal surface with microscopic papillae arranged in transverse rows. Lateral margins of proboscis free at base.

Trunk. Body wall moderately transparent. Trunk uniformly covered with elliptical papillae, arranged in transverse rows, slightly larger at posterior end. Ventral setae situated close to junction of proboscis and trunk. Genital pores 2 pairs, postsetal.

Setae. Setae golden-yellow in colour, hook-like, about 1,5 mm long (Figure 11). Proximal end of cylindrical shaft slightly bent, curved distal end terminating in a pointed tip. Fine concentric ridges on surface of both setae, more closely arranged on proximal bent part of shaft. Setae located in cone-shaped setal sacs supported by numerous muscle strands. Interbasal muscle not observed, probably dissected out or damaged.

Internal anatomy

Alimentary canal. Alimentary canal long and coiled, ruptured in several places, attached to body wall by numerous, closely arranged mesenteric strands especially in presiphonal and siphonal regions of intestine. Foregut short, terminating at ring sinus. Presiphonal region with a ciliated groove. Walls of intestine in region of siphon extremely thin and delicate. Posterior part of intestine compactly filled with shell fragments and coarse sand grains. Rectal caecum small, spherical, opening into rectum ventrally (Figure 12).

Anal vesicles. Paired anal vesicles thin-walled tubes, about one-third trunk length (Figure 12). Microscopic, unstalked, ciliated funnels sparsely distributed over surface of both vesicles.

Gonoducts. Gonoducts 2 pairs, small, spherical, located posterior to ventral setae (Figure 13). Anterior pair slightly larger than posterior pair. Gonostomes sac-like, much larger than gonoducts, with short gonostomal lips. Gonostomal lips directed forward and not spirally coiled.

Blood system. Only dorsal blood vessel, ring sinus and parts of neuro-intestinal vessels visible, the remainder damaged. Dorsal vessel short and prominent. Ring sinus located at posterior end of short foregut. Neuro-intestinal vessels paired.

Remarks

Thalassema philostracum, described by Fisher (1947), is known originally from numerous specimens. The descriptions provided by Fisher (1947) and Wesenberg-Lund (1959a, 1963) mention the presence of an

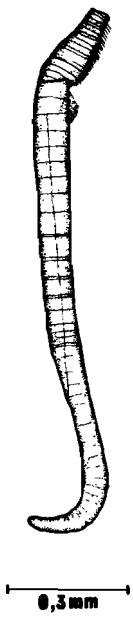

Figure 11 Right functional seta of *T. philostracum*.

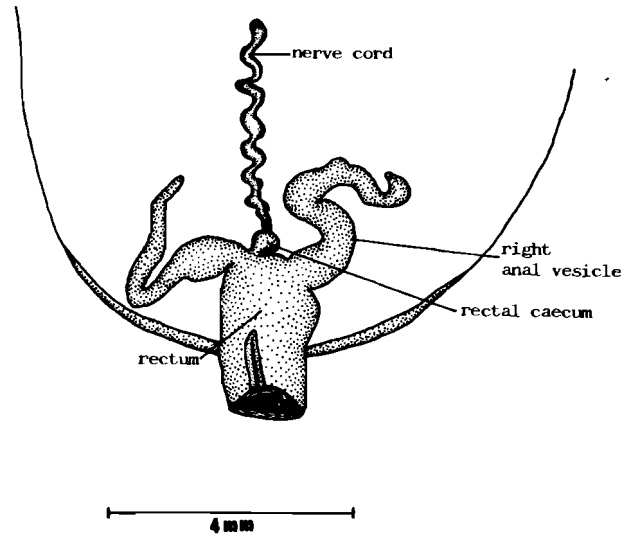

Figure 12 Posterior end of trunk cavity of *T. philostracum* showing the anal vesicles.

