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## TWO NEW SPECIES OF *TRIDENTELLA* (CRUSTACEA: ISOPODA: TRIDENTELLIDAE) FROM NAMIBIA

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### ABSTRACT

*Tridentella namibia* n. sp. and *T. benguela* n.sp. (Crustacea: Isopoda: Tridentellidae) are described from the shelf and slope off the coast of Namibia, south-western Africa. A key is provided to all the 16 species in the genus and distributional information tabulated.

Key words: Crustacea, Isopoda, Tridentellidae, *Tridentella*, taxonomy, key, new species, Namibia

### INTRODUCTION

Among a collection of isopods from Namibia donated to Museum Victoria, Melbourne, by Enrique Macpherson (Instituto del Ciencias de Mar, Barcelona, Spain), were several specimens of the isopod genus *Tridentella* Richardson, 1905. This genus had been considered a member of the family Corallanidae (e.g., Bruce et al., 1982) until Bruce (1984) established the monogeneric family Tridentellidae. The family is characterised by the presence of a maxillipedal endite and other mouthpart characters which differ substantially from those described for the corallanid genera (Delaney & Brusca, 1985). The genus comprises 14 species to which we now add a further two new species. A key to differentiate them is provid-

ed together with a tabulated summary of their known distributions (Table 1).

The drawings were prepared using a camera lucida. The specimens are deposited in the collection of Museum Victoria, Melbourne (NMV).

### SYSTEMATICS

#### TRIDENTELLIDAE Bruce, 1984

Tridentellidae Bruce, 1984: 448; 1988: 71-73;  
Delaney and Brusca, 1985: 728; Kensley and Schotte, 1989: 235; Wetzer et al., 1997: 36.

REMARKS. - The family, and its only genus, are similar to the Corallanidae but differ most obviously in the presence of a large maxillipedal

Table 1. Distribution of species of Tridentellidae.

Species	Distribution
<i>Tridentella acheronae</i> Bruce, 1988	New Zealand, 424–1006 m
<i>Tridentella benguela</i> n.sp.	Namibia, 285 m
<i>Tridentella cornuta</i> Kussakin, 1979	North-western Pacific, 20–50 m
<i>Tridentella glutacantha</i> Delaney & Brusca, 1985	California, 310–360 m
<i>Tridentella japonica</i> Thielemann, 1910	Sagami Bight, Japan, 600 m
<i>Tridentella laevicephalax</i> Menzies, 1962	southern Chile, 24 m
<i>Tridentella namibia</i> n.sp.	Namibia, 175–351 m
<i>Tridentella ornamenta</i> (Menzies & George, 1972)	Peru–Chile Trench, 907–935 m
<i>Tridentella quinicornis</i> Delaney & Brusca, 1985	California, 53 m
<i>Tridentella recava</i> Bowman, 1986	New York Bight, 100–300 m
<i>Tridentella saxicola</i> (Hale, 1925)	New South Wales, and Great Barrier Reef, eastern Australia, 137–146 m
<i>Tridentella sculpturata</i> Kussakin, 1955	North-western Pacific, 70–96 m
<i>Tridentella tangaroae</i> (Bruce, 1988)	New Zealand, 90–94 m
<i>Tridentella virginiana</i> (Richardson, 1900)	Virginia to Nova Scotia, 148 m
<i>Tridentella vitae</i> Bruce, 1984	Fiji, 360 m
<i>Tridentella ornata</i> (Richardson, 1911) (junior synonym: <i>T. williamsi</i> Delaney, 1990, see Kensley & Heard, 1997)	South-eastern USA, Gulf of Mexico, Caribbean Sea, 25–168 m

endite as well as a styliform maxilla 1 and scaled maxilla 2. Maxilla 2 in corallanids is no more than a minute lobe. The family differs from Cirolanidae in possessing a narrow rather than tri-dentate mandibular incisor and wholly distinctive mouthparts. Maxillae 1 and 2 and the maxilliped are fundamentally different from those of Cirolanidae. Maxilla 1 is similar to that of the Aegidae and Cymothoidae, while the maxilla 2 structure is unique. Aegidae have prehensile dactyli on pereopods 1-3.

*TRIDENTELLA* RICHARDSON, 1905

*Tridentella* Richardson, 1905: 161; Kussakin, 1979: 223; Delaney & Brusca, 1985: 729; Bruce, 1984: 448; Bruce, 1988: 73; Kensley & Schotte, 1989: 236 (type species *Cirolana virginiana* Richardson, 1900).

*Smicrostoma* Hale, 1925: 166 (type species *Smicrostoma saxicola* Hale, 1925).

REMARKS. - Fourteen species were known prior to this study and none is known from more than a few records. Bruce (1988) discussed differences in sculpture and pereopodal and mouthpart morphology between the 13 species known at that

time.

We present a key to the species based on published illustrations and literature.

KEY TO WORLD SPECIES OF *TRIDENTELLA*

- 1a. Body surface (tergites) smooth or at most with tubercles on head or carinae on pleotelson ..... 2
- b. Body surface with spines or tubercles on tergites .... 11
- 2a. With ornamentation on head ..... 3
- b. Without ornamentation on head ..... 7
- 3a. Head only with shallow elevations on posterior margin ..... *T. japonica*
- b. Head with prominent, well-separated tubercles ..... 4
- 4a. Head with 2 shallow elevations between eyes ..... *T. saxicola*
- b. Head with more than 2 shallow elevations between eyes ..... 5
- 5a. Head with 3 acute, anteriorly directed spines in male ..... *T. cornuta*
- b. Head with 4 or 5 tubercles ..... 6
- 6a. Head with 4 tubercles on head between eyes (close to anterior and posterior margins ..... *T. virginiana*
- b. Head with 5 tubercles (female without) .. *T. quinicornis*
- 7a. With pair of strong triangular posterior pleotelsonic spines ..... *T. recava*

