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## A new genus with three new species of copepods from the family Diaixidae (Crustacea: Calanoida), and a redefinition of the family

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Plankton samples taken in the Gulf of Carpentaria, Australia, yielded material of a new genus containing 3 new species: *Anawekia spinosa* gen. nov. et sp. nov., *A. robusta* sp. nov. and *A. bilobata* sp. nov., which are described herein. The family Diaixidae now contains 12 described species in 2 genera, 9 being in the genus *Diaixis*. It is noted that 3 of the *Diaixis* species (including the type species) share some features which are not shared with the remaining 6 species, and that these latter species should probably be placed into a third genus. An amplified redefinition of the family is given.

KEYWORDS: *Anawekia* gen. nov., taxonomy, Copepoda, Diaixidae, Australia.

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### Introduction

During the course of studies of the copepod fauna of the Gulf of Carpentaria we have found a new genus and 3 new species belonging to the family Diaixidae.

The family previously contained the single genus *Diaixis* Sars. In his definition of this genus, Sars (1903) included the two species *D. pygmaea* (T. Scott, 1894) and *D. hibernica* (A. Scott, 1896). Subsequently, Grice and Hulsemann (1970) described a single female taken on the continental slope south of Woods Hole, Massachusetts as *D. asymmetrica*. This species differs grossly from Sars' definition (1903) of the genus and family. Bradford *et al.* (1983), in their revision of the family, modified the definition to allow proper inclusion of *D. asymmetrica*. We feel that the family definition is still incomplete and unsatisfactory. We have reviewed the current status of the family, and provide an expanded redefinition to include all known species including those in the new genus described in this paper.

### Materials and methods

All material was collected using plankton nets with a mesh size of 140  $\mu\text{m}$  towed in a stepped-oblique hauls from near the sea bottom to the surface. Dissections, measurements and drawings were made in glycerine/water lightly stained with chlorazol black, and drawings were made from a Leitz HM-LUX with the aid of a camera lucida.

### Remarks

Prior to the present study, nine species had been included in the single genus *Diaixis*. In addition to the three mentioned above, there are *D. durani* Estrada, 1972; *D. tridentata* Andronov, 1974 (female only known); *D. gambiensis*, Andronov, 1979; *D. helenae* Andronov, 1979; *D. trunovi* Andronov, 1979; and *D. centrura*, Connell, 1981.

Estrada (1972) described only the male of *D. durani*, but later Andronov (1979) described what he believed to be the female of that species. It is, however, very doubtful that Andronov's female is conspecific with the male described by Estrada (1972). The two descriptions indicate gross differences in the shape of the body, and in segmentation and setation of the second antenna, mandible, first maxilla, second maxilla and maxilliped. The head is fused with the first pedigerous somite in the male but is separated in Andronov's description (1979) of the 'female'. Even the setal formula of the endopod of the first leg differs.

Bradford *et al.* (1983) redefined the genus *Diaixis*, incorporating the descriptions of Sars (1903), Andronov (1974) and Grice and Hulsemann (1970). This definition, however, has many discrepancies if all nine species mentioned above are to be included into the single genus *Diaixis*. Generic characteristics such as the first antenna being 23-segmented in the males, and the presence of a row of comb-like spines on the basipod of the male, are found only in three of the above species namely *D. durani sensu* Estrada (*loc. cit.*), *D. hibernica* and *D. pygmaea*. Furthermore, only these three species share the common characteristic of having the head fused with the first thoracic somite, and the sensory filaments on the first segment of the maxilliped absent. Bradford (personal communication) accepts the possibility of there being more than one genus in this family but could only deal with this group very briefly in her (1983) paper because of shortage of material at that time.

The existing species of *Diaixis* thus fall into two groups: the *pygmaea* group hereafter called the *Diaixis s.s.* group because the type species is contained therein, and the *centrura* group or *Diaixis s.l.* The two groups are differentiated on a set of characters as follows:

#### *pygmaea* group

Head fused with 1st thoracic somite  
 2nd antenna exopod 6-segmented  
 maxilla without bulb type aesthetascs  
 maxilliped without aesthetascs  
 male leg 5 with comblike spines on coxa  
 male 1st antenna 23-segmented

#### *centrura* group

Head and 1st thoracic somite separated  
 2nd antenna exopod 7-segmented  
 maxilla with bulb type aesthetascs  
 maxilliped 1st segment with aesthetascs  
 male leg 5 without comblike spines on coxa  
 male 1st antennae 24-segmented

*Diaixis s.s.* includes three species, i.e., *D. durani*, *D. hibernica* and *D. pygmaea*. *Diaixis s.l.* includes five species i.e., *D. asymmetrica*, *D. centrura*, *D. helenae*, *D. gambiensis* and *D. trunovi*. The authors consider that this latter group should be

placed in a distinct genus within the family, but this formal step awaits examination of further type materials. *Diaixis tridentata* is not allocated to either group at this stage for knowledge of this species is incomplete.

### Redefinition of the Family Diaixidae

Body short and robust; head and 1st pedigerous somite fused or separated; anterior border of head vaulted in lateral view; rostrum may be divided, with a pair of very fine filaments. Fourth and 5th pedigerous somites separated. Urosome short; 4 somites in female, 5 in male. Caudal rami short, with 4 subequal apical setae. First antenna slender, similar in both sexes, furnished or not with aesthetasc-type setae. Second with short endopod. Mandibular blade without expanded apex; mandibular palp with small endopod. First maxilla with or without sensory filaments. Sensory filaments on second maxilla usually vermiform, both vermiform and bulbous types present. Maxilliped with or without sensory filaments. Swimming legs slender, with or without spinules on anterior and posterior surfaces. Fifth leg absent in females; in males, uniramous, large, complicated and sometimes chelate.

In the present study three new species of copepod were found which have the characteristics of this family, but which grossly differ from *Diaixis s.s.*, and from all other species known in the family. A new genus, created to accommodate these species, is described below.

### *Anawekia* gen. nov.

Body small in size ( $<< 1$  mm), robust, oval in dorsal view. Head separated from pedigerous somites. In lateral view anterior margin of head curves almost at right angles to dorsal margin. Thorax with 5 free somites, urosome of 4 somites in females and 5 in males. Urosome short, 0.25 length of prosome. Furcal ramus with 4 subequal apical setae. First antenna 24-segmented. Second antenna exopod 7-segmented, twice length of endopod. Mandibular blade large and with complex cutting edges. Vermiform sensory filaments present on 2nd maxilla and maxilliped. First to 4th legs of both sexes biramous. Legs usually covered with spinules on both anterior and posterior surfaces. First leg endopod 1-segmented. Outer marginal spine on first exopod segment present only in females. Endopod of 2nd leg 2-segmented, 3rd and 4th legs 3-segmented. Fifth leg absent in females. Male 5th legs uniramous, asymmetrical, chelate and with common basipod. Right leg 2-segmented, terminal segment with digitiform process. Left leg 3-segmented, ends in chela.

*Type species.* *Anawekia spinosa* sp. nov.

*Etymology.* The generic name is derived from a Malay phrase 'Anak wek' meaning very small.

### Remarks

The genus *Anawekia* can be distinguished from *Diaixis s.s.* by the following combination of features: there are vermiform sensory filaments present on the 1st segment of the maxilliped in *Anawekia*, but not in *Diaixis s.s.*; the head is separated from the 1st pedigerous somite in *Anawekia*, fused in *Diaixis s.s.*; the male 1st antenna is 23-segmented in *Diaixis s.s.*, 24-segmented in *Anawekia*; the 5th leg of male has a row of comb-like spines on the basipod in *Diaixis s.s.*, these spines being absent in *Anawekia*. The new genus can be distinguished from *Diaixis s.l.* by the following combination of features: 2nd antenna exopod 6-segmented in *Anawekia*, 7-segmented

in *Diaixis s.l.*; bulb type aesthetascs are present on the maxilla of *Diaixis s.l.*, absent in *Anawekia*.

