

# A review of the scopelocheirid amphipods (Crustacea, Amphipoda, Lysianassoidea), with the description of new taxa from Australian waters

Niamh M. Kilgallen<sup>1</sup>, James K. Lowry<sup>1</sup>

<sup>1</sup> Australian Museum Research Institute, 6 College Street, Sydney, NSW 2010, Australia

<http://zoobank.org/CAFFC884-904F-40C2-AACF-12BE3A2F3ECC>

Corresponding author: Niamh M. Kilgallen (niamh.kilgallen@austmus.gov.au)

## Abstract

Received 19 August 2014  
Accepted 13 February 2015  
Published 5 March 2015

Academic editor:  
Carsten Lüter

## Key Words

Scopelocheiridae  
Paracallisominae  
Scopelocheirinae  
new genus  
new species  
*Austrocallisoma*  
*Tayabasa*  
Australia.

Scopelocheiridae is a small family of scavenging lysianassoid amphipods. There is a distinct shallow water group (Scopelocheirinae **subfam. n.**) and a distinct deep-sea group (Paracallisominae **subfam. n.**). We catalogue three genera and eight species in the scopelocheirines and move *Scopelocheirus onagawae* Takekawa & Ishimaru, 2000 to the genus *Aroui*. The deep-sea paracallisomines are not often collected and consequently their morphological diversity is not well understood. We catalogue seven genera and 15 species. We provide diagnostic descriptions and a key to all genera in the Scopelocheiridae. We describe two new genera, *Austrocallisoma* **gen. n.** and *Tayabasa* **gen. n.**, and three new species from Australian waters, *Austrocallisoma jerryi* **sp. n.**, *Paracallisoma woolgoolga* **sp. n.** and *P. zivianii* **sp. n.**

## Introduction

Scopelocheiridae Lowry & Stoddart, 1997 is a small family of scavenging lysianassoid amphipods which contains two subfamilies, Scopelocheirinae subfam. n. and Paracallisominae subfam. n. The scopelocheirines contain three genera and eight species living in temperate and boreal, mainly shallow, waters of the Mediterranean Sea, the North and South Atlantic, Japan and Australia. They are scavengers feeding on carrion on the sea bottom, with some species reported feeding in the dead tests of spatangoid urchins (Chevreux 1911, Lowry and Stoddart 1989). Paracallisomines are a larger group (seven genera and 15 species) widespread in the deep-

sea of the North and South Pacific, North and South Atlantic, Southern Ocean and Indian Ocean. Paracallisomines are not often collected and consequently their morphological diversity is not well understood. This has made their generic composition difficult to determine. In this paper we describe two new genera, *Austrocallisoma* for *A. jerryi* sp. n., and *Tayabasa* gen. n. for *Eucallisoma barnardi* Lowry & Stoddart, 1983, and provide a key to the world genera. We also describe two new species in the genus *Paracallisoma*, *P. woolgoolga* sp. n., and *P. zivianii* sp. n. (see Suppl. material 1 for specimen data on material examined). All species records from the literature, where found, are catalogued and their distributions and depth ranges noted (see also Suppl. material 2).

## Material and methods

The descriptions were generated from a DELTA database (Dallwitz 2010) to the scopelocheirid genera and species of the world. In the diagnostic descriptions, diagnostic characters that distinguish each taxon from all others are denoted in *italic* type. Maxilla 1 setal-tooth arrangements follow the formulae outlined in Lowry and Stoddart (1992, 1995). In describing the telson we define the cleftness as deeply cleft (more than 66%), moderately cleft (33% to 66%), or weakly cleft (less than 33%). We use the term labrum to refer to the epistome and upper lip complex. Material is lodged in the Australian Museum, Sydney (AM); Graduate School of Agricultural Science, Tohoku University (AMTU); Natural History Museum, London (NHM); Muséum National d'Histoire Naturelle, Paris (MNHN); Musée Oceanographique Monaco (MOM); Museo Civico di Storia Naturale, Verona (MSNV); Zoological Museum of Moscow University, Moscow (ZMM); United States National Museum of Natural History, Smithsonian Institution, Washington DC (USNM); Museum für Naturkunde, Berlin (ZMB); Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZIN); Zoological Museum, Hamburg (ZMH). Standard abbreviations used in the figures are: A, antenna; C, coxa; EP, epimeron; G, gnathopod; H, head; IP, inner plate; LM, labrum; MD, mandible; MX, maxilla; MP, maxilliped; OP, outer plate; P, pereopod; T, telson; U, uropod; l, left; r, right.

### Checklist of the family Scopelocheiridae Lowry & Stoddart, 1997

#### Scopelocheirinae subfam. n.

- Aroui americana* Lowry & Stoddart, 1997
- Aroui hamatopodus* Lowry & Stoddart, 1989
- Aroui onagawae* (Takekawa & Ishimaru, 2000)
- Aroui setosus* Chevreux, 1911
- Paracallisomopsis beljaevi* Gurjanova, 1962
- Scopelocheirus crenatus* Bate, 1857
- Scopelocheirus hopei* (Costa, 1851)
- Scopelocheirus polymedus* Bellan-Santini, 1985

### Key to Scopelocheirid genera

- 1 Maxilla 2 outer plate with extremely long distally-barbed slender setae ..... *Aroui*
- Maxilla 2 outer plate without long slender distally-barbed setae ..... 2
- 2 Pereopod 4 coxa with large subquadrate posteroventral lobe ..... 3
- Pereopod 4 coxa with subacutely produced posteroventral lobe ..... 5
- 3 Gnathopod 1 basis swollen, glandular ..... *Eucallisoma*
- Gnathopod 1 basis slender, non-glandular ..... 4
- 4 Gnathopod 1 coxa adze-shaped; pereopod 5 basis wider than long ..... *Scopelocheirus*
- Gnathopod 1 coxa subrectangular; pereopod 5 basis longer than wide ..... *Paracallisomopsis*
- 5 Pereopods 3 and 4 carpus distinctly longer than wide ..... 6
- Pereopods 3 and 4 carpus as wide as long or wider than long ..... 9
- 6 Pereopod 4 coxa posteroventral lobe weakly developed posteriorly ..... *Anisocallisoma*
- Pereopod 4 coxa posteroventral lobe well developed posteriorly ..... 7

#### Paracallisominae subfam. n.

- Anisocallisoma armigera* Hendrycks & Conlan, 2003
- Austrocallisoma jerryi* gen. n., sp. n.
- Bathycallisoma schellenbergi* (Birstein & M. Vinogradov, 1958)
- Eucallisoma glandulosa* J.L. Barnard, 1961
- Paracallisoma abyssi* (Oldevig, 1959)
- Paracallisoma alberti* Chevreux, 1903
- Paracallisoma coecum* (Holmes, 1908)
- Paracallisoma platepistomum* Andres, 1977
- Paracallisoma spinipoda* Hendrycks & Conlan, 2003
- Paracallisoma woolgoolga* sp. n.
- Paracallisoma zivianii* sp. n.
- Scopelocheiropsis abyssalis* Schellenberg, 1926
- Scopelocheiropsis armata* (Ledoyer, 1986)
- Scopelocheiropsis sublittoralis* G. Vinogradov, 2004
- Tayabasa barnardi* (Lowry & Stoddart, 1993)

## Systematics

### Family Scopelocheiridae Lowry & Stoddart, 1997

Scopelocheiridae Lowry & Stoddart, 1997: 122.

**Diagnosis.** (Modified after Lowry and Stoddart 1997). Head as long as deep, or deeper than long. Labrum, epistome and upper lip separate. Mandible incisors usually symmetrical, sometimes asymmetrical, large with straight or convex margins; left lacinia mobilis a stemmed distally expanded smooth or irregularly cusped blade, a long slender robust seta, or occasionally a cuspidate peg (*Paracallisomopsis*); accessory setal row without distal setal tuft; molar present or absent (*Scopelocheiropsis sublittoralis*), a narrow column with a small triturating surface, or a small non-setose triangular flap when present. Maxilla 1 inner plate usually strongly setose, with more than 2 pappose setae (except *Anisocallisoma*); outer plate broad, with 6–11 setal-teeth in a 7/4 arrangement; palp large, 1- or 2-articulate. Maxilliped outer plate with or without apical slender simple or pappose setae, with or without apical robust setae. Gnathopod 1 simple, dactylus reduced, complex, setose. Pereopods 3–7 usually simple, sometimes prehensile. Telson moderately to deeply cleft.



- 7 Maxilliped palp article 4 well developed. Gnathopod 1 dactylus anterior margin with rows of long slender setae ... *Paracallisoma*  
 – Maxilliped palp article 4 vestigial. Gnathopod 1 dactylus anterior margin without setae ..... 8  
 8 Mandible lacinia mobilis a stemmed, distally expanded blade. Gnathopod 1 coxa reduced ..... *Austrocallisoma*  
 – Mandible lacinia mobilis a cuspidate peg. Gnathopod 1 coxa well-developed, almost as large as coxa 2 ..... *Tayabasa*  
 9 Mandible lacinia mobilis a long slender robust seta ..... *Bathycallisoma*  
 – Mandible lacinia mobilis a distally expanded smooth blade ..... *Scopelocheiropsis*

### Subfamily Scopelocheirinae subfam. n.

<http://zoobank.org/3BBA67F9-3DA0-41D4-91C3-FCF000D1B594>

**Included genera.** The Scopelocheirinae includes three genera: *Aroui* Chevreux, 1911; *Paracallisomopsis* Guranova, 1962; *Scopelocheirus* Bate, 1857.

**Diagnosis.** Mandible molar a narrow column.

### *Aroui* Chevreux, 1911

*Aroui* Chevreux, 1911: 169. — J.L. Barnard 1969: 328. — Barnard and Karaman 1991: 434 (key), 467. — Lowry and Stoddart 1989: 112. — Lowry and Stoddart 2003: 249.

**Type species.** *Aroui setosus* Chevreux, 1911, by monotypy.

**Included species.** *Aroui* includes four species: *A. americana* Lowry & Stoddart, 1997; *A. hamatopodus* Lowry & Stoddart, 1989; *A. onagawae* (Takekawa & Ishimaru, 2000), comb. n.; *A. setosus* Chevreux, 1911.

**Diagnostic description.** Mandible lacinia mobilis a stemmed, distally expanded, irregularly cusped blade; palp article 2 broadened. *Maxilla 2* inner plate longer than outer plate; *outer plate with extremely long distally barbed slender setae*. *Gnathopod 1 coxa margins diverging distally*. Pereopod 5 coxa slightly wider than long; basis greatly expanded posteriorly.

**Distribution.** Western Atlantic. Mediterranean Sea. Japan. Australia.

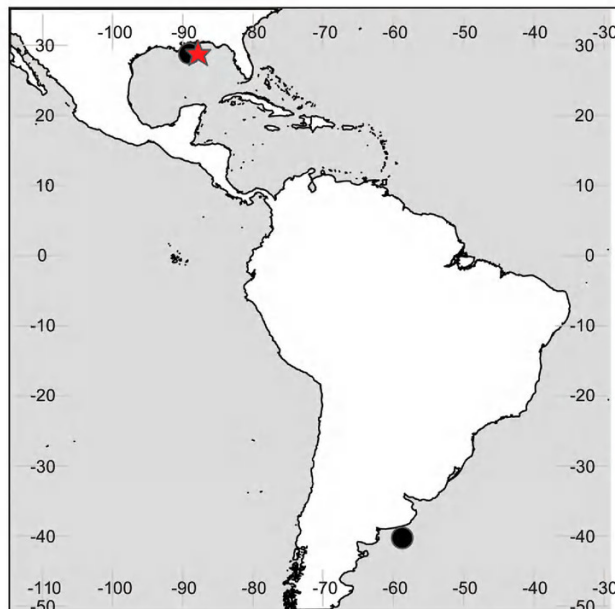
**Ecology.** Found in shallow warm seas. A scavenger, also found in dead spatangoid tests.

**Discussion.** Previously, the setal fringe on the distal margins of the coxae from gnathopod 1 to pereopod 4 was considered to be a diagnostic character of the genus *Aroui*. Here we exclude that character from the diagnosis of the genus, as the setal fringe is absent in *A. onagawae* (Takekawa & Ishimaru, 2000), comb. n. Instead, we consider the unusual long, distally barbed setae on the outer plate of maxilla 2 to be an autapomorphy that distinguishes *Aroui* from all other genera in the Scopelocheiridae. See *A. onagawae*, below, for further discussion.

### *Aroui americana* Lowry & Stoddart, 1997

Figure 1

*Aroui americana* Lowry & Stoddart, 1997: 124, figs 60–62.



