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- FISCHER, P.-H. 1948. Données sur la résistance et de la vitalité des mollusques. — *J. Conch.*, Paris 88: 100-140.
- FISCHER, P.-H., DUVAL, M. & RAFFY, A. 1933. Etudes sur les échanges respiratoires des littorines. — *Archs Zool. exp. gén.* 74: 627-634.
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- THEILE, 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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A NEW SPECIES OF *BRADYIDIUS* (COPEPODA,  
CALANOIDA) FROM THE MGAZANA ESTUARY,  
PONDOLAND, SOUTH AFRICA, AND A REVIEW OF  
THE CLOSELY RELATED GENUS *PSEUDOTHARYBIS*

By

JANET M. BRADFORD

Cape Town

Kaapstad

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AND A REVIEW OF THE CLOSELY RELATED GENUS  
*PSEUDOTHARYBIS*

By

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and Industrial Research, Wellington*

(With 5 figures and 1 table)

[MS. accepted 28 April 1976]

ABSTRACT

A new species, *Bradyidius hirsutus*, is described. Four species previously attributed to *Bradyidius* are transferred to *Pseudotharybis* which is placed in the Aetideidae.

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INTRODUCTION

The nine previously known species of the aetideid genus *Bradyidius* are *B. angustus* (Tanaka, 1957), *B. arnoldi* Fleminger, 1957, *B. bradyi* (Sars, 1902) (see Matthews (1964) for discussion of priority of specific name *bradyi* over *armatus*), *B. luluae* Grice, 1972, *B. pacificus* (Brodsky, 1950), *B. saanichi* Park, 1960, *B. similis* (Sars, 1902), *B. spinifer* Bradford, 1969a, and *B. tropicus* Wolfenden, 1905. Both sexes are known except for *B. angustus* described only from the male, and *B. tropicus* described only from the female and which has not been morphologically distinguished from *B. bradyi* except that it is smaller and has fewer, coarser teeth on the terminal exopod spine of legs 2-4 (Wolfenden 1905: 1006). At the end of this paper four species, previously attributed to *Bradyidius*, are removed to another genus.

The new species of *Bradyidius* described below was found in plankton samples from the Mgzana Estuary, Pondoland, South Africa (31° 50' S). Although *Bradyidius* is known to be a benthic genus these particular specimens were taken by T. Wooldridge on 1 September 1972 at night just below the surface on an incoming tide at the mouth of the Mgzana Estuary. The depth at this locality is about 3 metres at low tide, salinity 35,0‰ (measured by hydrometer) and temperature 17,8°C.

Dissected specimens of the presently described new species of *Bradyidius* were mounted unstained in Euparal and observed using phase contrast. Descriptions have been made from paratype material.

#### DESCRIPTION OF MATERIAL

##### *Bradyidius hirsutus* sp. nov.

(Figs 1-5)

##### *Holotype*

SAM-A13661 in the South African Museum, Cape Town. Adult female in plankton sample from mouth of Mgazana Lagoon, collected by T. Wooldridge, 1 September 1972.

##### *Paratypes*

SAM-A13662 in the South African Museum, Cape Town; 1 male whole, 2 males and 2 females dissected, collection data as above.

BM(NH)1975.1124 (1 female), BM(NH)1975.1125 (1 male) in the British Museum (Natural History), London; collection data as above.

P295 in the New Zealand Oceanographic Institute, Wellington, collection; 1 female and 1 male, collection data as above.

##### *Description*

*Female*: Holotype 1,61 mm, paratype specimens 1,59-1,68 mm.

Head and pedigerous segment 1 separate, pedigerous segments 4 and 5 fused. Rostrum bifurcate with slightly divergent points. Posterior metasomal points extend not quite to posterior border of genital segment.

Antenna 1 does not extend quite to posterior metasomal points, of 24 joints, each with annulate setae, joints 8 and 9 fused, joints 18-25 bear very long annulate setae as typical for the genus.

Antenna 2. Endopod joint 1 with 1 seta, joint 2 with 7 outer setae, 7 inner setae (1 small); exopod joint 1 with 1 small seta and joint 2 with 3 setae.

