SOUTHERN AFRICAN CUMACEA

by

JENNIFER A. DAY

VOLUME 1

Thesis submitted in the Faculty of Science, University of Cape Town for the degree of Doctor of Philosophy.

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SUMMARY

Several thousand cumaceans have been examined from over six hundred benthic samples collected around the coast of southern Africa (south of 20°S). The taxonomy of the families Bodotriidae, Lampropidae, Ceratocumatidae, Gynodiastylidae and Diastylidae has been studied in detail and papers on the southern African representatives of the first three families have been published in the Annals of the South African Museum. In the five families studied, seventy-five species are known in southern African waters and forty-five of these are here presented as new. There are four new genera (Alticuma, Austrocuma, Mossambicuma and Haliana). A group of six genera, Allodiastylis, Zimmeriana, Sheardia, Dicoides, Gynodiastylis and Haliana, is removed from the Diastylidae and returned to the previously-rejected family Gynodiastylidae Stebbing, 1912.

A complete synonymy is given for each species, together with a list of previous records and data on type material where this is available. All species examined by the author are described and figured.

The abundance of Iphinoe stebbingi in False Bay is positively correlated with depth, particle size and organic content of the substrate, while the abundance of Diastylis algoae correlates only with depth. These results are discussed in relation to the biology of the two species.

Analysis of breeding data suggests that Iphinoe stebbingi has a single breeding season in early spring; Diastylis algoae appears to breed throughout the year and Cumopsis robusta breeds throughout the period in which it is found intertidally, moving to deeper water during the winter to avoid the north-westerly onshore gales.

Sexual dimorphism, sex ratios and vertical migration are discussed. It is concluded that the average sex ratio of the common southern African species is about 1,5 females : 1 male and about 2,3 ovigerous females : 1 adult male. It is suggested that the difference between the ratios of

adults and of total numbers is due to the superior swimming and avoiding abilities of adult males. A preliminary analysis of a series of samples from the Great Barrier Reef in Australia shows that moonlight has a considerable influence on the number of animals caught in light-traps and that adult males are preferentially attracted to artificial lights. In the absence of artificial lighting the ratio of female to male is only slightly smaller than that anticipated by sex ratios alone. Thus it is not only adult males which migrate vertically.

The biogeographic distribution of each family is discussed in some detail. It is concluded that the Bodotriidae form a negatively-amphipolar, essentially shallow-water family, the Gynodiastylidae a shallow-water Indo-west-Pacific family, the Lampropidae a deep and/or cold-water family and the Diastylidae a cosmopolitan eurybathal family with a slight tendency to amphipolarity, being found mainly in temperate latitudes. The Ceratocumatidae are poorly-known but appear to form a deep-water Atlantic family.

The degree of endemism is extremely high (89%) in southern African waters, although further collections from the east coast of Africa should extend the distribution records of many species. Certain affinities are shown with the fauna of the Indo-west-Pacific and the central and north-eastern Atlantic.

Distribution of Cumacea in southern Africa indicates the presence of three faunistic provinces in waters shallower than 200 m. These are a subtropical tropical Natal Province with its south-western limit between 33°S 27°E and 31°S 29°E, a warm-temperate Agulhas Province extending to the vicinity of the Cape Peninsula and a cool-temperate Namaqua Province on the western Cape coast. There is some slight evidence that the northern limit of the Namaqua Province lies in the region of 16 - 18°S. It is suggested that below 200 m provincial boundaries are indistinct and that in fact separate provinces may not exist at these depths.

The phylogeny and evolution of Cumacea are discussed briefly and a phylogenetic tree is constructed.

SOUTHERN AFRICAN CUMACEA

INTRODUCTION

The aim of this study was to investigate the systematics and biology of southern African Cumacea, based largely on material hald by the Zoology Department of the University of Cape Town, the South African Museum and the National Institute for Water Research of the Council for Scientific and Industrial Research.

As is often the case, the systematic work proved more time-consuming than anticipated, and as a result the taxonomy of only five of the eight cumacean families has been completed. The taxonomic studies are presented as three published papers and a manuscript, and constitute Parts 1 to 4 of this thesis.

The data, collected from a number of different sources with different gear over a long period (1900 - 1977), is largely inadequate for studies on the general biology of the group. Thus the last part of the thesis (Part 5: 'Aspects of Cumacean Biology') is largely a review of the scanty literature on cumacean biology, although an attempt has been made wherever possible to use data obtained from the material available to me.

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SOUTH AFRICAN CUMACEA

PART 1

FAMILY BODOTRIIDAE, SUBFAMILY VAUNTHOMPSONIINAE

By

JENNIFER DAY

Cape Town Kaapstad

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SOUTH AFRICAN CUMACEA

PART 1
FAMILY BODOTRIIDAE, SUBFAMILY VAUNTHOMPSONIINAE

By

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Zoology Department, University of Cape Town

(With 15 figures and 1 table)

[*MS accepted 21 June 1974*]

CONTENTS

INTRODUCTION

This is the first in a series of papers on the Cumacea of southern Africa (south of 20°S). The families best represented in these waters are the Bodotriidae and Diastylidae. There are relatively few Leuconidae, Lampropidae and Nannastacidae, while the Pseudocumatidae are numerous, but confined almost exclusively to estuaries, where there are perhaps two species. There are also further specimens of the Ceratocumatidae to be described in a later paper in the series.

Studies on the cumacean fauna of southern African waters are scanty. Stebbing published two papers (1910, 1912) on material sent to him by the South African Museum, mainly describing specimens collected during the voyages of the s.s. *Pieter Faure* from 1898 to 1907. Zimmer (1908) included several South African species in his descriptions of the Deutsches Tiefsee-Expedition material,

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and later (1921) described a few in the collection of the Zoologisches Museum, Berlin. Since then, Fage (1951) and Jones (1956) have described a few species from this region in the collections of the Belgian Oceanographic Expedition and Atlantide series respectively, and Hale (1953) and Jones (1960) have published on some of the material in the collection of the University of Cape Town. Otherwise, the cumacean fauna of the region is poorly known.

MATERIAL

Some of the more interesting specimens were kindly loaned by Dr Brian Kensley of the South African Museum (SAM)—largely material obtained by the s.s. *Pieter Faure*, which is old and therefore frequently decalcified and damaged. Two specimens of *Vaunthompsonia natalensis* were sent to me by Mr Tim McClurg from the Natal Benthic Survey being carried out by the National Institute for Water Research (NIWR) of the Council for Scientific and Industrial Research (CSIR). The vast majority of specimens, however, was obtained by the Zoology Department of the University of Cape Town (UCT) during an extensive benthic survey of inshore waters from Lüderitzbucht in South West Africa to Inhambane in Moçambique, the cruises being funded by the Oceanographic Research Unit of the CSIR. I am particularly grateful for access to this material.

STATION DATA

The UCT material is numbered according to the area from which it was obtained: WCD (West Coast Dredge) from the border of South West Africa to Cape Agulhas, LBT from the Lambert's Bay Transect, FAL from False Bay, SCD (South Coast Dredge) from Cape Agulhas to the southern border of Natal, NAD (Natal Dredge) from Natal waters, and PED (Portuguese East Dredge) from Moçambique (Fig. 1). 'Coast' indicates material from the NIWR survey, and 'SAM', South African Museum material. The depths and positions of all SAM (*Pieter Faure*) stations have been approximated from charts, since the station data are sketchy, and many depths are not given, or are inaccurate.

METHODS

All the SAM and NIWR material was obtained by dredging. In the UCT survey, heavy-duty dredges and Van Veen grabs of area 0,2 m^2 were used. Some of the LBT material was obtained using a scuba-diver-operated suction device (Christie & Allen 1972). The instrument is a cylinder sampling an area of 0,1 m^2 by 60 cm deep, which is lowered right into the substrate. Different fractions of substrate may then be collected, enabling analysis of fractions from different levels below the surface. The cumaceans were all obtained in the top 10 cm fraction.

Length measurements were in all cases taken from the most anterior point of the carapace to the posterior edge of the telsonic somite, the uropods being omitted from these measurements.

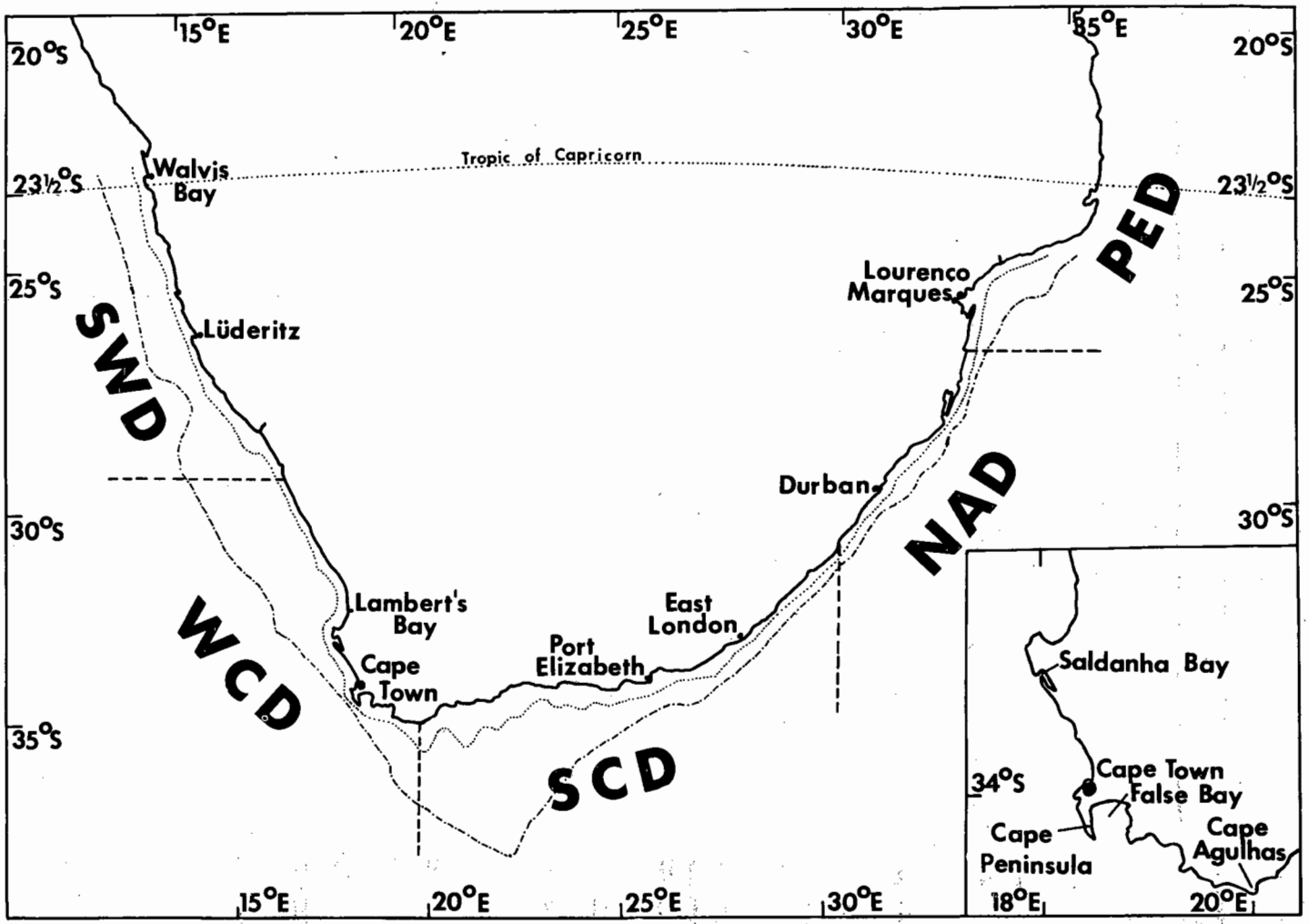

Fig. 1. Southern Africa south of 20°S: ..... 100 m depth contour; _____ 500 m depth contour.
Inset: south-western Cape.

STRUCTURE AND TERMINOLOGY

The terminology used by authors who are familiar with a group is frequently confusing to those who are dealing with it for the first time. Below is a brief account of the structure of the Cumacea, and the terminology used to describe it. For a fuller description, the reader is referred to Jones (1963), whose terminology is adopted in the present series, particularly in the use of the term 'somite' as a metameric segment of the body, and 'segment' as a podomere of the appendages.

The Cumacea are typical Malacostraca, having 19 body segments or *somites*, each of which may bear a pair of appendages. The *head* region consists of five somites, bearing from the anterior end two pairs of antennae, a pair of mandibles and two pairs of maxillae. There are eight *thoracic somites*, the anterior three bearing maxillipeds, and the posterior five (the *pedigerous somites*) bearing pereiopods. The *abdomen*, of six *pleon somites*, may have up to five pairs of pleopods in the male, and none in the female. The sixth abdominal somite bears a pair of uropods. A *telson* is present in some families, and in others it is fused with the last abdominal somite which is known as the *telsonic somite*.

A well-developed *carapace* is present, fused not only to all five head somites, but also to three, four, five or six thoracic somites. It is bowed laterally to cover the branchial chambers, and is produced anteriorly to form *pseudorostral lobes*, below which is the exhalent opening of the branchial chamber. The two lobes together are known as the *pseudorostrum*. Antero-laterally the carapace is frequently notched to accommodate the first antenna—the *antennal notch*—with a sharp point, the *antero-lateral angle*, below it. Dorsally, if visual elements are present, they are usually fused into a single median *eye*, frequently pigmented, with a variable number of lenses. The eye is situated on the *eyelobe*, a median projection of the carapace anteriorly between the pseudorostral lobes. The carapace may be quite smooth, but is often ornamented with tubercles, spines or other projections, or is sculptured into median and/or lateral keels or *carinae*. The free thoracic and abdominal somites may also be carinate.

APPENDAGES

Antenna 1 (antennule) consists of three basal segments bearing two flagella. The main *flagellum*, of up to six segments, carries a number of sensory filaments or *aesthetascs*, which are usually annulated. The *accessory flagellum* may have up to four segments, or may be wanting.

Antenna 2 is rudimentary in the female, but may reach the entire length of the body in the male, where it may be used for sensing the presence of the female, or for clasping her during copulation.

Mandibles are formed from a single segment, and are normally crescent-shaped.

Maxilla 1 (maxillule) is rudimentary, but may bear one or two epipodal filaments reaching into the branchial chamber.

Maxilla 2 (maxilla) is also rudimentary.

The *thoracic appendages* are typical stenopodous limbs. *Exopods*, some of which may be rudimentary, are always found consecutively on at least two of these limbs from maxilliped 3 to pereiopod 4 inclusive. The maximum number is five, and there are usually more in the male than the female. The exopods consist of a *basal segment*, sometimes expanded into a laminar plate, and a variable number of distal segments which usually carry long plumose setae. Well-developed exopods assist considerably in swimming. The *endopod* of a thoracic appendage is typically divided into seven *segments*. These are named (from the proximal end) the *coxa*, *basis*, *ischium*, *merus*, *carpus*, *propodus* and *dactyl*.

Maxilliped 1 normally consists of a seven-segmented endopod and an epipodite developed into a series of plates or lobes which function as the *gill*.

Maxilliped 2 is also normally seven-segmented. The coxa of ovigerous females is produced to form a *rudimentary oostegite*, bearing filaments which extend into the brood chamber and fan the developing embryos.

Maxilliped 3, always seven-segmented, usually bears a well-developed exopod. The outer distal portion of the basis is frequently expanded, and the basis forms a shield protecting the mid-ventral region of the thorax.

Pereiopod 1, always bearing an exopod, is seven-segmented, and is frequently elongated, reaching beyond the anterior end of the pseudorostral lobes.

Pereiopods 2 to 5 may or may not bear exopods, and are normally seven-segmented, although in some genera the ischium of pereiopod 2 is fused with the basis.

The male may bear up to five pairs of biramous *pleopods*. These may be rudimentary, but if fully developed consist of a basal segment, a 1-segmented *inner ramus* and a 2-segmented *outer ramus*. The distal ends of the rami are frequently supplied with a large number of plumose setae used in swimming.

The *uropods*, also biramous, consist of a 1-segmented *peduncle*, a 2-segmented *exopod* and an *endopod* which may consist of one, two or three segments. These appendages form the forked tail characteristic of all Cumacea.

SEXUAL DIMORPHISM

The Cumacea exhibit considerable sexual dimorphism. The sexual differences include small details such as the sculpturing and degree of armature of the exoskeleton, but most other more basic differences can be attributed to characters allowing greater swimming capacity in the male, and the presence of a *marsupium* or brood pouch in the female. Distinguishing male from female is important, since several characters of the males of some genera are the same as the female characters of another. Determination of sex is not always easy, especially in an immature animal, but the following may be helpful as a guideline:

The *adult male* has between zero and five pairs of pleopods, usually setiferous, and the second antennae extend a considerable distance along the body. Thoracic exopods are frequently flattened and expanded, the antero-lateral angle rounded or obliterated, and serrations of the carapace reduced or absent.

The *subadult male* has a full complement of pleopods, not yet setiferous, and the second antennae are still developing. Sculpturing of the exoskeleton is often midway between the condition of the adult male and the female.

The *ovigerous female* is distinguished by the presence of a *marsupium*. The coxae of maxilliped 3 and pereiopods 1 to 3 develop *oostegites*, forming a large ventral brood chamber in which the eggs are visible during the later stages of development.

The *adult female* differs from an ovigerous one only in the absence of a marsupium.

The *manca*, the larval stage at which the animals are released from the marsupium, is characterized by the absence of the last pair of pereiopods.

The *juveniles* may be recognized, apart from their small size, by the absence of sexual dimorphism.

The majority of *males* and *females* in most collections are intermediate between the fully adult and juvenile stages, and although some sexual differences are present, they are not always easily determined. For example, in many bodotriids, the lateral plates of the pedigerous somites differ even in young males and females. However, this type of character is variable, and must be determined anew for each genus or species. One distinguishing characteristic which holds true for many (but not all) genera is that the male tends to have more pereiopods bearing exopods than does the female.

SYSTEMATICS

The Cumacea, being a rather homogeneous group, have few characters which divide them obviously into families. Thus two main schemes have been used to separate them. The one, detailed by Stebbing in 1913, now has 27 families. The other more commonly adopted scheme has seven families. Although neither of these systems is ideal, the latter is less cumbersome and will be adopted in the present series of papers.

Family **Bodotriidae** Scott, 1901

Diagnosis

No free telson. Pleopods with an outer process to the inner ramus—usually five pairs, but may be two (*Mancocuma*) or three (*Leptocuma*). Mandibles normal (i.e. not broad at base). Endopod of uropod 1- or 2-segmented. Branchial apparatus without gill plates or supports.

The family was divided by Hale (1944) into two subfamilies, the Bodotriinae and Vaunthompsoniinae. The Bodotriinae are characterized by having exopods limited to the third maxillipeds and first pereiopods in both sexes. The South African representatives of the subfamily will be dealt with in the second paper of this series.

Subfamily **Vaunthompsoniinae** G. O. Sars, 1879

Diagnosis

Bodotriidae with exopods on pereiopods other than the first pair.

KEY TO THE SOUTH AFRICAN SPECIES OF VAUNTHOMPSONIINAE

It should be noted that this key will separate all species found to date in southern African waters, but will *not* necessarily distinguish them from species from other areas.

1 Exopods present on pereiopods 1 and 2 only (♂ and ♀)..... *Pseudosympodomma africanum* (Fig. 2)
– Exopods present on pereiopods 1 to 3 (♂ and ♀).....2

2 Exopods of pereiopods 2 and 3 rudimentary.....3
– Exopods of pereiopods 2 and 3 well-developed; ♂ with exopod on pereiopod 4.....5

3 Maxilliped 3 with basis not at all produced distally..*Cumopsis robusta* sp. nov. (Figs 5, 6)
– Maxilliped 3 with basis produced distally.....4

4 Pereiopods 2 and 3 with exopods 1-segmented.....*Heterocuma africanum africanum*
– Pereiopods 2 and 3 with exopods 2-segmented..... *Heterocuma africanum intermedium* (Figs 3, 4)

5 Maxilliped 3 with basis not at all produced distally.....6
– Maxilliped 3 with basis produced distally.....9

6 Eye absent; carpus of maxilliped 3 inserted half way along length of merus; merus expanded externally ..... *Hypocuma dentatum* sp. nov. (Figs 7, 8)
– Eye present; carpus of maxilliped 3 not expanded, and inserted at distal end of merus....7

7 Serrated middorsal carina present in ♀.....*Vaunthompsonia cristata*
– No middorsal carina present in female.....8

8 Merus of maxilliped 3 longer than carpus; first segment of exopod of uropod less than half length of first segment of endopod.....*Vaunthompsonia natalensis* sp. nov. (Figs 9, 10)
– Merus of maxilliped 3 shorter than carpus; first segment of exopod of uropod nearly as long as first segment of endopod.....*Vaunthompsonia* sp. (Fig. 11)

9 Carapace of ♂ and ♀ with middorsal serrations; telsonic somite produced between uropods for at least ⅓ its length 10
– Carapace of ♀ at least with no middorsal serrations; telsonic somite little produced between uropods.....*Bathycuma datum* sp. nov. (Fig. 15)

10 Peduncle of uropod longer than telsonic somite; antenna 1 of adult ♂ very large, with many setae ..... *Bathycuma natalense* (Figs 13, 14)
– Peduncle of uropod shorter than telsonic somite; antenna 1 of ♂ unmodified..... *Bathycuma capense* (Figs 12, 13)

Pseudosympodomma Kurian, 1954

Generic diagnosis

Eyelobe narrowly linguiform with a cluster of lenses anteriorly—more in male than female. Pseudorostral lobes extending anteriorly but not meeting in front of elongated eyelobe. All pedigerous somites exposed. Basis of maxilliped 3 distally produced. Pereiopods 1 and 2 with free exopods in both sexes; adult male sometimes with a small ridge in position of exopod of pereiopod 3. Male with five pairs of pleopods. Endopod of uropod 2-segmented.

Type species *P. indicum* Kurian, 1954, from India, 'in weeds, 0,2 fm'.

*Pseudosympodomma africanum** (Stebbing, 1912)
Fig. 2

Sympodomma africanus Stebbing, 1912: 138, pl. L.
non *Sympodomma africanum:* Hale, 1928: 40, figs 9–10; 1944: 284, fig. 30.

Records

SAM A4331,	*Pieter Faure* 10782:	29°49′S/31°08′E	85 m	1♀	10,9 mm	
SAM A597,	*Pieter Faure* 17643:	34°24′S/17°58′E	370 m	1♀ adult	15,7 mm	PARATYPE
SAM A598	*Pieter Faure* 17643:	34°24′S/17°58′E	370 m	1♂ subadult	15,7 mm	
PED 23 X	22.8.1964	26°00′S/33°05′E	135 m	1 manca	4,3 mm	

Note: In his description of *S. africanum*, Stebbing gave the depth as 805 m. In fact, if the distance of 12½ miles from Cape Natal (*Pieter Faure* log) is correct, then the depth can be no more than 400 m in any direction, according to present-day charts. The bearing also appears to be the reciprocal of the normal bearings in the log, as 'Cape Natal N 3/4 E 12½ miles' is practically in the surf zone.
Holotype designated by Stebbing (1912) as *Sympodomma africanus*, *Pieter Faure* 17643 (as above), subadult male, 18,0 mm. British Museum (Natural History).

Description

Adult female, length 15,7 mm, paratype. Broken in two, but otherwise undamaged.

Carapace faintly tubercular, nearly twice as long as deep; median carina with three very large, anteriorly-directed teeth on the anterior part (Fig. 2A). Eye present, lenses distinct—seven above and seven below (Figs 2B, 2C). Eyelobe elongated, pseudorostral lobes not meeting. Antennal notch fairly shallow, semicircular; antero-lateral angle almost rectangular. All pedigerous somites visible above. Sternite of fourth pedigerous somite with anteriorly-directed tooth. Carapace as long as free thoracic somites. Cephalothorax equal in length to first four abdominal somites. Pedigerous somites with faint lateral carinae; two pairs of lateral carinae along length of abdomen. Telsonic somite produced between uropods for nearly ⅓ its length.

Antenna 1 (Fig. 2D) geniculate between segments 1 and 2. First segment large, slightly expanded laterally, equal in length to next two segments. Flagellum 2-segmented with two terminal setae. Accessory flagellum 2-segmented, equal in length to first segment of flagellum.

Maxilliped 3 (Fig. 2E) with basis 2½ times length of remaining segments, widely expanded at distal end, with four spines along the outer edge and two apical ones. Inner edge with a row of small denticles along its length. Remaining segments almost equal in length, ischium slightly the longest. Merus expanded slightly externally and carpus internally. Exopod small, basal segment less than ⅓ length of basis.

*The words 'omma' (Gr.), an eye, and 'cuma' (Gr.), an embryo, are grammatically neuter, hence *Pseudosympodomma africanum*, *Bathycuma natalense*, etc.

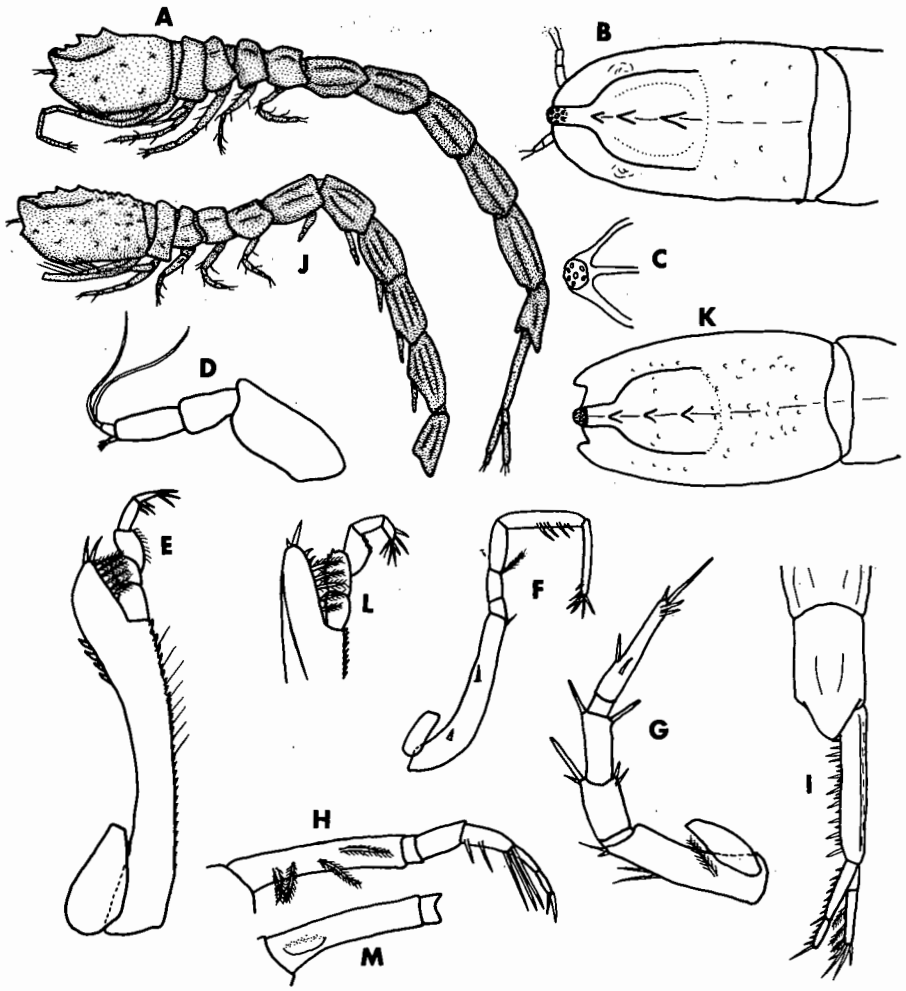

Fig. 2. *Pseudosympodomma africanum* (Stebbing, 1912)

Adult female, paratype, 15,7 mm: A, lateral view; B, dorsal view of carapace; C, ventral view of eyelobe; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

Subadult male, 15,7 mm: J, lateral view; K, dorsal view of carapace; L, distal portion of maxilliped 3; M, proximal segments of pereiopod 3.

Pereiopod 1 (Fig. 2F) fairly stout. Basis equal in length to next four segments. Ischium short. Propodus and dactyl long, subequal, each equal in length to merus plus carpus. Exopod small, basal segment not much more than a quarter length of basis.

Pereiopod 2 (Fig. 2G) stout. Basis equal in length to next four segments. Ischium $\frac{1}{3}$ as long as broad. Merus and carpus subequal. Dactyl equal to merus

plus carpus and bearing a number of scattered spines. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopod 3 (Fig. 2H) more slender. Basis equal in length to rest of leg. Ischium small, half as long as broad. Merus and carpus subequal. Carpus just longer than propodus, which is again slightly longer than dactyl. No exopod.

Peduncle of uropod (Fig. 2I) just longer than telsonic somite with 20 unequal spines along inner edge. Endopod slightly longer than exopod and about $\frac{2}{3}$ length of peduncle; first segment twice length of second, with eight small spines on inner margin, second with four, and one terminally. Exopod with first segment half the length of second, and unarmed. Second segment with three plumose setae on the inner margin and four terminal spines.

Subadult male, length 15,7 mm. In poor condition, uropods and parts of some thoracic appendages missing. As in the female, except as follows: teeth on middorsal carina less elevated, and followed by a row of uneven tubercles, the dorsal outline thus appearing uneven. Tubercles scattered over the rest of the carapace (Figs 2J, 2K). Antennal notch much shallower, antero-lateral angle less obvious. Ventral margin faintly dentate below the angle for about $\frac{1}{3}$ its length. Sternites of fourth and fifth pedigerous somites with an anteriorly-directed tooth in the midline. Abdominal somites with three pairs of carinae.

Distal prolongation of maxilliped 3 (Fig. 2L) narrower than in female, with four distal spines. Inner edge more spinous. Merus and carpus further expanded, these edges dentate.

Pereiopods as in female. Pereiopod 3 (Fig. 2M) without a free exopod, but with a slight swelling along the outer edge of the basis for about $\frac{1}{3}$ its length.

Five pairs of pleopods present.

Uropods missing. Telsonic somite of holotype male broader than that of female. Stebbing's figure of uropods of holotype as in female of present collection, but with greater armature.

Remarks

Stebbing (1912) described the species from a single subadult male, and the above specimens differ from his description only as follows: carapace of holotype less tubercular; distinct individual lenses present in eye of female, but eye of male as figured by Stebbing. Maxilliped 3 of holotype with merus and carpus slightly more expanded, with setae and not denticles along expanded edges. Stebbing figured the basal segment of antenna 1 as geniculate. The antennae of the holotype are missing, but in the present specimens the antenna is geniculate between the first and second segments.

In 1912 Stebbing erected a new family, the Sympodommatidae, with the single genus *Sympodomma* to receive four species—*Vaunthompsonia anomalum* (G. O. Sars, 1871), *Heterocuma weberi* Calman, 1905, *Heterocuma diomedaea* Calman, 1912 and a new species, *Sympodomma africanum*. The main distinguishing feature of the new family and genus was the presence of exopods on pereiopod 3 in both sexes. These were obviously present (according to descriptions in

the literature) in the first three species, but he says of *S. africanum* (one subadult male) that: 'exopods to the third pair were not satisfactorily made out, but may be presumed, as they occur in both sexes of the allied Japanese species.'

In addition to the holotype, I have examined four specimens which undoubtedly belong to Stebbing's *S. africanum*. One is a paratype, a subadult female, from the type locality with the same station data and museum number as the holotype. Another specimen, a subadult male from the same locality but with different station data, has a swelling in the expected position of the exopod of pereiopod 3, but this is fused to the basis along its entire length. Unfortunately the holotype now consists of little more than an empty carapace, three badly damaged and limbless thoracic somites and several abdominal somites, so that the pereiopods in question could not be examined. Neither of the females nor the manca had the slightest trace of an exopod on these limbs.

In 1954 Kurian erected a new genus, *Pseudosympodomma*, to receive a new Indian species, *P. indicum*, which has exopods on pereiopods 1 and 2 only in both sexes. He suggested that *Sympodomma africanum* might be referable to the new genus. Owing to the lack of an exopod on pereiopod 3 of the present specimens, Stebbing's *S. africanum* must now be referred to the genus *Pseudosympodomma*.

The two species of the genus may be distinguished as follows: the pseudorostral lobes and eyelobes of *P. indicum* are relatively longer than those of *P. africanum*. *P. indicum* has a 3-segmented accessory flagellum, while that of *P. africanum* is 2-segmented. In *P. indicum* the exopod of maxilliped 3 is less than a quarter the length of the basis; the prolongation of the basis is narrower and extends well beyond the merus. The last two segments of the first pereiopod are longer and more slender. The two segments of the endopod of the uropod are subequal, the two rami are of equal length, and the first segment of the exopod is only a quarter the length of the second. In the description of *P. indicum*, no mention is made of the teeth on the sternites of the pedigerous somites.

The two genera *Sympodomma* and *Pseudosympodomma* are very similar in general appearance, in distinctive features such as the large teeth or incisions on the dorsal carina, and the presence of teeth on the thoracic sternites of several species. Thus the genera are closely related, and the single feature distinguishing between them is the presence or absence of exopods on pereiopod 3. In the female this is quite clear, but in the male even this character is less distinctive due to the small protuberances on the bases of these legs. Thus the generic diagnosis of *Pseudosympodomma* has been expanded to accommodate *P. africanum*.

It should also be noted that Hale (1928, 1944, 1949) had some specimens which he considered to be *S. africanum*. Later, being unable to obtain more material, he erected a new species, *Sympodomma ?incerta* Hale, 1949. It is very similar to *P. africanum* in external appearance, but due to the presence of an obvious exopod on pereiopod 3 of the male, Hale's query may be removed, and the species becomes *Sympodomma incertum*.

Distribution of Pseudosympodomma

P. indicum is found in shallow Indian waters (Kurian 1954), and *P. africanum* from Natal to Cape Point at depths from 85 to 370 m. Thus the genus falls into the Indo-Pacific faunal group.

Heterocuma Miers, 1879

Generic diagnosis

Vaunthompsoniinae with the first pedigerous somite visible dorsally. Telsonic somite not produced. Eye present. Basis and merus of maxilliped 3 distally produced. Pereiopods 2 and 3 with rudimentary exopods in both sexes. Endopod of uropod 2-segmented. Male with five pairs of pleopods.
Type species *H. sarsi* Miers, 1879, from Korea and Japan.

KEY TO THE SPECIES OF *HETEROCUMA*

1 Pereiopods 2 and 3 with exopods 2-segmented.....
H. africanum intermedium (Fage, 1924)—West and South Africa
– Pereiopods 2 and 3 with exopods 1-segmented.....2
2 Pleon segments carinate.....3
– Pleon segments not carinate.....4
3 First segment of endopod of uropod shorter than second.....
H. sarsi Miers, 1879—Korea and Japan
– First segment of endopod of uropod longer than second..*H. andamani* Kurian,1954—India
4 Endopod of uropod distinctly shorter than peduncle.....
H. africanum africanum Zimmer, 1921—India, West and South Africa
– Endopod of uropod just longer than peduncle.....*H. armatum* Kurian, 1954—India

Heterocuma africanum intermedium (Fage, 1924) n. comb.

Figs 3 (♀), 4 (♂)

Heterocuma intermedia Fage, 1924: 364, fig. 1.
Heterocuma africana: Jones, 1956: 194 (?pars); 1960: 172.

Records

WCD 99 R	32°05′S/18°17′E	2.7.1961	27 m	Sandy shell	1♂ adult	18,4 mm
SCD 151 C	34°55′S/21°26′E	21.2.1960	91 m	Sand	1♀ adult	19,1 mm
					1♀ ovig.	24,8 mm
SCD 293 F	33°04′S/27°57′E	6.2.1962	84 m	Sandy shell	1♀ ovig.	22,4 mm
FAL (False Bay)	34°S/18°E		15–77 m	Sandy shell	15 records:	
					2 adult ♂	18,2–18,4 mm;
					1 subadult ♂	19,3 mm;
					2♂	7,9–9,4 mm;
					3♀ ovig.	19,2–23,2 mm;
					8♀ adult	17,6–21,6 mm;
					5♀	7,4–11,0 mm;
					5 manca	4,0–5,8 mm (1 adult ♂, 1 ♀ ovig. and 2 ♀ adult identified by Jones 1960)

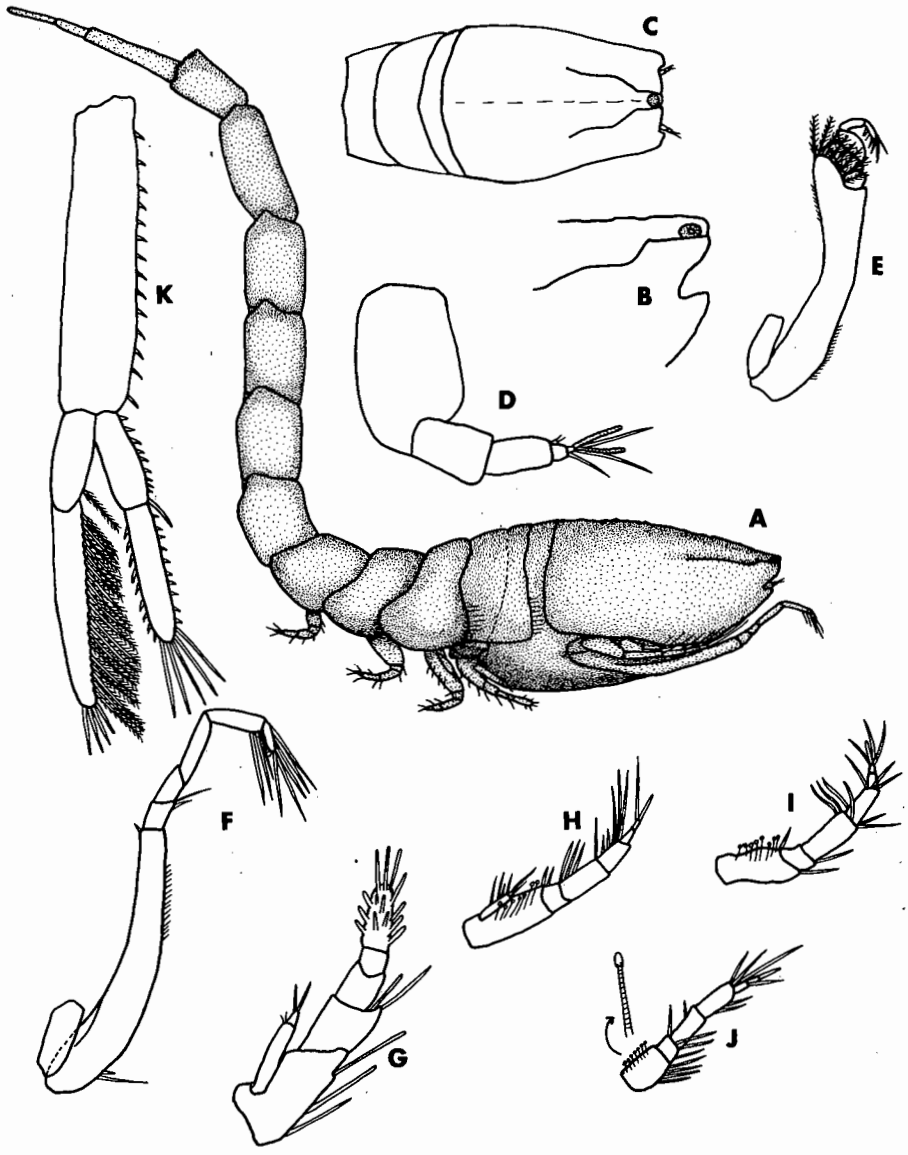

Fig. 3. *Heterocuma africanum intermedium* (Fage, 1924)
Ovigerous female, 23,2 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, pereiopod 5; K, uropod.

Holotype designated by Fage (1924) as *Heterocuma intermedia*; Museum National d'Histoire Naturelle, Paris.

Description

Ovigerous female, length 23,2 mm. Carapace twice as long as deep with a faint mid-dorsal carina. In lateral view (Fig. 3A), mid-dorsal line irregular and faintly arched posteriorly. Antennal notch deep, antero-lateral angle acute (Fig. 3B). Carapace just shorter than remaining free thoracic somites. Thorax and abdomen subequal. No lateral plates or carinae on abdomen. Eye present with single lens faintly visible on either side. Pseudorostral lobes not meeting anterior to eyelobe (Fig. 3C).

Antenna 1 (Fig. 3D) with basal segment very much expanded, being twice as long and twice as broad as second segment. Second and third segments subequal, second broader. Flagellum 2-segmented, first twice as long and as broad as second which carries a number of terminal setae and two aesthetascs. Accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 3E) with well-developed broad distal prolongation of the basis. Ischium normal, merus dilated externally and carpus internally. Propodus and dactyl subequal. Basal segment of exopod less than a quarter length of basis.

Basis of pereiopod 1 (Fig. 3F) a quarter as long again as rest of leg. Ischium and merus subequal, as are carpus and propodus. Dactyl half length of propodus. Basal segment of exopod about a quarter length of basis.

Pereiopod 2 (Fig. 3G) very stout—basis half as long as broad. Ischium fused with basis. Dactyl with a large number of spines. Exopod large, as long as the basis, with a small but obvious second segment.

Pereiopod 3 (Fig. 3H) more slender, with exopod half length of basis, and having a small second segment.

Pereiopods 4 and 5 (Figs 3I and 3J) without exopods. Third to fifth pereiopods all furnished with distinctive knobbed setae on the bases.

Peduncle of uropods (Fig. 3K) half as long again as telsonic somite, with one row of 14 small spines on the inner edge. Exopod equal in length to peduncle, with first segment half as long as second. First with a single plumose seta, second with about 20, and four short terminal spines. Endopod $\frac{4}{5}$ length of peduncle, first segment about $\frac{3}{4}$ length of second with nine small and one large terminal spines on the inner edge. Second segment with 9–10 small spines on inner and outer edges, and five terminal spines of equal length.

Note: a single female from False Bay has a particularly well-marked row of tubercles on the mid-dorsal line of the carapace, and carinae running down the length of the abdomen on either side of the mid-line. Otherwise it corresponds with the above description.

Adult male, length 18,4 mm. As the female, except as follows: carapace with much less deeply indented antennal notch, antero-lateral angle almost obsolete (Fig. 4B). Thorax equal in length to next five abdominal somites (Fig. 4A). As is typical for the family, the thoracic sideplates are well developed, that of the

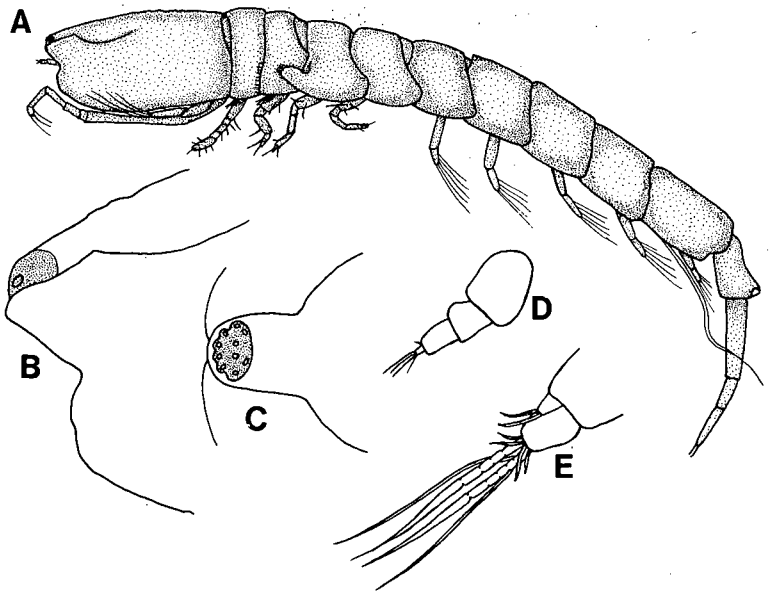

Fig. 4. *Heterocuma africanum intermedium* (Fage, 1924).
Adult male, 18,4 mm: A, lateral view; B, detail of anterior end of carapace; C, detail of eyelobe in dorsal view; D, antenna 1; E, distal segments of antenna 1.

fourth pedigerous somite having a prominent linguiform anterior projection. The armature of the peduncle of the uropods is more pronounced, having about 50 small, closely-packed spines in two rows along the inner edge. The single subadult male from the west coast differs from the adult males only in that the thoracic sideplates and uropodal armature are not fully developed, and the eye has 10 distinct lenses on the dorsal surface (Fig. 4C). Antenna 1 (Fig. 4D) is somewhat shorter in the male, and the flagellum is 1-segmented (Fig. 4E).

Distribution

Tropical West Africa (Fage 1924, 1950, 1951; Jones 1960—part); False Bay and south-west coast of South Africa (Jones 1960).

Heterocuma africanum africanum Zimmer, 1921

Heterocuma africana Zimmer, 1921: 129, figs 25–27. Kurian, 1954: 294, fig. 7.

Records

NAD 86 G	29°10′S/31°51′E	29.7.1964	43 m	Sand	2 ♀ adult 1 ♂	10,4–11,2 mm; 6,8 mm

Holotype designated by Zimmer, 1921 from West Africa, one subadult male. ?Zoologisches Museum, Berlin.

Description

The single sample from Natal is of interest in that although generally the specimens are very similar to *H. africanum intermedium*, they have short, 1-segmented exopods on pereiopods 2 and 3. The eyes of the single male and both females have lenses similar to those shown in Figure 4C. Although the females are adult, they are only about half the size of comparable specimens from False Bay. The carapace has no trace of a carina.

Distribution

Tropical West Africa (Zimmer 1921; Jones 1956—part); India (Kurian 1954); Natal.

Remarks

Heterocuma africanum was described but poorly figured by Zimmer (1921) from an immature specimen collected together with many juveniles from Freetown in Sierra Leone. Fage (1924) described *H. intermedium* from Rio do Oro, from Goreé (1950) and from Darsen and Annobon Islands (1951). Jones (1956) examined many specimens from the coast of West Africa, and equated Fage's *H. intermedium* with *H. africanum* due to the fact that Zimmer obviously described the latter from an immature specimen. More recently, Jones (1960) identified several specimens (now in the present collection) from False Bay and Dassen Island as *H. africanum*. These are indicated in the records above. Undoubtedly the two forms are very similar in most respects, but they are in fact distinguishable by the nature of the exopods of the second and third pereiopods. In Zimmer's specimen, they were 'in the form of short cylinders', while Fage (1924) specifically mentions 'the greater size and the division into two articles of the exopods of the second and third pereiopods'. Kurian (1954) identified two adult specimens (7–8 mm) as *H. africanum*, and both of these are figured as having short, 1-segmented exopods. The majority of the South African specimens have larger, 2-segmented exopods, while the exopods of those from Natal are smaller and 1-segmented. Jones (1956, 1960) mentioned the differences in size of some of the West African specimens, and the fact that those from South Africa are very large, but did not describe the exopods. In fact there is correlation between the size of the animals and the nature of the exopods. Those with 1-segmented exopods are smaller—Zimmer's largest was 4 mm, Kurian's 7–8 mm, and the Natal specimens reach 11,2 mm. Those with the bigger 2-segmented exopods are also larger in size—Fage's 16 mm, and the largest of the present specimens nearly 25 mm. The fact that 1-segmented exopods are present in adult animals from both India and Natal shows that this is not an age-dependent character, and it is therefore suggested that there are two distinct forms, insufficiently different to warrant specific rank. Those of Zimmer and Kurian, together with the NAD specimens are therefore designated *H. africanum africanum*, as opposed to those of Fage and Jones, and the majority of the specimens in the present collection, which become *H. africanum intermedium*.

Note: the size differences of the specimens identified by Jones (1956) in West Africa suggest that both forms may occur there.

Distribution of Heterocuma

H. sarsi, *H. armatum* and *H. andamani* are all shallow-water Indian Ocean or Indo-Pacific species. The two subspecies of *H. africanum* extend the range to the tropical Atlantic region.

Cumopsis G. O. Sars, 1878

Generic diagnosis

Vaunthompsoniinae with rudimentary exopods on pereiopods 2 and 3 in both sexes. Antenna 1 of male with a brush of sensory setae at base of flagellum. Basis of maxilliped produced distally very slightly or not at all, carpus not widened. Male with five pairs of pleopods. Telsonic somite truncate posteriorly, and not produced between the uropods. Endopod of uropod 2-segmented.
Type species *C. longipes* (A. Dohrn, 1869) as *Cuma longipes* from British Isles and Mediterranean.

KEY TO THE SPECIES OF *CUMOPSIS*

1 Dorso-lateral folds present 2
– Dorso-lateral folds absent 3

2 Two distinct lateral folds; carapace flattened dorsally ..... *C. goodsiri* (Van Beneden, 1861)—Europe, Indo-Pacific
– A single lateral fold; carapace convex dorsally ..... *C. wafri* Jones, 1956—West Africa

3 Thoracic sideplates well defined dorsally ..... *C. elongata* Jones, 1956—West Africa
– Thoracic sideplates not defined dorsally 4

4 Peduncle of uropod twice length of rami 5
– Peduncle of uropod only slightly longer than rami ..... *C. robusta* sp. nov.

5 First segment of exopod of uropod longer than second ..... *C. fagei* Băcescu, 1956—W. France, Morocco
– First segment of exopod of uropod shorter than second ..... *C. longipes* (A. Dohrn, 1869)—Britain and Mediterranean

Cumopsis robusta sp. nov.

Figs 5 (♀), 6 (♂)

Records

LBT 5H	15.9.1970	32°04′S/18°18′E	3 m	Sand	1 ♀ ovig.	3,7 mm	HOLOTYPE
LBT 8L	15.9.1970	32°04′S/18°18′E	5 m	Sand	1 ♂ adult	4,0 mm	
LBT 105F	30.1.1972	32°04′S/18°18′E	LWS	Sand	5 ♀ ovig.	3,7–4,8 mm	
LBT 144A	Sept. 1972	32°04′S/18°18′E	LWS	Sand	2 ♀ ovig.	3,7–4,2 mm	
LBT 146E	Sept. 1972	32°04′S/18°18′E	1 m	Sand	1 ♂ subadult	3,6 mm	
LBT 147G	Sept. 1972	32°04′S/18°18′E	1 m	Sand	1 ♀	3,5 mm	
CP 833A	May 1972	False Bay (34°S/18°E)		Sand	1 ♀ ovig.	4,4 mm	
					1 ♀	3,2 mm	

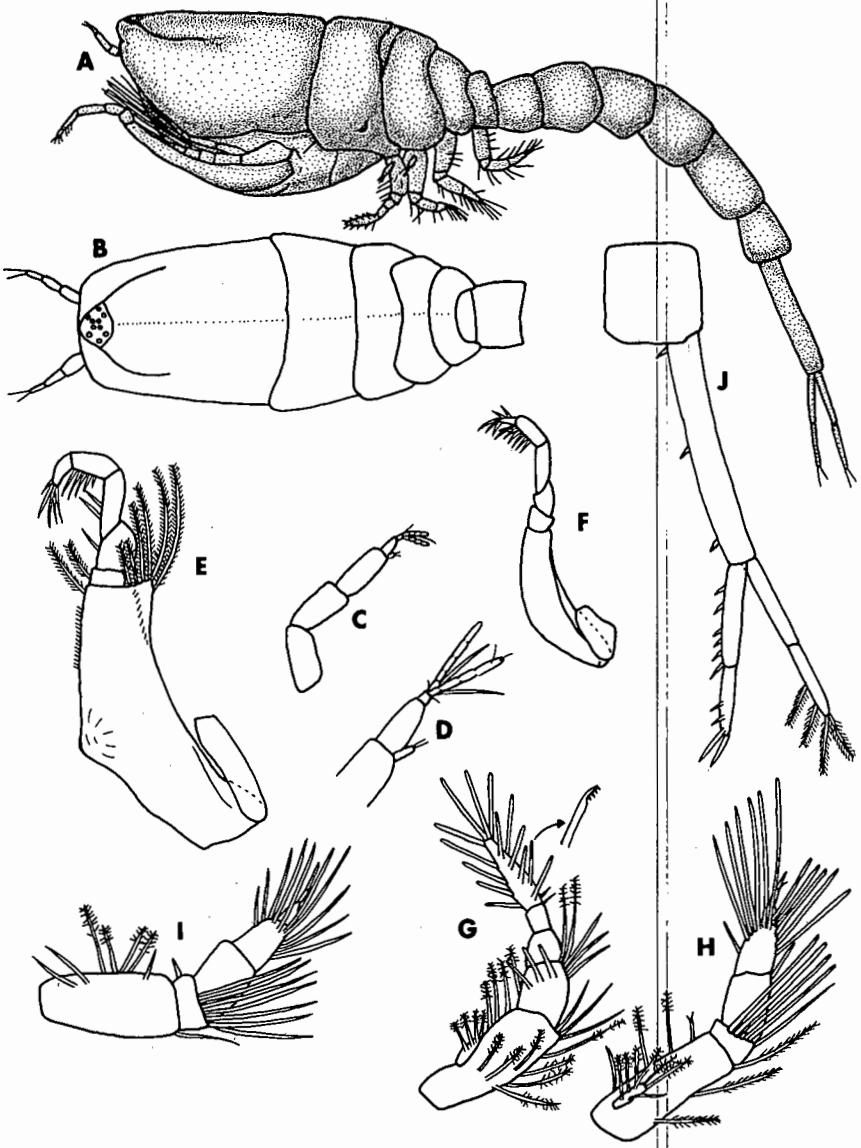

Fig. 5. *Cumopsis robusta* sp. nov.
Ovigerous female, holotype, 3,7 mm: A, lateral view; B, dorsal view of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, telsonic somite and uropod.

Holotype

Ovigerous female, deposited in the South African Museum, number SAM A13433.

Description

Ovigerous female, holotype, length 3,7 mm. Integument lightly calcified, with faint reticulations at high magnifications. Carapace nearly twice as long as deep, and equal in length to remaining free thoracic somites (Fig. 5A). No trace of lateral folds. Carapace in dorsal view (Fig. 5B) almost rectangular anteriorly due to short unproduced pseudorostral lobes being interrupted by eyelobe. Eye elliptical with a number of dark red pigmented rings; lenses not discernable. Antennal notch hardly defined. Cephalothorax just longer than abdomen. Abdominal somites without sideplates. Telsonic somite plus uropods equal in length to the four preceding somites. Mouthparts and lower edge of carapace dark in fresh specimens.

Three basal segments of antenna 1 (Fig. 5C) subequal, slight flexure between first and second. Flagellum with two aesthetascs. Accessory flagellum small, 1-segmented (Fig. 5D).

Basis of maxilliped 3 (Fig. 5E) half as long again as rest of limb, distally truncate, and broadly widened at its midpoint. Ischium half as long as wide. Merus slightly flared externally. Carpus and propodus subequal. Basal segment of exopod less than half length of basis.

Basis of pereiopod 1 (Fig. 5F) stout, just longer than remaining segments, of which carpus the longest. Basal segment of exopod $\frac{2}{5}$ length of basis, and slightly expanded at the mid-point.

Pereiopod 2 (Fig. 5G) stout. Ischium fused with basis. Carpus and propodus subequal. Dactyl equal in length to merus plus carpus, with many spines. Exopod 1-segmented, and about quarter length of basis, with four long plumose setae.

Pereiopod 3 (Fig. 5H) very stout. Basis equal in length to next four segments. Merus and carpus subequal. Exopod as in pereiopod 2.

Pereiopod 4 (Fig. 5I) stout, with many setae. No exopod.

Telsonic somite square in dorsal view (Fig. 5J), unarmed. Uropods equal in length to the four preceding somites. Peduncle just longer than rami, with three small spines on inner edge. First segment of endopod $1\frac{1}{2}$ times length of second, with six spines on inner edge; second segment with two spines on inner edge and two long terminal spines. Segments of exopod subequal, first unarmed, second with two plumose setae on inner edge and two long terminal ones.

Adult male, length 4,0 mm. Differs from female as follows: carapace $\frac{3}{4}$ as deep as long; cephalothorax equal in length to next five abdominal somites (Fig. 6A), which are more robust than in the female. Sideplates of pedigerous and abdominal somites defined ventrally, that of the fourth pedigerous somite being produced anteriorly. No antennal notch.

Antenna 1 (Figs 6B, 6C) very robust, with a brush of sensory setae surrounding the 2-segmented flagellum (Fig. 6D).

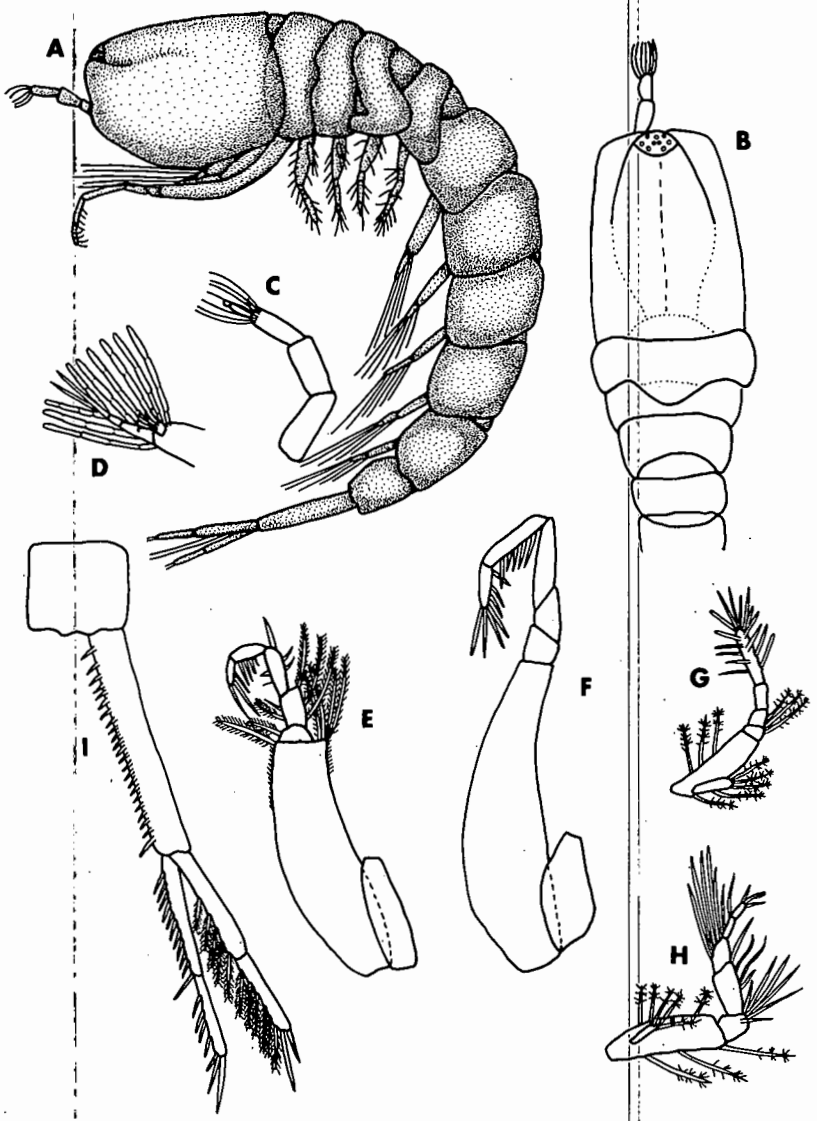

Fig. 6. *Cumopsis robusta* sp. nov.
Adult male, 4,0 mm: A, lateral view; B, dorsal view of carapace; C, antenna 1; D, detail of distal end of antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

Antenna 2 extending just beyond uropods—segments short.

Maxilliped 3 (Fig. 6E) with merus slightly expanded externally; less robust than in female, and basis not angled.

Propodus of pereiopod 1 (Fig. 6F) relatively shorter.

Pereiopods 2 and 3 (Figs 6G and 6H) less stout. Merus and carpus of pereiopod 2 shorter than propodus. Basal segment of exopod nearly half length of basis.

Telsonic somite and uropods (Fig. 6I) equal in length to the three preceding somites. Inner border of peduncle armed with about 23 small spines. Armature of rami greater than in female.

Remarks

The species of *Cumopsis* are rather similar morphologically. *C. robusta* may be distinguished from *C. fagei*, which it closely resembles, as follows: in *C. fagei* the peduncle of the uropods is almost twice the length of the endopod, while in *C. robusta* the two are almost subequal. In dorsal view the eyelobe and pseudorostral lobes form a straight line anteriorly in *C. robusta* while in *C. fagei* the pseudorostral lobes extend beyond the eyelobe for a short distance. The peduncle of the uropod is relatively broader and the rami are subequal in *C. robusta*, while the exopod is the longer in *C. fagei*.

Distribution of Cumopsis

This genus is found almost exclusively intertidally or in the infratidal fringe. It occurs in the British Isles, through the Mediterranean, tropical West Africa and South Africa to Annam. *C. robusta* would appear to be endemic to the south-western coast of South Africa.

Hypocuma Jones, 1973

Generic diagnosis

Vaunthompsoniinae with pseudorostral lobes produced anteriorly to meet in front of the eyeless eyelobe. No antennal notch or angle in either sex. Antenna 1 long and slender. Mandible normal. Five pairs of thoracic appendages bearing large flattened exopods in the male, and four in the female. Merus of maxillipeds 2 and 3 expanded, basis of maxilliped 3 not produced distally. Pereiopod 2 7-segmented. Well-developed exopods on first four pereiopods in male, and first three in female. Female with rudimentary exopod on pereiopod 4. Five pairs of pleopods in male. Telsonic somite produced between uropods. Type species *Hypocuma serratifrons* Jones, 1973 from 1 934 m off the Canary Islands.

Hypocuma dentatum sp. nov.

Figs 7 (♂), 8 (♀)

Records

SAM A10602a, *Pieter Faure* 17440: 34°25′S/17°50′E about 400 m
1 subadult ♂ 5,9 mm—uropods missing. HOLOTYPE
1 adult ♂ 6,0 mm—last somite missing
2 adult ♀—cephalothorax only

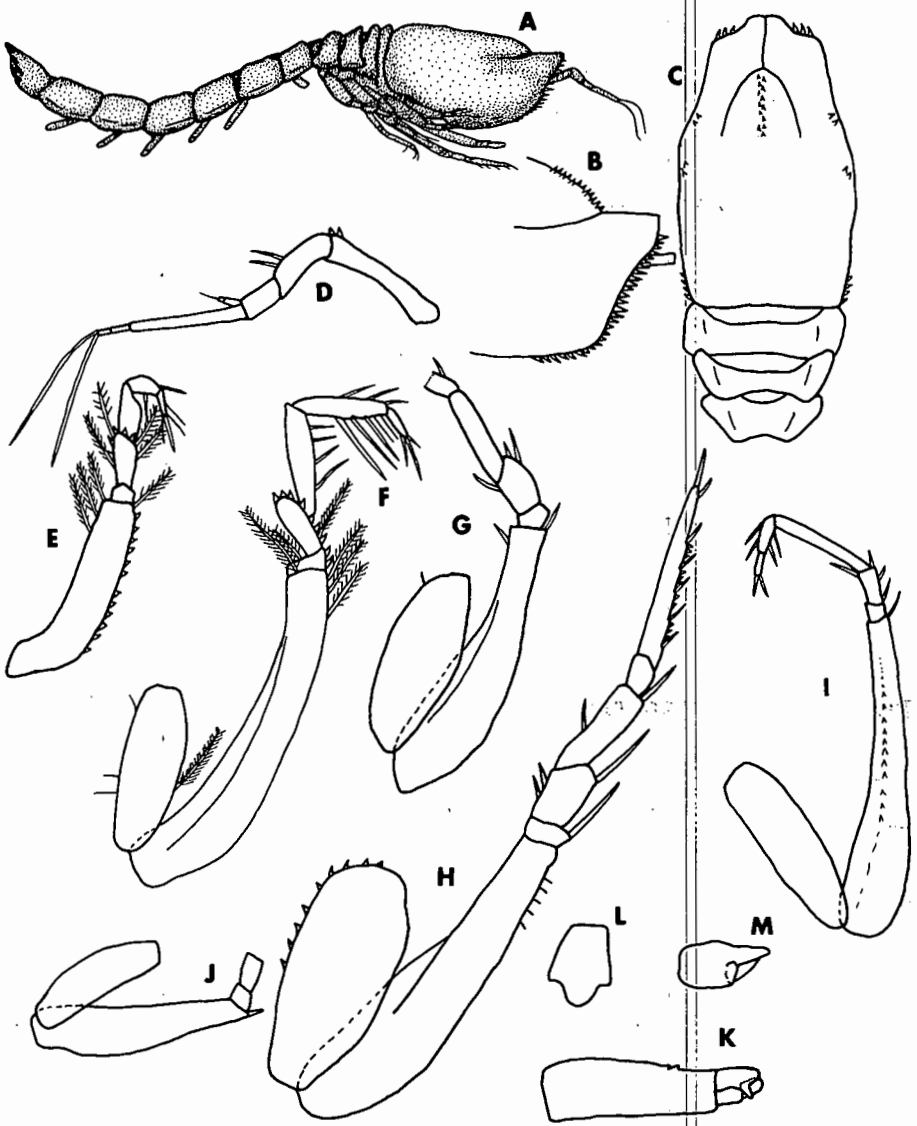

Fig. 7. *Hypocuma dentatum* sp. nov.
Adult male, holotype, 5,9 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 2; F, maxilliped 3; G, pereiopod 1; H, pereiopod 2; I, pereiopod 3; J, pereiopod 4; K, pleopod 2; L, dorsal view of telsonic somite; M, lateral view of telsonic somite.

Holotype

Subadult male, deposited in the South African Museum, number SAM A13434.

Description

Subadult male, holotype, length 5,9 mm. Carapace twice as long as deep with slightly upturned pseudorostrum reaching well beyond eyelobe and constituting $\frac{1}{5}$ total length of carapace (Fig. 7A). No antennal notch (Fig. 7B). A row of well-developed denticles on anterior edges of carapace, becoming smaller and disappearing along ventral edge. Eyelobe eyeless with a row of small denticles dorsally (Fig. 7C). Exoskeleton generally sculptured with triangular denticles of varying size. Carapace $1\frac{1}{2}$ times length of free thoracic somites, and of almost equal length to first four abdominal somites. First pedigerous somite visible dorsally and laterally, second to fourth with slight ventro-lateral flanging. Abdominal somites with well-developed sideplates. Telsonic somite produced between uropods for about $\frac{1}{3}$ its length.

Antenna 1 (Fig. 7D) slender, elongate, and geniculate between first and second segments. Flagellum 3-segmented, with first segment greatly elongated. Accessory flagellum small, 2-segmented.

Maxilliped 2 (Fig. 7E) with a row of denticles on inner edge of basis; ischium small; merus and carpus subequal, inner edge of merus expanded distally, and bearing five denticles.

Maxilliped 3 (Fig. 7F) with basis slightly longer than combined length of remaining segments, and not produced distally. Ischium twice as wide as long, with two denticles on inner edge. Merus expanded externally with seven denticles along inner and distal edges. Carpus and propodus subequal, and each $1\frac{1}{2}$ times length of merus. Dactyl small. Basal segment of exopod oval, and less than half length of basis.

Pereiopod 1 (Fig. 7G) relatively short. Ischium as broad as long, and slightly expanded internally, as is the merus. Merus twice length of ischium. Carpus cylindrical, twice length of merus. Dactyl and part of propodus missing. Exopod very well developed, basal segment $\frac{2}{3}$ length of basis.

Pereiopod 2 (Fig. 7H) largest of the legs, nearly $2\frac{1}{2}$ times length of basis of pereiopod 1. Basis slightly keeled to accommodate the large exopod, which has basal segment $\frac{3}{4}$ length of basis, flattened, with a row of 9–10 denticles along the outer and distal edges. Ischium half as long as broad. Merus three times length of ischium. Carpus cylindrical, equal in length to ischium plus merus. Propodus small, just more than $\frac{1}{3}$ length of carpus. Dactyl elongate, equal in length to ischium, merus and carpus together, with a small terminal spine and five lateral spines on inner edge, interspersed with small denticles.

Pereiopod 3 (Fig. 7I) smaller, reaching end of carpus of pereiopod 2. Basal segment of exopod smaller and less expanded, slightly more than half length of basis. Basis long and straight, $1\frac{1}{2}$ times length of rest of limb, with a row of denticles along its length. Ischium square, merus twice its length. Carpus

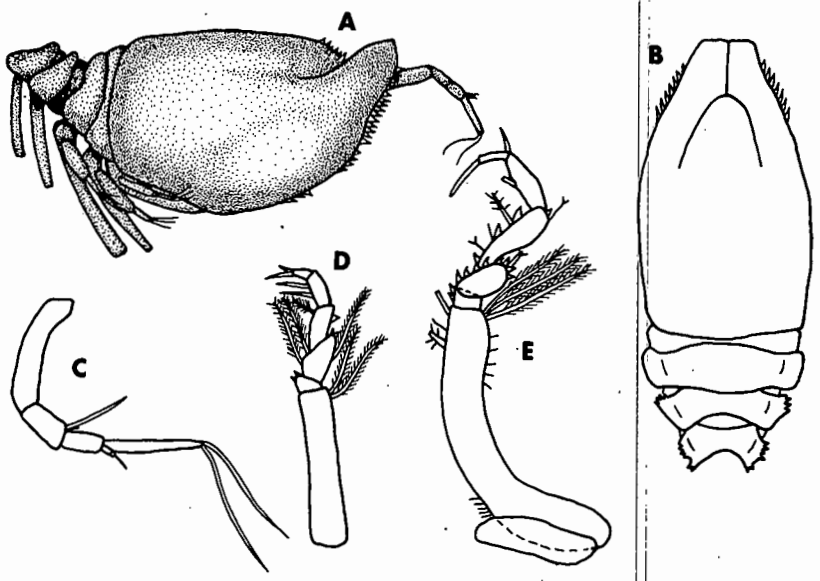

Fig. 8. *Hypocuma dentatum* sp. nov.
Adult female, paratype, carapace length 2,0 mm: A, lateral view of cephalothorax; B, dorsal view of cephalothorax; C, antenna 1; D, maxilliped 2; E, maxilliped 3.

elongate, twice length of ischium plus merus. Propodus and dactyl small, subequal.

Pereiopod 4 (Fig. 7J) smaller still, with basal segment of exopod $\frac{2}{3}$ length of basis. Ischium square, merus slightly longer. Rest of limb missing. Pereiopod 5 missing.

Five pairs of pleopods (Fig. 7K), each with a sharp external projection on inner ramus.

Telsonic somite (Figs 7L, 7M) produced between insertion of uropods for $\frac{1}{3}$ its length, unarmed. Uropods missing.

Adult female, paratype, length of carapace 2,0 mm. Last thoracic segment and abdomen missing in both specimens. Only bases of pereiopods retained.

Carapace similar to male, but deeper, about $1\frac{1}{2}$ times as long as deep (Fig. 8A), with denticles on anterior edge. Pseudorostrum just less than a quarter length of carapace, and more upturned than in male. No eye (Fig. 8B).

Antenna 1 (Fig. 8C) less elongate. First segment longest, second and third subequal and together about $\frac{3}{4}$ length of first. Accessory flagellum with minute second segment. Flagellum 1-segmented, and nearly as long as basal segment.

Maxilliped 2 (Fig. 8D) with merus more expanded internally than in male.

Maxilliped 3 (Fig. 8E) with exopod $\frac{2}{3}$ length of basis. Merus expanded internally, but not as elongated as in male.

Pereiopods represented by bases only, that of pereiopod 2 largest. Articulation of exopod of pereiopod 3 visible, but exopod missing.

Remarks

H. dentatum quite obviously belongs to the genus *Hypocuma*, and the differences between it and *H. serratifrons* are not great. The two species may be distinguished as follows: in *H. dentatum* the exoskeleton is covered by scattered denticles of varying size, those on the anterior edge of the carapace being particularly distinctive, and larger than in *H. serratifrons*. The general shape of the carapace differs, mainly in the lack of a depression behind the pseudorostrum in *H. dentatum* and the nature and degree of tilting of the pseudorostral lobes. The telsonic somite protrudes between the uropods for less than $\frac{1}{3}$ its length in *H. dentatum*, and for nearly half in *H. serratifrons*. The flagellum of the first antenna in *H. serratifrons* is 2-segmented in both the male and the female, and in *H. dentatum* is apparently 1-segmented in the female, and 3-segmented in the male, but since the specimens of *H. dentatum* are very old and quite decalcified, it is difficult to be certain about the exact position of some sutures.

Distribution of Hypocuma

The single sample of *H. dentatum* was obtained from about 400 m off Cape Point. No substrate data are given. The very considerable development of the exopods of the male thoracic appendages indicates that it is an active swimmer. Further collecting off the south and east coasts of southern Africa is needed to determine the distribution range. *H. serratifrons* Jones is also represented by a single sample, from 1 934 m off the Canary Islands.

Vaunthompsonia Bate, 1858

Generic diagnosis

Pseudorostrum short, eyes present. All pedigerous somites visible from above. Telsonic somite slightly produced between uropods. Antenna 1 short with 1-segmented accessory flagellum. Basis of maxilliped 3 not produced distally. Exopods present on pereiopods 1–4 in male and 1–3 in female. Male with five pairs of pleopods. Endopod of uropod 2-segmented.
Type species *Vaunthompsonia cristata* (Bate, 1856), British Isles, Mediterranean, West Indies, Indo-Pacific, South Africa.

KEY TO THE SPECIES OF *VAUNTHOMPSONIA*

1 Peduncle of uropods longer than telsonic somite.....2
– Peduncle of uropods shorter than or equal to telsonic somite.....3

2 Pereiopod 1 reaching end of carapace with part of propodus; dorsal outline not strongly arched ..... *V. cristata* (Bate, 1856)—widespread
– Pereiopod 1 reaching end of carapace with dactyl only; dorsal outline strongly arched.... *V. arabica* Calman, 1907—India

3 Antero-lateral borders of carapace serrated.....4
– Antero-lateral borders of carapace not serrated.....6

4 Minute serrations on antero-lateral border only..... *V.* sp.—South Africa
– Serrations present on carapace apart from antero-lateral border.....5

5 Single row of mid-dorsal serrations on carapace..... *V. serratifrons* Gamô, 1964—Japan
– A double row of serrations on posterior half of carapace, converging towards posterior border ..... *V. meridionalis* G. O. Sars, 1887—Antarctica

6 Basis of maxilliped 3 somewhat produced distally... *V. inermis* Zimmer, 1909—Antarctica
– Basis of maxilliped 3 not produced 7

7 Length of telsonic somite anterior to insertion of peduncle greater than length posterior to insertion 8
– Length of telsonic somite anterior to insertion of peduncle shorter than or equal to length posterior to insertion..... 9

8 First segment of exopod almost equal in length to second of endopod..... *V. natalensis* sp. nov.—South Africa
– First segment of exopod half length of second segment of endopod..... *V. media* Zimmer, 1952—Indochina

9 Pereiopod 1 with basal segment of exopod $\frac{2}{3}$ length of basis; first two segments of antenna 1 longer than rest of appendage 10
– Pereiopod 1 with basal segment of exopod $\frac{2}{5}$ length of basis; first two segments of antenna 1 shorter than rest of appendage..... *V. dawydoffi* Zimmer, 1952—Indochina

10 First segment of exopod of uropod $\frac{1}{6}$ length of second..... *V. floridana* Băcescu, 1971—Caribbean
– First segment of exopod of uropod $\frac{1}{2}$ length of second ..... *V. nana* Hale, 1944—Australia

Vaunthompsonia cristata (Bate, 1856)

Vaunthompsonia cristata: G. O. Sars, 1879: 22, pl. 23–26, figs 17–18. Stebbing, 1913: 10, figs 5–7.

Records

One specimen from False Bay (34°S/18°E), depth 5 m

Holotype

Designated by Bate, 1856, from western France. ?British Museum (Natural History).

Remarks

This species, represented by a single damaged male, was identified by Jones (1960) from UCT material taken from False Bay. Dr Jones has kindly re-examined the material, which is still in his possession, and confirms his original identification.

Distribution

Widespread—British Isles, Mediterranean, Annam, Japan, West Indies, South Africa, in shallow waters.

Vaunthompsonia natalensis sp. nov.