**Figure 1.** Distribution of *Aroui americana* Lowry & Stoddart, 1997. Star indicates type locality.

— Escobar-Briones and Winfield 2003: 42. — Ortiz et al. 2007: 513. — Martín et al. 2013: 1715 (appendix 1).

**Type material.** Holotype, female, 5 mm (with oostegite buds), USNM 282716. Paratypes: 1 male, 5.4 mm, USNM 282717; 1 male AM P.45339.

**Type locality.** Gulf of Mexico, south of Mobile Bay (approximately 29°12'N, 85°07'W), from stomach of a Blackfin grenadier, *Coelorinchus caribbaeus* (Goode & Bean, 1885), 200 m depth.

**Depth range.** 95–200 m (Lowry and Stoddart 1997). The deeper record represents animals taken from fish stomachs.

**Distribution.** *Argentina*: east of Bahía Unión (Lowry and Stoddart 1997). *United States*: Gulf of Mexico, south of Mobile Bay and south-east of the Mississippi River Delta (Lowry and Stoddart 1997).

**Ecology.** Known from sandy bottoms, but also a scavenger by implication (Lowry and Stoddart 1997).

**Discussion.** This species was described from three specimens: two from fish stomachs in the Gulf of Mexico and in the collections of the USNM, and another specimen taken in a trawl off Argentina by the USS *Albatross* in the collections of the AM. No new material has been recorded in the literature since its description.



***Aroui hamatopodus* Lowry & Stoddart, 1989**

Figure 2

*Aroui hamatopodus* Lowry & Stoddart, 1989: 114, figs 2–4.  
 — Springthorpe and Lowry 1994: 18. — Lowry and Stoddart 2003: 249. — Berge et al. 2004: 1719 (table 1).

**Type material.** Holotype, male, 7.8 mm, AM P.38460. Paratypes: female, 8.0 mm (with oostegites), AMP.38461; 9 specimens, AM P.38462.

**Additional Australian material examined.** *New South Wales*: 9 specimens, AM P.43490 [NSW-945]; 1 specimen, AM P.44276 [NSW-946]; 1825 specimens, AM P.44256 [NSW-944], off Wollongong (34°31.48'S, 151°13.22'E), 200 m, baited trap, 27–28 March 1994, J.K. Lowry & K. Dempsey, MV *Robin E*; 8 specimens, AM P.44238, off Wollongong (34°31.48'S, 151°13.22'E), 200 m, baited trap, 28–29 March 1994, J.K. Lowry & K. Dempsey, MV *Robin E* [NSW-962]; 1 specimen, AM P.44452, off Wollongong (34°32.25'S, 151°15.16'E), 300 m, baited trap, 6–7 May 1993, P. Freewater, S.J. Keable & W. Vader, MV *Robin E* [NSW-783]; 23 specimens, AM P.44426 [NSW-801]; 2 specimens, AM P.44437 [NSW-802], off Wollongong (34°32.53'S, 151°15.0'E), 300 m, baited trap, 7–8 May 1993, P. Freewater, S.J. Keable & W. Vader, MV *Robin E*; 4 specimens, AM P.47032, off Wollongong (34°32.08'S, 151°12.55'E), 200 m, baited trap, 7–8 May 1993, P. Freewater, S.J. Keable & W. Vader, MV *Robin E* [NSW-797].

**Type locality.** Australia, New South Wales, from stomach of a jackass morwong (tarakihi), *Nemadactylus macropterus* (Forster, 1801), 73–183 m depth.

**Depth range.** 73–620 m (Lowry and Stoddart 1989).

**Distribution.** *Australia*: North-east of Rowley Shoals, Western Australia; Lady Elliot Island, Queensland, to off Wollongong, New South Wales (Lowry and Stoddart 1989, this study).

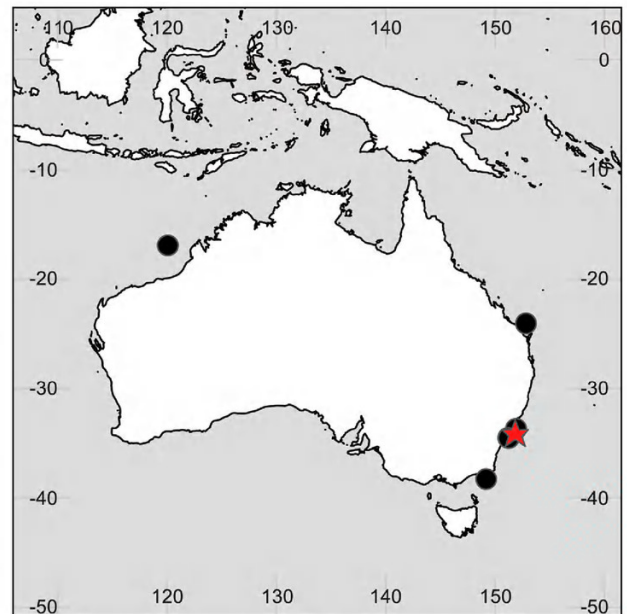
**Ecology.** Taken in baited traps (this study). Also recorded feeding on dead spatangoids, *Taimanawa mortenseni* Henderson & Fell, 1969 (Lowry and Stoddart 1989).

***Aroui onagawae* (Takekawa & Ishimaru, 2000), comb. n.**

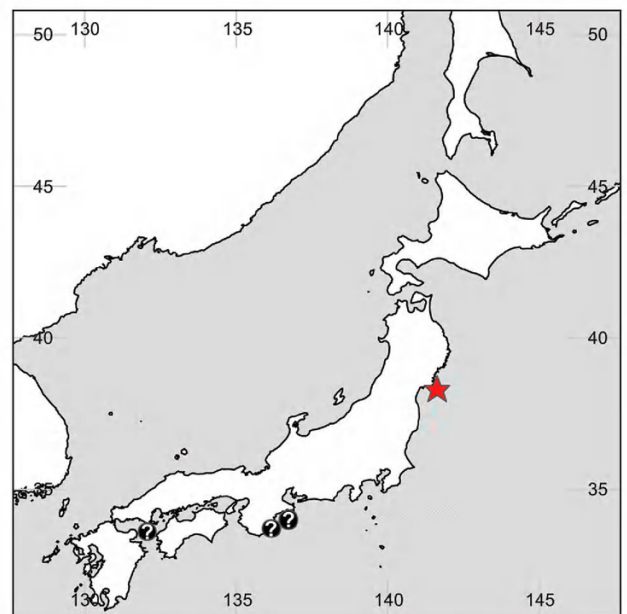
Figure 3

*Scopelocheirus onagawae* Takekawa & Ishimaru, 2000: 681, figs 1–6. — Takekawa et al. 2004: 971. — Ide et al. 2005: 725. — Ide et al. 2006a: 194. — Ide et al. 2006b: 1209. — Ide et al. 2007: 71.  
 ? *Scopelocheirus hopei*. — Nagata 1965: 148. — Sekiguchi and Yamaguchi 1983: 10, fig. 6.

**Type material.** Holotype, male, 10.4 mm, AMTU 110. Paratypes: males, AMTU 101, 102, 104, 105; females AMTU 106, 108, 109; juveniles AMTU 103, 107.



**Figure 2.** Distribution of *Aroui hamatopodus* Lowry & Stoddart, 1989. Star indicates type locality.



**Figure 3.** Distribution of *Aroui onagawae* (Takekawa & Ishimaru, 2000). Star indicates type locality, question marks indicate uncertain records.

**Type locality.** Japan, Miyagi Prefecture, Onagawa Bay (38°25.75'N, 141°32'E), 30 m depth.

**Depth range.** 30 m (Takekawa and Ishimaru 2000). Possible extension to 519 m (Sekiguchi and Yamaguchi 1983).

**Distribution.** *Japan*: Onagawa Bay (Takekawa and Ishimaru 2000); Seto Inland Sea? (Nagata 1965) (as *Scopelocheirus hopei*); Enshu- and Kumano-nada? (Sekiguchi and Yamaguchi 1983) (as *Scopelocheirus hopei*).



**Ecology.** A scavenger, taken in baited traps (Ide et al. 2005), and also known to attack injured flounder juveniles under laboratory conditions (Ide et al. 2006b).

**Discussion.** Takekawa and Ishimaru (2000) originally placed this species in the genus *Scopelocheirus*, based on the lack of a setal fringe on the coxae of the anterior pereopods. In the present study we have revised the diagnoses for these genera and excluded this character from the diagnosis of *Aroui*. We are therefore removing this species from the genus *Scopelocheirus* to *Aroui* based on maxilla 2, of which the outer plate is shorter than the inner plate and bears long, distally barbed slender setae.

### *Aroui setosus* Chevreux, 1911

Figures 4, 5

*Aroui setosus* Chevreux, 1911: 170, fig. 3, pl. 7, figs 14–27. — J.L. Barnard 1958: 90 (list). — Belloc 1960: 6. — Thurston and Allen 1969: 356. — Stroobants 1976: 239, figs 1–4, 5B, D, F, H. — Vader 1978: 127. — Diviacco and Ruffo 1989: 476, figs 321, 322. — Lowry and Stoddart 1989: 112, fig. 1. — Barnard and Karaman 1991: 467. — Springthorpe and Lowry 1994: 31. — Stefanidou and Voultsiadou-Koukoura 1995: 602 (table 1), 607. — Bellan-Santini 1998: 874 (table 3). — Bellan-Santini and Ruffo 1998: 900 (table 7). — Berge et al. 2004: 1719 (table 1). — Christodoulou et al. 2013: table 2.

**Type material.** Lectotype, female, 8 mm, MNHN-Am3985. Paralectotypes: female, 7.6 mm, male, 5.8 mm, AM P.35541; 3 specimens, NHM 1912:4:4:5–7; 93 specimens, MNHN-Am900 and Am901; 3 specimens, MOM.

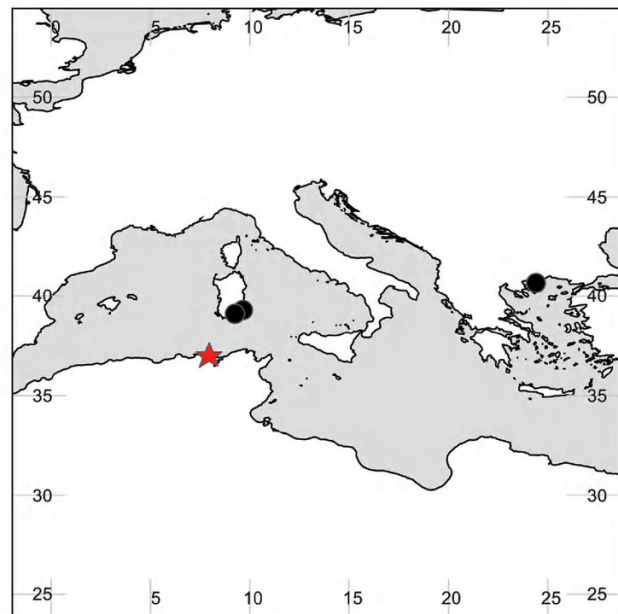
**Type locality.** Mediterranean Sea, Algeria, north-east of Cap de Garde (approximately 36°55'N, 7°47'E), 65 m depth, 12 June 1904, *Melita* stn 726.

**Depth range.** 34–80 m (Stroobants 1976, Stefanidou and Voultsiadou-Koukoura 1995).

**Distribution.** *Algeria*: off Annaba (Chevreux 1911). *Greece*: near Thasos (Stefanidou and Voultsiadou-Koukoura 1995). *Italy*: Cagliari; and between Capo Ferato and Torre Corallo, Sardinia (Stroobants 1976).

**Ecology.** Found living on the test of sea urchins (*Spatangus* spp.) (Chevreux 1911, Stroobants 1976). Also collected from the sponge *Suberites* covering a gastropod shell that housed a hermit crab, *Paguristes* sp. (Stroobants 1976).

**Discussion.** Stroobants (1976) designated a neotype for *Aroui setosus* from material collected from Sardinia. Lowry and Stoddart (1989) subsequently deemed this to be an invalid act, as original syntype material was available, from which these authors selected a lectotype. See Lowry and Stoddart (1989) for a comprehensive synopsis and further discussion.



**Figure 4.** Distribution of *Aroui setosus* Chevreux, 1911. Star indicates type locality.

### *Paracallisomopsis* Gurjanova, 1962

*Paracallisomopsis*. Gurjanova 1962: 311. — J.L. Barnard 1969: 355. — Barnard and Karaman 1991: 511, fig. 92j.

**Type species.** *Paracallisomopsis beljaevi* Gurjanova, 1962, by monotypy.

**Included species.** *Paracallisomopsis* includes one species: *P. beljaevi* Gurjanova, 1962.

**Diagnostic description.** *Mandible lacinia mobilis a cuspidate peg*; palp article 2 slender. Maxilla 2 inner plate subequal in length to outer plate; outer plate without long distally barbed slender setae. *Gnathopod 1 coxa margins slightly tapering distally*. *Pereopod 5 coxa slightly wider than long*; *basis linear*.