- b. Without strong posterior pleotelsonic spines ..... 8 (female, 16 mm); off Orange River (Cruise BENGUELA IX, trawl sample P-41) (29°23.4'S 014°41.8'E), 285-285 m, E. Macpherson, 20-VI-1986, NMV J27635 (ovigerous female, 18 mm).
- 8a. Pleotelson without ridges or grooves ... *T. laevicephalax*  
 b. Pleotelson with ridges and/or grooves ..... 9
- 9a. Pleotelson with only carinae, but no lateral serrations ..... 10  
 b. Pleotelson with lateral margin strongly serrated on both sides of longitudinal carinae ..... *T. vitae*
- 10a. Pleotelson with 2 distinct longitudinal carinae .....  
 ..... *T. tangaruae*  
 b. Pleotelson with 5 pairs of slight and shallow transverse carinae ..... *T. benguela* n.sp.
- 11a. Tergites covered with similar small tubercles, especially posteriorly ..... 12  
 b. Tergites covered with more robust tubercles or strong spines posteriorly than anteriorly ..... 13
- 12a. Tergites covered with tiny nodules; maxillipedal endite long, reaching or surpassing tip of last palp article .....  
 ..... *T. acheronae*  
 b. Tergites highly sculptured, with many small, blunt spines; maxillipedal endite reaching almost distal aspect of fourth palp article ..... *T. namibia* n.sp.
- 13a. Tergites and pleotelson strongly covered with blunt spines; pleotelson mediodorsally with 5 distinct longitudinal carinae ..... *T. sculpturata*  
 b. Tergites of last pereonites and pleonites with blunt spines; pleotelson with spines and lateral incisions..14
- 14a. Pleotelson almost 3 times as wide as long; uropods shorter than apex ..... *T. ornamenta*  
 b. Pleotelson only slightly wider than long ..... 15
- 15a. Male with distinct rostrum and spinose pleotelson, uropod longer than pleotelson, each eye occupying one-quarter of head; female without rostrum, pleotelson with broad triangular plates, uropods about as long as pleotelson ..... *T. glutacantha*  
 b. Male without distinct rostrum, pleotelson with broad triangular plates laterally, uropods distinctly longer than pleotelson, each eye occupying one-third of head; female unknown ..... *T. ornata*

### ***Tridentella namibia* n.sp.**

Figs. 1-4

#### MATERIAL

Holotype: NAMIBIA, off Orange River (Cruise BENGUELA XII, trawl sample P-53) (28°24.5'S 014°29.0'E), 348-351 m, inside sponge, E. Macpherson, 6-XII-1988, NMV J27636 (male, 19 mm).

Paratypes: NAMIBIA, off Orange River (Cruise BENGUELA VIII, trawl sample P-39) (29°04.4'S 015°08.4'E), 175 m, between stones, E. Macpherson, 16-VII-1985, NMV J27633

DESCRIPTION OF HOLOTYPE MALE. - Length 19 mm; body 1.9 times as long as wide (Fig. 1A); head with two small elongate frontomesial elevations and two smooth ones more posteriorly between eyes. Eyes each occupying one-third of free head margin, dark-brown in fixed specimens, broader anteromedially than posterolaterally.

Pereonite 1 slightly narrower than fourth and fifth, fused with head. Pereonites 2-6 about equal in length (measured on lateral margin) and width, pereonite 7 shorter. Pereonites increasingly tuberculate posteriorly; all with transverse row of blunt tubercles along posterior margin; each with transverse row submarginally, less pronounced mid-dorsally especially on anterior pereonites, leading to broad tuberculate region over lateral third of tergite. Coxae with increasingly acute posteroventral corner posteriorly, with oblique ridge; coxae 4-7 tuberculate especially along posterior margin.

Pleonite 1 narrowest and shortest, largely concealed by pereonite 7, with single transverse row of tubercles; pleonites 2-5 with increasing numbers of tubercles over dorsal surface. Pleotelson almost semicircular in dorsal view, with prominent tuberculate elevation anteriorly, separated from posterior region by deep ridge; posterior area with median row and about six pairs of longitudinal rows of tubercles, less well defined laterally; without robust setae.

Frontal lamina (Fig. 2A) longer than wide, laterally excavate; clypeus broadly triangular, dorsally vaulted, and ventrolaterally extended.

Antenna 1 (Fig. 2B) peduncular article 1 widest, with ventrodiscal pappose seta, article 2 shortest, with two medial simple setae, article 3 longer combined lengths of articles 1 and 2, with one distal pappose and three simple setae; flagellum extending to posterior of pereonite 1, with at least 20 articles, article 1 small, ring-like, with one pappose seta, article 2 more than 7 times as long as first, with one simple seta, following flagellar articles slightly narrowing, article 3 with two simple setae, following with 1 aesthetasc and three simple setae.

