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A new species of benthopelagic calanoid copepod of the genus *Bradyidius* Giesbrecht, 1897 (Calanoida: Aetideidae) from New Zealand

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Abstract A new species of benthopelagic calanoid Copepoda is described from New Zealand. The species, *Bradyidius capax* n. sp. (Family: Aetideidae), is the second species of this genus to be recorded from New Zealand. *B. capax* females are close to *B. armatus* Giesbrecht, 1897 and *B. rakuma* (Zvereva, 1977). *B. capax* differs from these two species by a combination of its small size, hardly divergent rostral points, fusion line between pedigerous somites 4 and 5 not visible, posterior corners of pedigerous somite 5 directed straight posteriorly (not divergent in dorsal view), seminal receptacles occupy 57% of length of genital double somite measured ventrally, and antennal exopod segment 1 with small seta. The distribution of *B. spinifer* Bradford, 1969 is extended along the continental slope of north-eastern New Zealand and some features previously undescribed, are illustrated.

Keywords Copepoda; Calanoida; Aetideidae; *Bradyidius capax*; *Bradyidius spinifer*; benthopelagic; new species

INTRODUCTION

Recent collections of benthopelagic calanoid copepods (Bradford-Grieve 2001a) are adding to our knowledge of these crustaceans from the New Zealand slope. To date, the slope benthopelagic copepod fauna of New Zealand is known from

Bradford (1969) and Bradford-Grieve (2001a,b) and shallow water species were reported from Wellington Harbour (Bradford-Grieve 1999). The currently examined samples were taken from the upper slope of the south-eastern coast of the North Island using a plankton net suspended from the warps to the trawl boards of R.V. *Kaharoa* (see Bradford-Grieve 2001a) (Table 1).

The calanoid copepods of the family Aetideidae were the most common in these samples (Bradford-Grieve 2001a). Eight species were present (Table 2), among which were two species of *Bradyidius* Giesbrecht, 1897, one was *B. spinifer* Bradford, 1969 and the other species was a smaller undescribed species.

The Northern Hemisphere species of *Bradyidius* have been recently reviewed by Markhaseva (1996). The genus *Bradyidius* contains the following species that are all very similar and are distinguished by subtle details of the proportions of the body and limbs, the degree of spinulation of the limbs, and also leg 5 of the male: *B. angustus* (Tanaka, 1957); *B. armatus* Giesbrecht, 1897; *B. arnoldi* Fleminger, 1957; *B. curtus* Markhaseva, 1993; *B. hirsutus* Bradford, 1976; *B. luluae* Grice, 1972; *B. pacificus* (Brodsky, 1950); *B. plinoi plinoi* Campaner, 1978; *B. plinoi minor* Campaner, 1978; *B. rakuma* (Zvereva, 1977); *B. saanichi* Park, 1966; *B. similis* (Sars, 1902); *B. spinifer* Bradford, 1969; *B. styliformis* Othman & Greenwood, 1987; *B. subarmatus* Markhaseva, 1993; *B. tropicus* Wolfenden, 1905. *B. capax* n. sp. is added to this list.

METHODS

Calanoid copepods were collected in a non-closing plankton net with a 250 µm mesh net that was attached to the warps of the trawl boards of R.V. *Kaharoa* when fishing on the upper slope on the south-east coast of the North Island, New Zealand (Table 1). The sediment and organisms taken by the net were preserved in 2% formaldehyde. Sorted copepods were observed whole in lactic acid, and

dissected parts mounted, stained with chlorazol black, in gum-chloral (Pantin 1964). Mounted specimens were observed using Nomarski differential interference contrast. The system of morphological nomenclature used is based mainly on that of Huys & Boxshall (1991) but the major body segments are referred to as "somites" and the somites bearing swimming legs are "pedigerous somites".

Bradyidius capax n. sp.

Material examined

An undissected adult female from KAH0001/71 is designated as the holotype (total length (TL): 2.20 mm) and is deposited in the NIWA collection in Wellington, New Zealand (H811). Five undissected paratype females KAH0005/05 (P1290) are deposited in the NIWA type collection in Wellington. Two dissected paratype females (P1290/1, P1290/2) both from KAH0005/05 are also deposited in the NIWA collection. Total measured: eight females 2.00–2.20 mm TL (mean 2.10 mm) (see Table 2). The descriptions are based on specimens from the paratype series.

Type locality

NIWA Station KAH0001/71 near the seafloor in 299 m of water off East Cape, New Zealand (37°25.22'S, 178°09.92'E) collected on 19 February 2000.