### *Paracallisomopsis beljaevi* Gurjanova, 1962

Figures 6, 7

*Paracallisomopsis beljaevi* Gurjanova, 1962: 317, fig. 103a–c. — Stroobants 1976: 263, table 3. — Barnard and Karaman 1991: 511, fig. 92j. — Springthorpe and Lowry 1994: 10.

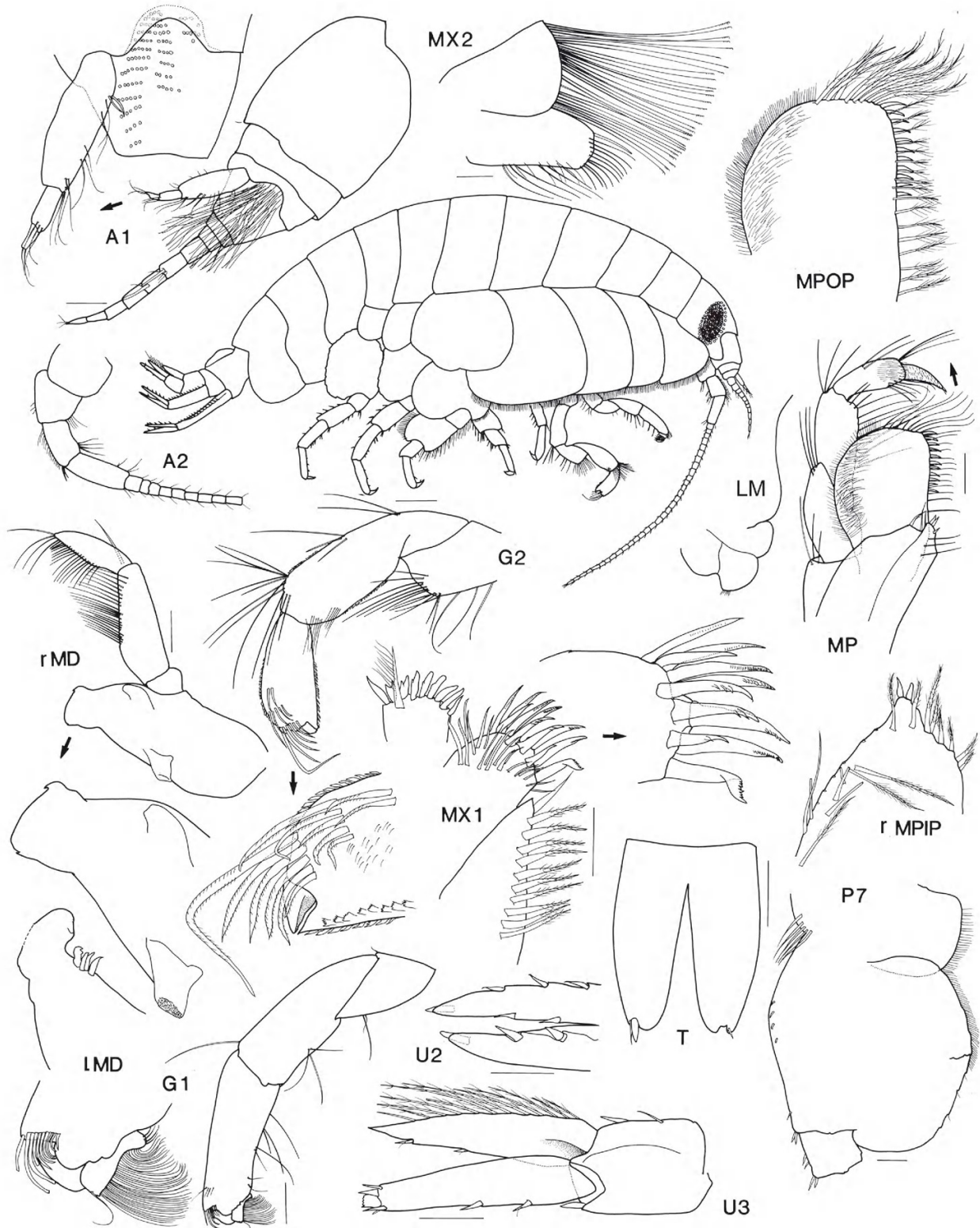
**Type material.** Syntypes: 1 specimen, sex unknown, 5.5 mm, AM P.35701; 10 specimens, ZIN I-34963.

**Type locality.** Bering Sea, Russia, Kamchatka, Olyutorsky Bay, 150 m [approximately 60°13'N, 168°23'E].

**Depth range.** 150 m (Gurjanova 1962).

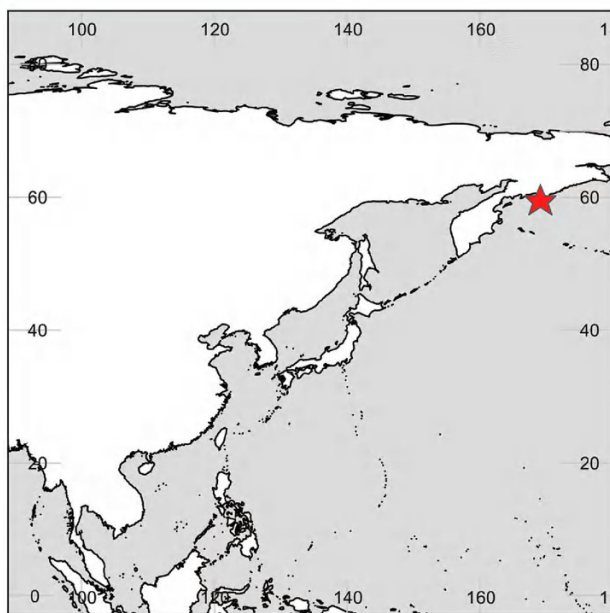
**Distribution.** Known only from the type locality, Olyutorsky Bay in the Bering Sea (Gurjanova 1962).





**Figure 5.** *Aroui setosus* Chevreux, 1911. Lectotype female, 8.0 mm, MNHN-Am3985, off Bône, Mediterranean Sea. Scales represent 0.1 mm.





**Figure 6.** Distribution of *Paracallisomopsis beljaevi* Gurjanova, 1962.

**Discussion.** Stroobants (1976) considered the possibility that the specimen described by Gurjanova (1962) is a juvenile of *Paracallisoma alberti*. We consider it to be a valid species and placed in the subfamily Scopelocheirinae based on the columnar molar. We examined the syntype in the Australian Museum, but were unable to determine whether the molar has a triturating surface.

### *Scopelocheirus* Bate, 1857

*Callisoma* O.G. Costa, 1840: 5 (*nomen nudum*). — A. Costa 1851: 1 (homonym, Coleoptera). — Lilljeborg 1865a: 33. — Lilljeborg 1865b: 23. — Heller 1866: 26. — Boeck 1871: 101. — Boeck 1872: 131. — G.O. Sars 1890: 52. — Della Valle 1893: 838.  
*Scopelocheirus* Bate, 1857: 138. — Stebbing 1906: 61. — Chevreux and Fage 1925: 54. — Stephensen 1929: 64. — Schellenberg 1942: 110. — Gurjanova 1951: 241. — J.L. Barnard 1969: 362. — Lincoln 1979: 50. — Diviaco and Ruffo 1989: 542. — Barnard and Karaman 1991: 528, 434 (key), 454 (key).

**Type species.** *Scopelocheirus crenatus* Bate, 1857 by monotypy.

**Included species.** *Scopelocheirus* includes three species: *S. crenatus* Bate, 1857; *S. hopei* A. Costa, 1851; *S. polymedus* Bellan-Santini, 1985.

**Diagnosis.** Mandible lacinia mobilis a stemmed, distally expanded, irregularly cusped blade; palp article 2 broadened. *Maxilla* 2 inner plate slightly longer than outer; *outer plate without long distally barbed slender setae*. Gnathopod 1 coxa margins diverging distally. Pereopod 5 slightly wider than long; basis greatly expanded posteriorly.

**Ecology.** *Scopelocheirus* species are frequently taken in baited traps. They are also reported in the literature as an associate of echinoids.

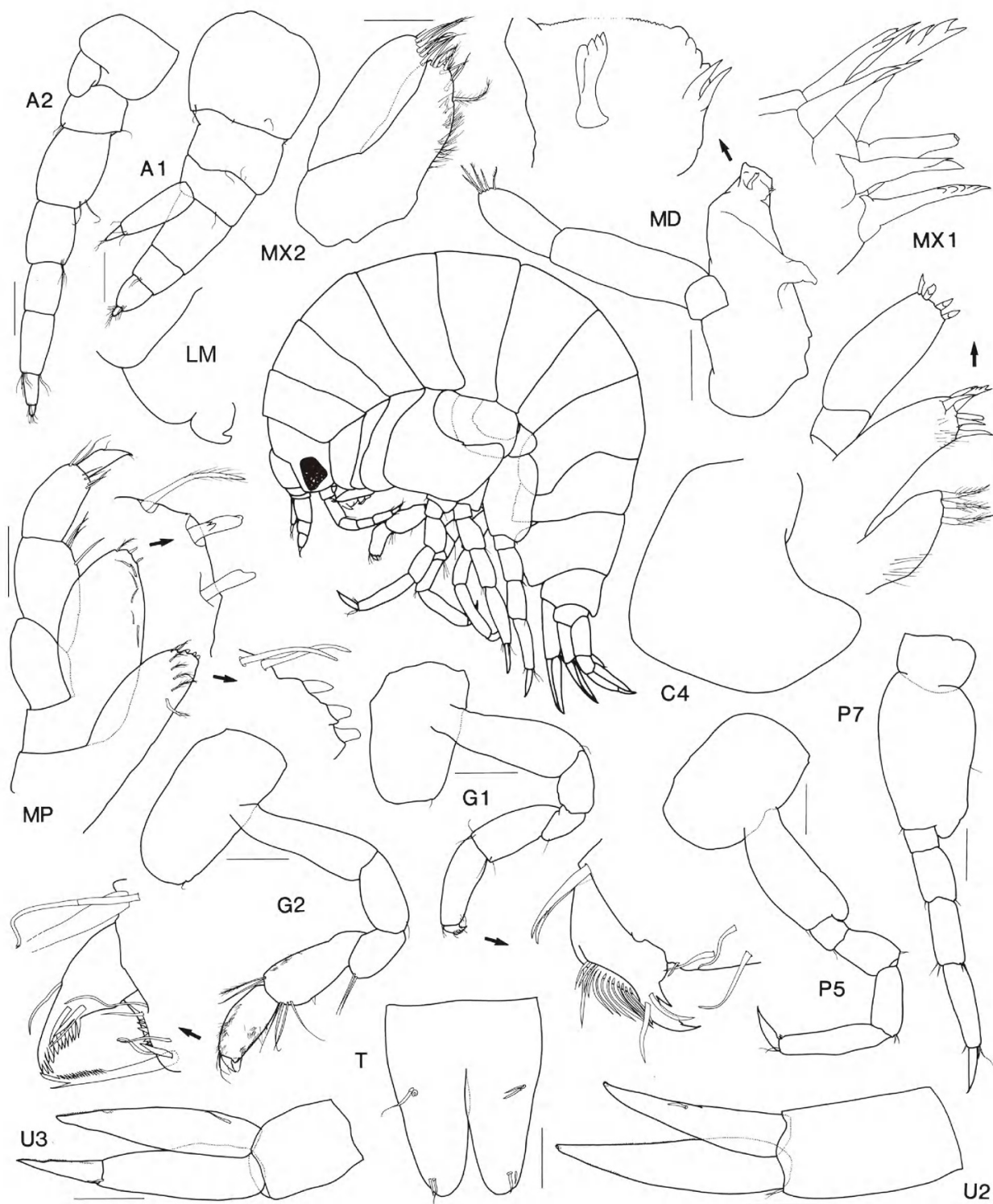
**Discussion.** The taxonomic and nomenclatural history of the genus *Scopelocheirus* is highly complex. Della Valle (1893) placed all of the then described species of *Scopelocheirus* (*Callisoma Barthelemyi* Costa, 1853; *Scopelocheirus breviatus* Bate, 1856; *Scopelocheirus crenatus* Bate, 1857; *Anonyx Kröyeri* Bruzelius 1859; *Callisoma Branickii* Wrzesniewski, 1874; and *Tryphosa serra* Meinert 1890) in the synonymy of *Scopelocheirus hopei* (as *Callisoma hopei*). Since then, *S. crenatus* and *S. hopei* have variously been treated as synonyms by some authors, e.g. Lincoln (1979), and as distinct species by others, e.g. Diviaco and Ruffo (1989). As these names have been recorded many times in the literature and appear commonplace in the north-east Atlantic and Mediterranean, the result is a confused synonymy and a distributional record that is beyond the scope of the present study to untangle. In the following catalogue we treat these names separately, and detail what is recorded in the literature without making any assumption on the validity of the taxon concepts in most cases, which would require a much more detailed study of material.