*Anawekia spinosa* sp. nov.

(Figs 1–3)

*Type material.* Deposited in the Queensland Museum as follows: HOLOTYPE 1 ♀ of total length 0.77 mm (QM W12080); ALLOTYPE 1 ♂ of total length 0.73 mm (QM W12081); PARATYPES 1 ♂ and 1 ♀ (QM W12082).

*Type locality.* Gulf of Carpentaria, latitude 16°30'S, longitude 140°0'E. Water depth 29 m.

*Material examined.* All material found in samples as detailed in Rothlisberg *et al.* (1982). 2 ♀ ♀, 1 ♂, sample no. 219A4, lat. 12°40.7'S, long. 141°30.5'E, 3 May 1976; 3 ♀ ♀, sample no. 270A8, lat. 16°0.0'S, long. 141°15.4'E, 29 June 1976; 1 ♀, sample no. 325A4, lat. 13°53.0'S, long. 139°57.0'E, 4 September 1976; 1 ♀, sample no. 423A4, lat. 17°15.0'S, long. 140°0.0'E, 13 September 1976; 1 ♀, sample no. 437A4, lat. 14°0.0'S, long. 141°25.5'E, 6 November 1976; 2 ♀ ♀, sample no. 708A3, lat. 14°0.0'S, long. 141°26.0'E, 19 March 1977; 2 ♂ ♂, 1 ♀, sample no. 870A5, lat. 17°0.0'S, long. 140°0.0'E, 29 March 1977; 3 ♀ ♀, sample no. 880A3, lat. 12°41.0'S, long. 141°33.0'E, 3 May 1977; 3 ♀ ♀, 1 ♂, sample no. 1056P, lat. 16°30'S, long. 140°10'E, 24 September 1978.

*Description of female* (Figs 1A–G and 2A–H)

*Size.* Total length (TL) from tip of prosome to end of furcal rami 0.77 mm ( $n = 15$ ) ranging from 0.75 to 0.81 mm (SD 0.0214).

Body very robust, compact, oval in dorsal view, relatively short urosome (Fig. 1A). Prosome length to width ratio 1.83:1, greatest width at midlength of prosome. Prosome to urosome length ratio 4.07:1. Head separated from pedigerous somites. In lateral view anterior margin of head curved at almost right angle from dorsal margin (Fig. 1B). Thorax of 5 free somites, dorsal surface with additional convex shaped margins posterior to 1st pedigerous somite. Posterior prosomal margin asymmetrical. Left margin almost rounded in dorsal view, with a slight dorsally directed hump in lateral view (Fig. 1C). Right margin with very prominent posteriorly directed spinous process (Fig. 1B). Tuft of very fine hairs present at midpoint of both margins laterally.

Urosome 4-segmented. Genital somite longest. Relative lengths of somites and furcal rami, not counting telescoped parts, as follows:

Somite:	1	2	3	4	furcal rami	
Proportions:	40	13	11	14	22	= 100

Caudal furca symmetrical with 4 pairs of subequal apical setae. Two minute spines present on each ramus, one on lateral outer margin, midlength of segment, and another at posterior part of dorsal inner margin. Length to breadth ratio of ramus 1.33:1.

First antenna 24-segmented, extends 0.90 prosome length. Numbers of setae on segments moderate, many short.

Endopod of 2nd antenna short, extending just beyond midlength of exopod (Fig. 1D). First basipod segment short, devoid of setae. Second segment twice length of first, bearing a seta at distal inner margin. Exopod 6-segmented. First segment short, about equal in length to 1st basipod segment, bearing a distal inner seta. Second segment more than twice length of 1st and carrying 3 setae, one about 0.33 away from the proximal inner margin and the other two near the distal inner margin. Segments

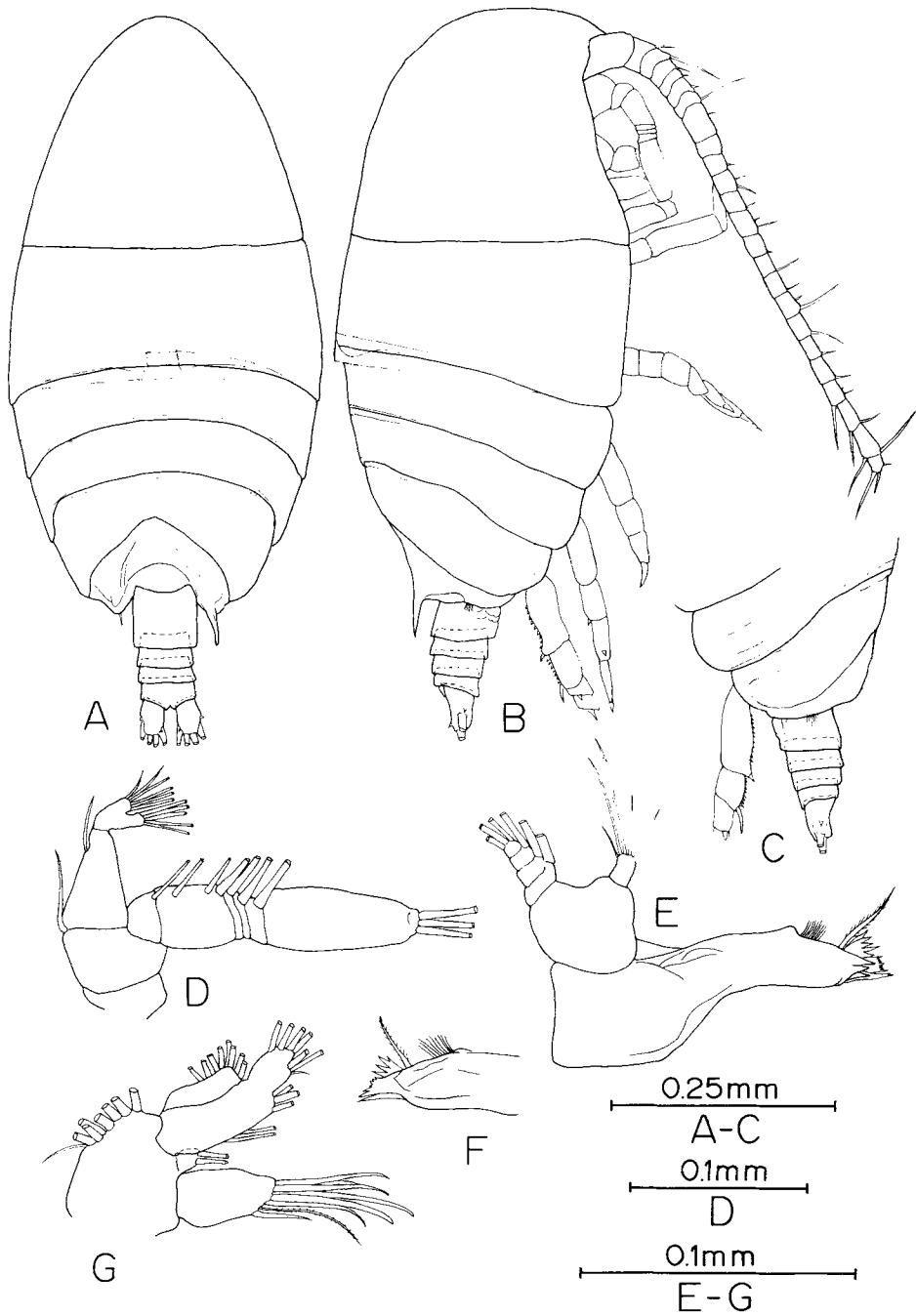


FIG. 1. *Anawekia spinosa* sp. nov., female; (A) dorsal view; (B) lateral, right view; (C) posterior end of prosome and urosome, lateral, left view; (D) 2nd antenna; (E) mandible; (F) apical part of mandibular blade; (G) 1st maxilla.