Antenna 2 (Fig. 2C) peduncular article 1 short,

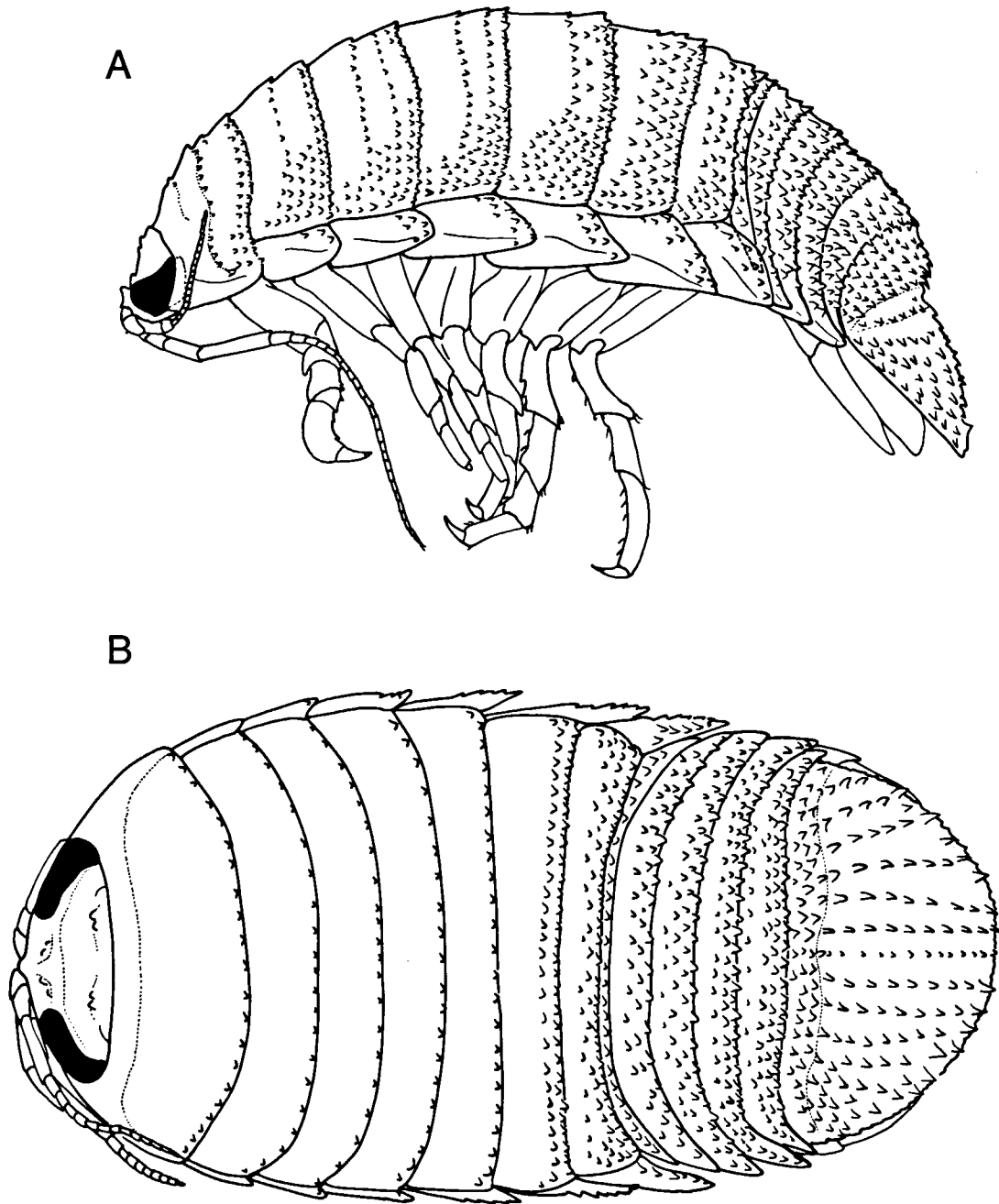


Fig. 1. *Tridentella namibia* n.sp. A, holotype male of 19 mm length in dorsal view. B, paratype female (16 mm) in lateral view.

ring-like, with two simple short setae, article 2 about as long as first, with three simple distal setae, article 3 as long as 1-2 together, with two pappose and several simple setae, article 4 about as long as 1-3 together, with three pappose setae and small hairs, some distally branched, article 5 longest, about 1.5 times as long as fourth, with many distal simple setae; flagellum of 28 articles,

article 1 broadest, with three simple apical setae, article 2 with two pairs of simple setae, following articles slightly narrowing and shortening, with groups of three apical simple setae.

Mandible (Figs. 2D, E) with incisor narrow, acute; molar process, acutely triangular, setulate margin at about 150° to incisor, with small apical spines and simple setae along distal margin;

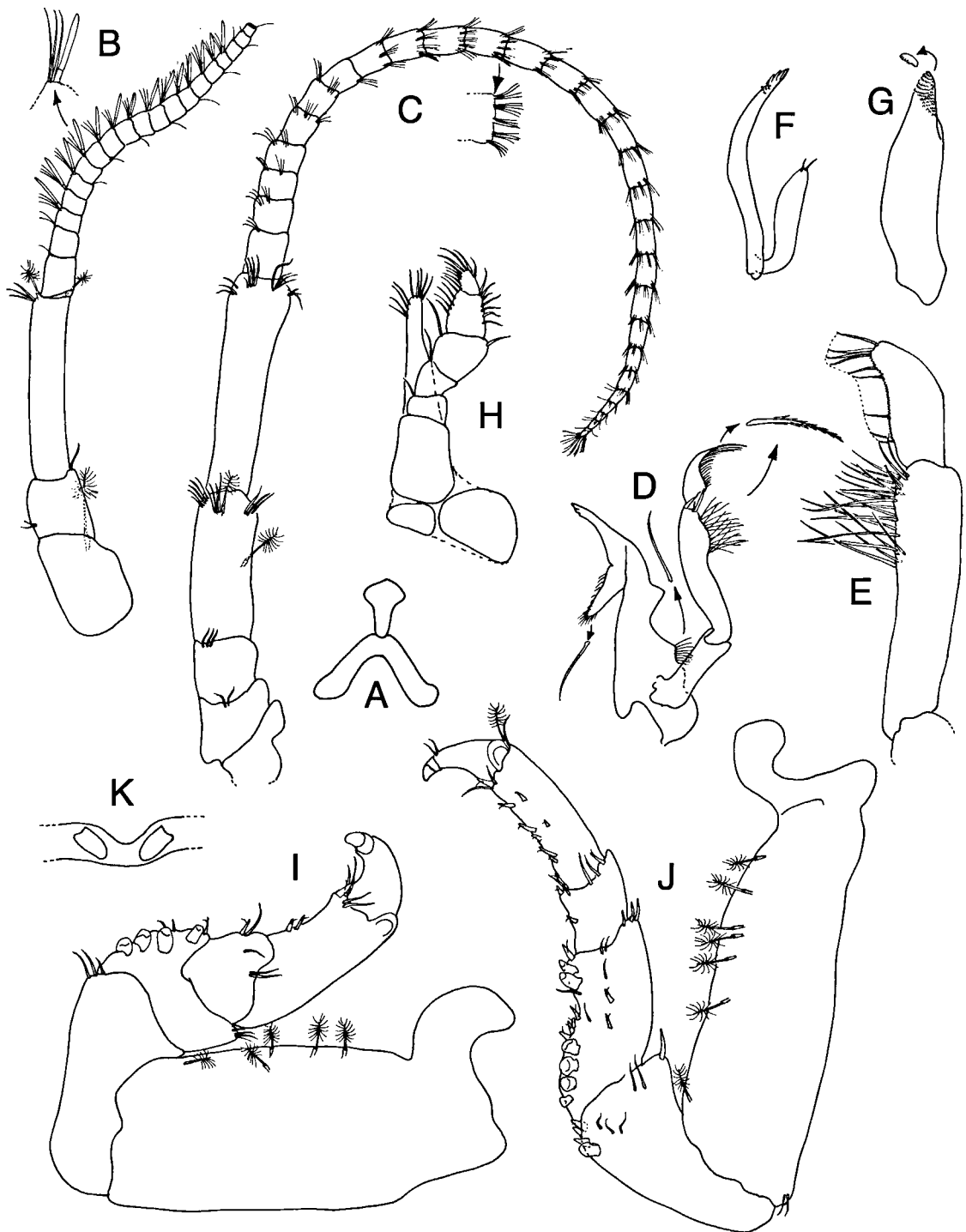


Fig. 2. *Tridentella namibia* n.sp., holotype male. A, frontal lamina and clypeus. B, antenna 1. C, antenna 2. D, right mandible. E, palp of left mandible. F, maxilla 1. G, maxilla 2. H, maxilliped. I, pereopod 1. J, pereopod 2. K, penial processes on pereonite 7.