Female

Cephalosome fused to pedigerous somite 1; pedigerous somites 4 and 5 fused (Fig. 1A,B). In lateral view posterolateral corners of prosome extend straight posteriorly into acute point that extends to posterior border of genital double somite or slightly beyond (Fig. 1G). Rostrum in form of medium-sized, ventrally directed, bifurcate plate; points only slightly divergent (Fig. 1C,D). Urosome 4-segmented (composed of genital double somite followed by 3 articulated somites: somites 3 and 4 and anal somite); genital double somite (Gns) symmetrical, swollen in dorsal view, ventral genital operculum small with convex lateral borders and concave posterior border, placed centrally on somite; pair of large seminal receptacles (SR) sitting obliquely in somite in lateral view so that, in dorsal or ventral view, they occupy more than half of ventral length of somite measured in midline (SR length: Gns = 0.57) (Fig. 1G,H); posterior border fringed with a soft frill with ragged posterior border. Urosomite 3 (segment 2) and uroso-

Table 1 Sampling stations.

Station number	Date	Depth (m)	Latitude	Longitude
KAH0001/71	19 Feb 2000	299	37°25.22'S	178°09.92'E
KAH0001/79	23 Feb 2000	306	41°04.10'S	176°22.05'E
KAH0005/05	13 Apr 2000	452	41°04.67'S	176°23.48'E

Table 2 Aetideidae found at three slope stations (Table 1). (f, female; m, male; CV, stage 5 copepodite.)

Species	Stations		
	KAH0001/71	KAH0001/79	KAH0005/05
<i>Aetideopsis tumorosa</i> Bradford, 1969	1f	5f	7f, 1m
<i>Aetideus pseudarmatus</i> Bradford, 1971	–	1f	–
<i>Bradyidius capax</i> n. sp.	27, 1CV 2.05, 2.10 mm CV 1.90 mm	–	7f 2.00–2.20 mm av. 2.10 mm
<i>Bradyidius spinifer</i> Bradford, 1969	1f	15f, 1CV, 3m	5f
<i>Chiridius molestus</i> Tanaka, 1957	27, 2m	1f	18f, 4m
<i>Chiridius poppei</i> Giesbrecht, 1892	1f, 1m	–	–
<i>Gaetanus minor</i> Farran, 1905	–	–	1f
<i>Undeuchaeta intermedia</i> A. Scott, 1909	–	–	1f