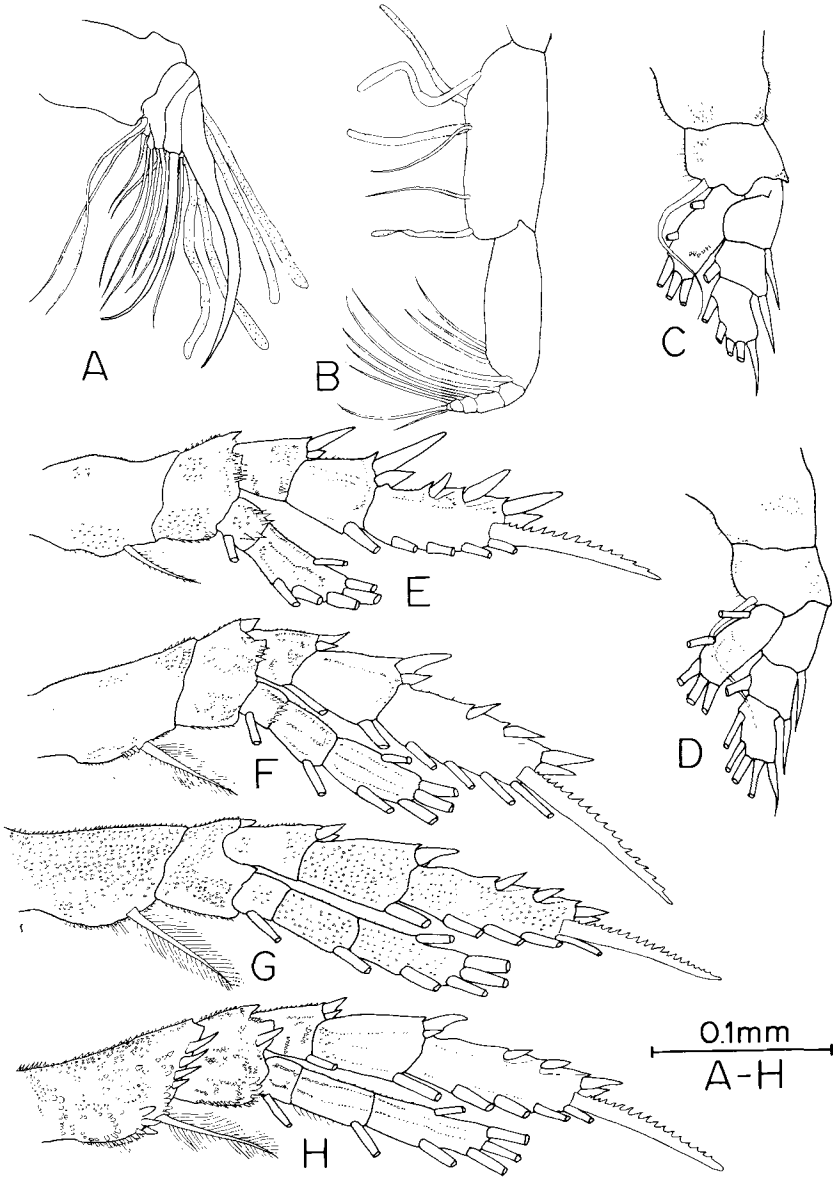


FIG. 2. *Anawekia spinosa* sp. nov., female; (A) 2nd maxilla; (B) maxilliped; (C) 1st leg, posterior view; (D) 1st leg, anterior view; (E) 2nd leg; (F) 3rd leg; (G) 4th leg, anterior; (H) 4th leg, posterior.

3–5 short with combined total lengths equal to that of 1st segment. Each segment is furnished with an inner distal seta. Segment 6 more than 4.5 times length of segment 1 with 3 terminal setae. Endopod 2-segmented, first segment triangular-shaped with one distal inner seta. Second segment bilobed, with 5 setae on apical lobe and 6 setae on inner distal lobe. Length of setae gradually increasing from inner to outer margin but at outermost margin length of setae decreases again.

Mandibular palp with stout and large basipod (Fig. 1E). Endopod, tiny, single-segmented, bearing 5 apical setae. Exopod 4-segmented, apical segment furnished with 3 setae, other segments with single seta on inner margin. Mandibular blade large but with a narrow apex ending in many irregularly sized and complex cutting edges (Fig. 1E and F). A row of very fine hairs originating from anterior margin of gnathobase about 0.33 length from distal end.

Basipod of 1st maxilla with 7 long and 1 minute outer marginal setae (Fig. 1G). Inner margin of basipod 2-lobed, larger proximal lobe with 7 thick spines and 1 minute plumose setae, and very small distal lobe with 4 setae. Exopod with 8 setae. Endopod longer than exopod, with 6 long and 1 minute apical setae and 3 inner marginal setae.

Second maxilla 4-segmented (Fig. 2A), 1st segment smooth with no seta, 2nd segment carried 7 setae, third with 1 thick gently-curved long spine and 3 setae, last segment with a single thick gently-curved long spine. In addition, 4 aesthetascs extending length of terminal spine present, originating from proximal segments.

Maxilliped 7-segmented (Fig. 2B). First segment bears 4 aesthetascs and 2 setae on inner margin. Second segment carries 3 setae at 0.25 length from distal end of segment and a single distal seta. Each of segments 3–6 possesses a seta at disto-inner margin while apical segment bears 2 setae.

First to 4th legs biramous. First leg furnished with numerous spinules on both anterior (Fig. 2C) and posterior surfaces (Fig. 2D) of basipod and endopod. First basipodal segment without seta. Second basipodal segment bearing a sigmoid seta on inner distal end reaching tip of exopod. Exopod 3-segmented, each segment with an outer disto-marginal spine. Inner margin of 1st exopod devoid of setae. Second segment with a single inner marginal seta. Third segment with 2 inner and 2 apical marginal setae. Endopod 1-segmented, with 2 inner and 3 apical marginal setae.

Basipod of 2nd leg 2-segmented, ornamented with numerous spinules on posterior surface (Fig. 2E). First basipod segment carries an inner disto-marginal seta. Exopod 3-segmented, about twice length of endopod. First and 2nd exopodal segments each with 2 unequal length spines on outer distal margin, outermost spine at least twice as long as inner. Third segment with 2 marginal and 3 unequal length apical spines. Innermost apical longest, extending about 3 times length of outermost spine, spine with serrate outer margin. Outermost spine, 1.5 times longer than middle spine. Inner margin of exopod with a seta on each of 1st and 2nd segments and 4 setae on 3rd segment. Endopod 2-segmented, 1st segment about 0.33 length of 2nd segment and bearing single inner seta. Second segment carrying 3 inner, 2 apical and 1 outer setae along margin. Surfaces of endopod and exopod furnished with numerous spinules.

Third and 4th legs both rami 3-segmented. Lengths of segments of both endopod and exopod gradually increasing distally. Arrangements of spines and setae on 3rd and 4th legs as for 2nd leg. Spinules on posterior surface of 3rd leg shown in Fig. 2F.

Spinulation of anterior surface of 4th leg more widespread and with consistently near uniform-sized spinules (Fig. 2G) than on posterior surface (Fig. 2H). A row of four very large and conspicuous spines present on distal posterior surface margin of 1st basipod segment. Spines progressively increase in size from inner to outer margin.