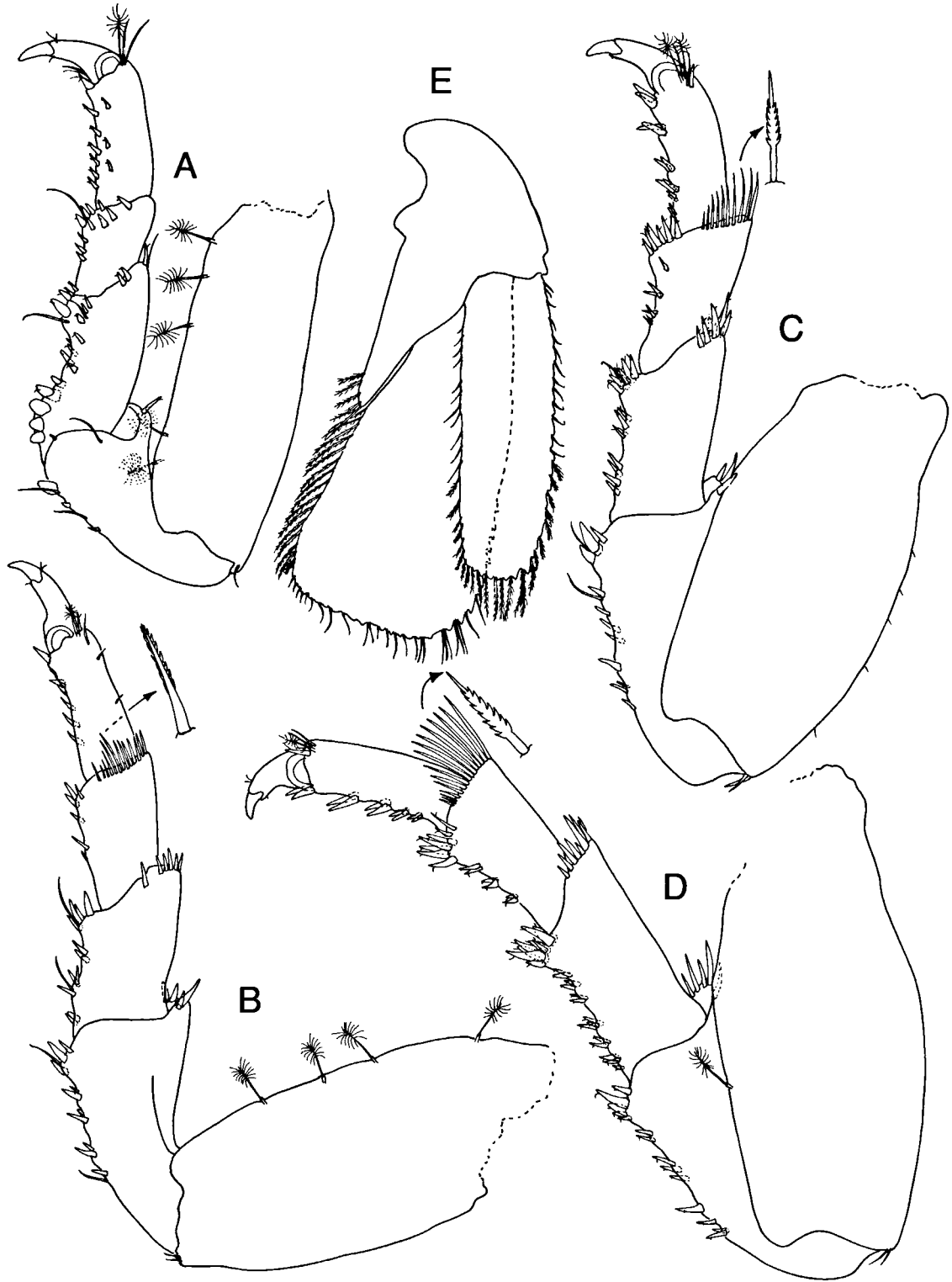


Fig. 3. *Tridentella namibia* n.sp., holotype male. A, pereopod 3. B, pereopod 4. C, pereopod 5. D, pereopod 6. E, uropod.