Figs 9 (♀), 10 (♂)

Records

SCD 272 Y	19.7.1961	34°23′S/25°54′E	Sand and shell	182 m	1	♀ ovig.	3,4 mm
SCD 321 L	9.7.1962	34°15′S/25°50′E	Fine sand	108 m	1	subadult ♂	3,0 mm
Coast 4/P3	6.2.1973	30°37′S/30°40′E		75 m	1	♀	2,0 mm
Coast 4/Q2	6.2.1973	30°46′S/30°31′E		48 m	1	♀	1,8 mm

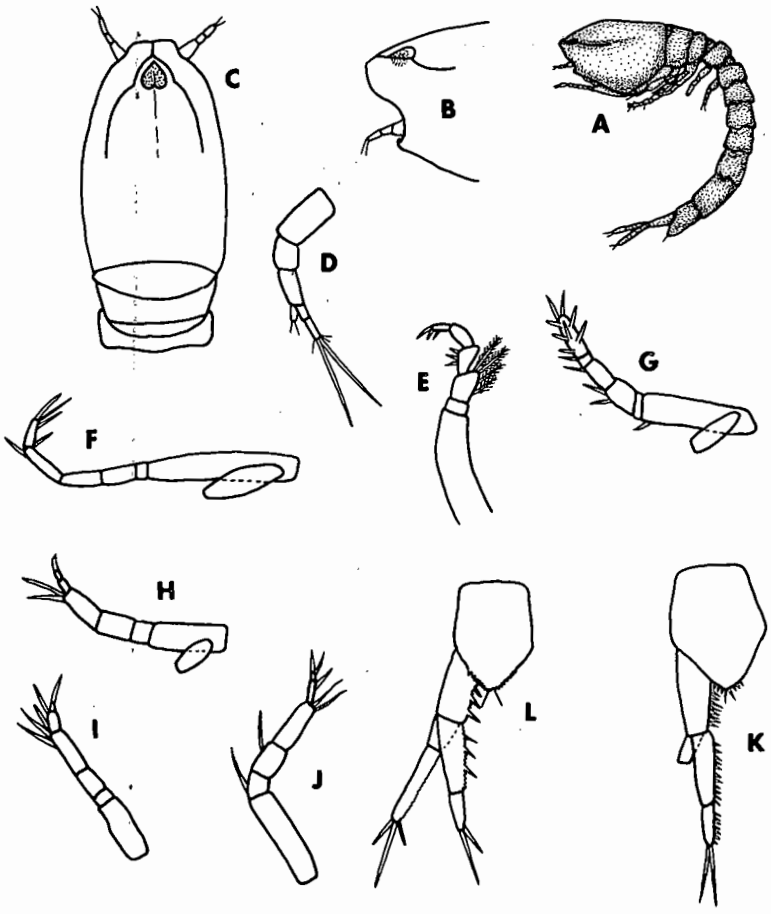

Fig. 9. *Vaunthompsonia natalensis* sp. nov.
Adult female, holotype, 3,4 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, pereiopod 4; J, pereiopod 5; K, telsonic somite and uropod of adult; L, telsonic somite and uropod of juvenile.

Holotype

Ovigerous female deposited in the South African Museum, number SAM A13435.

Description

Ovigerous female, holotype, length 3,4 mm. Body compact, smooth, without serrations (Fig. 9A). Carapace about $\frac{2}{3}$ as deep as long, somewhat vaulted anteriorly with faint mid-dorsal carina on eyelobe. Antennal notch shallow, antero-lateral angle defined by a small tooth (Fig. 9B). Eye obvious, heart-shaped in dorsal view, with no visible lenses (Fig. 9C). Pseudorostrum meeting in front of the rounded eyelobe for a short distance. Carapace a quarter

3 Carapace about two and a quarter times as long as deep; basis of pereiopod 2 longer than rest of limb ..... *africana* Zimmer, 1908—South Africa
– Carapace about three times as long as deep; basis of pereiopod 2 shorter than rest of limb. 4

4 Adults less than 10 mm in length; basis of pereiopod 1 about one and a half times length of rest of limb; basis of pereiopod 2 hardly longer than wide ..... *brevipes* Hansen, 1895—west Africa
– Adults more than 12 mm in length; basis of pereiopod 1 about one and three-quarters length of rest of limb; basis of pereiopod 2 about twice as long as wide ..... *stebbingi* Jones, 1956—South Africa

5 Carapace no more than one and two-thirds times as long as deep, or if nearly twice as long as deep in male then basis of pereiopod 1 no more than three times as long as wide ... 6
– Carapace twice as long as deep; basis of pereiopod 1 about six times as long as wide 10

6 Pseudorostrum upturned, lower edge curled inwards, truncate anteriorly 7
– Pseudorostrum straight, not curled inwards, not obviously truncate 8

7 Antennal notch very deeply excavated, anterolateral angle strongly produced and serrate in both sexes; a pair of dorsal ridges running back from eyelobe almost to posterior edge of carapace ..... *pokoui* LeLoeuff & Intes, 1972—west Africa
– Antennal notch absent in male, moderate in female; anterolateral angle normal, slightly serrate ventrally; faint dorsal ridges on front half of carapace only ..... *crassipes* Hansen, 1895—South African and Indian form

8 Middorsal line of carapace serrate .. *tenella* Sars, 1878—India, west Africa, Mediterranean
– Middorsal line of carapace not serrate 9

9 Prolongation of basis of maxilliped 3 not reaching articulation of merus and carpus; merus not expanded ..... *capensis* (Zimmer, 1921)—South Africa
– Prolongation of basis of maxilliped 3 reaching beyond articulation of merus and carpus; merus very slightly expanded ..... *truncata* Hale, 1953—South Africa (estuarine)
– Prolongation of basis of maxilliped 3 reaching articulation of carpus and propodus; merus strongly expanded ..... *crassipes* Hansen, 1895—west African and Mediterranean form

10 Carapace with a pair of dorsolateral carinae 11
– Carapace lacking dorsolateral carinae 12

11 Carinae confined to dorsal half of carapace ... *plicata* LeLoeuff & Intes, 1972—west Africa
– Carinae running diagonally from anterolateral corner almost to mid-dorsal line ..... *robusta* Hansen, 1895—west Africa

12 0–3 minute serrations middorsally 13
– Numerous serrations on at least half of middorsal carina 14

13 Prolongation of basis of maxilliped 3 comprising one-third its total length; carapace slightly less than twice as long as deep ... *senegalensis* Jones, 1956—South and west Africa
– Prolongation of basis of maxilliped 3 comprising one-quarter its total length; carapace slightly more than twice as long as deep ..... *fagei* Jones, 1955—South Africa

14 Basis of pereiopod 1 subequal in length to rest of limb ... *dayi* Jones, 1960—South Africa
– Basis of pereiopod 1 no longer than next four segments together 15

15 Merus of maxilliped 3 expanded, basis little longer than remaining segments together ..... *sanguinea* Kemp, 1916—India (lentic)
– Merus of maxilliped 3 not expanded, basis one and a half times length of remaining segments together ..... *pigmenta* Kurian, 1961—India (lentic)

Iphinoe stebbingi Jones, 1956

Figs 17–18

Iphinoe brevipes (*non* Hansen, 1895): Stebbing, 1910: 410. Jones, 1955: 288.
Iphinoe stebbingi Jones, 1956: 203–205, figs 10–12; 1960: 175.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
WCD	33–34°S 18°E	65–84 m	2		2	2	6		12	2
FAL & FBY	34°S 18°E	17–90 m	22	143	182	88	413	25	875	79
SST	34°S 22°E	50–80 m	8	8	7	4	16	31	74	8
SCD	34°S 21°E–33°S 27°E	36–100 m	7	18	38	19	80	29	191	21
NIWR	30°S 30°E–29°S 31°E	30–62 m			1		1	2	4	4
SAM	34°S 18°E–34°S 22°E	55–87 m	10		1	12	7		30	8

Previous records

Cape Point to St Francis Bay, 44–62 m (34°S 18°E–33°S 25°E) (Stebbing 1910 (= Jones 1956)); False Bay to Cape Agulhas (34°S 18°E–34°S 19°E), 20–82 m (Jones 1960).

Syntypes

Adults of both sexes deposited by Jones in the British Museum (Natural History): specimens previously identified by Stebbing as *I. brevipes*. Type locality: not specified; material from St Francis Bay (33°S 25°E), off Cape Point Lighthouse (34°S 18°E) and off Sebastian Bluff (34°S 22°E).

Description

Ovigerous female, length 15,9 mm, from False Bay. Slender, elongate. Body cylindrical, carapace slightly compressed laterally. Integument shiny with faint reticulations at high magnifications. Carapace (Fig. 17A) slightly less than three times as long as deep (slightly more in non-ovigerous females), with a faint middorsal carina, especially on posterior half. Antennal notch excavate, anterolateral angle acute, tooth present (Fig. 17B). Pseudorostral lobes meeting for a short distance in front of elongate, eyeless eyelobe (Fig. 17C).

First pedigerous somite visible, about a third as long as second; second longer than third. Thorax slightly longer than carapace, cephalothorax longer by two somites than abdomen.

Antenna 1 (Fig. 17D) of moderate length, first and third segments subequal in length, second slightly shorter. Flagellum 1-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 17E) three times length of remaining segments together; distal prolongation reaching half way along merus (Fig. 17F), merus slightly expanded.

Basis of pereiopod 1 (Fig. 17G) one and three-quarters times length of rest of limb, slender, with several spines on outer distal edge. Ischium and merus subequal in length, as are next three segments.

Pereiopod 2 (Fig. 17H) 6-segmented, short, stout, equal in length to basis of pereiopod 3. Basis twice as long as broad, merus stout.

Pereiopods 3 (Fig. 17I) and 4 stout, 7-segmented.

Pereiopod 5 (Fig. 17J) with ischium, merus and carpus very much enlarged,

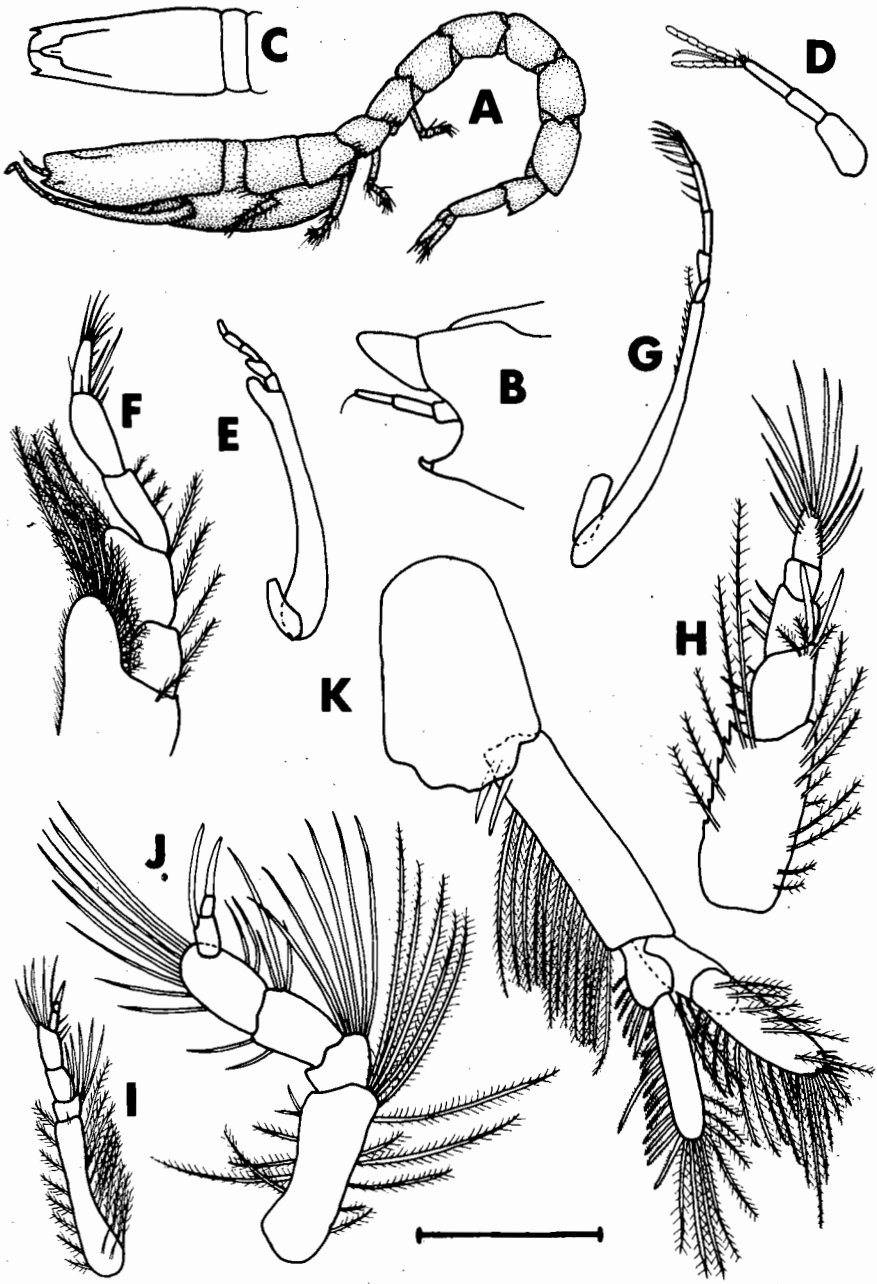

Fig. 17. *Iphinoe stebbingi*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Detail of distal tip of maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Pereiopod 5. K. Telsonic somite and uropod.

Scale line = 4 mm for A, C; 2 mm for E, G; 1 mm for B, D, I, K; 0,5 mm for F, H, J.

carpus of pereiopod 1 (Fig. 11G) and the telsonic somite and uropods (Fig. 11L), described below.

Telsonic somite ¾ as wide as long at its widest point, and produced between uropods for half its length, terminating in two small anal setae. Ratio of outer edge of telsonic somite: outer edge of peduncle is 1 : 2. Peduncle with nine spines on inner edge. First segment of endopod slightly more than half length of peduncle, with 12 fine spinules along inner edge. Second segment missing. First segment of exopod ¾ as long as first segment of endopod, unarmed. Second segment just shorter than first, with four small spines near the end.

Remarks

Since neither of the uropods of the single female is complete, and since Zimmer described *V. media* on the basis of adult males, certain identification or the erection of a new species should await further material. The specimen differs from *V. natalensis* in the shape of the carapace, in the basis and carpus of maxilliped 3, in the presence of serrations on the lower border of the carapace and in particular in the proportions of the telsonic somite, and the peduncle and rami of the uropods.

Distribution of Vaunthompsonia

Vaunthompsonia has the widest distribution of any of the genera under consideration. Species occur from the British Isles (*V. cristata*) to South Georgia and Kerguelen (*V. meridionalis* and *V. inermis*), Japan (*V. serratifrons*) and Australia (*V. nana*). The genus is generally confined to waters shallower than 250 m, but *V. meridionalis* has been found at 315 m in South Georgia.

Bathycuma Hansen, 1895

Generic diagnosis

Pseudorostral lobes meeting anteriorly. Eye absent. First pedigerous somite exposed. Telsonic somite produced between uropods. Basis of maxilliped 3 produced distally. Exopods present on pereiopods 1–4 in male, and 1–3 in female. Male with five pairs of pleopods. Endopod of uropod 2-segmented.
Type species *B. elongatum* Hansen, 1895, from 4 980 m in the central Atlantic.

KEY TO THE SPECIES OF *BATHYCUMA*

1 Lateral carinae on pleon somites.....2
– Pleon somites not carinate.....3

2 Distal prolongation of basis of maxilliped 3 not reaching end of merus.....
B. longicaudatum Calman, 1912—California
– Distal prolongation of basis of maxilliped 3 reaching beyond end of merus.....
B. magnum Jones, 1969—Indian Ocean

3 Pereiopod 2 with six segments.....*B. elongatum* Hansen, 1895—Atlantic
– Pereiopod 2 with seven segments.....4

4 Segments of endopod of uropod not subequal.....5
– Segments of subequal endopod of uropod.....6

5 First segment of endopod of uropod twice length of second; prolongation of basis of maxilliped 3 reaching middle of merus.....*B. capense* (Zimmer, 1921)—South Africa
– First segment of endopod of uropod shorter than second; prolongation of basis of maxilliped 3 reaching end of merus.....*B. brevirostre* (Norman, 1879)—Europe

6 Carapace without mid-dorsal serrations; segments of exopod of uropod subequal.....
B. datum sp. nov.—South Africa
– Carapace with mid-dorsal serrations; first segment of exopod of uropod half length of second 7

7 Uropods more than twice length of telsonic somite; first segment of endopod distinctly longer than second.....*B. natalense* Stebbing, 1912—South Africa
– Uropods less than half length of telsonic somite; first segment of endopod just longer than second ..... *B. longirostre* Calman, 1905—Malaya

Bathycuma capense (Zimmer, 1921)

Figs 12 (♀), 13A–D (♂)

Vaunthompsonia capensis Zimmer, 1921: 131, figs 28–29.

Records

SAM A10602c, *Pieter Faure* 17440:		34°20′S/18°50′E	about 400 m		1 ♂ 7,2 mm
WCD 77 A	8.10.1960	34°17′S/17°53′E	320 m	Sand and mud	1 ♀ adult 10,9 mm 1 ♂ subadult 10,2 mm
SCD 405 E	?	34°10′S/20°12′E	about 200 m	Sand	4 ♀ 8,6–10,2 mm 2 ♂ subadult 9,9–10,2 mm 1 juv. 4,6 mm

Holotype designated by Zimmer (1921) from Agulhas Bank 35°19′S/20°12′E 140 m. Zoologisches Museum, Berlin.

Description

Adult female, length 10,2 mm. Body elongate, carapace short, vaulted, a little more than 1½ times as long as deep (Fig. 12A), mid-dorsal carina bearing numerous small teeth anteriorly. Pseudorostral lobes meeting in front of very small eyeless eyelobe for $\frac{1}{10}$ length of carapace (Fig. 12C). Antennal notch not deep, but dorso-ventrally excavated with several minute teeth above (Fig. 12B). Antero-lateral angle acute, defined by a large tooth with several small serrations along the ventro-lateral margin. Carapace just longer than rest of thorax. Pedigerous somites all exposed, second, third and fourth with slight flanges visible dorsally. Cephalothorax just shorter than next five abdominal somites which are cylindrical in cross-section. Telsonic somite produced between uropods for $\frac{1}{3}$ its length.

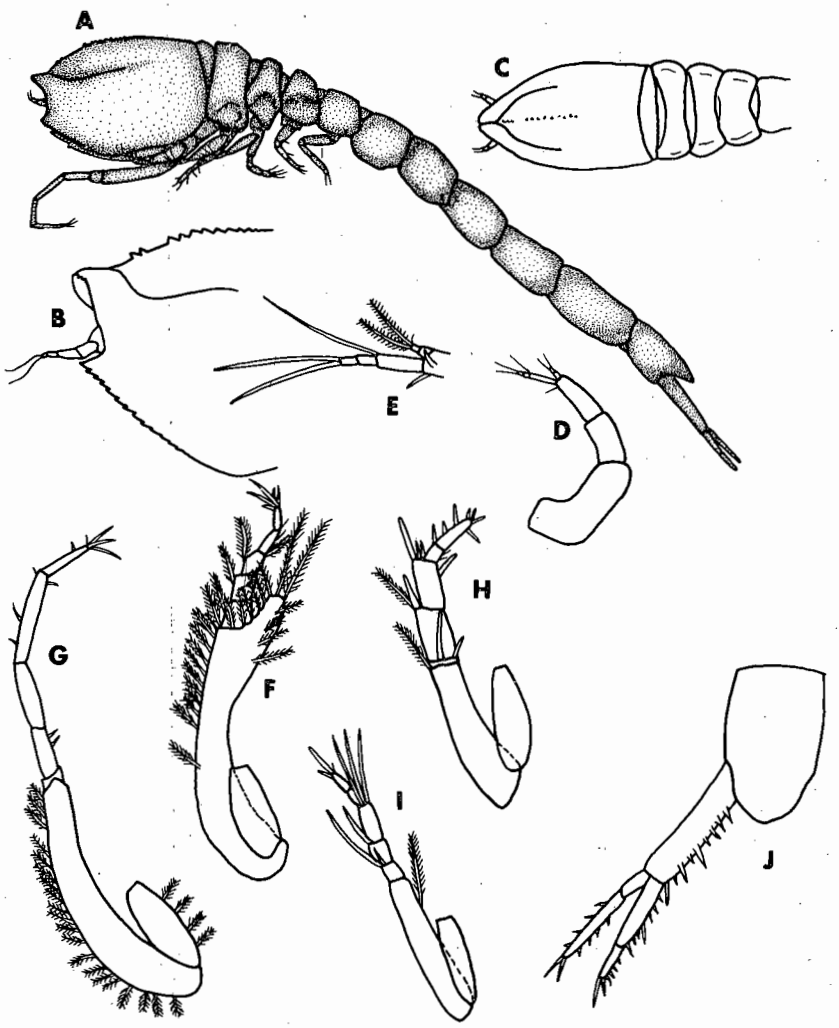

Fig. 12. *Bathycuma capense* (Zimmer, 1921)
Adult female, 10,2 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, detail of distal end of antenna 1; F, maxilliped 3; G, pereiopod 1; H, pereiopod 2; I, pereiopod 3; J, telsonic somite and uropod.

Antenna 1 (Fig. 12D) robust, first segment geniculate and longer than next two together. Second segment just shorter than third. Flagellum (Fig. 12E) 3-segmented, nearly as long as second basal segment, with two terminal setae. 2-segmented accessory flagellum half as long as first of flagellar segments, with two plumose terminal setae.

Maxilliped 3 (Fig. 12F) setiferous. Basis more than twice length of remaining segments, with a distal prolongation reaching half way along merus. Other seg-

ments subequal, ischium slightly longest and stoutest. Basal segment of exopod more than quarter length of basis.

Pereiopod 1 (Fig. 12G) elongate, with propodus and dactyl exceeding tip of pseudorostrum. Basis setiferous. Ischium broader than long. Carpus equal to ischium plus merus. Propodus and dactyl long and slender. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopod 2 (Fig. 12H) fairly stout, basis nearly as long as last four segments. Ischium distinct but very short. Merus and carpus subequal, stout, each with a strong distal spine. Propodus $\frac{1}{3}$ length of merus. Dactyl relatively short, twice length of propodus, with a few small spines. Basal segment of exopod $\frac{2}{3}$ length of basis.

Pereiopod 3 (Fig. 12I) more slender. Basis longer than remaining segments together, of which carpus is longest. Exopod as in pereiopod 2.

Peduncle of uropods shorter than telsonic somite (Fig. 12J) with nine uneven spines along inner edge. Exopod just longer than endopod and just shorter than peduncle. First segment of exopod less than half length of second, unarmed. Second segment with four small spines on both edges, and two terminally. First segment of endopod more than twice length of second, with seven small spines on inner edge. Second segment with four spines on inner edge and two terminally.

Subadult male, length 10,2 mm. As in female, except: carapace more rectangular in outline; pseudorostral lobes $\frac{1}{7}$ total length of carapace (Fig. 13A). Antennal notch much shallower, angle obtuse with finer teeth below (Fig. 13B). Length of cephalothorax somewhat less than length of next five abdominal somites.

Antenna 1 (Fig. 13C) with first segment not geniculate, accessory flagellum longer, flagellum 2-segmented, terminating in two aesthetascs.

Thoracic appendages as in female, but pereiopod 1 longer, with carpus exceeding tip of pseudorostrum.

Armature of uropods more extensive (Fig. 13D).

Remarks

Zimmer (1921) described *B. capense* as *Vaunthompsonia capensis* from a single subadult male, figuring only the entire animal and a uropod. Although he did not accept the genus *Bathycuma*, considering it at most to be a subgenus of *Vaunthompsonia*, it is quite obvious that Zimmer's specimen belongs to *Bathycuma* as now accepted. I am unable to find any significant differences between Zimmer's description and the present material.

Bathycuma natalense Stebbing, 1912
Figs 13E–J (♂), 14 (♀)

Bathycuma natalense Stebbing, 1912: 135, pl. 49.

Records

SST 66 C	21.7.1972	34°23′S/21°26′E	15 m	Sand and shell	1 ♀ adult	9,0 mm
					1 ♀	6,5 mm
					1 ♂	6,1 mm

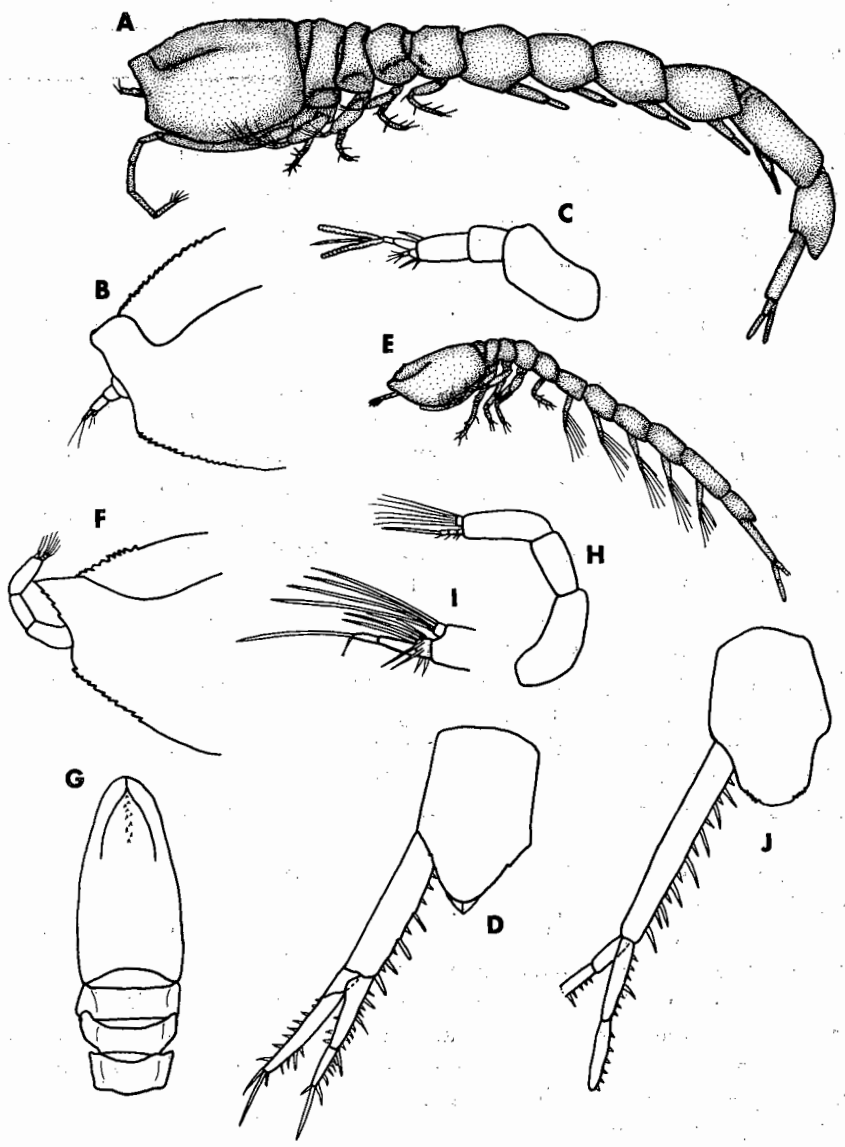

Fig. 13. *Bathycuma capense* (Zimmer, 1921)
Subadult male, 10,2 mm: A, lateral view; B, anterior end of carapace; C, antenna 1; D, telsonic somite and uropod.
Bathycuma natalense Stebbing, 1912
Adult male, 11,2 mm: E, lateral view; F, detail of anterior end of carapace; G, dorsal view of carapace; H, antenna 1; I, detail of distal segments of antenna 1; J, telsonic somite and uropod.

Antenna 1 (Fig. 13H) unusual, extremely robust, with numerous setae on the accessory flagellum (Fig. 13I). Basal segment geniculate. Flagellum 3-segmented, first segment small with a number of setae; second twice length of first, third just longer than first with a single terminal spine. Accessory flagellum 1-segmented with numerous long setae.

Pereiopods as in female.

Telsonic somite (Fig. 13K) with minute serrations laterally, posterior to insertion of uropods. Uropods and first segment of endopod relatively longer.

Remarks

In most respects, this species is similar to other members of the genus, but is distinguished by the greater length of the peduncle of the uropods, and the very robust first antennae of the male. *B. natalense* and *B. capense* are similar to each other in general appearance, and are probably closely related. In addition to the differences in the first antennae of the adult males, however, they are also distinguished by the relative lengths of the uropods and the different shapes of the carapace.

The depth of the type specimen (about 400 m) is fairly typical for the genus, but the shallow depth of 15 m for the SST sample seems inexplicable. Records, logs and labels have been checked and seem to be correct. The greatest depth reached in this particular transect was 200 m, so that even had a labelling error occurred, the depth is surprisingly shallow. Further collecting is required to determine whether in fact *B. natalense* does normally occur at such shallow depths.

Bathycuma datum sp. nov.

Fig. 15

Records

SAM A10602b, *Pieter Faure* 17440:	34°25′S/18°50′E	400 m	1 ♀	7,7 mm

Holotype

Unique adult female, deposited in the South African Museum, number SAM A13436.

Description

Adult female, length 7,7 mm. Body smooth, integument very finely squamous. Dorsal outline of carapace gently arched, not carinate or serrate (Fig. 15A). Pseudorostrum very short, meeting just in front of minute, triangular eyeless eyelobe (Fig. 15C). Antennal notch relatively deep, antero-lateral angle with a small tooth (Fig. 15B). Carapace $\frac{2}{3}$ as deep as long, and just longer than remaining free thoracic somites. Terga of second, third and fourth pedigerous somites slightly elevated, the second most obviously. Cephalothorax just shorter than abdomen. Telsonic somite only slightly produced between uropods.

Antenna 1 (Fig. 15D) short, basal segment robust, $\frac{3}{4}$ as broad as long with a row of six small denticles along outer edge. Second segment $\frac{1}{3}$ length of first, and broader than long. Third segment nearly twice length of second. Flagellum

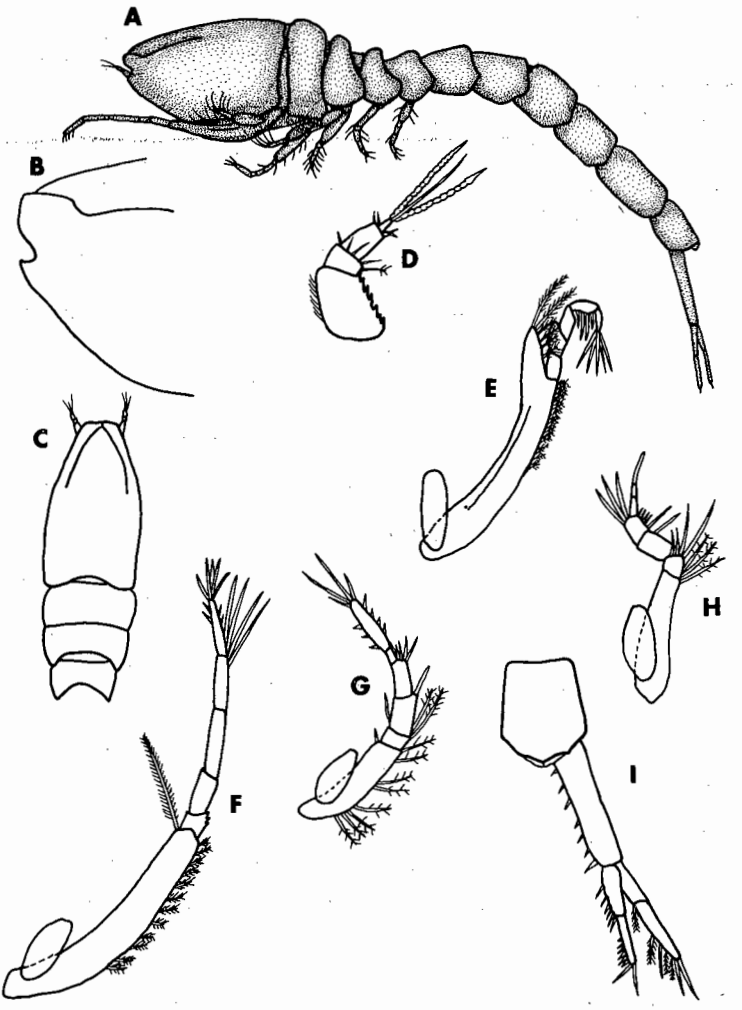

Fig. 15. *Bathycuma datum* sp. nov.
Adult female, holotype, 7,7 mm: A, lateral view; B, detail of anterior end of carapace; C, dorsal view of carapace; D, antenna 1; E, maxilliped 3; F, pereiopod 1; G, pereiopod 2; H, pereiopod 3; I, telsonic somite and uropod.

1-segmented with two terminal aesthetascs. Accessory flagellum 1-segmented, and half as long as flagellum.

Mandible normal, with narrow base.

Basis of maxilliped 3 (Fig. 15E) (including distal prolongation) twice length of remaining segments. Prolongation of basis narrow, extending not quite to distal end of merus. Ischium nearly twice as long as broad, merus slightly longer than ischium, slightly expanded internally. Basal segment of exopod less than $\frac{1}{3}$ length of basis.

Pereiopod 1 (Fig. 15F) elongated, basis just shorter than remaining segments. Ischium square with two small denticles distally. Merus twice length of ischium. Carpus equal to ischium plus merus. Propodus and dactyl subequal. Basal segment of exopod less than $\frac{1}{3}$ length of basis.

Basis of pereiopod 2 (Fig. 15G) just longer than next four segments. Ischium $1\frac{1}{2}$ times as broad as long, merus twice this length. Merus and carpus subequal, propodus small. Dactyl almost as long as merus plus carpus, setiferous, with four very stout terminal spines. Basal segment of exopod more than half length of basis.

Pereiopod 3 (Fig. 15H) with basis longer than remaining segments. Ischium square, merus twice its length. Propodus and dactyl almost subequal, each $\frac{2}{3}$ length of carpus. Basal segment of exopod less than half length of basis.

Pereiopods 4 and 5 similar, but basis of pereiopod 4 longer.

Peduncle of uropods (Fig. 15I) $1\frac{1}{2}$ times length of telsonic somite and just longer than exopod, with seven evenly spaced spines along inner edge. Endopod just shorter than exopod, segments subequal, first with six fine spines on inner edge, second with six small spines on inner edge and two long terminal spines. First segment of exopod $\frac{2}{3}$ length of second, unarmed. Second with four plumose setae and one spine on inner edge, and two spines terminally.

Remarks

This species may be distinguished from others of the genus by the absence of a serrated dorsal carina, the short, stout first antenna with a 1-segmented flagellum, and the relatively short prolongation of the telsonic somite between the uropods.

Distribution of Bathycuma

As the name *Bathycuma* indicates, most of the species in this genus inhabit waters of a considerable depth—usually more than 1 000 m. The genus is quite widely distributed in the North Atlantic, Mediterranean, Indian and Pacific Oceans, generally being circumtropical, with certain elements from higher latitudes. The three South African species would appear to have been derived from the Indian Ocean group, rather than having spread from the North Atlantic, since no species have been found on the west coast of Africa. All three are endemic, *B. capense* to the west coast, *B. natalense* to the south and east coasts, and *B. datum* to the Cape west of the Peninsula. The known depths at which all three species occur are unusually shallow for the genus.

DISTRIBUTION OF THE VAUNTHOMPSONIINAE

In general the distribution of each species in the subfamily is rather narrow. This is partly due to rather scanty collecting in many areas, but even taking this into account, of the 65 species listed in Jones (1969) and the present work, only one, *Vaunthompsonia cristata*, is found in the Atlantic, Indian and Pacific Oceans, one in the Pacific and Indian Oceans (*Heterocuma sarsi*), one in the

Atlantic and Pacific Oceans (*Cumopsis goodsiri*), and one in the Indian and Atlantic Oceans (*Heterocuma africanum*)—a total of less than 7% of the species in the subfamily occurring in more than one ocean.

Zimmer (1941) has called the Bodotriidae a 'negatively amphipolar' family. This is borne out by the fact that none of the Vaunthompsoniinae has been found at latitudes greater than 70°. Table 1 details the distribution of the subfamily. Each species may be represented more than once, as each record of a species from widely differing areas has been included.

TABLE 1

Distribution of Vaunthompsoniinae according to depth and latitude. Data mainly from Jones (1969).

Latitude	*Shore–5 m*	*5–200 m*	*200–2 000 m*	*>2 000 m*	*Total number*
N of 70°N	—	—	—	—	—
70°N–50°N	1	4	—	—	5
50°N–20°N	3	13	5	1	22
20°N–20°S	1	13	3	1	18
20°S–50°S	2	36	4	2	44
50°S–70°S	—	2	—	1	3
S of 70°S	—	—	—	—	—
Total	7 (5 sp)	68 (47 sp)	12 (10 sp)	5 (5 sp)	92 (67 sp)

Only eight of the 92 records are from latitudes greater than 50°. The majority of records are from 20° to 50° N and S, fewer being found in the tropics, which is generally true for the Cumacea. The predominance of records in the south temperate latitudes may be due to the very extensive work done by Hale in Australia. 21 of the 44 records for these latitudes are his, and as few other areas have been as thoroughly worked, the data are somewhat biased in this direction. However the bias is offset to some extent by the fact that only one member of the subfamily has been described from the whole of South America, where very little collecting has been done. Assuming that more records will eventually come from this region, it may be concluded that the Vaunthompsoniinae are a family of temperate latitudes, predominating in the south.

Again, 81% of the records are from depths less than 200 m, indicating that the subfamily belongs predominantly to the shelf fauna, with some elements, particularly members of the genus *Cumopsis*, now occupying the infratidal fringe, and some, particularly *Bathycuma* and *Gaussicuma*, the bathyal and abyssal zones.

DISTRIBUTION OF THE SOUTH AFRICAN VAUNTHOMPSONIINAE

The southern African coast is washed on the western side by the cold northward-flowing Benguela Current (surface 15°C, bottom 10°C), and the warm Moçambique Current flowing southwards along the east coast (surface 25–27°C, bottom 21°C). The southern coast has the fast-flowing warm Agulhas Current running from north-east to south-west (surface 25°C, bottom 12–14°C), and a

narrow counter-current close inshore. The Cape Peninsula marks the westward extent of the warm tongues of Agulhas water which occasionally penetrate into False Bay (surface 15°C, bottom about 12°C). The boundary between Agulhas and Benguela water is not stationary, so that False Bay may also receive cold Benguela water at other times of the year. Thus generally animals from the west coast are cold-water forms, and those from the south and east coasts (including False Bay), warm-water forms. It is frequently found that animals occurring in fairly shallow water on the cold west coast inhabit deeper waters on the south coast due to the increased temperature of the Agulhas water (Day *et al.* 1970). Seven of the eleven species and subspecies of Vaunthompsoniinae in these waters are confined to one or other coast, suggesting that their distribution may be largely temperature-dependent.

The only inter- and infra-tidal species, *Cumopsis robusta*, which belongs to a predominantly intertidal genus, has only been found in False Bay and on the west coast, and is therefore endemic. The anatomically related *Heterocuma* is a shelf genus. *H. africanum intermedium* occurs in fairly large numbers in False Bay (maximum depth just less than 90 m) to a depth of 66 m, and has also been found in 27 m on the west coast. The same species has also been recorded twice from the south coast in 84 to 91 m—an example of shallower depth range on the west coast. It has also been recorded from shallow waters off tropical West Africa. It is thus a warm-water Atlantic form, and is the only species represented by more than 12 specimens in the present collection. *H. africanum africanum* has only been found off Natal in 43 m, as well as in the Indian Ocean and tropical West African waters.

Pseudosympodomma africanum is endemic, being found at a depth of 370 m off the Cape Peninsula, and also at 85 and 135 m off the east coast.

The *Bathycuma/Hypocuma/Vaunthompsonia* group is divided not only taxonomically but also ecologically, *Bathycuma* generally occurring at very great depths, the two species of *Hypocuma* at 400 and 1 934 m and *Vaunthompsonia* at less than 250 m. *Bathycuma*, represented by three species and 17 specimens, can be divided into a group living in fairly deep water off the Cape (*B. datum* and *B. capense*), and *B. natalense* with the rather peculiar depth distribution from 15 to 400 m off Natal. The depth range of all three species is rather shallow, since *Bathycuma* is generally a typically bathyal genus. *Hypocuma dentatum*, represented by only four specimens in a single sample, appears to be a deep-water endemic form. Although three species of *Vaunthompsonia* are present, they are represented by only six specimens, so that numerically, members of the genus are only scantily represented in these waters. The three species do not overlap in range, and the distribution of each necessarily appears narrow due to the paucity of specimens. *V. natalensis* has been found only on the south and east coasts, *V. cristata* in False Bay, and *V.* sp. on the west coast.

Thus the fauna can be divided into three groups:

1. Cold-water forms occurring on the west coast only—*Hypocuma dentatum*, *Bathycuma datum* and *Vaunthompsonia* sp.

2. Warm-water forms occurring on the south and east coasts only—*Bathycuma natalense*, *Vaunthompsonia natalensis* and *Heterocuma africanum africanum*.
3. Forms occurring around the coast, or including False Bay in their range—*Pseudosympodomma africanum*, *Bathycuma capense*, *Vaunthompsonia cristata*, *Heterocuma africanum intermedium* and *Cumopsis robusta*.

The present collection contains at least two thousand specimens of the Bodotriidae. All but 77 of these are Bodotriinae, representing an estimated 18–20 species, giving a specimen : species ratio of at least 100 : 1. The 77 Vaunthompsoniinae represent 11 species, giving a very high ratio of 7 : 1. Thus the subfamily exhibits a very high diversity in these waters. There is also a high rate of endemism. Of the ten named species and subspecies, only three—*Vaunthompsonia cristata*, *Heterocuma africanum africanum* and *H. a. intermedium*—are not endemic. Thus 70% of the species are endemic, with a link to the tropical West African fauna in the form of the two subspecies of *H. africanum*, while *V. cristata* is cosmopolitan.

SUMMARY

Nine species of the southern African members of the subfamily Vaunthompsoniinae are described and figured. Of these, *Hypocuma dentatum*, *Cumopsis robusta*, *Bathycuma datum* and *Vaunthompsonia natalensis* are new species. *Heterocuma africanum africanum* and *H. a. intermedium* are newly designated subspecies. The females of *Bathycuma capense*, *B. natalense* and *Pseudosympodomma africanum* are described for the first time, *P. africanum* also being allocated to a different genus. A specimen of *Vaunthompsonia* is briefly described and figured, but not named. It is found that the subfamily is represented in southern Africa by ten species in six genera.

The general distribution of the Vaunthompsoniinae is discussed, and a more detailed account is given of the distribution of its southern African members. It is concluded that this subfamily in southern African waters has a high rate of endemism and a high diversity, but a very low frequency of occurrence.

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Jennifer Day

SOUTH AFRICAN CUMACEA

PART 1

FAMILY BODOTRIIDAE, SUBFAMILY VAUNTHOMPSONIINAE

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ANNALS

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SOUTHERN AFRICAN CUMACEA

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By

JENNIFER DAY

Cape Town Kaapstad

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SOUTHERN AFRICAN CUMACEA

PART 2

FAMILY BODOTRIIDAE, SUBFAMILY BODOTRIINAE

By

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Zoology Department, University of Cape Town

(With 48 figures and 3 tables)

[*MS. accepted 18 January 1978*]

ABSTRACT

The Bodotriinae in southern Africa are represented by 34 species in 9 genera. 31 of these species are described and figured. 3 of the genera (*Alticuma*, *Austrocuma* and *Mossambicuma*) are new, as are 16 of the species (*Eocuma foveolatum*, *E. winri*, *E. aculeatum*, *Cyclaspoides pellucidus*, *Mossambicuma elongatum*, *Austrocuma platyceps*, *Alticuma bellum*, *Iphinoe producta*, *Cyclaspis scissa*, *C. australora*, *Bodotria clara*, *B. nitida*, *B. tenuis*, *B. falsinus*, *B. serica* and *B. vertebrata*). *B. vertebrata* is divided into two subspecies. The females of *I. dayi* and *Iphinoe? zimmeri* are described for the first time, as are the males of *A. carinata*, *C. spectabilis*, *B. magna* and *B. montagui*. *Alticuma carinatum* and *Iphinoe capensis* are allocated to different genera and *Iphinoe? zimmeri* is considered to be *incertae sedis*.

Keys are given to the genera of the Bodotriinae, the southern African species in the subfamily, the world species of *Eocuma* and the African and European species of *Iphinoe* and *Bodotria*.

The general distribution of the Bodotriinae is discussed and a more detailed account is given of the subfamily in southern African waters. It is concluded that the genera *Bodotria* and *Iphinoe* are the most successful in this region, contributing more than half of the species and 93 per cent of the individuals. The Bodotriidae in general and the Bodotriinae in particular are the most successful of the cumacean families in these waters.

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Ann. S. Afr. Mus. **75** (7), 1978: 159–290, 48 figs, 3 tables.

INTRODUCTION

This is the second in a series of papers on the Cumacea of Africa south of 20°S. The reader is referred to the first in the series (Day 1975) for a discussion of the structure and terminology of Cumacea in general, as well as a report on the taxonomy and distribution of the subfamily Vaunthompsoniinae in these waters.

There has been little previous work on the southern African Bodotriinae, and the cumacean fauna of the region is generally poorly known. The few earlier descriptions are to be found in: Zimmer's (1908) paper on the material from the Deutsches Tiefsee-Expedition and his report on the collection in the Berlin Zoologisches Museum (Zimmer 1921); two papers by Stebbing (1910, 1912); Fage's (1951) report on material from the Belgian Oceanographic Expedition; Jones's (1956) report on material from the *Atlantide* and *Galathea* Expeditions, and two papers on material collected by the Zoology Department of the University of Cape Town (Hale 1953; Jones 1960).

MATERIAL AND STATION DATA

The vast majority of samples used in this study was collected by the Zoology Department of the University of Cape Town (UCT) during a benthic survey round the South African coast, the programme being funded by the Oceanographic Research Institute of the Council for Scientific and Industrial Research (CSIR) and headed by J. H. Day. Other material was obtained from: the South African Museum, mostly collected by the S.S. *Pieter Faure* in 1898–1907 and the R.V. *Meiring Naude* in 1976–1977; the National Institute for Water Research of the CSIR; the Sea Fisheries Branch in Cape Town; a survey of Richards Bay conducted by the Port Elizabeth Museum; a survey of Lake St Lucia conducted by the Zoology Department of Rhodes University.

Due to the numerous samples and sources of material it is unpractical to list exact station data for each species. Thus in the distribution records the area of collection and the institution providing the material are designated by code letters and only extremities of range and depth are given. Table 1 lists the code letters and their geographical positions. These are also shown graphically in Figure 1.

METHODS

Collections: estuarine material was collected by means of plankton nets of various kinds and most benthic samples by grabs or dredges. A few of the UCT samples from the shallower stations at Lambert's Bay, Saldanha Bay, Still Bay and Langebaan Lagoon were obtained by means of a diver-operated suction-sampling device.

Length measurements were taken from the anterior tip of the carapace to the posterior edge of the telsonic somite. Exhalant siphons and uropods were excluded in every case.

TABLE 1

Code letters of the survey programmes and their geographical ranges.

Institute	*Area*	*Explanation*	*Geographical position*
UCT		*University of Cape Town*	
	SWD	South West Africa benthic survey	Cape Cross (21°S 13°E) to Orange River Mouth (28°S 16°E)
	WCD	West coast benthic survey	Orange River Mouth (28°S 16°E) to Cape Agulhas (34°S 20°E)
	LBT	Lambert's Bay benthic transect	Lambert's Bay, shore to 800 m (32°S 18°E)
	SB	Saldanha Bay benthic survey	Saldanha Bay (32°S 17°E)
	LB	Langebaan Lagoon benthic survey	Langebaan Lagoon (33°S 18°E)
	FAL	False Bay benthic survey	False Bay (34°S 18°E)
	FBY	False Bay benthic transect	False Bay, shore to 84 m (34°S 18°E)
	SST	Still Bay transect	Still Bay, shore to 200 m (34°S 21°E)
	SCD	South coast benthic survey	Cape Agulhas (34°S 20°E) to Natal border (31°S 30°E)
	KNY	Knysna estuarine survey	34°S 23°E (plankton)
	CP	Cape Peninsula shore survey	34°S 18°E
	CPR	Cape Province shore survey	Orange River Mouth (28°S 16°E) to Umtamvuna River Mouth (31°S 30°E)
NIWR		*National Institute for Water Research*	
	COD	benthic coastal survey near Durban	30°S 30°E
	BLL	grid of benthic stations off Durban	29°S 31°E
	CON	*Morrumbene estuarine survey*	Morrumbene estuary, Mozambique (23°S 35°E: plankton)
SAM		*South African Museum*	various (see text for details)
RU		*Rhodes University* (*Zoology Dept.*)	Lake St Lucia, Zululand (28°S 32°E: plankton)
PEM		*Port Elizabeth Museum*	Richards Bay, Zululand (28°S 32°E: plankton)
FISH		*Sea Fisheries Branch*	South West Africa (20°S 12°E: plankton)
BMNH		*British Museum* (*Natural History*)	Hermanus, shore (34°S 19°E)

SYSTEMATICS

Family **Bodotriidae** Scott, 1901

Diagnosis

No free telson. Pleopods (males only) with an outer process to the inner ramus—usually five pairs, but may be two or three. Mandibles narrow at base. Endopod of uropod 1- or 2-segmented. Branchial apparatus without gill-plates or supports.

Remarks

The family was divided by Hale (1944*b*) into two subfamilies according to the number of thoracic limbs bearing exopods. The Vaunthompsoniinae are characterized by having exopods on pereiopods other than the first pair and the southern African representatives of this subfamily were dealt with in the first paper in this series (Day 1975).

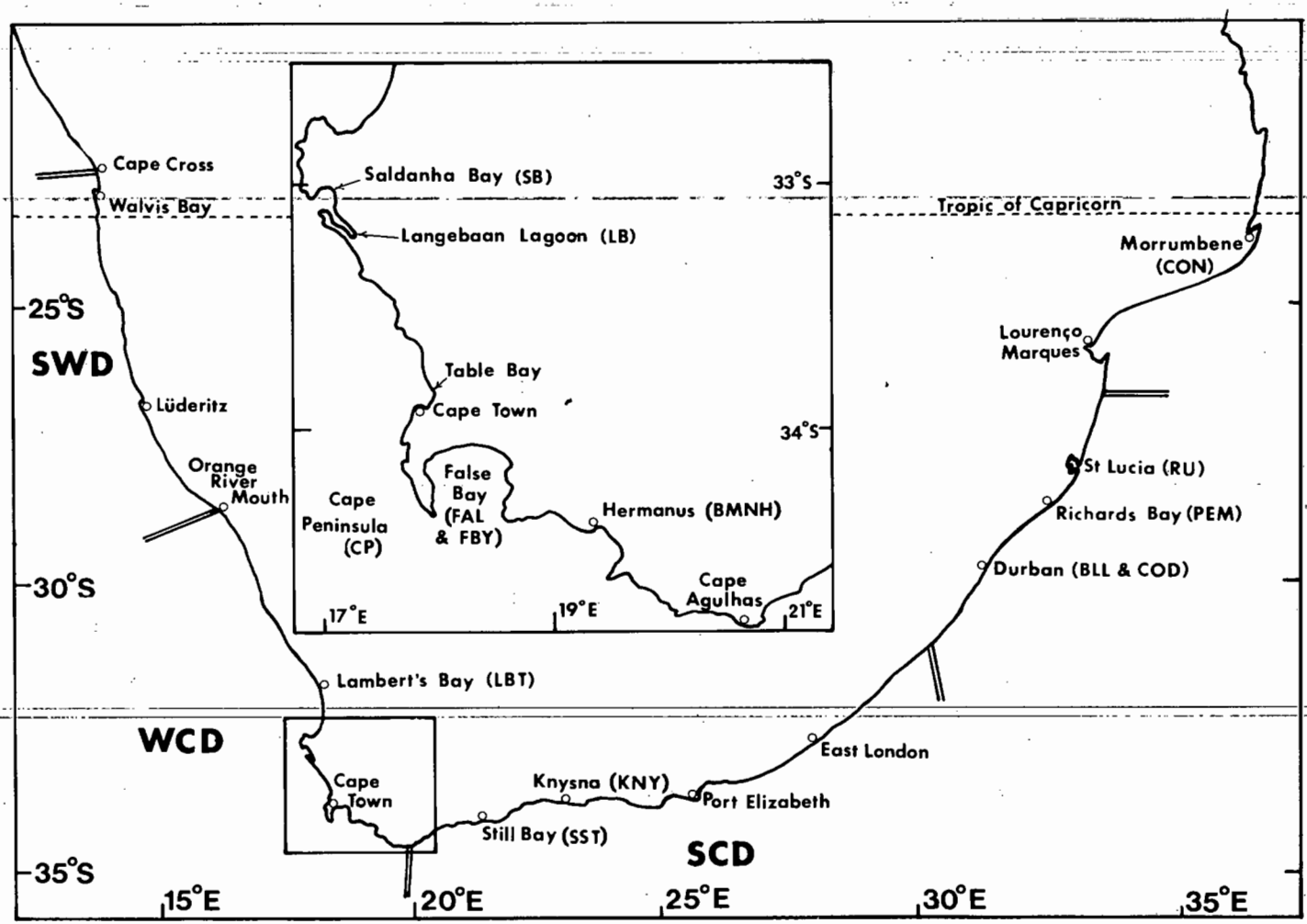

Fig. 1. Southern Africa south of 20°S:
collecting areas and corresponding code letters. Double lines indicate borders of code areas. Inset: south-western Cape.

Subfamily **Bodotriinae** Hale, 1944

Diagnosis

Bodotriidae with exopods only on the third maxilliped and first pereiopod in both sexes.

Remarks

The genera of the Bodotriinae form a fairly homogeneous and apparently natural group. The subfamily up to now has consisted of eight genera, all related morphologically and similar in general appearance. *Stephanomma* is a monotypic genus, known only from a single specimen in the West Indies, characterized by the absence of pseudorostral lobes. *Zygosiphon*, also monotypic, is known from a few specimens from Indo-China and is characterized by the pseudorostral lobes being produced laterally to accommodate the widely divergent branchial siphons. Representatives of all the other genera occur in the present collection, as well as specimens which do not fit into any known genus. Since generic boundaries are already tenuous in most cases, it is felt that less confusion will result from the erection of new genera than from the expansion of the definitions of existing ones.

A small number of individuals from Morrumbene estuary in Mozambique are in some respects similar to *Eocuma*, while in others they are quite distinct. They have been placed, rather hesitantly, in a new genus, *Mossambicuma.*

There are also some specimens of a single species in which the male has only three pairs of pleopods. Since this character is unique in the subfamily they too must be separated, and are placed in the new genus *Austrocuma.*

Representatives of *Cyclaspis carinata* Zimmer, 1921 occur in the collection. Further examination shows them to be quite atypical for the genus: the second pereiopod is 7-segmented, while the first pedigerous somite is quite clearly visible in both sexes and the endopod of the uropod is 2-segmented. A new genus, *Alticuma*, has therefore been created for them and for a second similar species found in deep water in the southern Mozambique Channel.

The *Bodotria–Iphinoe–Cyclaspis* group consists of a continuum of species which are separated into three genera on the basis of the number of free pedigerous somites and of segments of pereiopod 2 and of the endopod of the uropod. Thus *Iphinoe* has five free pedigerous somites, the second pereiopod is 6-segmented and the endopod of the uropod 2-segmented. *Cyclaspis* has four visible pedigerous somites, the second pereiopod is 7-segmented and the endopod of the uropod 1-segmented. *Bodotria* has four visible pedigerous somites, the second pereiopod is 6-segmented and the endopod of the uropod 1- or 2-segmented. But generic distinctions are not absolute, for in the females of some species of *Cyclaspis* the first pedigerous somite may be visible and in *Bodotria* the fusion of the ischium of pereiopod 2 with the basis is not always complete, so that it is sometimes difficult to say with certainty whether the limb is 6- or 7-segmented.

TABLE 2. Diagnostic characters of the genera of the Bodotriinae

	Iphinoe	*Alticuma* gen. nov.	*Zygosiphon*	*Austrocuma* gen. nov.	*Cyclaspis*	*Stephanomma*
First pedigerous somite visible?	yes	yes	yes	in ♀ only	no (except in some ovig. ♀♀)	yes
width of second pedigerous somite	moderate (♂) to wide (♀)	moderate	moderate	moderate (♂) to very wide (♀)	narrow	moderate
number of segments of pereiopod 2	6	7	7	6	7	7
number of segments of endopod of uropod	2	2	2	1	1	1
length of peduncle of uropod in relation to rami	equal or longer	longer	longer	equal	variable	much longer
length of peduncle of uropod in relation to telsonic somite	longer	longer	longer	much longer	variable	much longer
length of pseudorostral lobes	moderate to long	short to moderate	long, divergent	very short	short to very short	none
body form	slender	slender to moderate	moderate	short, flat, very wide	very variable	moderate
ornamentation	frequently middorsal carina, often serrate	variable	none	none	variable—plain, highly ornate or moderately so	none
other features of diagnostic value	ventral thoracic sternites of ♂ frequently complex	none	branchial siphons widely divergent	♂ with three pairs of pleopods	none	no pseudorostral lobes

TABLE 2. Diagnostic characters of the genera of the Bodotriinae (*Continued*)

	Mossambicuma gen. nov.	*Bodotria*	*Eocuma*	*Upselaspis*	*Cyclaspoides*
First pedigerous somite visible?	no	no	no	no	no
width of second pedigerous somite	moderate	moderate in ♂, very wide in ♀	narrow (may fuse with carapace)	wide in ♀, very narrow or under carapace in ♂	under carapace in ♀, visible laterally only in some ♂♂
number of segments of pereiopod 2	6	6	6	6	6
number of segments of endopod of uropod	1	1–2	1	2	1–2
length of peduncle of uropod in relation to rami	shorter	longer	much shorter	subequal	shorter
length of peduncle of uropod in relation to telsonic somite	shorter or subequal	much longer	much shorter	longer	much shorter
length of pseudorostral lobes	moderate	short to very short	short to moderate	short	long
body form	elongate	moderate to stout	elongate	moderate	abdomen short, carapace relatively long
ornamentation	none	often with one or more pairs of lateral carinae	usually dorsoventrally flattened and/or with lateral horns	none	carapace laterally compressed with middorsal carina
other features of diagnostic value	none	none	basis of pereiopod 1 produced to a point distally	none	third pedigerous somite under carapace at least laterally

However, the species of both *Iphinoe* and *Bodotria* are generally rather characteristic of their genera, those of *Iphinoe* usually being slender and elongate with long pseudorostral lobes and of *Bodotria* being more compact and frequently bearing one or more pairs of lateral carinae and very short pseudorostral lobes. One of the species occurring in considerable numbers in the present collection was named *Iphinoe zimmeri* by Stebbing (1910) on the basis of a single adult male. Although in external appearance and in details of the limbs it quite clearly belongs to *Iphinoe*, since the first pedigerous somite is invisible it should by rights be placed in *Bodotria*, which is plainly unsatisfactory. It is therefore considered to be *genus incertus* and is called '*Iphinoe? zimmeri*'.

The main problem in *Bodotria* seems to be less a matter of generic than of specific boundaries. Many of the numerous species are very similar to one another and may well prove to be genetic morphs rather than valid species.

Cyclaspis is a very variable genus, the carapace of some species being highly ornamented and of others quite unadorned, while the proportions of the segments of the uropods to the telsonic somite vary far more than they do in other genera. Added to this, *Cyclaspis* has a large number of species (about 80) and could profitably be split into two or more genera of roughly equal numbers. There does not, however, seem to be any satisfactory means of doing so since the ornamentation, which is the most striking polymorphic feature, does not correspond uniformly with any other obvious distinguishing characters.

Within *Cyclaspis* there is one small group of species (*subgrandis*, *tasmanica*, *longicaudata*, *gigas* and *spectabilis*) which are clearly related in a number of features, notably the unadorned, more or less spherical carapace, the long telsonic somite, the short peduncle of the uropods and the large basis of maxilliped 3. They also tend to be deep-water forms. However, these characters, which are quite distinctive in the species mentioned, are to be found to a lesser degree in some of the more typical species. As a result it would be necessary to examine representatives of a large number of species quite closely in order to decide whether, in fact, those mentioned above could satisfactorily be removed to a new genus. This could well be one of the more useful applications of numerical taxonomy.

Table 2 (see page 164) lists the diagnostic characters of the genera of the Bodotriinae, which are also keyed below.

KEY TO THE GENERA OF BODOTRIINAE

1 Second pereiopod 7-segmented (ischium not at all fused with basis).....2
– Second pereiopod 6-segmented (ischium at least partly fused with basis).....4
2 No pseudorostral lobes.....*Stephanomma* Sars, 1871
– Pseudorostral lobes widely divergent.....*Zygosiphon* Calman, 1905
– Pseudorostral lobes normal, anteriorly directed.....3
3 First pedigerous somite visible at least dorsally in male, dorsally and laterally in female; endopod of uropod 2-segmented.....*Alticuma* gen. nov.
– First pedigerous somite never visible in male, sometimes visible dorsally in ovigerous female; endopod of uropod 1-segmented.....*Cyclaspis* Sars, 1865

4 First pedigerous somite visible in both sexes; endopod of uropod 2-segmented; male with five pairs of pleopods ..... *Iphinoe* Bate, 1856
– First pedigerous somite visible in female only; endopod of uropod 1-segmented; male with three pairs of pleopods ..... *Austrocuma* gen. nov.
– First pedigerous somite visible in neither sex; endopod of uropod 1- or 2-segmented; male with five pairs of pleopods 5
5 Gut coiled; pedigerous somites 2 and 3 incorporated under carapace at least dorsally in both sexes ..... *Cyclaspoides* Bonnier, 1896
– Gut straight; pedigerous somite 3 always free and visible in both sexes; pedigerous somite 2 visible in female, sometimes fused with or incorporated under carapace in male 6
6 Peduncle of uropods no more than half length of rami 7
– Peduncle of uropods equal in length to, or longer than, rami* 8
7 Third segment of antenna 1 longest; basis of pereiopod 1 not distally produced *Mossambicuma* gen. nov.
– Third segment of antenna 1 no longer than first; basis of pereiopod 1 distally produced to a point ..... *Eocuma* Marcussen, 1894
8 Lateral carinae frequently present on carapace; second pedigerous somite always visible in both sexes (often as wide as deep in female, half as wide as deep in male); peduncle of uropod much longer than rami* ..... *Bodotria* Goodsir, 1843
– Carapace without lateral carinae; second pedigerous somite free in female (about half as wide as deep), incorporated under carapace in male or else very narrow; peduncle of uropod subequal in length to rami ..... *Upselaspis* Jones, 1955

*Peduncle of uropod subequal in length to rami in *Iphinoe? zimmeri*.

KEY TO THE SOUTHERN AFRICAN BODOTRIINAE

Taxonomically accurate keys to both genera and species are often difficult for the inexperienced to follow. Since such keys also frequently require examination of adult animals of both sexes and details of appendages which may be missing, the following key is provided for convenience. It should be noted, however, that although this key will separate all species found to date in southern African waters, it will *not* necessarily distinguish them from species in other areas. The key is based almost entirely on characters of those parts of the body that are least likely to be damaged or missing, so that although it can be used to identify damaged animals, it is *not* as rigorous as the keys to individual genera and species, which should always be consulted for final identification.

1 Carapace with one or more pairs of longitudinal ridges (carinae) or depressions lateral to midline (Figs 4A, 26A, 41A) 2
– Carapace with paired carinae (Fig. 15A), horns (Fig. 5B) or depressions (Fig. 6A) lateral to midline, but none running longitudinally 15
– Carapace without paired carinae, horns or depressions lateral to midline (Figs 2A, 13A), although dorsal outline may undulate (Fig. 37A) 18
2 Carapace very strongly depressed dorsoventrally, lateral carina forming plate-like edge and produced anterolaterally to form a pair of rounded projections visible in dorsal view *Eocuma winri* (Fig. 4)
– Carapace not strongly depressed dorsoventrally; carinae neither platelike nor forming horns 3
3 Carapace with one or more pairs of shallow longitudinal grooves or depressions but lacking lateral carinae 4
– Carapace with no more than one pair of longitudinal depressions; at least one pair of lateral carinae present (Fig. 12A) 5
4 All five pedigerous somites visible dorsally; a number of shallow longitudinal grooves present on either side of carapace ..... *Iphinoe crassipes* (Figs 26–27)

– Only four pedigerous somites visible dorsally; a single shallow longitudinal groove present on either side of carapace..... *Mossambicuma elongatum* (Figs 10–11)

5 Two pairs of lateral carinae on at least part of carapace (Fig. 43A, N) (lower one may be secondary, forming ventral edge of continuous midlateral depression (Fig. 43A) at least anteriorly)..... 6

– A single pair of lateral carinae on carapace (Fig 45A, E); midlateral depression, if present, not bounded anteroventrally by continuous secondary carina (Fig. 46A, I)..... 9

6 Dorsal parts of free pedigerous somites laterally compressed, forming narrow plates *Bodotria clara* (Figs 34–35)

– Free pedigerous somites not compressed, not forming narrow plates dorsally..... 7

7 Carapace more than twice as long as deep..... *Bodotria tenuis* (Fig. 42)

– Carapace less than twice as long as deep..... 8

8 Carapace of female wider than long, of male less than one and a quarter times as long as wide; carpus of pereiopod 1 less than three times as long as wide.. *Bodotria falsinus* (Fig. 43)

– Carapace of both male and female at least one and a half times as long as wide; carpus of pereiopod 1 at least four times as long as wide..... *Bodotria australis*

9 Carapace about as wide as long and more than one and a half times as wide as deep, making animal conspicuously flat above; male with three pairs of pleopods..... *Austrocuma platyceps* (Fig. 12)

– Carapace longer than wide and less than one and a half times as wide as deep; male with five pairs of pleopods..... 10

10 Second pedigerous somite carinate laterally..... *Bodotria montagui* (Fig. 41)

– Second pedigerous somite not carinate laterally..... 11

11 Distal prolongation of basis of maxilliped 3 pointed, reaching well beyond insertion of carpus on merus; carapace distinctly more than twice as long as deep; lateral carina present on anterior part of carapace only..... *Bodotria glabra*

– Distal prolongation of basis of maxilliped 3 rounded, hardly or not reaching insertion of carpus on merus (Fig. 39E); carapace no more than twice as long as deep; lateral carinae variable..... 12

12 Pedigerous somites 4 and 5 elevated to a point dorsally (more distinct in female than male—Figs 44A, E)..... 13

– Pedigerous somites 4 and 5 not elevated dorsally in either sex (Fig. 46A, I)..... 14

13 Lateral carina reaching posterior border of carapace with a longitudinal row of rounded depressions below..... *Bodotria vertebrata vertebrata* (Fig. 44)

– Lateral carina not reaching posterior border of carapace; no rounded depressions below *Bodotria vertebrata semicarinata* (Fig. 45)

14 Second pedigerous somite strongly elevated to a point dorsally in female and juvenile; lateral carina sinuous, most evident along midregion of carapace; integument often strongly calcified..... *Bodotria elevata* (Figs 39–40)

– Second pedigerous somite never elevated dorsally in either sex; lateral carina straight, evident along almost entire length of carapace; integument usually silky and never strongly calcified..... *Bodotria serica* (Fig. 46)

15 Carapace with a pair of oblique ridges, depressions or slashes running from middorsal line towards ventrolateral edge (Figs 15A, 32A)..... 16

– Carapace without oblique irregularities (Fig. 6A)..... 17

16 Caraplace slashed by transverse groove..... *Cyclaspis scissa* (Fig. 32)

– Carapace with raised transverse ridge, faint in adult male, very strong in females and young males..... *Alticuma bellum* (Figs 15–16)

17 Single pair of acutely pointed lateral horns on carapace; integument tuberculate and hairy *Eocuma aculeatum* (Fig. 5)

– Anterolateral edges of carapace produced to level of pseudorostrum to form blunted, horn-like projections; integument slightly wrinkled..... *Eocuma* sp (Fig. 6)

18 Integument strongly pitted or rugose..... 19

– Integument smooth (faint pitting or reticulations may be visible at high magnifications).. 20

19 Integument, especially of carapace, very rugose; second pedigerous somite not narrower than third..... *Bodotria magna* (Fig. 36)

– Integument strongly pitted; second pedigerous somite narrower than third..... *Eocuma foveolatum* (Figs 2–3)

20 Pseudorostral lobes not meeting in front of eyelobe (Fig. 31A).....21
– Pseudorostral lobes meeting in front of eyelobe, even if only for a very short distance (Figs 7B, 47C).....22
21 Dorsal outline of carapace undulating; articulatory peg present between carapace and first free pedigerous somite.....*Bodotria nitida* (Figs 37–38)
– Dorsal outline of carapace smoothly arched; no articulatory peg between carapace and first free pedigerous somite.....*Cyclaspis australora* (Figs 30–31)
22 Carapace at least two and a half times as long as deep.....23
– Carapace less than two and a half times as long as deep.....24
23 Carapace three times as long as deep, circular in cross-section, not serrate middorsally *Iphinoe stebbingi* (Figs 17–18)
– Carapace nearer two and a half times as long as deep, elliptical in cross-section, serrate middorsally.....*Iphinoe producta* (Fig. 21)
24 Pereiopod 2 less than three-quarters length of pereiopod 3....*Iphinoe africana* (Figs 19–20)
– Pereiopod 2 more than three-quarters length of pereiopod 3.....25
25 Middorsal carina evident; carapace elliptical in cross-section (Figs 9C, 13A, D).....26
– Middorsal carina defined poorly or not at all; carapace almost rounded in cross-section (Fig. 7A–B).....28
26 Second pereiopod 7-segmented.....*Alticuma carinatum* (Figs 13–14)
– Second pereiopod 6-segmented.....27
27 Middorsal carina serrate; first pedigerous somite visible in both sexes..... *Iphinoe dayi* (Figs 22–23)
– Middorsal carina not serrate; first pedigerous somite not visible in either sex..... *Cyclaspoides pellucidus* (Figs 8–9)
28 Carapace globose, vaulted dorsally, less than one and a half times as long as deep..... *Cyclaspis spectabilis* (Fig. 33)
– Carapace not globose, not vaulted dorsally, more than one and a half times as long as deep (Figs 7A, 23A).....29
29 Eye absent.....*Upselaspis caparti* (Fig. 7)
– Eye present.....30
30 Prolongation of basis of maxilliped 3 reaching level of insertion of propodus on carpus (Fig. 24F).....31
– Prolongation of basis of maxilliped 3 reaching merus (Fig. 28D).....32
31 Prolongation of basis of maxilliped 3 a quarter its total length.*Iphinoe fagei* (Figs 24–25)
– Prolongation of basis of maxilliped 3 a third its total length.....*Iphinoe senegalensis*
32 Merus and carpus of maxilliped 3 strongly flattened, carpus and propodus widely inserted on preceding segments.....*Iphinoe capensis* (Fig. 29)
– Merus and carpus of maxilliped 3 not strongly flattened, carpus and propodus inserted over little more than half width of preceding segments (Fig. 28D, L).....33
33 Basis of maxilliped 3 less than four times as long as wide, one and a half times length of remaining segments together.....*Iphinoe truncata* (Fig. 28)
– Basis of maxilliped 3 six times as long as wide, twice length of remaining segments together *Iphinoe? zimmeri* (Figs 47–48)

Eocuma Marcussen, 1894

Generic diagnosis

Carapace frequently with lateral horns and/or very distinct lateral carinae, almost always wider than deep. First pedigerous somite always invisible, second frequently fused with carapace. Distal prolongation of maxilliped 3 large and stout, merus frequently greatly expanded. Basis of pereiopod 1 distally produced beyond insertion of ischium. Second pereiopod 6-segmented. Peduncle of uropod much shorter than telsonic somite or rami. Endopod of uropod 1-segmented.

Type species

E. hilgendorfi Marcussen, 1894, from Japan.

Remarks

The genus, consisting of 22 species, is well known. In almost all cases its species can readily be distinguished by distinctive lateral horns and/or carinae. However, one of the new species, *E. foveolatum*, is in most respects quite clearly a member of the genus, yet has neither horns nor carinae in either sex, thus resembling the females of *E. dimorphum* Fage, 1928.

Only a single specimen of *Eocuma* has previously been described from South Africa (Stebbing 1910).

Distribution of Eocuma

Members of the genus are confined to the warmer waters of the eastern hemisphere, being distributed mainly round the coast of Africa (12 species) and Indochina (9 species); 1 species occurs in Australian and 2 in Japanese waters; 3 of the African species are here described as new. Most species in the genus are found in shallow waters less than 50 m in depth, and a few are found as deep as about 100 m. The greatest recorded depth for the genus is vastly increased by the presence of *E. aculeatum* sp. nov. from 550 m off Natal.

KEY TO THE SPECIES OF *EOCUMA*

1 Carapace dorsoventrally flattened, entire lateral border carinate 2
– Carapace rounded or dorsoventrally flattened, but carinate for less than half its length, or not at all 13
2 Carapace in dorsal view with at least one pair of distinct lateral horns or projections 3
– Carapace in dorsal view without distinct lateral horns, but edge may be incised or bear a pair of small teeth 10
3 Second pedigerous somite fused with carapace, unsutured dorsally ..... *dollfusi* Calman, 1907*b*—Mediterranean and Morocco to northern France
– Second pedigerous somite free or sutured dorsally 4
4 Carapace without paired dorsal ridges 5
– Carapace with paired dorsal ridges on posterior half at least 8
5 Basis of pereiopod 1 almost as long as rest of limb ..... *productum* Calman, 1907*a*—Indo-China
– Basis of pereiopod 1 about two-thirds length of rest of limb 6
6 In dorsal view pseudorostrum narrow, carapace tapering smoothly anteriorly from lateral horns in a straight line; horns laterally directed, tips forming widest part of carapace ..... *longicorne* Calman, 1907*a*—Suez
– In dorsal view pseudorostrum wide, carapace rounded anterior to lateral horns; horns anteriorly directed, tips slightly anterior to widest part of carapace 7
7 Pereiopod 2 shorter than basis of pereiopod 3; second and third segments of antenna 1 subequal in length ..... *winri* sp. nov.
– Pereiopod 2 longer than basis of pereiopod 3; second segment of antenna 1 about half length of third segment ..... *taprobanicum* Calman, 1904*a*—Ceylon
8 Eye with at least three corneal lenses ..... *hilgendorfi* Marcussen, 1894—Japan
– Eye without lenses 9
9 Carpus of pereiopod 1 more than twice length of dactyl ..... *stelliferum* Calman, 1907*a*—Indo-China
– Carpus of pereiopod 1 much less than twice length of dactyl ..... *latum* Calman, 1907*a*—Mediterranean, Indo-China, Japan

10 Carapace smooth dorsally with no longitudinal ridges.....*kempi* Kurian, 1954—India
– Carapace with at least one pair of longitudinal ridges.....11
11 Dactyl and propodus of pereiopod 1 of equal length....*cadenati* Fage, 1928—West Africa
– Dactyl of pereiopod 1 little more than half length of propodus.....12
12 Lateral carina of carapace produced anteriorly to form two obtusely rounded lobes *amakuense* Gamô, 1967—Japan
– Lateral carinae incised anteriorly forming a pair of slightly angular lobes..... *cochlear* LeLoeuff & Intes, 1972—West Africa
13 Two pairs of horns forming pointed anterolateral projections..... *calmani* Fage, 1928—West Africa
– One pair of horns laterally or none.....14
14 Horns short, anteriorly directed, reaching anterior tip of pseudorostrum.....15
– Horns laterally directed, not reaching level of pseudorostrum anteriorly, or absent.....16
15 Horns well developed, acutely pointed.....*sarsi* (Kossmann, 1880)—Red Sea
– Horns poorly developed, very short.....*Eocuma* sp.—South Africa
16 Ischium of maxilliped 3 subequal in length to maximal length of merus, or longer.....17
– Ischium of maxilliped 3 no more than half maximal length of merus.....18
17 Dactyl of pereiopod 1 half length of propodus; peduncle of uropod nearly a third length of rami.....*affine* Calman, 1904*a*—India
– Dactyl of pereiopod 1 longer than propodus; peduncle of uropod nearly quarter length of rami.....*agrion* Zimmer, 1914—Australia
18 Basis of pereiopod 1 equal in length to next three segments together; horns present..... *travancoricum* Kurian, 1951–India
– Basis of pereiopod 1 considerably longer than next three segments together; horns present or absent.....19
19 Carpus of pereiopod 1 longer than ischium and merus together; horns present.....20
– Carpus of pereiopod 1 shorter than ischium and merus together; horns present or absent.21
20 Integument smooth; ischium of maxilliped 3 wider than long..... *lanatum* LeLoeuff & Intes, 1972—West Africa
– Integument tuberculate; ischium of maxilliped 3 longer than wide.....*aculeatum* sp. nov.
21 Maximal length of merus of maxilliped 3 little less than twice length of ischium; horns present.....*ferox* (Fischer, 1872)—Mediterranean
– Maximal length of merus of maxilliped 3 nearly three times length of ischium; horns present or absent.....22
22 Tip of basis of pereiopod 1 reaching end of ischium or just beyond; ♂ with horns, ♀ without; pereiopod 2 of ♀ less than half length of pereiopod 3..... *dimorphum* Fage, 1928—West Africa
– Tip of basis of pereiopod 1 reaching along a third length of merus; ♂ and ♀ without horns; pereiopods 2 and 3 of ♀ subequal in length.....*foveolatum* sp. nov.

Eocuma foveolatum sp. nov.

Figs 2–3

Records

			adult ♂	sub. adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
LB	33°S 18°E	5 m	6	5	1	6	2	4	24	13*
FAL	34°S 18°E	15–60 m	5	5	4	4	3		21	20
SST	34°S 21°E	80 m	1	2			3		6	1
SCD	34°S 23°E–33°S 25°E	42–44 m	1			2	2	1	6	3

*Five samples collected by plankton net.