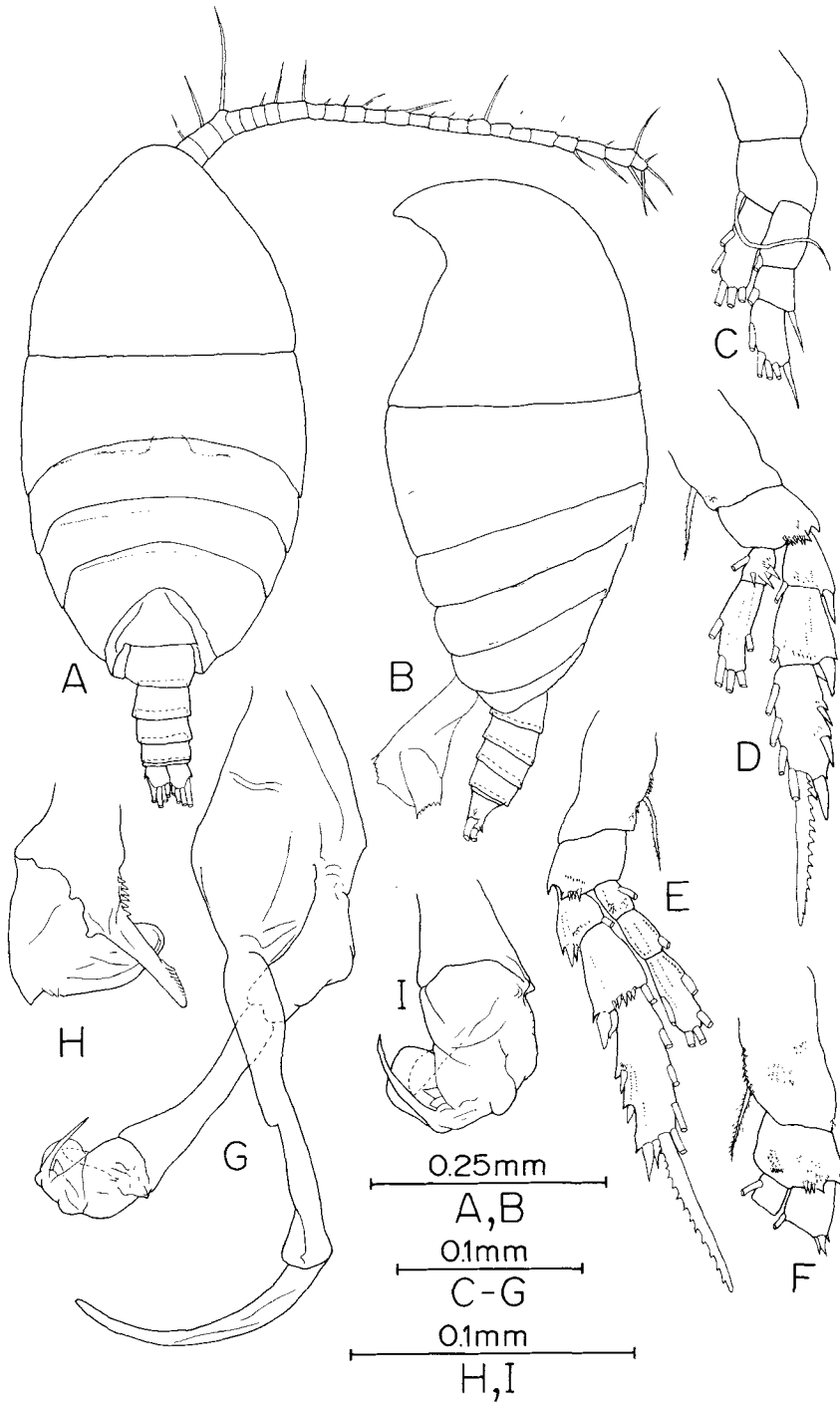


FIG. 3. *Anawekia spinosa* sp. nov., male; (A) dorsal view; (B) lateral view; (C) 1st leg; (D) 2nd leg; (E) 3rd leg; (F) 4th leg; (G) 5th leg; (H) terminal segment of left 5th leg; (I) terminal segment of left 5th leg, posterior view.

Single large prominent spine present on distal posterior surface margin of 2nd basipod segment. Spines on both basipodal segments visible even when examining the animal whole (Fig. 1B).

Fifth legs absent.

*Description of male* (Fig. 3A–I)

*Size.* TL 0.70 mm ( $n = 3$ ), ranging from 0.67 to 0.73 mm (SD 0.025).

Male differs from female in being smaller and having a more rounded body in dorsal view (Fig. 3A). Prosome length to breadth ratio 1.6:1, prosome to urosome length ratio 3.45:1. Posterior thoracic margin nearly symmetrical, rounded in lateral view (Fig. 3B).

Urosome 5-segmented. Genital somite slightly asymmetrical in dorsal view; left margin more convex than right. Proportional lengths of visible somites as follows:

Somite:	1	2	3	4	5	furcal rami	
Proportions:	29	21	17	14	3	16	= 100

Furcal rami short with length to breadth ratio 1.28:1. Number of setae on furca as in females.

First and 2nd antennae, mandible, 1st and 2nd maxillae and maxillipeds are similar in both sexes.

Segmentation of 1st to 4th legs similar in male and female. First leg differs from female's in possession of very smooth posterior (Fig. 3C), as well as anterior, surfaces. First exopodal segment lacking outer marginal spine. Spinulation on posterior surfaces of 2nd and 3rd legs resembling those of female except that numbers of spinules very much reduced (Fig. 3D and E). Spination on posterior surface of 4th leg differs conspicuously from that of female with male basipod lacking row of 4 very large spines distally on 1st basipod segment and single large spine on 2nd basipod segment (Fig. 3F).

Fifth leg asymmetrical and uniramous (Fig. 3G). Right leg 2-segmented, longer than left, with distal segment gently curving and tapering to smooth apex. Left leg chelate, 3-segmented. Distal part of second segment produced into thumb-like structure; distal segment curving inward into shape of a palm (Fig. 3H and I). Thumb with serrate outer margins both at proximal and distal ends.

*Etymology.* The specific name *spinosa* is derived from the prominent spine on the distal margin of the right fifth thoracic segment.

*Anawekia robusta* sp. nov.

(Figs 4–7)

*Types.* Type material deposited in the Queensland Museum as follows: HOLOTYPE 1 ♀ of total length 0.94 mm (QM W12083); ALLOTYPE 1 ♂ of total length 0.78 mm (QM W12084); PARATYPES 1 ♂ and 2 ♀ (QM W12085).

*Type locality.* Gulf of Carpentaria, latitude 13°57.0'S, longitude 137°53.0'E. Water depth 56 m.

*Material examined.* 1 ♀, sample no. 245A4, lat. 14°0.0'S, long. 141°25.6'E, 10 May 1976; 1 ♂, 2 ♀, sample no. 274A4, lat. 14°59.0'S, long. 139°36.6'E, 30 June 1976; 1 ♀, sample no. 300A4, lat. 11°55.5'S, long. 140°0.0'E, 30 August 1976; 1 ♀, sample no. 320A4, lat. 12°42.0'S, long. 140°0.0'E, 2 September 1976; 1 ♀, sample no. 325A4, lat. 13°53.0'S, long. 139°57.0'E, 4 September 1976; 1 ♀, sample no. 327A8, lat. 13°52.0'S, long. 139°26.0'E, 4 September 1976; 1 ♀, 1 ♂, sample no. 332A4, lat.