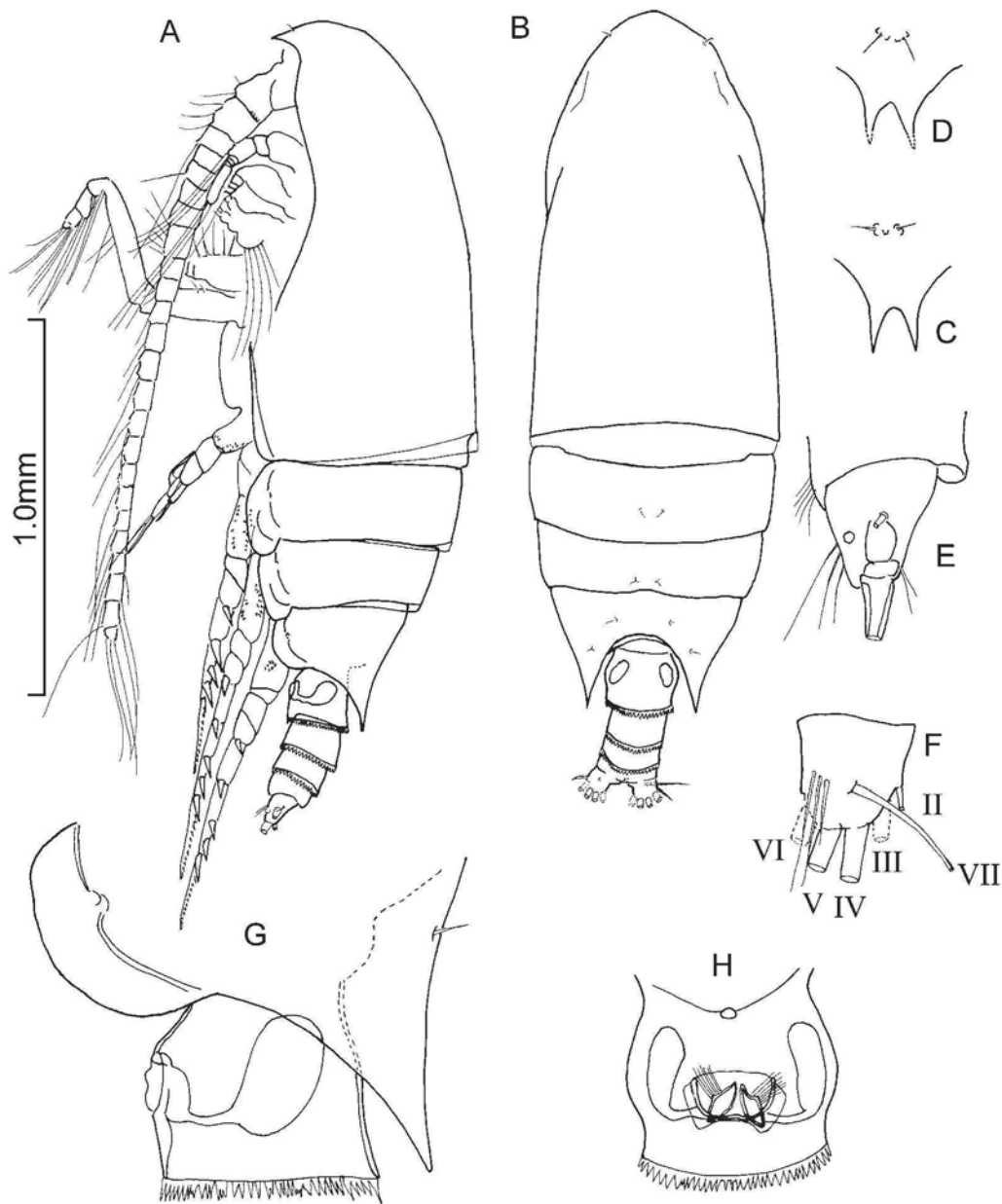


Fig. 1 *Bradyidius capax* n. sp. female. **A**, Lateral view; **B**, dorsal view; **C**, rostrum in anterior view; **D**, rostrum, view slightly left of anterior; **E**, left caudal ramus, lateral view; **F**, left caudal ramus, ventral view; **G**, genital double somite, left side view; **H**, genital double somite, ventral view. All illustrations are of the paratype P1290/2 except for **D**.

mite 4 (segment 3) posterior borders also fringed with a soft frill with ragged posterior border; anal somite (segment 4) slightly shorter than urosomite 4 ($Ur5:Ur4 = 0.91$ measured along lateral border excluding posterior frill on $Ur4$) with ventrodistal

fine hairs. Caudal rami symmetrical, about as long as wide, without seta in position I, seta II (Fig. 1E,F) located adjacent to seta III, four strong terminal setae in positions III–VI, appendicular seta VII small, situated on ventral surface directed laterally; with

group of (c. 6) long soft hairs originating on medial ventral surface adjacent to origin of seta VII.

Antennule (Fig. 2A–C) 24-segmented, extending to anterior border of genital double somite; armature elements referring to ancestral segments as follows (all setae of annulate type, only small number plumose): 1 on XXV, 1 on XXVI, 1 on XXVII–XXVIII): I-3, II–IV-6 + aesthetasc, V-2 + aesthetasc, VI-2, VII-2 + aesthetasc, VIII-2, IX-2 + aesthetasc, X–XI-4 + aesthetasc, XII-2, XIII-2, XIV-2 + aesthetasc, XV-2, XVI-2 + aesthetasc, XVII-2, XVIII-2, XIX-2, XX-2, XXI-2 + aesthetasc, XXII-1, XXIII-1, XXIV-1 + 1, XXV-1 + 1, XXVI-1 + 1, XXVII–XXVIII-4 + aesthetasc. Segment I with row of distal, posteroventral spinules.

Antenna (Fig. 2D) Endopod and exopod of approximately equal length; coxa and basis separate, coxa with 1 plumose seta, basis with 2 plumose setae; endopod segment 1 with 2 distal setae, segment 2 with 6+8 setae and outer border with small, stiff spinules; exopod 7-segmented, segment 1 (ancestral segments I) with 1 vestigial seta, segment 2 (composed of ancestral segments II–IV) with 3 setae, segments 3–6 (ancestral segments V–VIII) with 1 seta each, segment 7 (composed of ancestral segments IX and X) with 1 seta placed on distal one-third of segment and 3 terminal setae. Most setae of endopod and exopod with distal part annulate and lightly plumose.

Mandible (Fig. 2E,F) Gnathobase masticatory margin with 7 multicuspoid teeth that decrease in size from ventral to dorsal, a narrow long simple tooth, then a dorsal plumose seta. Wide proximal part of gnathobase bearing short spinules ventrally; more distally, there are 2 rows of long spinules on anteroventral surface. Basis with 2 setae; endopod segment 1 with 3 setae, one very small, and segment 2 with 9 setae; exopod with 6 setae.