Holotype

Ovigerous female, in the South African Museum, SAM–A15492, collected during the UCT benthic survey, 5 December 1962. Type locality: 44 m, off East London (33°53'S 25°48'E). UCT station number SCD 378L.

Description

Ovigerous female, holotype, length 4,8 mm. Integument marked by fine reticulations interspersed with deep pits, particularly on sides of carapace, and fine hairs causing small particles of debris to stick to entire animal. Carapace (Fig. 2A) smoothly rounded, one and a half times as long as deep, with no trace of lateral horns. Antennal notch (Fig. 2B) small, anterolateral angle obtuse, defined by a small, sharp tooth. Carapace in dorsal view (Fig. 2C) almost oval, not much longer than wide, lacking middorsal carina; middorsal line marked by a shallow indentation. Pseudorostral lobes short, truncate anteriorly. Eyelobe eyeless, rounded, with a few scattered tubercles on surface.

First pedigerous somite invisible. second well defined and not fused with carapace; third and fourth much less elevated dorsally than second, bearing rounded sideplates. Carapace twice length of free pedigerous somites. cephalothorax shorter than first five abdominal somites together. Abdomen very elongate, cylindrical.

Antenna 1 (Fig. 2D) relatively short and stout. Flagellum (Fig. 2E) very short, 1-segmented, with two aesthetascs; accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 2F) stout, basis strongly flexed at mid-point, part distal to point of flexure subequal in length to rest of limb. Distal prolongation long and narrow, reaching articulation of carpus and merus. Merus three times length of ischium, expanded, distal prolongation reaching distal tip of carpus. Carpus, propodus and dactyl subequal in length, cylindrical.

Pereiopod 1 (Fig. 2G) stout, basis slightly longer than remaining segments together, distal projection reaching beyond distal tip of ischium. Distal segments fairly stout, all of similar lengths.

Pereiopod 2 (Fig. 2H) long, 6-segmented; basis subequal in length to rest of limb. Merus and carpus subequal, propodus half length of dactyl.

Pereiopods 3 (Fig. 2I) to 5 similar, dactyl extremely small and unarmed.

Telsonic somite two-thirds length of preceding one, not produced between uropods. Peduncle of uropod (Fig. 2J) very short, as wide as long, little more than half length of telsonic somite, unarmed. First segment of exopod expanded dorsally beyond insertion of second, less than half length of second, armed with a small spine on outer edge. Second segment armed with two long, fine spines on inner edge, seven short spines on outer edge and two complex hooked setae terminally. Endopod 1-segmented, bearing six fine plumose setae on inner edge and one very stout spine terminally.

Adult male, paratype, length 6,7 mm. As female, except as follows: carapace (Fig. 3A) smoothly ovoid, nearly twice as long as deep, slightly flattened dorso-

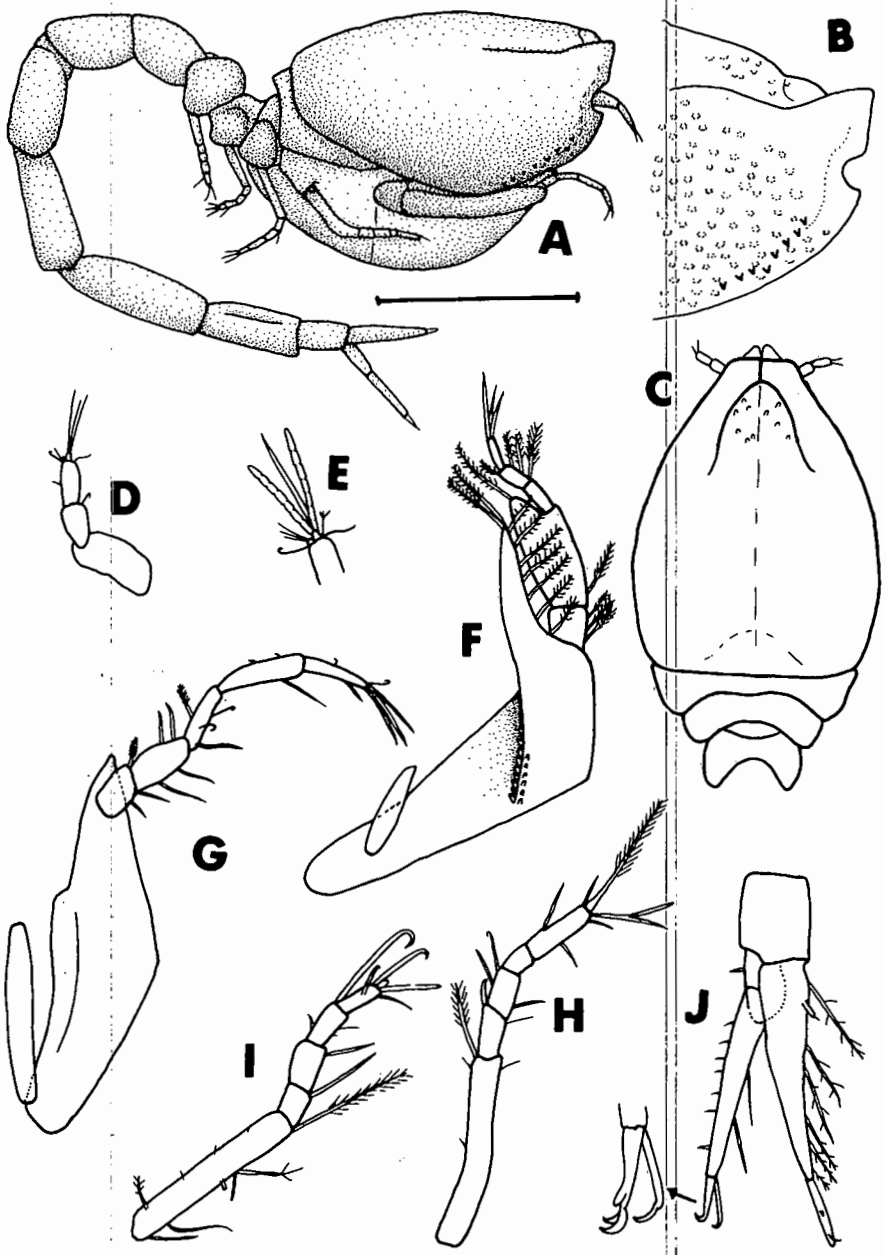

Fig. 2. *Eocuma foveolatum* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Detail of distal tip of antenna 1. F. Maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Uropod.

Scale line = 1 mm for A, C; 0,5 mm for B, D, F–J; 0,25 mm for E.

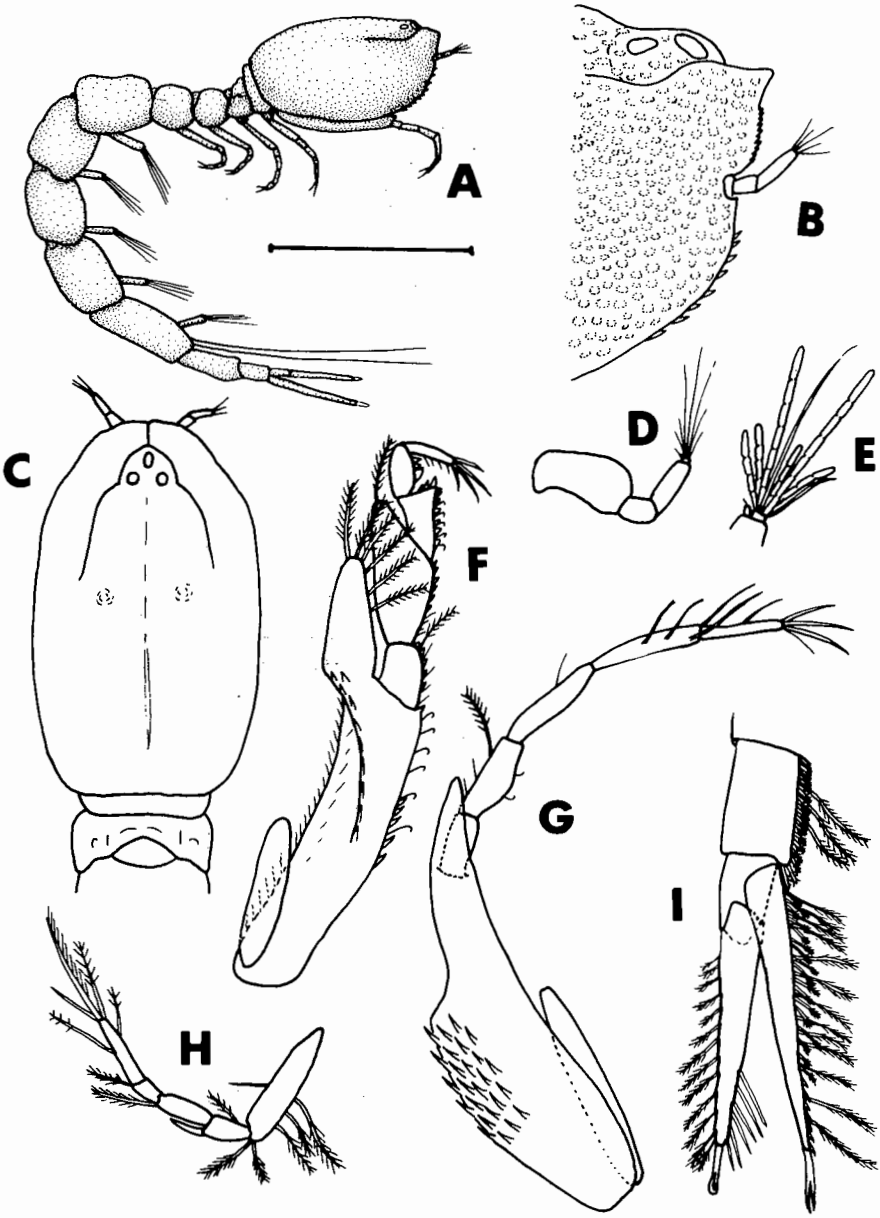

Fig. 3. *Eocuma foveolatum* sp. nov.

Adult male, paratype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Detail of distal tip of antenna 1. F. Maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Uropod.

Scale line = 2 mm for A; 1 mm for C, H; 0,5 mm for B, D, F–G, I; 0,25 mm for E.

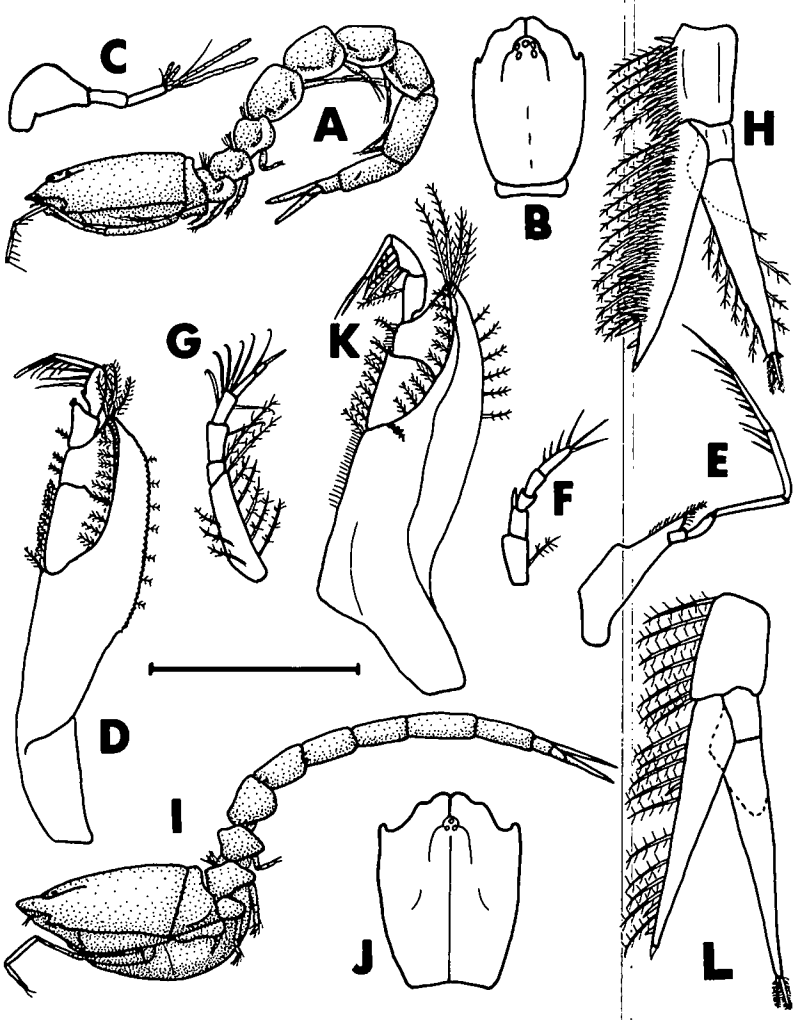

Fig. 4. *Eocuma winri* sp. nov.

Adult male, holotype, A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Uropod. Ovigerous female. I. Lateral view. J. Dorsal view of carapace. K. Maxilliped 3. L. Uropod. Scale line = 4 mm for A, B, I–J; 2 mm for E; 1 mm for D, G–H, K–L; 0,5 mm for C, F.

Pereiopods 3 (Fig. 4G) to 5 similar, basis of pereiopod 3 longest and of pereiopod 5 shortest. Basis and carpus highly setose.

Telsonic somite slightly shorter than preceding one, twice as long as wide, not produced between uropods. Peduncle of uropod (Fig. 4H) short and very stout, less than half length of telsonic somite with five plumose setae and numerous serrate spines in several rows on inner edge. Endopod about two

and a half times length of peduncle, 1-segmented, with eleven plumose setae and numerous serrate spines in several rows on inner edge and a single short, blunt spine terminally. First segment of exopod about a quarter length of second, unarmed; second armed with six plumose setae on inner edge, four on outer edge and two stout ones terminally.

Ovigerous female, length 11,9 mm (slightly damaged), from 80 m off the Natal coast. As male, except as follows: carapace (Fig. 4I) slightly more vaulted posteriorly and wider dorsally (Fig. 4J). Eyelobe smaller and bearing three lenses. Middorsal carina evident on carapace and all subsequent somites except the last. Second pedigerous somite wider, third very small, visible laterally as small flattened sideplate only. Abdominal somites much more slender, cylindrical.

Flagellum of first antenna 2-segmented. Basis of maxilliped 3 (Fig. 4K) very stout, relatively shorter. Distal projection of pereiopod 1 shorter. Pereiopods 3 to 5 less setose. Peduncle of uropod (Fig. 4L) with seven plumose setae in one row on inner edge. Rami slightly longer, second segment of exopod unarmed except for two terminal spines. Endopod with ten plumose setae in one row on inner edge.

Length

Adult male	11,6 mm
Ovigerous female	11,9 mm

Remarks

This species closely resembles *E. taprobanicum* Calman, 1904*a* from Ceylon, and the two may prove to be synonymous. *E. winri* differs from Calman's figures of *E. taprobanicum* in the narrower carapace of the female, the less well-developed lateral horns and the shorter basis of perieopod 1. In particular, pereiopod 2 is much smaller, the basis and merus together being shorter than the rest of the limb and the distal spine on the merus is shorter and weaker. The rami of the uropods are slightly shorter and the first segment of the endopod relatively larger. The differences are not considerable and these individuals may be representatives of a single species occurring from Natal to the tropical Indian Ocean and varying slightly from one end of the range to the other.

Distribution

At present known from the type locality and its vicinity, from 37 to 80 m off the Natal coast. With only six specimens known it is numerically insignificant in comparison with the total number of specimens in the collection, but is fairly common in the Natal material, representing almost 5 per cent of the individuals from this region.

Eocuma aculeatum sp. nov.

Fig. 5

Records

SAM 27°S 32°E 550 m 1 manca

Holotype

Manca, unique, in the South African Museum, SAM-A15491, collected by the South African Museum, 22 May 1974. Type locality: 550 m, in the southern Mozambique Channel (27°59'S 32°40'E). *Meiring Naude* station number SM 86.

Description

Manca, *holotype*, length 6,7 mm. Integument roughened by numerous small tubercles and hairs, especially on cephalothorax and first three abdominal somites. Carapace (Fig. 5A) nearly twice as long as deep, oval in lateral outline, with a single pair of well-developed lateral horns about a third of distance from anterior tip. Pseudorostral lobes (Fig. 5B) rounded, meeting for short distance in front of rounded, eyeless eyelobe. Middorsal line very slightly evident on carapace, not at all behind this.

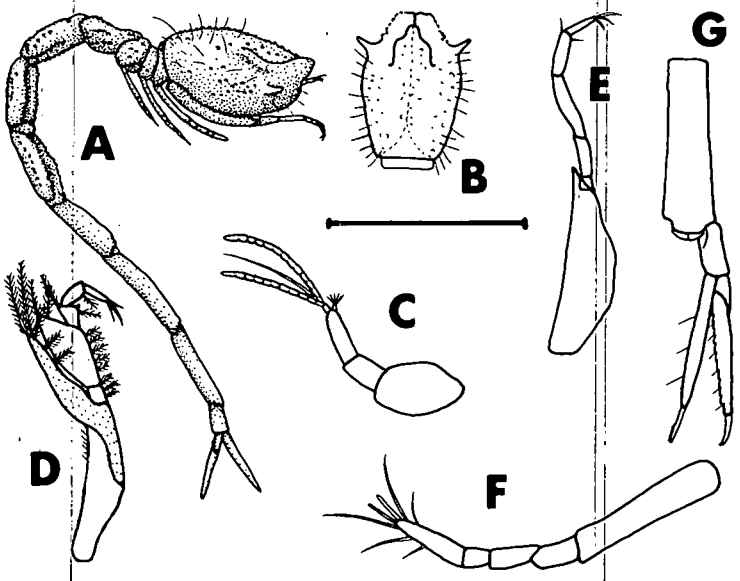

Fig. 5. *Eocuma aculeatum* sp. nov.
Manca, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Telsonic somite and uropod.
Scale line = 2 mm for A–B; 1 mm for D–E, G; 0,25 mm for C, F.

Free thoracic somites together two-thirds length of carapace; second pedigerous somite very narrow but not fused with carapace; third narrow, fourth and fifth with some tubercles, each longer than preceding one. Abdomen very long and slender, twice length of cephalothorax; first three somites tuberculate, a row of tubercles running along the length down each side forming a ventrolateral ridge; last three somites unadorned, slender and translucent. Limbs all covered with very fine detritus.

Antenna 1 (Fig. 5C) of moderate length, first segment stout, twice width of and subequal in length to next two segments. Flagellum 1-segmented with two aesthetascs; accessory flagellum small, 1-segmented.

Basis of maxilliped 3 (Fig. 5D) slender, distal prolongation long and narrow, reaching articulation of merus and carpus distally. Ischium small, merus very long and stout, distally produced to articulation of carpus and propodus. Carpus small, very slightly widened distally.

Pereiopod 1 (Fig. 5E) of moderate length, basis fairly stout, subequal in length to rest of limb, distal point reaching beyond tip of ischium. Merus and propodus subequal in length, carpus longer.

Pereiopod 2 (Fig. 5F) long and slender, 6-segmented. Merus and carpus subequal in length, twice as long as propodus. Dactyl fairly long, subequal in length to carpus and propodus together, armed with a few small spines distally.

Telsonic somite (Fig. 5G) more than three times as long as wide, slightly shorter than uropods, very slightly produced between uropods and wider posteriorly. Peduncle of uropod about twice as long as wide, less than half length of rami, unarmed. First segment of exopod less than a third length of second, unarmed; second slender, serrations on inner margin interspersed with a few very fine setae and a single terminal spine. Endopod with three very fine setae on inner margin and one stout serrate seta terminally.

Length

Manca 6,7 mm

Remarks

The specimen is the only one known from southern Africa in which the carapace bears a pair of acutely pointed lateral horns and yet lacks lateral carinae. It is unique in the genus in the presence of long hairs and tubercles on the integument. Although it is not normally acceptable to describe a new species on the basis of a single immature specimen, there are several good reasons for doing so in this case. Firstly, very little more material is likely to become available from deep waters off the eastern seaboard. Secondly, the specimen is quite distinct from all other members of the genus in the adornment of the integument, is in a good state of preservation, and it should not prove difficult to match up adults of the same species at a later date. Thirdly, its presence adds considerably to the range of depths recorded for the genus.

Distribution

At present known only from the type locality.

Eocuma sp.

Fig. 6

Eocuma sarsi: Stebbing, 1910: 414.

Records

SAM 32°S 28°E 56 m 1 subadult male. *Pieter Faure* station number SAM–A590.

Remarks

Stebbing (1910) identified this specimen as *E. sarsi* (Kossmann, 1880), saying that 'the proportions agree well with Kossmann's figure', but giving no figure or description himself. The author has re-examined the specimen, and perhaps due to the ravages of time, the external features no longer correspond well with either Stebbing's (1913) or Calman's (1904*a*) figures. In fact, it is dissimilar enough to suspect that it does not belong to *E. sarsi*. Since it is the only individual, and in a poor state of preservation, it would be unwise to refer it to a particular species. It is shown in Figure 6, and a very brief description is given below.

The carapace (Figs. 6A, C) is extremely irregular, being considerably narrower dorsally and widening out quite abruptly ventrally. The lateral horns are ill-defined, being merely blunt protrusions reaching the level of the pseudorostrum on either side. The basis of maxilliped 3 (Fig. 6F) is very much produced distally, and the merus extremely large, being little less than half as long as the basis. The distal tip of the basis of pereiopod 1 (Fig. 6G) reaches about two-thirds along the length of the merus. The four distal segments of pereiopod 2 (Fig. 6H) are sub-equal in length; pereiopod 3 (Fig. 6I) appears to be 6-segmented. The peduncle of the uropod (Fig. 6J) is not much shorter than the telsonic somite.

Upselaspis Jones, 1955

Generic diagnosis

First pedigerous somite not visible, second visible in females and some males. Second pereiopod 6-segmented. Endopod of uropod 2-segmented, peduncle subequal in length to rami.

Type species

Upselaspis caparti (Fage, 1951) (as *Cyclaspoides caparti*). The genus is monotypic.

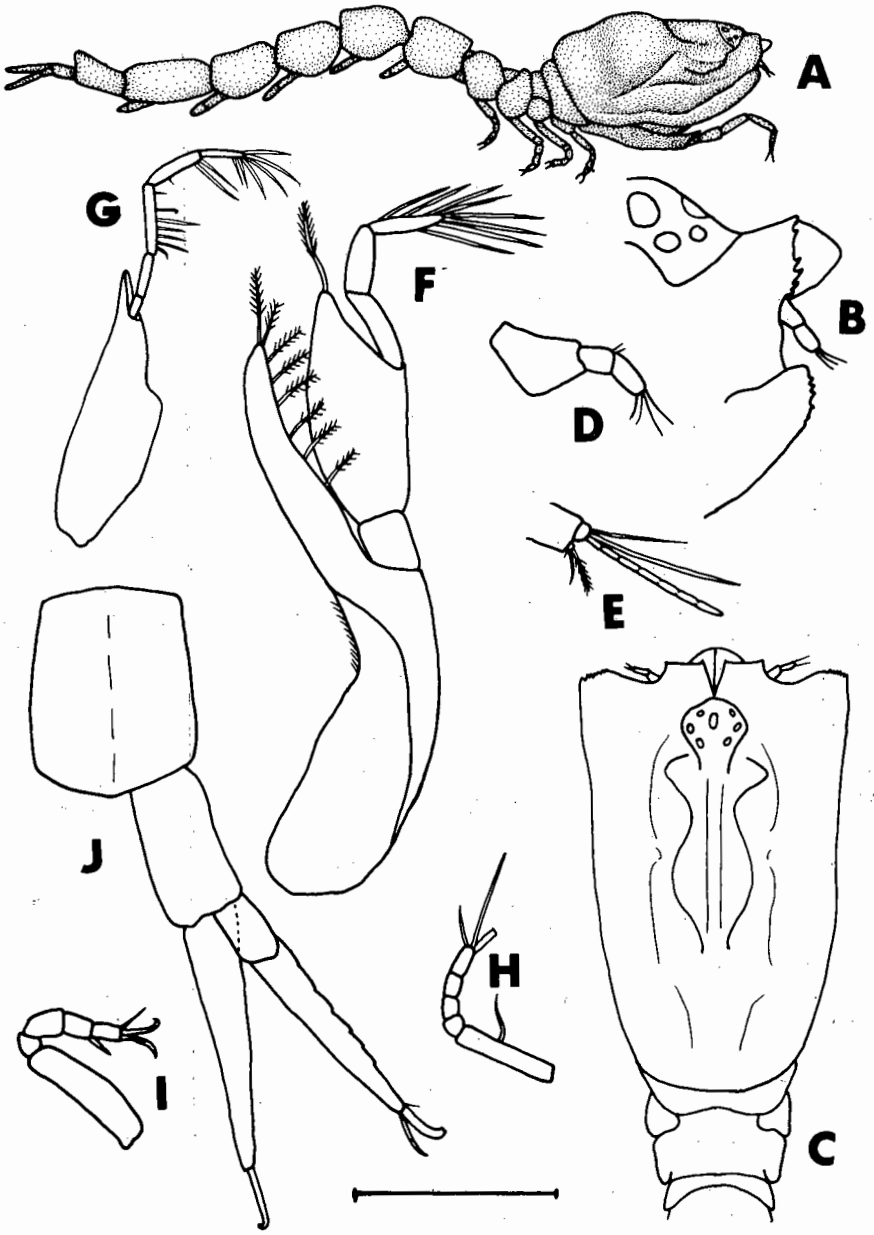

Fig. 6. *Eocuma* sp.

Subadult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Detail of distal tip of antenna 1. F. Maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Telsonic somite and uropod.

Scale line = 2 mm for A; 1 mm for C, G–I; 0,5 mm for B, D, F, J; 0,25 mm for E.

Upselaspis caparti (Fage, 1951)

Fig. 7

Cyclaspoides caparti Fage, 1951: 5–8, figs 2–4.
Upselaspis caparti Jones, 1955: 284; 1956: 197.

Records

			adult ♂	sub-adult ♂	ovig. ♀	♀	juv.	total	no. of records	
WCD	33°S 17°E	78 m	1					1	1	(benthic)
SAM	23°S 14°E	1 m	4	5	6	3	14	32	3	(planktonic)
FISH	20°S 12°E	95–0 m			1			1	1	(planktonic)

Previous records

Near Walvis Bay (22°S 14°E), plankton (Fage 1951; Jones 1955); Sierra Leone Estuary, 10–12 m (Jones 1956).

Syntypes

Males, females and juveniles, deposited by Fage (1951) in the Museé d'Histoire Naturelle, Paris. Type locality: surface plankton haul, near Walvis Bay, South West Africa (22°S 14°E).

Description

Ovigerous female, length 3,4 mm, from Sandwich Harbour (23°S 14°E). Integument slightly roughened, white, thin, with minute pits. Carapace (Fig. 7A) rounded, lacking carinae; deeper anteriorly than posteriorly, more than one and a half times as long as deep at deepest point. Antennal notch moderate, anterolateral angle rounded with very fine serrations below. Pseudorostral lobes (Fig. 7B) meeting for short distance in front of rounded, eyeless eyelobe.

First pedigerous somite invisible, second half as wide as deep, third to fifth produced laterally to form distinct sideplates. Free pedigerous somites together about two-thirds length of carapace. Abdominal somites cylindrical; abdomen subequal in length to cephalothorax.

Antenna 1 (Fig. 7C) elongate, reaching well beyond pseudorostrum. First and third segments subequal in length, second shorter. Flagellum 2-segmented with two aesthetascs. Accessory flagellum relatively long, 1-segmented.

Basis of maxilliped 3 (Fig. 7D) twice length of remaining segments together, strongly angled; distal prolongation short, not reaching articulation of merus and carpus. Merus much expanded externally, distal tip reaching articulation of carpus and propodus.

Basis of pereiopod 1 (Fig. 7E) one and a half times length of rest of limb, lower border with fine hairs, hooks and plumose setae. Last three segments subequal in length.

Pereiopod 2 (Fig. 7F) elongate, almost as long as pereiopod 1, 6-segmented.

Basis subequal in length to remaining segments together.

Pereiopods 3 (Fig. 7G) to 5 similar, each shorter than preceding limb. Ischium and merus short, subequal in length. Dactyl very small on pereiopod 3, apparently absent from pereiopod 5.

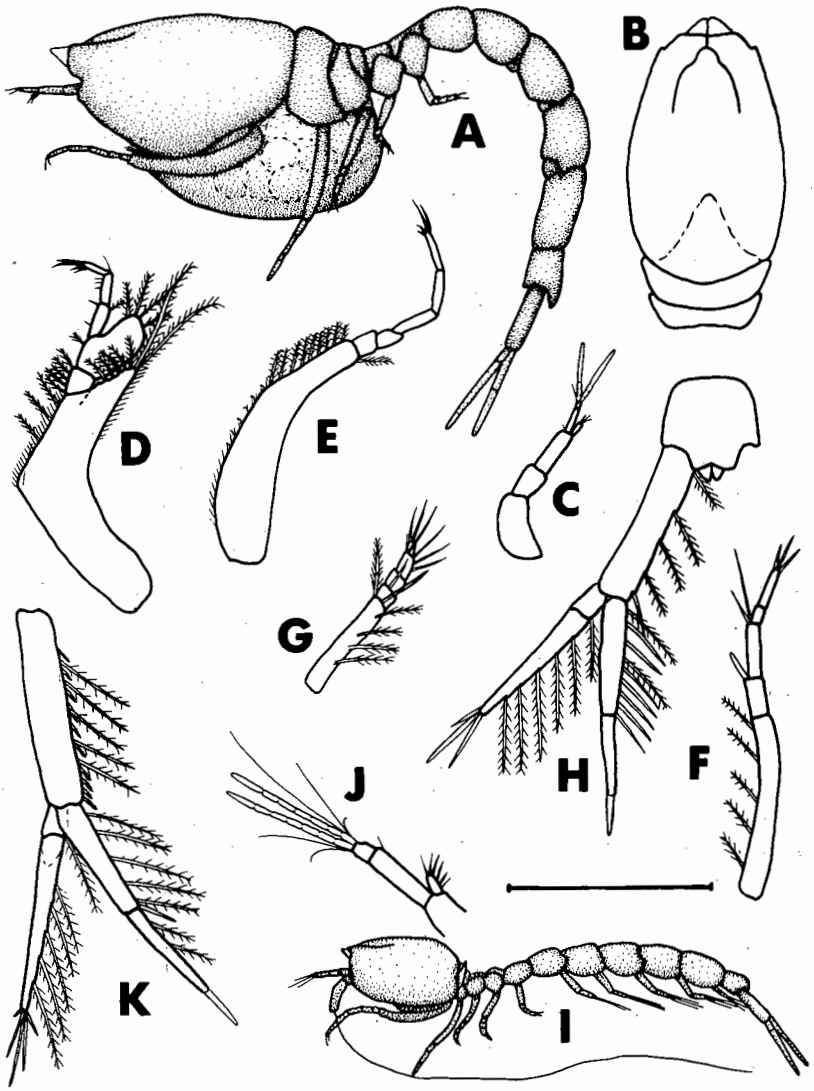

Fig. 7. *Upselaspis caparti*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod. Adult male. I. Lateral view. J. Detail of distal tip of antenna 1. K. Uropod.

Scale line = 2 mm for I; 1 mm for A–B; 0,5 mm for C–H, K; 0,25 mm for J.

Telsonic somite (Fig. 7H) produced between uropods for a short distance, very slightly wider than long. Peduncle of uropod more than one and a half times as long as telsonic somite with four plumose setae and one spine on inner edge. Endopod slightly longer than exopod, first segment longer than second with two plumose setae and seven fine spines on inner edge; second unarmed except for one long stout spine terminally. First segment of exopod less than a quarter length of second with one plumose seta distally on inner edge; second with five plumose setae on inner edge and three slender spines terminally.

Adult male, length 3,8 mm, from Sandwich Harbour. As female, except as follows: integument less translucent. Carapace rectangular in lateral outline (Fig. 7I), a little less than twice as long as deep. Antennal notch and antero-lateral angle wanting. Second pedigerous somite not visible in some, usually very narrow, pointed dorsally and forming very small rounded sideplates laterally; covered anteriorly by posterior edge of carapace. Abdominal somites with sideplates defined ventrally. Abdomen slightly longer than in female.

Flagellum of antenna 1 (Fig. 7J) stouter, bearing several fine setae as well as two aesthetascs. Basis of maxilliped 3 not angled, prolongation of basis narrower and more pointed distally, reaching articulation of merus and carpus. Basis of pereiopod 1 very stout proximally, bearing ten teeth distally on lower edge. Peduncle of uropod (Fig 7K) with five plumose and ten serrate setae. Exopod as in female. First segment of endopod with five plumose setae and one spine; second as long as first with two plumose setae on inner edge.

Length

Adult male	3,8–4,1 mm
Ovigerous female	3,1–3,6 mm

Remarks

The specimens correspond in all details with those described by Fage (1951), except that the second pedigerous somite of the male is sometimes visible, and pereiopods 2 to 5 are relatively longer.

Distribution

Apparently endemic to the coast of west and south-west Africa, usually in estuaries at depths between 1 and 12 m, and usually found off the bottom, although a single benthic specimen is known from 78 m. The presence of this species in Sandwich Harbour constitutes the only records for any cumacean in estuarine conditions in South West Africa. Its distribution appears to be patchy but it may occur in quite large numbers in individual hauls.

Cyclaspoides Bonnier, 1896

Generic diagnosis

Carapace laterally compressed, pseudorostral lobes long. First two or three pedigerous somites incorporated in carapace at least dorsally. Second pereiopod

6-segmented. Telsonic somite long, peduncle of uropod short. Endopod of uropod 1- or 2-segmented. Gut coiled.

Type species

Cyclaspoides sarsi Bonnier, 1896

Remarks

Only one species of Cyclaspoides has previously been reported. The new species is clearly a member of the genus, but since the endopod of the uropod is 2-segmented, the generic diagnosis has been expanded accordingly.

Distribution of Cyclaspoides

C. sarsi is known from the Bay of Biscay (Bonnier 1896) in 950 m and off the coast of Ireland in 698 m (Calman 1905). It is also widely distributed in deep waters of the tropical and northern Atlantic down to 4 934 m (Jones pers. comm.). Calman (1904*a*) tentatively assigned to this species a single specimen from the atrial cavity of an ascidian from Malaya. Until further material becomes available the identity of his specimen must remain in doubt. Since *C. pellucidus* is also a deep-water form, it appears that *Cyclaspoides* is essentially a deep-water genus.

Cyclaspoides pellucidus sp. nov.

Figs 8–9

Records

SAM	34°S 17°E	400 m	1 subadult ♂, 2 ovig. ♀♀ (1 record)
SAM	27°S 32°E	820 m	1 young ♀ (1 record)

Holotype

Ovigerous female, in the South African Museum, SAM–A15490, collected by the S.S. *Pieter Faure* in about 1900. Type locality: approximately 400 m, off the Cape Peninsula (34°25′S 17°50′E). *Pieter Faure* station number SAM–A10602 (PF 17440).

Description

Ovigerous female, holotype, length 5,2 mm. Integument thin, brittle, almost transparent, with fine reticulations. Coiled gut faintly visible. Exhalant siphon elongate, a third as long as carapace. Carapace (Fig. 8A) oval, pseudorostral lobes elongate; antennal notch (Fig. 8B) elliptical, anterolateral angle small, acute, serrated below for a short distance. Eyelobe (Fig. 8C) bluntly rounded, eyeless. Middorsal carina very slightly evident.

First three pedigerous somites fused with carapace dorsally, sideplates of third visible laterally. Free region of thorax very short, about a quarter length

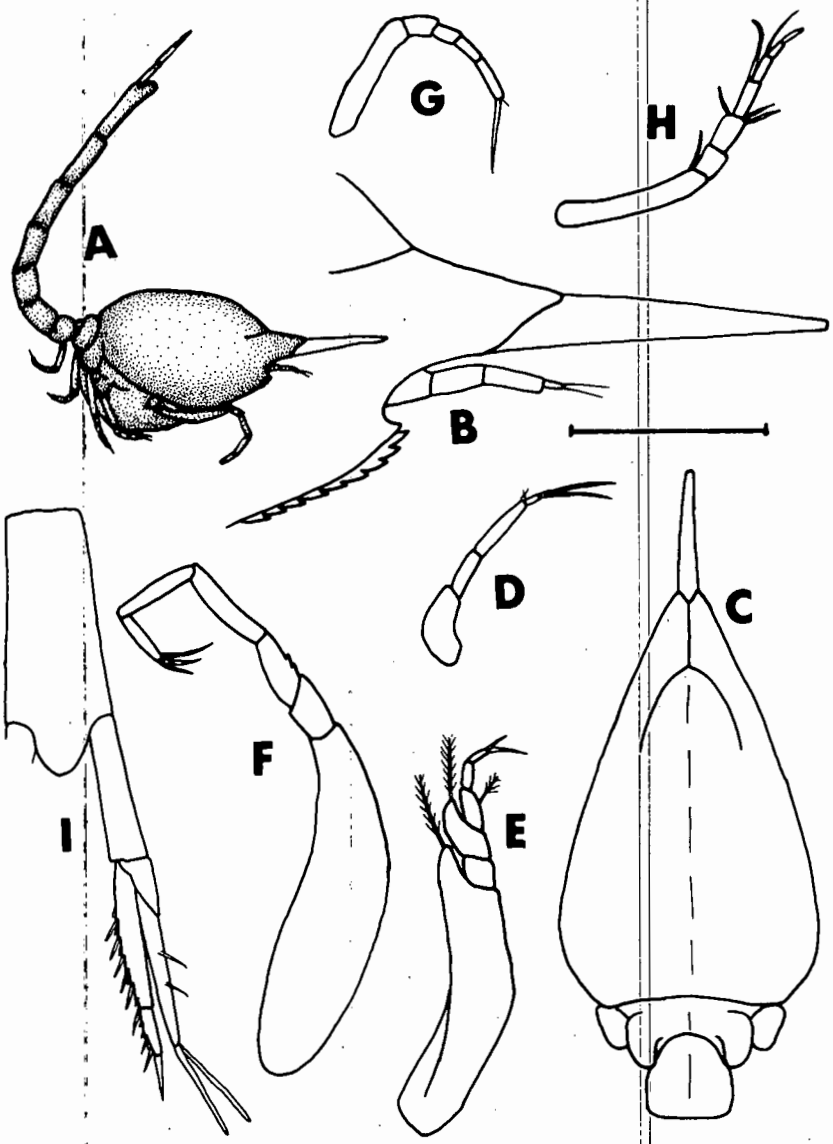

Fig. 8. *Cyclaspoides pellucidus* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Carapace in dorsal view. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 2 mm for A; 1 mm for C; 0,5 mm for B, D–I.

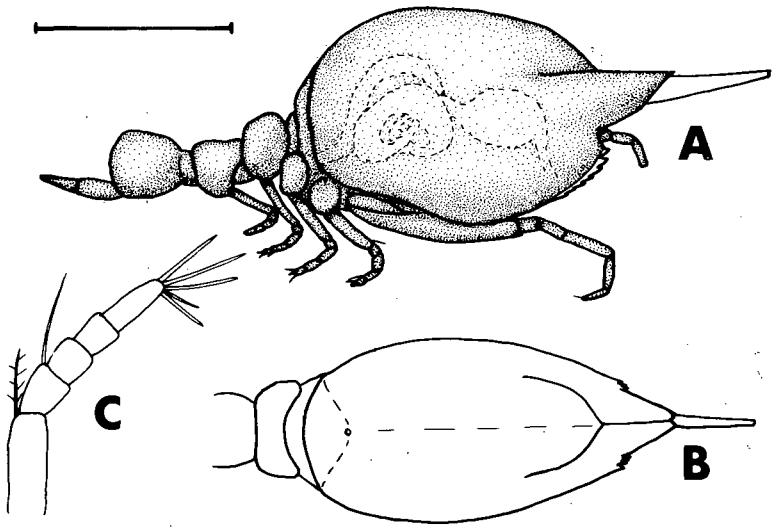

Fig. 9. *Cyclaspoides pellucidus* sp. nov.
Subadult male, paratype. A. Lateral view. B. Dorsal view. C. Pereiopod 2.
Scale line = 1 mm for A–B; 0,5 mm for C.

of carapace. Cephalothorax subequal in length to abdomen. Abdomen slender, cylindrical; first five somites with anterior articulatory peg.

Antenna 1 (Fig. 8D) reaching tip of pseudorostrum, basal segment short, geniculate. Flagellum short, 1-segmented, with two aesthetascs. Accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 8E) stout, short, almost lacking setae. Basis nearly twice length of remaining segments together; distal prolongation short, reaching about half-way along merus. Merus somewhat expanded, almost reaching distal tip of carpus.

Basis of pereiopod 1 (Fig. 8F) stout, longer than remaining segments together. Ischium and merus subequal in length, as are carpus and propodus.

Pereiopod 2 (Fig. 8G) 6-segmented, shorter than pereiopod 3, unarmed except for a single terminal spine. Basis subequal in length to remaining segments together; merus, carpus and propodus subequal in length, slightly shorter than dactyl.

Pereiopods 3 (Fig. 8H) to 5 similar, third longest and fifth shortest, armed with a few spines.

Telsonic somite (Fig. 8I) longer than preceding somite, produced between uropods for about a fifth its length. Peduncle of uropod slightly more than half length of telsonic somite, moderately stout, unarmed. Rami subequal in length. First segment of exopod less than half length of second, unarmed; second armed with two spines on upper edge and two terminally. First segment of endopod three times length of second with six small spines on serrated

inner edge, and a stout one terminally.

Subadult male, paratype, length of cephalothorax 2,7 mm. Last five abdominal somites missing. As female, except as follows: carapace (Fig. 9A) slightly more rectangular, integument thinner, coiled gut clearly visible. Pseudorostral lobes (Fig. 9B) slightly longer. Pedigerous somites 2 and 3 fused with carapace, but suture lines distinct dorsally and laterally.

Distal parts of antenna 1 missing, otherwise as in female. Maxilliped 3 more setose. Basis of pereiopod 1 straight, slightly broader. Pereiopod 2 (Fig. 9C) stouter, basis shorter, no longer than remaining segments together.

Length

Ovigerous female 5,2 mm.

Remarks

This species clearly belongs to Bonnier's genus, being similar to *C. sarsi* in general appearance, as well as having only two free pedigerous somites and a coiled gut. It differs from *C. sarsi* in a number of respects, however: the second and third pedigerous somites are visible laterally in the female, and dorsally as well as laterally in the male, although in both cases they are firmly fused with the carapace (in *C. sarsi* they are indistinguishable or sometimes separated by a faint suture line). In *C. pellucidus* the endopod of the uropod is 2-segmented and the entire uropod slightly longer than the telsonic somite: in *C. sarsi* the endopod is 1-segmented, and the uropod distinctly shorter than the telsonic somite.

The varying number of segments in the endopod of the uropod is not unusual in genera of this subfamily, but it has necessitated expanding the diagnosis of the genus.

Distribution

Known only from two records, one at a depth of 400 m off the Cape of Good Hope, and one from 820 m in the southern Mozambique Channel.

Mossambicuma gen. nov.

Generic diagnosis

First pedigerous somite not visible. Ischium of maxilliped 3 larger than merus. Basis of pereiopod 1 without distal projection. Second pereiopod 6-segmented. Telsonic somite shorter than fifth abdominal somite and longer than peduncle of uropod. Rami of uropod longer than peduncle, endopod 1-segmented.

Type species

M. elongatum sp. nov. (by monotypy).

Remarks

It is with some hesitation that a new genus is erected for this species. In many ways it resembles some species of *Eocoma*, but the form of the carapace is quite different and the first pereiopod lacks the characteristic distal projection. Thus it seems better to erect a new genus which may later be submerged than to add species to *Eocuma*, which is at present well defined.

Mossambicuma elongatum gen. et sp. nov.

Figs 10–11

Records

CON	23°S 32°E	1–2 m	1 adult ♂, 1 ovig. ♀, 1 young ♀, 2 juvs (2 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15495, collected by A. C. Connell of the NIWR. Type locality: 1–2 m, near Mongue, Morrumbene estuary, Mozambique (23°40′S 35°22′E). NIWR station number CON 3.

Description

Ovigerous female, holotype, length 2,2 mm. Integument uncalcified, flexible. Carapace (Fig. 10A) with scattered shallow pits, one and a half times as long as deep, slightly narrower dorsally due to a shallow depression running midlaterally along carapace. A second smaller depression runs anteroventrally from posterior middorsal region for a short distance. Antennal notch shallow, anterolateral angle poorly defined, obtuse. Pseudorostral lobes produced beyond rounded, eyeless eyelobe for one-fifth total length of carapace (Fig. 10B).

Second pedigerous somite about half as wide as deep, third to fifth about as deep as abdominal somites. Carapace about one and a half times length of free thoracic somites together, cephalothorax equal in length to first five abdominal somites. Abdominal somites cylindrical, elongate.

Antenna 1 (Fig. 10C) elongate, protruding well beyond tip of pseudorostrum. First two segments subequal in length, together as long as third. Flagellum (Fig 10D) 2-segmented with one aesthetasc; accessory flagellum very small, 1-segmented.

Maxilliped 3 (Fig. 10E) short and stout, basis broad and flattened; distal prolongation narrow, reaching beyond articulation of merus and carpus. Ischium as long as next three segments together. Merus wide, distal prolongation reaching articulation of carpus and propodus.

Basis of pereiopod 1 (Fig. 10F) short, half length of remaining segments together, not produced distally. Propodus long, almost equal in length to merus and carpus together.

Pereiopod 2 (Fig. 10G) 6-segmented, basis shorter than rest of limb. Dactyl twice length of propodus.

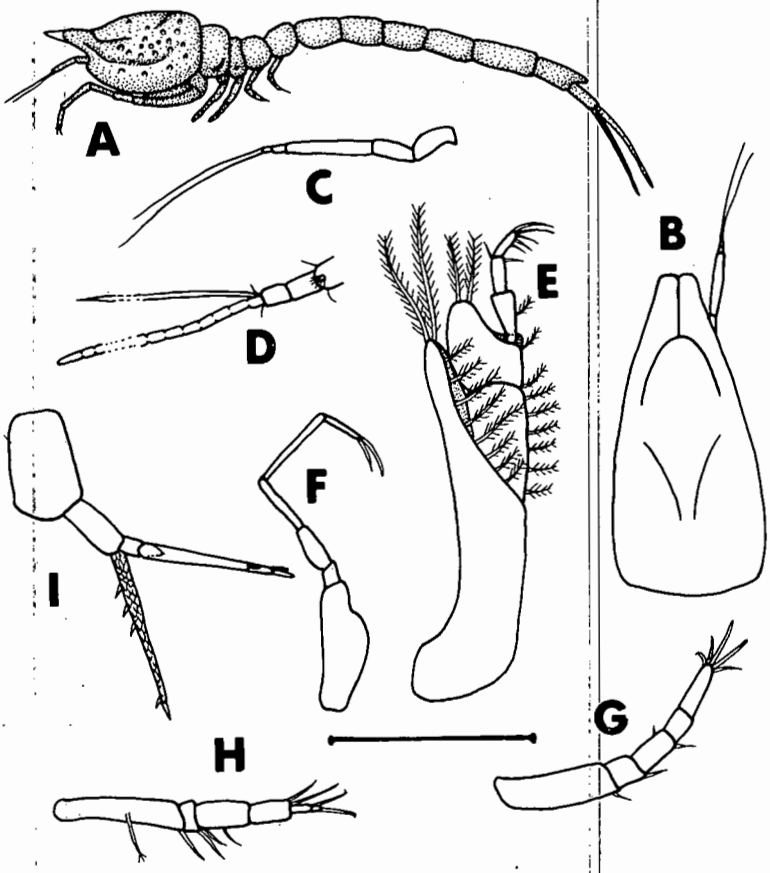

Fig. 10. *Mossambicuma elongatum* gen. et sp. nov.
Ovigerous female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Detail of distal tip of antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.
Scale line = 1 mm for A; 0,5 mm for B–C, F, I; 0,25 mm for D–E, G–H.

Pereiopods 3 (Fig. 10H) to 5 similar, pereiopod 3 longest and 5 shortest. Merus and carpus stout, merus slightly the longer.

Telsonic somite (Fig. 10I) one and a half times as long as wide, slightly shorter than fifth abdominal somite, little produced between uropods. Peduncle of uropod less than two-thirds length of telsonic somite, less than half length of subequal rami, unarmed. First segment of exopod about a quarter as long as second; second armed with a single small spine dorsally near the tip, and two stouter ones terminally. Endopod 1-segmented, surface covered with small scales, with four very small spines on inner edge and a slightly longer one terminally.

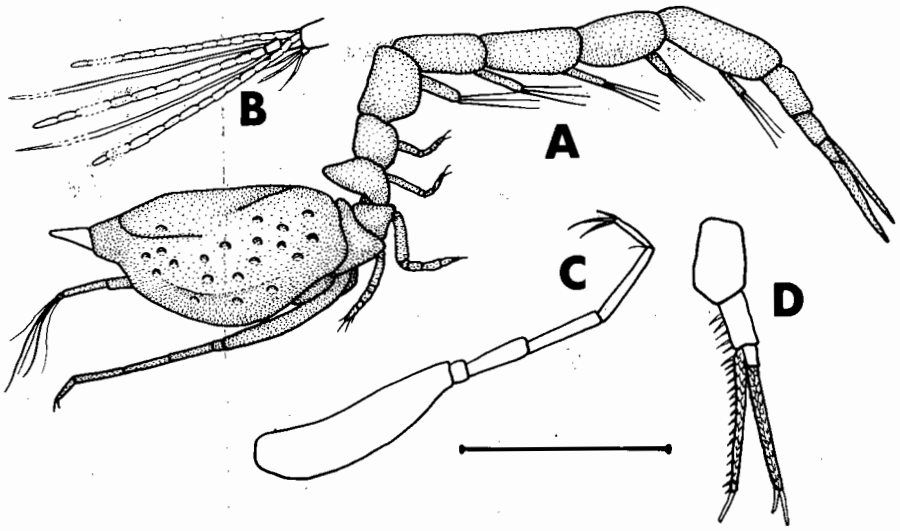

Fig. 11. *Mossambicuma elongatum* gen. et sp. nov.
Adult male, paratype. A. Lateral view. B. Detail of distal tip of antenna 1. C. Pereiopod 1. D. Telsonic somite and uropod.
Scale line = 0,5 mm for A; 0,25 mm for C–D; 0,1 mm for B.

Adult male, paratype, length 2,1 mm. As female, except as follows: carapace (Fig. 11A) slightly longer, pseudorostral lobes shorter. Fourth pedigerous somite produced dorsally to form a blunt point. Sideplates poorly defined ventrally.

Antenna 1 (Fig. 11B) with two aesthetascs arising at base of flagellum and one distally. Basis of maxilliped 3 narrower proximally, ischium slightly shorter. Basis of pereiopod 1 (Fig. 11C) longer, merus narrower and propodus not as greatly elongated. Telsonic somite (Fig. 11D) not at all produced. Peduncle of uropod with five spines on inner edge, endopod with sixteen. Endopod and second segment of exopod scaly.

Length

Adult male	2,1 mm
Ovigerous female	2,2 mm

Remarks

See remarks for genus *Mossambicuma*.

Distribution

So far only five specimens known, all from Morrumbene estuary, Mozambique, at depths from 1 to 2 m.

Austrocuma gen. nov.

Generic diagnosis

Dorsoventrally flattened Bodotriinae with four pedigerous somites visible in the male and five in the female. Eye present. Basis of maxilliped 3 slightly expanded distally. Second to fifth pereiopods 6-segmented. Male with three pairs of pleopods, each with an outer process to the inner ramus. Endopod of uropod 1-segmented.

Type species

Austrocuma platyceps sp. nov. (by monotypy)

Remarks

This genus is the only one in the subfamily in which the male has three pairs of pleopods. The flattened structure of the carapace and the nature of the third maxilliped and first pereiopod are also unusual in the Bodotriinae.

Austrocuma platyceps gen. et sp. nov.

Fig. 12

Records

CP	34°S 18°E	intertidal-2 m	3 adult ♂♂, 1 subadult ♂, 10 ovig. ♀♀, 2 mancas (5 records)
CPR	33°S 18°E	intertidal	3 ovig. ♀♀ (2 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15480, collected by UCT, 25 April 1956. Type locality: 1 m, Muizenberg Beach, Cape Peninsula (34°06′S 18°29′E). UCT station number CP 463B.

Description

Ovigerous female, holotype, length 1,8 mm. Whole animal dorsoventrally flattened (Fig. 12A). Integument smooth, carapace and thorax somewhat calcified, abdomen translucent. Carapace nearly twice as wide as deep with a single pair of lateral carinae, well-defined in the midregion, becoming rounded anteriorly and posteriorly. Anterolateral angle rounded, antennal notch small, triangular. Pseudorostral lobes rounded in lateral view, scalloped in dorsal view (Fig. 12B). Eyelobe wide, slightly pointed anteriorly, bearing reddish pigmented area with two pairs of large lenses on either side and one pair medially. Cephalothorax elliptical in dorsal view. Carapace subequal in length to free thoracic somites, of which first is narrow and second very wide. Cephalothorax nearly one and a half times length of narrow subcylindrical abdomen. Telsonic somite short, very slightly produced between uropods.

Antenna 1 (Fig. 12C) stout, elongate. Basal segment subequal in length to next two segments together. Flagellum 2-segmented with one very short aesthetasc. Accessory flagellum minute, 1-segmented.

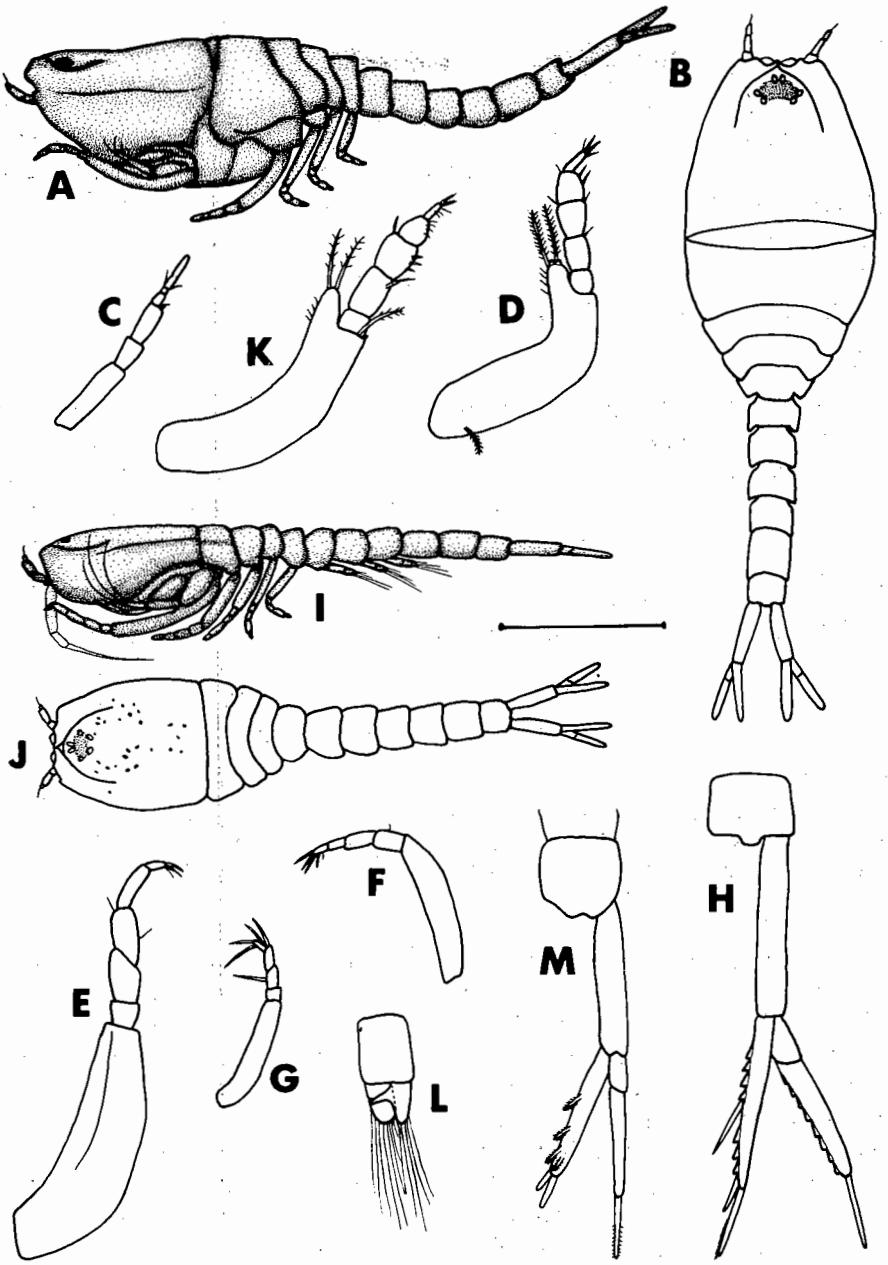

Fig. 12 *Austrocuma platyceps* gen. et sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Dorsal view. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod. Adult male. I. Lateral view. J. Dorsal view. K. Maxilliped 3. L. Pleopod 2. M. Telsonic somite and uropod.

Scale line = 0,5 mm for A, I–J; 0,25 mm for B, D–G, K; 0,15 mm for C, H, L–M.

Maxilliped 3 (Fig. 12D) stout, basis curved through nearly 90°, produced distally beyond tip of ischium. Ischium, merus, carpus and propodus all flattened but not produced distally. Dactyl slender.

Pereiopod 1 (Fig. 12E) very stout, meeting with its partner to form strong protection for the underlying mouthparts. Merus, carpus and propodus subequal in length, merus and carpus stout.

Pereiopod 2 (Fig. 12F) 6-segmented, basis one and a half times length of rest of limb. Merus and carpus subequal in length, as are propodus and dactyl. Dactyl small, armed with a few small spines.

Pereiopods 3 (Fig. 12G) to 5 similar, 6-segmented, shorter than pereiopod 2 and each shorter than preceding one. Ischium and merus subequal in length, as are carpus and propodus. Dactyl apparently wanting.

Telsonic somite (Fig. 12H) short, wider than long; entire somite less than half length of peduncle of uropod. Peduncle unarmed, subequal in length to rami. First segment of exopod less than half length of second, unarmed; second serrated on inner edge with one long terminal spine. Endopod 1-segmented, serrated on inner edge, with one long fine spine and two shorter stouter spines terminally.

Colour in life speckled above due to many dark brown and fewer greenish-white chromatophores; mainly greenish-white below, fading immediately on immersion in alcohol.

Adult male, length 1,4 mm, from Kommetjie, Cape Peninsula. As female, except as follows: cephalothorax narrower, carapace longer than wide (Fig. 12J), nearly twice as long as deep (Fig. 12I). Lateral carina confined to posterior half of carapace, which is excavated ventrally to accommodate the large exopods of maxilliped 3 and pereiopod 1. Second pedigerous somite much narrower. Carapace longer than free thoracic somites, cephalothorax longer than abdomen.

Antenna 1 relatively stouter and slightly shorter. Basis of maxilliped 3 (Fig. 12K) less curved, distal segments stouter. Basis of pereiopod 1 straight, propodus and dactyl stouter, limb relatively longer, slightly more slender. Bases of pereiopods 2 to 5 shorter relative to rest of limb. Three pairs of pleopods present (Fig. 12L), rami bearing long plumose setae. Telsonic somite (Fig. 12M) as long as wide, rounded posteriorly. Peduncle slightly longer than rami. Endopod slightly shorter than exopod with four serrate spines on inner edge. Second segment of exopod not serrate.

Length

Adult male	1,4–1,5 mm
Ovigerous female	1,6–1,8 mm

Remarks

This species is quite distinct from all other members of the subfamily, partly because of its very flattened appearance in both sexes, and more particularly because of the presence of only three pairs of pleopods in the male. The

reduction in number of pleopods is perhaps less strange than may appear at first sight, since this tendency is found in some of the Vaunthompsoniinae as well as routinely in some of the other families. In these forms the thoracic exopods are usually highly developed, as is the case in the males of *Austrocuma platyceps*.

Distribution

At present only a few specimens are known from the shores of the Cape Peninsula, from Muizenberg to Hout Bay, at depths from 0 to 1 m.

Note: Just prior to going to press several more specimens of this species were found intertidally between Ysterfontein and Melkbosch on the south-western Cape coast.

Alticuma gen. nov.

Generic diagnosis

First pedigerous somite visible in both sexes. Second pereiopod 7-segmented. Endopod of uropod 2-segmented.

Type species

Alticuma carinata (Zimmer, 1921) (as *Cyclaspis carinata*).

Remarks

The above combination of characters exhibited by the two species in the collection excludes them from *Iphinoe* and *Cyclaspis*, the genera closest to them, since placing them in either would necessitate the expansion of an existing definition. The limits of the genera of the Bodotriinae are discussed on page 163.

The differences between the two species included in the genus are mainly in the superficial appearance of the carapace, the body and appendages being rather similar in structure. Thus the genus may in fact prove to be a realistic assemblage of species rather than a merely convenient grouping.

Distribution of Alticuma

Thus far limited to waters deeper than 183 m off the coast of southern and eastern Africa.

Alticuma carinatum (Zimmer, 1921) n. comb.

Figs 13–14

Cyclaspis carinata Zimmer, 1921: 126–127, figs 19–21.

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
LBT	32°S 17°E	208–500 m				5	1	2	8	5
WCD	34°S 17°E	320 m						1	1	1
SCD	34°S 20°E–34°S 23°E	183–200 m		2		3	1		6	3
SST	35°S 22°E	200 m	2	8	6	5	9	4	34	4
SAM	27°S 32°E–30°S 30°E	550–850 m	1			2	4	9	15	5

Previous records

Type locality, holotype specimen only.

Holotype

Female, deposited by Zimmer (1921) in the Berlin Zoologisches Museum. Type locality: 693 m, off the east African coast (1°S 41°E).

Description

Ovigerous female, length 6,7 mm, from 200 m on the Still Bay transect. Integument translucent with fine reticulations and pits visible at high mag-

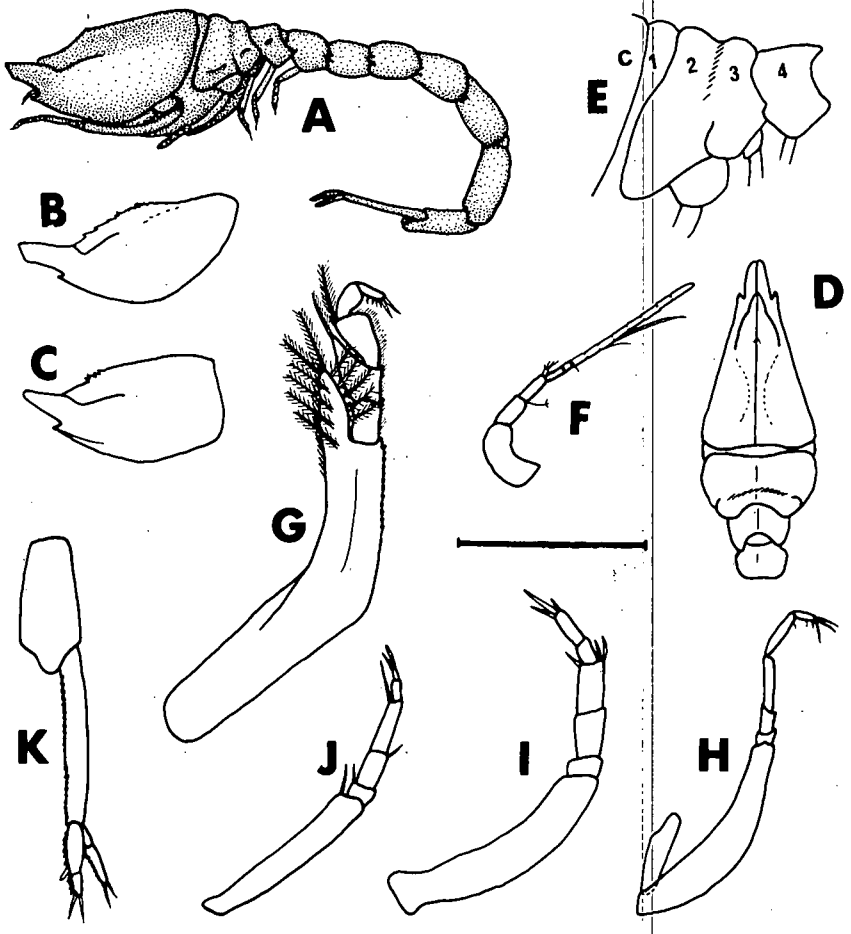

Fig. 13. *Alticuma carinatum*

Ovigerous female (SST). A. Lateral view. D. Dorsal view of carapace. E. Detail of pedigerous somites from the side. F. Antenna 1. G. Maxilliped 3. H. Pereiopod 1. I. Pereiopod 2. J. Pereiopod 3. K. Telsonic somite and uropod.

Females. B. Lateral view of SAM specimen. C. Lateral view of LBT specimen.

Scale line = 2 mm for A–D; 1 mm for E, H, K; 0,5 mm for F–G, I–J.

nifications. Dorsal half of carapace strongly compressed laterally forming a narrow, pointed median carina (Fig. 13A). Pseudorostral lobes elongate, meeting in front of eyelobe for one-sixth total length of carapace. Eyelobe distinct, elliptical, eyeless (Fig. 13D); in lateral view visible above level of pseudorostral lobes and slanting steeply to the elevated posterior region of the carapace. One tooth present midway along middorsal carina. Carapace twice as long as deep. Antennal notch deeply excavate between pseudorostral lobes, anterolateral angle acutely pointed.

(*Note:* the outline of the carapace in lateral view is very variable. The pseudorostral lobes may be as much as a quarter the total length of the carapace (some SAM specimens, Fig. 13B); the eyelobe may not be elevated above the pseudorostral lobes (some LBT and SAM specimens, Figs 13B–C); the anterior part of the middorsal carina may bear 0–2 large teeth (most of the SST specimens, Fig. 13A), or a long row of many minute ones (SAM and some LBT specimens, Fig. 13B), or ones intermediate in size and number (some LBT specimens, Fig. 13C). Only the carapace is variable, the limbs being similar in all specimens. Too few males are available to determine the degree of variability in them, or the likelihood of there being more than one species represented.)

All five pedigerous somites visible laterally, second and third apparently partly fused dorsolaterally (Fig. 13E). Free thoracic somites slightly flanged laterally with a faint middorsal carina. Carapace nearly half as long again as free thoracic somites. Cephalothorax subequal in length to abdomen. Articulatory notches present laterally on all abdominal somites except the last.

Basal segment of antenna 1 (Fig. 13F) geniculate, equal in length to next two subequal segments together. Accessory flagellum short, 1-segmented. Flagellum 1-segmented with one aesthetasc longer than the antenna.

Maxilliped 3 (Fig. 13G) stout, basis angled, distal prolongation reaching articulation between merus and carpus. Ischium longer than wide; merus sharply expanded externally, prolongation reaching distal tip of carpus. Carpus expanded distally, equal in length to subequal propodus and dactyl.

Pereiopod 1 (Fig. 13H) not elongate. Basis equal in length to rest of limb. Carpus and propodus subequal in length, longer than dactyl.

Pereiopod 2 (Fig. 13I) stout, 7-segmented. Basis longer than remaining segments together. Ischium short but distinct.

Pereiopods 3 (Fig. 13J) to 5 similar, less stout than pereiopod 2.

Telsonic somite (Fig. 13K) produced between uropods for nearly a third its length, slightly shorter than peduncle of uropod. Peduncle unarmed but serrate on inner margin, two and a half times length of rami. Exopod slightly longer than endopod, first segment unarmed, half length of second; second only with two terminal spines. First segment of endopod twice length of second with one spine distally on inner edge, second with two terminal spines only. First segment of exopod and both of endopod serrated on inner margin.

Adult male, length 6,7 mm, from 200 m on the Still Bay transect. Differs

from the female as follows: integument less calcified. Carapace less sharply carinate, less sloping behind eyelobe (Fig. 14A). Pseudorostral lobes shorter (Fig. 14B), anterolateral angle obtuse, blunt. First pedigerous somite obscured laterally by anterior projection of second; second narrow, not fused with third. Ventral sideplates well marked on abdomen.

Accessory flagellum of antenna 1 (Fig. 14C) with numerous short aesthetascs. Basis of maxilliped 3 not angled, ischium slightly longer and merus shorter. Basis of pereiopod 1 with eight sharp spines in mid-region.

Peduncle of uropod (Fig. 14D) with six fine spines on inner edge, followed by fourteen serrate setae in pairs, with two spines distally. Second segment of exopod with four plumose setae on inner edge; first of endopod with five fine spines, second with three and a single end-spine.

Length

Adult male	6,7 mm
Ovigerous female	5,8–7,4 mm

Remarks

This species appears to be the same as Zimmer's *Cyclaspis carinata*. However, he describes and figures only the whole animal and the telsonic somite and uropod, and the author has not been able to obtain the type for comparison. Zimmer's figures correspond with the SAM material, except that in the latter the ovigerous female is broader across the posterior part of the carapace, the telsonic somite does not appear to be emarginate posteriorly, and there are no setae on the inner border of the peduncle in the females. The most significant difference is that the inner ramus of the uropod is 2-segmented in all specimens examined, whereas Zimmer's appears to be 1-segmented. How-

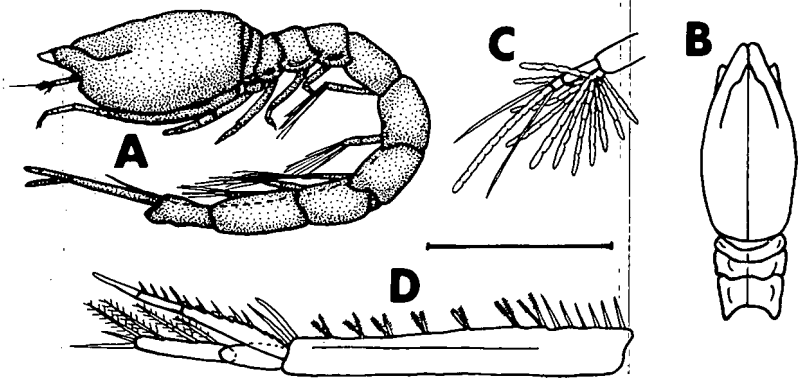

Fig. 14. *Alticuma carinatum*

Adult male. A. Lateral view. B. Dorsal view of carapace. C. Distal tip of antenna 1. D. Uropod.

Scale line = 2 mm for A–B; 0,5 mm for D; 0,25 mm for C.

ever, the diagram is poor, and the author is disinclined to place too much emphasis on this character. It is not possible to state with certainty that all specimens under discussion are conspecific, but from the characteristic general appearance of the animals, it is suggested that they probably are. The variability of the available specimens is confined to characters of the carapace, and so at this stage it is assumed that the various morphological variations are intraspecific, rather than that there are as many as four distinct species, all very closely related, and all represented by very few specimens. The situation may well have to be reviewed when further material is available.

The fusion of the second and third pedigerous somites is extremely unusual in this family, but once again it is a variable character, not present even in all the ovigerous females. Although it may be of considerable functional significance to the living animal, its sporadic occurrence means that it is of no immediate taxonomic value.

Distribution

The most common species in deep waters off South and east Africa, from Lambert's Bay to Kenya, at depths from 183 to 810 m.

Alticuma bellum gen. et sp. nov.

Figs 15–16

Records

SAM	30°S 30°E–26°S 33°E	550–1 300 m	1 adult ♂, 47 subadult ♂♂, 9 ovig. ♀♀, 69 ♂♂ and ♀♀, 13 juvs, 32 mancas (10 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15479, collected by the South African Museum, 22 May 1976. Type locality: 550 m, southern Mozambique Channel (27°59′S 32°40′E). *Meiring Naude* station number SM 86.

Description

Ovigerous female, holotype, length 10,0 mm. Integument white, slightly crystalline. Carapace (Fig. 15A) divided transversely by strong ridge running across middorsal region almost to ventrolateral edge; smooth posterior to this, lower and with two slight protuberances on either side anterior to it. Pseudorostral lobes short, not meeting in front of eyelobe. Anterolateral angle acute, antennal notch angular (Fig. 15B). Carapace in dorsal view (Fig. 15C) abruptly wider across posterior part due to transverse ridge. Eyelobe eyeless.

Carapace twice as long as deep, one and a half times length of free pedigerous somites together. Cephalothorax equal in length to first five abdominal somites together. Abdominal somites cylindrical.

Antenna 1 (Fig. 15D) small, first segment subequal in length to next two. Flagellum 1-segmented with two aesthetascs; accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 15E) stout, basis strongly angled, about two and a half times length of remaining segments together. Distal prolongation reaching

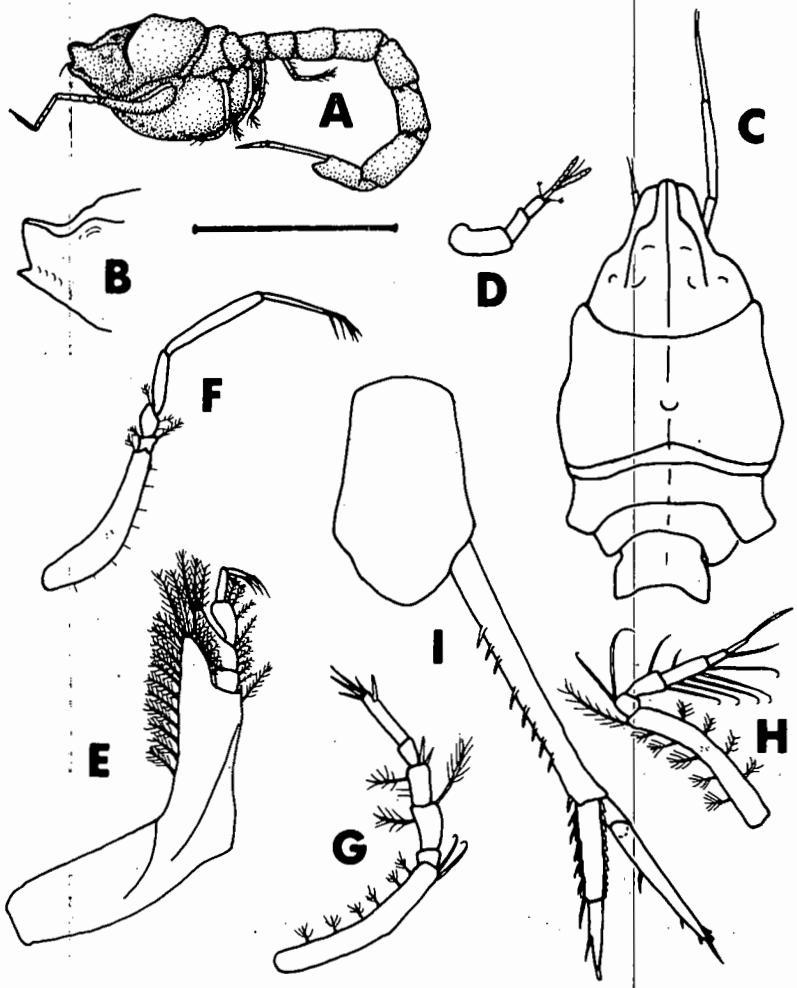

Fig. 15. *Alticuma bellum* gen. et sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 4. I. Telsonic somite and uropod.

Scale line = 4 mm for A; 2 mm for B–C, F; 1 mm for D, E, G–I.

beyond articulation of merus and carpus. Ischium square in outline, merus expanded distally, reaching articulation of carpus and propodus; carpus slightly expanded, propodus and dactyl subequal in length, cylindrical.

Pereiopod 1 (Fig. 15F) elongate, basis less than two-thirds length of rest of limb. Ischium small, half length of merus. Carpus subequal in length to merus and ischium together; propodus and dactyl very long: propodus longer than ischium, merus and carpus together, dactyl slightly shorter.

Pereiopod 2 (Fig. 15G) 7-segmented. Basis subequal in length to rest of limb, ischium small, merus and carpus subequal, merus stouter. Dactyl twice length of propodus.

Pereiopods 3, 4 (Fig. 15H) and 5 similar, basis of 3 longest. Carpus relatively very long with four hooked setae. Propodus and dactyl subequal.

Telsonic somite (Fig. 15I) two-thirds lengths of peduncle of uropod, produced between uropods for about one-third its length. Peduncle of uropod less than twice length of exopod, slender, with eight small spines on inner edge. Exopod slightly longer than endopod, first segment less than one-third length of second, unarmed; second armed with two small spines on inner edge and four terminally. First segment of endopod one and a half times length of second, with six spines on inner edge, interspersed with scale-like serrations; outer edge serrated; second segment with one fine spine on inner edge and a short one terminally (probably broken).

Adult male, length 10,3 mm, from near the type locality. As female, except as follows: carapace (Fig. 16A) less than twice as long as deep, transverse ridge very much fainter, anterolateral angle (Fig. 16B) smaller and less acute; anterior and ventral edges of antennal notch serrated. First pedigerous somite visible dorsally only. Abdominal sideplates distinctly defined ventrally. Anterior end of single specimen damaged. Free pedigerous somites flanged laterally (Fig. 16C).