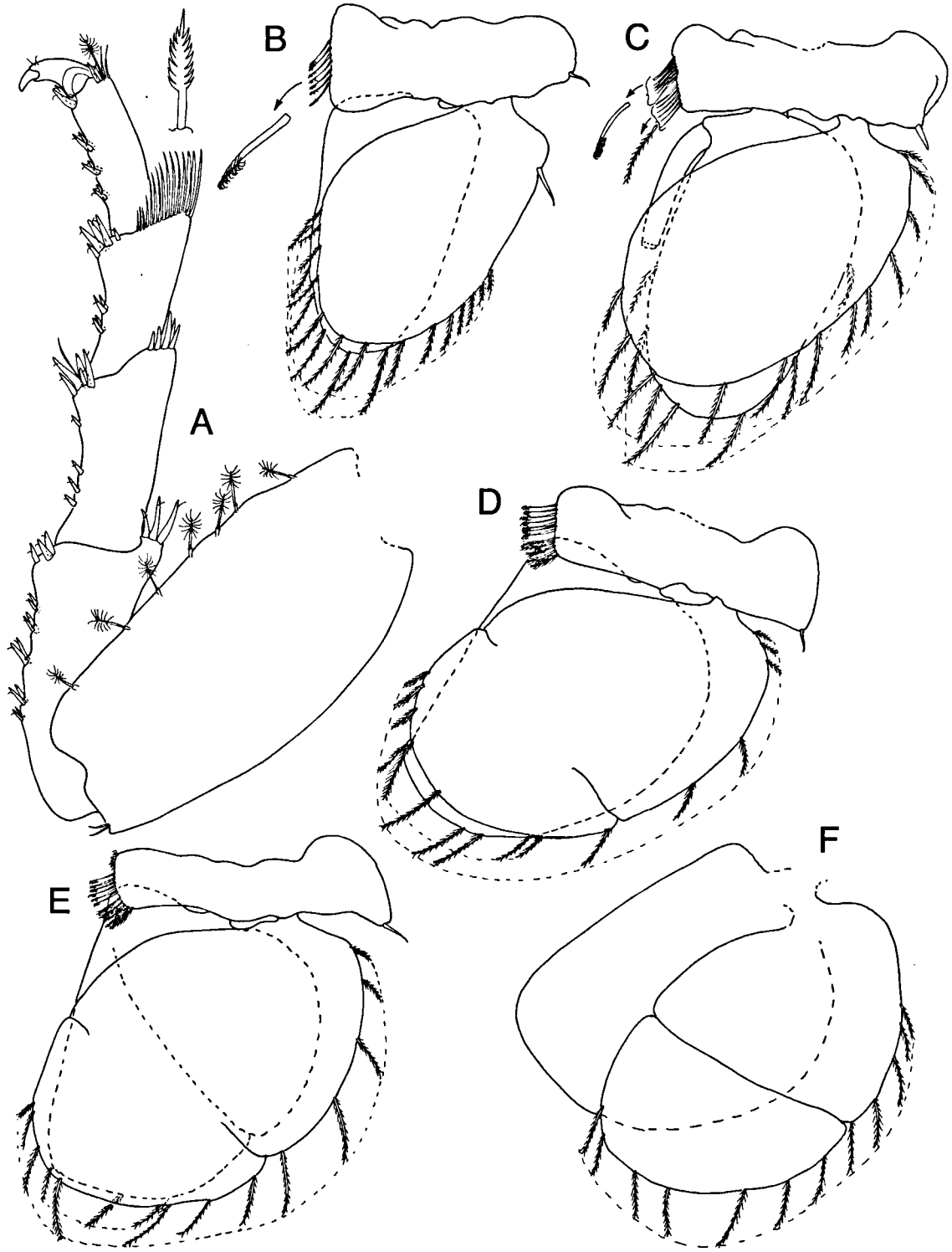


Fig. 4. *Tridentella namibia* n.sp., holotype male. A, pereopod 7. B, pleopod 1. C, pleopod 2. D, pleopod 3. E, pleopod 4. F, pleopod 5.

lacinia mobilis absent; palp article 1 slightly longer than third, without setation, article 2 longest, with setae along distal half lateral margin, article 3 weakly falcate, with lateral row of ca. 36 setae.

Maxilla 1 (Fig. 2F) inner lobe with two apical setae; outer lobe slender, styliform, with five acute spines and few small scales distally. Maxilla 2 (Fig. 2G) slender, with distal rows of small, saw-like rasping scales. Maxilliped (Fig. 2H) without epipod; long, lamellar endite extending to palp article 4, distally with simple setae; palp articles 1-3 each with mesial seta, article 4 with seven lateral setae and five mesial setae, article 5 with seven mesial and distal setae.

Pereopod 1 (Fig. 2I) shorter and more robust than others; pereopods 2-7 increasing in length, basis becoming wider posteriorly. Pereopod 1 basis broad, with five pappose setae along anterior margin; ischium with few distal setae; merus with four bluntly-hooked robust setae on posterior margin; carpus triangular with one acute robust seta and four simple setae; propodus with two small acute robust setae on palm, one distally opposing dactylus; dactylus strongly curved, with conical unguis.

Pereopod 2 (Fig. 2J) ischium and merus with one and six bluntly hooked robust setae along posterior margin, interspersed with simple short robust setae; carpus cylindrical, with short robust setae; propodus with eight robust setae, irregularly placed; dactylus curved.

Pereopod 3 (Fig. 3A) ischium-propodus with irregular arrangement of stout and more conical robust setae along posterior margin and mesial face; dactylus curved.

Pereopods 4-7 (Figs. 3B-D and 4A) with basis broad (2.0 times as long as wide in pereopod 6, slightly narrower in others), ischium-propodus with irregular arrangement of more conical robust setae along posterior margin, concentrated in dense clusters on posterodistal angles of ischium, merus and carpus, especially of posterior limbs; anterodistal margins of ischium and merus promoted, with transverse row of long robust setae, and of carpus with transverse row of pectinate setae; propodus narrower than carpus, especially posteriorly; dactylus half as long as propodus, gently curved.

Penial processes (Fig. 2K) flattened tapering

lobes, separated by a broad boss on posterior margin of pereonite 7.

Pleopods 1-4 (Figs. 4B-E) with peduncle having long mesial coupling hooks and simple lateral seta, 2-4 with mesial setae. Pleopod 1 exopod broader than endopod, with prominent seta near proximolateral angle, both rami with fringe of long plumose setae along distal margins. Pleopod 2 exopod broader than endopod, oval, with many long plumose setae along lateral and distal margins; endopod with plumose setae along distal margin; with appendix masculina (broken off at mid length of endopod). Pleopod 3 exopod broader than endopod, oval, with partial transverse suture, with many long plumose setae along lateral and distal margins; endopod with fringe of plumose setae along distal margin. Pleopod 4 exopod broader than endopod, oval, with partial transverse suture, with many long plumose setae along lateral and distal margins; endopod with transverse suture, with plumose setae along distal margin. Pleopod 5 (Fig. 4F) exopod broader than endopod, oval, with complete transverse suture, with long plumose setae along lateral and distal margins; endopod without transverse suture, without plumose setae.

Uropod (Fig. 3E) not reaching apex of pleotelson; peduncle extended mesially, with five distomesial pappose setae; endopod 2.0 times as long as greatest width, distally expanded, truncate, distally and distolaterally with small, blunt teeth, short simple setae situated in notches between teeth, mesially with row of long pappose setae; exopod 0.77 length of endopod, elongate-oval, 3.2 times as long as wide, distally and distolaterally with pappose setae, laterally and mesially with simple ones, distally setae also situated in notches between blunt spines; without robust setae.

**FEMALE.** - Ovigerous female (18 mm; lateral view in Fig. 1B) differs from the male in having extensive fields of blunt tubercles laterally on anterior pereonites.

**ETYMOLOGY.** - For Namibia off whose coast the species was taken (noun in apposition).

**REMARKS.** - *Tridentella namibia* n.sp. belongs to the group of sculptured species. It is similar to *T.*



*acheronae* from New Zealand in possession of numerous short even tubercles over most of the body. It differs in lacking the two longitudinal carinae seen on the pleotelson of *T. acheronae*. The maxillipedal endite of *T. namibia* n.sp. is shorter and more setose than in *T. acheronae*. The only other species from the region, *T. benguela* n. sp. described below, lacks significant sculpture.

### ***Tridentella benguela* n.sp.**

Figs. 5-7

#### MATERIAL

Holotype: NAMIBIA, off Orange River (Cruise BENGUELA IX) (29°23.4'S 014°41.8'E), 285 m, with a holothurian between stones, trawl sample P-41, E. Macpherson, 6-II-1986, NMV J27634 (1 juvenile, 7 mm).