Mandible. Basipod 2 with 1 seta; endopod joint 1 with 1 large and 2 small setae, joint 2 with 10 setae, 1 of them small.

Maxilla 1. Inner lobe 1 with 14 spines and setae, inner lobe 2 with 5 setae, inner lobe 3 and 4 setae, basipod 2 with 5 setae, endopod with at least 13 setae, exopod with 10 setae, outer lobe 1 with 9 setae and outer lobe 2 naked.

Maxilla 2. Lobes 1-5 each with 3 spine-like setae, lobe 5 with 1 of these spines very thick and heavy. Terminal part of limb with 7 setae.

Maxilliped as in other *Bradyidius*.

Leg 1. Basipod 1 with outer edge patch of spines, outer edge spines of exopod joints 1 and 2 not extending beyond base of spine on next joint, outer edge spine on exopod joint 3 longer than its joint.

Leg 2. Basipod 1 with outer edge patch of spines; anterior surface of endopod naked, posterior surface of endopod joint 2 with small hairs covering about half area. Terminal exopod spine with 17 or 21 teeth.

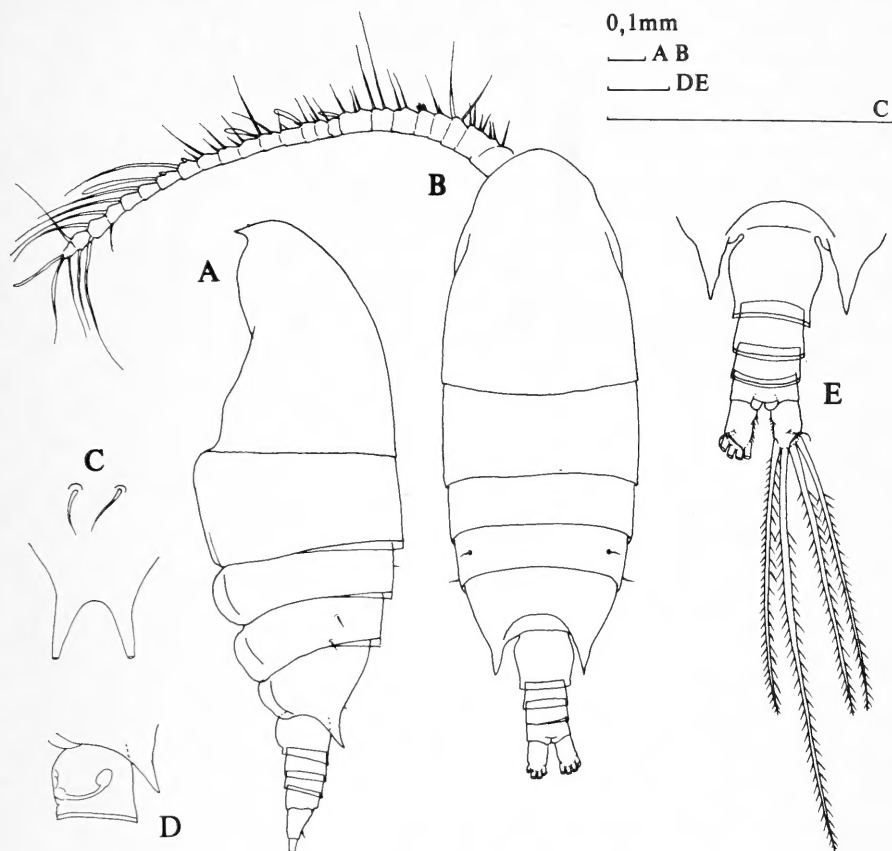


Fig. 1. *Bradyidius hirsutus* sp. nov. Female.

A. Lateral view. B. Dorsal view. C. Rostrum. D. Genital segment, lateral view. E. Urosome, dorsal view.

Leg 3. Basipod 1 with outer edge patch of spines; anterior surface of endopod joints 2 and 3 with small hairs covering slightly smaller area than spines on posterior surface. Terminal exopod spine with 18 or 19 teeth.