Basal segment of antenna 1 (Fig. 16D) larger, setose; numerous aesthetascs surrounding flagellum. Basis of maxilliped 3 (Fig. 16E) less angled, merus narrowly expanded. Propodus and dactyl of pereiopod 1 relatively shorter. Merus, carpus and dactyl of pereiopod 2 slightly longer and stouter. Bases of pereiopods 3 and 4 (Fig. 16F) shorter, carpus relatively large.

Both uropods damaged.

Subadult male, *paratype*, length 10,5 mm. Carapace (Fig. 16G) strongly sculptured, transverse ridge very pronounced, posterior and ventral regions with scattered rounded projections. Distinct ridges running posteriorly from antennal notch and posteroventrally from eyelobe suture nearly to ventral edge. Peduncle of Uropod (Fig. 16H) with twelve spines on inner edge. Second segment of exopod serrated distally on inner edge. First segment of endopod serrated on both edges and second on inner edge.

Manca, *paratype*, length 4,6 mm (Fig. 16I). Carapace smoother than in adults, transverse ridge strongly pronounced, edge defined by a row of small rounded tubercles.

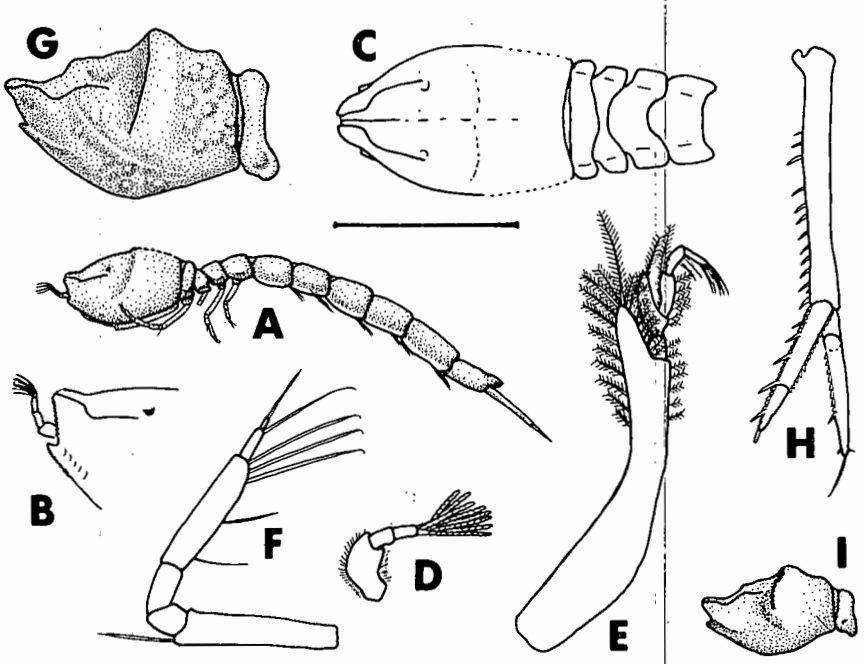

Fig. 16. *Alticuma bellum* gen. et sp. nov.
Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 4.
Subadult male, paratype. G. Lateral view of carapace. H. Uropod.
Manca, paratype. I. Lateral view of carapace.
Scale line = 4 mm for A; 2 mm for B–C, G; 1 mm for D–F, H–I.

Length

Adult male	10,3 mm
Ovigerous female	10,0 mm

Remarks

Although in outward appearance this species is very different from *A. carinatum*, the presence of a free first pedigerous somite, 7-segmented second pereiopod and 2-segmented endopod of the uropod would place them in the same genus. Certainly the appendages are very similar, but the lengths of the pseudorostral lobes are very different and the sculpturing of the carapace is quite dissimilar. The species may easily be distinguished from all other South African members of the subfamily by the transverse ridge on the carapace. It is not very different in external appearance from some of the members of Hale's '*exculpta*' group of *Cyclaspis* (Hale 1944*a*), but is clearly separated from all of them by the nature of pereiopod 2 and the endopod of the uropod.

The uropods of a number of specimens are rather different from those described above. The peduncle is shorter by about a third than the telsonic somite and the rami are subequal in length to the peduncle. The proportions of the rami are the same as those described above. It would appear that all of these specimens are immature, and that this is merely a juvenile variation, as others from the same sample have uropods almost identical with those of adults. The sculpturing of the carapace is also less pronounced in these specimens. Otherwise they seem to be identical to those described above.

Distribution

One of the more common deep-water species from Natal to the southern Mozambique Channel at depths from 550 to 1 300 m.

Iphinoe Bate, 1856

Generic diagnosis

Five pedigerous somites visible, the first short. Second pereiopod 6-segmented. Endopod of uropod 2-segmented, rami no longer than peduncle.

Type species

I. trispinosa Bate, 1856—Europe, to 150 m.

Distribution of Iphinoe

While the greatest depth recorded for *I. producta* is 280 m, for *I. serrata* 1 175 m (Jones, pers. comm.) and for *I. trispinosa* 150 m, the others appear to be confined to depths less than 100 m. Of the 33 species so far described, only 2 are found exclusively north of 40°N, the ranges of 3 extend north of 40°N and south of 40°S and the other 28 are found between these latitudes. Thus *Iphinoe* is essentially a genus of warm, shallow waters.

24 species are found in European and African waters; 3 of these also extend to India, where there are also 2 endemic species; 6 species are found in other regions (Indochina and Australia). Although the known ranges of many species will undoubtedly be increased by further collecting, the rate of endemism appears to be high. 25 species are known only from rather restricted areas, while 3 occur in two or more oceans. 7 of the 9 South African species are endemic, 1 also occurs in west Africa and 1 in both west Africa and India.

Since the South African species of *Iphinoe* appear to be linked only to those from west Africa and India, the following key applies to species occurring in these areas only.

KEY TO THE AFRICAN AND INDIAN SPECIES OF *IPHINOE*

1 Carapace at least two and a quarter times as long as deep 2
– Carapace less than two and a quarter times as long as deep 5
2 Pereiopods 2 and 3 subequal in length ..... *producta* sp. nov.
– Pereiopod 2 about half length of pereiopod 3 3

3 Carapace about two and a quarter times as long as deep; basis of pereiopod 2 longer than rest of limb ..... *africana* Zimmer, 1908—South Africa
– Carapace about three times as long as deep; basis of pereiopod 2 shorter than rest of limb. 4

4 Adults less than 10 mm in length; basis of pereiopod 1 about one and a half times length of rest of limb; basis of pereiopod 2 hardly longer than wide .....
brevipes Hansen, 1895—west Africa
– Adults more than 12 mm in length; basis of pereiopod 1 about one and three-quarters length of rest of limb; basis of pereiopod 2 about twice as long as wide .....
stebbingi Jones, 1956—South Africa

5 Carapace no more than one and two-thirds times as long as deep, or if nearly twice as long as deep in male then basis of pereiopod 1 no more than three times as long as wide . . . 6
– Carapace twice as long as deep; basis of pereiopod 1 about six times as long as wide 10

6 Pseudorostrum upturned, lower edge curled inwards, truncate anteriorly 7
– Pseudorostrum straight, not curled inwards, not obviously truncate 8

7 Antennal notch very deeply excavated, anterolateral angle strongly produced and serrate in both sexes; a pair of dorsal ridges running back from eyelobe almost to posterior edge of carapace ..... *pokoui* LeLoeuff & Intes, 1972—west Africa
– Antennal notch absent in male, moderate in female; anterolateral angle normal, slightly serrate ventrally; faint dorsal ridges on front half of carapace only .....
crassipes Hansen, 1895—South African and Indian form

8 Middorsal line of carapace serrate . . *tenella* Sars, 1878—India, west Africa, Mediterranean
– Middorsal line of carapace not serrate 9

9 Prolongation of basis of maxilliped 3 not reaching articulation of merus and carpus; merus not expanded ..... *capensis* (Zimmer, 1921)—South Africa
– Prolongation of basis of maxilliped 3 reaching beyond articulation of merus and carpus; merus very slightly expanded ..... *truncata* Hale, 1953—South Africa (estuarine)
– Prolongation of basis of maxilliped 3 reaching articulation of carpus and propodus; merus strongly expanded ..... *crassipes* Hansen, 1895—west African and Mediterranean form

10 Carapace with a pair of dorsolateral carinae 11
– Carapace lacking dorsolateral carinae 12

11 Carinae confined to dorsal half of carapace . . . *plicata* LeLoeuff & Intes, 1972—west Africa
– Carinae running diagonally from anterolateral corner almost to mid-dorsal line .....
robusta Hansen, 1895—west Africa

12 0–3 minute serrations middorsally 13
– Numerous serrations on at least half of middorsal carina 14

13 Prolongation of basis of maxilliped 3 comprising one-third its total length; carapace slightly less than twice as long as deep . . . *senegalensis* Jones, 1956—South and west Africa
– Prolongation of basis of maxilliped 3 comprising one-quarter its total length; carapace slightly more than twice as long as deep ..... *fagei* Jones, 1955—South Africa

14 Basis of pereiopod 1 subequal in length to rest of limb . . . *dayi* Jones, 1960—South Africa
– Basis of pereiopod 1 no longer than next four segments together 15

15 Merus of maxilliped 3 expanded, basis little longer than remaining segments together .....
sanguinea Kemp, 1916—India (lentic)
– Merus of maxilliped 3 not expanded, basis one and a half times length of remaining segments together ..... *pigmenta* Kurian, 1961—India (lentic)

Iphinoe stebbingi Jones, 1956

Figs 17–18

Iphinoe brevipes (*non* Hansen, 1895): Stebbing, 1910: 410. Jones, 1955: 288.
Iphinoe stebbingi Jones, 1956: 203–205, figs 10–12; 1960: 175.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
WCD	33–34°S 18°E	65–84 m	2		2	2	6		12	2
FAL & FBY	34°S 18°E	17–90 m	22	143	182	88	413	25	875	79
SST	34°S 22°E	50–80 m	8	8	7	4	16	31	74	8
SCD	34°S 21°E–33°S 27°E	36–100 m	7	18	38	19	80	29	191	21
NIWR	30°S 30°E–29°S 31°E	30–62 m			1		1	2	4	4
SAM	34°S 18°E–34°S 22°E	55–87 m	10		1	12	7		30	8

Previous records

Cape Point to St Francis Bay, 44–62 m (34°S 18°E–33°S 25°E) (Stebbing 1910 (= Jones 1956)); False Bay to Cape Agulhas (34°S 18°E–34°S 19°E), 20–82 m (Jones 1960).

Syntypes

Adults of both sexes deposited by Jones in the British Museum (Natural History): specimens previously identified by Stebbing as *I. brevipes*. Type locality: not specified; material from St Francis Bay (33°S 25°E), off Cape Point Lighthouse (34°S 18°E) and off Sebastian Bluff (34°S 22°E).

Description

Ovigerous female, length 15,9 mm, from False Bay. Slender, elongate. Body cylindrical, carapace slightly compressed laterally. Integument shiny with faint reticulations at high magnifications. Carapace (Fig. 17A) slightly less than three times as long as deep (slightly more in non-ovigerous females), with a faint middorsal carina, especially on posterior half. Antennal notch excavate, anterolateral angle acute, tooth present (Fig. 17B). Pseudorostral lobes meeting for a short distance in front of elongate, eyeless eyelobe (Fig. 17C).

First pedigerous somite visible, about a third as long as second; second longer than third. Thorax slightly longer than carapace, cephalothorax longer by two somites than abdomen.

Antenna 1 (Fig. 17D) of moderate length, first and third segments subequal in length, second slightly shorter. Flagellum 1-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 17E) three times length of remaining segments together; distal prolongation reaching half way along merus (Fig. 17F), merus slightly expanded.

Basis of pereiopod 1 (Fig. 17G) one and three-quarters times length of rest of limb, slender, with several spines on outer distal edge. Ischium and merus subequal in length, as are next three segments.

Pereiopod 2 (Fig. 17H) 6-segmented, short, stout, equal in length to basis of pereiopod 3. Basis twice as long as broad, merus stout.

Pereiopods 3 (Fig. 17I) and 4 stout, 7-segmented.

Pereiopod 5 (Fig. 17J) with ischium, merus and carpus very much enlarged,

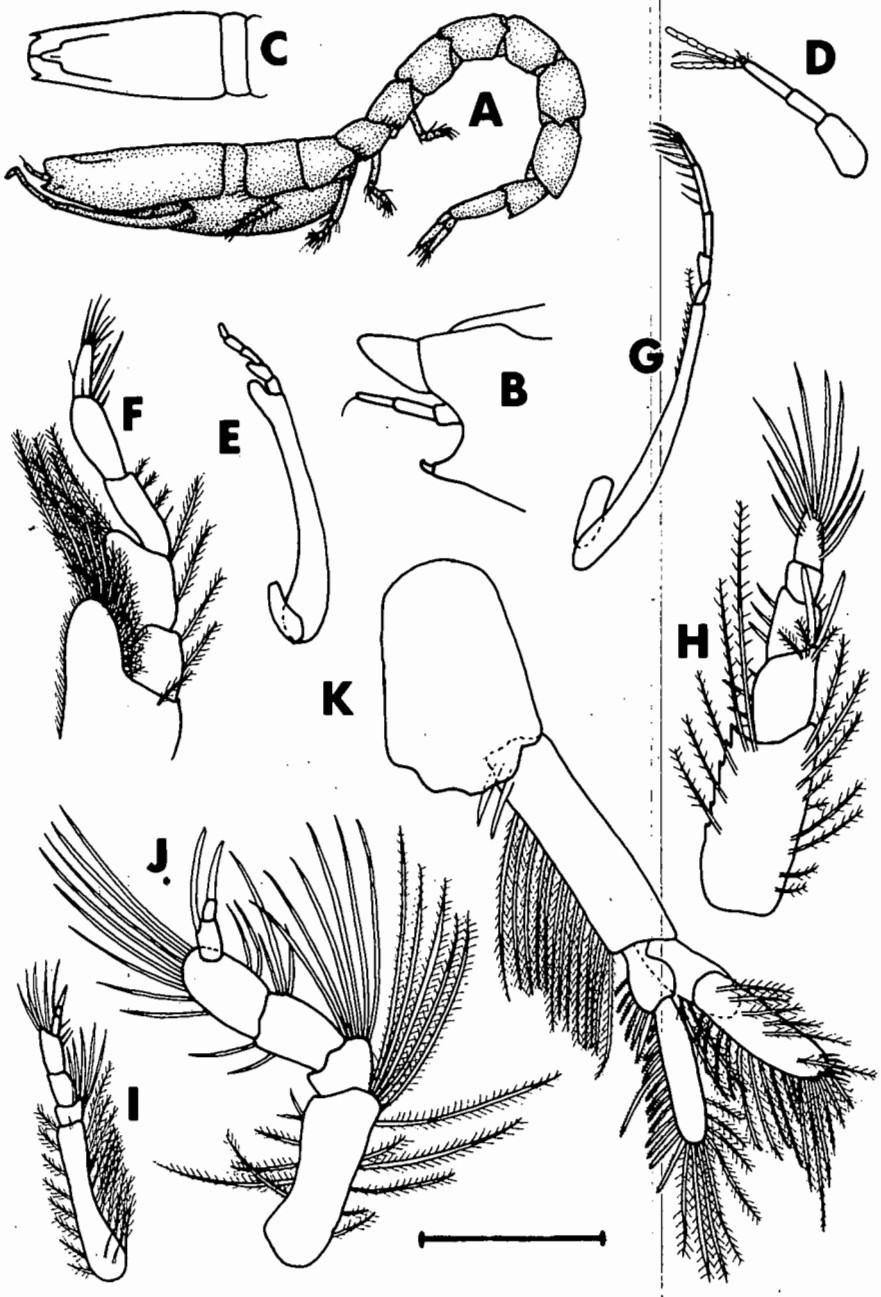

Fig. 17. *Iphinoe stebbingi*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Detail of distal tip of maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Pereiopod 5. K. Telsonic somite and uropod.

Scale line = 4 mm for A, C; 2 mm for E, G; 1 mm for B, D, I, K; 0,5 mm for F, H, J.

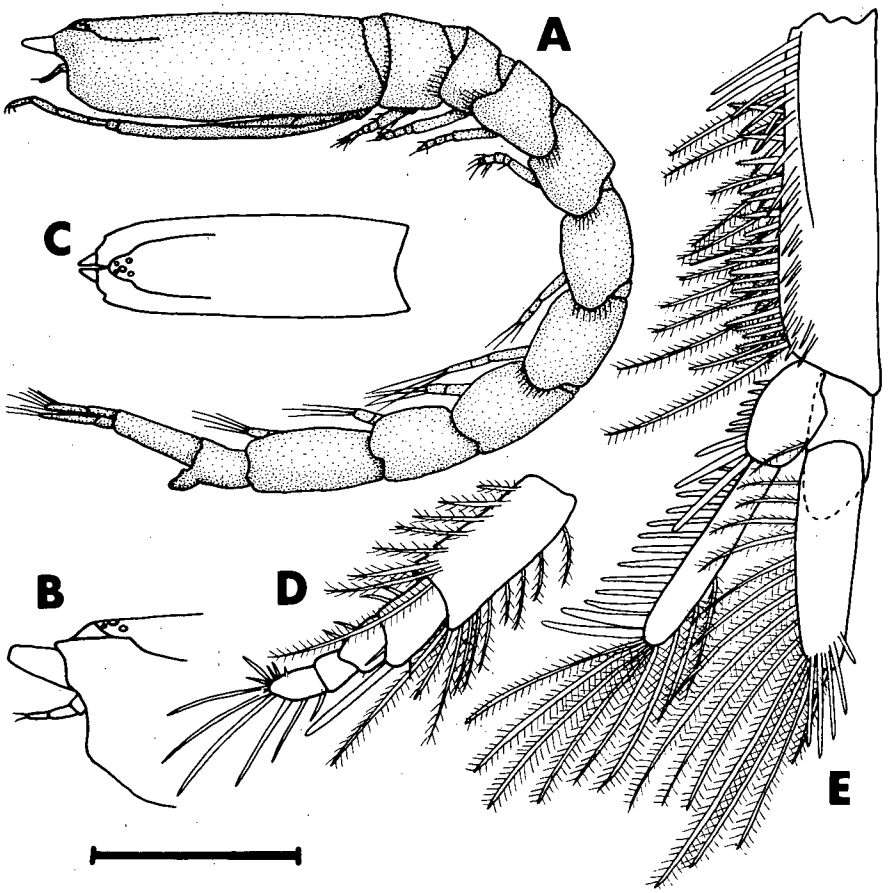

Fig. 18. *Iphinoe stebbingi*
Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Pereiopod 2. E. Uropod.
Scale line = 3 mm for A, C; 1 mm for B; 0,5 mm for D–E.

merus and carpus subequal in length and width to basis, each of the first four segments furnished with fans of stout setae. Propodus and dactyl small, cylindrical.

Telsonic somite (Fig. 17K) one and a half times as long as broad, equal in length to peduncle of uropod. Peduncle with two spines proximally followed by thirteen plumose setae in one row on inner edge. Rami subequal in length. First segment of exopod shorter than second, with two plumose setae on inner edge; second with six plumose setae dorsally and sixteen on inner edge and four short terminal spines. First segment of endopod half length of second with six serrate setae on inner edge, second with fourteen on inner edge and nine plumose

setae on tip and inner edge distally.

Adult male, length 14,9 mm, from False Bay. As female, except as follows: integument thinner and less polished in appearance. Carapace almost exactly three times as long as deep (Fig. 18A). Anterolateral angle wanting, antennal notch only slightly excavated (Fig. 18B). Posteroventral corners of carapace produced backwards to cover part of first pedigerous somite, which is narrowly visible. Eye consisting of five lenses (Fig. 18C), no pigment visible in preserved specimens at least. Sideplates of pereion produced backwards, of fourth also produced forwards to overlap third; abdominal sideplates defined ventrally. Ventral sternites poorly armed, first with two spines produced anteriorly between first pereiopods; second with raised protuberance bearing anteriorly-directed spine; third unarmed; fourth as second; fifth with slight, rounded protuberance.

Carpus of maxilliped 3 slightly less expanded. Pereiopod 2 (Fig. 18D) less stout, relatively longer. Peduncle of uropod (Fig. 18E) stouter, heavily armed with several rows of spines, serrate and plumose setae (about seventy in all). Spines on inner edge of endopod much longer, not serrate.

Length

Adult male	12–18 mm.
Ovigerous female	15–22 mm.

Remarks

The individuals of this species are morphologically uniform, only varying to some extent in size throughout the range, being on the whole a little larger in the south. They compare in all features with Jones's descriptions and figures. For a discussion of the *brevipes–stebbingi–africana* group of species, see p. 213.

Distribution

Endemic to South Africa from the Cape Peninsula to Durban at depths from 17 to 100 m. Absence of records from the west coast almost certainly indicates a real distribution limit at the Cape Peninsula, as *I. stebbingi* has not been found on the west coast despite intensive sampling in the area. The majority of individuals was found between False Bay and Port Elizabeth, only isolated specimens occurring on the Natal coast. There is less evidence that Durban is the northern limit, however, for little material has been collected from shallow waters in northern Natal, and sampling in Mozambique and further north has been scanty or non-existent.

This appears to be the second most abundant species on the southern African coasts (after *I. africana*), constituting more than 26 per cent of the total number of individuals in the collection.

Iphinoe africana Zimmer, 1908

Figs 19–20

Iphinoe africana Zimmer, 1908: 163–164, pl. 2; 1942: 190–191. Fage, 1951: 4–5. Jones, 1955: 288; 1956: 202.
Iphinoe brevipes (*non* Hansen, 1895): Stebbing, 1910: 411; 1913: 45.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
SWD	22°S 14°E	7,5 m	4	7		13		26	50	1
WCD	33°S 17°E–34°S 18°E	62–130 m	2	3		1	2	2	10	3
SB	33°S 17°E	3–29 m	199	221	61	195	206	661	1 543	53

Previous records

'Great Fish Bay' (16°S 11°E) (Zimmer 1908); Walvis Bay (23°S 14°E) (Fage 1951); northern South West Africa to Lüderitz (19°S 12°E–25°S 14°E), plankton (Jones 1955); Kunene River Mouth to Walvis Bay (17°S 11°E–23°S 14°E), 6–100 m (Jones 1956).

Syntypes

Ovigerous females, deposited by Zimmer (1908) in the Berlin Zoologisches Museum. Type locality: no depth given, 'Great Fish Bay', near Kunene River Mouth (16°S 11°E).

Description

Ovigerous female, length 12,3 mm, from Saldanha Bay. Animal elongate, almost cylindrical (Fig. 19A). Integument shiny, slightly translucent, with minute reticulations visible at high magnifications. Carapace about two and one third times as long as deep with distinct middorsal carina bearing eleven teeth (number varies between four and sixteen, usually ten to twelve). Pseudorostral lobes vertically blunted in lateral view (Fig. 19B), short, not much produced anterior to eyelobe. Antennal notch moderately excavate, anterolateral angle acute with several small teeth below along ventral margin. Eyelobe (Fig. 19C) rounded, some reddish pigment visible well below surface, even after long preservation in alcohol; no lenses.

First pedigerous somite visible dorsally and laterally, second almost as wide as deep, third and fourth produced posteriorly. Pedigerous somites together longer than carapace, cephalothorax longer than abdomen by one segment. Abdominal somites cylindrical, fifth longest.

Antenna 1 (Fig. 19D) fairly long, first and third segments subequal in length, second a little shorter. Flagellum 1-segmented with one aesthetasc; accessory flagellum 1-segmented.

Basis of maxilliped 3 (Fig. 19E) more than twice length of remaining segments together; distal prolongation not greatly expanded, reaching junction

of ischium and merus. Merus somewhat expanded externally. Last three segments almost cylindrical, subequal in length.

Pereiopod 1 (Fig. 19F) elongate, basis little longer than rest of limb, serrate on distal third of inner edge.

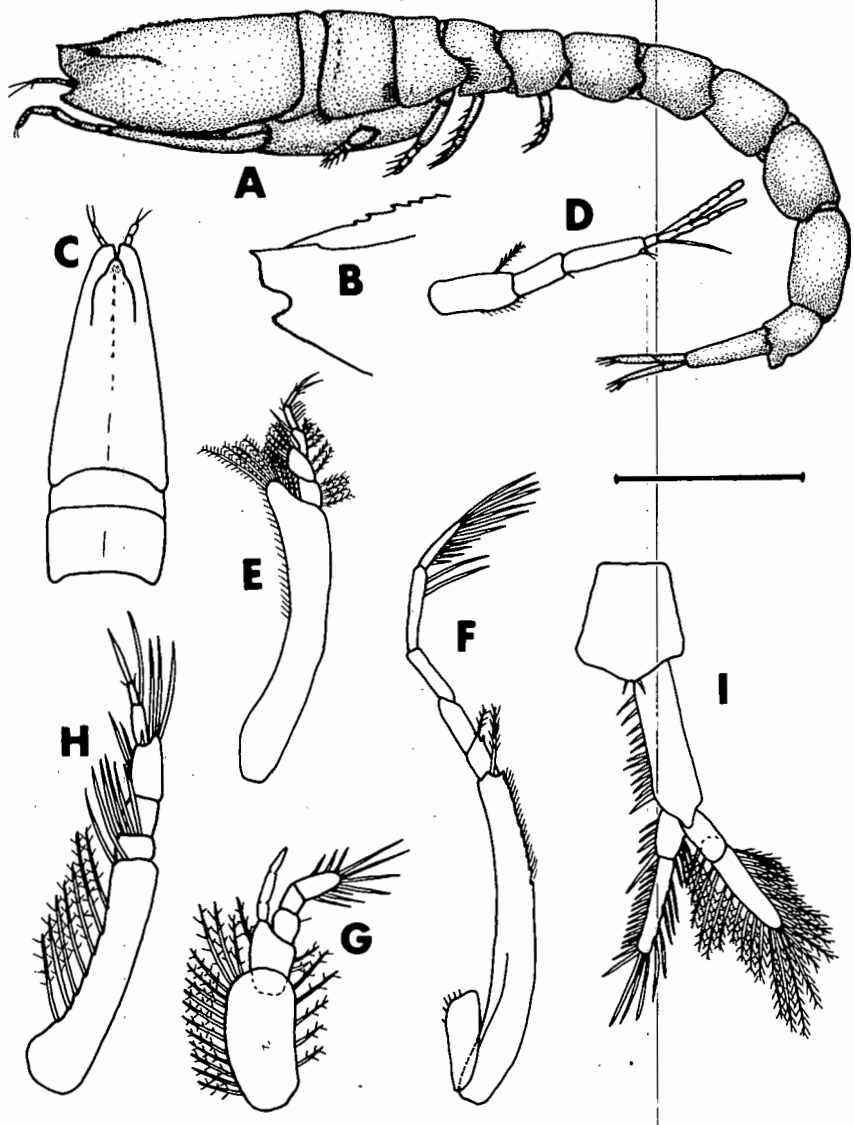

Fig. 19. *Iphinoe africana*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 2,5 mm for A, C; 1,5 mm for B, E–F, I; 0,5 mm for D, G–H.

Pereiopod 2 (Fig. 19G) characteristically short and broad, equal in length to basis of pereiopod 3, 6-segmented. Basis twice as long as broad, edged with many plumose setae. Merus broader than long with one very long spine at the expanded distal tip, reaching apex of limb. Carpus and propodus subequal in length, together equal in length to dactyl.

Pereiopods 3 (Fig. 19H) to 5 similar, basis of pereiopod 3 longest. Carpus of pereiopod 5 relatively longer than that of 3 or 4.

Telsonic somite as wide as long at widest point, with two anal setae; in lateral view with small middorsal tooth a third from posterior end, anterior to a slight depression. Peduncle of uropod (Fig. 19I) slightly longer than telsonic somite, subequal in length to rami, with 12 fine sharp spines on inner edge. First segment of exopod two-thirds length of second with two plumose setae on inner border; second segment with twenty-two plumose setae around entire border. First segment of endopod half length of second with five spines on inner and four on outer border; second segment with fourteen sharp spines on inner and five on outer border, plus three terminally.

Adult male, length 9,2 mm, from Saldanha Bay. As female, except as follows: Mid-dorsal carina not serrate (Fig. 20A), antennal notch very shallow, anterolateral angle obsolete, but some serrations present along anteroventral margin for a short distance. Carapace relatively wider anteriorly (Fig. 20B). Second and third pedigerous somites narrower, sideplates of fourth overlapping third and fifth ventrolaterally. Abdominal sideplates defined ventrally. Carapace subequal in length to rest of thorax, cephalothorax and abdomen subequal in length. Armature of thoracic sternites simple: second forming a raised transverse ridge with five spines at equal intervals across the width; third and fourth forming slightly raised projections each with a forward-pointing midventral hook, fifth a low rounded projection.

Aesthetascs of antenna 1 (Fig. 20C) annulated only proximally, accessory flagellum 2-segmented with two short aesthetascs. Pereiopods 2 to 5 less stout and more heavily armed. Pereiopod 2 longer relative to pereiopod 3. Peduncle of uropod with 35 spines of varying length in several rows on inner edge. (Fig. 20D). Second segment of exopod unarmed on outer edge. Armature of endopod much stouter, and including plumose setae.

Length

Adult male	8,0–11,5 mm
Ovigerous female	9,0–15,2 mm

Remarks

Zimmer (1908) described *I. africana* from 'several female individuals'. Apart from slight differences in the degree of expansion of the merus of maxilliped 3 and the carpus of pereiopod 3, the females in the present collection are identical with Zimmer's description and figures. Except for the second pereiopod and uropod figured by Fage (1951), the male has not previously

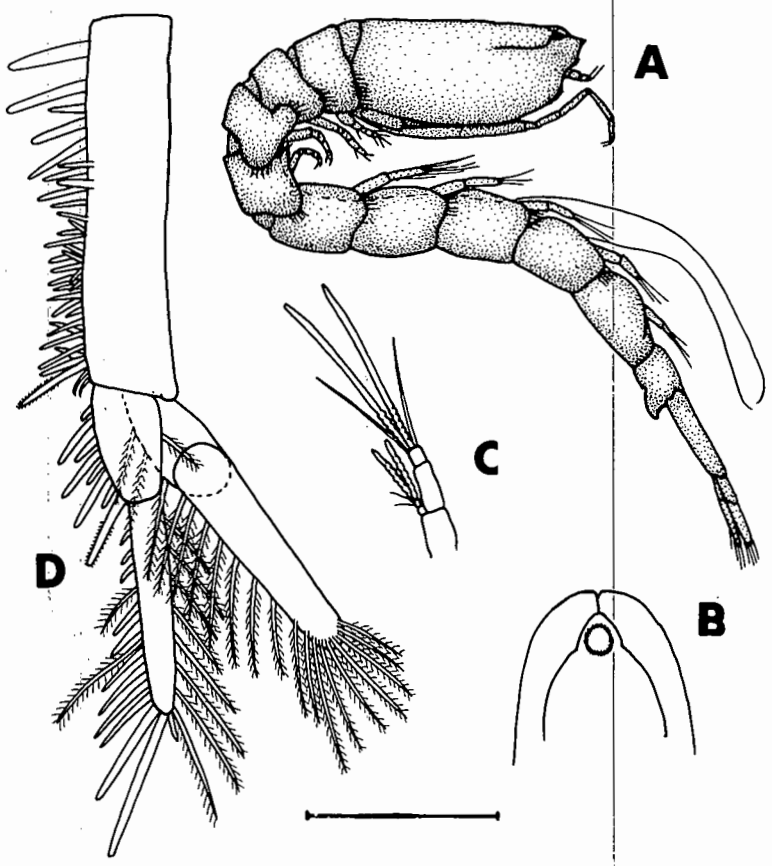

Fig. 20. *Iphinoe africana*
Adult male. A. Lateral view. B. Detail of eyelobe. C. Detail of distal tip of antenna 1. D. Uropod.
Scale line = 2 mm for A; 1 mm for B; 0,5 mm for D; 0,3 mm for C.

been figured or described.

Note: the number of teeth on the middorsal carina is related to age and sex. Juveniles of indeterminate sex have between two and seven teeth, the number increasing in females to between seven and ten in young adults and between ten and sixteen in ovigerous females. In males the reverse is true, two or three teeth occurring in young males with asetous pleopods, while in fully adult males there are no teeth at all.

Distribution

I. africana is endemic to the cold south-western coast of Africa from the Kunene River Mouth to Cape Point. Sufficient collecting has been done on either side of this region to make it probable that the species is indeed confined

to this rather narrow range. It is apparently restricted to areas with a mean annual temperature of less than 20°C. The depth range is 3 to 130 m. It is the most abundant species in these waters, constituting almost 35 per cent of the individuals in the collection.

The *brevipes–africana–stebbingi* group

I. brevipes was described by Hansen in 1895 from the Gulf of Guinea in west Africa and *I. africana* by Zimmer (1908) from the Great Fish Bay in southern Angola. Stebbing (1910, 1913) was of the opinion that they were too similar to warrant the maintenance of two species, and referred all specimens (including some from South Africa) to *I. brevipes*. Zimmer (1916, 1942) maintained not only that these two species were distinct from one another, but that a third species would probably have to be erected for the South African material. This was in fact done by Jones (1956), who gave the name *I. stebbingi* to the new species.

Although distinct from one another, the three species fall into a subgroup within the genus, since they share a number of characters not found in the other members of the genus, in particular the shortness of pereiopod 2 and the elongate, almost cylindrical carapace. Their distinctness from each other is evident ecologically as well as morphologically, since the distribution of the three species is disjunct. They may be distinguished from each other as follows:

I. brevipes	*I. africana*	*I. stebbingi*
pseudorostral lobes pointed anteriorly in lateral view	pseudorostral lobes bluntly truncate anteriorly	pseudorostral lobes somewhat truncate anteriorly
antennal notch small, confined to ventral part of pseudorostrum	antennal notch of moderate size, confined to ventral part of pseudorostrum	antennal notch large, not confined to ventral part of pseudorostrum
anterolateral tooth small and blunt with ventral serrations	anterolateral tooth small, pointed, with serrations above and below	anterolateral tooth long and pointed, reaching beyond anterior tip of pseudorostrum, without serrations
basis of pereiopod 1 one and a half times length of rest of limb	basis of pereiopod 1 equal in length to rest of limb	basis of pereiopod 1 twice length of rest of limb
basis of pereiopod 2 as long as broad	basis of pereiopod 2 twice as long as broad	basis of pereiopod 2 twice as long as broad
telsonic somite rounded posteriorly with two small teeth in midline	telsonic somite bluntly truncate posteriorly with two very small teeth in midline	telsonic somite rounded posteriorly, without teeth
maximal length of adult female 10 mm, of adult male about 8,6 mm	length of adult female 9–15 mm, of adult male 8,0–11,5 mm	minimal length of adult female 15 mm, of adult male 12 mm
serrations on middorsal carina in both sexes	serrations on middorsal carina in juveniles and adult females only	middorsal carina never serrate
southern limit 5°S	northern limit 17°S, eastern limit 18°E	western limit 18°E

Iphinoe producta sp. nov.

Fig. 21

Records

LBT 32°S 17°E 200–280 m 1 subadult ♂, 3 ovig. ♀♀ 1 juv. (3 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15494, collected during the UCT benthic survey, 24 September 1971. Type locality: 200 m, off Lambert's Bay (32°04′S 17°12′E). UCT station number LBT 67D.

Description

Ovigerous female, holotype, length 9,3 mm. Very slender and elongate. Integument translucent, slightly calcified, very finely reticulate. Anterior three-quarters of middorsal carina of carapace bearing well-developed forward-pointing denticles (Fig. 21A). Pseudorostral lobes (Fig. 21B) about a seventh of total length of carapace. Eyelobe narrow with three very small lenses (Fig. 21C). Anterolateral angle acute, antennal notch distinct but small, confined to ventral half only. Carapace two and a half times as long as deep, slightly longer than free thoracic somites together.

Cephalothorax subequal in length to abdomen. First pedigerous somite visible dorsally and laterally, second slightly wider than third. Abdominal somites cylindrical, lacking defined sideplates ventrally. Middorsal carina present up to and including third pleon somite.

Basal segments of antenna 1 (Fig. 21D) subequal in length. Accessory flagellum short, 2-segmented. Flagellum 2-segmented with one long aesthetasc.

Basis of maxilliped 3 (Fig. 21E) more than two and a half times length of remaining segments together, distal prolongation reaching beyond junction of merus and carpus (Fig. 21F). Merus short and slightly expanded externally.

Pereiopod 1 (Fig. 21G) very slender and elongate, basis slightly shorter than rest of limb with a few stout spines distally along outer edge. Carpus, propodus and dactyl all very slender, more or less subequal in length.

Pereiopod 2 (Fig. 21H) fairly stout, 6-segmented, slightly shorter than posterior pereiopods. Basis equal in length to carpus, propodus and dactyl together. Merus and carpus stout, subequal in length.

Pereiopods 3 (Fig. 21I) to 5 similar, basis of pereiopod 3 longest, merus and carpus of pereiopod 5 longest.

Telsonic somite slightly produced between uropods (Fig. 21J). Peduncle of uropod a little longer than telsonic somite with eleven blunt spines on inner edge. Exopod slightly longer than endopod, first segment unarmed, a third length of second; second with eleven plumose setae on inner edge and six spines terminally, three very long. First segment of endopod less than half length of second, with five spines on inner edge; second with eleven small spines on inner edge and four long ones terminally.

A single damaged *subadult male* was taken at the same station as the holotype female. It appears to be similar in most details, but is not sufficiently whole to allow an adequate description. Its length is approximately 7,5 mm.

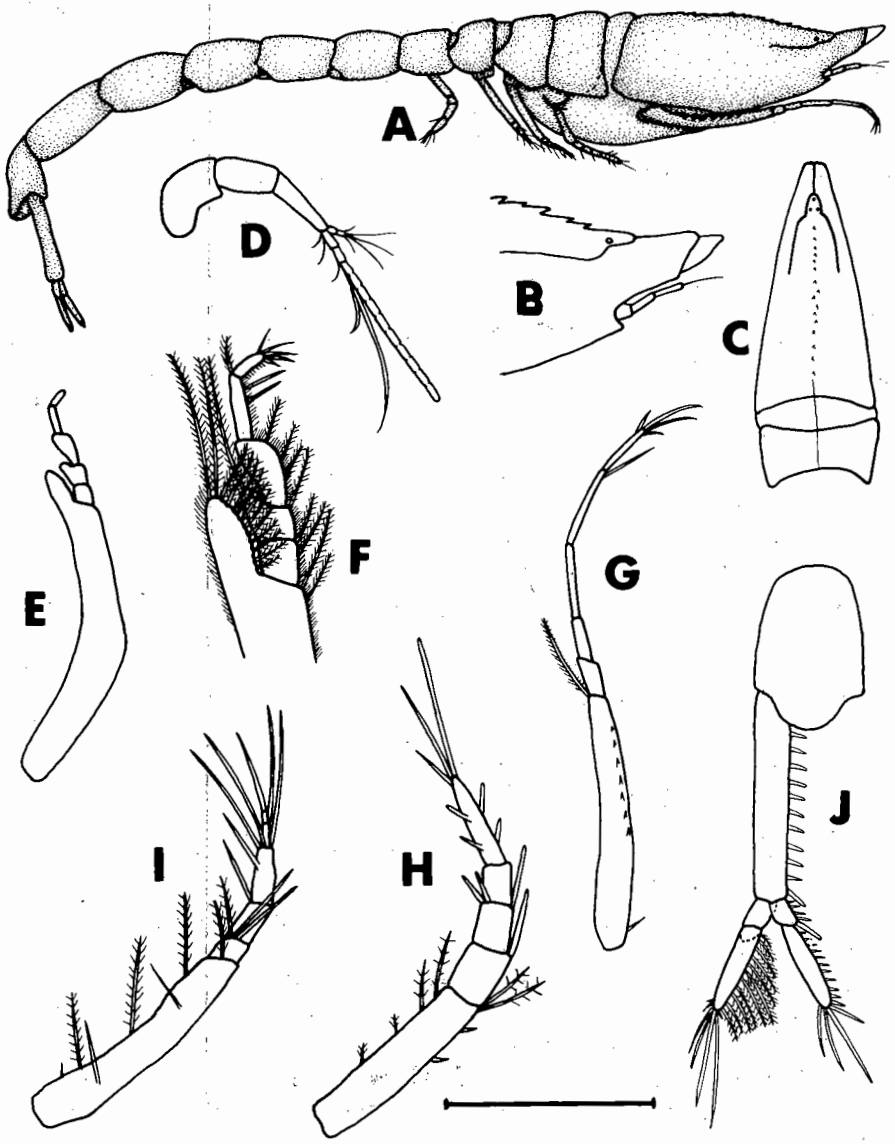

Fig. 21. *Iphinoe producta* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Detail of distal tip of maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, E, G, J; 0,5 mm for D, F, H–I.

Length

Ovigerous female 8,6–9,5 mm.

Remarks

I. producta is undoubtedly a member of the genus *Iphinoe*, most closely resembling *I. ischnura* Zimmer, 1952, from Indo-China. Apart from other minor differences, the two species may be distinguished by the more elongate carapace with more numerous serrations, the longer bases of pereiopods 2 to 5 and the longer first segment of the endopod of the uropod in *I. producta*. *I. ischnura* reaches 4,5 mm in length and *I. producta* 9,6 mm. It may be distinguished from *I. dayi* Jones, 1960, by the more robust form and the presence of two aesthetascs on the flagellum of the first antenna in the latter species, and from *I. tenella* Sars, 1878, *I. elisae* Băcescu, 1950, and *I. serrata* (Norman, 1867) by the shorter carapace in these three species.

Distribution

Five specimens known, all from the south-western coast of South Africa at depths between 200 and 280 m.

Iphinoe dayi Jones, 1960

Figs 22–23

Iphinoe dayi Jones, 1960: 175–177, fig. 2.

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
WCD	33°S 18°E	65 m	1						1	1
FAL & FBY	34°S 18°E	23–87 m	28	10	16	22	24	27	127	45
SST	34°S 21°E	80 m	2	1	7	1	2	4	17	4
SCD	34°S 25°E–33°S 27°E	26–84 m					3	3	6	4
SAM	?	?					1		1	1

Previous records

False Bay (34°S 18°E), 20–58 m (Jones 1960).

Holotype

Adult male, designated by Jones (1960), in the British Museum (Natural History). Type locality: 20 m, False Bay (34°S 18°E).

Description

Ovigerous female, length 9,6 mm, from False Bay. Integument finely reticulate, neither shiny nor translucent. Carapace somewhat compressed laterally, middorsal carina bearing eight teeth (varies between eight and ten) on anterior half (Fig. 22A). Carapace twice as long as deep, pseudorostral lobes

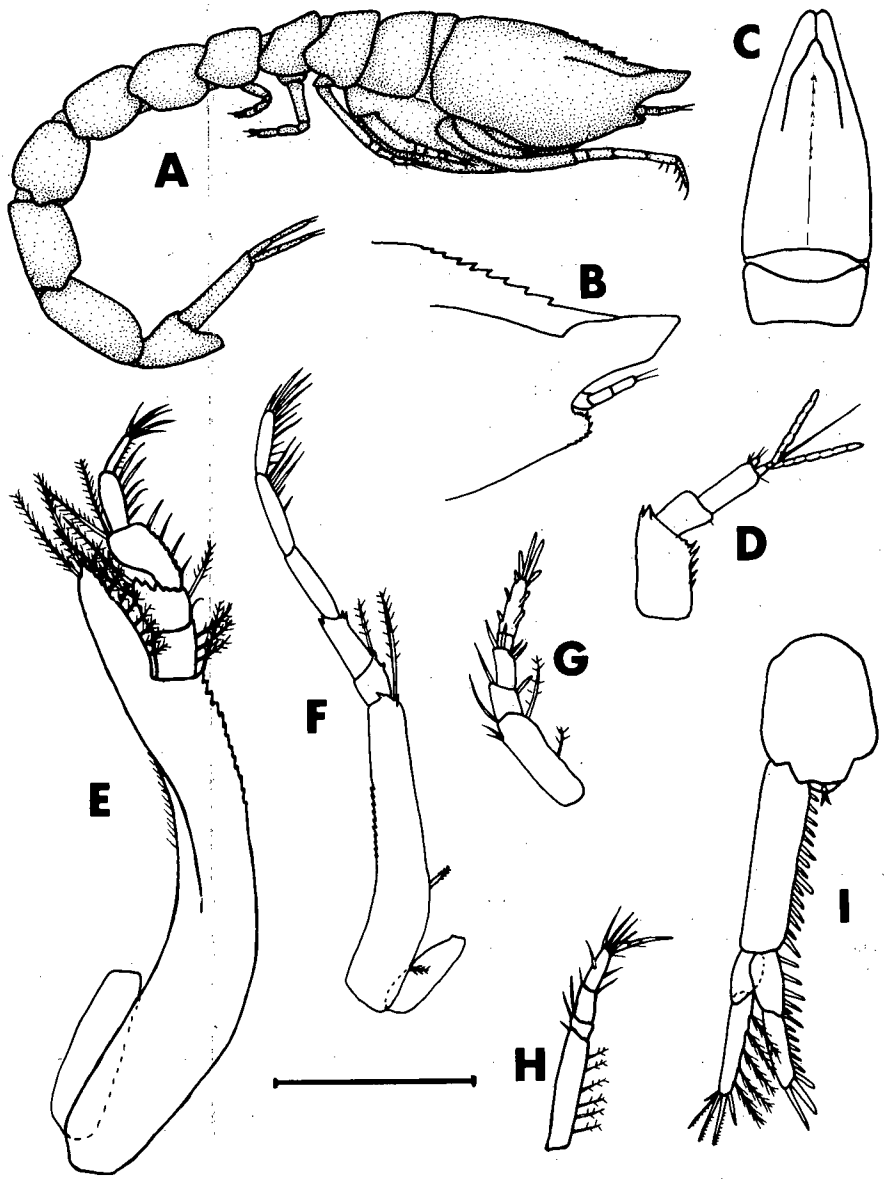

Fig. 22. *Iphinoe dayi*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, F–I; 0,5 mm for D–E.

well developed, produced beyond eyelobe for about one-seventh of total length of carapace. Anterolateral angle (Fig. 22B) rounded, bearing several small teeth. Antennal notch deeply excavate, set back from pseudorostral lobes. Eyelobe somewhat elongate, eyeless (Fig. 22C).

First pedigerous somite visible dorsally and laterally, second and third of equal width, third produced backwards to overlap fourth. Carapace slightly longer than free thoracic somites together. Cephalothorax longer than abdomen by one somite. Abdominal somites cylindrical.

Antenna 1 (Fig. 22D) fairly short, basal segment half as wide as long, edged with denticles. Flagellum short, 2-segmented, with two aesthetascs and one fine seta. Accessory flagellum short, 1-segmented.

Basis of maxilliped 3 (Fig. 22E) curved, two and a half times length of remaining segments together; distal prolongation elongate, almost reaching distal tip of carpus. Merus short, little expanded, wider and denticulate distally. Carpus inserted on inner half of merus only.

Basis of pereiopod 1 (Fig. 22F) equal in length to rest of limb. Ischium half length of merus. Last three segments subequal in length.

Pereiopod 2 (Fig. 22G) 6-segmented, very slightly shorter than pereiopod 3. Basis shorter than rest of limb, dactyl furnished with a number of short blunt spines.

Pereiopods 3 (Fig. 22H) to 5 similar, pereiopod 3 longest.

Telsonic somite somewhat produced between uropods, less than one and a half times as long as wide, about two-thirds length of peduncle of uropod. Peduncle (Fig. 22I) with fifteen short, blunt spines on inner edge. Exopod slightly longer than endopod, two-thirds length of peduncle. First segment a third length of second, unarmed; second with five plumose setae on inner edge and five terminal spines. Segments of endopod subequal in length, each with six spines on inner edge, second also with two spines terminally.

Adult male, length 8,9 mm, from False Bay. As female, except as follows: teeth of middorsal carina smaller and between five and seven in number (Fig. 23A). Anterolateral angle obsolete, antennal notch shallow (Fig. 23B) with a few small serrations below. Eye present (Fig. 23C) in the form of two small lenses and a little pigment (although in some the eye is well developed). Sideplates of fourth pedigerous somite overlapping third anteriorly and fifth posteriorly. Abdominal sideplates defined ventrally. Thoracic sternites simple, that of first pedigerous somite forming a single mid-ventral spine and of third and fifth forming small rounded projections (no armature on second or fourth).

Merus of maxilliped 3 (Fig. 23D) a little more expanded, carpus and propodus narrower. Peduncle of uropod (Fig. 23E) stouter, with about forty short blunt spines and serrate setae in several rows on inner edge. Second segment of exopod with seven plumose setae on inner edge and three long serrate setae terminally. First segment of endopod with twelve spines of various types, unevenly spaced; second with an even row of slender spines on inner edge and two stout serrate setae terminally.

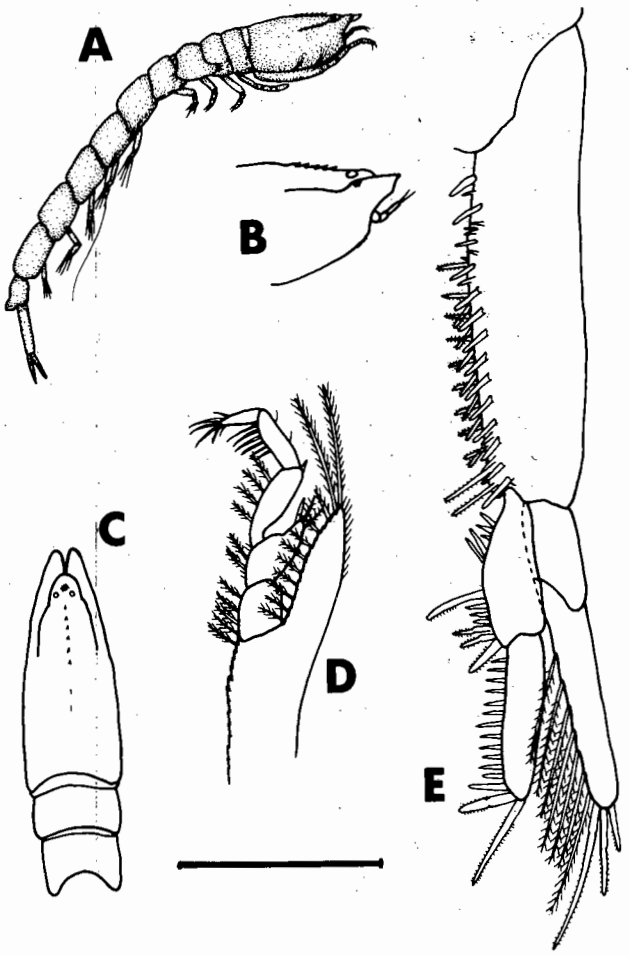

Fig. 23. *Iphinoe dayi*
Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Distal tip of maxilliped 3. E. Uropod.
Scale line = 4 mm for A; 2 mm for B–C; 0,5 mm for D–E.

Length

Adult male	8,6–10,6 mm
Ovigerous female	8,3–11,2 mm

Remarks

Only the male of this species has previously been described (Jones 1960). The present specimens have been compared with paratypes identified by Jones, and there are no differences of any degree, apart from the varying degree of

development of the eye in adult males. A much-mutilated specimen of *I. dayi*, now in the possession of the South African Museum, was tentatively labelled by Stebbing (unpublished) as *I. tenella*, and the two species are not dissimilar. But *I. dayi* may be distinguished from all other species having a serrated mid-dorsal carina in the male as follows: *I. tenella*, *I. ischnura*, *I. elisae* and *I. producta* have only one aesthetasc on the flagellum of the first antenna and *I. serrata* is serrate for the whole length of the mid-dorsal carina. *I. dayi* may further be distinguished from *I. producta*, the only other species from southern Africa in which the male is serrate, by the greater length of the carapace in *I. producta* and the generally far more slender body and limbs.

Distribution

Apparently endemic to South Africa from the Cape Peninsula to East London at depths from 23 to 87 m. The relative rarity of this species means that the limits of its range can be determined with less finality than can those of *I. africana* and *I. stebbingi*. Nevertheless, it is fairly common in those areas where it is known to occur, and accounts for more than 3 per cent of the total number of individuals in the collection.

Iphinoe fagei Jones, 1955

Figs 24–25

Iphinoe fagei Jones, 1955: 285–287, figs 3–4; Jones, 1956: 199.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
SWD	26°S 15°E	26 m						8	8	1
WCD	32°S 17°E–32°S 18°E	11–172 m	15	11	2	15	18	24	85	6

Previous records

South West Africa (south of Walvis Bay) (22°S 14°E–25°S 14°E), plankton (Jones 1955); South West Africa (23°S 14°E), 22–76 m (Jones 1956).

Holotype

Not designated. Type locality: plankton, South of Walvis Bay (22°S 14°E).

Description

Ovigerous female, length 6,9 mm, from St Helena Bay (32°S 18°E). Integument translucent, finely reticulate, appearing slightly crystalline. Carapace oval with two (varying between none and three) small teeth on middorsal carina, little over a third of the distance from anterior tip (Fig. 24A). Middorsal carina present only on anterior two-thirds of carapace. Pseudorostral lobes meeting for a short distance in front of eyelobe (Fig. 24B). Eyelobe (Fig. 24C) rounded

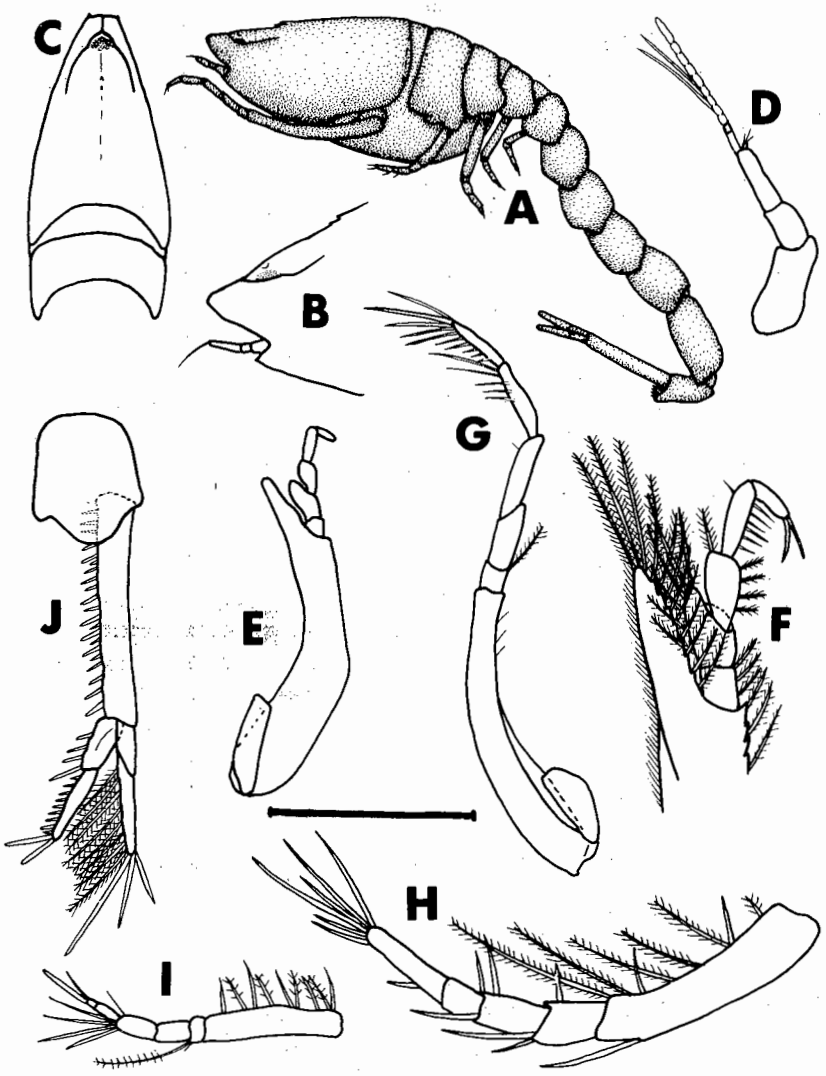

Fig. 24. *Iphinoe fagei*

Ovigerous female. A. Lateral view. B. Anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Detail of distal tip of maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, E; 0,5 mm for D, F–J.

with three (or more) small, indistinct lenses, slightly pigmented. Anterolateral angle acute with small tooth at apex, antennal notch excavate, angular.

Carapace twice as long as deep, longer than free thoracic somites together. First pedigerous somite exposed for a short distance, second broad. Cephalo-

thorax little longer than abdomen; abdominal somites cylindrical.

Antenna 1 (Fig. 24D) of moderate length, first segment longest and second shortest. Flagellum 2-segmented with one aesthetasc; accessory flagellum small, 1-segmented.

Basis of maxilliped 3 (Fig. 24E) more than two and a half times length of remaining segments together; distal prolongation narrow, nearly reaching distal tip of carpus. Ischium (Fig. 24F) slightly longer than wide, merus produced externally, tip reaching half-way along carpus.

Pereiopod 1 (Fig. 24G) elongate, basis curved, subequal in length to rest of limb. Last three segments fairly stout, subequal in length.

Pereiopod 2 (Fig. 24H) stout, 6-segmented. Basis slightly shorter than rest of limb. Dactyl fairly long, strongly armed at tip.

Pereiopods 3 (Fig. 24I) to 5 similar, basis of pereiopod 3 longest.

Telsonic somite slightly produced between uropods (Fig. 24J), more than half as long as penducle. Peduncle nearly twice length of rami with twenty-one fine spines on inner edge. First segment of exopod shorter than second, unarmed; second with eight plumose setae on inner edge and three terminal spines. First segment of endopod shorter than second with four spines on inner edge; second with nine short spines on inner edge and two long ones terminally.

Adult male, length 7,5 mm, from St Helena Bay. As female except as follows: integument thinner, carapace (Fig. 25A) without middorsal carina; antennal notch much shallower (Fig. 25B), anterolateral angle obtuse, poorly defined. Eye present (Fig. 25C), consisting of three to five large lenses (distinct if white pigment present below, otherwise difficult to see). Sideplates present on all abdominal somites, fourth thoracic sideplate overlapping third and fifth. First pedigerous somite visible only dorsally and dorsolaterally. Sternite of first pedigerous somite armed with three plumose setae pointing posteriorly on either side; second with large rounded projection bearing forward-directed tooth; third with slight transverse ridge; fourth unarmed; fifth with small rounded projection.

Flagellum of antenna 1 (Fig. 25D) surrounded by several short aesthetascs. Basis of pereiopod 1 armed with ten spines proximally on lower edge. Prolongation of basis of maxilliped 3 somewhat longer (Fig. 25E). Merus of pereiopod 2 (Fig. 25F) longer. Peduncle of uropod (Fig. 25G) more than one and a half times length of rami, with about forty-two spines on inner edge. Second segment of exopod with about ten plumose setae on inner edge and four spines terminally. First segment of endopod with twelve spines on inner edge, second with thirteen, plus two larger ones subterminally and three plumose setae terminally.

Length

Adult male	6,7–8,3 mm
Ovigerous female	6,7–9,8 mm

Remarks

I. fagei was first described by Jones (1955) from plankton collected by the R.R.S. *William Scoresby* off the coast near Walvis Bay. Further benthic samples were collected by the *Galathea*, also off Walvis Bay, and identified by Jones (1956). The author has examined some ovigerous females from the latter collection and finds that they agree in morphological detail with those of the present collection. However, the *Galathea* specimens are transparent and slightly smaller, whereas those of the author are quite translucent and brittle due to a very much thicker integument. The adult males in the present collection agree with Jones's description and figures.

Most females may be distinguished from other females in the genus by the presence of one to three small teeth behind the eyelobe, but the teeth are absent

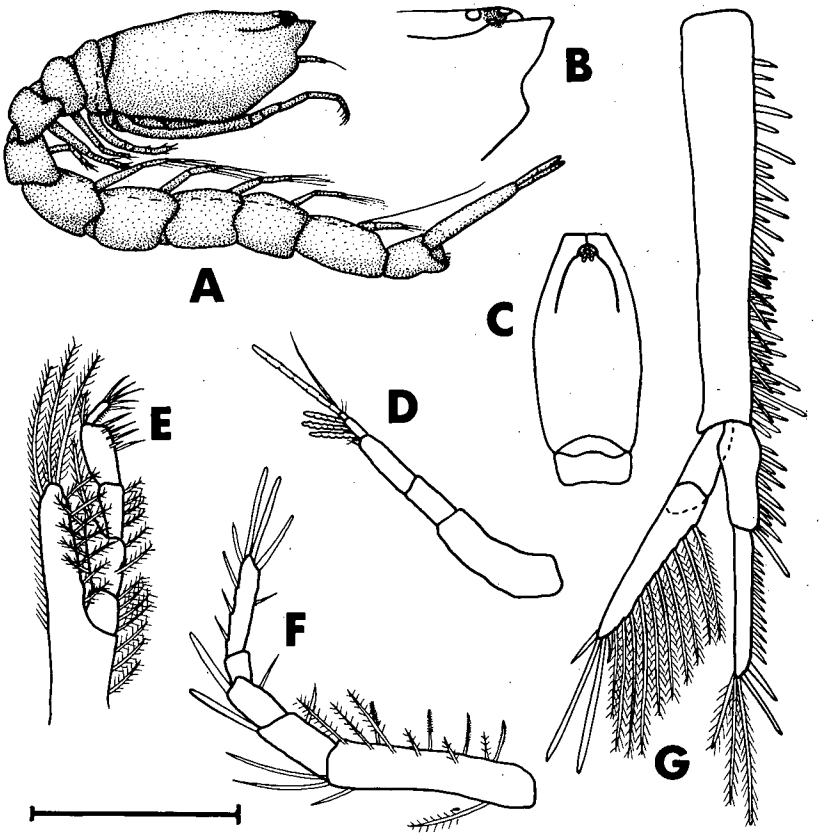

Fig. 25. *Iphinoe fagei*

Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Distal tip of maxilliped 3. F. Pereiopod 2. G. Uropod.

Scale line = 2 mm for A, C; 1 mm for B; 0,5 mm for D–G.

in some specimens. The latter may be distinguished by the smooth carapace which is almost exactly twice as long as deep, and the similar lengths of pereiopods 2 and 3. The species most closely resembling *I. fagei* is *I. senegalensis* Jones, 1956, from the shore in west Africa. The two may be distinguished primarily by the longer basis of maxilliped 3 and the greater body size of *I. fagei*.

Distribution

Apparently endemic to the south-western coast of southern Africa from Walvis Bay to St Helena Bay, at depths from 11 to 172 m, and constituting a little over 2 per cent of the individuals in the collection. Its distribution appears to be patchy, a few hauls yielding large numbers of individuals.

Iphinoe senegalensis Jones, 1956

I. senegalensis Jones, 1956: 200–201, figs 7–8; Jones 1960: 175.

A single adult male from an earlier UCT collection (not in the author's possession) was identified by Jones (1960) as *I. senegalensis*. The position (32°S 18°E) at a depth of 1 m suggests that the specimen came from Langebaan Lagoon. As Jones pointed out, it is not easy to identify with confidence a single adult male of this genus, and confirmation of the occurrence of *I. senegalensis* in South Africa will have to await the collection of more material. The species, which previously has been found only on the beach at Goreé in Senegal, is very similar to *I. fagei*. Differences between the two are mentioned in the discussion of *I. fagei* above.

Iphinoe crassipes Hansen, 1895

Figs 26–27

Iphinoe crassipes Hansen, 1895: 53–54, pl. 4 (figs 4–4f). Stebbing, 1910: 412–413, pl. 45; 1913: 43–44, figs 21–22. Fage 1928: 331. Zimmer, 1942: 191–192. Kurian, 1951: 84–86; 1954: 276. Jones, 1956: 202, fig. 9. Băcescu, 1961: 501, fig. 4. LeLoeuff & Intes, 1972: 43.

Iphinoe macrobrachium Calman 1904*a*: 173, pl. 4 (figs 72–75).

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
SB	33°S 18°E	13–29 m			1	4	2	6	13	4
FAL & FBY	34°S 18°E	16–39 m		4	1	12	3	15	35	7
SCD	34°S 21°E–33°S 25°E	44–79 m	8	3	1	3	1	8	24	7
SAM A 688	33°S 26°E	92 m	1						1	1
NIWR	30°S 30°E–28°S 32°E	23–103 m	12	7	5	19	14	13	70	20

Previous records

Gulf of Guinea, plankton (Hansen 1895); Ceylon, 8–14 m (Calman 1904*a*); South Africa (East London) (32°S 28°E), 75 m (Stebbing 1910); tropical west

Africa (Fage 1928; Jones 1956; LeLoeuff & Intes 1972); India, 6–32 m (Kurian 1951, 1954); Red Sea (Băcescu 1961).

Holotype

Immature male, length 3,2 mm, unique. Type locality: Gulf of Guinea.

Description

Ovigerous female, length 7,2 mm, from the south coast near Knysna. Integument rather thin and delicate, little calcified, somewhat transparent. Reticulations and pits visible at high magnifications producing a finely crystalline appearance. Carapace little more than one and a half times as long as deep with several shallow longitudinal furrows (Fig. 26A). Middorsal carina forming double row of very small serrations on middle part of carapace only. Eyeless eyelobe elevated above pseudorostral lobes in lateral view (Fig. 26B). Pseudorostral lobes short, rounded, slightly upturned and truncate anteriorly, curled inwards in dorsal view (Fig. 26C). Anterolateral angle acute with several small serrations below. Antennal notch rounded, of moderate size. Five free pedigerous somites, together as long as carapace; first narrow, second wider ventrally.

Cephalothorax equal in length to first five abdominal somites. Abdominal somites almost cylindrical with sideplates poorly defined posteroventrally on each somite.

Antenna 1 of moderate length (Fig. 26D), second segment about half length of first or third. Flagellum 2-segmented with two slender spines. Accessory flagellum 1-segmented, without setae.

Basis of maxilliped 3 (Fig. 26E) very wide and short, about one and a half times length of remaining segments together, serrate on inner edge. Distal prolongation particularly long, narrowed distally, reaching half-way along propodus. Merus also much expanded, distal edges parallel for some distance, reaching more than half-way along propodus.

Basis of pereiopod 1 (Fig. 26F) particularly short, equal in length to next three segments together, slightly curved. Carpus wide, slightly longer than subequal propodus and dactyl.

Pereiopod 2 (Fig. 26G) relatively short and stout, basis very short, subequal in length to merus, carpus and propodus together. Dactyl stout, strongly armed, subequal in length to basis.

Pereiopods 3 (Fig. 26H) to 5 similar, merus and carpus stout, carpus strongly armed distally.

Telsonic somite (Fig. 26I) well produced between uropods, with two fine anal setae. Peduncle of uropod little longer than telsonic somite, armed with seven evenly-spaced stout spines on inner edge. Exopod of uropod two-thirds length of endopod, only slightly longer than first segment of endopod. First segment of exopod half length of second, unarmed; second segment armed with two very small spines on inner edge and six long stout ones terminally. First

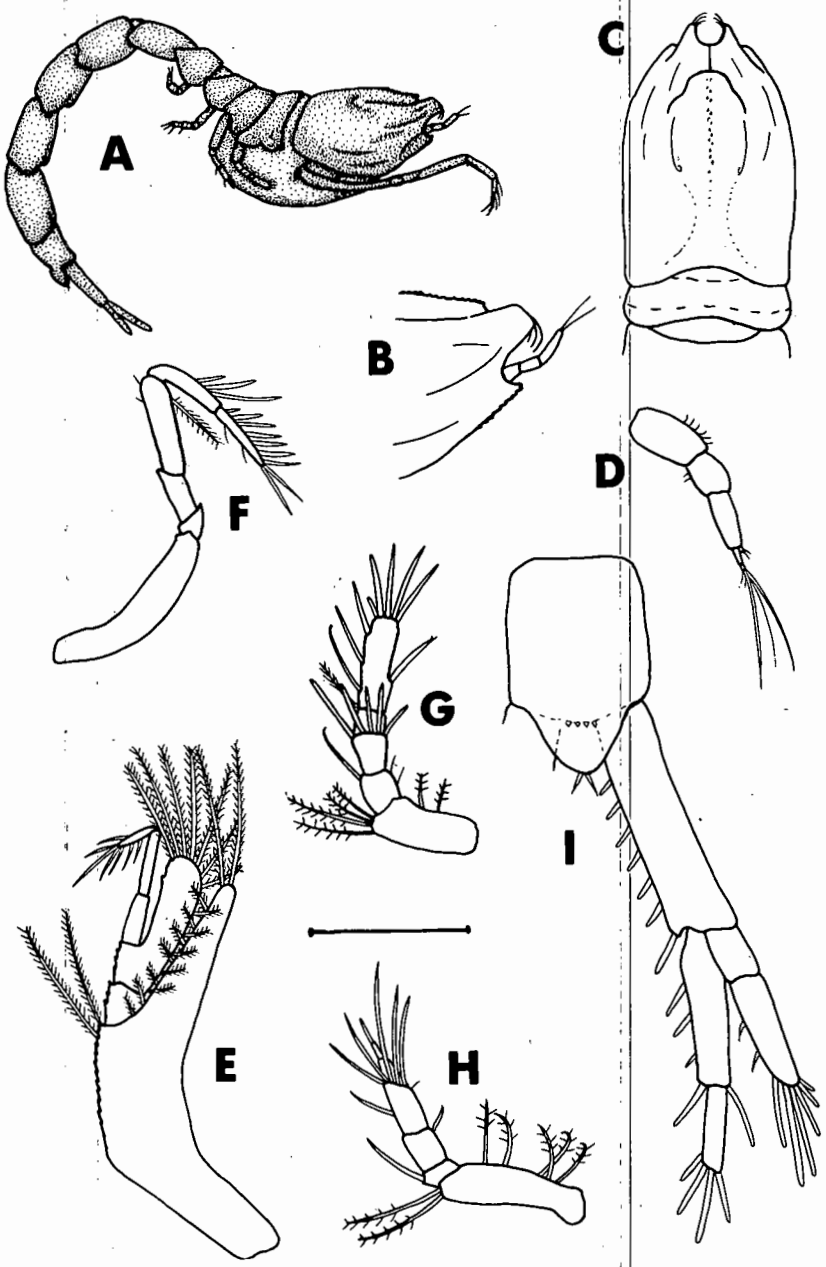

Fig. 26. *Iphinoe crassipes*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 2 mm for A; 1 mm for B–C, F; 0,5 mm for D–E, G–I.

segment of endopod nearly twice length of second, armed with four spines on inner edge and one distally on outer edge. Second segment narrower than first with four strong distal spines.

Adult male, length 7,8 mm, from UCT's SCD programme near Knysna. As female, except as follows: anterolateral angle and antennal notch wanting (Figs 27A & B). Serrations of middorsal carina of carapace much less distinct. Eye (Fig. 27C) well developed, consisting of a single large central lens surrounded by eight smaller ones, with pigment below.

Antenna 1 (Fig. 27D) stouter, flagellum bearing about nine short aesthetascs. Prolongation of basis of maxilliped 3 (Fig. 27E) shorter and broader, of merus wider, distally reaching articulation of propodus and dactyl. Peduncle

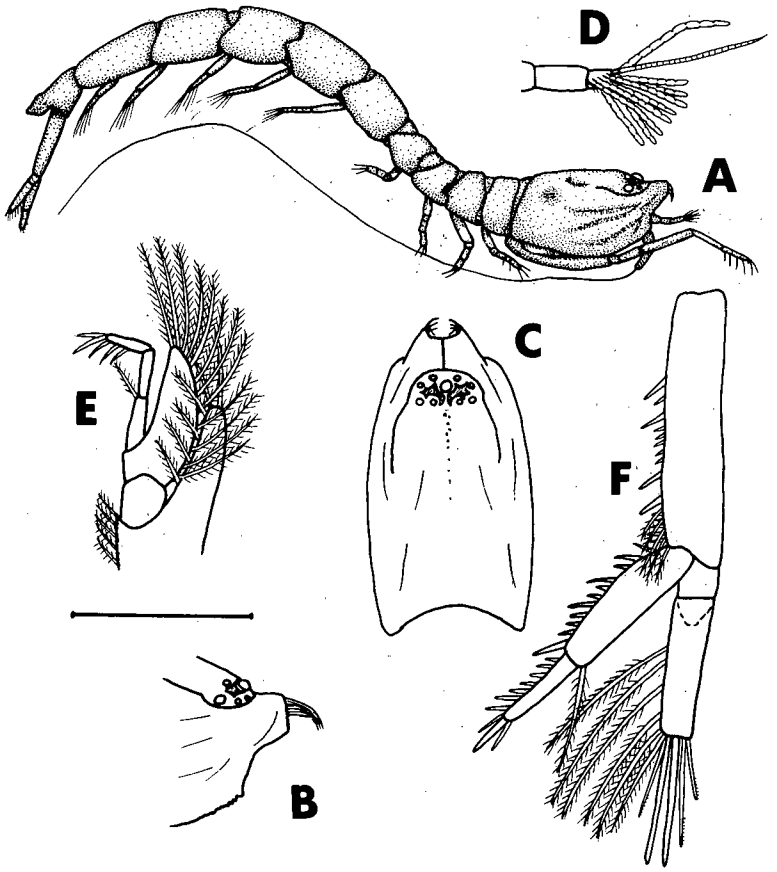

Fig. 27. *Iphinoe crassipes*

Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Distal tip of maxilliped 3. F. Uropod.

Scale line = 2 mm for A; 1 mm for B–C; 0,5 mm for E–F; 0,3 mm for D.

of uropod (Fig. 27F) armed with fourteen spines on inner edge and five small plumose setae distally. First segment of exopod shorter relative to second with six very long plumose setae on inner edge. First segment of endopod with eleven stout spines on inner edge, second with seven.

Length

Adult male	5,7–8,1 mm
Ovigerous female	5,6–7,8 mm

Remarks

The relationship between *I. crassipes* Hansen, 1895, and *I. macrobrachium* Calman, 1904*a*, has never been satisfactorily determined. *I. crassipes* was described on the basis of a single immature male, 3,2 mm in length, from west Africa. In 1904 Calman described specimens from Ceylon, for which he erected a new species, *I. macrobrachium*. (In his paper he gives the length as 1 mm, but in fact both are about 4,5 mm in length.) He considered his species to be distinct from *I. crassipes*, differing mainly in 'the outline of the carapace', the length of the basis of pereiopod 1 and the unequal lengths of the rami of the uropods in his specimens. Stebbing (1910) described a single adult male from South Africa which he called *I. crassipes* (although it exhibited some of the characters used by Calman to differentiate *I. macrobrachium* from Hansen's species), considering the differences between Calman's and Hansen's specimens to be due solely to sexual dimorphism between obviously immature individuals. The author does not have Stebbing's specimen, but it is presumably similar to those in her possession, which are very uniform in structure throughout the range. His figures do not correspond well with any specimens, particularly in the outline of the carapace, the basis of pereiopod 1 and the uropod. Since then Fage (1928), Jones (1956) and LeLoeuff & Intes (1972) have all recorded specimens referred to as *I. crassipes* from west Africa, Jones figuring the previously undescribed female. Kurian (1951, 1954) has recorded some specimens from India and Băcescu (1961) has erected a new subspecies, *I. c. haifae*, for material from the Red Sea.

The question still remains as to whether Stebbing was correct in assuming *I. crassipes* and *I. macrobrachium* to be synonymous. The author has examined Calman's two syntypes and several specimens from P. LeLoeuff's west African material. Despite the striking differences between the figures given by different authors, particularly those of the carapace, the external appearance of the animals is rather uniform throughout the range. In all specimens examined the carapace is characterized by shallow longitudinal furrows on the anterior part. Individuals differ mainly in that in some the eyelobe is elevated above the level of the pseudorostrum, and in others the two are flush with each other; in some the pseudorostrum is clearly upturned and truncate anteriorly while in others it is more or less anteriorly directed and rounded. In all cases the pseudorostal lobes are curled inwards and downwards in dorsal view, with a number of downward-directed spines. The other major variations occur in the first

pereiopods and uropods. The basis of pereiopod 1 varies between a third and nearly half the total length of the limb; the exopod of the uropod may be two-thirds the length of the endopod or the rami may be subequal in length; the first segment of the endopod may be twice the length of the second or the two segments may be of equal length.

Since these variations are not found uniformly throughout the geographical range, the author has come to the conclusion—after some deliberation—that the differences exhibited between individuals from different areas are not consistent enough to warrant the existence of two species or even subspecies. Thus Stebbing was correct in his conclusion although, contrary to his suggestion, few of the differences are sexual. The author also suspects that, from his figures and very brief description, Băcescu's *I. c. haifae* will be found to fit within the range of variability of *I. crassipes* without subspecific differentiation, being very like the West African forms in most respects.

The major variable characters shown by individuals from different regions are tabled below.