Maxillule (Fig. 2G–I) Praecoxal arthrite with 4 posterior surface setae, long posterior distal hairs, and 10 marginal spines and setae; coxal endite and basal endites 1 and 2 with 4, 4, 5, setae respectively, basal endite 1 with long spinules on anterior surface; basis and endopod segments 1–3 fused on anterior surface, demarcation between basis and endopod and endopod segments 2 and 3 visible on posterior surface; endopod with 4+4+6 setae; exopod small with 10 setae; basal exite without seta; coxal epipodite with 9 setae.

Maxilla (Fig. 3A,B) Praecoxal endite 1 with 3 spinulose setae and one very small, articulated

spine-like seta, praecoxal endite 2 with 2 spinulose setae and 1 smaller seta with proximal border heavily spinulose on one side, coxal endite 1 with 2 spinulose setae and 1 smaller seta with proximal border heavily spinulose on one side, coxal endite 2 with 2 spinulose setae and 1 slightly smaller seta with proximal border heavily spinulose on one side, basal endite 1 with 3 setae, one of them thickened and claw-like; endopod with 6 setae.

Maxilliped (Fig. 3C–E) Syncoxa approximately same length as basis; syncoxa from proximal to distal with endite 1 with 1 seta, endite 2 with 2 setae, endite 3 with 3 setae (one longer than other 2); endite 4 with 3 setae (one strongly plumose), distal corner of syncoxa with patch of very small spinules, medial border in the same plane as endite 3 with elongate patch of very small spinules; basis with elongate patch (widest proximally) of very small, inner edge spinules extending half way to 3 medial setae; endopod segment 1 apparently incorporated into basis, with 2 setae, free endopod segments 2–6 with 4, 4, 3, 3+1, 4 setae respectively.

Swimming legs (Fig. 3F–I, Fig. 4A–D) Segmentation and disposition and numbers of spines and setae as in Clausocalanoidea. Terminal spines of legs 2–4 coarsely toothed, outer edge exopod spines of legs 2–4 bordered by very fine hairs.

Leg 1 Coxa with inner border hairs and patch of posterolateral strong spinules; basis with inner border hairs and 1 inner distal seta on anterior surface; endopod outer swelling with rows of strong spinules, anterolaterally endopod with patch of long spinules at about mid length; exopod segment 1 outer distal spine extends slightly beyond base of spine on exopod segment 2, exopod segment 2 outer distal spine extends slightly beyond base of spine on exopod segment 3, exopod 3 outer distal spine extends more than half way along terminal spine; all outer border spines spinulose.

Leg 2 Coxa with inner plumose seta and patch of strong outer border spinules that extend more onto posterior surface; endopod segment 1 posterior surface naked, segment 2 with elongate patch of spinules on posterior surface; terminal spine with 17–18 outer edge teeth.

Leg 3 Coxa with inner plumose seta and patch of strong outer border spinules; endopod segment 1 posterior surface naked, segments 2 and 3 with small patches of posterior surface spinules; terminal spine with 19 outer edge teeth.