Leg 4. Posterior surface of endopod joints 2 and 3 also anterior surface of endopod joint 3 with small hairs. Terminal exopod spine with 20–23 teeth.

Leg 5 absent.

*Male*: Paratypes 1,36–1,53 mm.

Head and pedigerous segment 1 also pedigerous segments 4 and 5 completely fused. Rostrum bifurcate with slightly diverging points. Posterior metasomal points extend as far as posterior border of urosome segment 1.

Antenna 1 does not extend beyond posterior metasomal points; of 21 or 22 joints, most with annulate setae, 8–10, 12–13 fused as are 20–21 on right side; joints 1–12 with large aesthetes.

Antenna 2 similar to that of female except basipod 1 with row of conspicuous hairs, exopod joint 1 without setae, endopod joint 2 with 2 setae; endopod joint 2 with 6 outer setae.

Mandible blade without teeth, basipod apparently without seta, endopod joint 2 with 10 setae.

Maxilla 1 inner lobes 1-3 without spines or setae, endopod with a few rudimentary setae, exopod and outer lobe 1 with setae.

Maxilla 2 reduced to small lobe without setae.

Maxilliped similar to that of female except basipod 1 has 2 setae distally.

Legs 1-4 similar to those of female except outer edge exopod spines smaller. Terminal spine of legs 2-4 with 20-23, 20-22, and 24-26 teeth respectively.

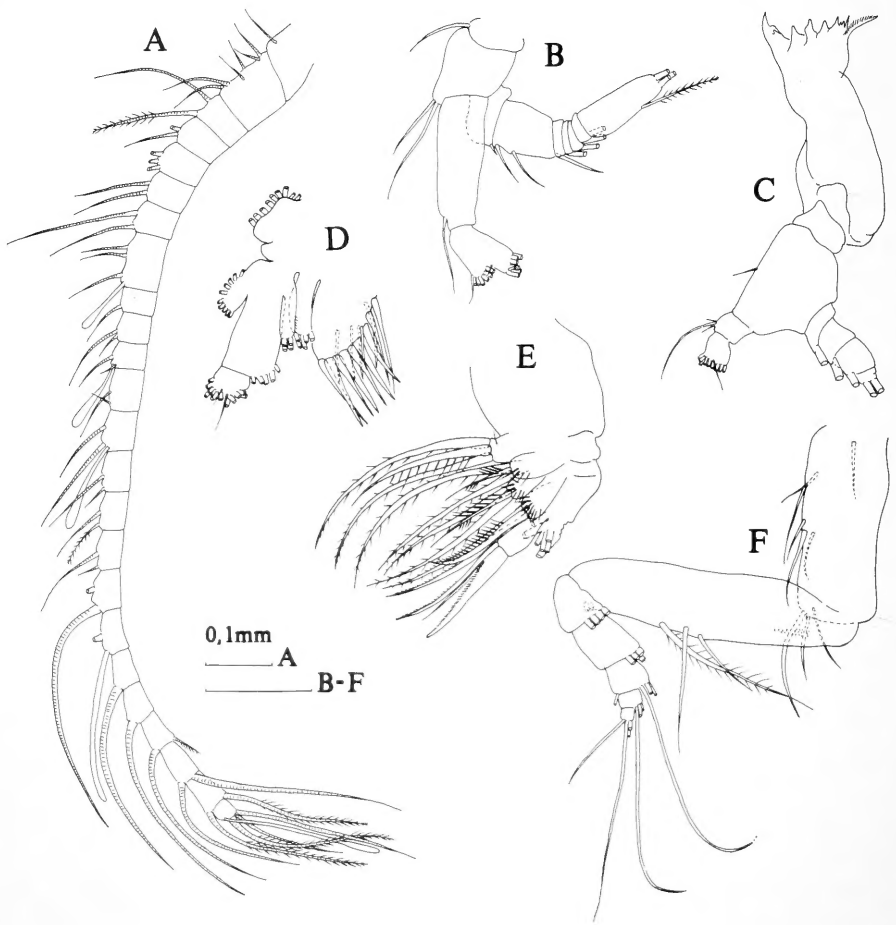


Fig. 2. *Bradyidius nirsutus* sp. nov. Female.