Ceylon and India (*I. macrobrachium* sensu Calman)	South Africa (*I. crassipes* sensu Stebbing)	Red Sea (subspecies *I. c. haifae* sensu Băcescu)	West Africa (*I. crassipes* sensu Hansen)
eyelobe strongly elevated in ♀ (no ♂ available)	eyelobe strongly elevated in ♀, slightly in ♂	? eyelobe elevated in ♂ and ♀	eyelobe elevated in ♂, less in ♀
pseudorostrum upturned in ♀	pseudorostrum upturned in ♀, very slightly in ♂	pseudorostrum rounded, ? not upturned	pseudorostrum upturned in ♂, rounded in ♀
distal process of basis of maxilliped 3 reaching distal tip of carpus	distal process of basis of maxilliped 3 reaching at least distal tip of carpus	distal process of basis of maxilliped 3 reaching half-way along carpus	distal process of maxilliped 3 reaching one-third length of carpus
basis of pereiopod 1 three-sevenths total length of limb	basis of pereiopod 1 three-fifths total length of limb	basis of pereiopod 1 half total length of limb	basis of pereiopod 1 less than half total length of limb
endopod of uropod one and a third length of exopod	endopod of uropod one and a half length of exopod	exopod and endopod of uropod subequal in length	
first segment of endopod slightly longer than second	first segment of endopod twice length of second	segments of endopod subequal in length	
peduncle of uropod shorter than endopod	peduncle and endopod subequal in length	penducle of uropod longer than endopod	

It can be seen that in most respects the west African and Red Sea forms are rather similar, as are the South African and Ceylonese forms, but the degree of overlap of distinguishing characters is such that taxonomic differentiation is inappropriate.

I. crassipes is obviously closely related to *I. pokoui* LeLoeuff & Intes, 1972, from West Africa, the only other species bearing long stout first pereiopods and an upturned pseudorostrum. It may be distinguished from *I. crassipes* by

the very wide antennal notch with a narrow serrate elongate anterolateral angle and more slender uropods with subequal rami. Both species are rather aberrant for the genus, the pereiopods and maxilliped 3 having some similarity with those of *Eocuma*. The nature of the carapace and thoracic somites, however, ensures that they remain in the genus *Iphinoe*.

Distribution

India; Ceylon; South Africa: Saldanha Bay (13–29 m) to Natal (23–103 m); Gulf of Guinea; Red Sea. The species is absent from the colder waters of South West Africa, but otherwise probably occurs round the entire Atlantic and Indian Ocean coasts of Africa and India from about 8 to little over 100 m in depth. It constitutes a little more than 3 per cent of the individuals in the collection, but represents more than 70 per cent of the individuals from Natal waters.

Iphinoe truncata Hale, 1953

Fig. 28

Iphinoe truncata Hale, 1953: 48–50, figs 3–4.

Records

			adult ♂	sub-adult ♂	ovig. ♀	♂ & ♀	juv.	total	no. of records
CON	Morrumbene (23°S 35°E)			2	3		9	14	5
PEM	Richards Bay (28°S 32°E)		1					1	1
RU	St Lucia (28°S 32°E)	estuarine		2	5	5	1	13	1
UCT	Keurboom's River (34°S 23°E)	plankton	10	4	15	9	5	43	2
UCT	Knysna (34°S 23°E)				2	2		4	1
UCT	Great Brak River (34°S 22°E)				1			1	1

Previous records

Estuarine plankton from: The Haven (32°S 28°E), Port St Johns (31°S 29°E), Umkomaas (30°S 30°E) (Hale 1953); Knysna (34°S 23°E) (Jones 1960).

Holotype

Not designated. Type localities: ovigerous female, Umkomaas River Mouth; adult male, Port St Johns River Mouth; both in sand, estuarine.

Description

Ovigerous female, length 2,8 mm, from Keurboom's River Mouth. Integument translucent, finely spotted with black chromatophores. Carapace one and two-thirds as long as deep (Fig. 28A). Anterolateral angle very small, acute; antennal notch tiny, too small to accommodate first antenna. Distinct mid-dorsal carina present on carapace (Fig. 28B), widening slightly about half-way back along the carapace, and absent on posterior third. Pseudorostral lobes short, barely meeting in front of eyelobe. Eyelobe rounded, eye consisting of large patch of black pigment; no lenses visible.

pereiopods and uropods. The basis of pereiopod 1 varies between a third and nearly half the total length of the limb; the exopod of the uropod may be two-thirds the length of the endopod or the rami may be subequal in length; the first segment of the endopod may be twice the length of the second or the two segments may be of equal length.

Since these variations are not found uniformly throughout the geographical range, the author has come to the conclusion—after some deliberation—that the differences exhibited between individuals from different areas are not consistent enough to warrant the existence of two species or even subspecies. Thus Stebbing was correct in his conclusion although, contrary to his suggestion, few of the differences are sexual. The author also suspects that, from his figures and very brief description, Băcescu's *I. c. haifae* will be found to fit within the range of variability of *I. crassipes* without subspecific differentiation, being very like the West African forms in most respects.

The major variable characters shown by individuals from different regions are tabled below.

Ceylon and India (*I. macrobrachium* sensu Calman)	South Africa (*I. crassipes* sensu Stebbing)	Red Sea (subspecies *I. c. haifae* sensu Băcescu)	West Africa (*I. crassipes* sensu Hansen)
eyelobe strongly elevated in ♀ (no ♂ available)	eyelobe strongly elevated in ♀, slightly in ♂	? eyelobe elevated in ♂ and ♀	eyelobe elevated in ♂, less in ♀
pseudorostrum upturned in ♀	pseudorostrum upturned in ♀, very slightly in ♂	pseudorostrum rounded, ? not upturned	pseudorostrum upturned in ♂, rounded in ♀
distal process of basis of maxilliped 3 reaching distal tip of carpus	distal process of basis of maxilliped 3 reaching at least distal tip of carpus	distal process of basis of maxilliped 3 reaching half-way along carpus	distal process of maxilliped 3 reaching one-third length of carpus
basis of pereiopod 1 three-sevenths total length of limb	basis of pereiopod 1 three-fifths total length of limb	basis of pereiopod 1 half total length of limb	basis of pereiopod 1 less than half total length of limb
endopod of uropod one and a third length of exopod	endopod of uropod one and a half length of exopod	exopod and endopod of uropod subequal in length	
first segment of endopod slightly longer than second	first segment of endopod twice length of second	segments of endopod subequal in length	
peduncle of uropod shorter than endopod	peduncle and endopod subequal in length	penducle of uropod longer than endopod	

It can be seen that in most respects the west African and Red Sea forms are rather similar, as are the South African and Ceylonese forms, but the degree of overlap of distinguishing characters is such that taxonomic differentiation is inappropriate.

I. crassipes is obviously closely related to *I. pokoui* LeLoeuff & Intes, 1972, from West Africa, the only other species bearing long stout first pereiopods and an upturned pseudorostrum. It may be distinguished from *I. crassipes* by

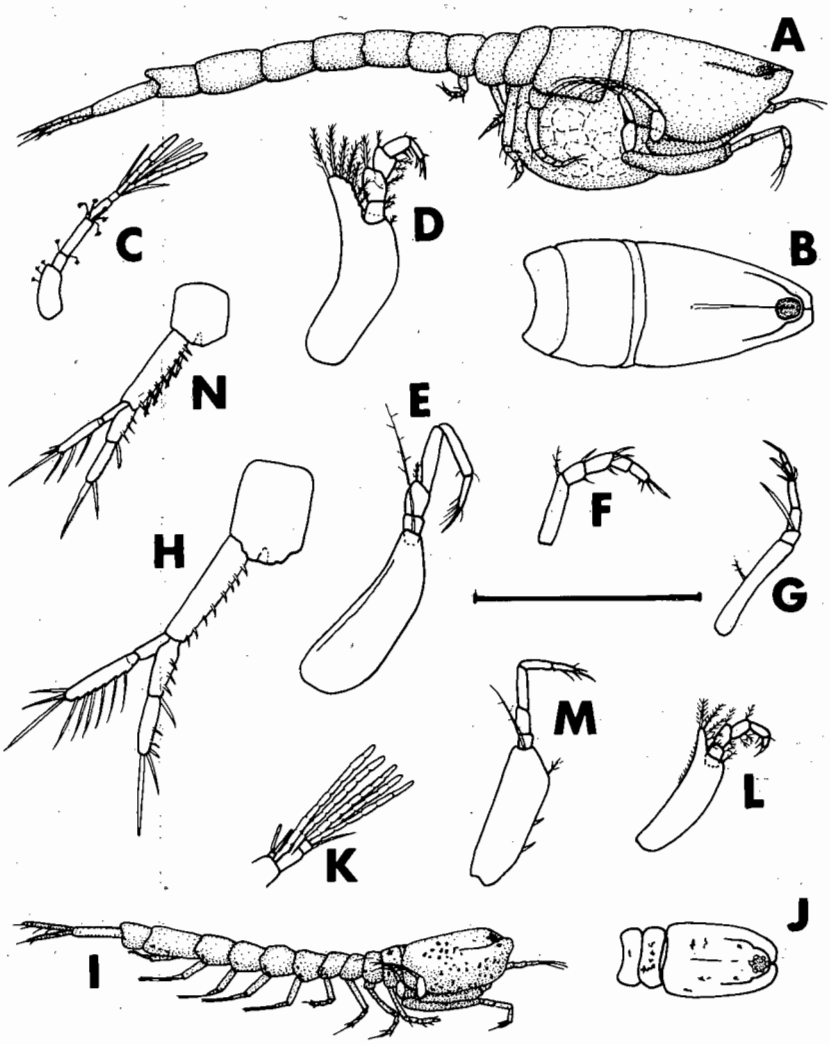

Fig. 28. *Iphinoe truncata*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod. Adult male. I. Lateral view. J. Dorsal view of carapace. K. Detail of distal tip of antenna 1. L. Maxilliped 3. M. Pereiopod 1. N. Telsonic somite and uropod.

Scale line = 1 mm for A–B, J; 0,5 mm for C–I, L–N; 0,1 mm for K.

First pedigerous somite visible, second very wide. Carapace almost as long as free thoracic somites together, cephalothorax as long as abdomen and peduncle of uropod together. Marsupium very large. Exopods of maxilliped 3 and pereiopod 1 large and reflexed upwards.

Antenna 1 (Fig. 28C) fairly long and slender, first segment of basal region short, subequal in length to third. Accessory flagellum very small, 1-segmented. Flagellum 2-segmented, bearing two aesthetascs and a number of fine setae.

Maxilliped 3 (Fig. 28D) short and stout, basis a third as wide as long; prolongation narrow, reaching junction of merus and carpus. Merus and carpus both somewhat expanded.

Basis of pereiopod 1 (Fig. 28E) stout, very slightly longer than rest of limb. Remaining segments also stout, particularly ischium and merus.

Pereiopod 2 (Fig. 28F) 6-segmented, slightly shorter than pereiopod 3, last four segments subequal in length.

Pereiopods 3 (Fig. 28G) to 5 similar, slender. Basis of pereiopod 3 subequal in length to rest of limb, bases of others relatively shorter.

Telsonic somite (Fig. 28H) almost square in dorsal view, notched in midline. Peduncle of uropod slightly longer than telsonic somite with eight small serrated spines on inner edge. Rami subequal in length. First segment of exopod about half length of second, unarmed; second armed with six very slender spines on inner edge and three stouter terminal spines, one very long. Segments of endopod subequal in length, first armed with four spines on inner edge, second with three on inner edge and two terminally.

Adult male, length 1,7 mm, from Keurboom's River Mouth. As in female, except as follows: much smaller in size, fewer chromatophores present. Carapace (Fig. 28I) almost twice as long as deep; anterolateral angle wanting; no antennal notch. First pedigerous somite visible only dorsally, second much narrower. Anterior part of carapace (Fig. 28J) relatively wider.

Flagellum of antenna 1 with five aesthetascs, three around base (Fig. 28K). Basis of maxilliped 3 (Fig. 28L) somewhat narrower, less angled; prolongation narrower. Basis of pereiopod 1 (Fig. 28M) slightly narrower, ischium and merus less stout. Peduncle of uropod (Fig. 28N) armed with twelve spines, second segment of exopod with three spines, second segment of endopod serrated on inner edge with two terminal spines, one constricted half-way along and serrated distally.

Length

Adult male	1,7–2,5 mm
Ovigerous female	2,5–3,1 mm

Remarks

This species has previously been recorded by Hale (1953) and Jones (1960). Hale described it on the basis of adult females only, although he did also designate an adult male holotype without description. The present specimens are clearly members of Hale's species, not differing from those figured by him in any significant way. This species can be distinguished from others in the genus by the absence of a serrated dorsal carina in conjunction with the rami of the uropods being subequal in length to the peduncle and the very short, stout

bases of maxilliped 3 and pereiopod 1.

The adult males are all considerably smaller than the ovigerous females, and the size of these females varies rather more than is common in the genus.

Distribution

The only bodotriid known in estuaries from Great Brak River to Morrumbene, where it is found in fairly small numbers.

Iphinoe capensis (Zimmer, 1921)

Fig. 29

Bodotria capensis Zimmer, 1921: 123–124, figs 12–14.
Iphinoe brevidactyla Hale, 1953: 145–148, figs 1–2.

Records

			adult ♂	sub-adult ♂	ovig. ♀	♂ & ♀	juv.	total	no. of records
SWD	26°S 15°E	26 m	1		2			3	1
LBT	32°S 18°E	10–13 m	9		3		1	13	8
LB	33°S 18°E	0–2 m	5		2	1	3	11	6
CP*	34°S 18°E	0–2 m	1					1	1
FAL & FBY	34°S 18°E	0–23 m	71	2	1	4	4	82	4**
NIWR	29°S 31°E	30 m			1			1	1

*Kommetjie
**Two records from light-traps

Previous records

'Cape Town' (Zimmer 1921); Langebaan Lagoon (33°S 18°E), 1–3 m (Hale 1953).

Syntypes

Two adult males, deposited by Zimmer (1921) as *Bodotria capensis* in the Berlin Zoologisches Museum. Type locality: 'Cape Town'.

Description

Ovigerous female, length 3,1 mm, from Kalk Bay Harbour, False Bay. Integument translucent, shiny. Carapace (Fig. 29A) more than one and a half times as long as deep, anterolateral angle obtuse, small; antennal notch very shallow (Fig. 29B). Pseudorostral lobes short, rounded. Eyelobe rounded, eye large and distinct with maroon pigment below; three lenses visible (Fig. 29C).

First pedigerous somite very short, second very wide. Carapace subequal in length to free thoracic somites, cephalothorax longer than abdomen by two somites. Abdominal somites cylindrical.

Antenna 1 (Fig. 29D) short; first segment longest and second shortest. Accessory flagellum very small; flagellum short, 1-segmented, with a single short aesthetasc.

Maxilliped 3 (Fig. 29E) stout, basis angled; prolongation short and blunt, hardly reaching level of articulation of ischium and merus. Merus, carpus and propodus all flattened and of equal width. Dactyl short and cylindrical.

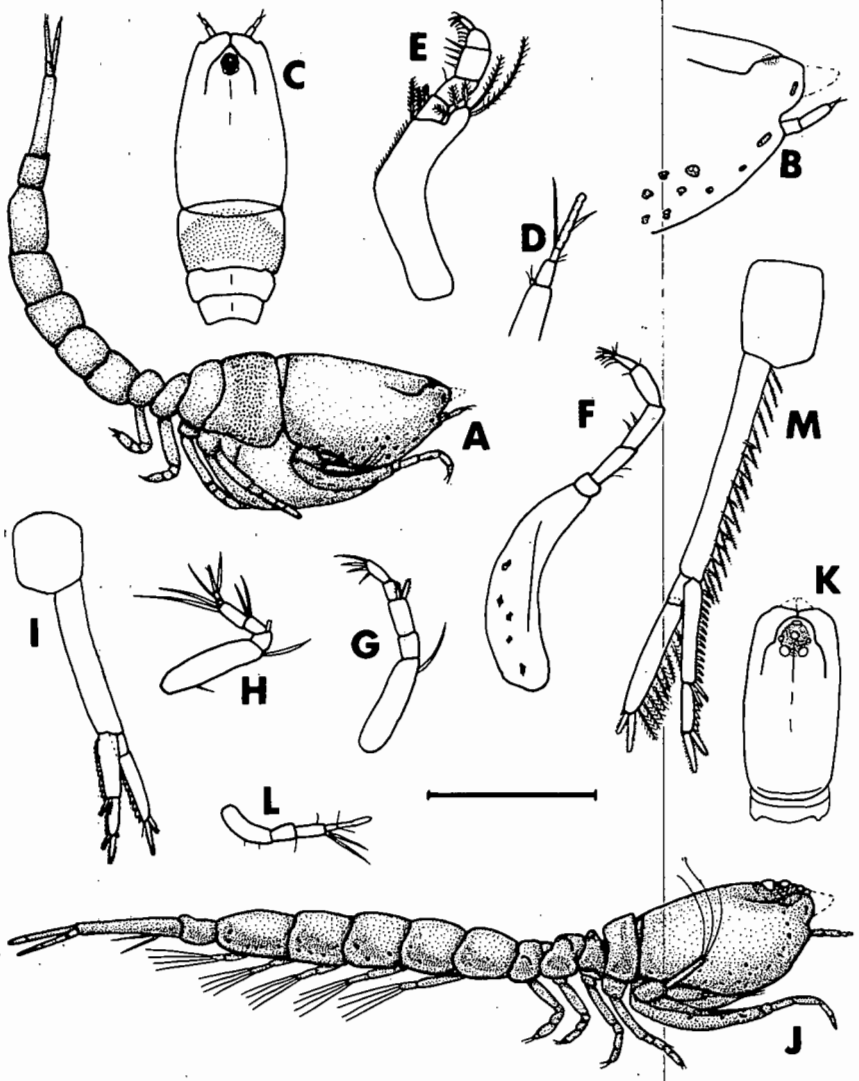

Fig. 29. *Iphinoe capensis*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Detail of distal tip of antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Adult male. J. Lateral view. K. Dorsal view of carapace. L. Antenna 1. M. Telsonic somite and uropod.

Scale line = 1 mm for A, C, J–K; 0,5 mm for B, E–I, L–M; 0,25 mm for D.

Pereiopod 1 (Fig. 29F) short and stout, basis equal in length to remaining segments together. Distal segments stout, cylindrical.

Pereiopod 2 (Fig. 29G) stout, 6-segmented, poorly armed. Dactyl very slightly longer than propodus.

Pereiopods 3 (Fig. 29H) to 5 similar, well armed with long spines on merus, carpus and propodus. Propodus and dactyl very short, relatively stout.

Telsonic somite (Fig. 29I) little produced between uropods, about half length of peduncle. Peduncle about one and a half times length of rami, unarmed. Exopod slightly shorter than endopod, first segment unarmed; second toothed on inner edge with two stout serrated terminal spines. Both segments of endopod toothed on inner edge, first with two stout serrate setae distally, second with two terminally.

Colour in life beige with numerous white chromatophores dorsally, especially on carapace, and melanophores scattered over the body and limbs ventrally, also forming a wide transverse band across second pedigerous somite. White pigment fades rapidly, but melanophores may still be evident after some months or years in alcohol.

Adult male, length 3,8 mm, from Kalk Bay Harbour, False Bay. As female, except as follows: antennal notch (Fig. 29J) less evident. Eye bigger with six large lenses (Fig. 29K). Sideplates of last three pedigerous somites slightly produced laterally, abdominal sideplates produced ventrally.

Aesthetasc of antenna 1 (Fig. 29L) extremely short. Basis of maxilliped 3 slightly longer and less curved. Basis of pereiopod 1 slightly longer and stouter. Peduncle of uropod (Fig. 29M) longer and more slender, bearing sixteen long slender and ten short, stout, serrate setae on inner edge. Second segment of exopod bearing eight very fine plumose setae on inner edge. First segment of endopod with thirteen short, stout serrate spines on inner edge and two larger ones distally; second segment toothed on inner edge with two large, strong serrate spines terminally.

Length

Adult male	3,1–4,3 mm
Ovigerous female	3,1–3,4 mm

Remarks

Zimmer (1921) described *Bodotria capensis* from Cape Town on the basis of two adult males, which he ascribed to *Bodotria* on the basis that only four pedigerous somites were visible. He also stated that the posterior part of the carapace was bounded by a ring or collar. In his diagram this looks very like the first pedigerous somite. Apart from a figure of the whole animal, only the third maxilliped and uropod were figured. As far as can be seen from the description and figures, the specimens in the present collection are identical with his.

Hale (1953) described *I. brevidactyla* from male and female individuals from Langebaan Lagoon. His descriptions and figures tally with those of the

author in all respects except as follows: the adult female is shown with an acutely pointed pseudorostrum (but in some of the present specimens the siphons are calcified and appear as a forward projection of the pseudorostrum); more lenses are visible in the eye of the female; in the female also, the second segment of the uropodal exopod bear four fine setae, whereas the present ones are toothed; in the male the peduncle of the uropod has fewer setae on the inner border than in the present males.

It is noticeable that individuals vary even within a single sample in all these characters, and the differences are minor. so that the present specimens are clearly members of Hale's species.

In fully ovigerous females the first pedigerous somite is quite evident dorsally and dorsolaterally but in others, including most young females and some adult males, the somite is totally invisible. Thus, within one species the main character distinguishing between *Iphinoe* and *Bodotria* becomes obscure. However, even when the first pedigerous somite is not evident, it can be seen on flexing the animal. Thus it seems appropriate to concur with Hale and place the species in *Iphinoe*. It is not then necessary to expand the definition of *Bodotria*, which would cause considerable confusion since the boundaries between the genera are not clear-cut.

I. capensis is easily distinguished from the other species of *Iphinoe* by the very distinctive distal segments of maxilliped 3 and pereiopods 3–5 as well as by the serrations of the second segment of the uropodal endopod.

Distribution

Widely distributed from Lüderitz to Durban at depths from 0 to 50 m, but occurring in rather small numbers. The species constitutes about 2 per cent of the individuals in the collection.

Some specimens were collected by light trap in Kalk Bay Harbour and others were taken very near to Lambert's Bay Harbour. These are both fishing harbours, indicating that the species is resistant to at least some degree of organic pollution.

Cyclaspis Sars, 1865

Generic diagnosis

Carapace variable in shape. Eye present or absent. Four pedigerous somites visible in male, sometimes five in ovigerous females. Second pereiopod 7-segmented. Endopod of uropod 1-segmented.

Type species

C. longicaudata Sars, 1865.

Remarks

A general discussion of the genera of the Bodotriinae is to be found on page 163 in the Introduction. The South African members of *Cyclaspis* are poor

in number both of samples and individuals. In comparison with the warmer waters of the Indo-Pacific region with several tens of species, only three occur in South African waters, and only one other species has been recorded off the rest of Africa. It seems fairly certain that the species occurring here are quite distinct from those from other regions, but the amount of variability in the genus is so great that it is difficult to state with certainty that the species are distinct entities and not genetic variations of species from other regions. Since only three species are known from southern Africa, no key is given. The reader is referred to Hale (1944*a*) for a key to all species known up to that time.

Distribution of Cyclaspis

The genus is a very large and widespread one, representatives being found in all oceans. Of approximately 80 species nearly 60 per cent are found exclusively in Australasian waters, 20 per cent in the Indo-Chinese region and 10 per cent occur around the coasts of the Americas; 3 species occur in South Africa, 1 in east Africa, 3 in European and 2 in Antarctic waters. Fully 57 per cent of the species occur between 20 and 45°S (mainly due to the very great preponderance in Australasian waters) and only 5 per cent north or south of 45°. This indicates that the genus is essentially one of south temperate latitudes.

The majority of species has a depth range from about 10 to 50 m, and almost all are confined to depths less than 100 m. However, a group of morphologically distinct species occurs at much greater depths. These are *C. subgrandis* Jones 1969 (3 290 m off Kenya), *C. tasmanica* Jones, 1969 (610 m in the Tasman Sea), *C. longicaudata* Sars, 1865 (120–3 834 m off Europe), *C. gigas* Zimmer, 1907 (193–640 m in the Antarctic) and *C. spectabilis* Zimmer, 1908 (140–1 300 m off South Africa). *C. sibogae* Calman, 1905, is also a deep-water species, occurring at a depth of 411 m in the Philippine Sea.

Cyclaspis australora sp. nov.

Figs 30–31

Records

SST	34°S 21°E	15 m	1 subadult ♂, 4 ovig. ♀♀ (1 record)
SCD	33°S 25°E	7 m	4 subadult ♂♂, 1 ♀, 3 juvs (1 record)
NIWR	29°S 31°E–27°S 32°E	20–27 m	1 adult ♂, 1 juv. (2 records)

Holotype

Ovigerous female, in the South African Museum, SAM–A15488, collected during the UCT benthic survey, 21 June 1972. Type locality: 21 m, off Still Bay (34°23′S 21°26′E). UCT station number SST 66B.

Description

Ovigerous female, holotype, length 5,6 mm. Integument clean, white, shiny, slightly brittle and translucent with minute reticulations and scattered pits

visible at high magnifications. Carapace (Fig. 30A) oval, one and a half times as long as deep. Anterolateral angle (Fig. 30B) acute, antennal notch fairly small, rounded. Pseudorostral lobes (Fig. 30C) very short, not meeting in front of eyelobe. Eyelobe (Fig. 30D) rounded, eye consisting of eight small lenses

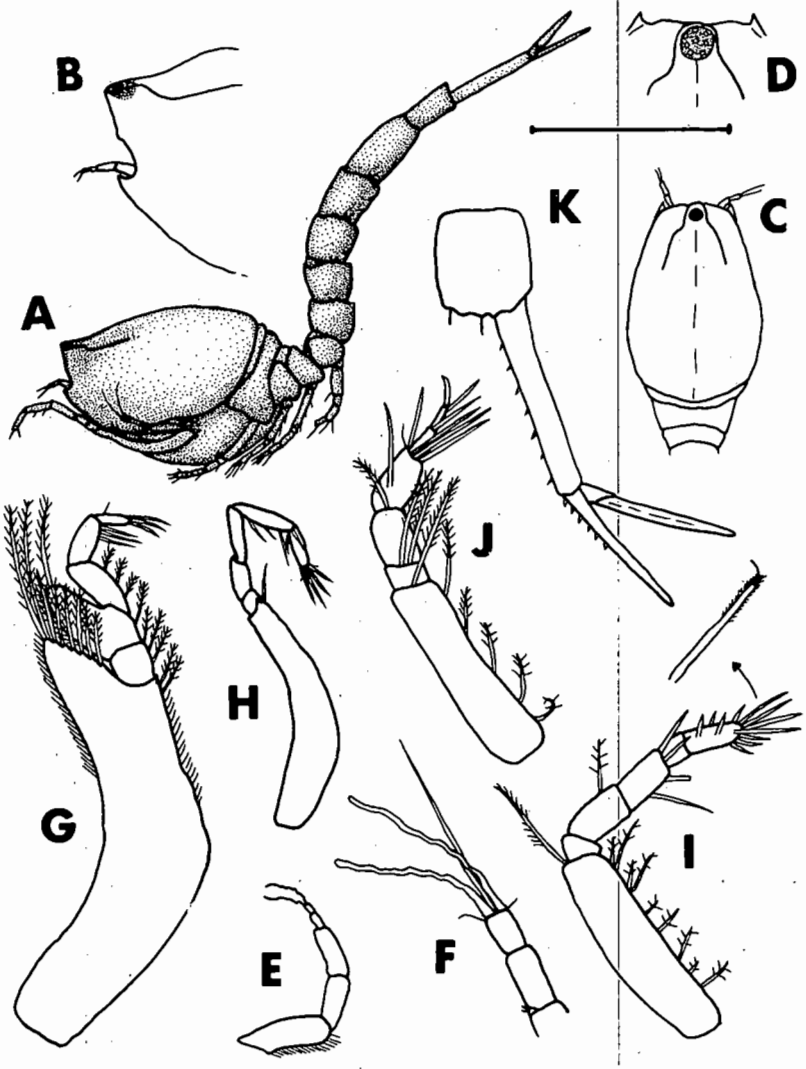

Fig. 30. *Cyclaspis australora* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Detail of eyelobe. E. Antenna 1. F. Detail of distal tip of antenna 1. G. Maxilliped 3. H. Pereiopod 1. I. Pereiopod 2. J. Pereiopod 3. K. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, D, H, K; 0,5 mm for E, G, I–J; 0,1 mm for F

above a red pigmented area. Middorsal region marked by a suture-line, carina hardly present.

First pedigerous somite visible dorsally and dorsolaterally second narrower dorsally than ventrally. Dorsolateral edges of third to fifth pedigerous somites raised. Carapace twice length of free thoracic somites. Cephalothorax and abdomen subequal in length. Abdominal somites cylindrical with small lateral articulatory pegs on second to fifth.

First segment of antenna 1 (Fig. 30E) slightly longer than each of next two. Flagellum 2-segmented with three setae, one rigid and two irregular and flexible. Accessory flagellum (Fig. 30F) minute, 1-segmented.

Basis of maxilliped 3 (Fig. 30G) stout, curved, twice length of rest of limb.

Distal prolongation triangular, reaching half-way along merus. Outer distal portion of merus expanded, reaching junction of carpus and propodus.

Basis of pereiopod 1 (Fig. 30H) curved, equal in length to rest of limb. Remaining segments stout, propodus longest.

Pereiopod 2 (Fig. 30I) 7-segmented. Basis slightly shorter than rest of limb. Ischium short, merus and carpus subequal in length, dactyl twice as long as propodus with eleven sharp serrate spines.

Pereiopods 3 (Fig. 30J) to 5 similar, stout. Merus and carpus subequal in length and as wide as basis.

Telsonic somite (Fig. 30K) square in dorsal view, not produced between uropods, half length of peduncle. Peduncle half as long again as rami with seven very short spines on inner edge. First segment of exopod a quarter length of second, neither armed. Endopod very slightly shorter than exopod with six short spines distally on inner edge.

Adult male, length 6,2 mm, from Natal. As female, except as follows: anterolateral angle and antennal notch rounded (Fig. 31A). Carapace narrower in dorsal view (Fig. 31B). Eye (Fig. 31C) with nine large, clear lenses. Carapace not carinate. Sideplates of abdominal somites ventrally defined posterior to insertion of pleopods only.

Second segment of antenna 1 shorter and stouter, flagellum 1-segmented. Basis of maxilliped 3 less curved. Basis of pereiopod 1 (Fig. 31D) stout, produced to a strong point distally; subsequent segments more slender. Basis, merus and carpus of pereiopod 2 a little shorter. Bases of pereiopods 3 to 5 shorter. Telsonic somite (Fig. 31E) slightly longer. Peduncle of uropod with twelve short and seventeen long serrate spines on inner edge as well as three dorsally on proximal half. Endopod with twenty-three short spines on inner edge. Second segment of exopod with seven very small spines on inner edge.

Length

Adult male	6,2 mm
Ovigerous female	5,4–5,6 mm

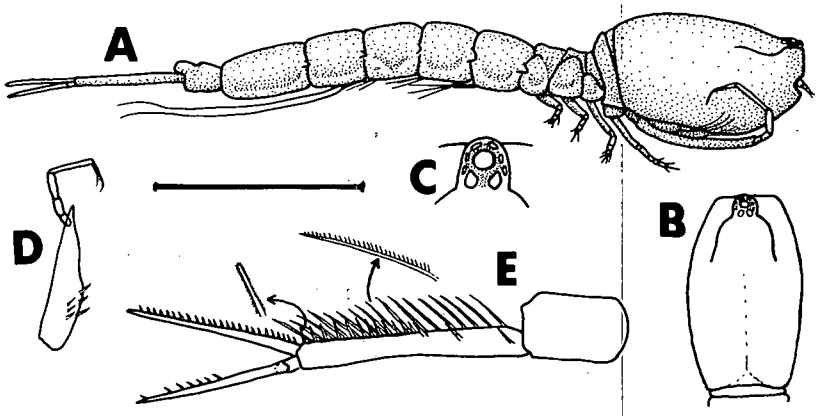

Fig. 31. *Cyclaspis australora* sp. nov.
Adult male. A. Lateral view. B. Dorsal view of carapace. C. Detail of eyelobe. D. Pereiopod 1. E. Telsonic somite and uropod.
Scale line = 2 mm for A–B, D; 1 mm for C, E.

Remarks

C. australora is one of the three species of *Cyclaspis* occurring in southern African waters. It may be distinguished from *C. spectabilis* by its very much longer and more slender uropods and from *C. scissa* by the lack of a transverse groove across the carapace.

It apparently falls within Hale's (1944*a*) *levis* group, most closely resembling a number of unsculptured Indo-Pacific species. Within this group only *C. australora* and *C. herdmanni* Calman, 1904*a* have the basis of pereiopod 1 subequal in length to the rest of the limb. Comparison with the syntypes of *C. herdmanni* shows a number of significant differences between the two species. *C. australora* is about twice the size of *C. herdmanni*; the anterior face of the carapace is perpendicular in *C. australora* and normally slanted in *C. herdmanni*. The distal prolongation of the basis of pereiopod 1 is shorter, while the whole limb is longer in *C. australora*; the uropods are equal in length to the last three somites together and the peduncle is nearly one and a half times the length of the rami in *C. australora*, while in *C. herdmanni* the uropods are little longer than the last two somites together and the peduncle is subequal in length to the rami.

Distribution

Apparently endemic to the warmer waters of the south-eastern coast of Africa from Still Bay to northern Natal at depths from 9 to 27 m; not a common species.

Cyclaspis scissa sp. nov.

Fig. 32

Records

NIWR 30°S 30°E–29°S 31°E 15–52 m 1 subadult ♂, 1 immature ♂, 2 ♀♀ (3 records)

Holotype

Young female, in the South African Museum, SAM–A15489, collected by the NIWR, 19 November 1973. Type locality: 15 m, off Durban (29°53′S 31°04′E). NIWR station number BL D1(G).

Description

Young female, holotype, length 5,8 mm. Integument white, velvety, with fine reticulations interspersed with scattered pits visible at high magnifications. Carapace (Fig. 32A) oval in outline with a sharply-delineated groove running transversely from middorsal region to ventral edge of carapace, ending a little behind the anterolateral angle and a small indentation dorsolaterally on either side slightly anterior to the major groove. Anterolateral angle small and acute, antennal notch small, semicircular. Pseudorostral lobes (Fig. 32B) short, ending level with eyelobe. Eyelobe (Fig. 32C) rounded, bearing three transparent lenses with reddish pigment below. Middorsal carina not strongly evident, most marked anteriorly.

First pedigerous somite not visible, second narrow, third and fifth with sideplates defined dorsolaterally. Free thoracic somites less than half length of carapace, cephalothorax slightly shorter than abdomen. Abdominal somites almost cylindrical with sideplates poorly defined ventrally. Articulatory pegs present on abdominal somites 1–5.

Antenna 1 (Fig. 32D) elongate, first segment geniculate, longer than second and third together. Flagellum 2-segmented bearing a single unmodified seta. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 32E) nearly twice length of rest of limb, inner part strongly calcified where exposed ventrally. Distal elongation reaching articulation between merus and carpus. Outer edge of merus widely expanded, distal tip reaching articulation of carpus and propodus.

Pereiopod 1 (Fig. 32F) elongate, reaching tip of pseudorostrum with carpus. Basis subequal in length to rest of limb. Merus slightly shorter than subequal propodus and dactyl.

Pereiopod 2 missing.

Pereiopods 3 (Fig. 32G) to 5 similar, stout. Ischium small, merus and carpus both relatively wide, strong, subequal in length.

Telsonic somite (Fig. 32H) protruding between uropods for about a third its length, one and a half times as long as broad. Peduncle of uropod less than one and a half times length of telsonic somite, unarmed except for three small

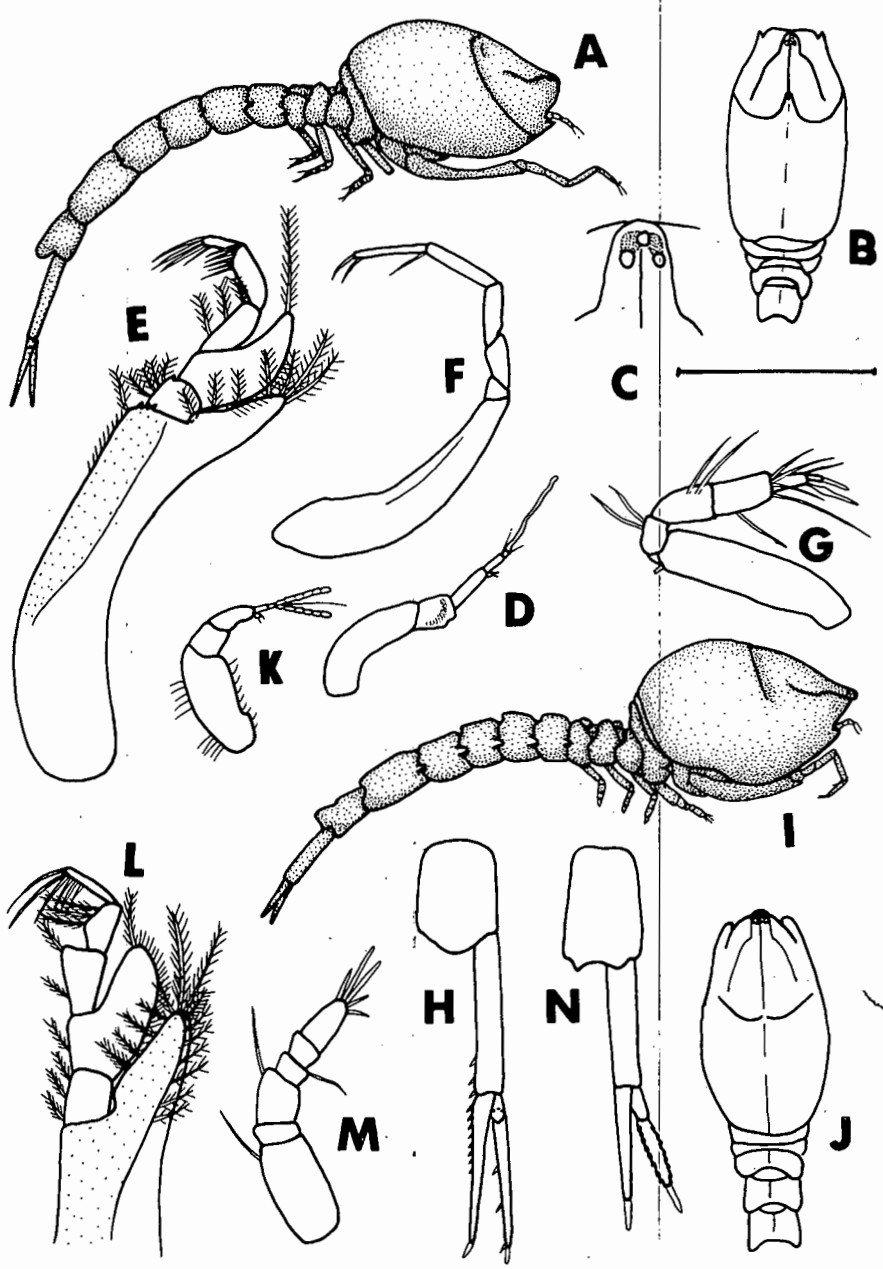

Fig. 32. *Cyclaspis scissa* sp. nov.

Young female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Detail of eyelobe. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 3. H. Telsonic somite and uropod.

Young male. I. Lateral view. J. Dorsal view of carapace. K. Antenna 1. L. Detail of distal tip of maxilliped 3. M. Pereiopod 2. N. Telsonic somite and uropod.

Scale line = 2 mm for A–B, I–J; 1 mm for F, H, N; 0,5 mm for C–E, G, K–M.

spines distally on inner edge. Endopod 1-segmented with eight small spines on inner edge and one terminally. First segment of exopod about a quarter length of second, unarmed; second with three very small spines on inner edge and one terminally.

Young male, length 5,8 mm, from Natal. (Note: a single subadult male is too badly damaged for descriptive purposes.) As female, except as follows: carapace (Fig. 32I) more vaulted posteriorly, transverse groove present only on dorsal half of carapace. Anterolateral angle rounded. Eyelobe (Fig. 32J) protruding between pseudorostral lobes, pigmented area larger.

Antenna 1 (Fig. 32K) shorter and stouter, with two aesthetascs. Greater part of basis of maxilliped 3 (Fig. 32L) exposed ventrally, carpus and propodus both slightly expanded internally. Pereiopods 2 (Fig. 32M) stout, relatively short. Ischium wider than long, merus large, carpus and propodus short, subequal in length. Dactyl with a few terminal spines. Abdominal somite protruding less between uropods. Peduncle (Fig. 32N) shorter and stouter, unarmed. Second segment of exopod clearly serrated on inner and outer margins, first segment relatively longer. Endopod unarmed.

Length

Subadult male	6,3 mm
Young female	5,8 mm

Remarks

C. scissa may be distinguished from all other southern African bodotriids by the strong transverse groove on the carapace of both sexes. It most closely resembles *C. uniplicata* Calman, 1904*a*, *C. longipes* Calman, 1904*a* and *C. nubila* Zimmer, 1936. In *C. longipes* there is no transverse groove and the basis of pereiopod 1 is considerably shorter than the rest of the limb; in *C. nubila* the basis of pereiopod 1 is considerably longer than the rest of the limb, and there is no transverse groove. *C. uniplicata* does possess a groove but anterior to it is a very distinctive middorsal tooth, the basis of pereiopod 1 is about a third the total length of the limb, which is slender.

Distribution

Four specimens known from the south coast of Natal at depths from 15 to 52 m.

Cyclaspis spectabilis Zimmer, 1908

Fig. 33

Cyclaspis spectabilis Zimmer, 1908: 161–162, pl. 1; 1921: 124.

Records

SAM	34°S 18°E	460–560 m	1 subadult ♂
SAM	27°S 32°E–30°S 30°E	680–1 300 m	2 subadult ♂♂, 1 ♂, 11 juvs, 6 mancas (5 records).

Previous records

Holotype only.

Holotype

Ovigerous female, deposited by Zimmer (1908) in the Berlin Zoologisches Museum. Type locality: 565 m, Agulhas Bank (35°S 18°E).

Description

Subadult male, length 7,8 mm, from material collected by the S.S. *Pieter Faure* off the Cape Peninsula. Handsome, integument appearing polished. Carapace (Fig. 33A) almost spherical, nearly as deep as long or wide. Antero-lateral angle rectangular, very slightly serrate below (Fig. 33B). Antennal notch rectangular, shallow. Eyelobe (Fig. 33C) pointed anteriorly, eyeless. Pseudo-rostral lobes very short, just meeting in front of eyelobe. Second pedigerous somite firmly fused with carapace, last three narrow.

Carapace more than twice as long as free thoracic somites together, cephalothorax shorter than abdomen. Abdominal somites cylindrical, each slightly constricted anteriorly, with lateral articulatory pegs present on somites 1–4 anteriorly.

Antenna 1 (Fig. 33D) short, basal segments subequal in length. Flagellum (Fig. 33E) 2-segmented with two long aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 33F) stout, about three times length of rest of limb; distal prolongation widely triangular, reaching more than half-way along carpus. Merus and carpus both expanded externally, distal tip of merus reaching half-way along carpus.

Pereiopod 1 (Fig. 33G) reaching beyond anterior tip of carapace. Basis wide and stout, shorter than remaining segments together.

Pereiopod 2 (Fig. 33H) 7-segmented. Basis equal in length to next four segments together. Lower edge of dactyl slightly serrate with three terminal spines.

Pereiopods 3 (Fig. 33I) to 5 similar, basis and carpus of pereiopod 3 longest.

Pleopods (Fig. 33J) not setose.

Telsonic somite (Fig. 33K) subequal in length to preceding somite, more than twice length of peduncle of uropods, produced between them for more than a quarter its length. Peduncle hardly twice as long as broad, unarmed. Rami subequal in length, about twice length of peduncle. Endopod 1-segmented, unarmed. Exopod 2-segmented, first segment about a fifth length of second, unarmed; second serrated on inner edge but lacking spines or setae.

Length

Subadult male 7,8–8,8 mm

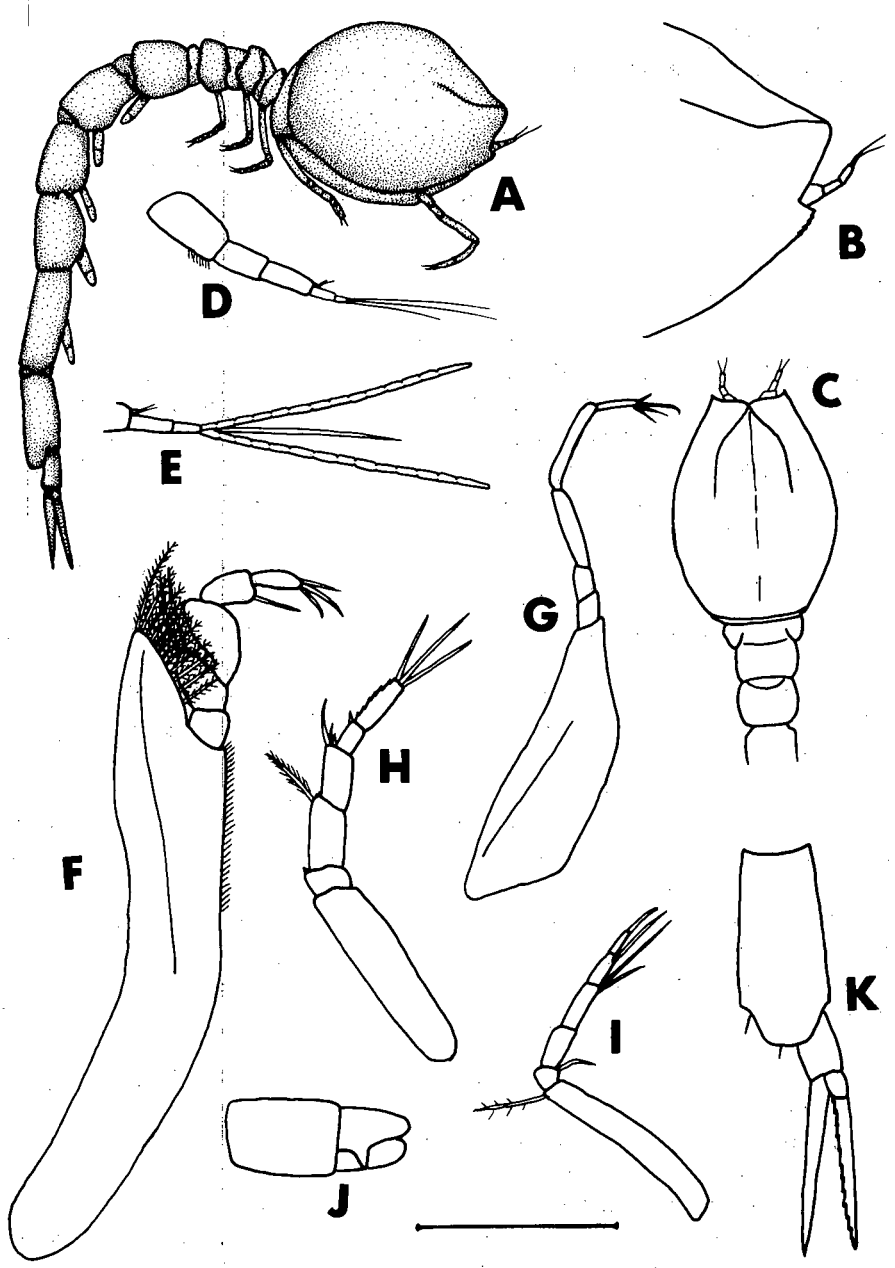

Fig. 33. *Cyclaspis spectabilis*

Subadult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Detail of distal tip of antenna 1. F. Maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Pleopod. K. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, G; 0,5 mm for D, F, H–K; 0,2 mm for E.

Remarks

Zimmer (1908) described *C. spectabilis* from 'several . . . females' collected by the Deutsches Tiefsee-Expedition from 565 m off the Cape Peninsula, and a single, dried specimen from about 140 m on the Agulhas Bank. His specimens were all females while all those in the present collection are subadult males, juveniles and mancas. Thus it is difficult to state with certainty that the specimens in the author's possession are indeed the same species as Zimmer's, although the differences between them and his figures are consistent with sexual variations within a species. The subadult males differ from those figured by Zimmer as follows: the males have no transverse suture across the carapace; the basal segment of antenna 1 is shorter; the prolongations of the basis and merus of maxilliped 3 are slightly more expanded; the carpus and propodus of pereiopod 1 are slightly shorter and the uropods slightly longer. In other respects they are very similar.

The combination of an almost spherical carapace and very short uropods is unique in the South African bodotriid fauna. *C. spectabilis* is very similar to a number of deep-water species: *C. tasmanica*, *subgrandis*, *gigas* and *longicaudata*. It may be distinguished from the latter two species by their longer uropodal peduncles and from the former two by their more laterally compressed carapaces.

Distribution

Fairly common in deep waters from the Cape Peninsula to the southern Mozambique Channel at depths from 140 to 1 300 m.

Bodotria Goodsir, 1843

Generic diagnosis

Carapace often with lateral carinae. First pedigerous somite not visible, second moderately wide in male and very wide in female. Second pereiopod 6-segmented. Peduncle of uropod much longer than rami; endopod 1- or 2-segmented.

Type species

Bodotria arenosa Goodsir, 1843

Remarks

The genus *Bodotria* at present consists of about forty species, most of which are clearly very closely related to each other. The most characteristic feature of the majority is the presence of at least one pair of lateral carinae on the carapace, frequently extending along the pedigerous somites and sometimes the abdomen as well. The integument is usually strongly calcified and brittle, the animals appearing heavy and compact. Due to the fact that in most species the details of the sculpturing of the carapace are variable both between and

within the sexes, it is not always easy to define the limits of each species. As a result, unless large numbers of individuals are available, there is danger of variable species being split into several species, at least until the extent of variation is known. Thus the whole genus is in serious need of revision and until such time as this is done the distinctness of many species must remain in question. This probably applies equally to the new species described here.

Distribution of Bodotria

All forty-odd species of *Bodotria* so far described are from the Eastern hemisphere. 8 species are known from Indo-China or Australia and 15 from Japan (although it is likely that some of the latter will prove to be synonymous). Of the 5 species known from the Red Sea and the Mediterranean, 3 also occur in the colder waters off Norway and the British Isles; 2 of these (*B. pulchella* and *B. scorpioides*) are very widespread, being found off the west African coast as well. The western and southern coasts of Africa are very rich in species, 20 having been described so far (including those in the paper by LeLoeuff & Intes (in press)). 10 species are apparently endemic to southern Africa, 7 to west Africa, and 1 occurs on the geographic boundary of 20°S.

All species but one are confined to depths less than 120 m, *B. tenuis* sp. nov. occurring between 78 and 550 m in the southern Mozambique Channel. This is also the northernmost record on the east coast of Africa.

KEY TO THE AFRICAN AND EUROPEAN SPECIES OF BODOTRIA

Note: the differences between many of the species of *Bodotria*, although constant in large numbers of individuals, are none the less so minor that a number of polymorphic species may well have been described under more than one name. Since only South African material has been available for study, no attempt has been made to group species from other areas. Each species has been keyed according to the most apparently satisfactory descriptions and figures in the literature.

1 Endopod of uropod 1-segmented in female at least (and in all males except *B. laevigata*)...2
– Endopod of uropod 2-segmented in both sexes.....5
2 Carapace with no trace of lateral ridges or carinae in either sex (endopod of uropod 2-segmented in male).....*laevigata* LeLoeuff & Intes, in press—west Africa
– Lateral carinae present on part of carapace at least.....3
3 Lateral carina present on anterior of carapace only.....*glabra* Jones, 1955—west Africa
– Lateral carina reaching posterior border of carapace.....4
4 Basis of pereiopod 1 subequal in length to rest of limb; lateral carina widely produced making width of carapace subequal to length.....*alata* Băcescu, 1975—Red Sea
– Basis of pereiopod 1 much longer than rest of limb; lateral carina not widely produced... *arenosa* Goodsir, 1843—Norway, Mediterranean
5 Carapace without lateral carinae.....6
– Carapace with lateral carinae.....7
6 Integument rugose; anterolateral angle not produced anterior to tip of pseudorostral lobes; basis of pereiopod 1 less than one and a half times length of rest of limb..... *magna* Zimmer, 1921—southern Africa
– Integument smooth; antero-lateral angle produced anteriorly as far as tip of pseudorostral lobes; basis of pereiopod 1 nearly twice length of rest of limb.....*nitida* sp. nov.

7 A single lateral carina on carapace....8
– Carapace with two lateral carinae, or lower edge of midlateral depression forming an angular ridge as second carina....17
8 Carina extending hardly more than half length of carapace....9
– Carina extending along full length of carapace, or absent only at extreme anterior tip...10
9 Second pedigerous somite in female elevated to a point middorsally, fourth and fifth not elevated in either sex....*elevata* Jones, 1960—South Africa
– Second pedigerous somite not elevated in either sex, fourth and fifth elevated to points middorsally on both sexes, more so in female....*vertebrata semicarinata* sp. et subsp nov.
10 Endopod of uropod less than half length of peduncle....11
– Endopod of uropod at least half length of peduncle....12
11 Third pedigerous somite abruptly lower than second in lateral view; endopod of uropod about a third length of peduncle....*cribaria* LeLoeuff & Intes, 1972—west Africa
– Pedigerous somites sloping gently in lateral view, third not abruptly lower than second; endopod of uropod slightly less than half length of peduncle....
scorpioides (Montagu, 1804)—west Africa, Europe
12 Some or all of pedigerous somites strongly elevated middorsally....13
– Pedigerous somites not elevated middorsally....14
13 Integument squamous; second and third pedigerous somites strongly elevated middorsally, forming an enormous point in female or rectangular plate in male; abdominal somites not elevated....*gibba* (Sars, 1879)—Mediterranean
– Integument smooth; second and third pedigerous somites not elevated middorsally; fourth and fifth pedigerous and first abdominal somites at least elevated to points middorsally....*vertebrata vertebrata* sp. et subsp. nov.
14 Prolongation of basis of maxilliped 3 pointed distally, reaching level of carpus....15
– Prolongation of basis of maxilliped 3 rounded distally, not reaching level of carpus....16
15 Lateral carina dorsal to midlateral line; carapace nearly twice as long as deep....
intermedia LeLoeuff & Intes, in press—west Africa
– Lateral carina midlateral; carapace less than one and a half times as long as deep....
montagui Stebbing, 1912—South Africa
16 Carpus of pereiopod 1 very stout, less than three times as long as broad, with spines on lower edge; carapace of female wider than long....*falsinus* sp. nov.
– Carpus of pereiopod 1 more than three times as long as broad, lower edge without spines; carapace of female and male longer than wide....*serica* sp. nov.
17 Lower carina very distinct, much longer than upper, curving strongly to meet it at posterodorsal corner of carapace....*pulchella* (Sars, 1879)—Europe, west Africa
– Lower carina no longer than upper, forming lower edge of midlateral depression, interrupted half-way along if curved, or meeting anterior to posterodorsal corner....18
18 Second and fourth pedigerous somites produced to form narrow, plate-like middorsal keel; gap between distal prolongation of basis of maxilliped 3 and ischium....*clara* sp. nov.
– Second and fourth pedigerous somites not platelike dorsally, no gap between prolongation of basis and ischium of maxilliped 3....19
19 Rami of uropods more than half length of peduncle....20
– Rami of uropods half length of peduncle or less....21
20 Basis of maxilliped 3 twice length of remaining segments together; major carina dorsolateral....*lata* Jones, 1956—west Africa
– Basis of maxilliped 3 nearly two and a half times length of remaining segments together; major carina apparently midlateral....*australis* Stebbing, 1912—South Africa
21 Carinae meeting in front of posterior border of carapace to form a deep depression....
bineti LeLoeuff & Intes, in press—west Africa
– Carinae not meeting....22
22 Basis of pereiopod 1 one and a half times length of rest of limb....
armoricana LeLoeuff & Intes, in press—west Africa
– Basis of pereiopod 1 equal in length to rest of limb....23
23 Carapace less than twice as long as deep; propodus of pereiopod 1 longer than carpus or dactyl....*africana* Zimmer, 1921—West Africa
– Carapace more than twice as long as deep; propodus of pereiopod 1 subequal in length to dactyl, shorter than carpus....*tenuis* sp. nov.

Bodotria clara sp. nov.

Figs 34–35

Records

FAL	34°S 18°E	2–4 m	1 adult ♂, 1 ovig. ♀ (2 records)
SCD	33°S 25°E	7 m	1 adult ♂

Holotype

Adult male, in the South African Museum, SAM–A15481, collected during the UCT benthic survey, 5 February 1962. Type locality: 7 m, off Port Elizabeth (33°52′S 25°38′E). UCT station number SCD 383L.

Description

Adult male, holotype, length 2,6 mm. Integument thick, white, brittle, with many large pits. Carapace (Fig. 34A) one and a half times as long as deep, dorsal outline irregular in lateral view. Sharp dorsolateral carina running from eyelobe to posterior edge of carapace, abruptly elevated in three steps, joined near posterior border by second carina running ventrally and then anteriorly for a short distance, continued forward as slight fold and distinct again on anterior third of carapace, reaching point of anterolateral angle. Anterolateral angle acute, bluntly rounded. Antennal notch narrow and deeply indented. Carapace in dorsal view (Fig. 34B) slightly longer than wide, pseudorostral lobes meeting for short distance in front of eyelobe. Eyelobe rounded, eye visible as two lenses laterally above some pigment. No middorsal carina on carapace.

Second pedigerous somite produced to form very distinct plate-like middorsal carina and a pair of lateral ridges, the latter forming strongly marked sideplates, excavated anteriorly by continuations in pits of integument. Third pedigerous somite elevated slightly, dorsally only; fourth strongly elevated middorsally forming thin median plate and produced into a pair of carinae laterally; last elevated middorsally only and somewhat excavate posteriorly. Free thoracic somites together little more than half length of carapace. Cephalothorax and abdomen subequal in length. Abdominal somites large, as deep as long, sideplates strongly defined ventrally; middorsal carina evident on first and second; third to fifth with lateral articulatory pegs.

Antenna 1 (Fig. 34C) short, first segment twice length of next two together. Flagellum (Fig. 34D) 1-segmented with one aesthetasc and three fine setae. Accessory flagellum 1-segmented with one aesthetasc.

Basis of maxilliped 3 (Fig. 34E) strongly angled distal to midpoint, more than twice length of remaining segments together; distal prolongation narrow, reaching half-way along merus. Merus slightly expanded, distal tip reaching half-way along carpus.

Pereiopod 1 (Fig. 34F) very stout, basis curved, more than twice length of rest of limb with four small spines half-way along on median edge. Ischium very

short, merus and carpus subequal in length, as are propodus and dactyl.

Pereiopod 2 (Fig. 34G) fairly stout, 6-segmented. Basis shorter than rest of limb. Merus slightly shorter than carpus, propodus half length of dactyl.

Pereiopods 3 (Fig. 34H) to 5 similar, basis of pereiopod 3 longest. Merus and carpus very stout, merus curved.

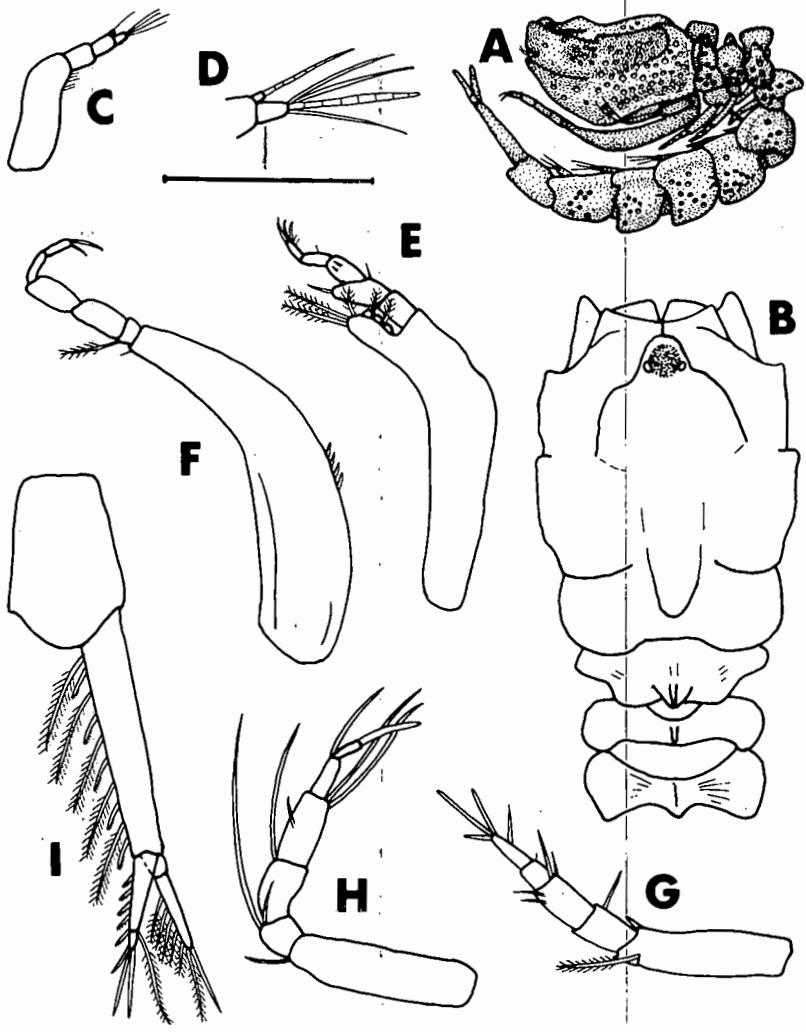

Fig. 34. *Bodotria clara* sp. nov.

Adult male, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Detail of distal tip of antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 1 mm for A; 0,5 mm for B, C, E–I; 0,2 mm for D.

Telsonic somite (Fig. 34I) longer than wide, slightly produced between uropods. Peduncle of uropod nearly half as long again as telsonic somite with five long plumose setae and five serrated spines on inner edge. Exopod slightly longer than endopod, less than half length of peduncle. First segment half length of second, unarmed; second with five plumose setae on inner edge, one long plumose seta and one long slender spine terminally. First segment of endopod nearly four times length of second with five serrate setae on inner edge and one plumose seta distally on outer edge; second with three fine spines terminally.

Ovigerous female, length, 1,9 mm, from False Bay. As male, except as follows: integument softer, poorly calcified, with smaller, less evident pits. Lower lateral carina of carapace (Fig. 35A) not joining upper, longer and more marked, anterior part not reaching anterolateral angle. Anterolateral angle sharper. Carapace wider ventrally than dorsally (Fig. 35B). Eye indistinct. Second pedigerous somite much wider, sideplates of fourth more distinct, fifth not elevated. Abdominal somite smaller.

First segment of antenna 1 (Fig. 35C) shorter, both flagella (Fig. 35D) without aesthetascs. Basis of maxilliped 3 (Fig. 35E) wider, more strongly

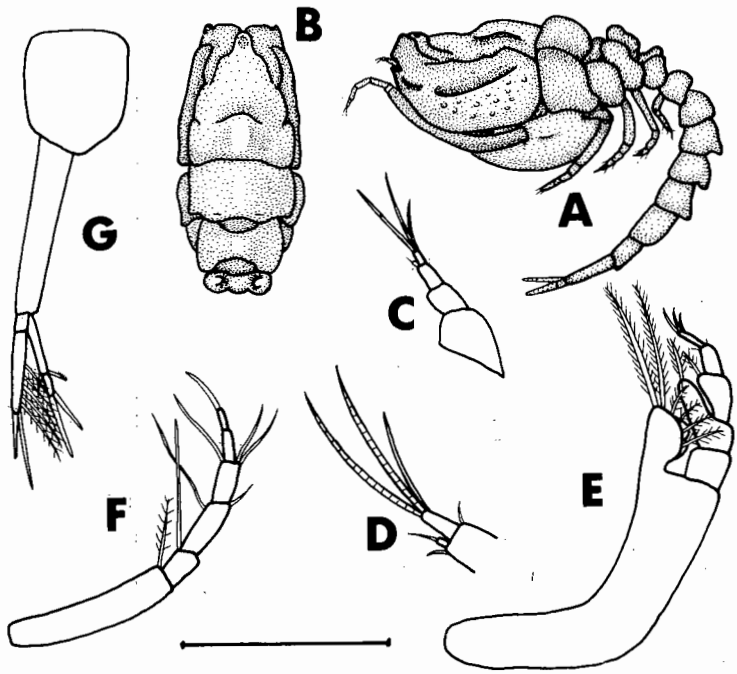

Fig. 35. *Bodotria clara* sp. nov.

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Detail of distal tip of antenna 1. E. Maxilliped 3. F. Pereiopod 3. G. Telsonic somite and uropod. Scale line = 1 mm for A–B; 0,5 mm for C, E–G; 0,2 mm for D.

angled, prolongation incised proximally. Merus slightly longer, carpus slightly expanded. Basis of pereiopod 1 shorter, less curved, lacking spines. Basis of pereiopod 2 shorter. Merus and carpus of pereiopods 3 (Fig. 35F) to 5 less stout. Telsonic somite (Fig. 35G) shorter. Peduncle of uropod somewhat less than twice length of exopod, unarmed. First segment of endopod with only one spine distally on inner edge, second with two terminally.

Length

Adult male	2,6–2,7 mm
Ovigerous female	1,9 mm

Remarks

The species is unique in the genus in the combination of a strongly pitted integument, the dumb-bell-shaped fourth pedigerous somite and the lateral carina rising in steps towards the posterior end of the carapace. It is reminiscent of *B. gibba* (Sars, 1879), from which it is easily distinguished by the lack of a plate-like median carina on the fourth pedigerous somite, the much longer prolongation of the basis of maxilliped 3 and the extreme elevation of the second pedigerous somite in *B. gibba*.

Distribution

So far only three specimens known, all from False Bay or Algoa Bay (Port Elizabeth), between 2 and 7 m.

Bodotria magna Zimmer, 1921

Fig. 36

Bodotria magna Zimmer, 1921: 121–123, figs 8–11.

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
FAL & FBY	34°S 18°E	48–87 m	15	13	1	25	18	16	88	14
SST	34°S 21°E	50–80 m	11	32	2	17	15	34	111	3
SCD	34°S 21°E	67 m				1			1	1

Previous records

'Great Fish Bay' (16°S 11°E), no depth given.

Holotype

Ovigerous female, deposited by Zimmer (1921) in the Berlin Zoologisches Museum. Type locality: 'Great Fish Bay' (16°S 11°E).

Description

Ovigerous female, length 6,0 mm, from False Bay. Integument very rugose, ridges running longitudinally for the most part, most evident on cephalothorax.

Carapace (Fig. 36A) less than one and a half times as long as deep, dorsal outline very gently arched. Antennal notch deeply excavate, anterolateral angle acute, pointed. Eyelobe (Fig. 36B) rounded, eye wanting. Pseudorostral lobes short, not meeting in front of eyelobe. Carapace lacking dorsal and lateral carinae.

Second pedigerous somite slightly elevated above level of carapace, fairly wide. Third to fifth pedigerous somites hardly elevated, with well-developed sideplates. Free thoracic and first two abdominal somites with distinct middorsal carina. Carapace subequal in length to free thoracic somites together, cephalothorax and abdomen subequal in length. Abdominal somites less rugose, sideplates defined ventrally.

Antenna 1 (Fig. 36C) short, first segment longer than next two together. Flagellum 2-segmented with two aesthetascs, accessory flagellum small, 1-segmented.

Basis of maxilliped 3 (Fig. 36D) twice length of remaining segments together, strongly calcified ventrally where exposed (stippled in figure). Distal prolongation broad and of moderate length, reaching articulation of merus and carpus. Merus slightly expanded, carpus cylindrical.

Pereiopod 1 (Fig. 36E) stout, basis slightly longer than remaining segments together, curved. Ischium short, merus and carpus stout, merus twice and carpus three times length of ischium.

Pereiopod 2 (Fig. 36F) stout, 6-segmented. Basis longer than rest of limb. Merus and carpus stout, subequal in length. Propodus and dactyl slender.

Pereiopods 3 (Fig. 36G) to 5 similar, ischium, merus and carpus all stout, dactyl small.

Telsonic somite (Fig. 36H) rectangular in dorsal view, not produced between uropods, little more than half length of peduncle of uropod. Peduncle unarmed, more than twice length of rami. Rami short, exopod slightly shorter than endopod. First segment of exopod a quarter length of second, unarmed; second with four plumose setae on inner edge and two terminally. Endopod 2-segmented, second segment less than half length of first; first with two small spines on inner edge, second with two, and one very stout terminal spine.

Adult male, length 6,3 mm, from False Bay. As female, except as follows: rugosities distinct, but forming more regular honeycomb pattern. Antennal notch shallower (Fig. 36I), anterolateral angle obtuse, rounded. Carapace more elongate, without carinae, but sculpturing absent dorsolaterally, resulting in the formation of a rounded edge. Second pedigerous somite narrower, not elevated; third produced to form a point middorsally. Abdominal sideplates deeper, sideplates more marked ventrally.

Antenna 1 (Fig. 36J) bearing four aesthetascs around flagellum as well as two at tip. Basis of maxilliped 3 less angled, distal prolongation a little longer, merus less expanded and carpus more. Basis of pereiopod 1 less angled, narrower, with about ten sharp spines on inner ventral edge. Carpus not stout. Pereiopod 2 (Fig. 36K) more strongly armed, basis somewhat shorter, dactyl

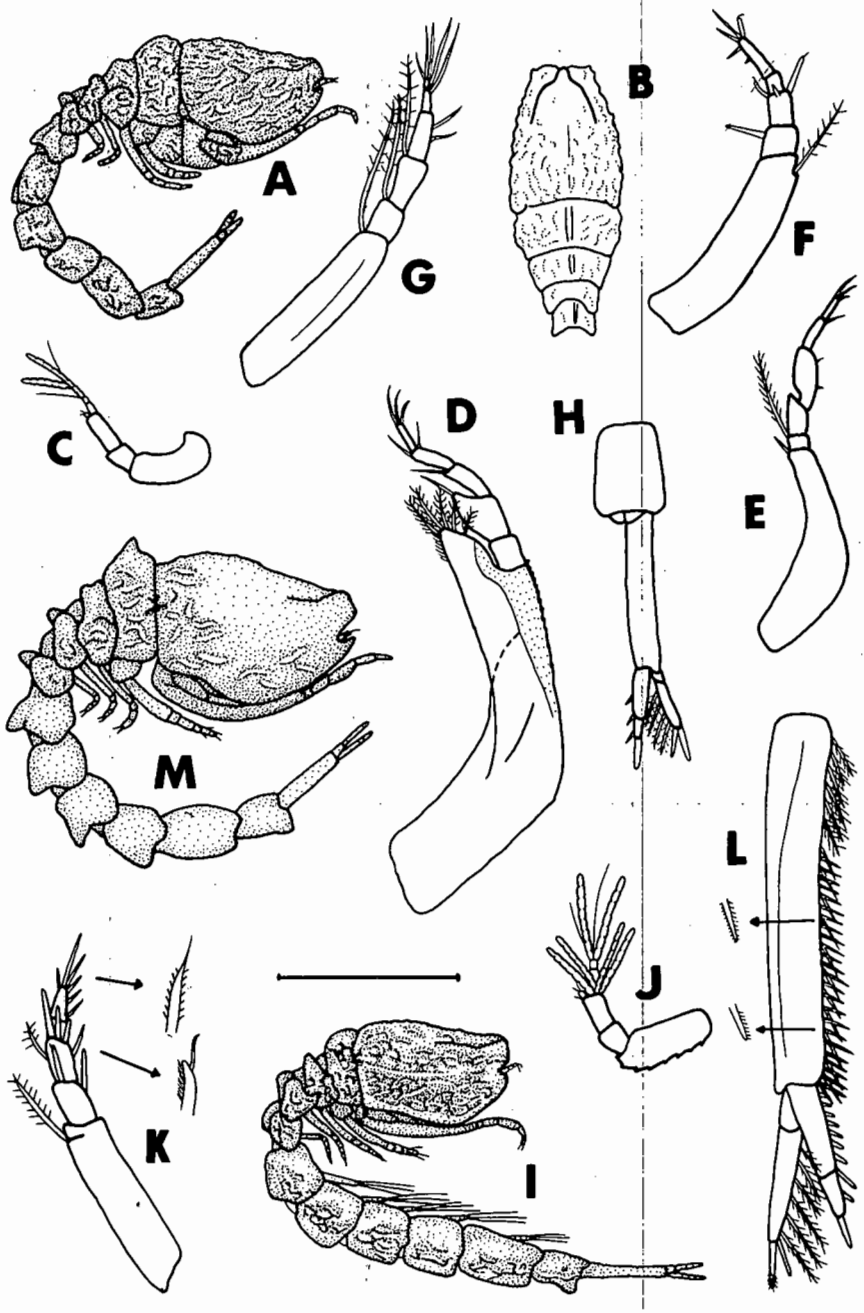

Fig. 36. *Bodotria magna.*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereipod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod.
Adult male. I. Lateral view. J. Antenna 1. K. Pereiopod 2. L. Uropod.
Juvenile. M. Lateral view.

Scale line = 2 mm for A–B, I; 1 mm for E, H, M; 0,5 mm for C–D, F–G, J–L.

shorter and stouter. Inner edge of peduncle of uropod (Fig. 36L) armed with six plumose setae proximally followed by thirty-six sharp serrate setae in two rows. Second segment of exopod with six plumose setae on inner edge and two spines terminally, one with a brush of fine filaments distally. First segment of endopod with eight and second with one blunt seta on inner edge, second terminating in one spine.

Juvenile (Fig. 36M), length 3,1 mm. Integument less calcified, sculpturing restricted to thorax and ventral and posterior regions of carapace, in the form of individual raised ridges—more extensive in some than in others. Second pedigerous somite strongly elevated to a point, last two thoracic and first three abdominal somites also pointed dorsally. The second pedigerous somite is also elevated to a point in *subadult males.*

Length

Adult male	4,3–6,3 mm
Ovigerous female	4,4–6,0 mm

Remarks

Although Zimmer's (1921) description and figures are rather incomplete, this species is quite obviously the same as his *B. magna*, especially since in his description Zimmer mentions the very characteristic sculpturing of the integument. The species is unique in the genus in this respect.

The species nearest to *B. magna* are *B. nitida* sp. nov. and *B. laevigata* LeLoeuff & Intes, in press. In both of these the integument is smooth. The endopod of the uropod in males of *B. laevigata* is 1-segmented and the basis of the first pereiopod in *B. nitida* is longer than that of *B. magna.*

Distribution

A fairly common species, constituting over 4 per cent of the individuals in the collection. It is apparently endemic to the south-western and southern coasts of southern Africa from the mouth of the Kunene River to Still Bay, at depths from 48 to 87 m.

Bodotria nitida sp. nov.

Figs 37–38

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
WCD	33°S 17°E	11–26 m	12	3	3	16		14	48	5
LBT	32°S 18°E	3–15 m	3	6	3	7	10	2	31	15
FAL & FBY	34°S 18°E	2–11 m	5	17	1	84	8	23	138	12
SST	34°S 21°E	15 m		1					1	1
SAM	33°S 18°E	?	2			2		1	5	1*
SCD	33°S 25°E	7 m	5	2	4		1	3	15	1

*from stomach of *Rhabdosargus globiceps*

Holotype

Ovigerous female, in the South African Museum, SAM–A15483, collected during the UCT benthic survey, 24 April 1962. Type locality: 11 m, outside Saldanha Bay (33°07′S 17°58′E). UCT station number WCD 129M.

Description

Ovigerous female, holotype, length 6,7 mm. Large, rotund. Integument yellowish-white in alcohol, lustrous at low magnifications, reticulate with faint pits at high magnifications. Carapace (Fig. 37A) smooth, no trace of carinae; nearly twice as long as deep. Antennal notch (Fig. 37B) deeply excavate, anterolateral angle acutely pointed and protruding beyond tip of pseudorostral lobes. Eyelobe (Fig. 37C) rounded, eyeless, protruding beyond anterior tip of pseudorostral lobes.

Articulatory peg present between carapace and second pedigerous somite dorsolaterally. This somite wide, smooth, very slightly elevated above level of carapace; third to fifth slightly elevated dorsally, with well-defined sideplates. Middorsal carina present on thorax. Carapace slightly longer than free thoracic somites. Cephalothorax and abdomen subequal in length. Abdominal somites with sideplates defined ventrally, each overlapping succeeding one.

Antenna 1 (Fig. 37D) of moderate length, first segment subequal in length to next two together. Flagellum short, 2-segmented, with two aesthetascs. Accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 37E) elongate, basis more than twice length of remaining segments together; distal prolongation short, reaching articulation of ischium and merus. Merus slightly expanded, carpus hardly at all.

Basis of pereiopod 1 (Fig. 37F) curved, wider at base, nearly twice length of rest of limb. Ischium short, merus and carpus subequal in length, dactyl short.

Pereiopod 2 (Fig. 37G) stout, 6-segmented. Basis longer than rest of limb, merus stouter than carpus, dactyl poorly armed, twice length of propodus.

Pereiopods 3 (Fig. 37H) to 5 similar, merus and carpus stout, propodus and dactyl narrow.

Telsonic somite (Fig. 37I) rectangular in dorsal view, less than one and a half times as long as broad, very slightly produced between uropods. Peduncle of uropod one and a half times length of telsonic somite, twice length of rami, unarmed. First segment of exopod about a third length of second, unarmed; second with eight plumose setae on inner edge and two short terminal spines. Endopod 2-segmented, first segment four times length of second with three small spines on inner edge; second unarmed except for two small terminal spines.