Barnard and Karaman (1991) considered *Bathycallisoma* to be a junior synonym of *Scopelocheirus*, however our re-diagnosis of *Scopelocheirus* excludes *Bathycallisoma* from the Scopelocheirinae on the basis of its flap-like molar. We consider it to be a valid genus, placed in the Paracallisominae.

### *Scopelocheirus crenatus* Bate, 1857

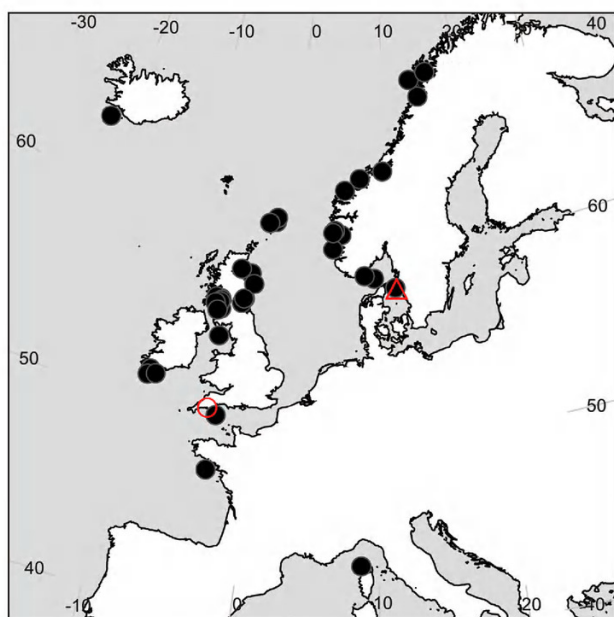
Figures 8, 9

*Scopelocheirus breviatus* Bate, 1856: 58 (*nomen nudum*)  
*Scopelocheirus crenatus* Bate, 1857: 138. — Stebbing 1906: 62. — Stephensen 1923a: 96. — Stephensen 1923b: 16. — Stephensen 1932: 355. — Chevreux 1935: 41, pl. 7, fig. 3. — Stephensen 1935: 77. — Raitt 1937: 249. — Stephensen 1940: 12. — Stephensen 1942: 472 (table). — Jones 1948: 404, 421. — Enequist 1949: 387 (table). — Jones 1951: 138, 143 (appendix). — Gurjanova 1951: 241 (key), 242 (fig. 107). — J.L. Barnard 1958: 99 (list). — Thurston and Allen 1969: 367. — Laverack and Blackler 1974: 81. — Mattson 1981: 115 (table 1). — Palerud and Vader 1991: 43.  
*Callisoma crenata*. — Bate 1862: 85, pl. 14, fig. 5. — Bate and Westwood 1863: 120, text fig. — Norman 1869: 276. — Boeck 1871: 101. — Boeck 1872: 132, pl. 7, fig. 1. — M'Intosh 1874: 266. — Haddon 1886: 636. — Chevreux 1888: 4. — Robertson 1888: 23. — Pocock 1889: 431. — G.O. Sars 1890: 53, pl. 19, fig. 1. — Meinert 1890: 151. — Walker 1892: 137. — Walker 1895: 291. — Walker 1896: 45. — Scott 1898: 176. — Scott 1900: 180. — Nordgaard 1905: 183. — Nordgaard 1911: 21. — Chumley 1918: [page unknown].



**Figure 7.** *Paracallisomopsis beljaevi* Gurjanova. Syntype, sex not known, 5.5 mm, AM P.35701, Barents Sea. Scales for gnathopods, pereopods represent 0.2 mm; remainder represents 0.1 mm.





**Figure 8.** Distribution of *Scopelocheirus crenatus* Bate, 1957, and its synonyms. Circles represent records of *Scopelocheirus crenatus* and its objective synonyms; triangle represents the subjective synonym *Tryphosa serra* Meinert, 1890. Type localities are indicated by the corresponding open symbol.

? *Tryphosa serra* Meinert, 1890: 156, pl. 51, figs 30–38.

*Callisoma crenatum*. — Chevreux 1898: 476.

*Callisoma hopei*. — Della Valle 1893: 839 (in part).

*Scopelocheirus crenatus*. — H.B. Moore 1937: 117.

*Scopelocheiropsis crenatus*. — Sanderson 1973: 38.

**Type material.** Syntypes, 26 specimens, NHM 1952.5:7:13.

**Type locality.** Plymouth Sound, United Kingdom.

**Depth range.** *Atlantic Ocean*: 3.7–323 m (Laverack and Blackler 1974, Enequist 1949). *Mediterranean Sea*: 2500 m (Chevreux 1935).

**Distribution.** In the literature, this species name has been widely recorded from the north-east Atlantic Ocean, with a single record from the Mediterranean Sea.

*North Atlantic Ocean. Denmark*: the Skagerrak and the Kattegat (Meinert 1890). *France*: South-west of Belle Île (Chevreux 1898). *Iceland*: South-west coast (Stephensen 1923a). *Ireland*: Bantry Bay (Haddon 1886); off Fastnet Rock (Pocock 1889); off Galley Head (Walker 1895). *North Sea Area*: north-west North Sea (Raitt 1937). *Norway*: Søndfjord; Hardangerfjord; and Hauge-sund (Boeck 1871, 1872); Alesund; Kristiansund (Boeck 1872); Trondheimsfjord (G.O. Sars 1890, Oldevig 1959); Skjerstadfjorden; Herdalfjord, Bergen (Nordgaard 1911); Lofotens (Stephensen 1932); the Skagerrak (Enequist 1949); Raunefjorden (Mattson 1981). *United Kingdom*: Plymouth Sound (Bate 1862); Banff (Bate 1862); Mac-duff (Bate 1862); Moray Firth (Bate and Westwood

1863); Shetland Islands (Norman 1869); St. Andrews (from the stomach of a haddock) (M'Intosh 1874, Laverack and Blackler 1974); Loch Fyne (Robertson 1888, Chumley 1918); Loch Goil (Robertson 1888, Chumley 1918); off Garnock Beacon (Robertson 1888); Kilchattan Bay (Robertson 1888); Cumbrae (Robertson 1892); West of Bradda Head, Isle of Man (Walker 1895, 1896); Firth of Forth (Scott 1898); off Aberdeen (Scott 1900); Gare-loch (Chumley 1918); Dunoon Basin (Chumley 1918); Skate Island (Chumley 1918); off Dartmouth, Devon (Chevreux 1935); Clyde (Sanderson 1973).

*Mediterranean Sea. France*: Off Corsica (Chevreux 1935).

**Ecology.** A scavenger that has been collected in baited traps (Chevreux 1935) and from dead fish on fishermen's lines (Sars 1890).

**Discussion.** We follow Stebbing (1906) and consider *Tryphosa serra* Meinert, 1890 to be a possible junior subjective synonym of *Scopelocheirus crenatus*. The record of Chevreux (1935) from off Corsica is the only known record of this species from the Mediterranean and is an order of magnitude deeper than all the Atlantic records. It may be a misidentification of *S. polymedus* Bellan-Santini, 1984.

### *Scopelocheirus hopei* (Costa, 1851)

Figure 10

*Callisoma Hopei* A. Costa, 1851: 5. — A. Costa 1857: 188.

— Bate 1862: 86, pl. 14, fig. 6. — Heller 1866: 27, pl. 3, figs 17, 18. Stossich 1880: 247. — Chevreux 1895: 426. — Norman 1895: 480. — Norman 1900: 200. — Chevreux 1903: 84. — Della Valle 1893: 839, pl. 6, fig. 11, pl. 26, figs 1–15 (in part).

? *Callisoma Barthelemyi* Costa, 1853a: 7.

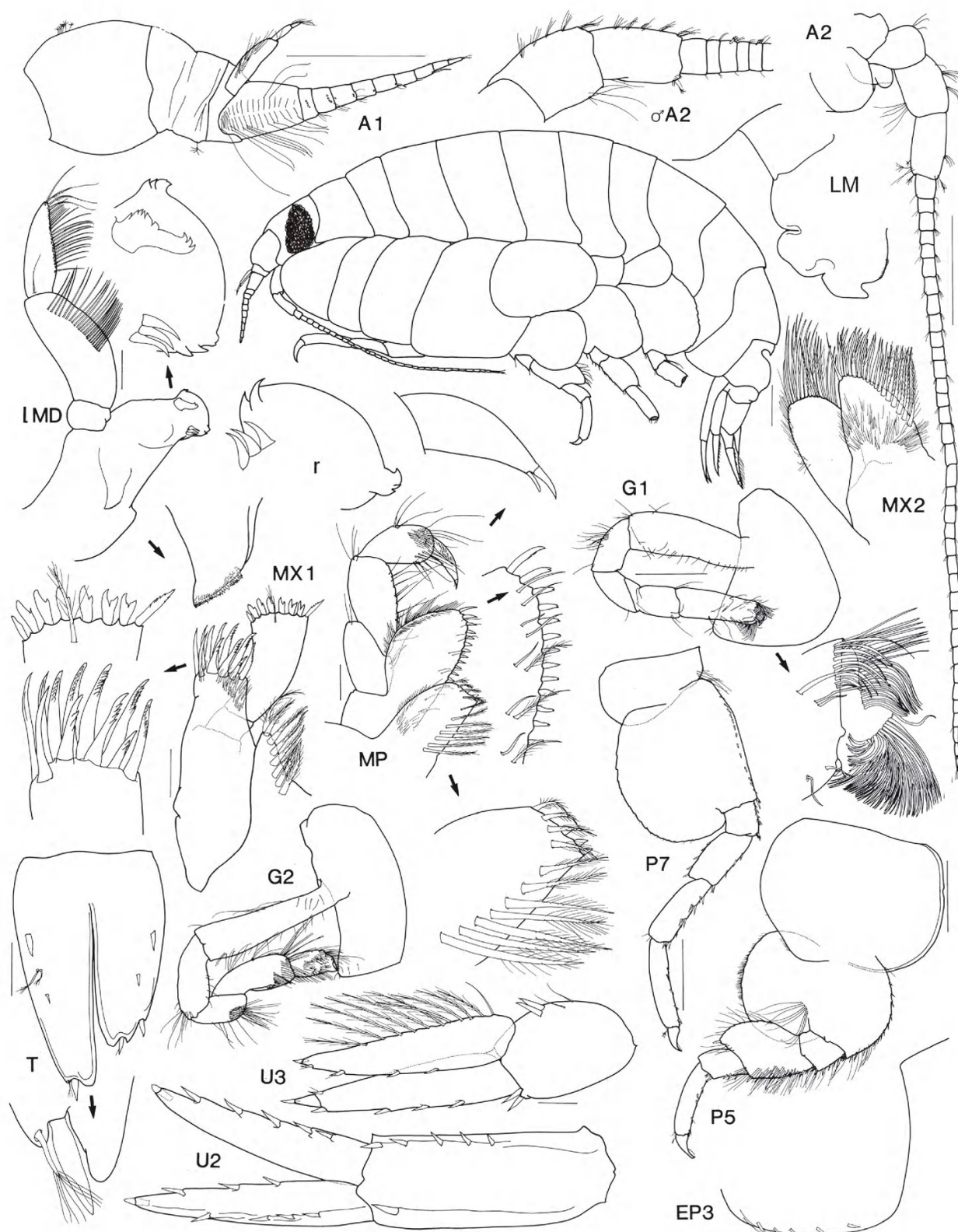
? *Anonyx Kröyeri* Bruzelius, 1859: 45, pl. 2, fig. 7.

? *Callisoma Kröyeri*. — Bate 1862: 371. — Lilljeborg 1865a: 33. — Lilljeborg 1865b: 23. — Boeck 1871: 102. — Boeck 1872: 134. — Metzger 1875: 284 (table). — G.O. Sars 1890: 54, pl. 19, fig. 2. — Norman 1900: 200.

? *Callisoma Branickii* Wrzesniowski, 1874: 15. — Wrzesniowski 1879: 349.

? *Callisoma kröyeri*. — Walker 1898: 166.