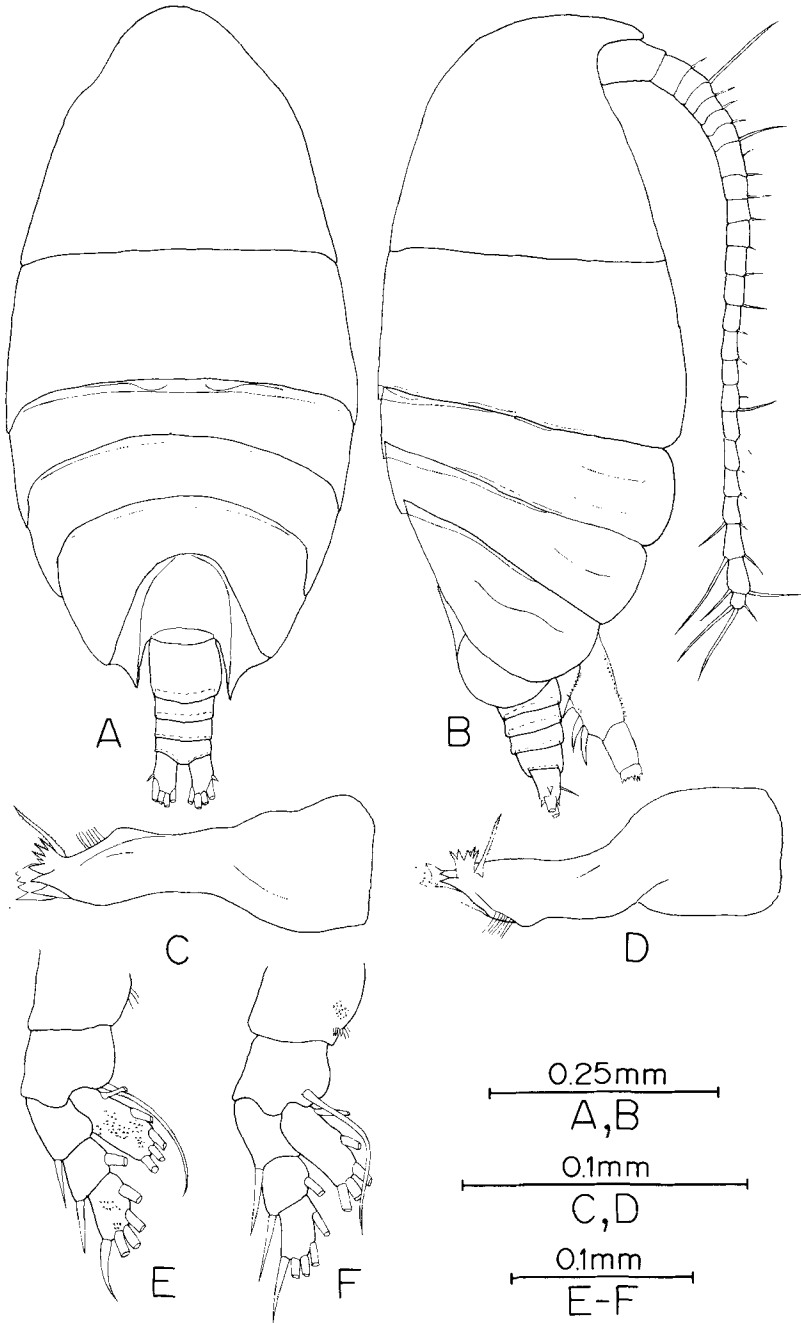


FIG. 4. *Anawekia robusta* sp. nov., female; (A) dorsal view; (B) lateral, right view; (C) mandibular blade; (D) mandibular blade, another specimen; (E) 1st leg, posterior; (F) 1st leg, anterior.

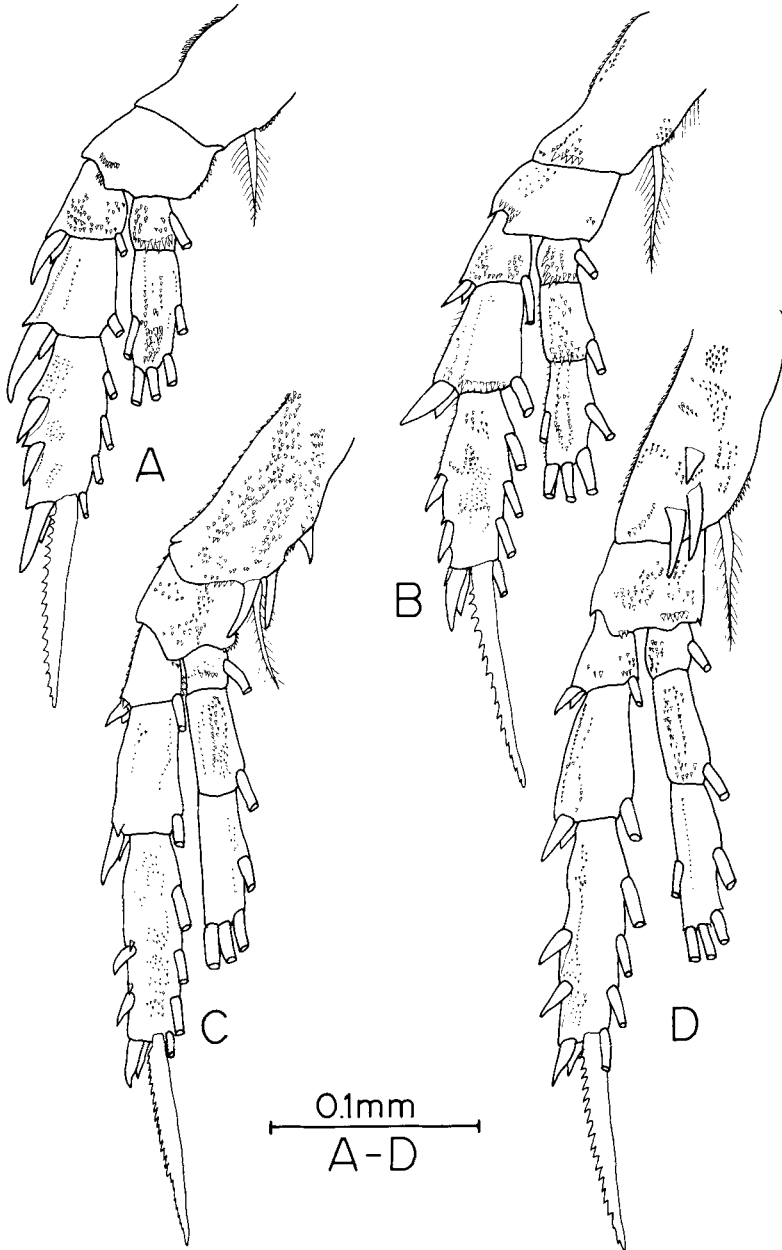


FIG. 5. *Anawekia robusta* sp. nov., female; (A) 2nd leg; (B) 3rd leg; (C) 4th leg; (D) 4th leg, another specimen.

13°57.0'S, long. 137°53.0'E, 5 September 1976; 1♀, 1♂, sample no. 469A4, lat. 14°0.0'S, long. 137°0.0'E, 12 November 1976; 1♀, sample no. 525A3, lat. 12°4.7'S, long. 138°56.0'E, 8 January 1977, 2♀♀, sample no. 691A6, lat. 12°0.0'S, long. 139°0.0'E, 17 March 1977; 1♀, sample no. 965A5, lat. 14°0.0'S, long. 137°0.0'E, 10 May 1977.

*Description of female* (Figs 4A–F and 5A–D)

*Size.* TL 0.89 mm ( $n = 8$ ), ranging from 0.85 to 0.95 mm (SD 0.029).

Shape of body like *Anawekia spinosa* females, except slightly more robust. Prosome length to width ratio 1.81:1. Head with slight lateral indentations from dorsal aspect (Fig. 4A) and, in lateral view, antero-dorsal curvature slightly less vaulted than *A. spinosa* (Fig. 4B; cf Fig. 1B). Prosome to urosome length ratio 4.31:1. Head separated from pedigerous somites. All 5 pedigerous somites free, last somite almost symmetrical but right margin extending slightly beyond left. Posterior margin of last segment assumes shape of a semicircle in lateral view, tapering to point in dorsal view.