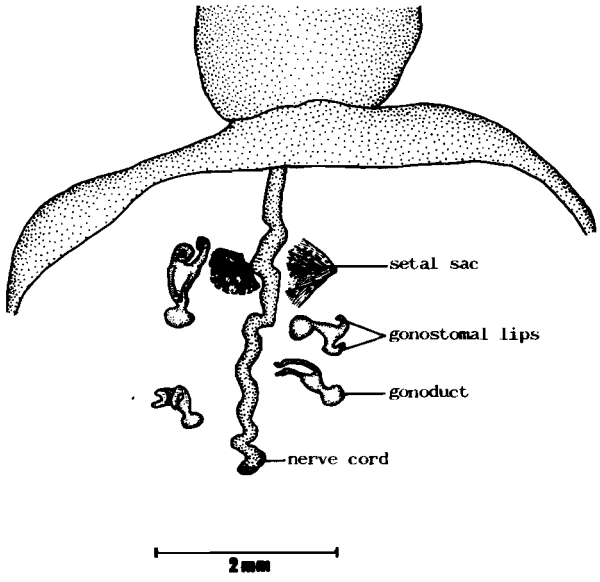

Figure 13 Anterior part of the trunk cavity of *T. philostracum* showing the gonoducts.

interbasal muscle in this species but, unfortunately, the relationship of this muscle to the neuro-intestinal vessel is not known.

Important distinguishing features of this species include: two pairs of sac-like, postsetal gonoducts with short, anteriorly directed gonostomal lips, the characteristic distribution of the papillae and the presence of an interbasal muscle. Other features of lesser taxonomic value are the comparatively short anal vesicles and the presence of microscopic papillae arranged in transverse rows on the dorsal surface of the proboscis. The proximal bent end of the cylindrical shaft of the setae may also be a useful feature in distinguishing *T. philostracum* from the other related species in the genus. Another interesting feature is the presence of numerous, closely arranged mesenteric strands attaching the gut to the body wall.

The specimen from Kosi Bay conforms in many respects with Fisher's description but an important difference lies in the shape of the gonostomes, which according to Fisher are fan-shaped.

Several species of *Thalassema* are known with two pairs of gonoducts and the species that seems to be most nearly related to *T. philostracum* is *T. steinbecki*, also described by Fisher (1946). The latter species is known from a number of localities from Baja in California to Ecuador. According to Fisher's description of *T. steinbecki* the proboscis, which is as long as the trunk, is broad proximally but ribbon-like distally. The papillae are scattered over the trunk and are largest just behind the proboscis and on the posterior third of the trunk. There is a well-developed interbasal muscle which passes through a loop of the neuro-intestinal vessel. The anal vesicles are almost as long as the trunk with numerous ciliated funnels. Fisher's description also mentions that the gonostomes are simple ciliated funnels with smooth lips forming an incomplete circle.

Hence *T. philostracum* differs significantly from *T. steinbecki* in the shape of the gonostomes, in the size and distribution of the papillae on the trunk and in the structure of the probosces. Differences are also present in the relative proportions of the proboscis and trunk lengths and in the lengths of the anal vesicles. Furthermore, the setae of *T. steinbecki* consists of a straight shaft with the curved terminal end set at right angles to the shaft.

From the descriptions of *T. philostracum* by the above authors, it is evident that some aspects of its internal anatomy require further investigation. Unfortunately the material examined by Wesenberg-Lund (1959a, 1963) was not in a satisfactory condition as the alimentary and blood vascular systems were damaged. Detailed redescriptions based on additional material in the future will probably shed more light on some other taxonomic characters.

Thalassema thalassemum (Pallas, 1766)

Lumbricus thalassema Pallas, 1766: 8–9, pl.1, fig.6.
Thalassema neptuni Gaertner of Pallas, 1774: 1–15. Greeff, 1879: 145. Reitsch, 1886: 313. Lankester, 1881: 350. Jameson, 1899: 535, 2 pls and 1 text-fig. Shipley, 1899: 351, pl. 33, figs 5 and 6. Stewart, 1900: 218. Southern, 1913: 39. Fischer, 1914: 20; 1922: 14. Leigh-Sharpe, 1928: 499–504, pls 14–15. Cuénot, 1922: 22–23, figs 12(a–b). Wesenberg-Lund, 1959a: 199. Stephen & Cutler, 1969: 114.
Thalassema thalassemum: Fisher, 1946: 230. Stephen & Edmonds, 1972: 459–460.