*Scopelocheirus hopei*. — Stebbing 1906: 62 (key). — Cecchini 1928: 301. — Marine Biological Association of the UK 1931: 188. — Stephensen 1932: 355. — Stephensen 1935: 76. — Williams 1938: 89. — Schellenberg 1942: 111. — Stephensen 1942: 472 (table). — Enequist 1949: 387, 400 (table). — Gurjanova 1951: 241, fig. 106 (key). — Williams 1954: 77. — Bossanyi 1957: 357. — J.L. Barnard 1958: 99 (list). — Oldevig 1959: 16. — Krapp-Schickel 1974: 321 (list), 339. — Stroobants 1976: 256, figs 6(S)–10(S), tables 1–4. — Ledoyer 1977: 389. — Lincoln 1979: p. 50, fig. 16. — Mattson 1981: 115 (table 1). — P.G. Moore 1984: 36. — Mateus and Mateus 1986: 130. — Dauvin 1988: 420. — Costello et



**Figure 9.** *Scopelocheirus crenatus* Bate. Female, 8.0 mm; male, 7.8 mm; AM P.35895, Skipness Point, Clyde Sea area, Scotland. Scales for antennae, gnathopods, pereopods represent 0.5 mm; remainder represent 0.1 mm.



al. 1989: 35 (in part, part *S. crenatus*). — Diviacco and Ruffo 1989: 542 (key), 544, fig. 372. — Kaartvedt 1989: 191, table 5. — Buhl-Jensen and Fosså 1991: 248, table 2. — Barnard and Karaman 1991: 528. — Nickell and Moore 1991: 368. — Palerud and Vader 1991: 43. — Albertelli et al. 1992: 142, 143, table 2. — Andres et al. 1992: 185, table 1. — Britton and Morton 1993: 369. — Dauvin et al. 1994: 551, table 3. — Ishimaru 1994: 59 (list). — Buhl-Mortensen 1996: 49, appendix 1. — Dauvin and Sorbe 1996: 443, 447, 449 (tables 3–5). — Krapp-Schickel and Zavodnik 1996: 459 (list). — Vallet and Dauvin 1996: 481. — Cunha et al. 1997: 133, appendix 1. — Ramsay et al. 1997: 892, table 6, 894. — Bellan-Santini 1998: 874, table 3. — Bellan-Santini and Ruffo 1998: 900, table 7. — Cartes and Sorbe 1999: 1138, table 1. — Miskov-Nodland et al. 1999: 154, appendix. — Groenewold and Fonds 2000: 1398. — O'Reilly et al. 2001: 36. — Bergmann et al. 2002: 190, figs 6a, 8, appendix 1. — Dauvin and Bellan-Santini 2002: 317, table 1. — Jones et al. 2003: 79, table 3, fig. 3. — Cartes et al. 2003: 748, table 1. — Kaim-Malka 2003: 37, figs 3–13, tables 1–7. — Castro et al. 2005: 442, table 3. — Horton 2006: 19, table 1. — Madurell et al. 2008: 338, table 1, 339, table 2. — Zakhama-Sraieb et al. 2009: 5, table 3. — Danovaro et al. 2010: 6. — Christodoulou et al. 2013: 12, table 2.

*Scopelocheirus Hopei*. — Chevreux 1911: 169. — Massy 1912: 40, 41. — Monod 1923: 22. — Stephensen 1923b: 15. — Chevreux and Fage 1925: 55, figs 39, 40. — Chevreux 1927: 61. — Stephensen 1929: 64. — Cecchini and Parenzan 1935: 165. — Chevreux 1935: 41. — Macquart-Moulin 1984: 185.

*Scopelocheiropsis hopei*. — Sanderson 1973: 38.

Not *Scopelocheirus hopei*. — Nagata 1965: 148. — Sekiguchi and Yamaguchi 1983: 10, fig. 6. (Probably = *Aroui onagawae*).

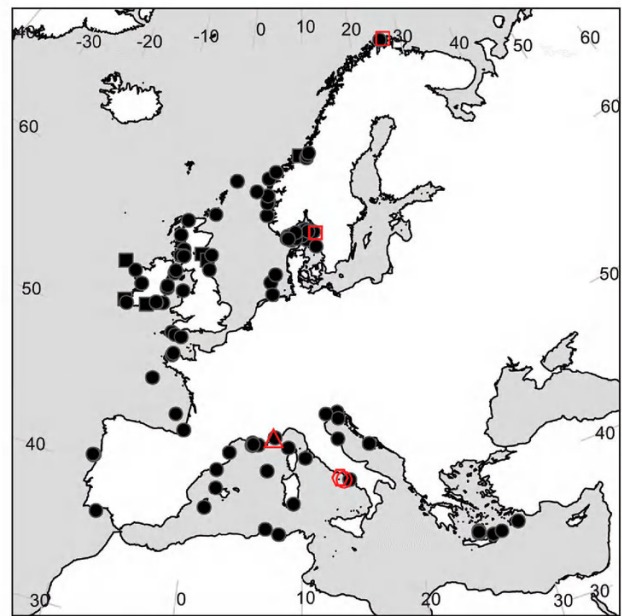
**Type material.** Probably lost.

**Type locality.** Naples, Italy, Mediterranean Sea.

**Depth range.** *Mediterranean Sea*: 34–2500 m (Stroobants 1976, Chevreux 1903). *Atlantic Ocean*: 12–2620 m (Stephensen 1923b, Chevreux 1903). *Pacific Ocean*: 40–519 m (Nagata 1965, Sekiguchi and Yamaguchi 1983).

**Distribution.** Widely recorded from the North Atlantic Ocean and Mediterranean Sea. Records from Japan are tentatively referred to *Aroui onagawae* (Sekiguchi & Yamaguchi, 1983).

**North Atlantic Ocean.** *Denmark*: near Horns Revs Lighthouse (Stephensen 1923b); the eastern Skagerrak (Stephensen 1923b); north of Skagen (Enequist 1949). *France*: Fosse de Capbreton (Norman 1900); Bay of Biscay (Chevreux 1903); off Roscoff (Dauvin 1988, Dauvin et al. 1994); Cap-Ferrat Canyon (Dauvin and Sorbe 1996). *Guinea-Bissau*: (Mateus and Mateus 1986). *Ireland*: Off the Skelligs, Co. Kerry; Ballycotton, Co. Cork



**Figure 10.** European distribution of *Scopelocheirus hopei* (Costa, 1851) (African distribution excluded). Circles represent records of *Scopelocheirus hopei* and its objective synonyms. Subjective synonyms are represented by the following symbols: (■) *Anonyx Kröyeri* Bruzelius, 1859; (▲) *Callisoma Branickii* Wrzesniewski, 1874; (●) *Callisoma Barthelemyi* Costa, 1853. Type localities are indicated by the corresponding open symbol.

(Walker 1898) (as *Callisoma kröyeri*); off south-west Ireland (Norman 1900); Dundrum-Dublin coast (Massey 1912); Galway Bay (McGrath 1981); Malahide; off Tuskar Rock; Hook Head; off Dunmore East; off Achill Head (Costello et al. 1989). *Norway*: Beian, Trondheimsfjord (G.O. Sars 1890) (as *Callisoma Kröyeri*); Raudeberg, Trondheimsfjord (Norman 1895); Finnmark (Bruzelius 1859) (as *Anonyx Kröyeri*); off the Aas Fjord; Strind Fjord; Gulosen; near Byberget, Trondheim region (Enequist 1949); Ålesund; north-west of Bergen; south-west of Haugesund; Skarnsyndet; Kjelvik (Oldevig 1959); Raunefjorden (Mattson 1981); Masfjorden (Kaartvedt 1989); Norwegian Shelf area (Buhl-Mortensen 1996); the Skagerrak (Miskov-Nodland et al. 1999). *Portugal*: off Aveiro (Andres et al. 1992, Cunha et al. 1997); south of Olhão (Castro et al. 2005). *Sweden*: Bohuslän (Bruzelius 1859) (as *Anonyx Kröyeri*); Gullmar Fjord, Bohuslän (Enequist 1949, Oldevig 1959, Buhl-Jensen and Fosså 1991); west of Hållö (Enequist 1949); Löken, Gåsö Ränn; west of Nidingen (Oldevig 1959). *United Kingdom*: Firth of Forth (Metzger 1875) (as *Callisoma Kröyeri*); Banff; Firth of Clyde; Firth of Forth; Inverary; Northumberland coast; Polperro, Cornwall; Seaham, Co. Durham; Shetland Islands; Sleat Sound (Norman 1900); Devon (Plymouth Marine Fauna 1931); off Dartmouth; east of the Orkney Islands (Chevreux 1935); Strangford Lough, Co. Down; off Donaghadee, Co. Down (Williams 1954); off Blyth, Northumberland (Bossanyi 1957); Clyde Area (Sanderson 1973, Moore 1984, Bergmann et al. 2002); near Assynt (Sanderson 1973); Anglesey (Ramsay et al. 1997).



Mediterranean Sea. *Algeria*: Annaba (Chevreux 1911). *Croatia*: Hvar (Heller 1866); Rovinj (Krapp-Schickel and Zavodnik 1996). *France*: ?Nice (Wrzesniowski 1874) (as *Callisoma branickii*); Calvi, Corsica (Chevreux 1903); Cap d'Ail (Monod 1923); Bonifacio, Corsica (Chevreux 1927); Canyon de Planier (Ledoyer 1977, Kaim-Malka 2003); south-east of Planier, north of Ratonneau; south of Île des Embiez (Ledoyer 1977); Banyuls-sur-Mer (Diviacco and Ruffo 1989); off Marseille (Ledoyer 1977, Kaim-Malka 2003). *Greece*: Cretan Sea; Rhodes Basin (Jones et al. 2003). *Italy*: Gulf of Naples (Costa 1851, 1857, Della Valle 1893, Cecchini 1928, Cecchini and Parenzan 1935); Monte Cristo Island (Chevreux 1895); Cagliari (Stroobants 1976); Ancona; Venice (Diviacco and Ruffo 1989). *Slovenia*: Piran (Heller 1866). *Spain*: Catalan slope (Cartes and Sorbe 1999); Balearic Islands (Cartes et al. 2003; Madurell et al. 2008). *Tunisia*: Between La Galite and Cap Serrat (Chevreux 1911).

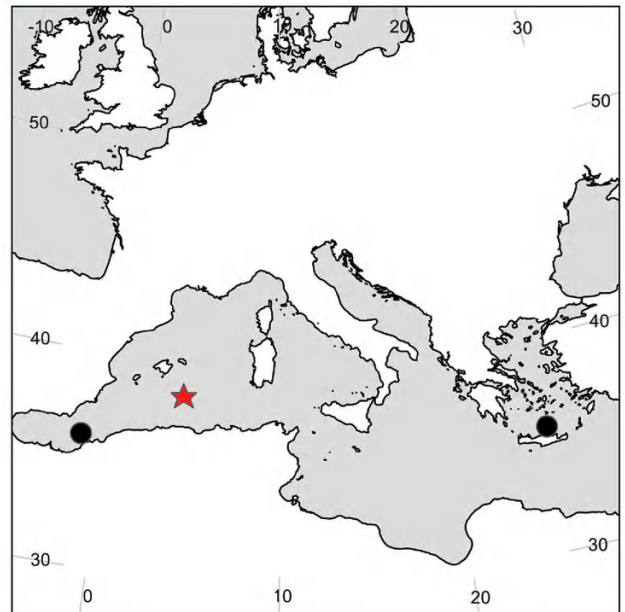
**Ecology.** A known scavenger, taken in baited traps (Chevreux 1895). Also reported as an associate of *Clypeaster* spp. (Wrzesniowski 1874) and *Echinocardium cordatum* (Pennant, 1777) (Metzger 1875, Plymouth Marine Fauna 1931); taken from the back and between the legs of *Maja squinado* (Herbst, 1788) (Plymouth Marine Fauna 1931); taken from the cranial cavity and along the nerve tracts of *Squalus acanthias* Linnaeus, 1758 (Williams 1938).

**Discussion.** Japanese records of *S. hopei* by Nagata (1965) and Sekiguchi and Yamaguchi (1983) are here considered to be inaccurate on the basis of their distribution, and some morphological inconsistencies with the European form such as the shape of the urosomite 1 (dorsally rounded in the European *S. hopei*, dorsally truncated in the Japanese specimens) and the length of the uropod 3 inner ramus (slightly shorter than and reaching at least to article 2 of outer ramus European specimens, much shorter than outer ramus in the Japanese specimens). It is possible that these records may actually represent *Aroui onagawae*. Unfortunately, the only illustration of Japanese specimens (by Sekiguchi and Yamaguchi (1983)) does not show the setae on the outer plate of maxilla 2 and as such precludes a generic placement in either *Aroui* or *Scopelocheirus*. However, all of the other illustrated characters correspond to the description and illustration of *A. onagawae* by Takekawa and Ishimaru (2000).