A. Antenna 1. B. Antenna 2. C. Mandible. D. Maxilla 1. E. Maxilla 2. F. Maxilliped.



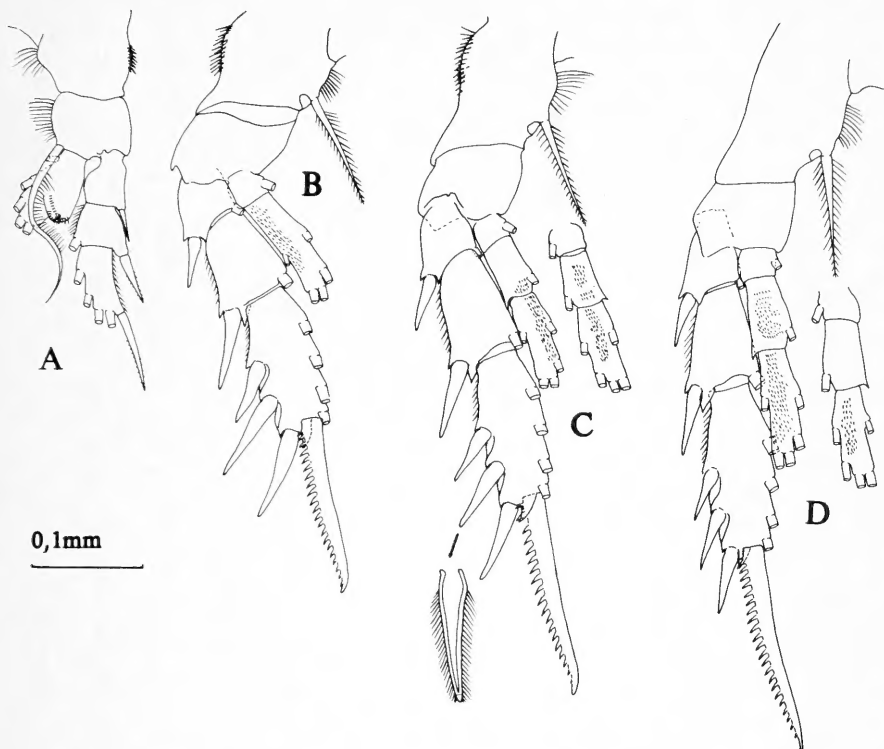


Fig. 3. *Bradyidius hirsutus* sp. nov. Female.

A. Leg 1, anterior view. B. Leg 2, posterior view. C. Leg 3, anterior view and posterior view of endopod. D. Leg 4, posterior view and anterior view of endopod.

Leg 5 uniramous on each side, hardly extending beyond caudal rami, right leg styliform, of 4 joints; left leg of 5 joints, penultimate joint with inner distal knob bearing a fine spinule, terminal joint with row of small spinules.

#### Etymology

From the Latin *hirsutus* = hairy, referring to the fact that hairs are to be found on both the anterior and posterior surfaces of legs 3 and 4.

#### Discussion

All the species of *Bradyidius* are compared in Table 1 in so far as they are known.

Female *Bradyidius hirsutus* may be distinguished primarily from *B. arnoldi*, *B. saanichi* and *B. spinifer*, the three species it most resembles in respect to the length of the posterior metasomal points in that the anterior surfaces of legs 3 and 4 as well as posterior endopod surfaces of legs 2-4 are ornamented with many small hairs. Also the rostral points of *B. hirsutus* are slightly divergent but in *B. arnoldi* not divergent and in *B. saanichi* strongly divergent (exact shape not