Diagnosis

Proboscis about three times trunk length when fully extended. Trunk brightly coloured, up to 70 mm in length, covered with papillae which are largest and most densely aggregated at posterior end. Integument transparent. Ventral setae one pair, connected by interbasal muscle. Gonoducts two pairs, postsetal in position. Gonostomes semicircular and frilled. Anal vesicles tubular, about two-thirds trunk length with unstalked ciliated funnels. Dorsal and neuro-intestinal vessels connected through well developed ring sinus at end of foregut. Interbasal muscle passing through loop of neuro-intestinal vessel. Foregut with a ciliated groove. Rectal caecum present.

Distribution

This species has a wide distribution, having been recorded from West Africa, British Isles, coasts of Ireland, France and the Mediterranean. It has been recorded previously from southern Africa at Port Elizabeth and Durban.

Remarks

Unfortunately it was not possible to obtain any specimens of *T. thalassemum*. This species, however, is well known, having been described from numerous localities. Shipley (1899) incorrectly states that the gonostomal lips are elongate and spirally coiled. The

specimens described by Stephen and Cutler (1969) were obtained at depths of up to 138 m. Stewart (1900) mentions some variations in the number of gonoducts of *T. thalassemum*.

This species seems to be very closely allied to *T. steinbecki*, described from the North Pacific Ocean by Fisher (1946). *T. steinbecki*, however, differs in having gonostomes with smooth margins. Furthermore, the papillae of *T. steinbecki* are roughly aligned in transverse rows and the proboscis is about as long as the trunk, ribbon-like and expanded distally. Differences between the two species are also evident in the size of sexually mature specimens.

Discussion

Additional material

The taxonomic status of two specimens of *Thalassema*, examined from the UCT collection, remains to be resolved. Both definitely belong to the genus *Thalassema* as the longitudinal and oblique muscle layers are continuous and the gonostomes are not elongate and spirally coiled. One is a juvenile specimen from Natal dredgings, collected by the UCT ecological survey of 9 September 1964. The exact locality and depth is not known. The length of the trunk is 13 mm and the proboscis, which is 8 mm long, is bilobed at the distal end. Although this specimen was already dissected, the external features were in a satisfactory condition. With the exception of the foregut and rectum the rest of the alimentary canal had been removed. However, the gonoducts, anal vesicles, ventral nerve cord and parts of the blood system were still intact. Distinguishing features of the specimen include the bilobed proboscis, a single pair of postsetal gonoducts with expanded, leaf-like gonostomes, a thin and transparent integument and the characteristic shape and distribution of the dermal papillae. Due to the poor state of the animal it is not possible to give a detailed account of the other internal organs. There seems little doubt that this specimen from Natal differs in several respects from the other species of *Thalassema* possessing a single pair of gonoducts. The bilobed proboscis seems to be a distinctive feature. A more detailed study of additional material in the future will shed more light on its taxonomic position and may well indicate that the specimen is new to science.

The other specimen from Cape Peninsula (Ref. No. CP 207) was collected on 1 November 1932. The exact locality, depth and nature of the sediment are unknown. The cylindrical trunk of this specimen is 23 mm long and the flat, ribbon-like proboscis is 12 mm in length. The proboscis is of uniform width throughout and the lateral margins are straight, smooth and free at the base. Small elliptical papillae cover the anterior and posterior ends of the trunk. At the posterior end the papillae are arranged roughly in transverse rows. A ring of larger papillae encircle the anus. Except for the setal sacs, ventral nerve cord and remains of blood vessels and gonoducts, the rest of the internal organs are macerated and in a very poor condition. A single, tubular gonoduct on the right, just posterior to the ventral seta, is in a fairly satisfactory condition. The gonoduct is white in colour and distended, probably due to the presence of gametes. Remains of some whitish tissues attached to the body wall in a position corresponding to the right gonoduct probably indicates the position of the left one. Because of the poor state of the internal organs it is not possible to make detailed comparisons with other species. Important distinguishing features of this specimen include the flat, ribbon-like proboscis, a single pair of postsetal gonoducts with small, crumpled gonostomes and the arrangement of small, elliptical papillae more or less in transverse rows on the posterior part of the trunk. The proboscis of this specimen from Cape Peninsula seems to be rather characteristic in the genus. It may represent an undescribed species, but more specimens, preferably adult, are essential for accurate taxonomic assessment.

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