### *Scopelocheirus polymedus* Bellan-Santini, 1985

Figure 11

*Scopelocheirus polymedus* Bellan-Santini, 1985a: 275, figs 1, 2. — Bellan-Santini 1985b: 334. — Diviacco and Ruffo 1989: 542 (key), 544, figs 373, 374. — Bellan-Santini 1998: 874, table 3. — Bellan-Santini and Ruffo 1998: 900, table 7. — Bellan-Santini 1990: 277, 279. — Barnard and Karaman



**Figure 11.** Distribution of *Scopelocheirus polymedus* Bellan-Santini, 1984. Star indicates type locality.

1991: 528. — Jones et al. 2003: 79, table 3, fig. 3. — Danovaro et al. 2010: 6. — Christodoulou et al. 2013: 12, table 2.

**Type material.** Holotype, female, 9 mm, MSNV 213.

**Type locality.** South-east of Mallorca, Mediterranean Sea (38°27'N, 04°08'E), 2447 m depth.

**Depth range.** 1511–2447 m (Jones et al. 2003, Bellan-Santini 1985a).

**Distribution.** Mediterranean Sea. Western Basin, south-east of Mallorca (Bellan-Santini 1985a). *Algeria*: north-west of Oran (Bellan-Santini 1985a). *Greece*: Cretan Sea (Jones et al. 2003).

**Ecology.** Taken in baited traps (Jones et al. 2003).

**Discussion.** Many of the deeper records of *S. hopei*, particularly those from the Mediterranean may actually be misidentifications of *S. polymedus*, and should be re-examined to confirm their identity.

### Subfamily Paracallisominae subfam. n.

<http://zoobank.org/015E0211-83B5-4A15-BA80-11E5872DAF2F>

**Included genera.** The Paracallisominae contains 7 genera: *Anisocallisoma* Hendrycks & Conlan, 2003; *Bathycallisoma* Dahl, 1959; *Eucallisoma* J.L. Barnard, 1961; *Austrocallisoma* gen. n.; *Paracallisoma* Chevreux, 1903; *Scopelocheiropsis* Schellenberg, 1926; *Tayabasa* gen. n.

**Diagnosis.** Mandible a non-setose flap or occasionally absent (*Scopelocheiropsis sublitoralis*).



**Anisocallisoma Hendrycks & Conlan, 2003**

*Anisocallisoma* Hendrycks & Conlan, 2003: 2313.

**Type species.** *Anisocallisoma armigera* Hendrycks & Conlan, 2003, by monotypy.

**Included species.** *Anisocallisoma* includes one species: *A. armigera* Hendrycks & Conlan, 2003.

**Diagnostic description.** *Mandible lacinia mobilis* a long, slender robust seta. *Maxilla 1* inner plate with apical pappose setae only; *palp 1-articulate*. *Maxilla 2* inner and outer plates subequal in width and in length. *Maxilliped* palp article 4 reduced. *Gnathopod 1* coxa reduced, margins tapering distally; basis swollen; dactylus reduced, simple. *Pereopods 3* and *4* carpus short, longer than wide. *Pereopod 4* coxa with weakly-developed, subacutely produced posteroventral lobe.

**Discussion.** *Anisocallisoma* can be distinguished from all other paracallisomines by the reduction in the number of setae of the *maxilla 1* inner plate. It is most similar to *Eucallisoma* Barnard, 1961, and *Tayabasa* gen. n. They share the following characters: *gnathopod 1* basis swollen, glandular; dactylus reduced, simple. It is also very similar to the new genus *Austrocallisoma*, but it can be distinguished from all of these taxa in lacking the distal tuft of setae on the accessory flagellum, and in having a much more weakly-developed posteroventral lobe on the *pereopod 4* coxa, as well as the reduced setae on the *maxilla 1*.

***Anisocallisoma armigera* Hendrycks & Conlan, 2003**

Figure 12

*Anisocallisoma* Hendrycks & Conlan, 2003: 2314.

**Type material.** Holotype, male, 5.5 mm, CMNC 2002-0003. Allotype, female, 3.7 mm, CMNC 2002-0004. Paratypes: 1 male, 4.1 mm, CMNC 2002-0005; 1 male, 5.7 mm, CMNC 2002-0006; 1 male, ZMUC CRU-3722.

**Type locality.** Station M, 220 km off Point Conception, California, United States (34°47.2'N, 123°03.0'W), 3450 m.

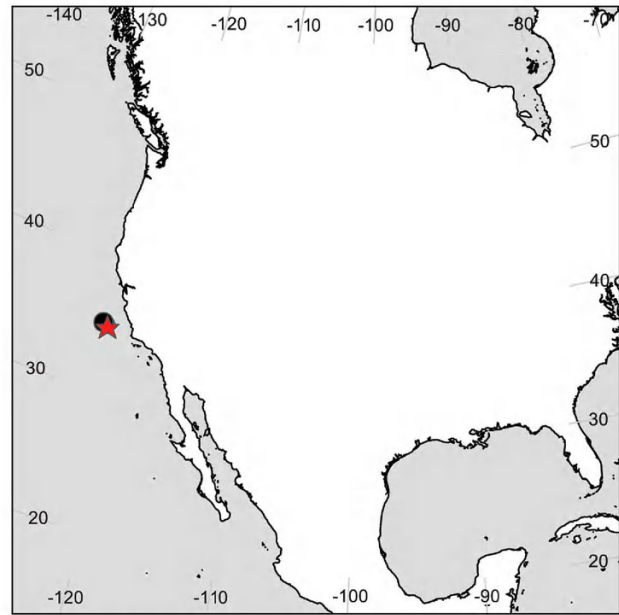
**Depth range.** 3450–4050 m (Hendrycks and Conlan 2003).

**Distribution.** *United States*: off Point Conception, California (Hendrycks and Conlan 2003).

***Austrocallisoma* gen. n.**

<http://zoobank.org/13BBD64A-FF5E-40EA-BE98-52946A289F28>

**Type species.** *Austrocallisoma jerryi* sp. n., by original designation.



**Figure 12.** Distribution of *Anisocallisoma armigera* Hendrycks & Conlan, 2003. Star indicates type locality.

**Included species.** *Austrocallisoma* includes one species: *Austrocallisoma jerryi* sp. n.

**Diagnostic description.** *Mandible lacinia mobilis* a stemmed distally expanded, irregularly cusped blade. *Maxilla 1* inner plate with pappose setae lining inner margin; *palp 1-articulate*. *Maxilla 2* inner plate broader than outer, inner and outer plates subequal in length. *Maxilliped* palp article 4 vestigial. *Gnathopod 1* coxa reduced, slightly shorter than coxa 2, margins slightly tapering distally; basis swollen, without glandular material; dactylus reduced, simple. *Pereopod 3* carpus short to long, longer than wide. *Pereopod 4* with well-developed, subacute posteroventral lobe.

**Etymology.** The name is a combination of the prefix *Austro-* from the latin *australis*, meaning southern and referring to the southern hemisphere distribution of the type species, and the suffix *-callisoma* (gender neuter) referring to its placement within the Paracallisominae.

**Discussion.** *Austrocallisoma* gen. n. is a difficult taxon that has much in common with the monotypic genera *Anisocallisoma*, *Eucallisoma* and *Tayabasa* gen. n. Having four monotypic genera that are highly derived yet clearly closely related is not ideal. However, to maintain consistency of diagnostic characters at a generic level we feel justified in establishing this new genus.

*Austrocallisoma* can be separated from both *Eucallisoma* and *Anisocallisoma* by the strongly developed and subacute posteroventral lobe on the *pereopod 4* coxa (well-developed and subquadrate in *Eucallisoma*, very weakly-developed and subacute in *Anisocallisoma*). It can be further distinguished from *Anisocallisoma* in having plumose setae lining the inner margin of the inner



plate of maxilla 1, and having a distal tuft of setae on the accessory flagellum. It differs from *Eucallisoma* in having a vestigial maxilliped palp article 4 (well-developed in *Eucallisoma*).

***Austrocallisoma jerryi* sp. n.**

<http://zoobank.org/D2E70936-572C-4DED-BAC7-C465C923AA69>

Figures 13–16

**Type material.** Holotype, female, 32.0 mm, AM P.69087, east of Sydney, New South Wales, Australia (33°44.5–08.9'S, 152°24.4–09.68'E), 0–1800 m over bottom depth 2994–3828 m, Isaacs-Kidd midwater trawl, 27–28 April 1989, coll. J.R. Paxton, HMAS *Cook* [JP 89-5]. Paratype, 1 immature female with non-setose oostegites, 26.0 mm, AM P.70171, east of Sydney, New South Wales, Australia (33°52.5–53.92'S, 152°39.0–05.9'E), 0–1800 m over bottom depth 1700–4856 m, Isaacs-Kidd midwater trawl, 27 April 1989, coll. J.R. Paxton, HMAS *Cook* [JP 89-3].

**Diagnosis.** Mandible lacinia mobilis a stemmed distally expanded, irregularly cusped blade. Maxilla 1 palp 1-articulate. Maxilliped palp article 4 absent. Gnathopod 1 coxa reduced, slightly shorter than coxa 2; basis swollen, without glandular material.

**Description.** Based on holotype female, 32.0 mm, AM P.69087.

Lateral cephalic lobe large, triangular, apically subacute. Rostrum absent. Eyes apparently absent. Antenna 1 short; accessory flagellum long, 2-articulate, forming cap partially covering callynophore; primary flagellum 7-articulate, with strong 2-field callynophore; calceoli absent. Antenna 2 longer than antenna 1; peduncle with strong brush setae, article 1 greatly enlarged, covering article 2; flagellum 30-articulate, calceoli absent.

Labrum, epistome produced, rounded distally; upper lip slightly produced, straight. Mandible incisor with slightly convex margins; lacinia mobilis a stemmed, distally expanded, irregularly cusped blade; molar flap-like; palp attached midway, article 2 slender. Maxilla 1 inner plate with pappose setae lining inner margin; palp 1-articulate. Maxilla 2 inner and outer plates subequal in length; outer plate without long distally barbed slender setae. Maxilliped outer plate small; palp large, 4-articulate; dactylus vestigial, represented by a short, narrow, curving robust seta.

Gnathopods 1–4 coxae without setal fringe along ventral margin. Gnathopod 1 coxa reduced, margins slightly tapering distally; basis broad; ischium long; carpus long, slightly longer than propodus; propodus margins tapering distally, anterodistal margin with row of long, slender setae, with 1 robust seta just above dactylus; dactylus small, simple, well developed, posterior margin without setae, without cusps along posterior margin. Gnathopod 2 minutely subchelate; propo-



**Figure 13.** Distribution of *Austrocallisoma jerryi* sp. n. Star indicates type locality.

dus long, palm transverse; dactylus reaching corner of palm. Pereopod 3 simple; propodus with posterodistal locking setae; dactylus short, slender. Pereopod 4 simple; coxa wider than deep, with subacutely produced posteroventral lobe; dactylus short, slender. Pereopod 5 simple; coxa with posterior lobe slightly produced; basis much longer than broad, moderately expanded posteriorly, posterior margin straight, posteroventral lobe moderately broadened, not extending beyond ischium; without row of long slender pappose setae medially; dactylus short, slender. Pereopod 6 basis moderately expanded with straight posterior margin, with rounded, moderately broadened posteroventral lobe, produced into merus; dactylus short, slender. Pereopod 7 basis rounded, expanded posteroproximally, posterior margin almost straight, smooth, forming a posteroventral lobe produced along merus, posteroventral margin rounded; dactylus short, slender.