TABLE 1  
Comparison of species of *Bradyidius*

Species	Length (mm)	FEMALE			FEMALE + MALE			MALE	
		Extent of posterior metasomal processes	$P_1$ outer edge spine of $Re_1$	Anterior-posterior surface spines $Ri$ $P_{2-4}$	Rostrum	$P_5$			
<i>B. angustus</i>	♀ unknown ♂ 1,37	—	—	Posterior	Hardly divergent	Uniramous: distal border right border left $B_2$			
<i>B. arnoldi</i>	♀ 1,64 ♂ 1,19-1,23	Almost to posterior border genital segment	Very small	Posterior	Not divergent	Biramous			
<i>B. bradyi</i>	♀ 2,65 ♂ 2,20	Posterior border genital segment	Reaches base next spine	Posterior	Slightly divergent	Uniramous: right leg much shorter than left			
<i>B. luluæ</i>	♀ 3,12 ♂ 3,00-3,25	Just beyond posterior border genital segment	Extends half way along next spine	Posterior (♂)	Strongly divergent	Uniramous: distal border right $Re_2$ extends to middle left $Re_1$			
<i>B. pacificus</i>	♀ 4,4 ♂ 3,3	Terminal one-third genital segment	Reaches base next spine	None	Not divergent	Biramous			
<i>B. saanichi</i>	♀ 2,33-2,56 ♂ 2,01-2,24	Almost to posterior border genital segment	Reaches base next spine	None	Strongly divergent	Biramous			
<i>B. similis</i>	♀ 3,0 ♂ 2,4	Hardly beyond middle genital segment	As in <i>B. bradyi</i>	None	—	Biramous			
<i>B. spinifer</i>	♀ 2,74 ♂ 1,96	Almost to posterior border genital segment	Extends over half way along next spine	Posterior	—	Uniramous: distal border right $Re_2$ extends to middle left $Re_1$			
<i>B. tropicus</i>	♀ 1,2 ♂ unknown	—	—	—	—	—			
<i>B. hirsutus</i> sp. nov.	♀ 1,59-1,68 ♂ 1,36-1,53	Almost to posterior border genital segment	Does not reach base next spine	Posterior and anterior	Slightly divergent	Uniramous: distal border right $Re_2$ extends just beyond distal border left $B_2$			

— information not known;  $Re_{1,2}$  = exopod joint 1, 2;  $P_{1-5}$  = legs 1-5;  $Ri$  = endopod;  $B_2$  = basipod 2.

known for *B. spinifer*) and the outer edge spine of leg 1 exopod joint 1 does not reach the base of the next spine in *B. hirsutus*, is very small in *B. arnoldi*, reaches the base of the next spine in *B. saanichi* and extends half-way along the next spine in *B. spinifer*.

The male of *B. hirsutus* is most like that of *B. angustus* even to the proportions of leg 5 but differs from it chiefly in the ornamentation on the anterior and posterior surfaces of legs 3 and 4. Also exopod joint 1 of antenna 2 has no setae in *B. hirsutus* whereas it appears to have a seta in Tanaka's (1957) illustration and the rostrum of *B. hirsutus* has a much wider notch at the base of the points than in *B. angustus*.

It appears the setation of the female maxilla 1 may be conservative. Re-examination of the holotype of *B. spinifer* revealed that the basipod 2 in fact has 5 setae, not 4 as described by Bradford (1969a) so *B. spinifer* does not differ from *B. lulae* in this respect.