Urosome 4-segmented with proportional lengths of visible somites as follows:

Somite:	1	2	3	4	furcal rami	
Proportions:	37	14	12	14	23	= 100

Furcal rami symmetrical and slightly narrower than *A. spinosa*. Length to breadth ratio of ramus 1.65:1.

First antenna 24-segmented, 0.8 times length of prosome.

Second antenna and rest of cephalic appendages as for *A. spinosa*. Mandibular blade furnished with numerous and rather complex cutting edges (Fig. 4C and D).

Segmentation and marginal spines of legs essentially same as *A. spinosa*. Posterior surface of 1st leg covered with numerous spinules only on endopod and on 3rd exopodal segments (Fig. 4E). Anterior surface of 1st leg devoid of spinules except those on 1st basipodal segment (Fig. 4F). Spinulation on posterior surface of 2nd and 3rd legs grossly similar to that of *A. spinosa* females (Fig. 5A and B). Fourth leg with 3 prominent spines on posterior surface of 1st basipodal segment, situated more towards inner margin (Fig. 5C and D). Two of spines close together, near distal end of segment. Proximal spine shorter by 0.5 length of other two. These spines visible even on examination of whole animal (Fig. 4B).

Fifth legs absent.

*Description of male* (Figs 6A–F and 7A–C)

*Size.* TL 0.77 mm ( $n = 3$ ), ranging from 0.75 to 0.78 mm (SD 0.017).

Male differs from female in being slightly smaller and having a more rounded body in dorsal view (Fig. 6A). Prosome length to width ratio 1.61:1 and prosome to urosome length ratio 2.89:1. Number of visible prosome somites similar to female. Posterior prosomal margin slightly asymmetrical. Left extends marginally further posterior than right. Both margins appear rounded in dorsal and lateral view (Fig. 6A and B).

Urosome 5-segmented. Genital somite slightly asymmetrical in dorsal view with left margin extending outward. Proportional lengths of visible somites as follows:

Somite:	1	2	3	4	5	furcal rami
Proportions:	27	19	16	18	4	16 = 100

Furcal rami symmetrical, each ramus with length to breadth ratio 1.38:1.

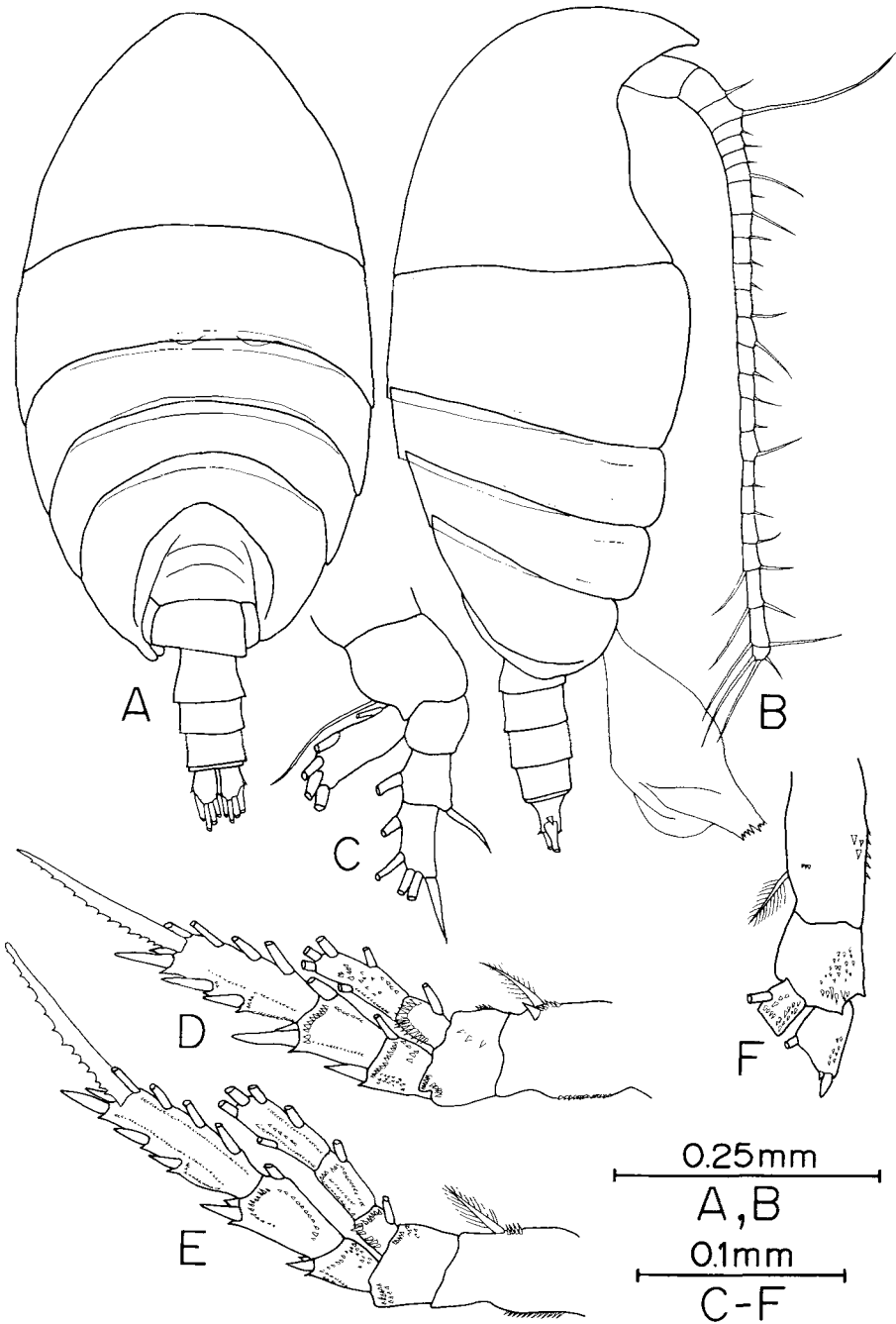


FIG. 6. *Anawekia robusta* sp. nov., male; (A) dorsal view; (B) lateral view; (C) 1st leg; (D) 2nd leg; (E) 3rd leg; (F) 4th leg.

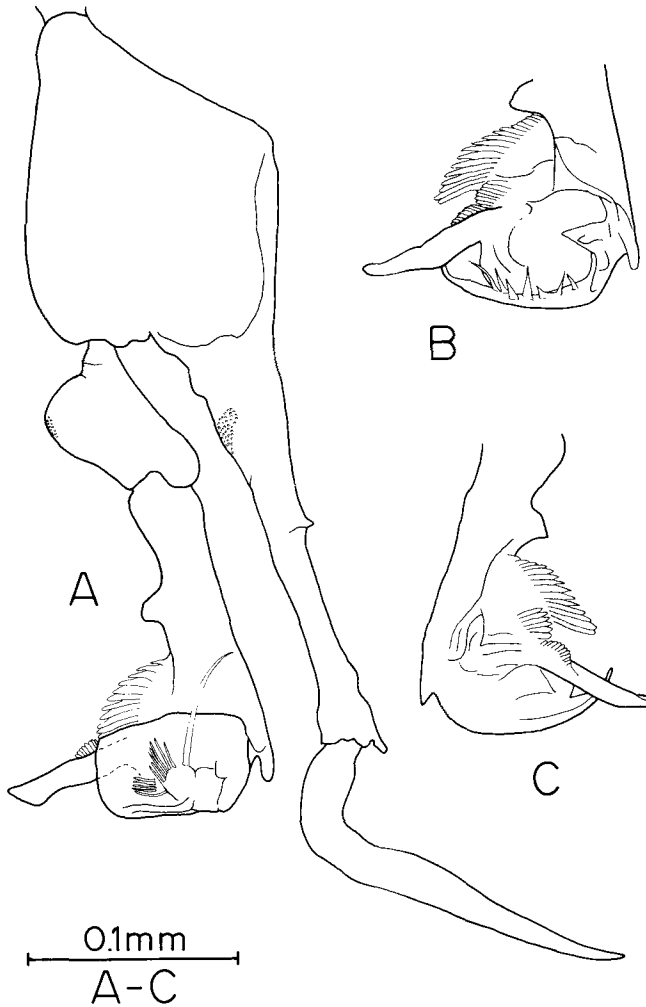


FIG. 7. *Anawekia robusta* sp. nov., male; (A) 5th leg; (B) terminal segment of left 5th leg; (C) terminal segment of left 5th leg, anterior view.