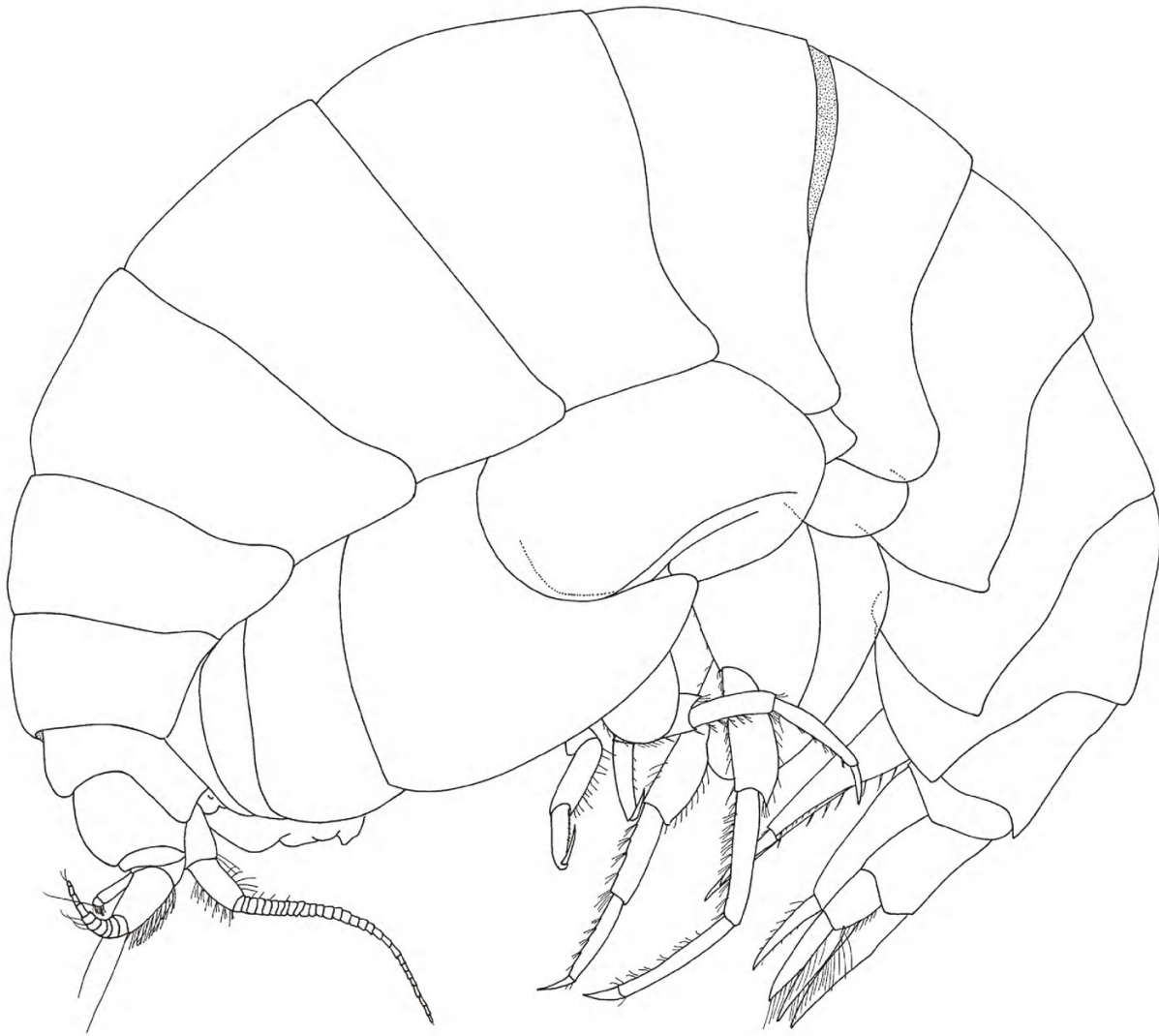
Epimeron 3 posteroventral corner subquadrate. Urosomite 1 dorsally smooth. Uropod 1 peduncle  $2.2 \times$  rami length; rami subequal in length. Uropod inner ramus slightly shorter than outer ramus. Uropod 3 peduncle short; rami lanceolate, subequal in length, outer ramus (?) 2-articulate, with plumose setae. Telson longer than broad, length  $2 \times$  breadth, moderately cleft (to 59%).

**Etymology.** Named in honour of Jerry Barnard, in recognition of his enormous contribution to amphipod taxonomy.

**Depth range.** 0–1800 m over a bottom depth of 1700–4856 m.

**Distribution.** *Australia:* east of Sydney, New South Wales.





**Figure 14.** *Austrocallisoma jerryi* sp. n., holotype, female, 32.0 mm, AM P.69087, from east of Sydney, New South Wales, Australia.

**Discussion.** The tip of the outer ramus on uropod 3 on both sides is damaged in both specimens available for study. Judging from where the damage occurs we suspect that the ramus is 2-articulate, however this is uncertain.

#### ***Bathycallisoma* Dahl, 1959**

*Bathycallisoma* Dahl, 1959: 220. — Gurjanova 1962: 433. — J.L. Barnard 1969: 305, key K, 328. — Ledoyer 1986: 733 (in part, part *Scopelocheiropsis*).

*Scopelocheirus*. — Birstein and Vinogradov 1960: 178 (in part). — Gurjanova 1962: 319 (in part). — Barnard and Karaman 1991: 528 (in part).

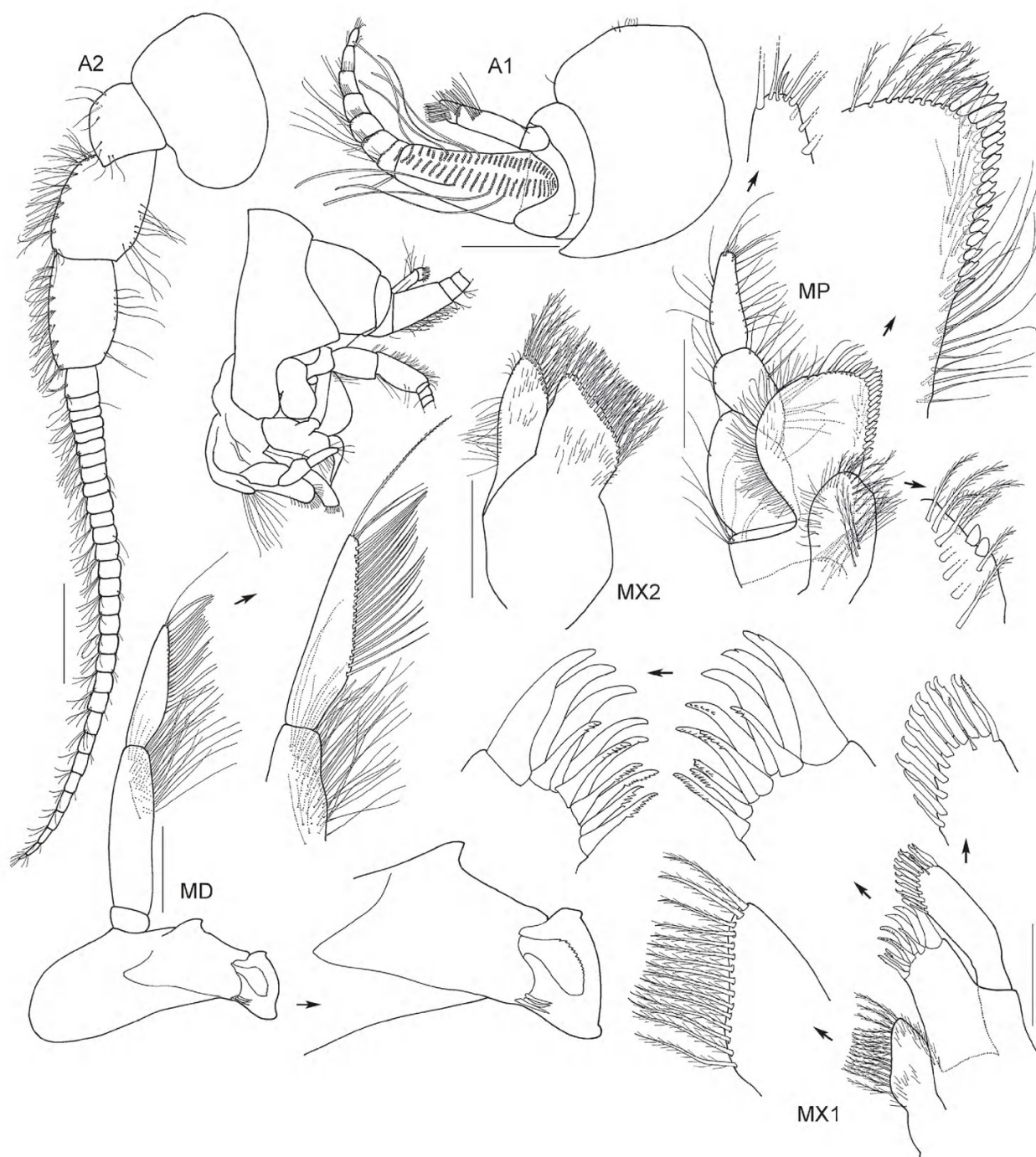
**Type species.** *Bathycallisoma pacifica* Dahl, 1959 by monotypy (= *S. schellenbergi* Birstein & Vinogradov, 1958).

**Included species.** *Bathycallisoma* includes one species: *Bathycallisoma schellenbergi* (Birstein & Vinogradov, 1958).

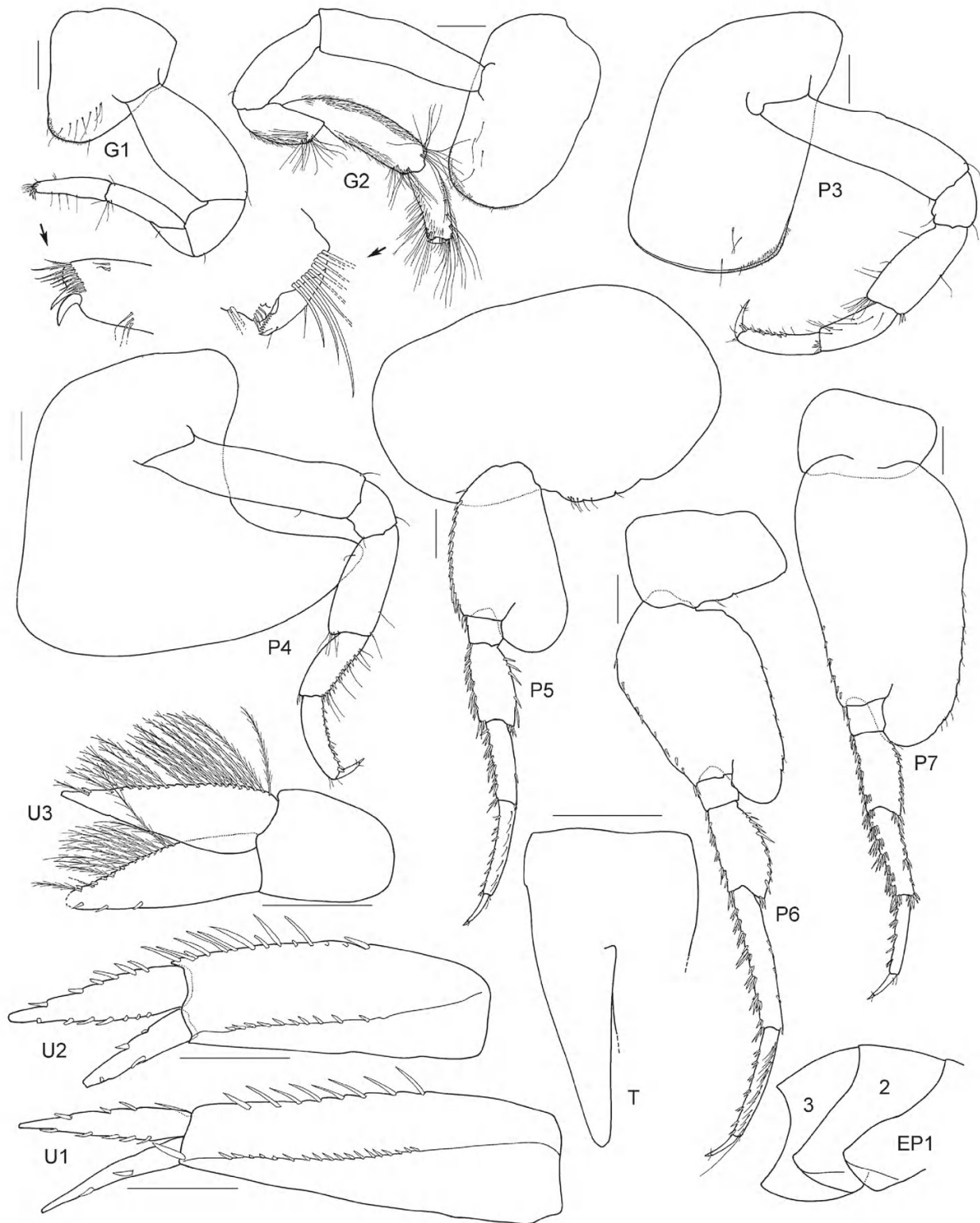
**Diagnostic description.** *Mandible lacinia mobilis* a long, slender robust seta. Maxilla 1 inner plate with pappose setae lining inner margin; palp 2-articulate. Maxilla 2 inner plate broader than outer plate; inner plate slightly shorter than outer plate. Maxilliped palp article 4 well developed. Gnathopod 1 coxa large, margins strongly diverging distally proximally slender, strongly broadened distally; dactylus small, simple, highly modified with blunt apical tip. Pereopod 3 carpus short to compressed, about as long as wide. *Pereopod 4 coxa with weakly-developed, subacutely produced posteroventral lobe.*

**Discussion.** This monotypic taxon is very similar to *Scopelocheiropsis* Schellenberg, 1926. The main diagnostic character is the form of the lacinia mobilis, which is a long, narrow robust seta in *Bathycallisoma*, compared with a stemmed and distally expanded ‘blade’ in *Scopelocheiropsis*. Aside from this, there is a large difference in body size of these animals, *Bathycallisoma schellenbergi* being an order of magnitude larger than any *Scopelocheiropsis* species.