Adult male, length 6,4 mm, from False Bay. As female, except as follows: carapace (Fig. 38A) more rectangular in lateral view, anterolateral angle obtuse and rounded, antennal notch shallow. Eyelobe (Fig. 38B) shorter, carapace slightly narrower in dorsal view. Abdominal somites stouter.

Antenna 1 (Fig. 38C) shorter, accessory flagellum surrounded by four aesthetascs. Distal prolongation of basis of maxilliped 3 (Fig. 38D) slightly

more produced. Telsonic somite (Fig. 38E) protruding even less between uropods, a little longer than wide. Peduncle relatively longer, armed proximally with six plumose setae and distally with 25–30 serrate setae on inner edge. Second segment of exopod with six plumose setae and first of endopod with eleven fine sharp spines on inner edges.

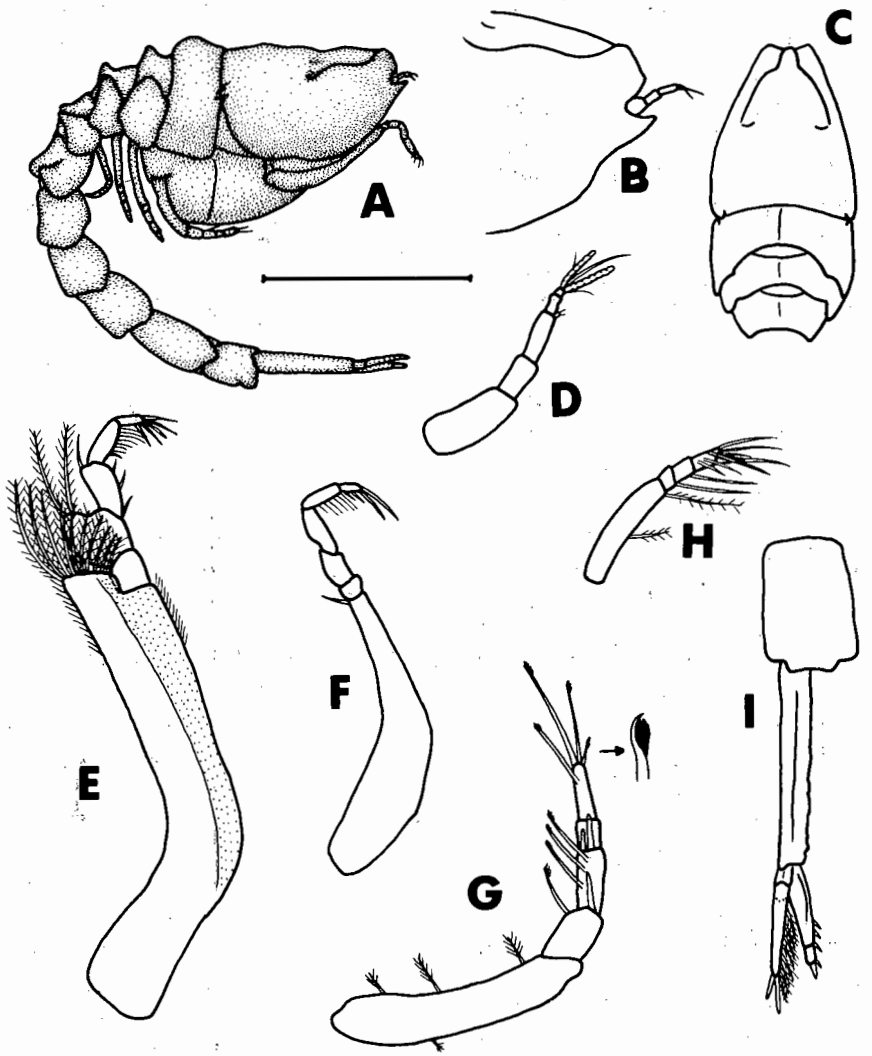

Fig. 37. *Bodotria nitida* sp. nov.
Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.
Scale line = 2 mm for A, C; 1 mm for B, F, H–I; 0,5 mm for D–E, G.

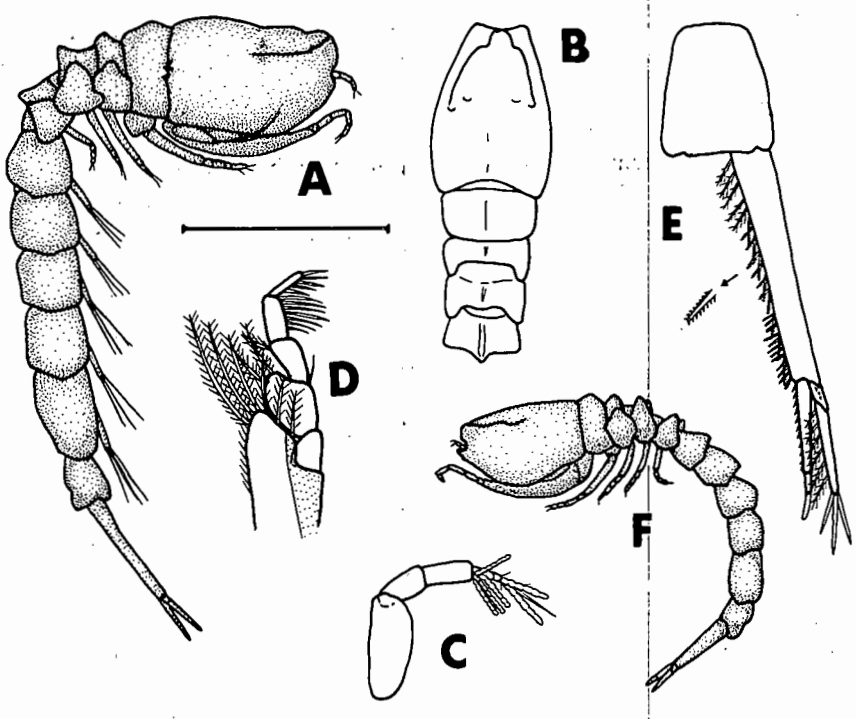

Fig. 38. *Bodotria nitida* sp. nov.
Adult male. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Distal tip of maxilliped 3. E. Telsonic somite and uropod.
Juvenile, paratype. F. Lateral view.
Scale line = 2 mm for A–B, F; 1 mm for E; 0,5 mm for C–D.

Juvenile, paratype (Fig. 38F), length 4,2 mm. Differs from the adults in that the third to fifth pedigerous somites are more elevated dorsally, both in the midline and laterally. The carapace is relatively smaller and smoothly arched dorsally and the peduncle of the uropod is shorter and stouter.

Length

Adult male	5,8–7,2 mm
Ovigerous female	4,5–7,7 mm

Remarks

The only other species of *Bodotria* totally lacking lateral carinae on the carapace are *B. choprai* Kurian, 1951, from India, *B. magna* Zimmer, 1921, from South West Africa and *B. laevigata* LeLoeuff & Intes (in press), from west Africa. Females of the new species may be distinguished from all of these by the very characteristic protrusion of the anterolateral angle beyond the point of the pseudorostral lobes. The male of *B. choprai* has the anterior part of the

carapace deepened and of *B. laevigata* has a 1-segmented endopod of the uropod.

Distribution

Apparently endemic to the Cape, from Saldanha Bay to Port Elizabeth, at depths from 2 to 26 m. Constituting over 5 per cent of the individuals in the collection, this a fairly common species, particularly in False Bay and further north.

Bodotria elevata Jones, 1960

Figs 39–40

Bodotria elevata Jones, 1960: 173–175, fig. 1.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
LBT	33°S 17°E	20 m			1	1	1		3	2
FAL & FBY	34°S 18°E	9–69 m	2	1		4	1		8	7
SST	35°S 22°E	15–50 m	3			2	1		6	4
SCD	34°S 20°E–33°S 27°E	7–87 m	6	3		5	18	1	33	11*

*type locality and some paratypes included.

Previous records

Off Hermanus, south-western Cape (34°S 19°E), 22–37 m, and Lambert's Bay (32°S 18°E), 17 m (Jones 1960).

Holotype

Not specified. Deposited by Jones (1960) in the British Museum (Natural History). Type locality: 22 m, off Hermanus, south-western Cape (34°S 19°E).

Description

Ovigerous female, length 4,1 mm, from the south coast near Mossel Bay. Integument hard, brittle, chalky-white with regularly scattered deep pits. Carapace (Fig. 39A) more than one and a half times as long as deep, middorsal carina only slightly evident. Dorsolateral carina present but not strongly marked. Antennal notch (Fig. 39B) fairly deep, anterolateral angle acute. Articulatory notch present dorsolaterally on posterior border of carapace. Eyelobe (Fig. 39C) eyeless, rounded.

Second pedigerous somite highly elevated, twice as deep as long. Third to fifth pedigerous somites all with sideplates well defined ventrally and dorsally. All free thoracic somites with middorsal carina continuing faintly along abdomen. Carapace slightly longer than free thoracic somites together, cephalothorax longer than abdomen. Abdominal somites rounded, first slightly elevated forming a posteriorly directed point.

Antenna 1 (Fig. 39D) short, first segment longer than next two together. Flagellum 2-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 39E) very long, more than two and a half times length of remaining segments together. Distal prolongation short, reaching half-way along unexpanded part of merus. Merus bluntly expanded, reaching two-thirds length of carpus.

Pereiopod 1 (Fig. 39F) fairly long, basis very stout, broadest at midpoint. Merus and carpus subequal in length, propodus and dactyl short, slender.

Pereiopod 2 (Fig. 39G) stout, 6-segmented. Basis longer than rest of limb. Merus and carpus subequal in length, propodus half length of dactyl. Dactyl armed with a few setae tipped with a brush of filaments.

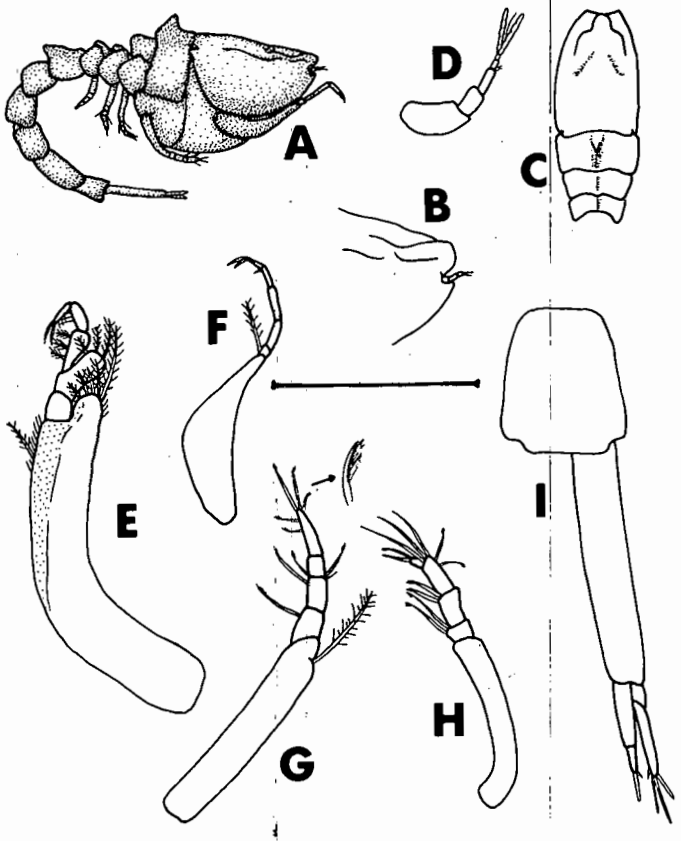

Fig. 39. *Bodotria elevata*

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Scale line = 2 mm for A–B; 1 mm for C, F; 0,5 mm for D–E, G–I.

Pereiopods 3 (Fig. 39H) to 5 similar; ischium short and stout; merus and carpus stout, subequal in length. Propodus and dactyl short, slender.

Telsonic somite (Fig. 39I) slightly longer than wide, rectangular in dorsal outline. Peduncle of uropod one and half times length of telsonic somite, two and a half times length of rami, unarmed. Exopod slightly longer than endopod, first segment about a quarter length of second, neither armed except for four terminal spines on second. First segment of endopod twice length of second, unarmed. Second armed with two slender terminal spines.

Adult male, length 4,7 mm, from the south coast near Mossel Bay. As female except as follows: carapace (Fig. 40A) more rectangular in lateral outline, antennal notch and anterolateral angle obscure. Second pedigerous somite only very slightly elevated dorsally. Sideplates of abdominal somites defined ventrally.

Antenna 1 (Fig. 40B) with three aesthetascs arising between flagella. Prolongation of basis and merus of maxilliped 3 (Fig. 40C) slightly longer. Basis of pereiopod 1 narrower with two spines half-way along length, carpus narrowed proximally. Pereiopod 2 narrower and shorter. Propodus of pereiopods 3 to 5 longer. Uropod (Fig. 40D) strongly armed: peduncle with eight plumose setae proximally and twenty-eight serrate spines distally in two rows on inner edge. Second segment with five plumose setae on inner edge, one spine and two plumose setae terminally. First segment of endopod with eight spines on inner edge, second with two on inner edge and one terminally.

Juvenile (Fig. 40E), length 2,4 mm, from type locality. Second pedigerous somite very strongly elevated to a sharp point dorsally, first abdominal somite elevated to two points dorsolaterally. Juveniles may be confused with juveniles

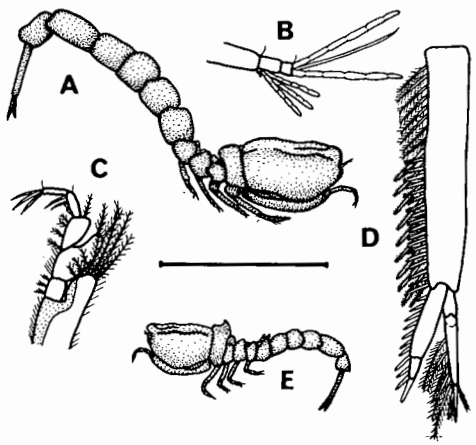

Fig. 40. *Bodotria elevata*

Adult male. A. Lateral view. B. Distal tip of antenna 1. C. Distal tip of maxilliped 3. D. Uropod. Juvenile. E. Lateral view.

Scale line = 2 mm for A, E; 0,5 mm for C–D; 0,2 mm for B.

of *B. magna* which also have the elevated second pedigerous somite, but there is always some degree of sculpturing in the latter, whereas in *B. elevata* the integument is always smooth. Also, in *B. magna* the first abdominal somite is elevated to a single point middorsally.

Length

Adult male	4,7–5,0 mm
Ovigerous female	3,8–4,3 mm

Remarks

The author has examined Jones's paratypes which, apart from being poorly calcified, are very much the same as those in the present collection. There are a number of differences between individuals from the west coast and those (frequently more calcified) from the south coast. Those from False Bay are intermediate in most respects. In both male and female it is extremely difficult to detect the second lateral carina in Jones's specimens and in the newer material these seem to be entirely absent; the lateral carinae do not extend on to the second pedigerous somite and there appear to be no lenses in the eye. Neither the peduncle nor the rami of the female uropod is serrated, but the armature of the male uropod is identical with that described by Jones. These variable characters are in accordance with the thesis that the species of *Bodotria* are more variable than those of most genera in the Bodotriidae.

B. elevata is the only species in the genus in which the second pedigerous somite alone is elevated in the adult female. The male is less readily identifiable but the distal segments of maxilliped 3 are characteristic.

Distribution

Apparently endemic to the west and south coasts of the Cape, occurring in small numbers from Lambert's Bay to East London at depths from 7 to 87 m.

Bodotria montagui Stebbing, 1912.

Fig. 41

Bodotria montagui Stebbing, 1912: 141–142, pl. 51(A).

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SWD	26°S 15°E	26 m		2	2		3		7	1
LBT	32°S 18°E	20–33 m	2			1	1		4	4
SB	33°S 17°E	31 m				1			1	1
FAL & FBY	34°S 18°E	29–87 m		1	1	2	3	1	8	6
SST	34°S 21°E	15 m				1			1	1
SCD	33°S 27°E	88 m					1		1	1

Previous records

Off East London (32°S 28°E), 75 m.

Holotype

Female deposited by Stebbing (1912) in the British Museum (Natural History). Type locality: 75 m, off East London.

Description

Ovigerous female, length 4,8 mm, from the Lambert's Bay transect. Integument solid, brownish in colour, with fine pitting and reticulation at higher magnifications. Carapace (Fig. 41A) less than one and a half times as long as deep, about one and a third times as long as wide, slightly vaulted dorsally. Single lateral carina running along entire length of carapace except at extreme anterior tip, almost straight. Anterolateral angle acute, rounded; antennal notch rounded, moderately excavate. Pseudorostral lobes meeting for short distance in front of rounded, eyeless eyelobe (Fig. 41B). Sides of carapace slightly oval in dorsal view. Middorsal carina present but not strongly defined on carapace and free pedigerous somites.

Second pedigerous somite with strong lateral carina continuing from that on carapace, moderately wide, not elevated dorsally; third to fifth with sideplates rounded, keeled dorsolaterally and slightly produced middorsally. Carapace slightly longer than free thoracic somites together, cephalothorax slightly longer than abdomen. Abdominal somites rounded ventrolaterally.

First segment of antenna 1 (Fig. 41C) wide, subequal in length to remaining segments together. Next two segments subequal in length. Flagellum 2-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 41D) more than twice length of remaining segments together, distal prolongation fairly long and relatively narrow, reaching beyond articulation of merus and carpus. Ischium longer than wide, longer than merus. Merus slightly expanded distally, carpus widened. Propodus and dactyl cylindrical.

Basis of pereiopod 1 (Fig. 41E) stout proximally, longer than remaining segments together. Ischium very small, carpus longer than ischium and merus or propodus and dactyl together. Propodus slightly expanded distally.

Pereiopod 2 (Fig. 41F) fairly short, basis subequal in length to rest of limb. Merus longest of distal segments, dactyl small and poorly armed.

Pereiopods 3 (Fig. 41G) to 5 similar, pereiopod 5 very short and slender. Basis of pereiopod 3 subequal in length to rest of limb, merus and carpus stout, carpus slightly longer.

Telsonic somite (Fig. 41H) little longer than wide, produced slightly between uropods. Peduncle of uropod one and a half times length of telsonic somite, nearly twice length of rami, unarmed. First segment of exopod less than half length of second, unarmed. Second segment serrated on inner edge with three spines terminally. First segment of endopod more than three times length of second with inner edge serrated proximally and with four spines distally. Second segment armed only with two terminal spines.

Adult male, length 5,8 mm, from the Lambert's Bay transect. As female

except as follows: integument lighter. Carapace (Fig. 41I) slightly longer, second pedigerous somite narrower. Abdominal somites larger, sideplates defined ventrally.

Basal segment of antenna 1 longer, accessory flagellum surrounded by five aesthetascs. Distal portion of maxilliped 3 (Fig. 41J) much more slender, particularly prolongation of basis. Basis of pereiopod 1 with seven spines near

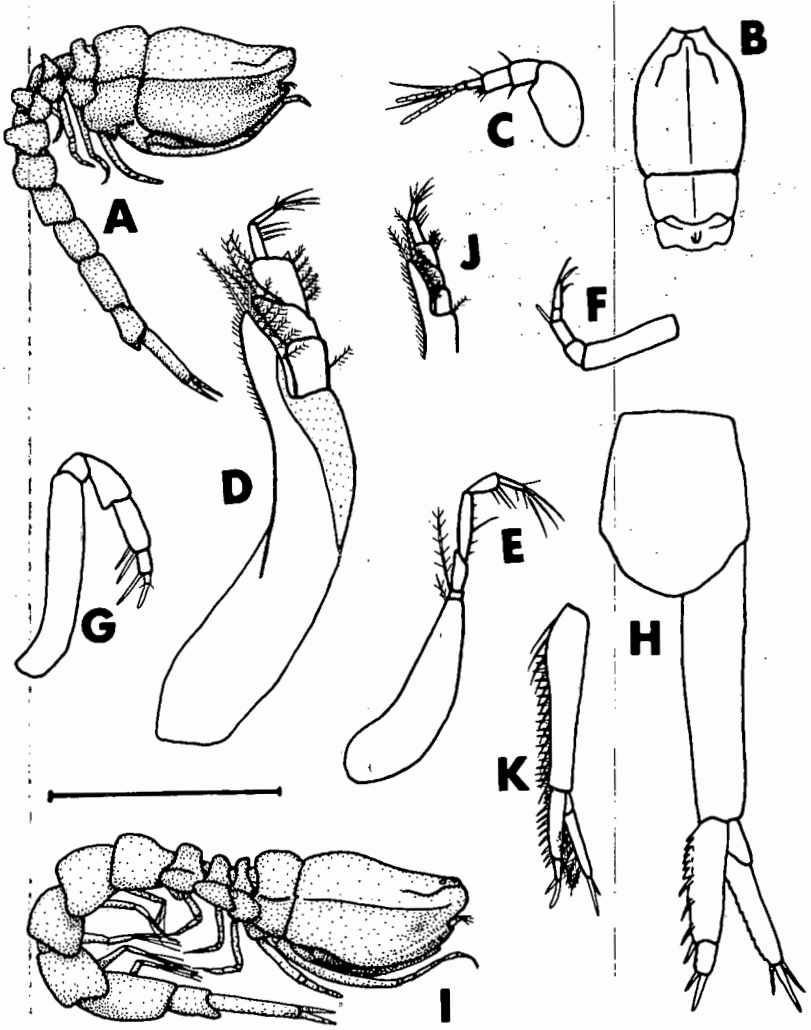

Fig. 41. *Bodotria montagui*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod.
Adult male. I. Lateral view. J. Distal tip of maxilliped 3. K. Uropod.
Scale line = 2 mm for A–B, I; 1 mm for E–F, J–K; 0,5 mm for C–D, G–H.

mid-region, propodus not expanded. Merus of pereiopod 2 slightly longer. Carpus of pereiopods 3 to 5 shorter and propodus stouter. Peduncle of uropod (Fig. 41K) armed with about thirty-one fine, sharp spines on two rows on inner edge. Second segment of exopod with six plumose setae on inner edge. First segment of endopod with three short and eight long fine spines on inner edge.

Length

Adult male	5,8 mm
Ovigerous female	3,8–5,0 mm

Remarks

Despite the rather indefinite nature of Stebbing's diagrams of *B. montagui*, it seems fairly certain that the present specimens can be referred to his species. The main differences between the two are: Stebbing figures the propodus of maxilliped 3 of his unique female as being expanded; the propodus of pereiopod 1 is longer and not expanded; the telsonic somite is shorter; the second segment of the exopod of the uropod has a few plumose setae on the inner edge. On the other hand, the very great similarity in the rest of the uropod and maxilliped 3 suggests that these are indeed referable to the same species. The rather extraordinary placing of the lateral carina very far ventrally on the carapace and second pedigerous somite in Stebbing's drawing should perhaps be discounted, since if this is an accurate representation, then the individual would indeed be unique in the genus.

The species is closest to *B. intermedia* LeLoeuff & Intes (in press), from which it may be distinguished by the longer and more vaulted carapace, the shorter ischium and merus of maxilliped 3, the more dorsally situated lateral carina on the carapace and second pedigerous somite and the slightly longer basis of pereiopod 1 in *B. intermedia.*

Distribution

Apparently endemic to the coasts of South and South West Africa, being found occasionally between Lüderitz and East London at depths from 15 to 88 m, more commonly in the west.

Bodotria tenuis sp. nov.

Fig. 42

Records

			adult ♂	sub-adult ♂	♂	ovig. ♀	♀	juv.	total	no. of records
SST	34°S 21°E–35°S 22°E	80–200 m	2			3	11	4	20	4
SCD	34°S 20°E–33°S 27°E	78–200 m		28	2	1	17	1	49	7
SAM	29°S 32°E	550 m			1		2		3	1

Holotype

Ovigerous female, in the South African Museum, SAM–A15485, collected during the UCT benthic survey, 20 June 1972. Type locality: 200 m, off Still Bay (35°22'S 22°31'E). UCT station number SST 17K.

Description

Ovigerous female, holotype, length 5,2 mm. Integument dull white, reticulations not very evident even at high magnifications. Body slender, elongate. Carapace (Fig. 42A) more than twice as long as deep with strong dorsolateral carina, almost rectangular in cross-section, sides more or less vertical. Major carina running full length of carapace, second minor carina (almost absent in some) midlateral, forming lower edge of lateral depression, running from below anterolateral angle to posterior third of carapace, slightly curved. Anterolateral angle acute, rounded. Antennal notch fairly deeply excavate and small. Eyelobe (Fig. 42B) eyeless, rounded, pseudorostral lobes meeting for a very short distance in front of it. Carapace about a quarter again as long as wide. Middorsal carina present (but not strongly marked) on carapace and thorax only. A single pair of very characteristic black pigmented areas present at level of upper carina very slightly anterior to midpoint of carapace.

Carapace slightly longer than free thoracic somites together, abdomen longer than cephalothorax by one somite. Second pedigerous somite wide, not elevated, dorsolateral carina strongly defined. Third to fifth pedigerous somites low, all with well-defined sideplates formed by posterior continuation of lateral carina. First two abdominal somites also with lateral carina, rest cylindrical.

Antenna 1 (Fig. 42C) fairly small, first segment subequal in length to remaining segments together, fairly slender. Flagellum 2-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Basis of maxilliped 3 (Fig. 42D) more than twice length of remaining segments together, fairly stout; distal prolongation relatively pointed, slender, reaching articulation of merus and carpus. Ischium longer than wide. Merus slightly expanded, reaching half length of carpus. Carpus slightly expanded, propodus and dactyl cylindrical.

Basis of pereiopod 1 (Fig. 42E) stouter proximally, slightly longer than rest of limb. Ischium very short, carpus slightly expanded, longer than ischium and merus together and shorter than subequal propodus and dactyl together.

Pereiopod 2 (Fig. 42F) stout, basis slightly longer than rest of limb. Merus and carpus stout, subequal in length; propodus more than half length of dactyl.

Pereiopods 3 (Fig. 42G) to 5 similar, slender. Each segment distal to basis narrower than the preceding one.

Telsonic somite slightly produced between uropods. Peduncle of uropod (Fig. 42H) stout, twice length of endopod, unarmed but finely serrate on inner edge. Exopod slightly longer than endopod, first segment third length of second, unarmed; second segment armed with six slender plumose setae on inner edge and three fine spines terminally. First segment of endopod more than three

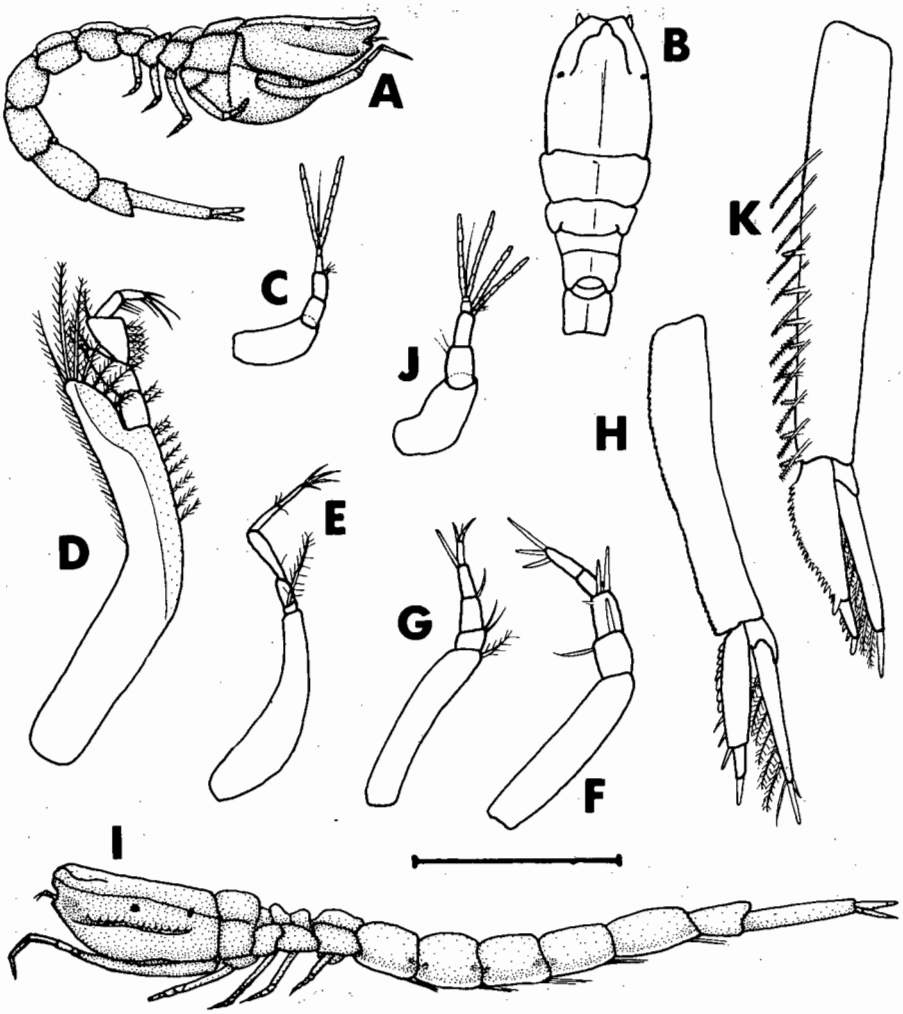

Fig. 42. *Bodotria tenuis* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1 D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Uropod.
Adult male, paratype. I. Lateral view. J. Antenna 1. K. Uropod.

Scale line = 2 mm for A–B, I; 1 mm for E; 0,5 mm for C–D, F–H, J–K.

times length of second, scalloped proximally on inner edge and with three small spines distally; second segment with a single terminal spine.

Adult male, paratype, length 6,5 mm. As female except as follows: dorsolateral carina of carapace (Fig. 42I) slightly more laterally situated, ventrolateral carina better defined, upper edge scalloped. Two pairs of pigmented areas on carapace. Anterolateral angle obtuse, antennal notch very shallow.

No lateral carinae on abdomen; sideplates defined ventrally.

Basis of antenna 1 (Fig. 42J) stouter and shorter with two aesthetascs. Basis of maxilliped 3 narrower, distal prolongation reaching half-way along carpus, carpus slightly longer. Basis of pereiopod 1 straight. Merus, carpus and propodus of pereiopods 3 to 5 longer and narrower. Peduncle of uropod (Fig. 42K) stouter, nearly two and a half times length of endopod, armed with twenty serrate setae in two rows on inner edge. Second segment of exopod with seven plumose setae on inner edge and a single terminal spine. First segment of endopod wide, strongly serrate on inner edge, serrations almost forming a row of small setae; second segment with three very small spines on inner edge.

Length

Adult male	6,5–6,7 mm
Ovigerous female	4,8–6,0 mm

Remarks

The most remarkable feature of this species is its relatively great depth range. No members of *Bodotria* have previously been found at depths greater than 120 m, yet the deepest at which *B. tenuis* is known to occur is 550 m

The specimens from the deep stations in the southern Mozambique Channel differ slightly from those further south in that there are no pigmented spots on the carapace and the lower carina is very faint. The second pedigerous somite is not carinate at all.

The species closest to *B. tenuis* may be distinguished from it as follows: *B. intermedia* Le Loeuff & Intes (in press) has no lower lateral carina on the carapace and the basis of pereiopod 1 is longer. The carapace in both *B. africana* Zimmer, 1921 and *B. armoricana* Le Loeuff & Intes (in press) is less than twice as long as deep; in *B. armoricana* the bases of maxilliped 3 and pereiopod 1 are longer and in *B. africana* they are shorter.

Distribution

From the Cape Peninsula to the southern Mozambique Channel at depths from 78 to 550 m; one of the more common species at these depths.

Bodotria falsinus sp. nov.

Fig. 43

Records

			adult ♂	sub-adult ♂	ovig. ♀	other	total	no. of records
FAL & FBY	34°S 18°E	40–69	2	1	2	2	7	5
SST	35°S 22°E	50–80	4	13	10	7	34	4
SCD	33°S 25°E	32	1				1	1

Holotype

Ovigerous female, in the South African Museum, SAM–A15482, collected during the UCT benthic survey, 20 June 1972. Type locality: 80 m, off Still Bay (34°40′S 21°39′E). UCT station number SST 29X.

Description

Ovigerous female, holotype, length 3,1 mm. Integument clear white, slightly reticulate, with a number of small pits on carapace. Carapace (Fig. 43A) very flat, almost twice as long as deep, slightly wider than long. Middorsal carina poorly defined; lateral carina dorsal to midlateral line, very evident, making carapace wider dorsally than ventrally in cross-section. A second much more evanescent carina present below major one, formed by lower edges of a series of small pits in a row, evident anteriorly only, beginning immediately behind eyelobe. Anterolateral angle (Fig. 43B) acute, antennal notch deep and narrow. Pseudorostral lobes short, not meeting in front of narrow, eyeless eyelobe (Fig. 43C).

Second pedigerous somite almost as wide as long, with midlateral carina continuing from carapace; ventrolaterally with rounded, yellowish protuberance. Third and fourth pedigerous somites with sideplates defined, not elevated dorsally; fifth slightly elevated in middorsal line. Middorsal carina present on thorax, absent from abdomen. Carapace longer than free thoracic somites together, abdomen equal in length to carapace and first two free thoracic somities together.

Antenna 1 (Fig. 43D) small, first segment rectangular in outline, nearly twice length of remaining segments together. Flagellum 1-segmented with two aesthetascs. Accessory flagellum minute, 1-segmented.

Maxilliped 3 (Fig. 43E) stout, basis curved, about twice length of rest of limb. Distal prolongation short, rounded, reaching half-way along merus. Ischium longer than wide, merus slightly expanded, carpus very wide distally.

Basis of pereiopod 1 (Fig. 43F) slightly longer than rest of limb, curved. Ischium short, wider than long; merus stout, carpus very stout, hardly more than twice as long as broad, with eight spines on lower edge, longer than subequal propodus and dactyl together.

Pereiopod 2 (Fig. 43G) stout, basis more than one and a half times length of remaining segments together. Suture-line of basis and ischium faintly visible on one side, marked by a single plumose seta. Merus longer and stouter than carpus; dactyl and propodus both short and stout, dactyl about twice length of propodus.

Pereiopods 3 (Fig. 43H) to 5 similar, carpus of each longest of distal segments. Pereiopod 5 by far the shortest.

Telsonic somite (Fig. 43I) longer than wide, produced between uropods for a short distance. Peduncle of uropod little longer than telsonic somite, one and a half times length of endopod, with six small, fine spines each on inner and outer edges. Exopod slightly shorter than endopod, first segment a third

length of second, unarmed; second armed with six plumose setae on inner edge and two spines terminally. First segment of endopod four times length of second, armed only with two small spines distally on outer edge; second armed with two spines terminally.

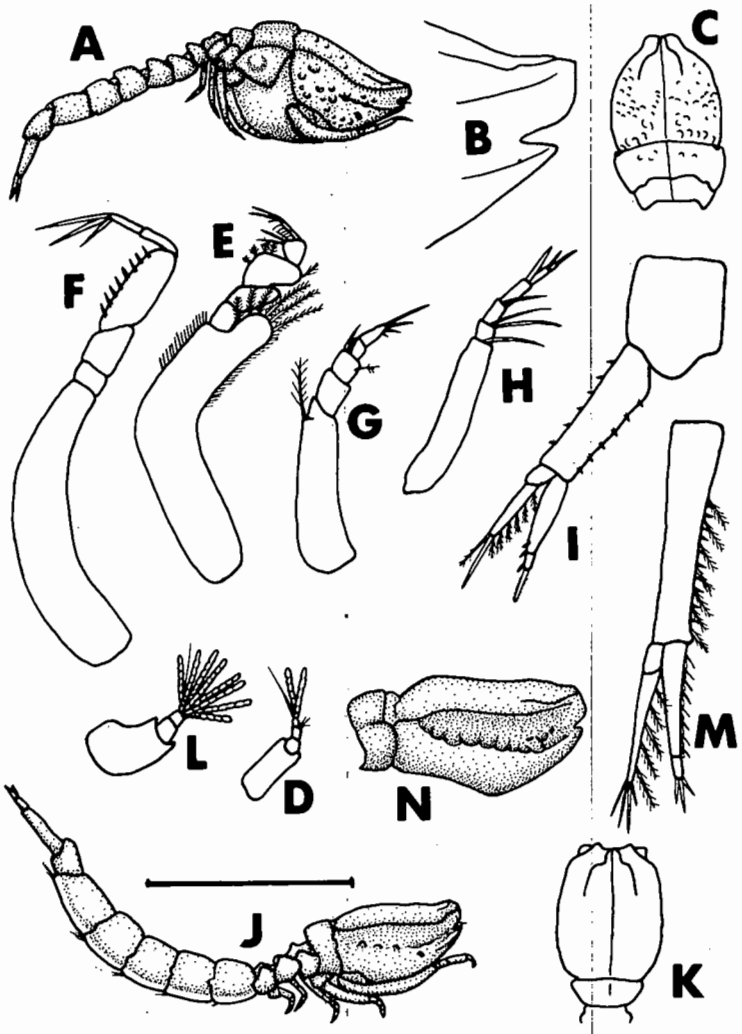

Fig. 43. *Bodotria falsinus* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Telsonic somite and uropod.

Adult male, paratype (large). J. Lateral view. K. Dorsal view of carapace. L. Antenna 1. M. Uropod.

Adult male, paratype (small). N. Lateral view of carapace.

Scale line = 2 mm for A, C, J–K; 1 mm for I, M–N; 0,5 mm for B, D–H, L.

Note: although the appendages of all female specimens referred to this species are very similar, the gross appearance of animals, even from the same sample, varies quite considerably. In ovigerous females the sides of the carapace may be pitted or quite smooth; the lower carina may be fairly evident, evanescent (Fig. 43A) or absent; the sharpness of the lateral carina is variable; the second pedigerous somite may or may not be carinate laterally and may or may not possess a rounded protuberance. The size of individuals varies between 2,4 and 4,1 mm. These variable characters are not always found together in the same individuals, suggesting that they are genetic variations.

Adult male, paratype, length 4,2 mm. As female, except as follows: carapace (Fig. 43J) almost rectangular in lateral outline, fewer pits present. Antennal notch not as deep. Eyelobe (Fig. 43K) wider, carapace longer than wide. Abdominal somites larger, sideplates defined ventrally.

First segment of antenna 1 (Fig. 43L) larger, accessory flagellum surrounded by six aesthetascs. Basis of maxilliped 3 less curved; ischium and prolongation of basis longer. Median edge of basis of pereiopod 1 with four spines. Merus and carpus of pereiopods 3 to 5 stouter. Telsonic somite slightly more produced between uropods. Peduncle of uropod (Fig. 43M) with seven plumose setae and ten small sharp spines on inner edge. Second segment of exopod terminating in four spines. First segment of endopod serrated, serrations alternating with eight small spines; second segment terminating in three spines.

Note: as in the female, there are a number of variable characters in the males. The secondary carina of the carapace may be well (Fig. 43N) or poorly (Fig. 43J) defined; the lateral carina may be present or absent from the second pedigerous somite; the integument may be strongly or slightly pitted. The size varies considerably.

Length

Adult male	2,9–4,6 mm
Ovigerous female	2,4–4,1 mm

Remarks

B. falsinus is similar to *B. vertebrata* sp. nov., *B. lata* Jones, 1955 and *B. australis* Stebbing, 1912. It may be distinguished from *B. vertebrata* by the absence of elevated points on the pedigerous and abdominal somites and by its much wider carapace, and from *B. lata* and *B. australis* also by its wider carapace, deeper antennal notch and enlarged carpus of pereiopod 1.

Distribution

Apparently endemic to the south coast of South Africa from False Bay to Port Elizabeth at depths from 32 to 80 m; not a commonly encountered species.

Bodotria vertebrata vertebrata sp. et subsp. nov.

Fig. 44

Records

			adult ♂	sub-adult ♂	ovig. ♀	♂ & ♀	total	no. of records
FAL & FBY	34°S 18°E	11–31 m	13	1	11	6	31	15
SST	34°S 21°E	15 m	1		3		4	1
SCD	34°S 23°E	11–42 m	2	1	2	2	7	3

Holotype

Ovigerous female, in the South African Museum, SAM–A15487, collected during the UCT benthic survey, 13 July 1967. Type locality: 23 m, False Bay (34°08′S 18°30′E). UCT station number FBY 90V.

Description

Ovigerous female, holotype, length 3,1 mm. Integument white, crystalline; no reticulations visible even at high magnifications. Carapace (Fig. 44A) smooth, less than twice as long as deep. Single distinct lateral carina running from posterior edge to level of anterolateral angle, with a few small, rounded pits in a single row beneath. Carapace rounded in cross-section, no middorsal carina, lateral carina not very sharp. Anterolateral angle acute, rounded; antennal notch narrow, moderately excavate. Pseudorostral lobes meeting for a short distance in front of rounded, eyeless eyelobe (Fig. 44B). Carapace less than one and a half times as long as wide.

Second pedigerous somite very wide, lacking lateral carina; third produced dorsally and laterally to form three rounded spines; fourth and fifth somites elevated to points middorsally only, sideplates defined dorsolaterally. First two abdominal somites produced to a wider elevated band dorsally. Carapace and free thoracic somites subequal in length, cephalothorax longer than abdomen by two segments.

Antenna 1 (Fig. 44C) very small, basis longer than remaining segments together. Flagellum with two aesthetascs, accessory flagellum minute.

Basis of maxilliped 3 (Fig. 44D) strongly curved, less than one and a half times length of remaining segments together; distal prolongation short, rounded, reaching proximal third of merus. Ischium relatively long and narrow, merus wide but very slightly expanded distally; carpus wider than long.

Basis of pereiopod 1 (Fig. 44E) very stout, slightly longer than remaining segments together, slightly curved. Ischium very short, much wider than long. Merus stout, carpus very stout, longer than subequal propodus and dactyl together.

Pereiopod 2 short and stout (Fig. 44F). Basis longer than rest of limb; junction of ischium and basis evident, marked by a single plumose seta. Merus

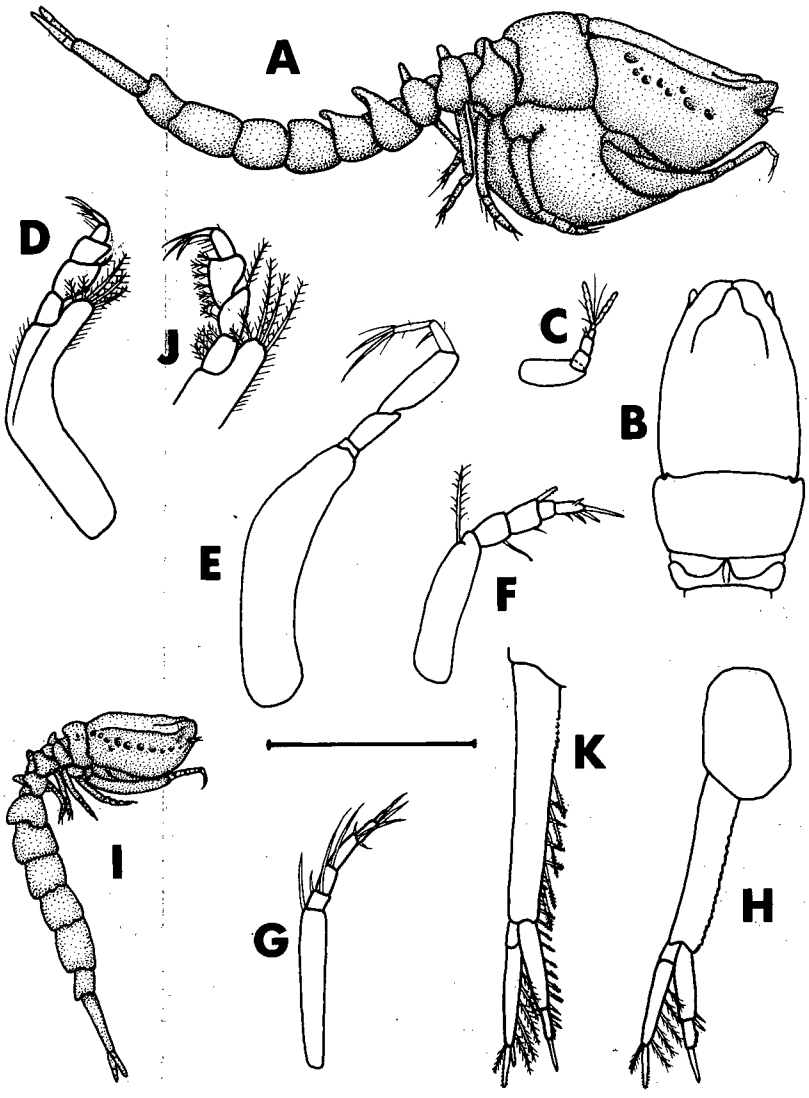

Fig. 44. *Bodotria vertebrata vertebrata* sp. et subsp. nov.

Ovigerous female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod.

Adult male, paratype. I. Lateral view. J. Distal tip of maxilliped 3. K. Uropod.

Scale line = 2 mm for I; 1 mm for A–B, D–G; 0,5 mm for C, H, J–K.

and carpus wide and stout, propodus short, more than half length of narrow dactyl.

Pereiopods 3 (Fig. 44G) to 5 similar, slender; pereiopod 5 much shorter than 4.

Telsonic somite (Fig. 44H) more than one and a half times as long as wide, rounded posteriorly, slightly produced between uropods. Peduncle of uropod one and a third times length of telsonic somite, more than one and a half times length of rami, unarmed, but serrated on inner edge. First segment of endopod two and a half times length of second, armed only with two spines distally; second slightly serrated on inner edge with a single spine terminally. First segment of exopod more than three times length of second; second with five plumose setae on inner edge and two terminally.

Adult male, paratype, length 3,5 mm. As female, except as follows: carapace (Fig. 44I) more rectangular in lateral outline, carina situated less dorsally, a few more pits below. Antennal notch shallower. Pedigerous somites narrower, less elevated dorsally, abdominal somites not at all. Abdominal somites bigger, sideplates defined ventrally.

Antenna 1 shorter, accessory flagellum surrounded by five aesthetascs. Ischium, merus and carpus of maxilliped 3 (Fig. 44J) longer, carpus wider. Basis of pereiopod 1 longer. Pereiopods 3 to 5 shorter. Peduncle of uropod (Fig. 44K) slightly more than twice length of rami, armed with nine long serrate spines proximally and six very short ones distally on inner edge. First segment of endopod with seven serrate setae on inner edge, second with two short and three very short spines.

Length

Adult male	3,1–3,8 mm
Ovigerous female	2,9–4,1 mm

Remarks

The presence of elevated spines middorsally on thoracic and abdominal somites is unique in the genus.

There are two distinct forms of the species: those from the south coast and False Bay have the lateral carina continuous along almost the whole length of the carapace and a number of small rounded pits below: those from the west coast have the carina extending only along half of the carapace without pits below. The forms are so similar that it seems unnecessary to split them into two species, but the differences are consistent enough to require subspecific differentiation. The differences between *B. vertebrata vertebrata* and *B. vertebrata semicarinata* are described in the discussion of the latter below.

Distribution

Found occasionally from False Bay to Knysna at depths from 11 to 42 m; less common than *B. v. semicarinata.*

Bodotria vertebrata semicarinata sp. et subsp. nov.

Fig. 45

Records

			adult ♂	sub-adult ♂	ovig. ♀	♀	juv.	total	no. of records
WCD	33°S 17°E–34°S 18°E	11–32 m	8	6	16	5	11	36	7
LBT	32°S 18°E	20–33 m	1		1			2	2
SB	33°S 17°E	7–29 m	6	10	13	11		40	11
SAM	33°S 18°E	?	2		3			5	1*

*from stomach of *Rhabdosargus globiceps*.

Holotype

Ovigerous female, in the South African Museum, SAM–A15486, collected during the UCT benthic survey, 25 April 1962. Type locality: 26 m, off Saldanha Bay (33°07′S 17°57′E). UCT station number WCD 134X.

Description

This subspecies is identical in most respects with *B. v. vertebrata*, differing from it as follows:

Ovigerous female, holotype, length 3,4 mm. Integument browner, velvety, finely reticulate. Carapace (Fig 45A) deeper, about one and a half times as long as deep, hardly longer than wide. Lateral carina extending no more than half length of carapace, lacking pits below. Pseudorostral lobes deeper and shorter, not meeting in front of eyelobe. Second pedigerous somite deeper, with mid-dorsal carina; third less elevated dorsally. Abdomen shorter, subequal in length to cephalothorax. Basis of antenna 1 slightly wider. Bases of maxilliped 3 and pereiopod 1 longer, of pereiopod 1 (Fig. 45B) nearly twice length of rest of limb. Pereiopod 2 (Fig. 45C) longer and more slender. Peduncle of uropod (Fig. 45D) twice length of rami, not serrate.

Adult male, paratype, length 3,8 mm. The same differences occur in the external anatomy of the males (Fig. 45E), apart from which the peduncle of the uropod (Fig. 45F) is about one and three-quarters times the length of the rami with sixteen long, slender spines evenly spaced along inner edge. The first segment of the exopod is slightly longer relative to the second.

Length

Adult male	3,6–4,1 mm
Ovigerous female	2,9–4,3 mm

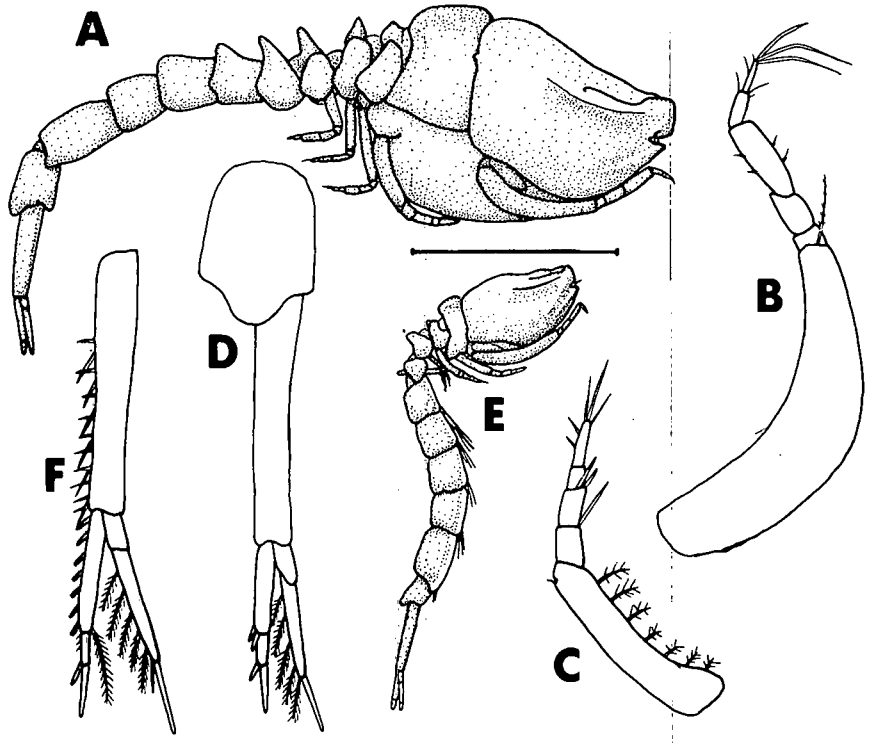

Fig. 45. *Bodotria vertebrata semicarinata* sp. et subsp. nov.
Ovigerous female, holotype. A. Lateral view. B. Pereiopod 1. C. Pereiopod 2. D. Telsonic somite and uropod.
Adult male, paratype. E. Lateral view. F. Uropod.
Scale line = 2 mm for E; 1 mm for A; 0,5 mm for B–D, F.

Remarks

In the genus *Bodotria* in most cases it is difficult to determine the limits of species because there are such great individual differences that there is a danger of creating more species than is perhaps realistic. For this reason the number of species proliferates greatly in almost every area where members of the genus are to be found. *B. vertebrata* is one of the few species in which the differences between individuals are consistent in two contiguous geographical areas, and for this reason subspecific separation is possible. The two forms are clearly very similar to each other and do not warrant specific differentiation.

Distribution

Apparently endemic to the west coast of South Africa from Lambert's Bay to Table Bay at depths from 11 to 33 m. Somewhat more commonly found than *B. v. vertebrata*, this subspecies accounts for nearly 2 per cent of the individuals in the collection.

Bodotria serica sp. nov.

Fig. 46

Records

			adult ♂	sub adult ♂	ovig. ♀	♂ & ♀	juv.	total	no. of records
WCD	34°S 17°E–33°S 18°E	65–79 m			1	1		2	2
FAL & FBY	34°S 18°E	17–87 m	8	4	16	12	7	47	24
SST	35°S 22°E	80 m	15	13	22	3	6	59	2

Holotype

Ovigerous female, in the South African Museum, SAM–A15484, collected during the UCT benthic survey, 21 June 1972. Type locality: 80 m, off Still Bay (34°40′S 21°39′E). UCT station number SST 29W.

Description

Ovigerous female, holotype, length 3,7 mm. Integument silky white, translucent, not strongly calcified, without reticulations. Carapace (Fig. 46A) nearly twice as long as deep, about one and a quarter times as long as wide. Dorsal carina faintly visible on posterior half of carapace and thoracic somites, almost invisible on abdomen. Single pair of rounded lateral carinae present about a third distance from dorsal edge of carapace with slight longitudinal depression below (not present in all specimens). Anterolateral angle acutely pointed, antennal notch evident, fairly deep, rounded. Pseudorostral lobes short, not meeting in front of eyeless eyelobe (Fig. 46B).

Second pedigerous somite very wide, carinate dorsally but not laterally; third deep, moderately wide, not carinate laterally; fourth and fifth very slightly elevated dorsally with sideplates defined dorsally and ventrally. Carapace slightly longer than free thoracic somites together, cephalothorax and abdomen subequal in length. Abdominal somites cylindrical.

Antenna 1 (Fig. 46C) small, first segment subequal in length to remaining segments together. Flagellum 1-segmented with two aesthetascs; accessory flagellum 1-segmented.

Maxilliped 3 (Fig. 46D) fairly long, basis more than twice length of rest of limb. Distal prolongation rounded, hardly reaching articulation of merus and carpus. Merus widely expanded, carpus wider distally than proximally.

Basis of pereiopod 1 (Fig. 46E) slightly longer than rest of limb; carpus longest of remaining segments, propodus and dactyl subequal in length.

Pereiopod 2 (Fig. 46F) stout, basis about one and a half times length of rest of limb; merus and carpus subequal in length, propodus more than half length of dactyl.

Pereiopods 3 (Fig. 46G) to 5 long, bases longer than rest of limbs.

Telsonic somite (Fig. 46H) one and a third times as long as wide, hardly produced between uropods, two-thirds length of peduncle of uropod. Peduncle

unarmed, very slightly less than twice length of rami. First segment of exopod half length of second, second with seven plumose setae on inner edge and a single spine terminally. First segment of endopod more than twice length of second, serrate proximally and with seven sharp spines distally on inner edge;

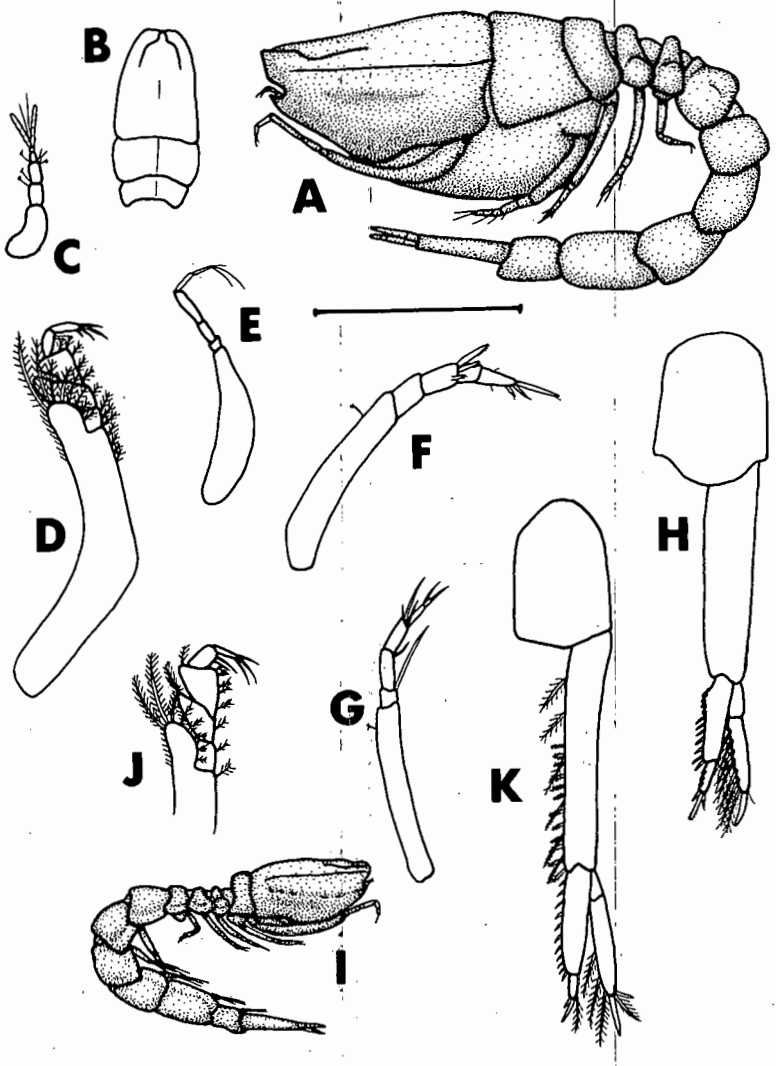

Fig. 46. *Bodotria serica* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Telsonic somite and uropod.

Adult male, paratype. I. Lateral view. J. Distal tip of maxilliped 3. K. Telsonic somite and uropod.

Scale line = 2 mm for B, I; 1 mm for A, E, H, K; 0,5 mm for C–D, F–G, J.

second with three terminal spines and serrate on inner edge.

Adult male, paratype, length 3,4 mm. As female, except as follows: carapace (Fig. 46I) with several small depressions below lateral carina; anterolateral angle obtuse, antennal notch shallower. Carapace narrower dorsally, with no middorsal carina. Sideplates of abdominal somites defined ventrally. Fifth pedigerous somite produced ventrally to form a rounded protuberance.

Four small aesthetascs between flagella of antenna 1. Merus of maxilliped 3 (Fig. 46J) smaller and carpus larger. Pereiopod 2 smaller than in female. Telsonic somite (Fig. 46K) produced less between uropods. Peduncle of uropod narrower with eighteen setae in two rows on inner edge. Second segment of exopod with three plumose setae, first of endopod with eleven small spines on inner edge.

Length

Adult male	3,3–4,8 mm
Ovigerous female	3,1–4,6 mm

Remarks

This species is most closely allied with *B. tenuis* sp. nov. and *B. australis* Stebbing, 1912, differing from *B. australis* mainly in the lack of a lateral carina on the second and third pedigerous somite in the female or second and fourth in the male, and the longer peduncle of the uropod; and from *B. tenuis* in the lack of the carinae, the rounded prolongation of the basis of maxilliped 3 and the absence of a second lower ridge below the main carina.

In recorded depth range as well as in morphological detail, this species seems to be intermediate between the two named above.

Distribution

Apparently endemic to the south-western coast of South Africa from Saldanha Bay to Still Bay, at depths from 17 to 87 m, this is a fairly common species, especially in the Still Bay region. It accounts for about 2 per cent of the individuals in the collection.

Bodotria australis Stebbing, 1912

Bodotria australis Stebbing, 1912: 142, pl. 51(B).

Remarks

Stebbing described this species from a single female 3,25 mm in length. Although corresponding in many features with several of the new species described here, Stebbing's figures show several characters which, *if* accurately portrayed, are sufficiently distinctive to separate this species from all the others known from South Africa. In particular the lateral carina is present on pedigerous somites 2 to 4 and abdominal somites 2 to 5. A lower lateral carina is present on the carapace, which is more than one and a half times as long as

broad. The distal prolongation of maxilliped 3 is rounded and the carpus of pereiopod 1 is not particularly stout. This combination of characters separates Stebbing's individual from *B. montagui* Stebbing, 1912, *B. falsinus* sp. nov., *B. vertebrata* sp. nov., and *B. serica* sp. nov. *B. australis* is most similar to *B. tenuis* sp. nov., which differs in the absence of a lateral carina on abdominal somites 3 to 5 and a dorsally situated lateral carina which makes the carapace flat on top.

Distribution

Off East London (32°S 28°E) at a depth of 75 m.

Bodotria glabra Jones, 1955

Bodotria glabra Jones, 1955: 282–284, figs 1–2.

Remarks

This species is known only from female and juvenile individuals in two plankton samples collected aboard the R.R.S. *William Scoresby* on the border of the southern African region. Distinguishing characters are: an elongate, flattish carapace (nearly two and a half times as long as deep, about one and a half times as long as wide) with a very faint lateral carina anteriorly; the basis of maxilliped 3 is stout, and the wide distal prolongation reaches the level of the carpus; the basis of pereiopod 1 is longer than the rest of the limb. The length of the ovigerous female is 4,5 mm. It is the only species occurring in Africa south of 20°S in which the endopod of the uropod is 1-segmented.

Distribution Off Cape Frio (19–20°S 12°E), plankton, 0–100 m.

Incertae sedis

Iphinoe? zimmeri (Stebbing, 1910)

Figs. 47–48

Iphinoe zimmeri Stebbing, 1910: 411–412, pl. 44.

Records

			adult ♂	sub-adult ♂	ovig. ♂	ovig. ♀	♀	juv.	total	no. of records
FAL & FBY	34°S 18°E	17–44 m			3		2		5	4
SST	34°S 21°E	15–80 m	2	11	2	7	3	15	40	7
SCD	34°S 21°E–33°S 25°E	42–73 m	4	3	2	11	5	2	27	5

Previous records

East London (32°S 28°E), 75 m (Stebbing 1910).

Holotype

Adult male, deposited by Stebbing (1912) in the British Museum (Natural History). Type locality: 75 m, off East London (32°S 28°E).

Description

Ovigerous female, length 7,0 mm, from the south coast, near Port Elizabeth. Integument poorly calcified, translucent, with small shallow pits. Carapace (Fig. 47A) elongate, more than twice as long as deep, pointed anteriorly. Antennal notch (Fig. 47B) moderately deep, triangular. Anterolateral angle acute, rounded. Carapace in dorsal view (Fig. 47C) narrower anteriorly, pseudorostral lobes meeting for a short distance in front of eyelobe. Eyelobe small, pigmented,

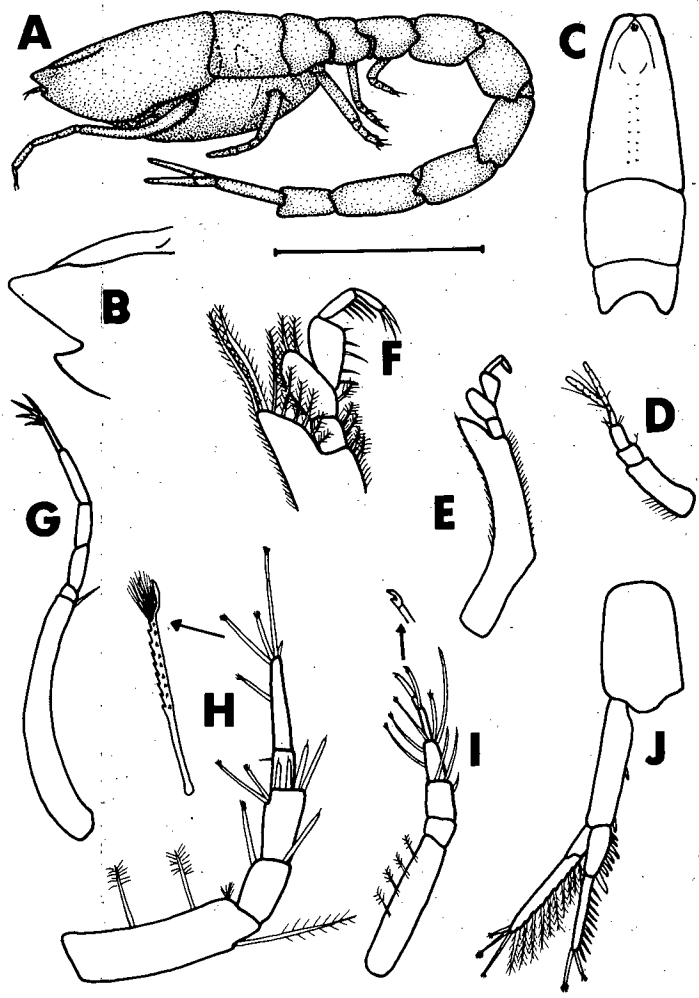

Fig. 47. *Iphinoe ? zimmeri*.

Ovigerous female. A. Lateral view. B. Detail of anterior tip of carapace. C. Dorsal view of carapace. D. Antenna 1. E. Maxilliped 3. F. Distal tip of maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Telsonic somite and uropod.

Scale line = 2 mm for A, C; 1 mm for B, E, G, J; 0,5 mm for D, F, H–I.

with very small scattered lenses. No middorsal carina—midline indicated by double rows of minute tubercles.

First pedigerous somite invisible, second very wide. Carapace subequal in length to free thoracic somites together. Gonad clearly visible as triangular orange patch laterally beneath integument of second pedigerous somite (dotted in Fig. 47A). Cephalothorax subequal in length to first five abdominal somites together. Abdomen cylindrical, each somite slightly produced posterolaterally.

Antenna 1 (Fig. 47D) short, first segment longer than next two together. Flagellum 2-segmented with two short aesthetascs. Accessory flagellum very small, 1-segmented.

Basis of maxilliped 3 (Fig. 47E) more than twice as long as remaining segments together, abruptly angled proximal to its mid-point. Distal prolongation (Fig. 47F) rather broad and short, reaching articulation of merus and carpus distally. Carpus slightly expanded.

Pereiopod 1 (Fig. 47G) slender, elongate, reaching beyond tip of pseudorostrum with carpus. Basis longer than remaining segments together. Ischium very short, merus, carpus and dactyl subequal in length, propodus slightly longer.

Pereiopod 2 (Fig. 47H) stout, 6-segmented. Basis equal in length to next three segments together. Carpus slightly longer than merus, well armed distally. Dactyl slender.

Pereiopods 3 (Fig. 47I) to 5 similar. Ischium, carpus and merus stout, propodus and dactyl very slender. All segments of pereiopods 2 to 5 distal to basis with very characteristic long, stout setae tipped with a brush of filaments.

Telsonic somite (Fig. 47J) one and a half times as long as wide, very slightly produced between uropods, subequal in length to peduncle. Peduncle subequal in length to rami with two very small spines on inner edge. First segment of exopod less than half length of second, unarmed. Second with 10 plumose setae on inner edge and three terminal spines wih apical bristles. First segment of endopod two-thirds length of second with seven spines on inner edge and two terminally with apical bristles.

Adult male, length 7,6 mm, from the south coast, near Port Elizabeth. As female, except as follows: integument very slightly wrinkled. Carapace (Fig. 48A) twice as long as deep, pseudorostral lobes (Fig. 48B) less pointed. Eye much larger, strongly pigmented, with six large lenses arranged in a ring. Antennal notch and anterolateral angle rounder and shallower. Carapace slightly depressed behind antennal notch and above posterior extremity of eyelobe. Gonad whitish, slightly visible through integument of second pedigerous somite. Sideplate of fourth pedigerous somite produced forward as linguiform process. Sideplates of abdominal somites defined ventrally. Ventral sternite (Fig. 48C) of third pedigerous somite produced into a crescentic ridge, of fourth with a rounded tubercle and of fifth with a larger, backward-pointing projection.

Antenna 1 (Fig. 48D) stouter, with fifteen aesthetascs surrounding flagellum.

Basis of pereiopod 1 longer. Pereiopods 3 (Fig. 48E) to 5 more slender, last four segments longer. Peduncle of uropod (Fig. 48F) armed with seven slender spines followed distally by about twenty-five serrated spines in two rows. Second segment of exopod with seventeen plumose setae on inner edge; first segment of endopod with ten serrate setae and second with twenty fine spines on inner edge.

Length

Adult male	7,9–8,4 mm
Ovigerous female	5,8–8,4 mm

Remarks

These animals are clearly the same as the one described by Stebbing (1910) as *Iphinoe zimmeri*. In almost all respects this species is typical of *Iphinoe*, particularly in the general appearance of the body, the anterior extension of the sideplate of the fourth pedigerous somite and the sternal processes of the males. However the fact that the first pedigerous somite is never visible in either sex excludes it from *Iphinoe* as the genus is now defined. The species does fit the

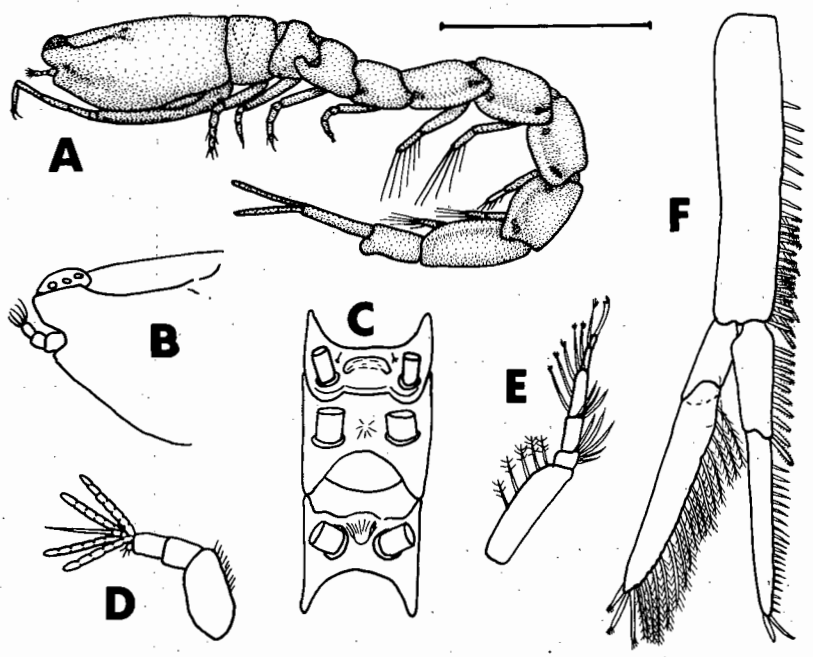

Fig. 48. *Iphinoe? zimmeri*

Adult male. A. Lateral view. B. Detail of anterior tip of carapace. C. Ventral sternites of pedigerous somites. D. Antenna 1. E. Pereiopod 3. F. Uropod.

Scale line = 2 mm for A; 1 mm for B–C, E; 0,5 mm for D, F.

generic diagnosis of *Bodotria*, but is patently unlike any other members of the genus. Since the state of the first pedigerous somite is the only character which reliably distinguishes between *Iphinoe* and *Bodotria*, altering the generic diagnosis of *Iphinoe* to accommodate this species would be untenable. So for the present at least the generic position of the species must remain uncertain.

Distribution

A fairly common species found between False Bay and East London at depths from 15 to 80 m.

DISTRIBUTION OF THE BODOTRIINAE

The rate of endemism is very high within the Bodotriinae as well as in the family as a whole. Of approximately 183 species only 25 (14%) occur across more than one major climatic or zoogeographic zone and 9 of these in more than one ocean: 4 of the 9 are found in both the Indian and Pacific Oceans, linking the Australasian, Indo-Chinese and Japanese fauna into an Indo-West-Pacific group; the other 5 demonstrate the strong link between the Mediterranean, eastern Atlantic and Indo-West-Pacific faunas—2 occur in the Mediterranean, west Africa and Indo-China, 1 in the Mediterranean, the Red Sea and Ceylon and 1 in west Africa and India, while the most widely distributed species of all, *Iphinoe crassipes*, occurs in the Red Sea, west Africa, South Africa and India.

The distribution of the species in the subfamily is detailed in Table 3. Each species may have more than one entry if it is known to occur in widely separate regions.

It is clear that, as with the Vaunthompsoniinae (Day 1975), the Bodotriinae are negatively amphipolar (Zimmer 1941). Not a single species is yet known from latitudes greater than 70° and only 4 per cent of the records are from latitudes

TABLE 3

Distribution of Bodotriinae according to depth and latitude (data mainly from Jones 1969)

	shore–5 m		5–200 m		200–2 000 m		>2 000 m		Total	
	no.	%	no.	%	no.	%	no.	%	no.	%
N of 70°N	—	—	—	—	—	—	—	—	—	—
70°N–50°N	—	—	4	<2	1	<1	1	<1	6	3
50°N–20°N	1	<1	44	21	—	—	1	<1	46	22
20°N–20°S	—	—	77	36	2	<1	1	<1	80	38
20°S–50°S	2	<1	70	33	6	<3	—	—	78	37
50°S–70°S	—	—	1	<1	1	<1	—	—	2	1
S of 70°S	—	—	—	—	—	—	—	—	—	—
Total no. of records	3	>1	196	92	10	5	3	1	212	
Total no. of species	3	>1	169	92	9	5	2	1	183	

greater than 50°. Fully 75 per cent occur between 20°N and 50°S. Although the Vaunthompsoniinae preponderate in the south temperate latitudes (48% between 20° and 50°S), there is a larger (38%) component of tropical species in the Bodotriinae and a smaller (37%) one of south temperate species. Were it not for the enormous diversification of the genus *Cyclaspis* in Australasia, the Bodotriinae would be very largely a tropical group.

The only ten species (less than 5%) known from the Western hemisphere (Western Atlantic and Eastern Pacific) are fairly widely spaced around the shores of North and South America, and each is known from only a few specimens. When one considers that most species in the Eastern hemisphere are also rather narrowly distributed, it becomes apparent that the powers of dispersion of these small, essentially benthic, ovoviviparous animals with no free larval stage are very limited. (This is not true, however, of the amphipods, some of which are very widely distributed. The mechanisms of dispersal in this group are uncertain, but it is widely agreed (Griffiths 1974) that rafting may play an important part. This method of dispersal would be strictly limited in the sand-dwelling Cumacea.)

It is a reasonable assumption that the ancestral bodotriids originated in the warmer tropical or subtropical waters of the Indo-West-Pacific, possibly in what is now the Indo-Malayan region, spreading along the continental shelves, with very few pioneers reaching the new world across the Atlantic and Pacific Oceans. Similar distribution patterns are found in many other groups. However, Eckman (1953) warns that the present richness of the fauna in the Indo-West-Pacific does not necessarily mean that in times past it has acted as a main centre for distribution. It may simply be that conditions in this area have been more stable so that a greater part of the original Tethys fauna has been sustained here than it has been, for example, in the Atlantic.

The vast majority of known species (93%) occurs at depths of less than 200 m. But the implication that the deep oceans are practically devoid of Bodotriinae is perhaps misleading. For example, five of the seven southern African species from 200 m and deeper are new, so that it is likely that the apparent lack of deep-water species is due rather to a scarcity of collecting. The two species previously known, both represented until now by a single specimen, were found in considerable numbers in the present surveys, suggesting that the numbers of individuals may also be greater than anticipated. This is borne out by the work of Jones & Sanders (1972), who analysed the Cumacea of deep waters in the North Atlantic, and concluded that the Cumacea are far more important in deep waters than previously estimated, in numbers both of species and of individuals.

DISTRIBUTION OF THE SOUTHERN AFRICAN BODOTRIINAE

It is intended to discuss the zoogeography of the southern African Cumacea more fully at a later date when all the families have been examined. Thus in the

present study, no attempt has been made to distinguish provinces or regions, since too small a number of genera and species is available in the Bodotriidae alone to allow significant conclusions to be drawn.

The west coast of southern Africa is essentially a region of cold water (bottom temperature about 10°C at a depth of 50 m), the south coast between the Cape Peninsula and East London is a region of cool water (bottom temperature 12–14°C at a depth of 50 m) and the east coast north of East London is one of warm water (bottom temperature more than 18°C at a depth of 50 m). The Bodotriinae from depths less than 200 m are generally confined to rather narrow areas, and may be divided into groups according to their distribution around the coast:

1. Cold-water species occurring on the west coast as far south as False Bay—five species: *Iphinoe africana* (from 16°S), *I. fagei*, *Upselaspis caparti*, *Bodotria vertebrata semicarinata*, *B. glabra* (19–20°S).
2. Cool-water species occurring to the west and east of False Bay or off the Cape Peninsula only—ten species: *Bodotria magna*, *B. nitida*, *B. elevata*, *B. montagui*, *B. serica*, *Austrocuma platyceps*, *Iphinoe stebbingi*, *I. dayi*, *I. capensis*, *Eocuma foveolatum*.
3. Warmer-water species occurring along the south coast from False Bay to East London—six species: *Bodotria falsinus*, *B. clara*, *B. vertebrata vertebrata*, *B. australis*, *Eocuma* sp., *Iphinoe? zimmeri*.
4. Subtropical species occurring along the Natal and Mozambique coasts—five species: *Eocuma winri*, *Mossambicuma elongatum*, *Iphinoe truncata*, *Cyclaspis scissa*, *C. australora*.
5. *Iphinoe crassipes* and *I. senegalensis* are the only shallow-water species whose ranges extend well out of the southern African region. *I. senegalensis* occurs in west Africa with only a single doubtful record from South Africa. *I. crassipes*, on the other hand, is very widely distributed, being known from the Red Sea, west Africa, India and Ceylon, as well as South Africa, where it occurs in warmer waters from Saldanha Bay to Natal.
6. A further group consists of seven species from depths greater than 200 m. In general there are fewer records, so that their limits are less accurately known, but they do tend to be more widespread than are shallow-water species. They are *Iphinoe producta* (west coast only), *Cyclaspoides pellucidus* and *Cyclaspis spectabilis* (off the Cape Peninsula to the southern Mozambique Channel), *Bodotria tenuis* (off Still Bay to the southern Mozambique Channel), *Eocuma aculeatum* (southern Mozambique Channel only) and *Alticuma bellum* (Natal to southern Mozambique Channel). *Alticuma carinatum* is the most widespread of this group, occurring in many deep-water hauls from Lambert's Bay eastwards. It is also known from a single specimen further north off Kenya.