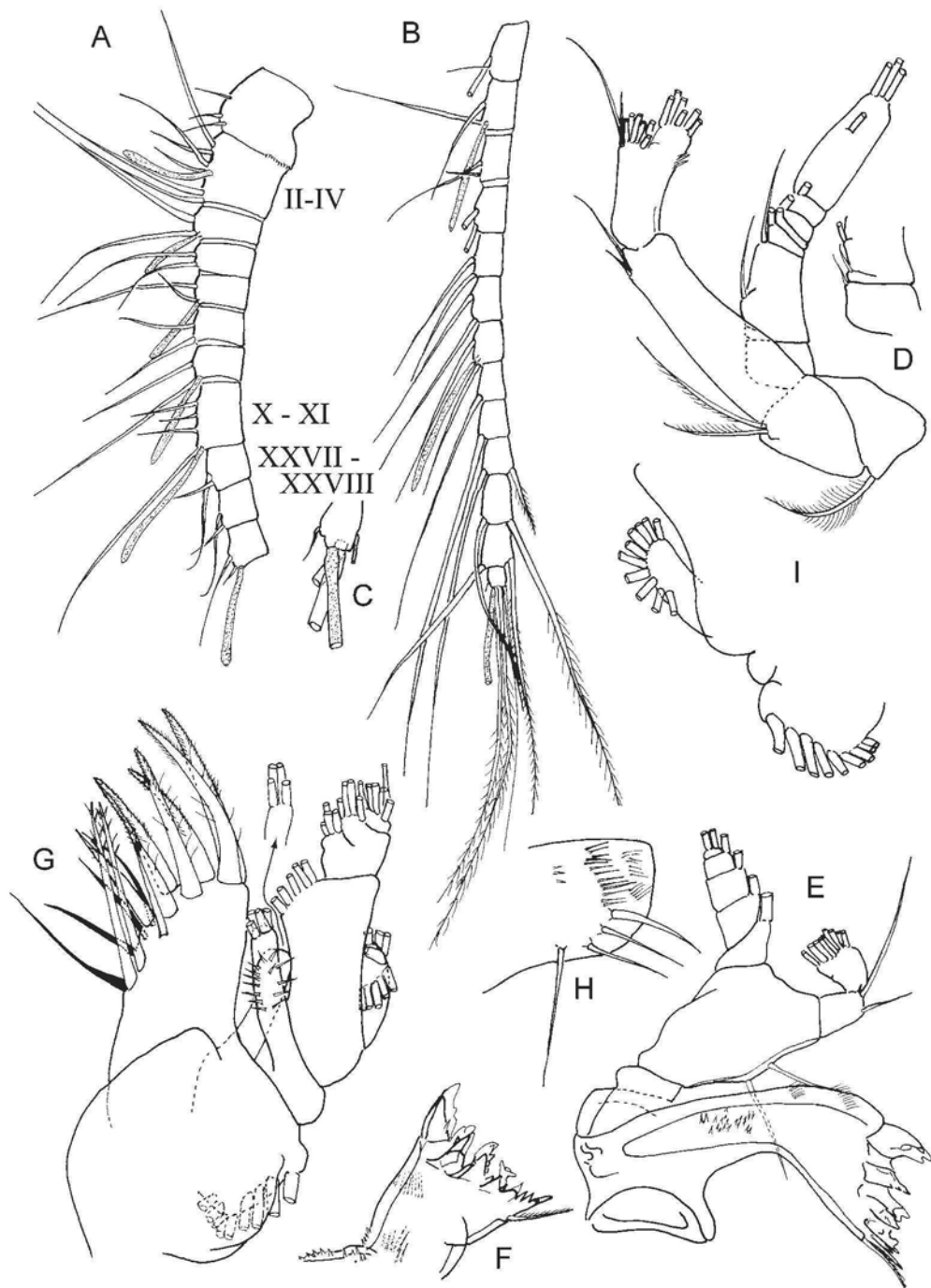


Fig. 2 *Bradyidius capax* n. sp. female. **A**, Right antennule, ancestral segments I–XIV; **B**, right antennule, ancestral segments XV–XXVIII; **C**, terminal segment (ancestral segments XXVII–XXVIII) of antennule; **D**, left antenna; **E**, right mandible; **F**, mandibular gnathobase; **G**, right maxillule; **H**, maxillule praecoxal arthritis, posterior view; **I**, maxillule outer border. All illustrations of paratype P1290/2 except for F, H, and I.