First antenna 24-segmented, about as long as prosome. Rest of cephalic appendages not noticeably different from those of *A. spinosa*.

Segmentation and spination of 1st to 4th legs similar to that of male *A. spinosa* (Fig. 6C–F). First leg (Fig. 6C) devoid of any surface spinules.

Fifth legs asymmetrical, uniramous and complex. Common basipodal segment very large (Fig. 7A) and partly fused with right leg. This segment extending about length of left leg. Distal segment of right leg bending sharply near proximal end and tapering into fine point distally. First segment of left leg broad with length to breadth ratio 1.52:1, about 0.5 length of middle segment. A distinct outwardly directed hump with minute spines on surface present on outer margin. Middle segment furnished with a tooth-like process at about midlength on outer surface. Distal end of segment expanded outwardly, assuming shape of a 'thumb'. Last segment with inwardly folded 'palm', furnished with many setae on its inner surface (Fig. 7B). Proximal base of thumb carries a rather complicated serrate margin (Fig. 7C).

*Etymology.* The name *robusta* refers to the nature of the species in being the largest and most robust of the three species presently described.

***Anawekia bilobata* sp. nov.**

(Figs 8 and 9)

*Types.* Type material deposited in the Queensland Museum as follows: Holotype 1 ♀ of total length 0.67 mm (QM W12086); ALLOTYPE 1 ♂ of total length 0.64 mm (QM W12087); PARATYPES 1 ♂ and 3 ♀ ♀ (QM W12088).

*Type locality.* Gulf of Carpentaria, latitude 16°0.0'S, longitude 141°15.4'E. Water depth 8 m.

*Material examined.* 1 ♀, sample no. 4A4, lat. 16°9.0'S, long. 141°15.5'E, 14 August 1975; 1 ♀, sample no. 8A2, lat. 14°0.0'S, long. 141°25.5'E, 14 August 1975; 1 ♂, 2 ♀ ♀, sample no. 176A4, lat. 17°15.0'S, long. 140°39.0'E, 23 April 1976; 2 ♀ ♀, sample no. 228A4, lat. 11°58.2'S, long. 138°53.5'E, 4 May 1976; 1 ♂, sample no. 245A4, lat. 14°0.0'S, long. 141°25.6'E, 10 May 1976; 3 ♂ ♂, sample no. 265A4, lat. 15°52.4'S, long. 139°30.7'E, 28 June 1976; 1 ♂, 1 ♀, sample no. 270A8, lat. 16°0.0'S, long. 141°15.4'E, 29 June 1976; 1 ♂, 3 ♀ ♀, sample no. 332A4, lat. 13°57.0'S, long. 137°53.0'E, 5 September 1976; 1 ♀, sample no. 426A4, lat. 17°15.2'S, long. 140°37.3'E, 1 November 1976; 1 ♂, 1 ♀, sample no. 523A4, lat. 12°6.3'S, long. 139°57.6'E, 8 January 1977; 3 ♀ ♀, sample no. 967A9, lat. 14°0.0'S, long. 138°0.0'E, 10 May 1977.

*Description of female* (Fig. 8A–G)

*Size.* TL 0.65 mm ( $n = 8$ ), ranging from 0.63 to 0.67 mm (SD 0.019).

Shape of body similar to other members of genus except slightly slimmer, more elongate and oval in dorsal view (Fig. 8A). Prosoma length to width ratio 2.09:1. Prosoma to urosome length 4.16:1. Anterior dorsal margin of head squarish. Head separated from pedigerous somites. Posterior margin of last pedigerous somite symmetrical. In lateral view, inward incision almost dividing last somite into 2 equal parts (Fig. 8B). In dorsal view these 2 parts lying one above the other, the more dorsad being the smaller.

Urosome 4-segmented with proportional lengths of visible somites as follows:

Somite:	1	2	3	4	furcal rami	
Proportions:	35	19	16	14	16	= 100

Caudal furca slightly narrower than *A. spinosa*. Length-to-breadth ratio of each ramus 1.67:1.

First antenna 24-segmented, extending 0.8 length of prosome.

Second antenna and rest of cephalic appendages essentially same as other members of genus. Segmentation and marginal spination of legs as for *A. spinosa*. Posterior surfaces of 1st to 3rd legs furnished with spinules (Fig. 8C–E). Numbers of spinules very much reduced compared with *A. spinosa*.

Fourth leg furnished with 3 large spines on 1st basipodal segment (Fig. 8F and G). Spines conspicuous and, as in other members of genus, visible when examining whole animal. Spines arranged in row lengthwise near outer margin. Proximal spine shortest and distal spine longest. Minute surface spinations also very much reduced in numbers, being present only on endopod and basipod.