It appears that there is a real geographical barrier separating tropical west coast species from those of the south-west African region (group 1). The limiting factor is probably temperature, since the northern extent of the cold

Benguela current is felt at about 18°S, which is about the northern limit of the species in group 1.

The depth ranges of the shallow-water species are very much more limited than those of species from deeper waters and can be divided into five groups according to their depth distribution. The sixth and deepest group is included for the sake of completeness.

Depth range in metres (approximate)	Number of species
0–4	4
3–20	3
20–50	4
20/30–80/90	12
20–200	3
> 200	7

It can be seen that the maximum depth at which each group occurs is very approximately double that of the previous group. The water pressure would also double at depths of 10, 20, 40, 80 m, etc., and these depths correspond fairly well with major changes in the fauna. It is not possible to say how well this relationship would hold at greater depths, due to the very small numbers of samples and individuals from these areas.

Despite the correlation between pressure and faunal changes it is likely that temperature—or a temperature-related parameter—is of more significance in controlling depth distribution. This statement is borne out by the fact that many species occur at greater depths the further east they are found, because the temperature contours are deeper on the warmer east coast than on the cooler west coast. A similar effect is shown by Millard (1978) for the southern African Hydrozoa.

A further factor which must be important in controlling the distribution of bodotriids is the size and composition of the substrate, since these animals are burrowing detritivores. Due to their very small size they presumably require fairly fine, well-sorted sediments. Particle size determinations for many of the UCT and NIWR samples may later become available for analysis, at which time this problem may be solved at least partially.

The material from the collections at hand has added to our knowledge not only of the local cumacean fauna but also of the depth distribution of several genera. *Cyclaspis scissa* sp. nov. and *C. australora* sp. nov. are the first shallow-water species in the genus recorded from Africa. *Bodotria* and *Eocuma* have always been considered to be distinctly shallow-water genera, but *B. tenuis* sp. nov. has increased the known depth range for its genus from 120 m to 550 m, and *Eocuma aculeatum* sp. nov. has increased that of *Eocuma* from 108 to 550 m. *Cyclaspoides pellucidus* sp. nov. is the second species known in the genus and the first from the Southern hemisphere. *Mossambicuma* and *Austrocuma* are new genera from previously unsampled areas (a tropical estuary and a Cape

shore respectively). *Alticuma* establishes a new genus consisting of two deep-water species.

The rate of endemism appears to be extremely high. In the southern African Vaunthompsoniinae it is of the order of 70 per cent (7 endemics out of 11 species), but in the Bodotriinae 28 (82%) of the 34 species have been found south of 20°S only. The ranges of another four extend beyond this limit, but none of these is found in any other areas. One record (*I. senegalensis*) is a doubtful identification and only one species (*I. crassipes*) occurs from equatorial Africa to India. It should be stressed, however, that very little data is available from the regions due north of the area under consideration so that these figures must be treated with caution.

Finally, 4 586 specimens of 31 species in 607 records were examined in this study. This gives a figure of 7,5 individuals per record and a specimen : species ratio of 148 : 1. In comparison, the Vaunthompsoniinae gave figures of 77 specimens, 11 species and 42 records with 1,8 individuals per record and a specimen : species ratio of 7 : 1. Thus the Bodotriinae exhibit much lower diversity and a much higher rate of occurrence than do the Vaunthompsoniinae in the same area. The ecological reasons for these differences are not clear, but the immediate cause is the very large number of specimens of some very successful species, particularly *Iphinoe africana* with 1 603 individuals and *I. stebbingi* with 1 186. These two species account for over half the number of individuals. The other numerically successful species are *I. dayi* (152 individuals), *I. crassipes* (143), *Bodotria magna* (200), *B. nitida* (238) and *B. serica* (108). Thus 7 species (about 20% of the total) account for 2 630 (nearly 60%) of individuals. In fact *Iphinoe* and *Bodotria* together account for 21 (about 65%) of the species and 93 per cent of the individuals. Without them the specimen : species and individual : record ratios would be much the same as they are in the Vaunthompsoniinae.

In conclusion, the Bodotriidae are the most successful of the cumacean families in southern African waters, both in numbers of species and of individuals. Preliminary estimates suggest that the Diastylidae will prove to be almost as diverse, although not as numerous, while the other families are relatively poorly represented.

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6. SYSTEMATIC papers must conform to the *International code of zoological nomenclature* (particularly Articles 22 and 51).

Names of new taxa, combinations, synonyms, etc., when used for the first time, must be followed by the appropriate Latin (not English) abbreviation, e.g. gen. nov., sp. nov., comb. nov., syn. nov., etc.

An author's name when cited must follow the name of the taxon without intervening punctuation and not be abbreviated; if the year is added, a comma must separate author's name and year. The author's name (and date, if cited) must be placed in parentheses if a species or subspecies is transferred from its original genus. The name of a subsequent user of a scientific name must be separated from the scientific name by a colon.

Synonymy arrangement should be according to chronology of names, i.e. all published scientific names by which the species previously has been designated are listed in chronological order, with all references to that name following in chronological order, e.g.:

Family Nuculanidae

Nuculana (*Lembulus*) *bicuspidata* (Gould, 1845)

Figs 14–15A

Nucula (*Leda*) *bicuspidata* Gould, 1845: 37.
Leda plicifera A. Adams, 1856: 50.
Laeda bicuspidata Hanley, 1859: 118, pl. 228 (fig. 73). Sowerby, 1871: pl. 2 (fig. 8a–b).
Nucula largillierti Philippi, 1861: 87.
Leda bicuspidata: Nicklès, 1950: 163, fig. 301; 1955: 110. Barnard, 1964: 234, figs 8–9.

Note punctuation in the above example:
comma separates author's name and year
semicolon separates more than one reference by the same author
full stop separates references by different authors
figures of plates are enclosed in parentheses to distinguish them from text-figures
dash, not comma, separates consecutive numbers

Synonymy arrangement according to chronology of bibliographic references, whereby the year is placed in front of each entry, and the synonym repeated in full for each entry, is not acceptable.

In describing new species, one specimen must be designated as the holotype; other specimens mentioned in the original description are to be designated paratypes; additional material not regarded as paratypes should be listed separately. The complete data (registration number, depository, description of specimen, locality, collector, date) of the holotype and paratypes must be recorded, e.g.:

Holotype
SAM–A13535 in the South African Museum, Cape Town. Adult female from mid-tide region, King's Beach Port Elizabeth (33°51'S 25°39'E), collected by A. Smith, 15 January 1973.

Note standard form of writing South African Museum registration numbers and date.

7. SPECIAL HOUSE RULES

Capital initial letters

(a) The Figures, Maps and Tables of the paper when referred to in the text
e.g. '. . . the Figure depicting *C. namacolus* . . .'; '. . . in *C. namacolus* (Fig. 10) . . .'

(b) The prefixes of prefixed surnames in all languages, when used in the text, if not preceded by initials or full names
e.g. Du Toit but A. L. du Toit; Von Huene but F. von Huene

(c) Scientific names, but not their vernacular derivatives
e.g. Therocephalia, but therocephalian

Punctuation should be loose, omitting all not strictly necessary

Reference to the author should be expressed in the third person

Roman numerals should be converted to arabic, except when forming part of the title of a book or article, such as
'Revision of the Crustacea. Part VIII. The Amphipoda.'

Specific name must not stand alone, but be preceded by the generic name or its abbreviation to initial capital letter, provided the same generic name is used consecutively.

Name of new genus or species is not to be included in the title: it should be included in the abstract, counter to Recommendation 23 of the Code, to meet the requirements of Biological Abstracts.

JENNIFER DAY

SOUTHERN AFRICAN CUMACEA
PART 2
FAMILY BODOTRIIDAE, SUBFAMILY BODOTRIINAE

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ANNALS

OF THE SOUTH AFRICAN MUSEUM

CAPE TOWN

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1. MATERIAL should be original and not published elsewhere, in whole or in part.

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Only generic and specific names should be underlined to indicate italics; all other marking up should be left to editor and publisher.

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THIELE, J. 1910. Mollusca: B. Polyplacophora, Gastropoda marina, Bivalvia. *In:* SCHULTZE, L. *Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Süd-Afrika* **4**: 269–270. Jena: Fischer. *Denkschr. med.-naturw. Ges. Jena* **16**: 269–270.

(*continued inside back cover*)

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SOUTHERN AFRICAN CUMACEA

PART 3

FAMILIES LAMPROPIDAE AND CERATOCUMATIDAE

By

JENNIFER DAY

Cape Town Kaapstad

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SOUTHERN AFRICAN CUMACEA
PART 3
FAMILIES LAMPROPIDAE AND CERATOCUMATIDAE

By

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Zoology Department, University of Cape Town

(With 16 figures and 1 table)

[*MS. accepted 20 June 1978*]

ABSTRACT

The Lampropidae in southern Africa are represented by eleven species in five genera. Seven species are new: *Platysympus camelus*, *P. depressus*, *P. compressus*, *P. phylloides*, *Paralamprops margidens*, *Hemilamprops glabrus* and *Hemilamprops* sp. *Hemilamprops pellucidus* and *Bathylamprops calmani* are redescribed and new figures are given. Adult males of *Paralamprops* (formerly *Platytyphlops*) *peringueyi* and *Stenotyphlops spinulosus* are described and figured for the first time. The generic diagnosis of *Paralamprops* is altered to accommodate information obtained from adult males of *P. peringueyi*, while the genus *Platytyphlops* is invalidated.

Keys are given to the genera of the Lampropidae, the southern African members of the family, the world species of *Paralamprops*, *Platysympus*, *Bathylamprops*, and *Ceratocuma*, and to the species of *Hemilamprops* from the southern hemisphere.

The general distribution of lampropids is discussed and a more detailed account given of the southern African representatives. It is concluded that lampropids are bipolar in distribution, preferring deep and/or cold waters and avoiding the tropics. No member of the family is found at depths of less than 188 m in these waters.

The only southern African member of the Ceratocumatidae, *Ceratocuma horridum*, is redescribed and refigured and is considered to belong to a local subspecies, *C. horridum australe*, which is polymorphic. The ceratocumatids are too poorly known to generalize effectively about their distribution, but they all appear to be deep-water, essentially Atlantic forms. None has been found at depths of less than 196 m or further from the Atlantic than the south-east coast of South Africa and Kerguelen.

CONTENTS

Ann. S. Afr. Mus. **76** (3), 1978: 137–189, 16 figs, 1 table.

INTRODUCTION

This is the third in a series of papers on the Cumacea (Crustacea) of southern Africa. The first two deal with the family Bodotriidae (subfamily Vaunthompsoniinae (Day 1975), subfamily Bodotriinae (Day 1978)). The reader is referred to the first of these for a discussion of the morphology and terminology of the group as a whole.

Since the Lampropidae are essentially cold-loving forms, the only species occurring in these waters are found at depths greater than 188 m where temperatures are uniform and generally low (less than 12°C in these latitudes). Only four species have previously been described from the southern African region: *Hemilamprops pellucidus* Zimmer, 1908, *Platytyphlops peringueyi* Stebbing, 1912, and *Stenotyphlops spinulosus* Stebbing, 1912, from southern Africa and *Bathylamprops natalensis* Jones, 1969, from the South-western Indian Ocean. The other species previously known from the African continent is *Bathylamprops calmani* Zimmer, 1908, from deep waters off equatorial east Africa. A further six species are described here, bringing the total number of named species for southern Africa to ten. There is a further species (probably of *Hemilamprops*), but all the individuals are too badly damaged to allow adequate description.

The Ceratocumatidae, a family known until recently (Jones 1969) from a single species, appear to occur only in waters deeper than 196 m. One of the two findings of the type species, *Ceratocuma horridum* Calman, 1904, was recorded by Stebbing (1912) from Natal. Further individuals are now available but they are morphologically variable and until more material is forthcoming it will not be possible to say with certainty whether all individuals belong to Calman's species.

MATERIAL AND STATION DATA

The vast bulk of the material available to the author was provided by the South African Museum (SAM). Part of it was obtained by the S.S. *Pieter Faure* in 1898–1907 from deep waters round the coast of South Africa, and the remainder was collected aboard the R.V. *Meiring Naude* in 1976–1977 during a survey conducted by the Museum in deep waters off the east coast of South Africa. A few of the samples come from the deepest stations of transects conducted by the Zoology Department of the University of Cape Town (UCT) aboard the University's Research Vessel, the R.V. *Thomas B. Davie*, off Still Bay and Lambert's Bay.

Depth records for some of the *Pieter Faure* stations are approximate and have been estimated from charts. Newly available information on depths off the Cape Peninsula shows that the depth for SAM–A10602 is about 800 m, rather than 400 m as previously estimated.

Figure 1 shows the positions at which lampropids and ceratocumatids were found. The code letters used are as follows:

South African Museum SAM: *Pieter Faure* samples
SM: *Meiring Naudé* samples

Zoology Department, University of Cape Town
LBT: transect at Lambert's Bay, 200 km north of Cape Town
SST: transect at Still Bay, 270 km east of Cape Town
WCD: benthic survey off the western Cape Province

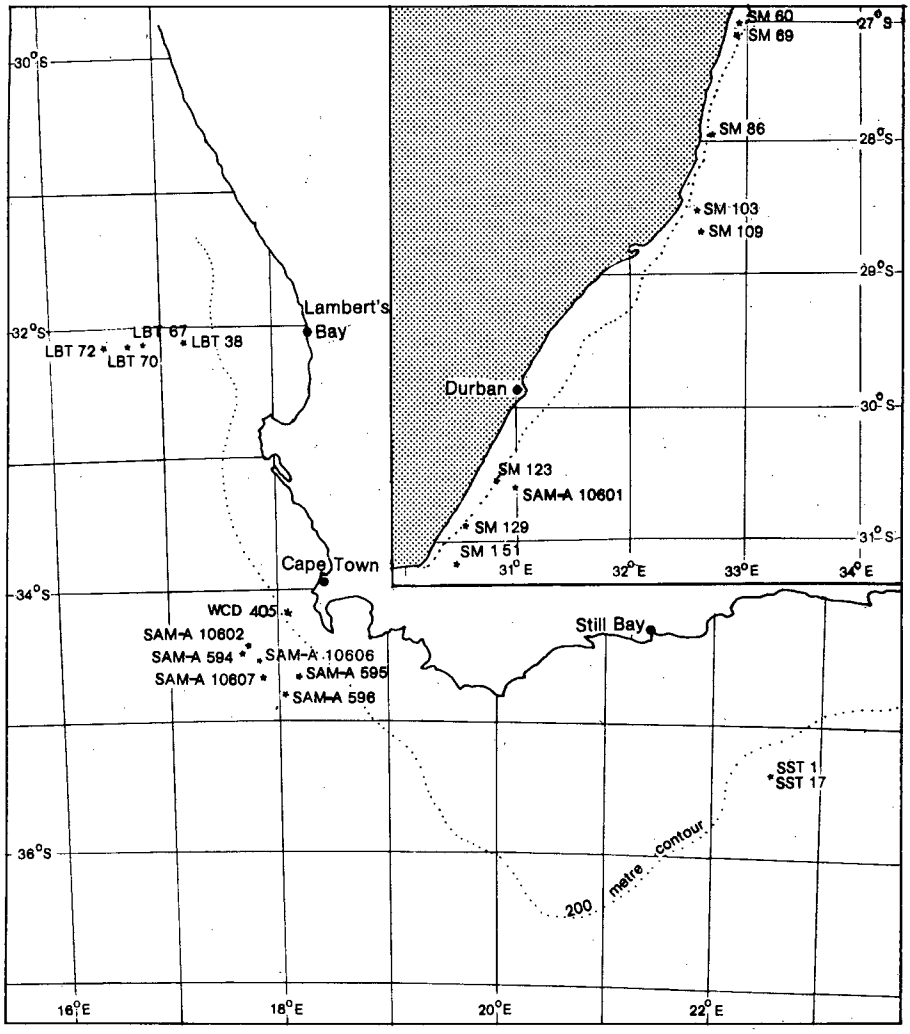

Fig. 1. Coastline of the Cape Province showing positions of stations at which lampropids and ceratocumatids were collected. Inset: coastline of Natal.

Dotted line indicates 200 m depth contour. See text for explanation of code letters.

METHODS

Collections: a variety of gear was used for sampling: dredges in the *Pieter Faure* and *Meiring Naude* programmes, and Van Veen grabs and Cape Town dredges in the *Thomas B. Davie* programmes.

Length measurements were made from the anterior tip of the carapace to the posterior tip of the telson. Exhalant siphons and uropods were excluded in every case.

KEY TO THE SOUTHERN AFRICAN LAMPROPIDAE AND CERATOCUMATIDAE

It should be noted that this key is designed to assist in the identification even of damaged animals and those of varying ages in which the sex may be difficult to determine. For this reason it should always be used in conjunction with the generic keys for final identification.

1 Telson small, semicircular, lacking apical spines (may be deflected over anal valves) (Fig. 15B); carapace sculptured into numerous rounded (Fig. 15A) or digitiform (Fig. 16A) processes ..... *Ceratocuma horridum australe* (Figs 15 & 16)
– Telson large, elongate, with at least three apical spines (Fig. 2I); sculpturing variable but not as above 2
2 Carapace rounded, more or less circular in cross-section, totally devoid of marginal or lateral carinae or longitudinal ridges on posterior half at least (Fig. 11A)..... 3
– Carapace dorsoventrally flattened anteriorly at least, marginal or lateral carinae or longitudinal ridges present on most or all of carapace (Figs. 2A, 4A)..... 6
3 Carapace with irregular transverse rows of minute denticles; pseudorostrum almost one-fifth total length of carapace..... *Bathylamprops calmani* (Fig. 10)
– Carapace without transverse rows of denticles; pseudorostrum distinctly less than one-fifth total length of carapace (Fig. 11A) 4
4 Pseudorostrum truncate anteriorly with short, poorly defined ventrolateral carinae; telson with five spines apically and none laterally..... *Hemilamprops glabrus* (Fig. 13)
– Pseudorostrum pointed anteriorly, without lateral carinae (Fig. 11A); telson with three apical and at least five pairs of lateral spines 5
5 Anterolateral corner of carapace with several long, slender spines; telson less than half length of peduncle of uropod..... *Hemilamprops* sp. (Fig. 14)
– Anterolateral corner of carapace smooth or minutely denticulate; telson at least two-thirds length of peduncle of uropod..... *Hemilamprops pellucidus* (Figs 11 & 12)
6 Carapace extraordinarily flat and leaf-like, almost as wide as abdomen is long..... *Platysympus phylloides* (Fig. 6)
– Carapace rounded or flattened but not leaf-like, not nearly as wide as abdomen is long (Fig. 8A) 7
7 Carapace and body with a number of longitudinal ridges formed by rows of small denticles; carapace almost rectangular in dorsal outline; fifth pereiopod reduced to two segments *Stenotyphlops spinulosus* (Figs 2 & 3)
– Carapace with a single sharp marginal carina; square or oval in dorsal outline; fifth pereiopod consisting of at least four segments..... 8
8 Abdomen twice as long as cephalothorax; carapace almost square in dorsal view..... *Paralamprops peringueyi* (Fig. 4)
– Abdomen subequal in length to cephalothorax; carapace oval in dorsal view (Fig. 7B)....9
9 Marginal carina of carapace strongly dentate; exopod present on pereiopod 2 of female *Paralamprops margidens* (Fig. 5)
– Marginal carina of carapace not dentate (Fig. 6A, C); exopod absent from pereiopod 2 of female 10

10 Carapace smoothly oval or with a few small, rounded projections; not laterally compressed dorsal to marginal carina; middorsal carina hardly evident..... *Platysympus depressus* (Fig. 7)
– Carapace smooth, laterally compressed dorsal to marginal carina (Fig. 8A); middorsal carina evident (Fig. 8B).....11
11 Dorsal edge of carapace smoothly arched; pseudorostrum pointed anteriorly in lateral view *Platysympus compressus* (Fig. 8)
– Dorsal edge of carapace sinusoidal; pseudorostrum dorsoventrally truncate anteriorly in lateral view.....*Platysympus camelus* (Fig. 9)

Family **Lampropidae** Sars, 1878

Diagnosis

Antenna 1 with flagellum well developed. Antenna 2 of male with short segments, of female with at least three segments. Mandibles of normal (boat) shape. Palp of maxilla 1 absent or bearing one or two filaments. Exopods present on maxilliped 3 and pereiopod 1 in both sexes and on pereiopods 2 to 4 in male. Exopods present on pereiopod 2 and rudimentary on pereiopods 3 and 4, or absent from all three, in female. Pleopods in male 0 to 3 pairs, with an outer process to the inner ramus. Telson moderate to large, well developed post-anally, with three to five apical spines.

Type genus

Lamprops Sars, 1863.

Remarks

The presence of a well-developed telson with at least three apical spines together with the well-developed first antenna is characteristic of the family.

Earlier workers tended to distinguish a greater number of families than are now accepted. The families Chalarostylidae, Paralampropidae, Platysympodidae, Pseudodiastylidae and Lampropidae of Stebbing (1913) are now all included in the larger family Lampropidae.

The family is well defined and consists at present of ten genera, five of which are represented in the present collection. One of these (*Stenotyphlops* Stebbing, 1912) is known only from southern Africa.

A problematic feature of the taxonomy of the family is the fact that, being deep-water forms for the most part, relatively few species are known and many of these are represented by only one sex. Since the major distinction between some genera (notably *Lamprops*, *Mesolamprops* and *Hemilamprops*) is the number of pairs of pleopods present in adult males (zero, two and three pairs respectively), females and juveniles cannot always be placed in a genus with any certainty. This in turn makes it difficult to construct a useful key to the genera. In the key below, an attempt has been made to use characters other than those found only in adult males, but these are not very clear-cut. The geographic distribution of the species of *Lamprops*, however, shows that it is essentially a shallow-water genus confined to high latitudes of the Northern hemisphere. The distribution of *Hemilamprops*, on the other hand, is much wider and its species

tend to occur in deeper waters. Thus there is little doubt that the species from deep water in the Southern hemisphere for which only females are known—*H. lotusae* Băcescu, 1969, *H. ultimaespei* Zimmer, 1921, *H. glabra* sp. nov. and *Hemilamprops* sp.—are, indeed, members of the genus *Hemilamprops*. The single specimen of *Lamprops? comata* Zimmer, 1907, from Tierra del Fuego is a fragmentary female, so that its systematic position must remain indeterminate for the present.

The presence in the collection of adult males of both *Stenotyphlops* and *Platytyphlops* with three pairs of pleopods throws some light on the relationship between these genera and closely allied ones. Details of the findings are presented in the discussion of *Paralamprops* on page 147.

The genera of the family as a whole are morphologically unremarkable for the most part, but for the fact that in several cases the carapace is very strongly flattened dorsoventrally, with a single, sharp lateral carina encircling the entire carapace apart from the posterior edge (and here called a *marginal carina* to distinguish it from the more usual lateral carinae found widely in several families). The reason for this adaptation is not clear, but since all the species exhibiting this character are deep-water forms, it may have evolved as a means of increasing the surface area to prevent sinking into the oozy mud of the seafloor.

A singular genus, described by Băcescu (1972), is *Archaeocuma*. It is monotypic and known only from the Peruvian Trench. It is distinguished by the presence in both sexes of a single pair of pleopods. In all other characters it is typically lampropid.

KEY TO THE GENERA OF LAMPROPIDAE

All males have three pairs of pleopods unless otherwise stated.

1 Antenna 1 with third segment no longer than second and accessory flagellum minute; telson and peduncle of uropods more than four times length of telsonic somite ..... *Pseudodiastylis* Calman, 1905
– Antenna 1 with third segment no longer than second and accessory flagellum well developed *or* with third segment elongate and accessory flagellum very small; telson and peduncle of uropod no more than four times length of telsonic somite.....2
2 Telson small, subequal in length to telsonic somite and a third length of peduncle of uropod (female unknown).....*Chalarostylis* Norman, 1879
– Telson distinctly longer than telsonic and at least half length of peduncle of uropod.....3
3 Pereiopod 5 reduced to a minute, 2-segmented projection; a single filament on palp of maxilla 1.....*Stenotyphlops* Stebbing, 1912
– Pereiopod 5 normal, or if reduced, at least 4-segmented; palp of maxilla 1 absent or with two filaments.....4
4 Basis of pereiopod 4 longer than entire length of pereiopod 5.....5
– Basis of periopod 4 subequal to, or shorter than, entire length of pereiopod 5.....6
5 Basis of maxilliped 3 much shorter than remaining segments together; male and female both with one pair of pleopods.....*Archaeocuma* Băcescu, 1972
– Basis of maxilliped 3 not shorter than remaining segments together; male with three pairs of pleopods and female with none.....*Paralamprops* Sars, 1887
6 Maxilla 1 lacking palp; exopods absent from pereiopods 2–4 in female; carapace with strong marginal carina.....*Platysympus* Stebbing, 1912

– Palp of maxilla 1 with two filaments; exopods normal on pereiopod 2 and rudimentary on pereiopods 3 and 4 in female; number of pairs of pleopods in male 0, 2 or 3; carapace without marginal carina 7
7 Pseudorostrum at least a fifth of total length of carapace; third segment of antenna 1 longer and considerably more slender than second ..... *Bathylamprops* Zimmer, 1908
– Pseudorostrum distinctly less than a fifth total length of carapace; third segment of antenna 1 not much longer or much more slender than second 8
8 Male without pleopods; antennal notch small but distinct; eye present; basis of pereiopod 1 approximately equal in length to rest of limb ..... *Lamprops* Sars, 1863
– Male with two pairs of pleopods; antennal notch present or absent; eye present or absent; basis of pereiopod 1 shorter than rest of limb ..... *Mesolamprops* Given, 1964
– Male with three pairs of pleopods; antennal notch usually absent; eye present or absent; basis of pereiopod 1 distinctly shorter than rest of limb ..... *Hemilamprops* Sars, 1883

Stenotyphlops Stebbing, 1912

Generic diagnosis

Carapace not strongly flattened. Eye absent. Both flagella of antenna 1 well developed. Palp of maxilla 1 with one filament. Exopods of pereiopods 3 and 4 of female rudimentary. Pereiopod 5 reduced to a minute, 2-segmented projection. Male with three pairs of pleopods.

Type species

S. spinulosus Stebbing, 1912 (by monotypy).

Remarks

The genus is monotypic and the single species is known only from southern Africa. The combined presence of a single filament on the palp of maxilla 1 and the greatly reduced fifth pereiopod is diagnostic. The adult male described below is the first known for the genus. The presence of three pairs of pleopods confirms *Stenotyphlops* as typically lampropid, while the extreme reduction of the fifth pereiopod and the nature of maxilla 1 clearly separate it from the other genera in the family. In general morphology it is otherwise very close to *Paralamprops*.

Distribution of Stenotyphlops

Deep water off southern Africa.

Stenotyphlops spinulosus Stebbing, 1912

Figs 2–3

S. spinulosus Stebbing, 1912: 162–163, pl. 60.

Records

SAM–A10602 (PF 17440)	34°25′S 17°45′E	800 m	1 ♂: 10,5 mm; 3 ♀♀: 11,2 mm and damaged; 4 juvs
SAM–A10607 (PF 16982)	34°40′S 17°50′E	1 200 m	1 adult ♂: 13,8 mm; 1 damaged adult ♀
SM 60	27°09′S 32°58′E	800 m	1 damaged ♂
SM 103	28°32′S 32°34′E	680 m	1 damaged ♂; 1 ovig. ♀: 12,5 mm
SM 123	30°33′S 30°48′E	690 m	2 ♀♀: 7,0 mm and damaged
SM 129	30°53′S 30°32′E	850 m	1 ♂: 9,6 mm; 1 ♀: 9,9 mm

Previous records

Holotype only.

Holotype

Adult female, deposited by Stebbing in the British Museum (Natural History). Type locality: approximately 370–550 m, off the Cape Peninsula (34°25′S 17°50′E).

Description

Ovigerous female, length 12,5 mm (SM 103). Integument slightly translucent, armed with very small denticles. Carapace (Fig. 2A) slightly flattened anteriorly and inflated posteriorly with three longitudinal rows of denticles on either side and two on the anterior sinus. Middorsal carina evident anteriorly

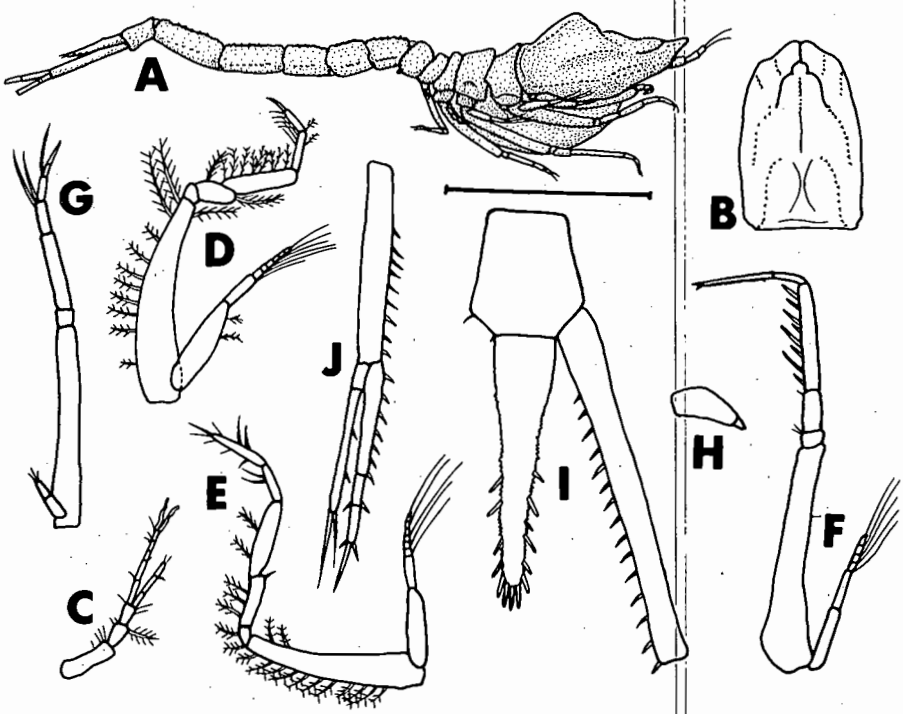

Fig. 2. *Stenotyphlops spinulosus*

Ovigerous female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Telson and peduncle of uropod.

Young female. J. Uropod.

Scale line = 4 mm for A–B; 2 mm for C–G; 1 mm for I–J; 0,5 mm for H.

(Fig. 2B) behind eyelobe, minutely denticulate. Eyelobe eyeless. Carapace inflated posterodorsally on either side of middorsal depression. First three thoracic somites flanged laterally. Abdominal somites cylindrical. Cephalothorax and abdomen subequal in length.

Antenna 1 (Fig. 2C) of moderate size; first segment subequal in length to next two together. Both flagella well developed.

Palp of maxilla 1 with a single filament.

Maxilliped 3 (Fig. 2D) fairly stout, basis subequal in length to rest of limb. Carpus long and parallel-sided, propodus and dactyl slender.

Pereiopod 1 (Fig. 2E) not elongate, basis subequal in length to next four segments together. Ischium small, merus and carpus elongate. Propodus and dactyl cylindrical.

Pereiopod 2 (Fig. 2F) elongate. Basis subcylindrical, carpus long and stout, armed with a row of spines on inner edge. Exopod small and slender.

Pereiopods 3 (Fig. 2G) and 4 similar. Basis subequal in length to rest of limb, merus longest of remaining segments. Dactyl minute. Exopod very small, 2-segmented.

Pereiopod 5 (Fig. 2H) reduced to a minute, 2-segmented stump.

Telson (Fig. 2I) distinctly wider proximally than distally, about three-quarters of length of peduncle or uropod, distally armed with five to six pairs of spines laterally and three single spines terminally. Rami of uropod damaged in adult female. Peduncle of uropod of young female (Fig. 2J) subequal in length to endopod. First segment of exopod much shorter than second. First segment of endopod nearly twice length of second and third together. Endopod longer than exopod by one segment.

Adult male, length 13,8 mm (SAM–A10607). As female, except as follows: carapace (Fig. 3A) less flattened anteriorly and less inflated posteriorly. Ridges on carapace more distinct, not always denticulate. Lateral flanges of thoracic somites scalloped (Fig. 3B).

First segment of flagellum of antenna 1 (Fig. 3C) bearing numerous short aesthetascs. Antenna 2 reaching about half way along length of body. Palp of maxilla 1 (Fig. 3D) illustrated. Segments distal to basis of maxilliped 3 and pereiopod 1 missing. Exopod of pereiopod 2 larger. Pereiopod 3 (Fig. 3E) stouter, dactyl minute and apparently continuous with small terminal spine. Pereiopod 5 (Fig. 3G) longer, but still 2-segmented. Three pairs of normal pleopods present.

Telson (Fig. 3F) shorter, about half length of peduncle of uropod. Armature of peduncle and proximal part of endopod of uropod more extensive. Distal portions missing.

Remarks

No adult males have previously been described. The differences between the female described here and Stebbing's holotype are slight, and the differences between adult male and adult female are within the limits expected between

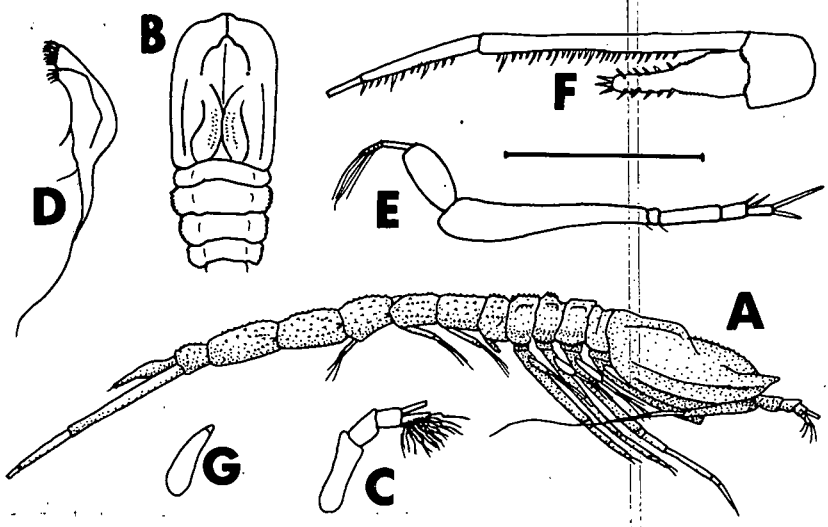

Fig. 3. *Stenotyphlops spinulosus*
Adult male. A. Lateral view. B. Dorsal view of cephalothorax. C. Antenna 1. D. Maxilla 1. E. Pereiopod 3. F. Uropod and telson. G. Pereiopod 5.
Scale line = 4 mm for A–B; 2 mm for C, E–F; 1 mm for D, G.

sexes. Stebbing figures his female with a slightly narrower carapace and a larger first segment of antenna 1. The flagellum of his female has four segments and the present one five. The greatest difference is in the telson: Stebbing figures it as being not very much longer than the telsonic somite and little more than half the length of the peduncle of the uropod. The telsons of both male and female figured here are twice the length of the telsonic somite and in the female is nearly as long as the peduncle of the uropod. In the male the peduncle is much longer, nearly twice as long as the telson. However these differences may simply be due to individual variation since the lengths of the peduncle and telson vary somewhat among the individuals available at present. Apart from this, they agree well with Stebbing's figures and there is little doubt that they belong to the same species.

Distribution

From Cape Point (about 500 to 1 200 m) to Natal (680 to 850 m).

Paralamprops Sars, 1887

Generic diagnosis

Carapace slightly or strongly depressed dorsoventrally with a marginal carina or at least one pair of lateral carinae. Antenna 1 with both flagella well developed. Palp of maxilla 1 absent or with two filaments. Exopods of pereiopods 3 and 4 of female rudimentary or absent. Pereiopod 5 small to

rudimentary, no longer than basis of pereiopod 4. Male with three pairs of pleopods. Telson well developed.

Type species

Paralamprops serratocostata Sars, 1887.

Remarks

The genus has consisted up to now of seven species: *P. serratocostata* Sars, 1887, *P. orbicularis* Calman, 1904, *P. aspera* Zimmer, 1907, *P. semiornata* Fage, 1928, *P. grimaldi* Fage, 1928, *P. arafurensis* Jones, 1969, and *P. rossi* Jones, 1971. The genus *Platytyphlops* was established by Stebbing (1912) on the basis of several specimens including a fragmentary ovigerous female and at least one young male. He decided that the male was probably mature and therefore characterized the genus as having no pleopods in the male and a greatly reduced fifth pereiopod in both sexes. One fully adult and several subadult males of the same species are now available, however, and possess three pairs of normal pleopods. They should thus be placed in *Paralamprops*. It also turns out that the reduction of the fifth pereiopod is less evident in the adult male than in immature males or adult females in *P. peringueyi* and that, in fact, the limb is reduced to some extent in all species of *Paralamprops*. But the degree of reduction varies considerably, reaching its limit in *P. peringueyi*. Thus the generic diagnosis of *Paralamprops* has been slightly altered accordingly.

The genus is morphologically rather variable. The first maxilla in *P. serratocosta* and *P. margidens* sp. nov. lacks a palp while in *P. orbicularis*, *P. semiornata*, *P. grimaldi* and *P. peringueyi* there is a normal palp with two filaments. In these last four species and in *P. rossi* the carapace is very strongly flattened with a single, sharp marginal carina forming a wide, flat, flange encircling the entire carapace apart from the extreme posterior edge. The first maxilla is not described for *P. rossi*, *P. aspera* or *P. arafurensis*, all of which are known from single specimens which would have been badly damaged by dissection of the anterior mouthparts. In *P. serratocostata*, which lacks a maxillary palp, the carapace is not strongly flattened dorsoventrally but, in common with *P. arafurensis* and *P. aspera*, does possess a number of longitudinal ridges. *P. margidens* also lacks a maxillary palp, but the carapace is somewhat flattened and bears a single dentate marginal carina, thus being intermediate between the two types described above.

Calman (1912) was of the opinion that the absence of a palp on maxilla 1 was 'so important and unexpected that it might justify the creation of a new genus'. The present author agrees that this character is of considerable significance and suggests that in the future *Paralamprops* may well be split into two genera on the combined characters of the first maxilla and the carapace. However, as Jones (pers. comm.) has pointed out, the practical difficulty of examining the maxilla in rare species and the lack of information on the adults of many of the species under discussion, precludes the splitting of the genus at present.

Stenotyphlops, distinguished by a single filament on the palp of maxilla 1, a greatly reduced fifth pereiopod and several longitudinal ridges on the carapace, is very close to *Paralamprops*, as is *Archaeocuma*, which is distinguished by a single pair of pleopods. The most closely allied genus of all is *Hemilamprops*. In fact, it is difficult to find a really satisfactory set of characters to distinguish *Hemilamprops* from some members of *Paralamprops*, other than the roundness of the carapace and shortness of the abdomen in *Hemilamprops*, and the fact that there is little or no reduction of the fifth pereiopod in this genus. However, these characters are easily distinguishable and seem to be uniform. In order to avoid making *Hemilamprops* unwieldy and even more diverse than it is at present, the two genera must be kept apart for convenience' sake.

Hemilamprops mawsoni Hale, 1937, which was not a satisfactory member of that genus, can, however, now be placed in *Paralamprops*, where it is very similar to *P. rossi*. This brings the total number of species of *Paralamprops* to ten.

Distribution of Paralamprops

Known at depths from 232 to 3 789 m in the Atlantic, Antarctic and East Indies.

KEY TO THE SPECIES OF *PARALAMPROPS*

1 Carapace with a single, sharp marginal carina 2
– Carapace with at least three pairs of lateral and/or dorsolateral carinae 8
2 Carapace no more elevated posteriorly than anteriorly 3
– Carapace more elevated posteriorly than anteriorly 4
3 Telson little longer than telsonic somite; second and third segments of antenna 1 subequal in length; ischium of pereiopod 1 about as wide as long
P. orbicularis Calman, 1904—N. Atlantic
– Telson more than twice length of telsonic somite; third segment of antenna 1 half length of second; ischium of pereiopod 1 much wider than long
P. semiornata Fage, 1928—W. Portugal
4 Telson nearly equal in length to last two somites together 5
– Telson about half length of last two somites together 7
5 Marginal carina strongly dentate ..... *P. margidens* sp. nov.
– Marginal carina smooth 6
6 Minute exopods on pereiopods 3 and 4 of female; carapace not transversely ridged in middorsal gutter; pseudorostrum pointed anteriorly in dorsal view
P. mawsoni (Hale, 1937)—Antarctic
– No exopods on pereiopods 3 and 4 of female; carapace lightly ridged transversely in middorsal gutter; pseudorostrum rounded anteriorly in dorsal view
P. rossi Jones, 1971—Ross Sea
7 Fifth pereiopod 5-segmented (female) or 6-segmented (male), much less than half length of pereiopod 4; basis of pereiopod 2 shorter than rest of limb .....
P. peringueyi (Stebbing, 1912)—South Africa
– Fifth pereiopod 7-segmented, as long as basis of pereiopod 4; basis of pereiopod 2 longer than rest of limb ..... *P. grimaldi* Fage, 1928—Azores
8 Middorsal carina not serrate; telson little narrower posteriorly than anteriorly with five spines transversely across apex ..... *P. arafurensis* Jones, 1969—East Indies
– Middorsal carina serrate; telson distinctly narrower posteriorly than anteriorly with three apical spines 9
9 Telson no more than twice length of telsonic somite .....
P. serratocostata Sars, 1887—Kerguelen
– Telson three times length of telsonic somite ..... *P. aspera* Zimmer, 1907—Antarctic

Paralamprops peringueyi (Stebbing, 1912)

Fig. 4

Platytyphlops peringueyi Stebbing, 1912: 159–161, pls 58–59.

Records

SAM–A596	(PF 17585)	34°48′S 18°03′E	369–554 m	3 ♀♀: 9,3 mm, 9,9 mm, damaged (paratypes)
SAM–A10602	(PF 17440)	34°25′S 17°45′E	800 m	1 adult ♂: 14,7 mm; 1 damaged subadult ♂; 3 ♂♂: 7,7–10,6 mm; 3 ♀♀: 8,0–16,0 mm; 2 damaged juvs
SAM–A10606	(PF 16769)	34°37′S 17°50′E	1 394 m	1 ovig. ♀: 14,7 mm

Previous records

Type locality only.

Holotype

Not designated: syntypes include ovigerous female and young males from two samples (PF 17585 and PF 17643), deposited in the British Museum (Natural History). Type locality: between 370 and 550 m, off Cape Point (34°48′S 18°03′E).

Description

Adult male, length 14,7 mm (SAM–A10602). Integument with minute triangular denticles. Sides of carapace strongly depressed (Fig. 4A), marginal carina very evident; median part of carapace compressed laterally, slightly more elevated posteriorly than anteriorly. Middorsal line defined anteriorly by extremely well-developed carina and posteriorly by a narrow gutter flanked by a pair of flattened dorsal elevations, denticulate on their anterior edges and bent outwards slightly (Fig. 4B). Eyelobe small, eyeless, flanked by flattened, upturned, lateral extensions of pseudorostral lobes. Carapace slightly longer than wide.

First pedigerous somite exposed dorsally only; second to fourth slightly flanged laterally, fifth cylindrical. Cephalothorax more than three-quarters length of cylindrical abdomen.

Antenna 1 (Fig. 4C) fairly large; first segment longer than next two together. Flagellum elongate, 4-segmented. Accessory flagellum 5-segmented with numerous short aesthetascs on basal segment.

Palp of maxilla 1 with two filaments.

Maxilliped 3 (Fig. 4D) short, leg-like. Merus slightly expanded, carpus and propodus cylindrical, subequal in length.

Basis of pereiopod 1 (Fig. 4E) stout, ischium slightly expanded. Carpus slightly longer than ischium and merus together. Part of propodus and dactyl missing. Exopod large and stout, basal segment almost circular.

Basis of pereiopod 2 (Fig. 4F) fairly short, carpus longer than ischium and

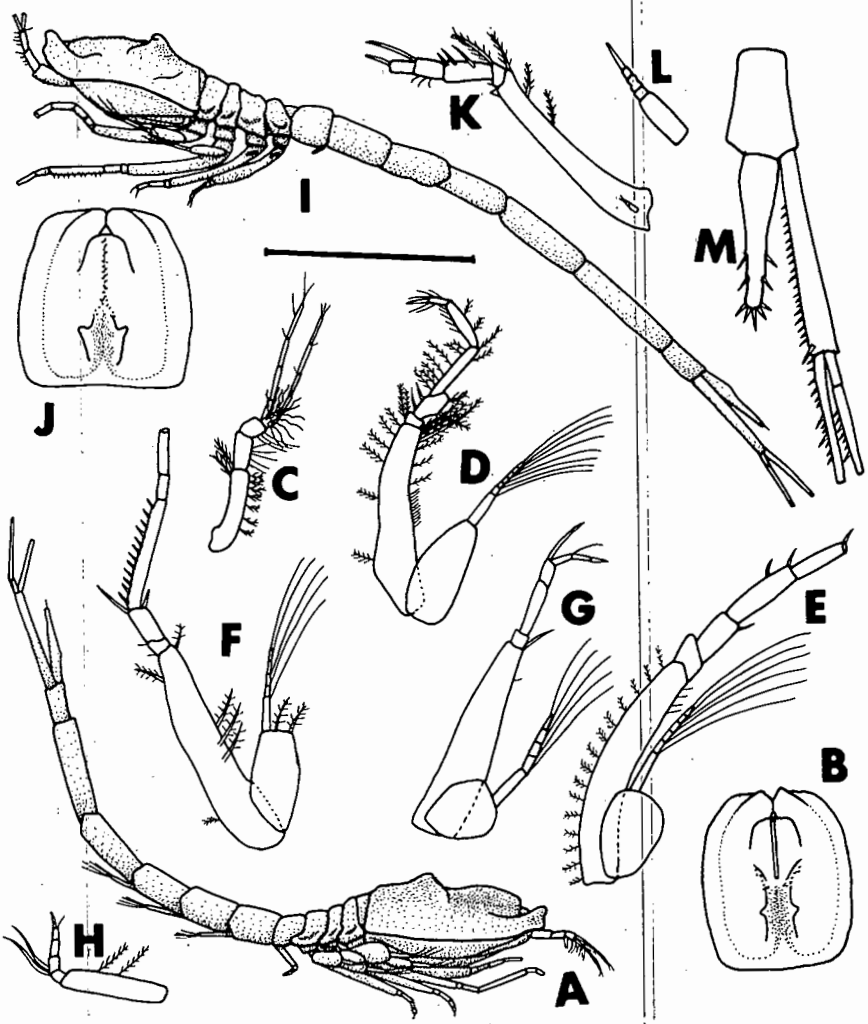

Fig. 4. *Paralamprops peringueyi*
Adult male. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5.
Adult female. I. Lateral view. J. Dorsal view of carapace. K. Pereiopod 3. L. Pereiopod 5. M. Uropod and telson.
Scale line = 4 mm for A–B, I–J; 2 mm for C–H, K, M; 0,5 mm for L.

merus together, armed with a row of sharp spines. Dactyl incomplete. Exopod large.

Pereiopods 3 (Fig. 4G) and 4 similar, basis very large in comparison with rest of limb, of which merus is longest.

Pereiopod 5 (Fig. 4H) very small, 6-segmented. All segments distal to basis subequal in length. Entire limb less than half length of basis of pereiopod 4.

Three pairs of pleopods present.

Uropods and telson as in female (Fig. 4M) except that telson has three pairs of lateral spines, not two.

Adult female, length 16,0 mm (SAM–A10602). As male, except as follows: posterodorsal elevations of carapace narrower and curling over laterally (Fig. 4I). Middorsal carina much less well developed, minutely denticulate. Carapace almost as wide as long (Fig. 4J). First pedigerous somite visible laterally as well as dorsally.

Antenna 1 with third segment slightly longer, first segment of flagellum without aesthetascs. Second antenna 4-segmented. Exopod of pereiopod 2 smaller. Basis of pereiopods 3 (Fig. 4K) and 4 relatively smaller, distal segments larger and stouter; exopods minute. Pereiopods 5 (Fig. 4L) minute, 5-segmented, with a stout terminal spine.

Telsonic somite (Fig. 4M) nearly twice as long as broad, two-thirds length of telson. Telson with two pairs of lateral spines and five terminally. Peduncle of uropod slightly longer than telson with numerous small spines on inner edge. Rami of uropods incomplete.

Remarks

The adult male has not previously been described but corresponds well with the female in most respects. The female differs slightly from that described by Stebbing (1912), mainly because his was considerably smaller and less mature. In particular the carapace is square, not rounded, in dorsal view and the carpus and propodus of maxilliped 3 are smaller in the present specimens. The exopods of the thoracic limbs of Stebbing's male are smaller, again because it is immature. Nevertheless these characters are of little specific significance and there is no doubt that all individuals belong to the same species. It should be noted that there is some individual variation in the degree to which the median part of the carapace is elevated, particularly in some of the younger individuals.

P. peringueyi is characterized by the very great reduction of the fifth pereiopod, particularly in the female. It is most similar to *P. grimaldi*, from which it may be distinguished by this character.

Distribution

Only known off the Cape Peninsula from about 369 to 1 394 m.

Paralamprops margidens sp. nov.

Fig. 5

Records

SAM–A595	(PF 15785)	34°39′S 18°10′E	500 m	1 ♀: 6,1 mm
SAM–A10602	(PF 17440)	34°25′S 17°45′E	800 m	2 ♀♀: 6,1 mm (holotype + 1); 3 ♂♂: 5,8–6,1 mm

Holotype

Young female, in the South African Museum, SAM–A15721, collected by the S.S. *Pieter Faure* in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25'S 17°45'E).

Description

Young female, holotype, length 6,1 mm. Integument lightly calcified, reticulate on body and very slightly denticulate on some limbs. Carapace (Fig. 5A) slightly wider than deep, nearly twice as long as deep, somewhat depressed immediately behind eyelobe. Marginal carina strongly dentate. Middorsal carina shallow, serrate anteriorly. Branchial regions somewhat inflated. No anterolateral angle (Fig. 5B). Pseudorostral lobes short in dorsal view (Fig. 5C). Eyelobe triangular, eyeless.

First three pedigerous somites denticulate laterally. Abdominal somites subcylindrical. Cephalothorax subequal in length to abdomen.

Antenna 1 as in male (Fig. 5N), but third segment slightly longer and flagellum 4-segmented. Accessory flagellum damaged in all females.

Antenna 2 (Fig. 5D) of moderate size, 4-segmented, with the last two segments relatively long.

Maxilla 1 (Fig. 5E) with no sign of palp.

Maxilliped 3 (Fig. 5F) leg-like, basis subequal in length to rest of limb. Ischium small, merus slightly expanded on outer edge with two large terminal spines. Carpus inserting subterminally on merus, subequal in length to last two segments together. Exopod well developed.

Pereiopod 1 (Fig. 5G) very long, basis half length of rest of limb. Merus and carpus subequal in length, propodus almost as long as merus and carpus together, dactyl slightly shorter with several terminal spines. Exopod well developed.

Pereiopod 2 (Fig. 5H) long and slender. Basis subequal in length to next four segments together. Carpus stout with six large spines on lower edge. Last two segments slender. Only basal segment of exopod present.

Pereiopods 3 (Fig. 5I) and 4 similar, basis of pereiopod 4 relatively shorter. Basis of pereiopod 3 very slender, more than twice length of rest of limb. Exopod very small, 2-segmented.

Pereiopod 5 (Fig. 5J) hardly more than half length of basis of pereiopod 4.

Telsonic somite (Fig. 5K) wider than long, little more than a third length of telson. Telson tapering evenly from base, armed with five pairs of short spines laterally and three longer ones terminally. Peduncle of uropod slightly longer than telson. Exopod reaching end of second segment of endopod. Endopod 3-segmented, first armed with fine setae on inner edge.

Subadult male, paratype, length 6,1 mm. As female, except as follows: carapace (Fig. 5L) somewhat shallower, denticles slightly larger. No depression behind eyelobe. Middorsal serrations (Fig. 5M) larger and extending further back. Third and fourth pedigerous somites denticulate dorsally.

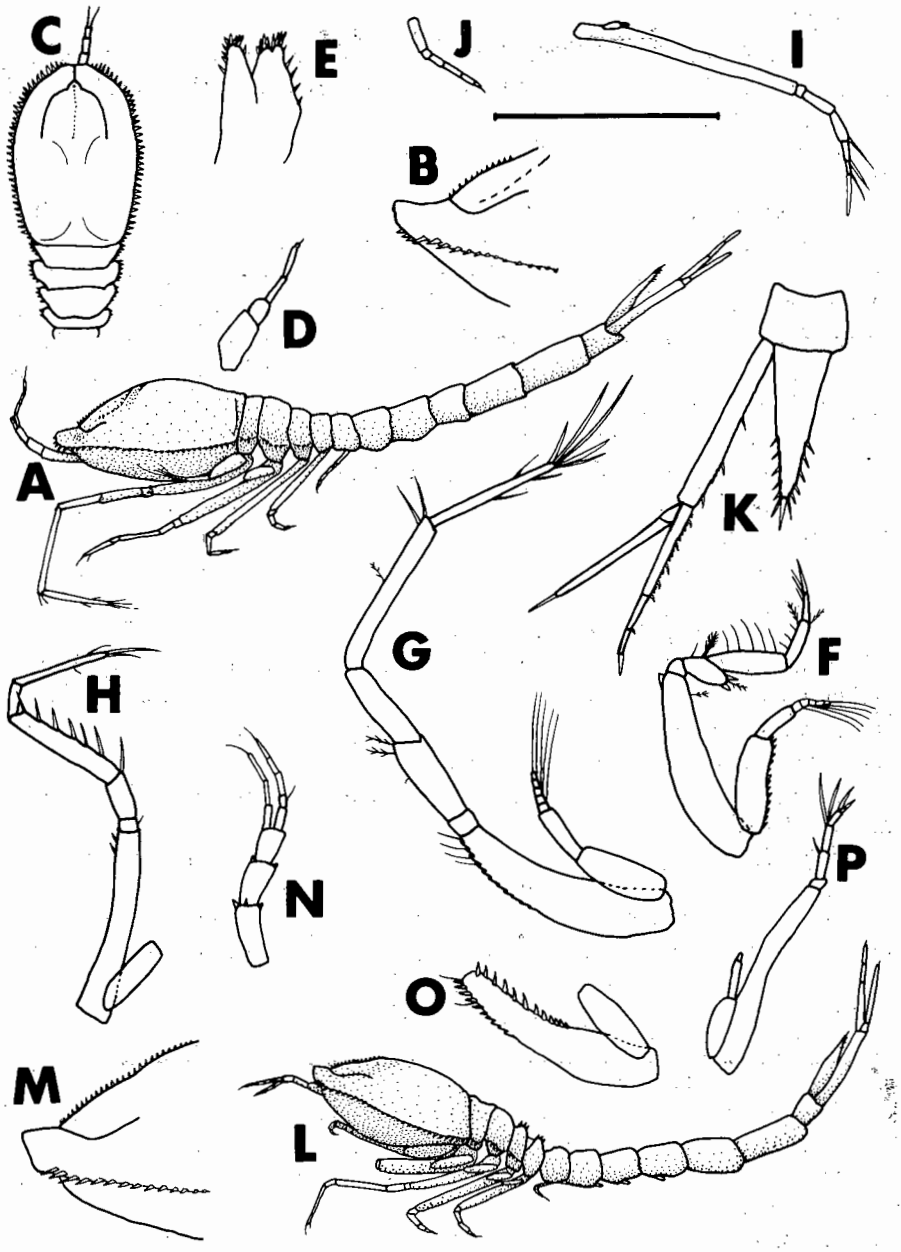

Fig. 5. *Paralamprops margidens* sp. nov.
Adult female, holotype. A. Lateral view. B. Detail of anterior end of carapace. C. Dorsal view of carapace. D. Antenna 2. E. Maxilla 1. F. Maxilliped 3. G. Pereiopod 1. H. Pereiopod 2. I. Pereiopod 3. J. Pereiopod 5. K. Uropod and telson.
Subadult male, paratype. L. Lateral view. M. Detail of anterior end of carapace. N. Antenna 1. O. Basis of pereiopod 1. P. Pereiopod 3.
Scale line = 2 mm for A, C, L; 1 mm for B, F–K, M, O–P; 0,5 mm for D–E, N.

Each segment of antenna 1 (Fig. 5N) slightly longer than succeeding one; flagellum 5-segmented, accessory flagellum 3-segmented. Basis of pereiopod 1 (Fig. 5O) strongly dentate. Distal segments of exopods missing from pereiopods 1 and 2. Bases of pereiopods 3 (Fig. 5P) and 4 shorter and stouter, exopods 3-segmented. Basis of pereiopod 5 slightly longer. Armature of uropods reduced (but possibly lost due to age).

Remarks

Lacking a palp on maxilla 1, *P. margidens* falls within the *serratocostata–aspera–arafurensis* group of *Paralamprops*. It is easily distinguished from these and from the South African *P. peringueyi* by the denticulate marginal carina.

Distribution

Known only from about 500 to 800 m off the Cape Peninsula.

Platysympus Stebbing, 1912

Platyaspis Sars, 1869: 158 (preoccupied name).

Generic diagnosis

Carapace strongly flattened dorsoventrally with strong marginal carina. Both flagella of antenna 1 well developed. Maxilla 1 without palp. Pereiopods 2 to 4 of female without exopods. Male with three pairs of pleopods. Telson well developed.

Type species

Platyaspis typicus Sars, 1869.

Remarks

The genus is well-defined and easily recognizable due to the very characteristic flattened carapace with a strong marginal carina. The absence of exopods on pereiopods 2 to 4 in the female is unique in the family although in other genera they may occasionally be absent from pereiopods 3 and 4. The presence of four new species in southern African waters brings the total number for the genus to seven.

Distribution of Platysympus

Europe from 226 to 1 100 m; North Atlantic from 219 to 957 m; Antarctic at 385 m; South Africa from 188 to 1 200 m.

KEY TO THE SPECIES OF *PLATYSYMPUS*

1 Carapace with three longitudinal ridges dorsal to marginal carina.....
P. tricarinatus Hansen, 1920—N. Atlantic

– Carapace with middorsal and marginal carinae forming only major longitudinal ridges....2

2 Pereiopod 5 half length of pereiopod 4; female with rudimentary exopods on pereiopod 2
*P. brachyurus** Zimmer, 1907—Antarctic

– Pereiopod 5 more than half length of pereiopod 4; pereiopod 2 of female without exopod..3

3 Carapace remarkably flattened and leaf-like: almost circular in dorsal view and wider than abdomen is long.....*P. phylloides*, sp. nov.
– Carapace flattened but not leaf-like: longer than wide in dorsal view and considerably narrower than abdomen is long..... 4
4 Dorsal outline of carapace undulating sinusoidally, forming two evenly-spaced elevations; bases of pereiopods 1 and 2 with flattened, scale-like edges.....*P. camelus* sp. nov.
– Dorsal outline of carapace smooth or with several low, unevenly-distributed tumidities; bases of pereiopods 1 and 2 without flattened, scale-like edges.....5
5 Dorsal third of carapace strongly compressed laterally, forming a very deep middorsal carina; basis of pereiopod 5 less than half length of rest of limb....*P. compressus* sp. nov.
– Dorsal third of carapace not strongly compressed laterally, middorsal carina negligible or incorporating much less than a third of its depth; basis of pereiopod 5 more than half length of rest of limb.....6
6 Middorsal carina distinct over whole length of carapace; carapace of female smooth; merus, carpus and propodus of pereiopod 1 wide and flattened....*P. typicus* (Sars, 1869)—Europe
– Middorsal carina of carapace only evident posteriorly; carapace of female with several tumidities and depressions; merus, carpus and propodus of pereiopod 1 not wide or flattened *P. depressus* sp. nov.

**P. brachyurus* is known only from one incomplete female individual. Some characteristics suggest that when further material is available the species will be found to fit better in *Paralamprops*.

Platysympus phylloides sp. nov.

Fig. 6

Records

SAM–A10607 (PF 16982)	34°40′S 17°50′E	1 200 m	1 adult ♀: 7,2 mm (holotype); 1 damaged ♀
SM 129	30°54′S 30°51′E	850 m	2 ovig. ♀♀: 7,4 and 7,7 mm (both damaged)

Holotype

Adult female, in the South African Museum, SAM–A15682, collected by the *Pieter Faure* in about 1900. Type locality: approximately 1 200 m, off the Cape Peninsula (34°40′S 17°50′E).

Description

Adult female, holotype, length 7,2 mm. Integument very delicate and translucent. Carapace (Fig. 6A) remarkably flat and leaf-like, almost circular in dorsal view (Fig. 6B) with middorsal carina faintly evident anteriorly. Eyelobe small, rounded and eyeless. Carapace flattened and paper-thin at edges forming an almost transparent wide flange extending round entire edge except where attached to abdomen. Posterolaterally, extensions of this carina form flaps overlapping third pedigerous somite on each side and leaving a gap on either side of second somite. All cephalothoracic appendages except fifth pereiopod entirely covered by carapace (Fig. 6C); bases of maxilliped 3 and pereiopod 1 pointing forward and attached underneath carapace by a thin membrane, being thus quite immobilized.

All five pedigerous somites free, last four wider than deep. Carapace wider than abdomen is long. Cephalothorax about half as long again as cylindrical abdomen.

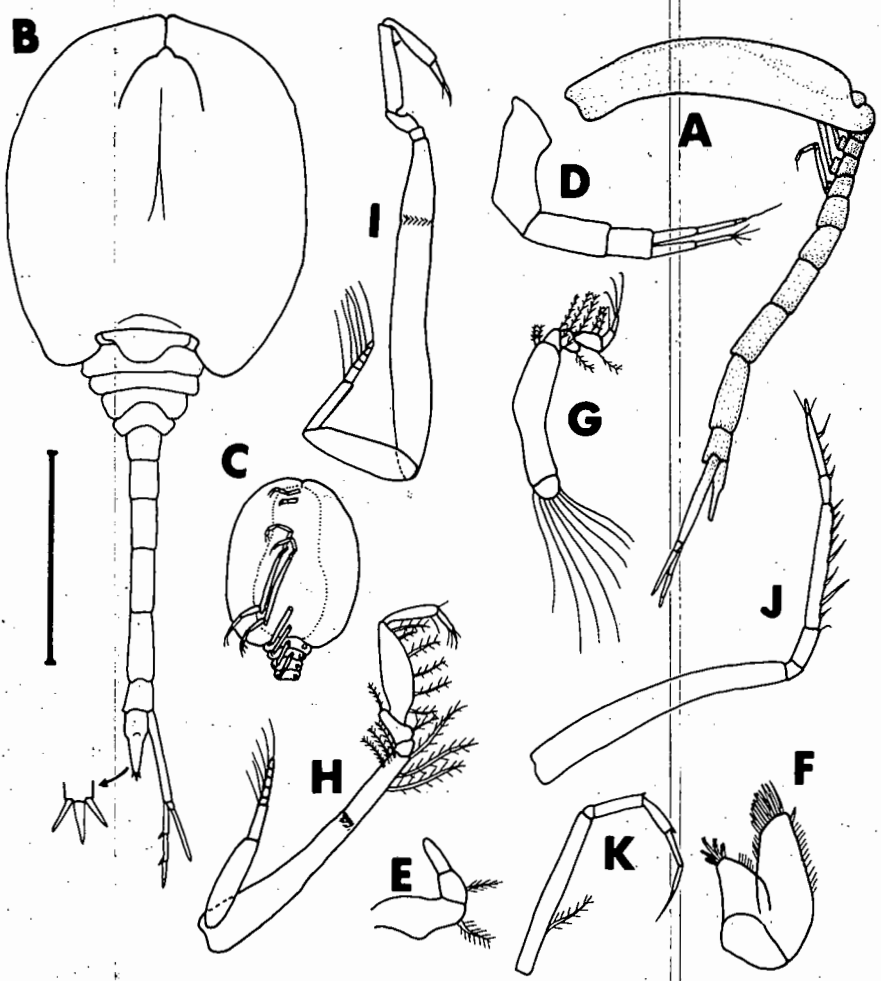

Fig. 6. *Platysympus phylloides* sp. nov.
Adult female, holotype. A. Lateral view. B. Dorsal view. C. Ventral view of cephalothorax. D. Antenna 1. E. Antenna 2. F. Maxilla 1. G. Maxilliped 2. H. Maxilliped 3. I. Pereiopod 1. J. Pereiopod 2. K. Pereiopod 3.
Scale line = 4 mm for C; 2 mm for A–B; 1 mm for G–K; 0,5 mm for D–F.

Antenna 1 (Fig. 6D) small, first segment subequal in length to next two together. Both flagella short but well developed, main flagellum 3- and accessory flagellum 2-segmented.

Antenna 2 (Fig. 6E) reasonably large, 3-segmented.

Maxilla 1 (Fig. 6F) without palp.

Maxilliped 2 (Fig. 6G—from ovigerous female, not holotype) with distal segments short. Oostegal setae long and numerous.

Basis of maxilliped 3 (Fig. 6H) very flexible but immobile, being attached

to the ventral surface of the carapace. Exopod normal but setae very small and poorly setulose. Ischium small; merus slightly expanded; carpus large and stout; propodus and dactyl slender.

Basis and exopod of pereiopod 1 (Fig. 6I) as in maxilliped 3. Ischium small. Carpus elongate, subequal in length to propodus and dactyl together.

Pereiopod 2 (Fig. 6J) lacking exopod. Basis slender, subequal in length to rest of limb. Carpus long and well armed.

Pereiopods 3 (Fig. 6K) to 5 all similar, lacking exopods. Limbs slender, basis subequal in length to rest of limb; merus, carpus and propodus subequal in length.

Telson (Fig. 6B) twice length of telsonic somite, armed with only three small apical spines. Peduncle of uropod subequal in length to last somite and telson together, unarmed. Exopod unarmed, about two-thirds length of endopod. Each segment of endopod armed with a single small spine distally on inner edge.

Males have not been found.

Remarks

In the absence of male individuals it is not possible to state with certainty that this species belongs to *Platysympus*. It is certainly quite distinctive in the nature of the carapace, but apart from this, the appendages are very similar to other members of the genus. It may be that this is merely the ultimate condition in a genus in which the carapace is always flattened, and that the peculiarities of its morphology are necessary to overcome problems associated with a greatly flattened carapace. For example, the exopods, on those limbs which have them, are reduced and it is difficult to see that they would be of any use if they were present. Pleopods would seem to be unimportant as a means of locomotion in such a flattened animal and it may prove that none are present even in the adult male. If this should be so, then the species will have to be placed in a separate genus.

The peculiar attachment of the third maxilliped and first pereiopod to the floor of the carapace is presumably also an adaptation to the overhanging carapace, as is the presence of the inhalent aperture on either side of the second pedigerous somite.

Distribution

Cape Point at 1 200 m and Natal at 850 m.

Platysympus depressus sp. nov.

Fig. 7

Records

SAM–A10602 (PF 17440)	34°25′S 17°45′E	800 m	1 adult ♂: 5,8 mm (holotype); 2 subadult ♂♂: 5,4 mm; 2 young ♂♂: 4,5 mm, 4,8 mm; 3 ovig. ♀♀: 5,8–6,4 mm; 6 ♀♀: 5,1–6,4 mm

SM 86	27°59′S 32°40′E	550 m	1 subadult ♂: 5,4 mm
SM 103	28°31′S 32°34′E	680 m	1 adult ♂: 7,0 mm; 1 damaged ♀
SM 129	30°54′S 30°31′E	850 m	1 young ♂, 2 ♀♀, all damaged
LBT 38J	32°07′S 16°31′E	440 m	1 ♂: 4,8 mm

Holotype

Adult male, in the South African Museum, SAM-A15683, collected by the *Pieter Faure* in about 1900. Type locality: 800 m, off the Cape Peninsula (34°25′S 17°45′E).

Description

Adult male, holotype, length 5,8 mm. Integument fairly thin and translucent without obvious denticles or reticulations. Carapace (Fig. 7A) dorsoventrally depressed with a single marginal carina around entire periphery except posteriorly. Dorsal outline low and smoothly arched. Middorsal carina faintly evident posteriorly only (Fig. 7B). Eyelobe small, eyeless. Pseudorostral lobes short and expanded laterally.

All five pedigerous somites visible, first four slightly flanged laterally. Abdominal somites cylindrical, together slightly shorter than cephalothorax.

Antenna 1 (Fig. 7C) fairly large. Flagellum 4-segmented, first bearing numerous short aesthetascs. Accessory flagellum 3-segmented.

Antenna 2 (Fig. 7D) fairly short, reaching beyond posterior edge of carapace. Segments short and poorly setose.

Maxilla 1 without palp.

Maxilliped 3 (Fig. 7E) fairly short. Basis unexpanded distally, subequal in length to rest of limb. Merus slightly expanded, carpus large. Propodus and dactyl slender.

Basis of pereiopod 1 (Fig. 7F) longer than rest of limb. Ischium as wide as long, next three segments subequal in length.

Pereiopod 2 (Fig. 7G) slender, carpus longer than propodus and dactyl together, armed with four stout spines.

Pereiopods 3 (Fig. 7H) and 4 similar. Basis slightly shorter than rest of limb in pereiopod 3 and slightly longer in pereiopod 4. Exopods present. Distal segments of pereiopod 5 missing.

Three pairs of normal pleopods present.

Uropods and telson as in female: parts of uropods missing from holotype.

Adult female, paratype, length 6.4 mm. As male, except as follows: carapace (Fig. 7J) with a number of slight swellings and depressions, slightly more elevated dorsally; middorsal carina better defined. No wider anteriorly than posteriorly in dorsal view. First pedigerous somite wider and third narrower.

Distal segments of flagella of antenna 1 missing. Antenna 2 (Fig. 7K) 4-segmented. Distal segments of pereiopod 1 flatter and wider. Pereiopods 2 to 4 without exopods. Pereiopod 2 much more slender, carpus longer; bases of pereiopods 3 and 4 longer and slightly thinner. Pereiopod 5 (Fig. 7I) very

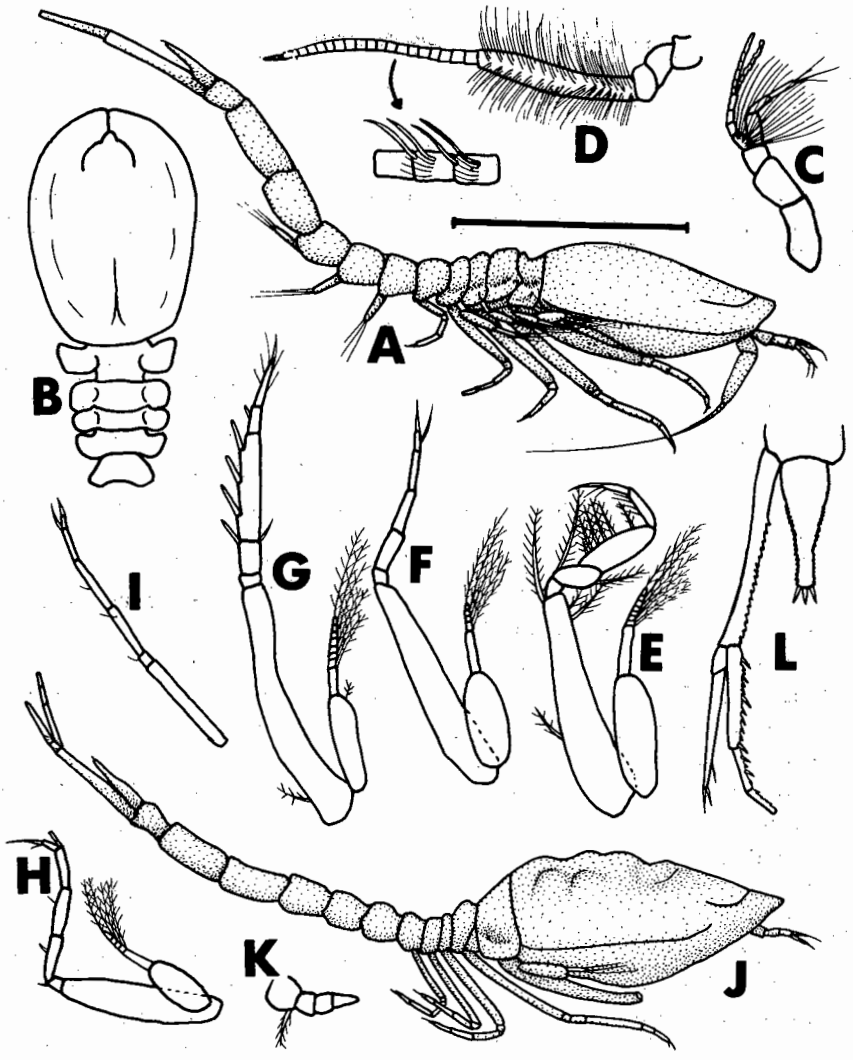

Fig. 7. *Platysympus depressus* sp. nov.
Adult male, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Pereiopod 5. Adult female, paratype. J. Lateral view. K. Antenna 2. L. Uropod and telson. Scale line = 2 mm for A–B, J; 1 mm for C–I, K–L.

slender, basis equal in length to next three segments together; merus and carpus subequal in length.

Telson (Fig. 7L) nearly twice length of preceding somite, wider proximally than distally and serrated on edges; armed only with three small spines apically. Peduncle of uropod longer than telson, subequal in length to endopod, serrated

on inner edge. Second segment of exopod with three slender distal spines. First segment of endopod longer than next two together.

Remarks

P. depressus is most similar to *P. typicus* (Sars, 1869) and *P. compressus* sp. nov. It may be distinguished from both in that it lacks a middorsal carina on the carapace and from *P. compressus* by the latter being laterally rather than dorsoventrally compressed, lacking low protuberances on the carapace of the female and having a larger first antenna in the male. *P. depressus* differs from *P. typicus* mainly in the shape of the carapace: the dorsal and marginal carinae are better defined and the female lacks low protuberances on the carapace in *P. typicus*. Also in this species the first antennae are smaller, the distal segments of pereiopod 1 are flattened and the second pereiopod is more slender with a longer dactyl.

Distribution

From Lambert's Bay to northern Natal at depths from 440 to 850 m.

Platysympus compressus sp. nov.

Fig. 8

Records

SAM–A10601 (PF 12605)	30°33′S 30°58′E	805 m	1 subadult ♂: 4,8 mm
SM 60	27°09′S 32°58′E	800 m	1 adult ♂: 5,5 mm (holotype); 3 ♂♂: 5,8–6,1 mm; 3 ovig. ♀♀: 5,8–6,1 mm

Holotype

Adult male, in the South African Museum, SAM–A15681, collected by the *Meiring Naude*, 19 May 1976. Type locality: 800 m, off northern Natal (27°09′S 32°50′E).

Description

Adult male, holotype, length 5,5 mm. Integument smooth without reticulations or denticles. Carapace (Fig. 8A) smooth with marginal carina as in *P. depressus*, dorsoventrally depressed for the most part but the dorsal third strongly compressed laterally, forming a very distinct, narrow middorsal carina. Pseudorostral lobes narrowed anteriorly in lateral view, rounded and fairly short in dorsal view (Fig. 8B). Eyelobe small, rounded and eyeless.

All pedigerous somites exposed, all of similar length. Abdominal somites subcylindrical, together shorter than cephalothorax.

Antenna 1 (Fig. 8C) large, first two segments slightly serrated. Second segment much wider distally than proximally, wider than long. Third segment short and subconical. Accessory flagellum missing. First segment of flagellum with numerous short aesthetascs, last three short and subequal in length.

Maxilla 1 without palp. Maxilliped 3 and pereiopods 1 and 2 represented by bases only.