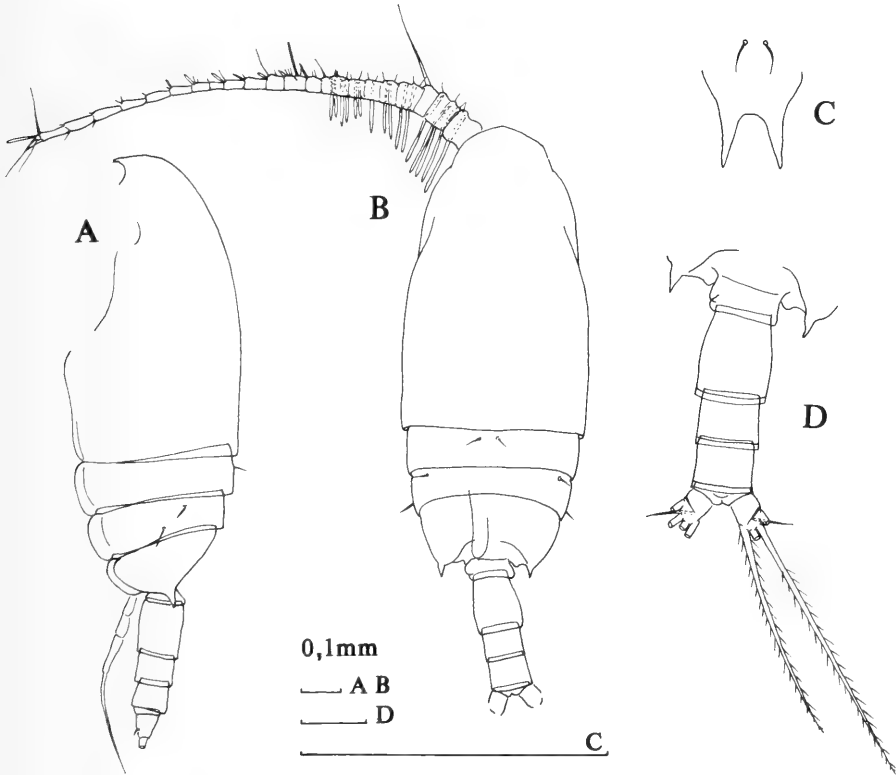


Fig. 4. *Bradyidius hirsutus* sp. nov. Male.