Paratype: collected with holotype, NMV J47043 (1 juvenile, 5 mm).

DESCRIPTION OF HOLOTYPE JUVENILE . - (Manca II). - Length 7 mm; body twice as long as wide (Figs. 5A-C); head smooth. Eyes large, pinkish in fixed specimen, broader anteromedially than posterolaterally, of many ocellae. Pereonite 1 longest and narrowest but only slightly narrower than fourth and fifth, fused with head. Pereonites 2-6 about equal in length (measured on lateral margin) and width, pereonite 7 shorter. Pereonites smooth. Coxae with increasingly acute posteroventral corner posteriorly, with oblique ridge, otherwise smooth. Pleonite 1 narrowest and shortest; pleonites smooth. Pleotelson almost semicircular in dorsal view, with seven pairs of obscure radiating ribs, most obvious closer to midline.

Frontal lamina (Fig. 6A) longer than wide, laterally excavate; clypeus broadly triangular, dorsally vaulted, and ventrolaterally weakly extended.

Antenna 1 (Fig. 6B) peduncular article 1 broadest, article 2 shorter, with medial simple seta, article 3 longer than first and second together, with distal pappose and three simple setae; flagellum with eight articles, article 1 small, ring-like, with one pappose seta, article 2 longer than first, with one simple seta, following flagellar articles slightly narrowing, article 3 with simple seta, following with aesthetascs and simple setae.

Antenna 2 (Fig. 6C) peduncular article 1 short (not figured), article 2 with two simple distal setae,

article 3 as long as 2, with two several simple setae, article 4 longer, with three pappose setae and small setae, article 5 longest, about 1.5 times as long as fourth, with many distal setae; flagellum >eight articles (broken), article 1 broadest, article 2 with simple setae, following articles slightly narrowing and shortening, with groups of three apical simple setae.

Mandible (Figs. 6D, E) with incisor narrow, acute; molar process, acutely triangular, setulate margin almost in line with incisor, with small apical spines and simple setae along distal margin; lacinia mobilis absent; article 1 of palp slightly longer than third, without setation, article 2 longest, with setae along distal half lateral margin, article 3 weakly falcate, with lateral row of setae. Maxilla 1 (Fig. 6F) inner lobe (not dissected); outer lobe slender, styliform, with five acute spines and few small scales distally. Maxilla 2 (Fig. 6G) slender, with distal rows of small, saw-like rasping scales. Maxilliped (Fig. 6H) without epipod; long, lamellar endite extending to palp article 4, distally with simple setae; palp articles 1-3 each with mesial seta, article 4 with three lateral setae and six mesial setae, article 5 with six mesial and distal setae.

Pereopod 1 (Fig. 6I) shorter and stronger than others; pereopods 2-7 increasing in length, with basis becoming wider posteriorly. Pereopod 1 basis broad, with four pappose setae along anterior margin; ischium with few distal setae; merus with three bluntly hooked robust setae on posterior margin; carpus triangular; propodus with two small robust setae on palm, one distally; dactylus hooked, with conical unguis. Pereopod 2 (Fig. 6J) ischium and merus with two and eight blunt robust setae along posterior margin; carpus cylindrical, with short robust simple and pectinate setae; propodus with three robust setae, evenly spaced; dactylus hooked, unguis fine. Pereopod 3 (Fig. 6K) ischium-propodus with irregular arrangement of conical robust setae along posterior margin and mesial face plus pectinate setae distally on merus; dactylus curved. Pereopods 4-6 (Figs. 6L and 7A, B) with basis moderately narrow (2.7 times as long as wide in pereopod 6, slightly narrower in others), ischium-propodus with irregular arrangement of more conical robust setae along posterior margin, concentrated in dense clusters on posterodistal angles of ischi-