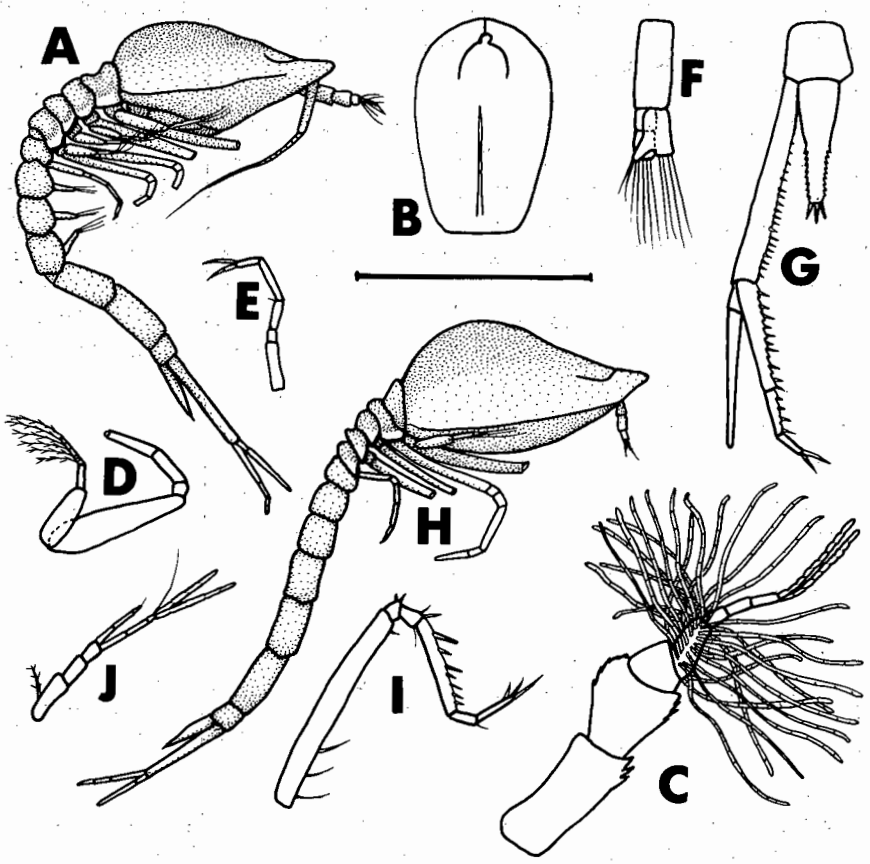

Fig. 8. *Platysympus compressus* sp. nov.
Adult male, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Pereiopod 3. E. Pereiopod 5. F. Pleopod 2. G. Uropod and telson.
Ovigerous female, paratype. H. Lateral view. I. Pereiopod 2. J. Antenna 1.
Scale line = 2 mm for A–B, H; 1 mm for D–E, G, I–J; 0,5 mm for C, F.

Pereiopods 3 (Fig. 8D) and 4 similar, last two segments of each missing. Basis stout, ischium short, merus and carpus subequal in length. Exopods moderately large.

Pereiopod 5 (Fig. 8E) short and slender.

Three pairs of pleopods present. (Fig. 8F)

Last abdominal somite as wide as long, less than half length of preceding one. Telson (Fig. 8G) slightly more than half length of peduncle of uropod, serrated distally on lateral edges and with three small sharp spines apically. Peduncle of uropod fairly stout, subequal in length to endopod with numerous small sharp spines distally on inner edge. Exopod slightly longer than first

two segments of endopod, unarmed. First segment of endopod longer than next two together with several small spines on inner edge. Second segment longer than third.

Ovigerous female, paratype, length 6,1 mm. As male, except as follows: carapace (Fig. 8H) slightly deeper, pseudorostral lobes less narrowed in lateral view. Pedigerous somites shorter, abdominal somites together subequal in length to cephalothorax. Marsupium small.

Antenna 1 small, segments not expanded. Flagella both 2-segmented. Pereiopod 2 slender, without exopod; carpus longer than last two segments together. Segments distal to basis missing from maxilliped 3 and pereiopods 1, 3 and 4. Pereiopods 3 and 4 without exopods. Telson relatively longer—two-thirds as long as peduncle of uropod—but otherwise as in male.

Remarks

Although the appendages of none of the individuals are complete, the carapace is distinctively different from that of the other species in the genus. The lateral compression of the dorsal part of the carapace is characteristic, as is the large, wide first antenna in the male.

Distribution

Known only from depths between 800 and 810 m off northern Natal.

Platysympus camelus sp. nov.

Fig. 9

Records

SM 86	27°59′S 32°40′E	550 m	1 adult ♂: 6,8 mm (holotype); 3 ovig. ♀♀: 6,1–6,8 mm
WCD 450D	34°11′S 18°05′E	188 m	1 subadult ♂: 3,9 mm; 1 ♀: 4,8 mm; 1 damaged ovig. ♀
SST 1K	35°22′S 22°31′E	200 m	1 ♀: 3,9 mm
SST 17N	35°22′S 22°31′E	200 m	1 damaged adult ♂; 1 subadult ♂: 4,1 mm; 4 ♀♀: 4,1 mm

Holotype

Adult male, in the South African Museum, SAM–A15684, collected by the *Meiring Naude*, 22 May 1976. Type locality: 550 m, off northern Natal (27°59′S 32°40′E).

Description

Adult male, holotype, length 6,8 mm. Integument smooth, slightly translucent. Carapace (Fig. 9A) strongly dorsoventrally depressed at edges; slightly compressed laterally in midline forming distinct dorsal carina undulating in lateral view due to two rounded elevations, one middorsally and one posterodorsally. Marginal carina strong, forming a flattened flange around entire carapace except posteriorly. Eyelobe (Fig. 9B) small, rounded and eyeless. All

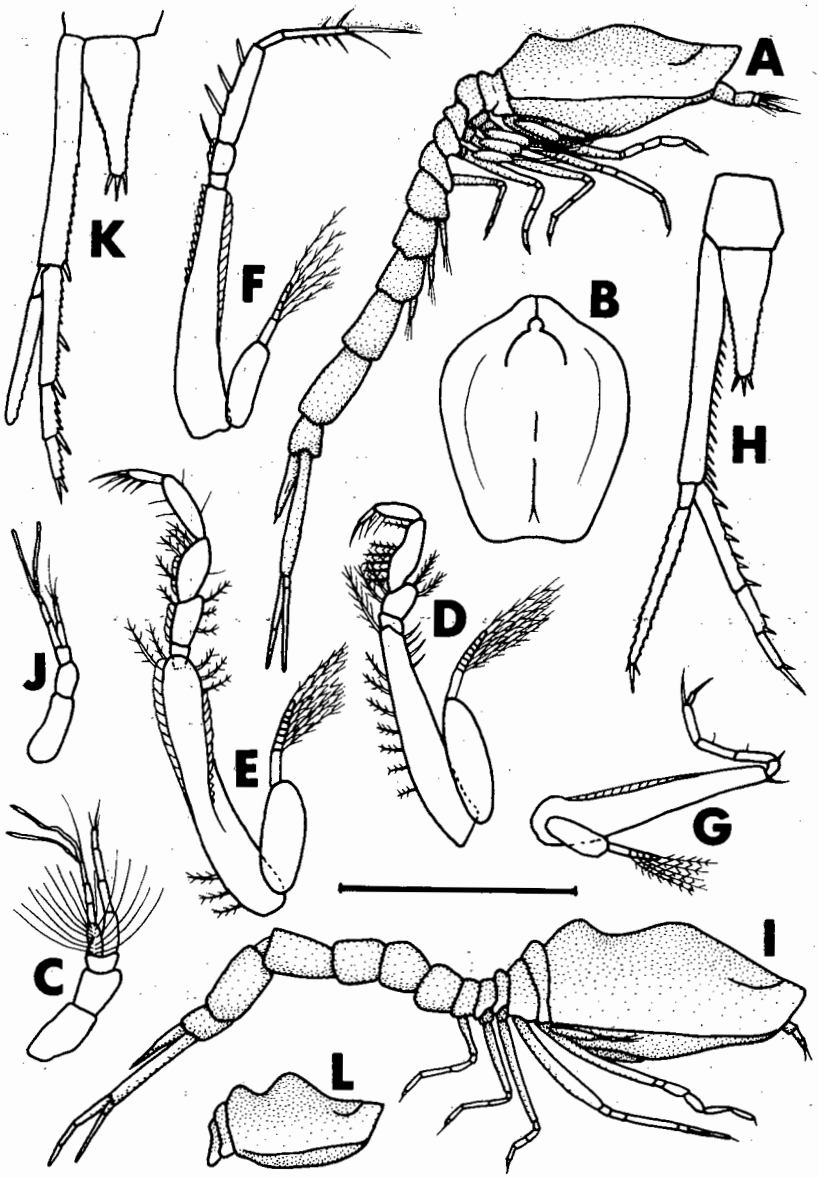

Fig. 9. *Platysympus camelus* sp. nov.

Adult male, holotype. A. Lateral view. B Dorsal view of carapace C. Antenna 1. D. Maxilliped 3. E. Pereiopod 1. F. Pereiopod 2. G. Pereiopod 3. H. Uropod and telson.
Ovigerous female, paratype. I. Lateral view. J. Antenna 1. K. Uropod and telson.
Juvenile. L. Lateral view of carapace.

Scale line = 2 mm for A–B, I, L; 1 mm for C–H, J–K.

pedigerous somites visible, of approximately equal length. Abdominal somites fairly large, rounded, together subequal in length to cephalothorax.

Antenna 1 (Fig. 9C) fairly large and stout; third segment wider than long. Both flagella 4-segmented, first segment of main flagellum surrounded by numerous short aesthetascs.

Maxilliped 3 (Fig. 9D) short and fairly stout. Basis longer than rest of limb, ischium wider than long. Carpus longer than ischium and merus together.

Bases of pereiopods 1 to 4 flattened, edges expanded by means of flat, transparent scales fusing to form flanges. Basis of pereiopod 1 (Fig. 9E) slightly longer than rest of limb, both inner and outer edges flanged distally. Ischium small, merus and carpus subequal in length, both flanged on inner edge; propodus slightly longer, dactyl short and cylindrical.

Basis of pereiopod 2 (Fig. 9F) flanged distally on both edges. Ischium half length of merus, together about half length of carpus. Propodus and dactyl short and cylindrical.

Pereiopods 3 (Fig. 9G) and 4 similar, inner edges flanged. Basis distinctly longer and stouter than rest of limb, of which merus, carpus and propodus are subequal in length and cylindrical.

Basis of pereiopod 5 about half length of basis of pereiopod 4, distal segments the same.

Three pairs of pleopods present.

Telsonic somite as wide as long, less than half length of telson. Telson (Fig. 9H) tapering evenly from base, little more than half length of peduncle of uropod, serrated distally on both edges and with three small apical spines. Peduncle of uropod with several small sharp spines distally on inner edge. First segment of exopod unarmed, second slightly serrated on both edges with three small terminal spines. First segment of endopod slightly longer than subequal second and third segments together.

Ovigerous female, *paratype*, length 6,8 mm. As male, except as follows: carapace (Fig. 9I) relatively larger, undulations of dorsal surface more marked. Pedigerous somites shorter, the first deeper. Carapace almost round in dorsal view. First segment of antenna 1 (Fig. 9J) larger, third narrower. Both flagella with three segments. Merus of maxilliped 3 longer and thinner, carpus stouter. Distal segments of pereiopod 1 less flattened, edges not flanged, together slightly longer relative to basis. Pereiopods 2 to 4 without exopods. Basis of pereiopod 2 more slender, remaining segments longer and thinner. Bases of pereiopods 3 and 4 more slender. Uropod slightly shorter and stouter, inner edges of peduncle and rami serrated and with fewer spines.

Remarks

The peculiar flanged edges of the bases of pereiopods 1 to 4 and the undulating dorsal edge of the carapace clearly distinguish this species from the others in the genus. It should be noted that this undulation is most marked in juveniles

(Fig. 9L) and least evident in adult males, although these are none the less easy to distinguish.

The flanges on the pereiopods are occasionally found in members of other families of Cumacea (e.g. *Ceratocuma horridum*, Fig. 16D). The functional significance of this feature is uncertain. It may be to increase the surface area (for digging?) with the smallest possible increase in weight.

Distribution

Northern Natal to the Cape Peninsula at depths from 188 to 550 m.

Bathylamprops Zimmer, 1908

Generic diagnosis

Carapace not flattened. Pseudorostral lobes large and acutely produced. Eye absent. First and third segments of antenna 1 elongate, accessory flagellum minute. Palp of maxilla 1 with two filaments. Pereiopods 3 and 4 of female with small exopods. Male with three pairs of pleopods. Telson large and well developed.

Type species

Bathylamprops calmani, Zimmer, 1908.

Remarks

The genus consists of three closely allied deep-water species, *B. calmani* Zimmer, 1908, and *B. natalensis* Jones, 1969, both of which are known only from the east coast of Africa, and *B. motasi* Băcescu & Muradian, 1976, found off Florida. The genus is clearly recognized by the greater development of the pseudorostrum than is usual in the family, and the large first antenna with the minute accessory flagellum. It undoubtedly has close links with *Hemilamprops*, which it resembles in general morphology.

Distribution of Bathylamprops

Deep waters between 1 300 and 3 800 m off the east coasts of Africa and the United States.

KEY TO THE SPECIES OF *BATHYLAMPROPS*

1 Telson more than three times length of telsonic somite; carapace with numerous low, denticulate transverse ridges.....*B. calmani* Zimmer, 1908—east and south-east Africa
– Telson no more than two and a half times length of telsonic somite; carapace minutely denticulate or smooth but without ridges.....2
2 Basis of maxilliped 3 twice length of remaining segments together, carpus no wider than merus; exopod of uropod shorter than telson; uropodal rami subequal in length.....
B. natalensis Jones, 1969—Natal
– Basis of maxilliped 3 little longer than remaining segments together, carpus much wider than merus; exopod of uropod longer than telson and longer than endopod.....
B. motasi Băcescu & Muradian, 1976—Florida

Bathylamprops calmani Zimmer, 1908

Fig. 10

B. calmani Zimmer, 1908: 173–175, figs 60–70.

Records

SM 109	28°41′S 32°36′E	1 300 m	1 adult ♀: 15,4 mm

Previous records

Off Dar-es-Salaam, 2 959 m (Zimmer 1908); off Durban, 2 720–3 530 m (Jones 1969).

Holotype

Damaged adult female, deposited by Zimmer in the Berlin Zoologisches Museum. Type locality: 2 959 m, off Dar-es-Salaam (6°12′S 41°17′E).

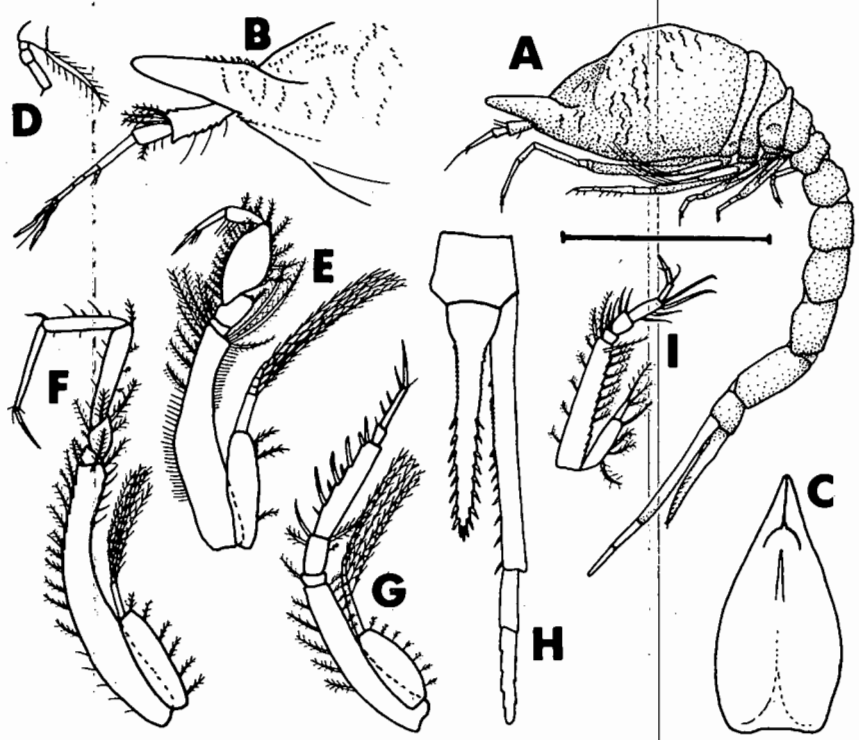

Fig. 10. *Bathylamprops calmani*

Adult female. A. Lateral view. B. Detail of anterior end of carapace. C. Dorsal view of carapace. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Telson and uropod. I. Pereiopod 4.

Scale line = 4 mm for A–B; 2 mm for C–I.

Description

Adult female, length 15,4 mm. Carapace (Fig. 10A) large, strongly vaulted posteriorly and pointed anteriorly. Integument of carapace minutely denticulate (Fig. 10B) forming numerous transverse ridges, particularly anteriorly. Pseudorostral lobes elongate, denticulate immediately in front of eyelobe; denticles also forming an indistinct and very short lateral carina behind the small and indistinct anterolateral angle. Carapace narrow in dorsal view (Fig. 10C), slightly depressed between a pair of large posterolateral expansions. Middorsal carina present for a short distance behind the eyelobe. Eyelobe very small and eyeless. Pseudorostrum about one-fifth of total length of carapace.

All five pedigerous somites short, visible. Cephalothorax slightly longer than abdomen.

Antenna 1 (Fig. 10B) elongate, first segment more than twice length of second, third slightly longer than second. Accessory flagellum minute, 2-segmented. Flagellum elongate, 3-segmented.

Antenna 2 (Fig. 10D) short, 4-segmented. First segment stout, second and third small, fourth elongate (distal tip missing).

Maxilliped 3 (Fig. 10E) very stout. Basis slightly longer than rest of limb; ischium much wider than long; merus short and slightly expanded; carpus very large and expanded; propodus and dactyl small and cylindrical.

Pereiopod 1 (Fig. 10F) elongate, basis longer than rest of limb. Ischium small, merus slightly longer. Carpus, propodus and dactyl cylindrical and elongate.

Pereiopod 2 (Fig. 10G) stout, basis shorter than rest of limb. Ischium small; carpus long with several strong spines; propodus and dactyl small, narrow.

Pereiopods 3 (Fig. 10I) and 4 similar, basis and exopod of pereiopod 4 shorter. Exopod very well developed for a female, 2-segmented.

Pereiopod 5 shorter and more slender than pereiopod 4.

Telsonic somite (Fig. 10H) slightly wider than long. Telson well developed, more than three times as long as telsonic somite; pre-anal part short, distinctly wider proximally; eight pairs of sharp spines distally on lateral edges and three short ones terminally. Peduncle of uropod slightly longer than telson with several small spines on inner edge. Exopod missing. First two segments of endopod present, first unarmed, second very slightly serrated on both edges.

Adult males are unknown.

Remarks

From the shape of maxilliped 3 and the sculpturing of the carapace it is clear that the present specimen belongs to the same species as Zimmer's. However he figures the pseudorostrum of his unique, damaged specimen as being somewhat shorter than that figured here. It is difficult to say if his was distorted due to mutilation or whether the length is variable.

B. calmani is very similar to both *B. natalensis* and *B. motasi*. However,

in both of the latter the carapace lacks transverse rows of denticles, the exopods of pereiopods 3 and 4 are much smaller and the telson is shorter. In *B. natalensis*, too, the carpus of maxilliped 3 is not expanded and the fifth pereiopod is larger.

Distribution

Confined to deep waters off the east coast of Africa from northern Natal to Dar-es-Salaam at depths from 1 300 to 3 530 m.

Hemilamprops Sars, 1883

Generic diagnosis

Carapace not strongly dorsoventrally flattened. Eye present or absent. Pseudorostrum short. Flagella of antenna 1 well developed. Palp of maxilla 1 with two filaments. Exopods on pereiopods 3 and 4 of female rudimentary. Male with three pairs of pleopods. Telson well developed.

Type species

Not designated: Sars included *H. rosea* (Norman, 1863), *H. cristata* (Sars, 1870), *H. uniplicata* (Sars, 1872) and *H. assimilis* Sars, 1883, in his first description of the genus in 1883.

Remarks

Hemilamprops Sars, 1883, *Mesolamprops*, Given, 1964, and *Lamprops* Sars, 1863, are very closely-related genera, differing mainly in the number of pairs of pleopods in the adult male: none in *Lamprops*, two pairs in *Mesolamprops* and three pairs in *Hemilamprops*. This is the only character which invariably separates the species of the three genera but there are some other differences which are usually reliable in distinguishing them. For example, there is a small but usually distinct antennal notch in *Lamprops*; it may be present or absent in *Mesolamprops* and is usually absent in *Hemilamprops*. An eye is present in *Lamprops*, variable in *Mesolamprops* and usually absent from *Hemilamprops*. The proportions of the basis of pereiopod 1 to the rest of the limb are perhaps most reliable. In *Lamprops* the basis is approximately equal in length to the rest; in *Mesolamprops* it is slightly shorter and in *Hemilamprops* it is distinctly shorter. Although this character appears to be constant, it is not always of practical value since the distal segments of the pereiopods are frequently lost or damaged, particularly in deep-water forms. However the combination of the characters mentioned above should allow most individuals to be placed in the correct genus. But it should be stressed that *only* the number of pleopods in the male is genuinely diagnostic.

Distribution

The genus consists of 22 species, widespread in the Arctic, Antarctic, Pacific, Atlantic and Southern Indian Oceans. The depth distribution is also wide, from 8 to 2 725 m.

The species occur in three distinct groups geographically: one group of eight species is found in the North Pacific, another of five species in the North

Atlantic and Arctic and the remaining group of eight species in southern oceans. Three species (two of which are new) in the last group are found in southern African waters.

There are no records for tropical or subtropical waters and no species is found both north and south of the tropics.

KEY TO THE SPECIES OF *HEMILAMPROPS* FROM THE SOUTHERN HEMISPHERE

Since the tropics form a very distinct boundary between Northern and Southern hemisphere species, a key is given only to those species occurring south of 30°S.

1 Carapace somewhat carinate ventrolaterally, more than one and a half times as broad as deep ..... *H. lata* Hale, 1946—Australia
– Carapace not carinate ventrolaterally, less than one and a half times as broad as deep 2
2 Telson longer than peduncle of uropod; carapace robust, subtruncate anteriorly; pseudorostral lobes not meeting anterior to eyelobe ..... *H. diversa* Hale, 1946—Australia
– Telson shorter than peduncle of uropod; carapace delicate and elongate; pseudorostral lobes meeting for some distance anterior to eyelobe 3
3 Telson with ten to twelve pairs of lateral spines; middorsal carina of female finely serrate; carpus of pereiopod 2 long and slender, distinctly more than half length of basis; pseudorostrum pointed anteriorly in lateral view .... *H. pellucidus* Zimmer, 1908—Southern Ocean
– Telson with no more than six pairs of lateral spines; middorsal carina and pseudorostrum variable; carpus of pereiopod 2 less than half length of basis 4
4 Anterior tip of pseudorostrum slightly uptilted; anterolateral edge and middorsal carina bearing long, slender spines; telson less than half length of peduncle of uropod with five pairs of small spines laterally and three long ones terminally ..... *H.* sp.—South Africa
– Anterior tip of pseudorostrum not uptilted; carapace without spines middorsally or laterally (may be denticulate); telson as long or almost as long as peduncle or uropod with zero to six pairs of spines laterally and three to five terminally 5
5 Telson with five long spines terminally and none laterally; carapace fairly broad and truncate anteriorly in dorsal view; basis of maxilliped 3 widely expanded, carpus very large and expanded ..... *H. glabrus* sp. nov.
– Telson with three long spines terminally and one to six pairs laterally; carapace fairly slender and pointed anteriorly in dorsal view; neither basis nor carpus of maxilliped 3 much expanded 6
6 Peduncle of uropod subequal in length to endopod .... *H. lotusae* Băcescu, 1969—Argentine
– Peduncle of uropod subequal in length to exopod 7
7 Telson with six pairs of lateral spines; carapace finely denticulate middorsally .....
H. serrulata Ledoyer, 1977—Kerguelen
– Telson with three pairs of lateral spines; carapace smooth middorsally .....
H. ultimaspei Zimmer, 1921—Tierra del Fuego

Hemilamprops pellucidus Zimmer, 1908

Figs 11–12

H. pellucidus Zimmer, 1908: 172–173, figs 53–59; 1913: 456–457. Stebbing 1912: 144–145, pl. 52. Jones 1963: 52–53, figs 192–201; Jones 1969: 119.

Records

SAM–A594 (PF 17386)		34°27′S 17°42′E	849 m	1 subadult ♂: 7,4 mm; 1 ♀: 8,0 mm
SAM–A595	(PF 15785)	34°39′S 18°10′E	500 m	4 subadult ♂♂: 5,8–8,0 mm; 4 ovig. ♀♀: 8,3–8,6 mm; 9 ♀♀: 6,1–9,0 mm

SAM–A10601 (PF 12605)	30°33′S 30°58′E	805 m	1 subadult ♂: 6,8 mm
SAM–A10602 (PF 17440)	34°25′S 17°45′E	800 m	2 subadult ♂♂: 7,0–8,0 mm; 1 ♂: 6,9 mm; 2 ovig. ♀♀: 8,6–9,9 mm; 1 juv. 4,6 mm
SM 60	27°09′S 32°58′E	800 m	1 adult ♂: 7,8 mm; 2 subadult ♂♂: 5,8–7,0 mm; 3 ♀♀: 6,4–9,6 mm
SM 69	27°12′S 32°56′E	660 m	1 damaged ♂
SM 86	27°59′S 32°40′E	550 m	6 adult ♂♂: 7,4–8,6 mm; 6 subadult ♂♂: 6,1–7,7 mm; 5 ♂♂: 5,8–6,4 mm; 5 ovig. ♀♀: 9,0–11,2 mm; 5 ♀♀: 5,4–8,3 mm; 5 juvs: 3,8–5,4 mm
SM 109	28°41′S 32°36′E	1 300 m	1 subadult ♂: 7,4 mm; 1 ♀: 7,4 mm
SM 129	30°53′S 30°31′E	850 m	1 damaged ♂; 2 ovig. ♀♀: 9,0–9,3 mm
SST 17P	35°22′S 22°31′E	200 m	1 ♀: 6,4 mm
LBT 67A	32°04′S 17°12′E	200 m	1 subadult ♂: 6,7 mm; 3 ♀♀: 5,8–7,0 mm
LBT 70C	32°07′S 17°12′E	330 m	1 juv.: 5,1 mm
LBT 72D	32°07′S 17°31′E	400 m	3 subadult ♂♂: 5,8–7,7 mm

Previous records

Agulhas Bank, 126 to 596 m (Zimmer 1908, 1921); Chatham Rise, 238 to 535 m (Jones 1963); Antarctic, 2 725 m (Zimmer 1913); Great Australian Bight, 1 320 to 1 340 m (Jones 1969); off Recife, Brazil, >1 000 m (Jones pers. comm.).

Holotype

Not designated: young male and female syntypes deposited in the Berlin Zoologisches Museum. Type locality: 564 m, on the Agulhas Bank (35°09′S 18°32′E).

Description

Adult male, length 7,4 mm (SM 86). Integument thin, pellucid, finely reticulate. Gut-contents black. Carapace (Fig. 11A) elongate, twice as long as deep. Pseudorostral lobes short, roundly pointed anteriorly. Antennal notch a slight excavation below pseudorostrum. Eyelobe (Fig. 11B) small, pointed, with several small denticles in midline. Carapace swollen posteriorly on either side of shallow middorsal depression. Middorsal carina evident anteriorly, denticulate only on eyelobe. Carapace less than half length of rest of body. Pedigerous somites all visible, not flanged laterally. Abdominal somites cylindrical.

First segment of antenna 1 (Fig. 11C) longer than next two together. Flagellum 4-segmented with several small aesthetascs at base; accessory flagellum 3-segmented.

Flagellum of antenna 2 (Fig. 11D) reaching almost to end of body.

Palp of maxilla 1 with two filaments.

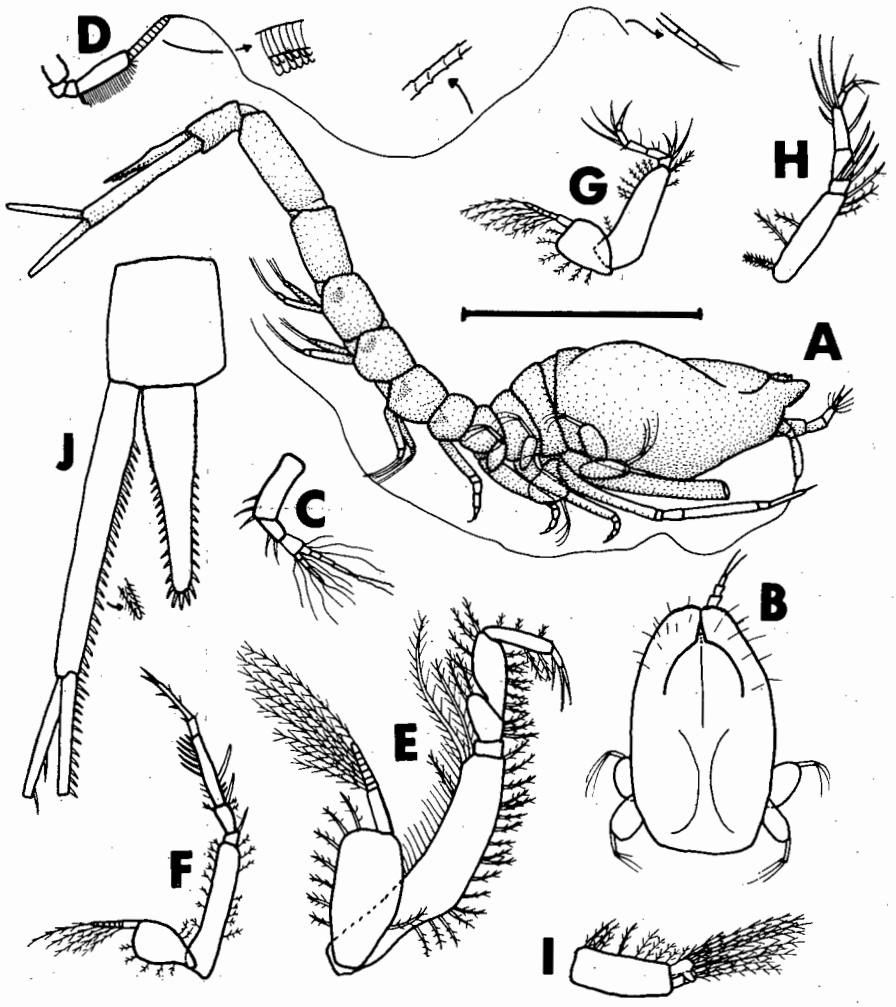

Fig. 11. *Hemilamprops pellucidus*

Adult male. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 2. G. Pereiopod 3. H. Pereiopod 5. I. Pleopod 2. J. Uropod and telson.

Scale line = 4 mm for A–B; 2 mm for C–J.

Basis of maxilliped 3 (Fig. 11E) slightly longer than rest of limb. Carpus stout and slightly expanded. Propodus about twice length of dactyl.

Distal segments of pereiopod 1 missing from all specimens. Exopod large and very well developed.

Basis of pereiopod 2 (Fig. 11F) little more than half length of rest of limb. Carpus elongate with several fine spines. Exopod large and almost circular in outline.

Pereiopods 3 (Fig. 11G) and 4 similar. Basis of pereiopod 3 very large and stout, of pereiopod 4 less so.

Pereiopod 5 (Fig. 11H) shorter, basis subequal in length to rest of limb.

Three pairs of typical pleopods present (Fig. 11I).

Telsonic somite (Fig. 11J) less than half length of preceding somite, about two-thirds length of peduncle of uropod. Pre-anal part of telson less than half of total length, serrated laterally. Post-anal part narrower with ten to twelve pairs of small lateral spines and three terminally.

Peduncle of uropod slender with many fine spines on inner edge. Distal portions of both rami missing from all males.

Adult female, length 11,2 mm (SM 86). As male, except as follows: eyelobe (Fig. 12A) without serrations; middorsal carina very finely serrate. Carapace (Fig. 12B) considerably wider posteriorly than anteriorly.

Antenna 1 (Fig. 12C) smaller, without aesthetascs. Antenna 2 (Fig. 12D) 3-segmented. Maxilliped 3 (Fig. 12E) stouter, carpus relatively longer. Exopods of pereiopods much smaller. Basis of pereiopod 1 (Fig. 12F) strongly serrate, subequal in length to next four segments together; propodus and dactyl long, slender and subequal in length. Basis of pereiopod 2 (Fig. 12G) shorter, carpus

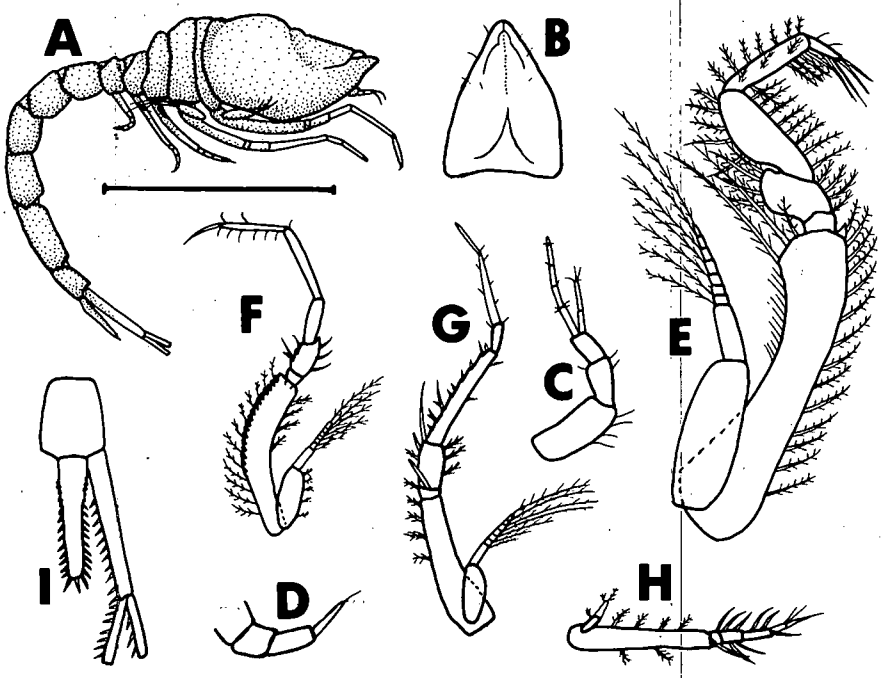

Fig. 12. *Hemilamprops pellucidus*

Adult female. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Antenna 2. E. Maxilliped 3. F. Pereiopod 1. G. Pereiopod 2. H. Pereiopod 3. I. Uropod and telson. Scale line = 4 mm for A–B; 2 mm for F–I; 1 mm for C–E.

longer. Bases of pereiopods 3 (Fig. 12H) and 4 shorter and more slender; exopods 2-segmented.

Telson (Fig. 12I) slightly longer, peduncle of uropod with fewer spines.

Remarks

This species is readily identifiable by the pellucid nature of the integument, nearly always resulting in the gut being clearly visible: in the present specimens it is black or dark brown. It closely resembles a number of other species in which the carapace is of similar shape, but may be distinguished from them as follows: *H. cristata* (Sars, 1869), *H. glabrus* sp. nov., *H. ultimaespei* Zimmer, 1921, *H. lotusae* Băcescu, 1969, *H. serrulata* Ledoyer, 1977, and *Hemilamprops* sp. all have no more than five pairs of lateral spines on the telson. *H. normani* Bonnier, 1896, has a shorter telson and uropodal peduncle and the middorsal carina is slightly serrated in the male. *H. pellucidus* most closely resembles *H. tanseiana* Gamô, 1967, differing from it in the greater number of lateral spines on the telson, the reduced serrations on the middorsal carina, the longer uropod and telson and the larger and more expanded merus and carpus of maxilliped 3 in *H. pellucidus*.

The individuals figured by Stebbing (1912) and Zimmer (1908) differ in several respects from each other and also from those figured here. The shape of the carapace in subadult males differs slightly, as does the length of the telson and its number of lateral spines. Adult males also have a longer telson and more, but smaller, spines on the peduncle of the uropod in the present specimens. Other differences can be attributed to varying age and sex. The adult female differs from that figured by Zimmer in the length of the propodus and dactyl of pereiopod 1 and from Stebbing's as well as from Zimmer's in the slightly longer and stouter telson. However, it seems that the specimens from SAM–A594 are the selfsame ones described and figured by Stebbing, and in fact these fit well within the range of variation of the other individuals available for examination. Thus it is clear that the present specimens can be referred to Zimmer's *H. pellucidus* without any great doubt.

Distribution

This is one of the few species of Cumacea which occurs in southern African waters without being endemic. It appears to be widespread throughout the southern oceans at depths from 126 to 2 725 m.

Hemilamprops glabrus sp. nov.

Fig. 13

Records

SM 109	28°41′S 32°36′E	1 300 m	1 ovig. ♀: 7,0 mm (holotype); 2 ♀♀: 6,4–7,2 mm; 2 mancas: 2,9–3,2 mm

Holotype

Ovigerous female, in the South African Museum, SAM–A15680, collected by the *Meiring Naude*, 25 May 1976. Type locality: 1 300 m, off northern Natal (28°41'S 32°36'E).

Description

Ovigerous female, holotype, length 7,0 mm. Integument rather thin and translucent. Carapace (Fig. 13A) fairly short, swollen posteriorly on either side of shallow middorsal depression. Pseudorostral lobes short and truncate anteriorly with an indistinct anterolateral carina running posteriorly for a short distance, bearing a few denticles above. Carapace in dorsal view (Fig. 13B) slightly flattened, distinctly broader than deep. Eyelobe small, rounded and

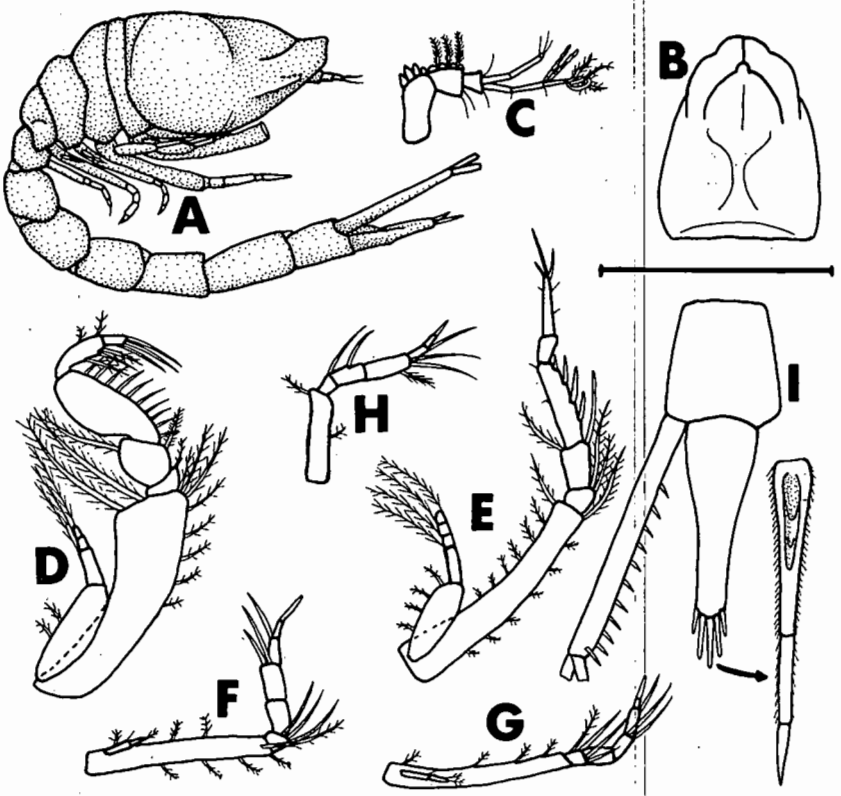

Fig. 13. *Hemilamprops glabrus* sp. nov.

Ovigerous female, holotype. A. Lateral view. B. Dorsal view of carapace. C. Antenna 1. D. Maxilliped 3. E. Pereiopod 2. F. Pereiopod 3. G. Pereiopod 4. H. Pereiopod 5. I. Uropod and telson.

Scale line = 2 mm for A–B; 1 mm for C–I.

eyeless. Pedigerous somites rather deep, all visible. Abdominal somites cylindrical, together subequal in length to cephalothorax. Marsupium small.

Antenna 1 (Fig. 13C) fairly short, both flagella 3-segmented, third segment of accessory flagellum very short.

Palp of maxilla 1 with two filaments.

Basis of maxilliped 3 (Fig. 13D) very stout, slightly shorter than rest of limb: no more than three times as long as wide and particularly expanded distally. Merus wide, carpus large and flattened.

Segments distal to basis missing from pereiopod 1 in all specimens.

Pereiopod 2 (Fig. 13E) slender, basis subequal in length to rest of limb; carpus relatively short, subequal in length to propodus and dactyl together.

Pereiopods 3 (Fig. 13F) and 4 (Fig. 13G) similar. Exopods very small, 2-segmented.

Pereiopod 5 (Fig. 13H) short, basis shorter than rest of limb.

Telsonic somite (Fig. 13I) almost square in dorsal outline, more than half length of telson. Telson slightly shorter than peduncle of uropod, wider proximally; lateral edges entirely smooth; apex with five long stout complex spines. Peduncle of uropod with several small sharp spines on inner edge. Rami missing from all specimens.

Males are not available.

Remarks

It has already been remarked that without mature males it is not possible to place species conclusively in *Lamprops*, *Mesolamprops* or *Hemilamprops*. In this case the first pereiopod cannot be used either since the distal segments are missing in all specimens. However, the general appearance of the specimens, together with their locality, strongly suggests that they should be placed in *Hemilamprops*. In some respects, they do bear a slight resemblance to *Lamprops? comata* Zimmer, 1907 from deep water off Tierra del Fuego, but since this species is known only from a single fragmentary female, no reasonable comparison is possible.

Within *Hemilamprops*, *H. glabrus* is easily distinguished by the short, stout basis of maxilliped 3 and the shape of the carapace. From those species which it most closely resembles it may be distinguished as follows: from *H. pellucidus* Zimmer, 1908, *H. cristata* (Sars, 1869), *H. tanseiana* Gamô, 1967, *H. normani* Bonnier, 1896, *H. serrulata* Ledoyer, 1977, and *Hemilamprops* sp. by the absence in *H. glabrus* of lateral spines on the telson and denticles on the mid-dorsal carina; from *H. ultimaespei* Zimmer, 1921, and *H. lotusae* Băcescu, 1969, in that it has five terminal spines on the telson and none at all laterally and that its carapace is much broader and truncate anteriorly.

Distribution

Known only from the type locality: northern Natal at 1 300 m.

Hemilamprops sp.

Fig. 14

Records

SAM–A10607 (PF 16982)	1 200 m	34°40′S 17°50′E	2 ovig. ♀♀: 9,6–10,2 mm; 1 ♀: 9,1 mm; 1 damaged ♀

Remarks

Although four individuals of this species are available, all of them are too badly damaged to allow an adequate description. Figure 14A is a composite drawing of the undamaged parts of both ovigerous females.

None the less the carapace and telson are quite distinct from those of any other known species. In particular, the denticles anteriorly along the mid-dorsal carina and on the anterolateral margin of the carapace (Figs 14A and 14B) are longer and sharper than those of any known species, while the telson (Fig. 14C) is characteristically short, with the three terminal spines particularly long and slender. In these characters it is unique in the genus, so that it should not prove difficult to identify further specimens as belonging to the same species.

It is tentatively placed in *Hemilamprops* for the same reasons as those given above for *H. glabrus*. However, the same cautionary note must be sounded until adult males are available to confirm its generic position.

Distribution

Known only from a single sample from a depth of 1 200 m off the Cape Peninsula.

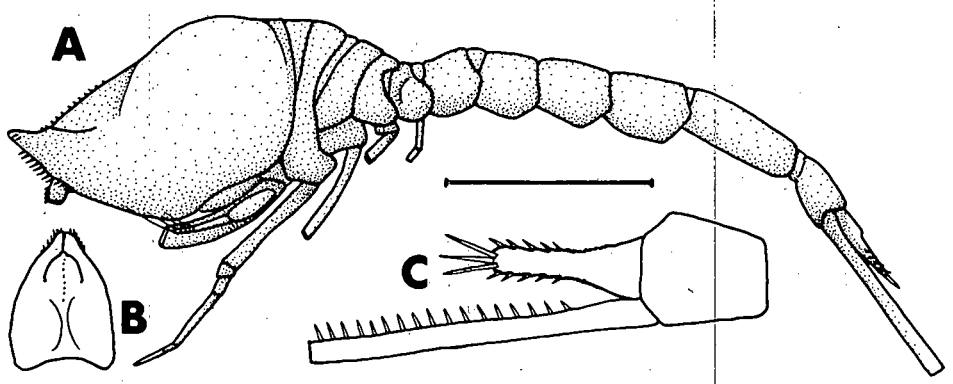

Fig. 14. *Hemilamprops* sp.
Adult female. A. Lateral view. B. Dorsal view of carapace. C. Uropod and telson.
Scale line = 4 mm for B; 2 mm for A; 1 mm for C.

DISTRIBUTION OF LAMPROPIDAE

With only fifty-eight species, the family is rather small, constituting less than 10 per cent of known species of Cumacea. Table 1 details the world-wide distribution of lampropids according to latitude and depth. It can be seen that the family is generally confined to deep and/or cold waters and has a bipolar distribution. 58 per cent of the species-records are from latitudes north of 20°N, 6 per cent between 20°N and 20°S and 36 per cent south of 20°S. Thus very few species are known from the tropics: one of these is recorded from 390 m and the rest from depths greater than 800 m, where temperatures are considerably lower than on the surface. This pattern of distribution shows a direct contrast to that of the Bodotriidae where 38 per cent of the species are found in the tropics (between 20°N and 20°S) (Day 1978).

TABLE 1. Distribution of Lampropidae according to depth and latitude (data mainly from Jones 1969). Species may be entered more than once if they have been recorded from widely different depths or localities. The entry marked * is also entered under '5–200 m' and is, therefore, excluded from the total count of species.

	Shore–5 m		5–200 m		200–2 000 m		> 2 000 m		Total	
	no.	%	no.	%	no.	%	no.	%	no.	%
N of 70°N . . .	1	1+	1	1+	0	0	0	0	2	3
50–70°N . . .	1	1+	12	18	9	13	0	0	22	32
20–50°N . . .			11	16	3	5	2	3	16	23
20°N–20°S . . .			0	0	3	5	1	1+	4	6
20–50°S			3	5	12	18	1	1+	16	24
50–70°S			2	3	0	0	0	0	2	3
S of 70°S . . .			1	1+	2	3	3	5	6	9
Total no. of records	2	3	30	44	29	43+	7	10+	68	100
Total no. of species	1*	1+	26	44	25	42	8	13	59	100

Assuming that the distribution of the lampropids is indeed limited by water temperature, then those species living in shallow water (less than 200 m) would be expected to occur at higher, cooler latitudes. This is shown by the fact that there are no records for shallow waters between 20°N and 20°S, which is not merely a reflection of collecting effort, since 36 per cent of bodotriids are found in the same situation.

Similarly it can be shown that the lampropids preponderate in northern waters, since there are nearly twice as many species (58 %) recorded north of 20°N as there are south of 20°S (36 %). Percentages for the bodotriids are again in inverse proportion to this: 24 per cent occur north of 20°N and 37 per cent south of 20°S.

Fully 55 per cent of lampropids are recorded from depths greater than 200 m (less than 8 % for bodotriids) and 12 per cent below 2 000 m (less than 1 % for bodotriids).

Thus the lampropids form a bipolar group, preferring deep, cold water and avoiding the tropics. Because the collecting effort has been minimal in deep waters, it is suggested that the number of species of lampropid is artificially

low. It is predicted that the number of new species in this family will increase rapidly if more collecting is done in deep waters. This prediction is supported by the fact that in the present paper, of the ten species described, six are new.

Of the eleven genera, four (*Mesolamprops* Given, 1964, from California, *Archaeocuma* Băcescu, 1972, from Peru, *Chalarostylis* Norman, 1879, from the North Atlantic and *Stenotyphlops* Stebbing, 1912, from South Africa) are monotypic and their distribution need concern us no further.

Bathylamprops Zimmer, 1908, consists of three species from deep waters, two off the east coast of Africa and one off Florida, and *Pseudodiastylis* Calman, 1905, of two species from deep tropical waters. The remaining genera together consist of fifty species.

Lamprops Sars, 1863, contains twelve species, all from shallow waters at depths less than 200 m and all from the northern hemisphere. Three of these occur mainly between 20° and 50°N and the rest are found north of 50°N, particularly in the region of the Bering Strait. The possible affinities of *Lamprops? comata* are discussed above. *Lamprops fasciata* is the only species in the family to have been found intertidally.

Hemilamprops Sars, 1883, consisting of twenty-one species, is very widespread, representatives being found from the Arctic to the Antarctic, from the Pacific, Atlantic, Indian and southern oceans at depths from 8 to more than 2 000 m. The species fall into three groups: 8 species occur in the North Pacific (Japan to California), 5 in the North Atlantic and Arctic and 8 around South America, South Africa and Australasia. None occurs between 30°N and 30°S. The genus is bipolar, and follows the distribution pattern shown by the family as a whole.

Platysympus Stebbing, 1912, now consists of 7 species, all from waters deeper than 200 m. 2 species are known from the North Atlantic and Norway, and 5 from the Southern hemisphere—1 from the Antarctic and the 4 new species from South Africa.

Paralamprops Sars, 1887, consists of 10 deep-water species. 3 occur in the North Atlantic from 600–3 789 m, 6 in the southern ocean from South Africa to the Antarctic at 232–3 423 m, and 1 in the East Indies at 390 m.

Many of the species are known only from a single record and since so little collecting has been done in deep water where many species normally occur, it is predictable that the actual distribution of species will prove to be much wider than it appears at present.

DISTRIBUTION OF THE SOUTHERN AFRICAN LAMPROPIDAE

Eleven species of lampropid are now known from these waters. Since they are found only at depths greater than 200 m (with a single exception at 188 m), and very little collecting has been done in deep water off southern Africa, it is difficult and perhaps misleading to distinguish any clear distribution patterns.

The frequency of occurrence is also uncertain, because earlier records are

incomplete and Cumacea are not caught in all samples, sometimes because the substratum is unsuitable (rock or very coarse sand) or simply because cumaceans are scanty for some other unknown reason. There is also the simple fact that no sampling has been done off the west coast north of Lambert's Bay or off Mozambique at depths greater than 200 m. However, of the 12 grabs taken by UCT at these depths around the coast, 6 contained lampropids, as did 7 of the ten SM samples which contained any Cumacea at all. The incompleteness of the early *Pieter Faure* records is such that it is not possible to determine the exact type of collecting gear nor the number of stations. But from the previous two sets of figures it seems that lampropids are not at all uncommon deep-water forms, although they are entirely absent from waters shallower than 188 m.

In this way the South African lampropids differ from the Northern hemisphere species, of which more than 60 per cent are shallow-water forms. This is no doubt due to the fact that shallow waters in southern Africa are relatively warm.

The southern African species do not fall into any obvious groups: temperature conditions in waters deeper than 200 m do not vary much round the coast and there are many stretches of coast which have been sampled poorly or not at all. In fact, there are only five rather small regions in which sampling has been at all comprehensive. These are off Lambert's Bay, the Cape Peninsula, Still Bay, Durban, and in a fairly wide area off northern Natal.

Two species occur throughout the range: *Platysympus depressus* (21 specimens) and *Hemilamprops pellucidus* (79 specimens), which are also the two most common species in most samples. (This indicates, incidentally, that breaks in the ranges of most species are due to a paucity of numbers rather than the realistic limits of very confined ranges.) Two further species occur from the Cape Peninsula to northern Natal: *Stenotyphlops spinulosus* (17 specimens) and *Platysympus camelus* (14 specimens). The other six species, *Paralamprops peringueyi* (14 specimens), *Paralamprops margidens* (6 specimens), *Platysympus phylloides* (4 specimens), *Platysympus compressus* (8 specimens), *Bathylamprops calmani* (1 specimen), *Hemilamprops glabrus* (5 specimens) and *Hemilamprops* sp. (4 specimens) occur in only one or two regions and are therefore of little value in zoogeographic terms. The only one for which there is some little evidence for a really restricted range is *Paralamprops peringueyi* which is not uncommon off the Cape Peninsula (14 specimens in 3 samples) but has not yet been found anywhere else.

Only two of the ten species are known outside South African waters: the type specimen of *Bathylamprops calmani* was found off Dar-es-Salaam, and Jones (1969) has since recorded three specimens off Durban. The type locality is at a depth of 2 959 m and the other depth records are 2 720 and 3 530 m, suggesting that the present specimen from 1 300 m was at about the upper depth limit for the species. *H. pellucidus* is one of the most widespread of southern African Cumacea, occurring in southern oceans from the Chatham Rise, the

Antarctic, Brazil and the Great Australian Bight as well as being by far the most common lampropid in local waters, constituting half of the individuals in the present collection.

Little can be deduced about depth distributions. In some cases there is a slight tendency for individuals to occur in shallower waters off the cold west coast (*P. depressus* at 440 m off Lambert's Bay, and 550 to 680 m off northen Natal; *P. camelus* at 188 m off the Cape Peninsula, and 550 m off northern Natal; *H. pellucidus* at 200 to 400 m off Lambert's Bay, and 550 to 1 300 m off northern Natal). However, collecting on the west coast has generally been in shallower waters than on the east coast so the differences may be more apparant than real.

There is a slight indication of a change in the fauna at very roughly 800 and 1 400 m. Four species (*Platysympus depressus. P. compressus*, *P. camelus* and *Paralamprops margidens*) occur only at depths less than 850 m; three species (*S. spinulosus*, *P. peringueyi* and *P. phylloides*) are found between 300 and 1 400 m and three (*B. calmani*, *H. glabrus* and *Hemilamprops* sp.) at 1 200 m or more. Here again valid conclusions are limited by the fact that the greatest depth at which sampling occurred was 1 400 m.

The species-diversity of the family is fairly high. In comparison with the Bodotriidae (which are by far the most abundant locally in terms of numbers, both of individuals and of species (Day 1978)) the figures are as follows: the Bodotriidae, with 4 582 specimens, 42 species and 649 records have a ratio of 7,1 individuals per record and a specimen : species ratio of 109. The Lampropidae, with 169 specimens, 11 species and 39 records have a ratio of 4,3 individuals per record and a specimen : species ratio of 15,4. Thus lampropids occur in fewer samples and are far less abundant where they do occur, but they are far more diverse than are the bodotriids.

Family **Ceratocumatidae** Calman, 1904

Diagnosis

Five free pedigerous somites. Mandibles narrow (boat-shaped) at base. Maxillipeds 2 and 3 elongate, 7-segmented, basis not produced distally. Exopods present at least on maxilliped 3 and pereiopod 1 in both sexes. Propodus of pereiopod 1 with two lobular setose processes. Male with four to five pairs of pleopods. Telson small, unarmed and flap-like, hinged to cover anal valves. Endopod of uropod 1-segmented, exopod 2-segmented with first segment very short.

Type genus

Ceratocuma Calman, 1904.

Remarks

This is the smallest and most recently erected of the seven cumacean families. The combination of four or five pairs of pleopods in the male, together

with a small telson and the setose lobes on the propodus of the first pereiopod, is quite characteristic. However, the telson is very small and is often held flapped over the anal valves so that it is sometimes difficult to detect.

Until 1969, the family was known from four specimens of a single species in two records, one from the north-western coast of Ireland at 705 m and one from about 800 m off Durban. Examination of material from deep waters in the Atlantic has increased numbers dramatically in the last few years so that the family is now known from hundreds of specimens in seven species and two genera. It is expected that further exploration of deep and abyssal waters will continue to provide useful information on this family.

Ceratocuma Calman, 1904

Generic diagnosis

Body elongate, carapace dorso-ventrally flattened with protuberances. Exopods present on pereiopod 1 in both sexes and on pereiopod 2 in the male. Pereiopods 2 to 4 very long and slender, pereiopod 5 absent. Uropods slender and elongate.

Type species

Ceratocuma horridum Calman, 1904.

Remarks

Ceratocuma is easily distinguished from *Cimmerius*, the only other genus in the family, the generic diagnosis of which reads as follows: Body not elongate. Carapace rounded, reminiscent of *Campylaspis*. Exopods present on pereiopods 1 to 4 in both sexes, reduced on pereiopod 4 in female. Pereiopod 5 present. Pereiopods and uropods not particularly elongate or slender.

In general appearance the two genera are quite different, although they both possess the familial characteristics.

Distribution of Ceratocuma

The four species are all known from the Atlantic and southern Indian oceans: one from Ireland and Natal, one from the Puerto Rico Trench, one from the Azores, and one from Panama, but all at depths of 680 m or more.

KEY TO THE SPECIES OF *CERATOCUMA*

1 About eighteen pairs of long, sharp, slender spines on carapace, others on posterior somites; carapace oval in dorsal view and rounded anteriorly (ignoring spines); telsonic somite less than half length of peduncle of uropod..... *C. reyssi* Jones, 1973—Azores
– Protrusions of carapace (about ten pairs or fewer) and posterior somites confined to blunt spines or rounded tubercles; carapace more or less rectangular in dorsal view; telsonic somite half length of peduncle of uropod or more.....2
2 Carapace without paired dorsolateral tubercles or blunt spines: at most with three pairs of very low but extensive rounded protrusions..... *C. amoena* Jones, 1969—Puerto Rico Trench, off Surinam, Bay of Biscay
– Carapace with several pairs of dorsolateral protrusions, tubercles or blunt spines.....3

3 Carpus of pereiopods 3 and 4 twice length of propodus; ischium and merus of pereiopod 1 together about half length of carpus.....
C. panamensis Băcescu & Muradian, 1974—off Panama
– Carpus and propodus of pereiopods 3 and 4 subequal in length; ischium and merus of pereiopod 1 together subequal in length to carpus.....4
4 All tubercles on carapace, including anterior ones, sharply hooked.....
C. horridum horridum Calman, 1904—North Atlantic
– Tubercles on anterior half of carapace low and bluntly rounded, on posterior half blunt or sharply hooked.....*C. horridum australe* subsp. nov.

Ceratocuma horridum Calman, 1904

C. horrida Calman, 1904: 37–40, pl. 55 (figs 57–75). Stebbing, 1913: 51–52.

Holotype

Not designated: three male syntypes, two of them mature, deposited by Calman in the British Museum (Natural History). Type locality: 705 m, off Northern Ireland.

Ceratocuma horridum australe subsp. nov.

Figs 15–16

C. horridus: Stebbing, 1912: 142–143.

Records

SM 103	28°31′S 32°34′E	680 m	1 adult ♂: 3,5 mm (holotype); 2 subadult ♂♂: 2,9 mm; 1 ovig. ♀: 3,7 mm; 2 juvs: 2,8 mm
SM 129	30°53′S 30°31′E	850 m	1 adult ♂: 4,5 mm; 1 damaged ovig. ♀
SM 151	30°14′S 30°27′E	900 m	1 ovig. ♀: 5,1 mm; 1 ♀: 3,7 mm

Previous records

Natal, 805 m (Stebbing, 1912).

Holotype

Adult male, in the South African Museum, SAM–A15722, collected by the R.V. *Meiring Naude*, 24 May 1976. Type locality: 680 m, off northern Natal (28°31′S 32°34′E).

Description

Adult male, holotype, length 3,5 mm (SM 103). Integument pale and thin, brittle, faintly reticulate. Carapace (Fig. 15A) large, slightly flattened dorsoventrally, somewhat wider than deep and nearly twice as long as deep; irregularly sculptured to form a number of low, rounded projections. In lateral view, nine pairs visible: one large pair posterodorsally, four closely-adjacent pairs posterolaterally, one pair anterolaterally, one pair immediately above the anterolateral angle, one pair middorsal and one pair midlateral. The same protuberances visible dorsally (Fig. 15B), the four outermost pairs forming the lateral edges of the carapace and causing the lateral outline to be broken;

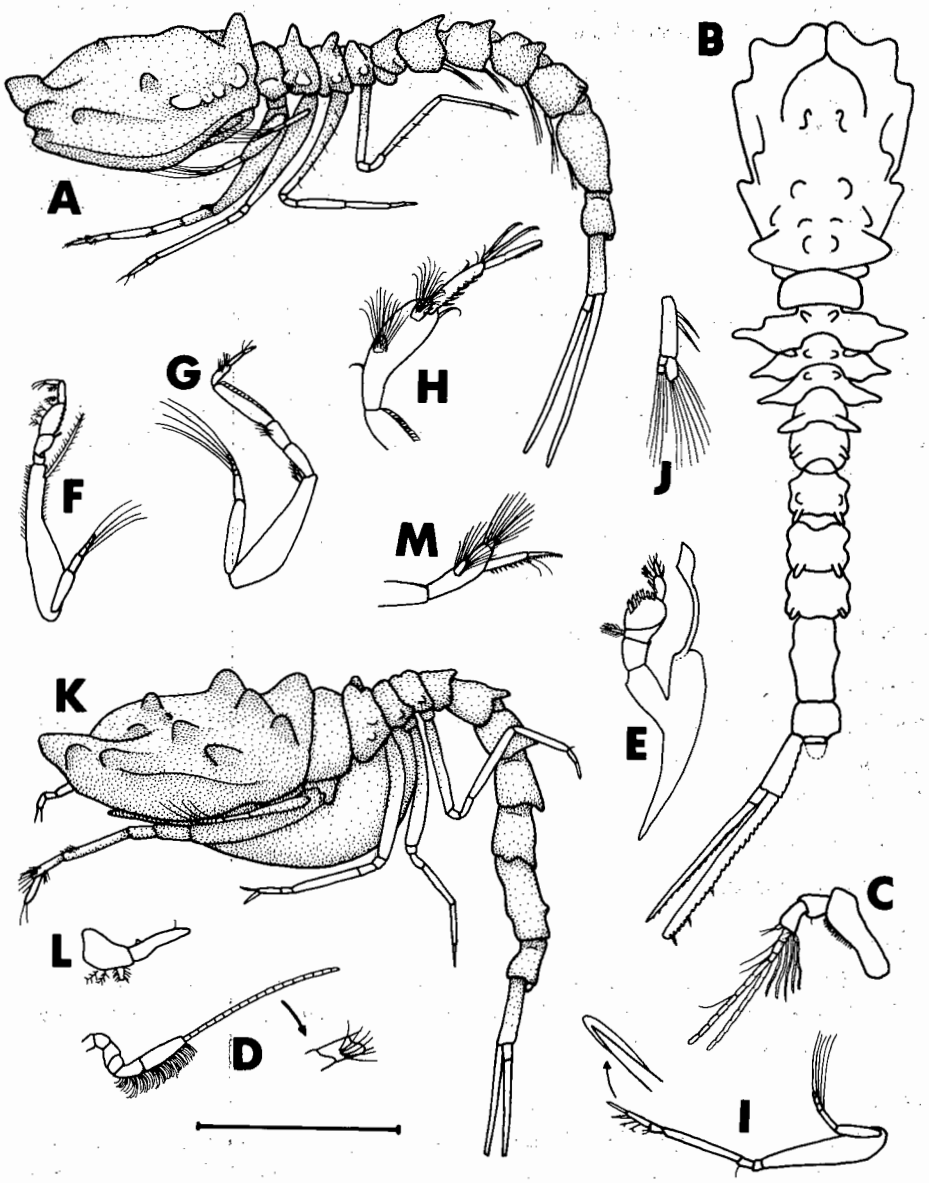

Fig. 15. *Ceratocuma horridum australe* subsp. nov. (SM 103)

Adult male. A. Lateral view. B. Dorsal view. C. Antenna 1. D. Antenna 2. E. Maxilliped 1. F. Maxilliped 3. G. Pereiopod 1. H. Distal tip of pereiopod 1. I. Pereiopod 2. J. Pleopod 3. Ovigerous female. K. Lateral view. L. Antenna 2. M. Distal tip of pereiopod 1.

Scale line = 1 mm for A–B, D, F–G, I, K; 0,5 mm for C, E, J, L–M; 0,3 mm for H.

slightly medial to these are two pairs and the last three pairs are arranged in longitudinal rows just lateral to midline. Middorsal carina absent. Eyelobe small and eyeless. Carapace slightly less than twice length of pedigerous somites together.

All five pedigerous somites visible, first slightly wider than deep without lateral expansions; second, third and fourth expanded ventrolaterally forming wide, pointed lateral extensions and dorsolaterally forming smaller, low protuberances. Last pedigerous somite without appendage, small and similar to abdominal somites. First four abdominal somites produced to slight points dorsolaterally, fifth elongate, sixth small and wider than long or deep. Cephalothorax longer than abdomen.

Antenna 1 (Fig. 15C) short, first segment longer than next two together. Accessory flagellum very small, 1-segmented. Flagellum short, 3-segmented with two aesthetascs.

Antenna 2 (Fig. 15D) shorter than carapace with short, poorly-setose segments.

Palp of maxilla 1 with two filaments.

Maxilliped 1 (Fig. 15E) with a single branchial leaflet; carpus very widely expanded.

Maxilliped 3 (Fig. 15F) normal, merus and carpus very slightly expanded.

Basis of pereiopod 1 (Fig. 15G) subequal in length to next three segments together. Ischium longer than merus, together subequal in length to carpus. Carpus elongate with laminar expansion on inner edge. Propodus (Fig. 15H) with two setose lobes, one at midlength and one subterminally. Dactyl narrow, shorter than propodus, with a number of small spines.

Pereiopod 2 (Fig. 15I) elongate with small exopod. Basis shorter than rest of limb; ischium very short, merus little longer. Carpus elongate, half length of propodus and dactyl together, unarmed. Terminal spine on dactyl with flattened tip.

Pereiopods 3 and 4 elongate, without exopod. Pereiopod 5 lacking (suppressed).

Telson very small, usually folded over anal valves; rounded when extended.

Peduncle of uropod much shorter than rami, serrated on inner edge. Both rami serrated on inner edge, otherwise poorly armed: both appear broken at tip.

Ovigerous female, *paratype*, length 3,7 mm (SM 103). As male, except as follows: carapace (Fig. 15K) with protuberances better developed, also nine pairs: one large pair posterolaterally; two sets of three pairs arranged transversely, the most dorsal pair in each case also being most anterior; two pairs laterally immediately behind anterolateral corner. First two pedigerous somites wider and deeper, all with much reduced lateral expansions, and dorsal expansions hardly evident. Marsupium large and well developed.

Antenna 2 (Fig. 15L) small and apparently 2-segmented. Second and third segments of antenna 1 slightly smaller. Propodus of pereiopod 1 (Fig. 15M) smaller, one of the setose lobes at distal tip; dactyl inserting subterminally

about a third of total length from distal tip. Pereiopod 2 without exopod. Telson slightly rounder and broader. Rami similar but distal tips missing.

Adult male, length 4,5 mm (SM 129). At first glance the two individuals from SM 129 and the ovigerous female from SM 151 look very different from the rest. However, these differences appear to be confined to the sculpturing of the carapace, and the appendages (except for the distal segments of pereiopod 1) are identical in all important respects. The sizes of the individuals also vary quite considerably. But it does not seem possible to pinpoint any really significant differences which would allow specific differentiation and it would therefore seem that we are dealing with a single polymorphic species.

The adult male from SM 129 (Fig. 16A) differs from that figured in Fig. 15A as follows: the five posterior pairs of protuberances on the carapace are drawn out to form distinct points and the anterior pairs are either very much reduced or absent. The tips of these points are very delicate, almost transparent and very easily broken off, so that the apparent degree of development of these may not be of great significance. The expansions of the second and third pedigerous somites and the first four abdominal somites are very much better developed: these too are easily damaged and one is broken off. In dorsal view (Fig. 16B) the second lateral pair of protuberances from the anterior end is

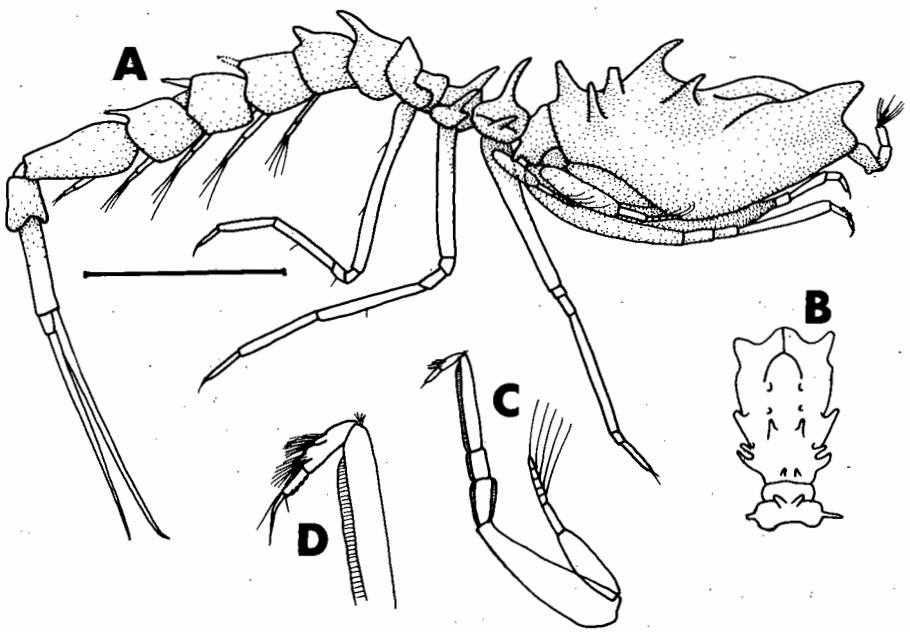

Fig. 16. *Ceratocuma horridum australe* subsp. nov. (SM 129)
Adult male. A. Lateral view. B. Dorsal view of carapace. C. Pereiopod 1. D. Distal tip of pereiopod 1.
Scale line = 2 mm for B; 1 mm for A, C; 0,5 mm for D.

much smaller, the third and fourth better defined and more pointed, as are the two posterodorsal pairs. The ovigerous female is the same in all respects as the male.

Pereiopod 1 of the male (Fig. 16C) differs slightly in that the inner edge of the ischium, merus and carpus have laminar expansions, the carpus is nearly one and a half times the combined length of the ischium and merus and the propodus is shorter (Fig. 16D). The peduncle of the uropod is also slightly longer relative to the fifth abdominal somite.

Remarks

The systematic position of these individuals is not indisputable. The appendages of all four species known so far are very similar, while the sculpturing of the carapace in particular and the rest of the body in general varies quite considerably. *C. reyssi* Jones, 1973, from the Azores, can easily be distinguished by the numerous long, slender spines, not only on the carapace but also on the first, fourth and fifth pedigerous and all abdominal somites except the last. The pseudorostrum, too, is pointed anteriorly without a broad, flanking projection on either side. There are other minor differences in the proportions of the limbs as well, so that this species is clearly distinct from the others.

C. amoenum was described by Jones (1969) on the basis of the cephalothorax of a single male from the Puerto Rico Trench. He has since (pers. comm.) found undamaged specimens of the same species from Surinam and the Bay of Biscay in which the sculpturing of the carapace is the same as that figured and which species he confirms to be easily distinguishable from *C. horridum* in all cases. It is further distinguished by 'the uropod peduncles being relatively long (compared with *C. horridum*) in proportion to the rami', and some fully adult males have only four pairs of pleopods. *C. amoenum*, then, is also clearly distinct.

C. panamensis Băcescu & Muradian, 1974, from north-east of Panama, differs from *C. horridum* in the smaller number of protuberances on the carapace and thorax and the proportions of the distal segments of the pereiopods. As the authors point out, it is very close to *C. horridum*; certainty about the validity of the species will have to await the collection of adult males.

C. horridum was described by Calman (1904) on the basis of three males, two of which were mature. Jones (pers. comm.) has since found large numbers in the North Atlantic and off Surinam, all of which clearly belong to Calman's species. Stebbing (1912) identified (but did not figure) a single specimen from Durban as *C. horridum*, saying that it differed from Calman's description and figures only 'in a small bulbous expansion of the base of [the] peduncle (of the uropod)'. The several other specimens now available from South Africa are problematical. Some approach *C. amoenum* in having low protuberances on the carapace, while others are very similar to Calman's description of *C. horridum*, having long, slender spine-like processes. However, close comparison of the structure and positioning of the protuberances in the present specimens

shows them to be very similar to each other, although the magnitude of the sculpturing differs considerably. The sculpturing—in the form of sharp digitiform processes in some cases and merely raised bumps in others—is very similar in arrangement to that figured by Calman for *C. horridum*. The structure of the limbs is almost identical in both South African forms and in the description of *C. horridum*, confirming that they are very similar. It therefore seems appropriate to consider these specimens as belonging to *C. horridum*.

Even in those specimens in which the carapace most closely approaches that figured by Calman, the sculpturing is greatly reduced anteriorly and the dactyl of pereiopod 1 inserts terminally on the propodus. In those specimens with all the sculpturing reduced, the dactyl inserts subterminally, as it does in Calman's figure. Since the central and northern Atlantic form of the species seems to be quite uniform, it is proposed to distinguish the local specimens subspecifically as *C. horridum australe*. Due to the considerable variation within as well as between samples, even the subspecies must be considered at least to be highly polymorphic. Whether this polymorphism will prove sufficient for erecting two species or subspecies in the place of *C. horridum australe* will have to await the collection of a much larger number and wider range of individuals. At such time, it should also be possible to determine the relationship between the local subspecies and *C. horridum sensu* Calman.

Distribution

Natal from 680 to 900 m.

DISTRIBUTION OF CERATOCUMATIDAE

With the family consisting of only seven species in two genera, it is not possible to draw many inferences from its distribution. It is worth noting, however, that all seven species appear to be confined to the Atlantic and southwestern Indian Ocean (including Kerguelen). They are cold- and deep-water forms, the depth at which they are found being reciprocal to the latitude, except in records from the deepest waters.

Anatomically, *Ceratocuma* appears to form a cline of species differing mainly in the sculpturing of the carapace but its distribution in the Atlantic is rather haphazard and available evidence shows no relationship between morphology and geographical distribution.

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6. SYSTEMATIC papers must conform to the *International code of zoological nomenclature* (particularly Articles 22 and 51).

Names of new taxa, combinations, synonyms, etc., when used for the first time, must be followed by the appropriate Latin (not English) abbreviation, e.g. gen. nov., sp. nov., comb. nov., syn. nov., etc.

An author's name when cited must follow the name of the taxon without intervening punctuation and not be abbreviated; if the year is added, a comma must separate author's name and year. The author's name (and date, if cited) must be placed in parentheses if a species or subspecies is transferred from its original genus. The name of a subsequent user of a scientific name must be separated from the scientific name by a colon.

Synonymy arrangement should be according to chronology of names, i.e. all published scientific names by which the species previously has been designated are listed in chronological order, with all references to that name following in chronological order, e.g.:

Family **Nuculanidae**

Nuculana (*Lembulus*) *bicuspidata* (Gould, 1845)

Figs 14–15A

Nucula (*Leda*) *bicuspidata* Gould, 1845: 37.
Leda plicifera A. Adams, 1856: 50.
Laeda bicuspidata Hanley, 1859: 118, pl. 228 (fig. 73). Sowerby, 1871: pl. 2 (fig. 8a–b).
Nucula largillierti Philippi, 1861: 87.
Leda bicuspidata: Nicklès, 1950: 163, fig. 301; 1955: 110. Barnard, 1964: 234, figs 8–9.

Note punctuation in the above example:
comma separates author's name and year
semicolon separates more than one reference by the same author
full stop separates references by different authors
figures of plates are enclosed in parentheses to distinguish them from text-figures
dash, not comma, separates consecutive numbers

Synonymy arrangement according to chronology of bibliographic references, whereby the year is placed in front of each entry, and the synonym repeated in full for each entry, is not acceptable.

In describing new species, one specimen must be designated as the holotype; other specimens mentioned in the original description are to be designated paratypes; additional material not regarded as paratypes should be listed separately. The complete data (registration number, depository, description of specimen, locality, collector, date) of the holotype and paratypes must be recorded, e.g.:

Holotype
SAM–A13535 in the South African Museum, Cape Town. Adult female from mid-tide region, King's Beach Port Elizabeth (33°51'S 25°39'E), collected by A. Smith, 15 January 1973.

Note standard form of writing South African Museum registration numbers and date.

7. SPECIAL HOUSE RULES

Capital initial letters

(a) The Figures, Maps and Tables of the paper when referred to in the text
e.g. '. . . the Figure depicting *C. namacolus* . . .'; '. . . in *C. namacolus* (Fig. 10) . . .'

(b) The prefixes of prefixed surnames in all languages, when used in the text, if not preceded by initials or full names
e.g. Du Toit but A. L. du Toit; Von Huene but F. von Huene

(c) Scientific names, but not their vernacular derivatives
e.g. Therocephalia, but therocephalian

Punctuation should be loose, omitting all not strictly necessary

Reference to the author should be expressed in the third person

Roman numerals should be converted to arabic, except when forming part of the title of a book or article, such as
'Revision of the Crustacea. Part VIII. The Amphipoda.'

Specific name must not stand alone, but be preceded by the generic name or its abbreviation to initial capital letter, provided the same generic name is used consecutively.

Name of new genus or species is not to be included in the title: it should be included in the abstract, counter to Recommendation 23 of the Code, to meet the requirements of Biological Abstracts.

JENNIFER DAY

SOUTHERN AFRICAN CUMACEA
PART 3
FAMILIES LAMPROPIDAE AND CERATOCUMATIDAE

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