A. Lateral view. B. Dorsal view. C. Rostrum. D. Urosome, dorsal view.

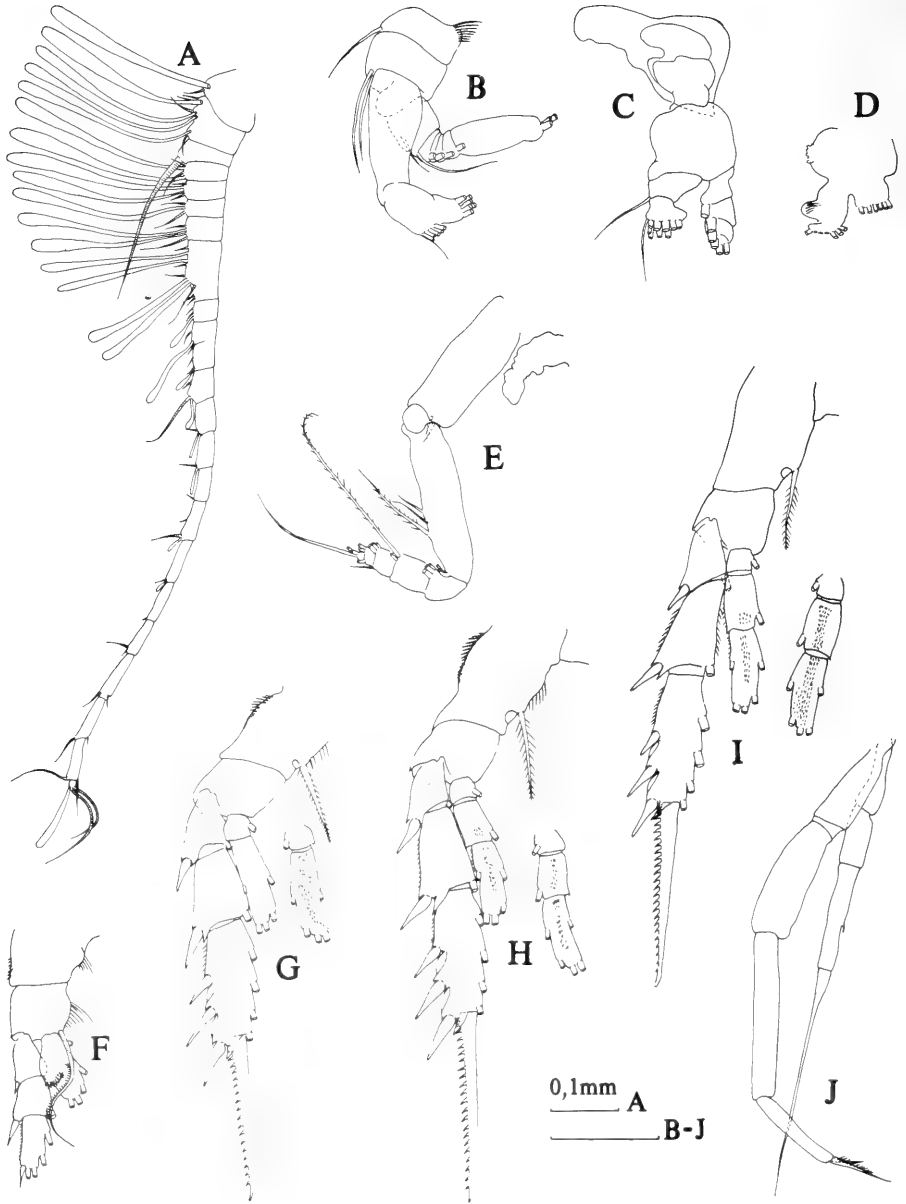


Fig. 5. *Bradyidius hirsutus* sp. nov. Male.

A. Left antenna 1. B. Antenna 2. C. Mandible. D. Maxilla 1. E. Maxilliped and rudimentary maxilla 2. F. Leg 1, anterior view. G. Leg 2, anterior view and posterior view of endopod. H. Leg 3, anterior view and posterior view of endopod. I. Leg 4, anterior view and posterior view of endopod. J. Leg 5.

REVIEW OF *PSEUDOTHARYBIS*

Females of three species attributed to *Bradyidius* by Bradford (1969*b*), *B. robustus*, *B. brevispinus* and a stage V *B. spinibasis* (erroneously referred to as *B. spinatus* in the text (Bradford 1969*a*: 484)) have subsequently been recognized by the author as fitting T. Scott's (1909*a*) brief description of *Pseudotharybis* because of the unique form of the female fifth legs which hardly varies from one species to another. Although T. Scott (1909*a*) implied *Pseudotharybis* was a tharybid, lack of sensory appendages terminally on maxilla 2 precluded that conclusion. This genus is here placed in the family Aetideidae, closely related to *Bradyidius* and *Aetideopsis*, and is one of the few genera in the family to have a female fifth leg.

The male of *B. robustus* Bradford, 1969*a* along with *B. dentatus* Bradford, 1969*a* indicates the form of male *Pseudotharybis* which hardly differs from that of *Bradyidius* or *Aetideopsis* except that the posterior metasomal points are represented in *Pseudotharybis* by a small posterodorsal tooth and in the other two genera by a posterior spine. Thus the genus *Pseudotharybis* now contains the following species: *P. zetlandicus* T. Scott, 1909*a*, *P. brevispinus* (Bradford, 1969*a*), *P. dentatus* (Bradford, 1969*a*), *P. robustus* (Bradford, 1969*a*), and *P. spinibasis* (Bradford, 1969*a*). There is also a possibility that *Aetideopsis magna* Grice & Hulsemann, 1970 belongs to this genus. Pending a closer examination of the genera *Aetideopsis*, *Bradyidius* and *Pseudotharybis* the exact limits of each genus, especially with reference to the males, remains uncertain.

T. Scott's (1909*b*) *P. dubius* must be removed from *Pseudotharybis* as there appear to be important differences from all other species in the genus. For example maxilla 1 inner and outer lobe 1 are well developed but the remaining parts are reduced in size and have a smaller number of setae, maxilliped basipod 1 has a strong spiniform seta on its distal border and leg 5 is of a different shape.

## ACKNOWLEDGEMENTS

I am indebted to Mr T. Wooldridge of the Port Elizabeth Museum for bringing the new species of *Bradyidius* to my attention.

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6. SYSTEMATIC papers must conform with 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 (figs 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 (33.51S, 25.39E), collected by A. Smith, 15 January 1973.

Note standard form of writing South African Museum registration numbers, date and geographical positions.

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.



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