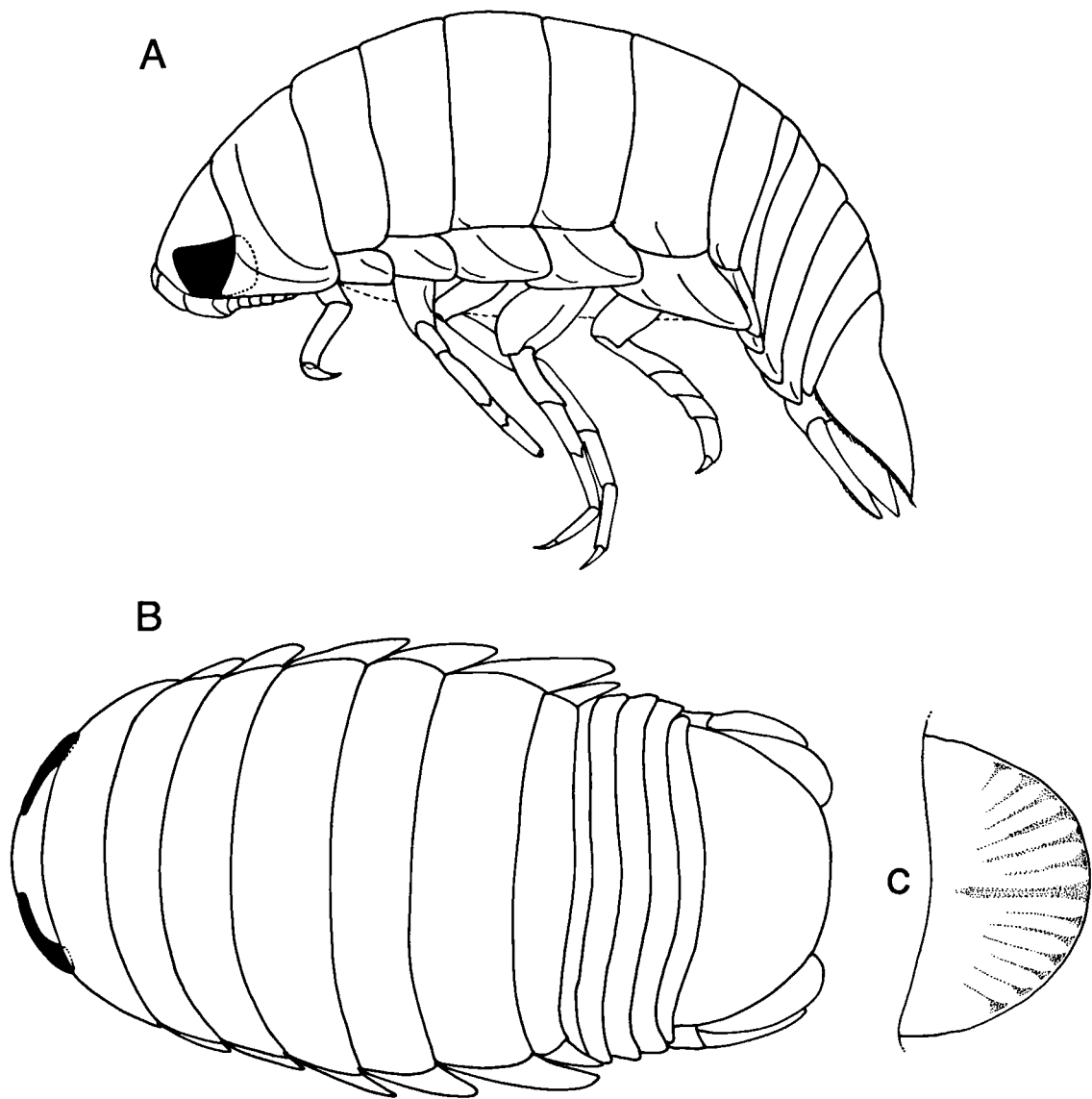


Fig. 5. *Tridentella benguela* n.sp., juvenile (manca II) of 7 mm length. A, in dorsal view. B, in lateral view. C, detail of pleotelson with indication of shallow grooves.

um, merus and carpus, especially of posterior limbs; anterodistal margins of ischium and merus promoted, with transverse row of long robust setae, and of carpus with transverse row of pectinate setae; propodus scarcely narrower than carpus; dactylus half as long as propodus, gently curved. Pereopod 7 of manca (Fig. 7C), not fully developed.

Pleopods 1-5 (Figs. 7D-H) as described for *T. namibia* n.sp. except for absence of appendix masculina and absence of sutures on exopods of

pleopods 3-5.

Uropod (Fig. 7I) reaching apex of pleotelson; peduncle extended mesially, with five distomesial pappose setae; endopod 1.8 times as long as greatest width, distally expanded, curved-truncate, distally and distolaterally with small, blunt teeth, short simple setae situated in notches between teeth, mesially with row of long pappose setae; exopod 0.81 length of endopod, elongate-oval, 2.7 times as long as wide, distally and distolaterally with pappose setae, laterally and mesial-

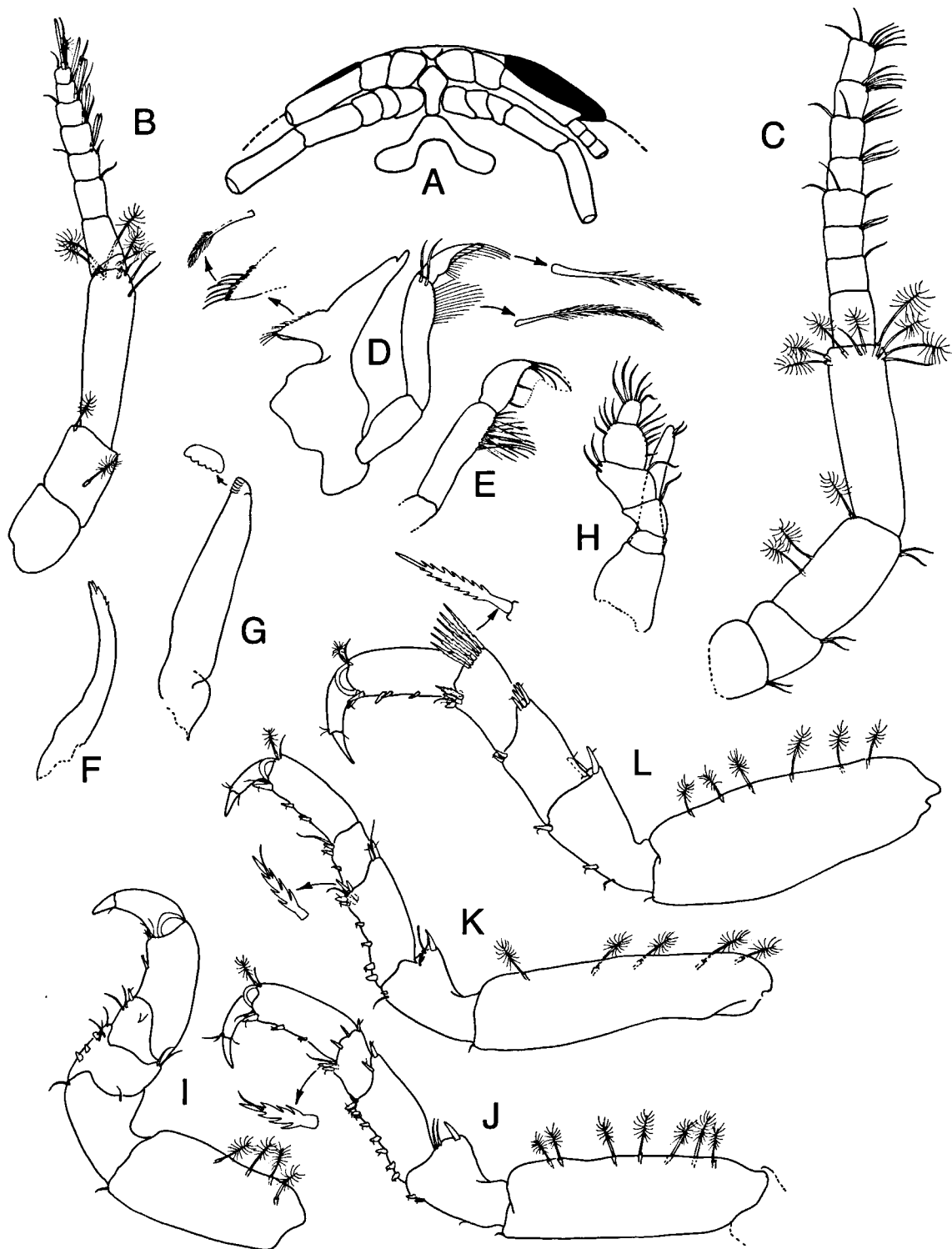


Fig. 6. *Tridentella benguela* n.sp., juvenile (manca II). A, frontal view of frontal lamina and clypeus. B, antenna 1. C, antenna 2. D, left mandible. E, palp of right mandible. F, maxilla 1. G, maxilla 2. H, maxilliped. I, pereopod 1. J, pereopod 2. K, pereopod 3. L, pereopod 4.