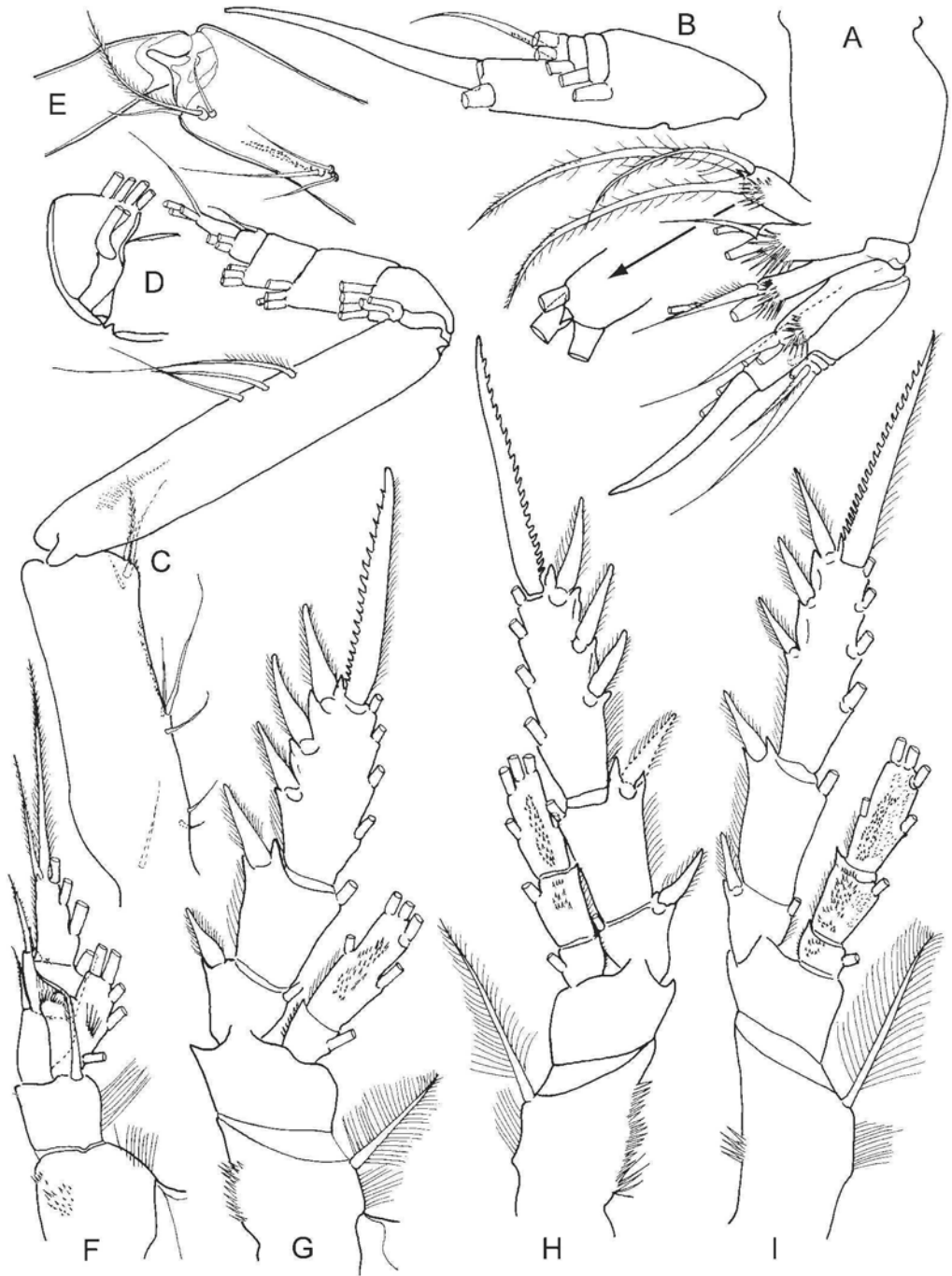


Fig. 3 *Bradyidius capax* n. sp. female. **A**, Right maxilla; **B**, maxilla terminal part; **C**, left maxilliped; **D**, maxilliped basis terminal part and endopod segment 2; **E**, maxilliped terminal part of coxa and proximal part of basis; **F**, leg 1, anterior view; **G**, leg 2, posterior view; **H**, leg 3, posterior view; **I**, leg 4, posterior view. All illustrations of paratype P1290/2 except for B, D, and E.