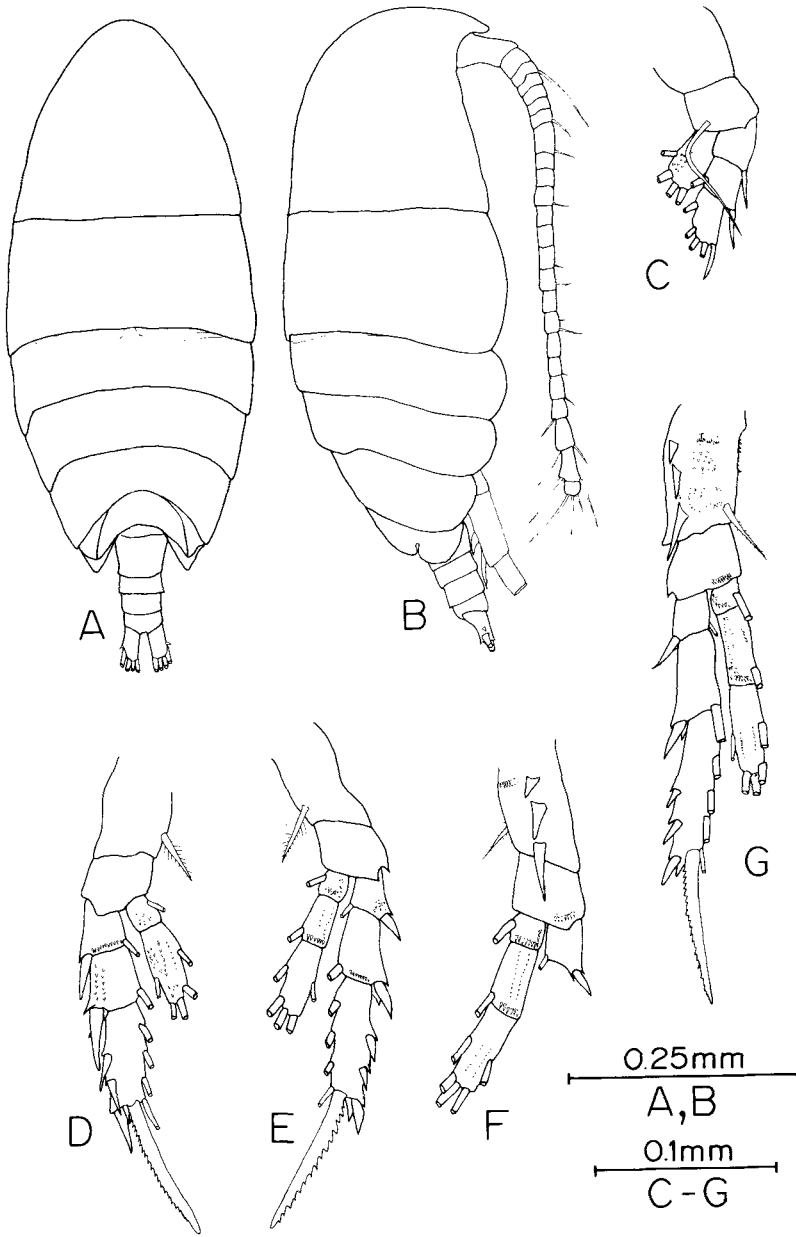


FIG. 8. *Anawekia bilobata* sp. nov., female; (A) dorsal view; (B) lateral view; (C) 1st leg; (D) 2nd leg; (E) 3rd leg; (F) 4th leg; (G) 4th leg, another specimen.

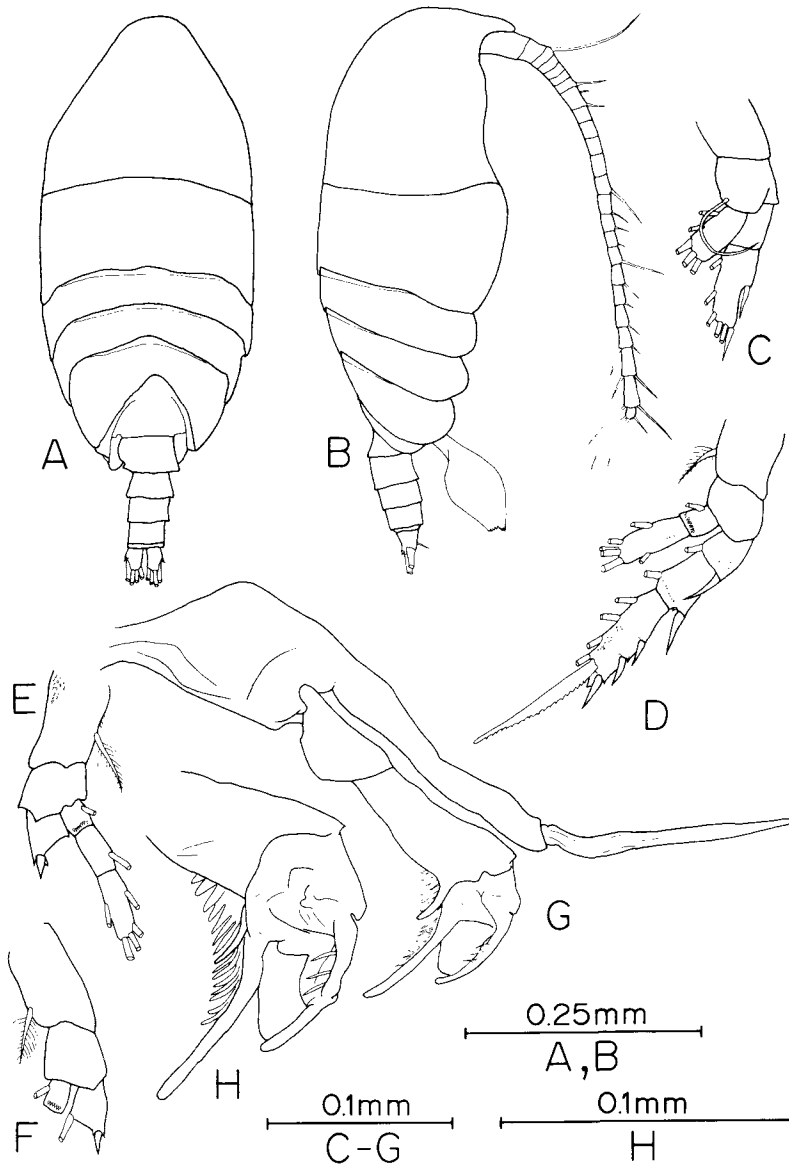


FIG. 9. *Anawekia bilobata* sp. nov., male; (A) dorsal view; (B) lateral view; (C) 1st leg; (D) 2nd leg; (E) 3rd leg; (F) 4th leg; (G) 5th leg; (H) terminal segment of left 5th leg.

*Description of male* (Fig. 9A–H)

*Size.* TL 0.62 mm ( $n = 6$ ), ranging from 0.60 to 0.64 mm (SD 0.018).

Male slightly smaller in size but more robust than female in dorsal view (Fig. 9A). Prosome length to width ratio 1.94:1 and prosome to urosome length ratio 3.15:1. Posterior thoracic margin only slightly asymmetrical, left margin extends slightly further posterior. Margin rounded both in dorsal and lateral views (Fig. 9A and B).

Urosome 5-segmented. Genital somite slightly asymmetrical; in dorsal view left margin convex. Proportional lengths of visible somites as follows:

Somite:	1	2	3	4	5	furcal rami	
Proportions:	24	20	17	18	3	18	= 100

Ratio of length to breadth of each furcal ramus 1.5:1.

First antenna 24-segmented extending to about middle of 4th pedigerous somite. Rest of cephalic appendages hardly distinguishable from those of other members of genus.

Segmentation and spination of 1st to 4th legs similar to those described for male *A. spinosa* (Fig. 9C–F).

Fifth legs asymmetrical, uniramous and chelate. Common basipodal segment smaller than other members of genus (Fig. 9G), segment extending about length of left leg. Distal segment of right leg straightened and tapers into a blunt distal end. Left leg 3-segmented. First segment convex on outer margin. Second segment twice length of 1st, gradually broadening towards distal end where an outwardly directed 'thumb' present. Longer and more conspicuous 'thumb' arising from proximal outer margin of 3rd segment. Distal part of this segment forming 'palm' bearing 3 setae on inner surface (Fig. 9H).

*Etymology.* The name *bilobata* alludes to the bilobed nature of the female posterior thoracic margin from the lateral view.

**Remarks**

The three species of *Anawekia* are readily distinguishable from one another in both sexes. Of the three, *A. robusta* is the largest and *A. bilobata* has the most slender prosome. In the female, *A. spinosa* can be differentiated from the rest by having asymmetrical thoracic margins, where the right margin is produced into a spiniform process. The thoracic margins in the other two species are symmetrical, smooth in *A. robusta* but bilobed in *A. bilobata*. The number of spines on the first basipod of the fourth leg in *A. spinosa* is four, and these are arranged in a row running transversely from inner to outer margin. In the other two species there are three spines on the first basipod of the fourth leg; in *A. bilobata* these are arranged equidistant from one another running lengthwise in the distal-proximal axis; in *A. robusta* two of the spines are situated close together and are near the distal end of segment, the third spine is proximal to this.

In the male, the distal end of the right fifth leg is conspicuously bent near its proximal end in *A. robusta*, but is smoothly curved in the other two species. The left fifth leg is narrow, and with a simple chela in *A. spinosa* whereas in *A. bilobata* and *A. robusta* it is much broader and with a more elaborately serrated chela. The fifth leg chela in *A. bilobata* is distinguished from that of *A. robusta* by having a second 'thumb' arising from the segment that makes up the 'palm'.

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