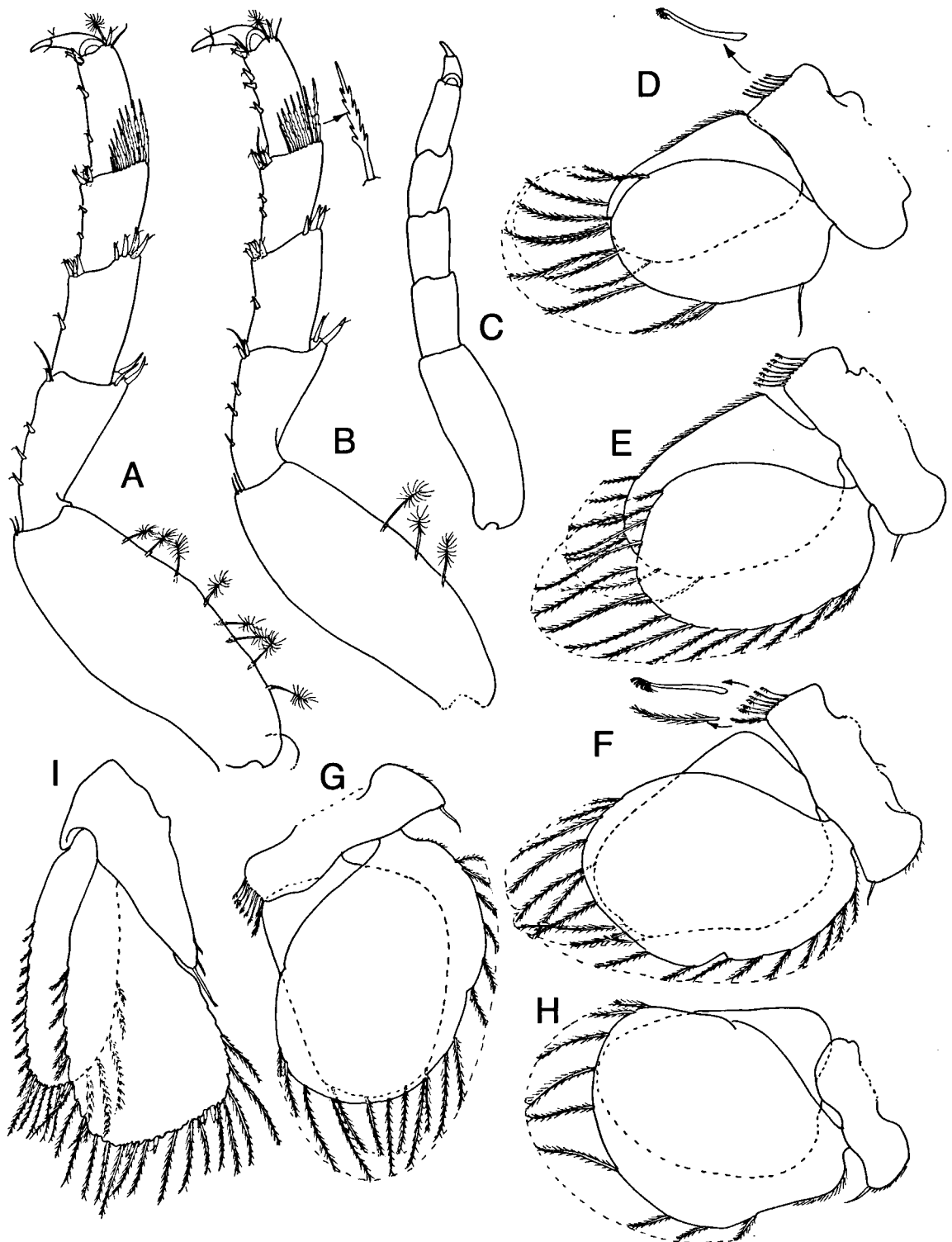


Fig. 7. *Tridentella benguela* n.sp., juvenile (manca II). A, pereopod 5. B, pereopod 6. C, pereopod 7. D, pleopod 1. E, pleopod 2. F, pleopod 3. G, pleopod 4. H, pleopod 5. I, uropod.

ly with simple ones, distally setae also situated in notches between blunt spines.

ETYMOLOGY. - For the Benguela Current flowing along the coast of Namibia (noun in apposition).

REMARKS. - While the new species is based on two juveniles from one of the same samples as the previous species, its sculpture is distinctive. We do not believe they are manca of *T. namibia* n.sp. It seems unlikely that the radiating pattern of ridges on the pleotelson of *T. benguela* n.sp. could develop with growth into the more parallel even rows of spines seen in *T. namibia* n.sp. The eyes are pinkish rather than dark brown and the uropodal exopod is broader. It is not the only species with weak sculpture. *Tridentella benguela* n.sp. most closely resembles *T. vitae* Bruce, 1984 and *T. tangaroae* Bruce, 1988 in having a smooth pereon. Both of these species, from Fiji and New Zealand, have small denticles on the pleon, obvious sculpture and lateral serrations on the pleotelson. The pleon of *T. benguela* n.sp. is smooth and the radiating pattern on ridges on the pleotelson quite obscure. *Tridentella recava* Bowman, 1986 also has a smooth dorsum but its pleotelson is characterised by two strong caudal acute spines, lacking in *T. benguela* n.sp.

## DISCUSSION

The new material was collected by trawl. Other species have been collected from various benthic habitats, including directly from the host fish (Bruce, 1984, gill arch of *Pristipomoides flavipinnis* [Lutjanidae]). There are several records of species being ectoparasites of fishes and this is probably their prime feeding strategy (Delaney & Brusca, 1985). Kensley & Heard (1997) reported *T. ornata* from the nasal cavities of groupers (species of Sparidae and Serranidae) and summarised records of ectoparasitism in other species. Bowman (1986) recorded *Tridentella recava* from the burrows of tilefish (*Lopholatilus chamaeloniceps* Goode & Bean), remarking on the similarity of the molar process of species of *Tridentella* to that of Cirolanidae, known benthic scavengers. The molar is a triangular lobe but lacks the prominent row of articulating spines seen in cirolanids.

Bruce (1988) discussed briefly species groupings in the genus. His groups were based on the most obvious character difference, between strongly sculptured and essentially smooth species. We have used these differences in the key, but some species do not fall clearly into one class or the other. Some of those species with a smooth pereon have some sculpture on the pleon and/or pleotelson. The distributions of sculptured and non-sculptured species overlap and do not reflect a biogeographic separation (see the map in Delaney & Brusca, 1985).

## ACKNOWLEDGEMENTS

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