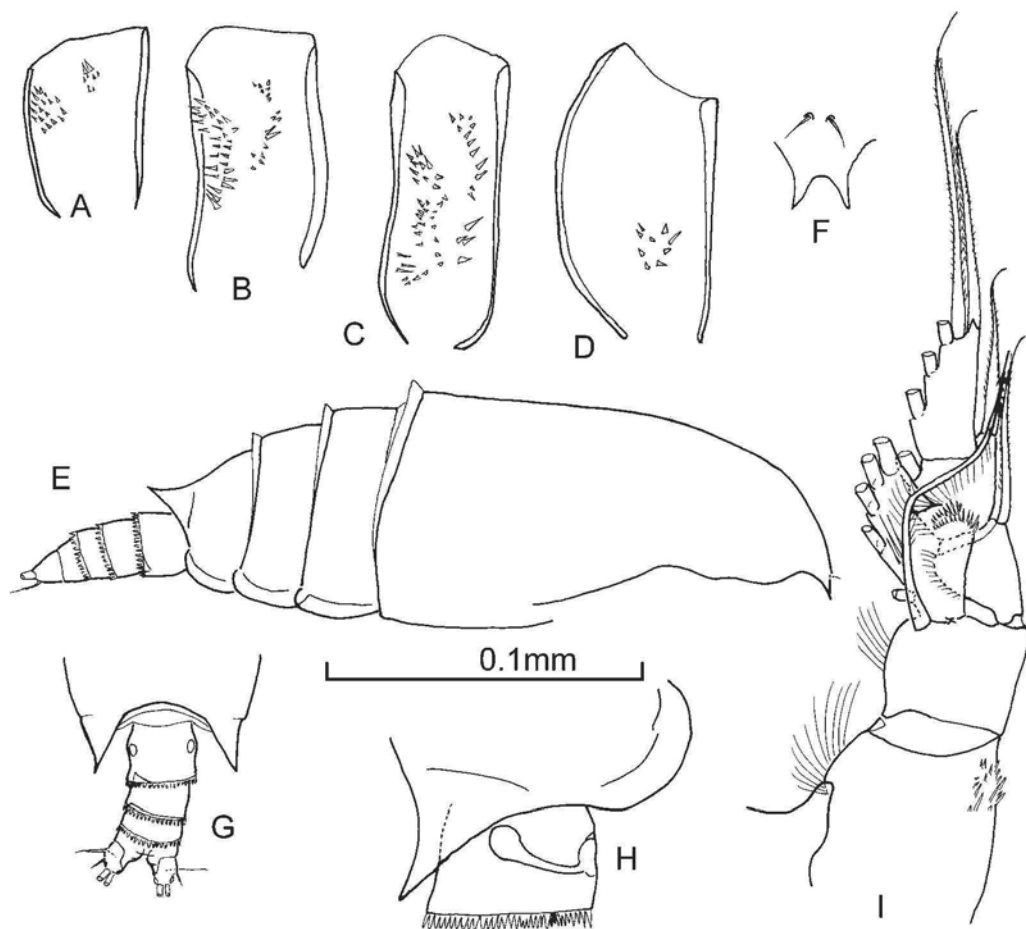


Fig. 4 *Bradyidius capax* n. sp. female paratype P1290/2: swimming legs, right side view of coxae. **A**, Leg 1; **B**, leg 2; **C**, leg 3; **D**, leg 4. *Bradyidius spinifer* Bradford, 1969 female from station KAH0001/79: **E**, lateral view; **F**, rostrum, anterior view; **G**, pedigerous somite 5 and urosome, dorsal view; **H**, pedigerous somite 3 and genital double somite, lateral view; **I**, leg 1.

Leg 4 Coxa with inner plumose seta and small patch of proximolateral spinules; endopod segments 1–3 densely covered in spinules, central spinules coarse, inner spinules fine; terminal spine with 21 outer edge teeth.

Leg 5 Absent.

Male

Unknown.

Remarks

Etymology The specific name “capax” is a Latin adjective meaning “roomy or spacious” used as an adjective with a masculine ending, refers to the large

seminal receptacles in the female genital double somite.

DISCUSSION

This species is close to *B. armatus* and *B. rakuma* as the new species and these two are the only species to have the combination of the posterior corners of pedigerous somite 5 extending to the posterior border of the genital double somite and leg 1 exopod segment 1 outer distal spine extending to (or slightly beyond) the base of the outer distal spine on segment 2. A comparison of these three species (Table 3) shows that *B. capax* differs from its closest relatives

Table 3 Comparison of three species of *Bradyidius*. (A2, antenna; B, basis; Mn, mandible; Pd4 + 5, pedigerous somites 4 and 5; Re1, exopod segment 1; SR, seminal receptacles; Gns, genital double somite; f, female, m, male.)

Species of <i>Bradyidius</i>	Distribution	Total length (mm)	Rostrum	A2 Re1 seta	Pd5 points: divergence, dorsal view	SR length: Gns length (ventral view)	Pd4+5 fusion line
<i>armatus</i> Giesbrecht, 1897	North Atlantic	f: 2.65–2.70 m: 1.50–2.20	divergent	absent	divergent	c. 0.30	not visible
<i>rakuma</i> (Zvereva, 1977)	Northern N Pacific	f: 3.10–3.30	strongly divergent	absent	directed straight posteriorly	c. 0.20	visible
<i>capax</i> n. sp.	East of New Zealand	f: 1.85–2.05	hardly divergent	present	directed straight posteriorly	0.57	not visible
<i>spinifer</i> Bradford, 1969	East of New Zealand	f: 2.20–2.50 m: 2.20	slightly divergent	present	slightly divergent	0.25	visible laterally

by a combination of its small size, hardly divergent rostral points, fusion line between pedigerous somites 4 and 5 not visible, posterior corners of pedigerous somite 5 directed straight posteriorly (not divergent in dorsal view), seminal receptacles occupy 57% of length of genital double somite measured ventrally, and antennal exopod segment 1 with a small seta.

The samples currently reported on have extended the range of *B. spinifer* northwards along the continental slope of north-eastern New Zealand. Examined as complete specimens, *B. spinifer* and *B. capax* look similar, but may be distinguished by the fact that *B. spinifer* is larger, the distal hyaline frill of pedigerous somites 2–4 in *B. spinifer* extends away from the body (Fig. 4E). In *B. spinifer* the outer exopodal spines of leg 1 are very long (Fig. 4I), the posterior corners of pedigerous somite 5 in dorsal view are slightly divergent (Fig. 4G), the fusion line between pedigerous somites 4 and 5 is visible in lateral view (Fig. 4E,G), seminal receptacles small, in dorsal or ventral view, they occupy about one-quarter of ventral length of somite measured in midline (SR length: Gns = 0.25) (Fig. 4H, Table 3); the rostral points are slightly divergent (Fig. 4F), legs 2 and 3 endopod segment 1 with fine spinules on posterior surface, spinules on legs 2–4 endopods all very fine (Bradford 1969) compared with the robust spinules of *B. capax*.

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REFERENCES

- Bradford, J. M. 1969: New genera and species of benthic calanoid copepods from the New Zealand slope. *New Zealand Journal of Marine and Freshwater Research* 3: 473–505.
- Bradford, J. M. 1976: A new species of *Bradyidius* (Copepoda, Calanoida) from the Mgazana Estuary, Pondoland, South Africa, and a review of the closely related genus *Pseudotharybis*. *Annals of the South African Museum* 72: 1–10.

- Bradford-Grieve, J. M. 1999: New species of benthopelagic copepods of the genus *Stephos* (Calanoida: Stephidae) from Wellington Harbour, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 33: 13–27.
- Bradford-Grieve, J. M. 2001a: A new species of benthopelagic copepod of the genus *Tharybis* (Calanoida: Tharybidae) from the upper slope, north-eastern New Zealand. *New Zealand Journal of Marine and Freshwater Research* 35: 421–433.
- Bradford-Grieve, J. M. 2001b: Two species of benthopelagic calanoid copepods of the genus *Neoscolecithrix* Canu, 1896 s.s. from New Zealand and the segregation of *Cenognatha* n. gen. *New Zealand Journal of Marine and Freshwater Research* 35: 781–793.
- Brodsky, K. A. 1950: Calanoida of the far eastern seas and polar basin of the USSR. *Opredeliteli po Faune SSSR* 35: 1–306. The National Science Foundation, Washington DC. 440 p. (In English.)
- Campaner, A. F. 1978: On some new planktobenthic Aetideidae and Phaennidae (Copepoda, Calanoida) from the Brazilian continental shelf. I. Aetideidae. *Ciência e Cultura* 30: 863–876.
- Fleminger, A. 1957: New calanoid copepods of the families Aetideidae, Euchaetidae and Stephidae from the Gulf of Mexico. *Fishery Bulletin, Fish and Wildlife Service, U.S.* 57(117): 355–363.
- Giesbrecht, W. 1897: Notizen zur Systematik der Copepoden. *Zoologischer Anzeiger* 20(546): 253–255.
- Grice, G. D. 1972: The existence of a bottom-living calanoid copepod fauna in deep water with descriptions of five new species. *Crustaceana* 23(3): 219–242.
- Huys, R.; Boxshall, G. A. 1991: Copepod evolution. London, The Ray Society. 468 p.
- Markhaseva, E. L. 1993: Two new species of *Bradyidius* with notes on *B. armatus* Giesbrecht (Crustacea, Copepoda: Aetideidae). *Zoosystemica Rossica* 2(1): 47–53.
- Markhaseva, E. L. 1996: Calanoid copepods of the family Aetideidae of the world ocean. *Trudy Zoologicheskogo Instituta, RAN* 268: 1–331. (In English.)
- Othman, B. H. R.; Greenwood, J. G. 1987: A new species of *Bradyidius* (Copepoda, Calanoida) from the Gulf of Carpentaria, Australia. *Journal of Plankton Research* 9: 1133–1141.
- Pantin, C. F. A. 1964: Notes on microscopical technique for zoologists. Cambridge University Press. 76 p.
- Park, T. S. 1966: A new species of *Bradyidius* (Copepoda: Calanoida) from the Pacific coast of North America. *Journal of the Fisheries Research Board of Canada* 23: 805–811.
- Sars, G. O. 1902: An account of the Crustacea of Norway. 4. Copepoda, Calanoida. Parts 3–12. Bergen, Bergen Museum.
- Scott, A. 1909: The Copepoda of the Siboga Expedition. Part 1. Free-swimming, littoral and semi-parasitic Copepoda. *Siboga-Expeditie* 17(29a): 1–324, 69 pl.
- Tanaka, O. 1957: The pelagic copepods of the Izu region, Middle Japan. Systematic account 3. Family Aetideidae (Part 1). *Publications of the Seto Marine Laboratory* 6: 31–68.
- Wolfenden, R. N. 1905: Plankton studies. Preliminary notes of new or interesting species. Part 1. Copepoda. Rebman Company, London and New York. 24 p. 7 pl.
- Zvereva, J. 1977: A new species of *Aetideopsis* Sars (Copepoda, Calanoida) from Aniva Bay (the Sea of Okhotsk). *Issledovaniya Fauny Morei* 20(28): 6–8.