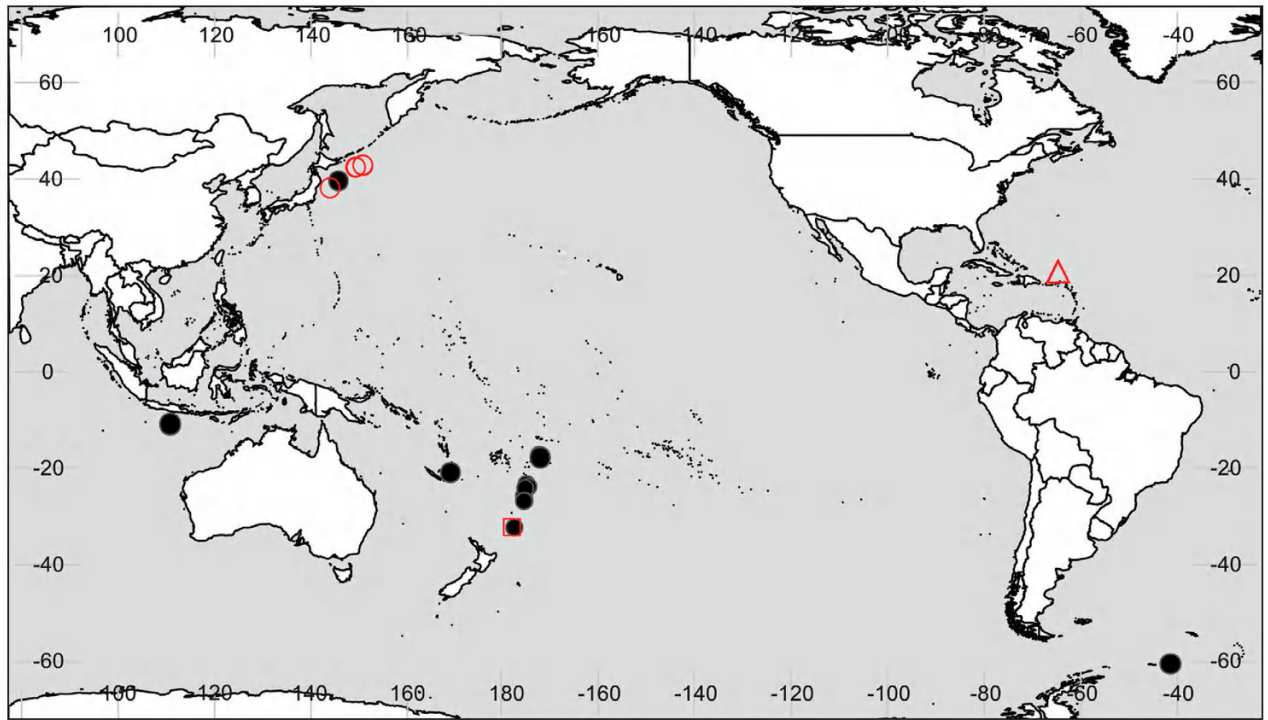


**Figure 15.** *Austrocallisoma jerryi* sp. n., holotype, female, 32.0 mm, AM P.69087, from east of Sydney, New South Wales, Australia. Scales represent 0.5 mm.



**Figure 16.** *Austrocallisoma jerryi* sp. n., holotype, female, 32.0 mm, AM P.69087, from east of Sydney, New South Wales, Australia. Scales represent 0.5 mm.





**Figure 17.** Distribution of *Bathycallisoma schellenbergi* (Birstein & Vinogradov, 1958) and its synonyms. Circles represent *Bathycallisoma schellenbergi* and its objective synonyms. Subjective synonyms are represented by the following symbols: (■) *Bathycallisoma pacifica*, (▲) aff. *Paracallisoma* spec. Type localities are represented by the corresponding open symbol.

***Bathycallisoma schellenbergi* (Birstein & Vinogradov, 1958)**

Figures 17, 18

? aff. *Paracallisoma* spec. Schellenberg, 1955: 185, fig. 1.  
*Scopelocheirus schellenbergi* Birstein & Vinogradov, 1958: 224, figs 3, 4. — Birstein and Vinogradov 1960: 178. — Gurjanova 1962: 321, figs 104a, b. — Birstein and Vinogradov 1964: 161. — J.L. Barnard 1964: 319. — Birstein and Vinogradov 1970: 402, 417 (table 3). — ?Kamenskaya 1981: 42. — Barnard and Karaman 1991: 528. — ?Vinogradov and Vinogradov 1993: 130. — Lörz and Held 2004: 11 (Appendix A). — Blankenship and Yayanos 2005: 892, fig. 2. — Blankenship et al. 2006: 51, 53 (table 2), figs 2, 3. — De Broyer et al. 2007: 159. — Blankenship and Levin 2007: 1685, fig. 1, 1687 (table 1). — Jamieson et al. 2009: 1040. — Jamieson et al. 2011: 54, 55 (table 3), 58 (table 6). — Søreide and Jamieson 2013: 3, fig. 4.

*Bathycallisoma pacifica* Dahl, 1959: 222, figs 6–8. — Gurjanova 1962: 433. (Holotype, 1 female, about 33 mm, somewhat mutilated, ZMUC CRU-7674; Kermadec Trench, South Pacific Ocean (32°10'S, 177°14'W), brown clay with pumice, 6960–7000 m depth).

*Bathycallisoma schellenbergi*. — Wolff 1959: 255 (table 1). — Gurjanova 1962: 433. — Nagata 1963: 1. — Ortiz 1979: 19.

**Type material.** Syntypes, 3 specimens, 26, 27 and 42 mm, ZMM.

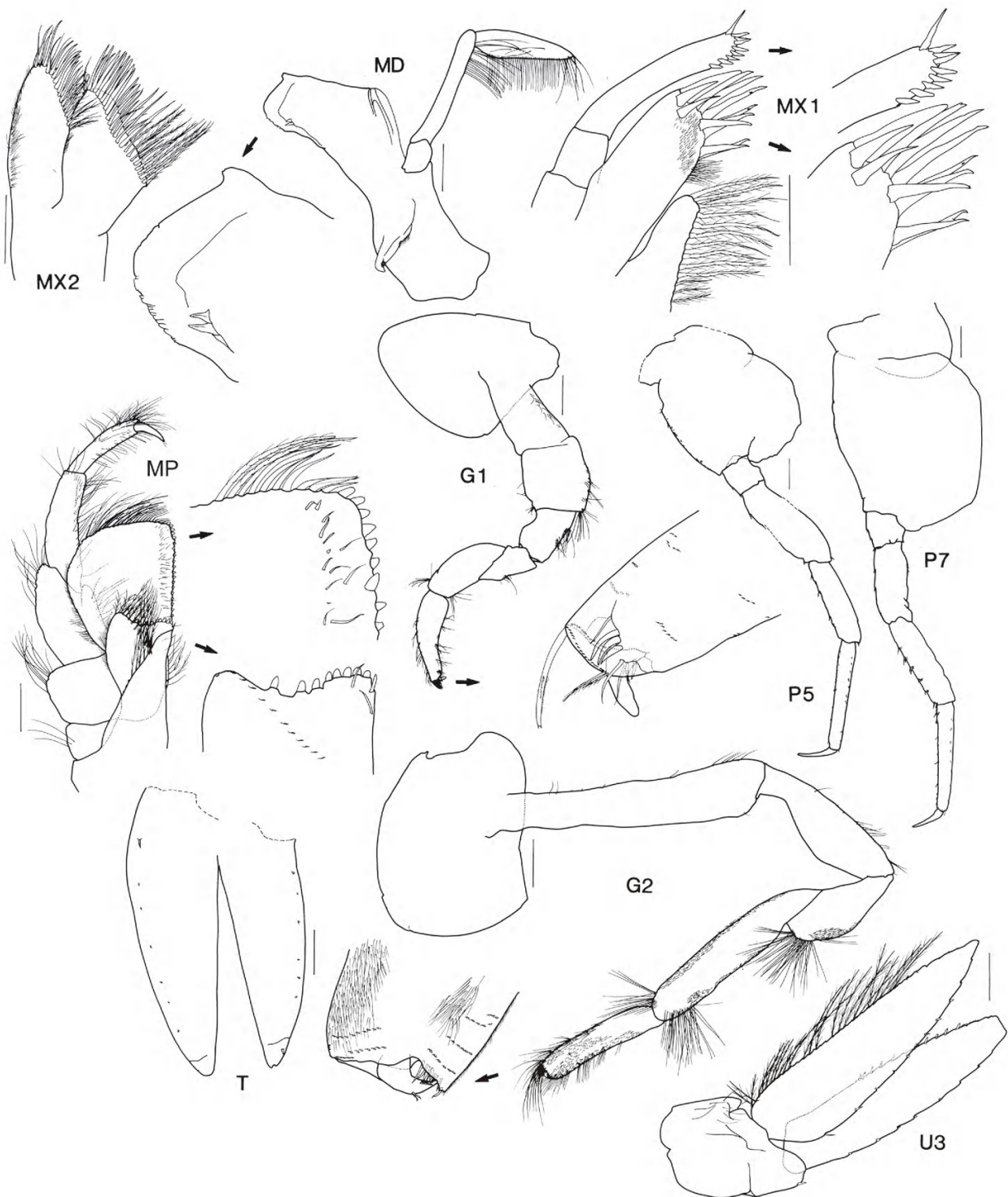
**Type locality.** North Pacific Ocean, Japan Trench (38°03'N, 143°57'E), 0–7000 m over bottom depth 7200 m; Kuril-Kamchatka Trench (43°48'N, 149°55'E), 0–8000 m over bottom depth 9180 m; and Kuril-Kamchatka Trench (44°08'N, 150°22'E), 0–6580 m over bottom depth 8900 m.

**Depth range.** Approximately 5600–9104 m (current study, Blankenship et al. 2006).

These records represent the shallowest and deepest known certain depths in the literature for *B. schellenbergi*. Records of 0–8129 m over a bottom depth of 10437 m (Birstein and Vinogradov 1960) are excluded as this equates only to length cabled out during mid-water trawls, thus the exact depth of capture is unknown.

**Distribution.** *Indian Ocean:* Java Trench (Birstein and Vinogradov 1964). *North Pacific Ocean:* Kurile-Kamchatka Trench (Birstein and Vinogradov 1958, Birstein and Vinogradov 1970); Japan Trench (Birstein and Vinogradov 1958, Nagata 1963). *South Pacific Ocean:* Kermadec Trench (Dahl 1959, Blankenship et al. 2006); New Hebrides Trench (Birstein and Vinogradov 1960, current study); Tonga Trench (Birstein and Vinogradov 1960, Blankenship and Levin 2007, Jamieson et al. 2011). *?North Atlantic Ocean:* Puerto Rico Trench (Schellenberg 1955). *?South Atlantic Ocean:* Orkney Trench (Vinogradov and Vinogradov 1993).

**Ecology.** This species has been taken frequently in baited traps (Blankenship et al. 2006, Jamieson et al. 2011),



**Figure 18.** *Bathycallisoma pacifica* Dahl, 1959. Holotype female, 33 mm, ZMUC CRU-7674, Kermadec Trench. Scales for gnathopods, pereopods represent 1.0 mm; remainder represent 0.5 mm.

and seems also to live a semi-pelagic lifestyle as it has been taken in mid-water trawls (e.g. Birstein and Vinogradov 1958). It appears to be a lower abyssal and hadal endemic.

**Discussion.** Dahl (1959) described the genus *Bathycallisoma* for his new species *B. pacifica* from the Kermadec Trench, placing aff. *Paracallisoma* spec.

Schellenberg 1955 from the Puerto Rico Trench in its synonymy. While Dahl's publication was in press Birstein and Vinogradov (1958) published an account of the amphipods of the north-western Pacific, including a new species, *Scopelocheirus schellenbergi*, also with aff. *Paracallisoma* spec. Schellenberg 1955 in its synonymy. Dahl (1959) consequently included a footnote in his account, stating that Schellenberg's specimen should be



referred to *Scopelocheirus schellenbergi*, which in turn should be recombined as *Bathycallisoma schellenbergi*. He considered his Kermadec specimen to be a separate species from *B. schellenbergi* based on the shape of the first gnathopod and “some other minor characteristics”. We cannot observe these differences and so prefer to retain *B. pacifica* as a junior subjective synonym of *B. schellenbergi*, thereby agreeing with most subsequent authors.

### ***Eucallisoma* J.L. Barnard, 1961**

*Eucallisoma* J.L. Barnard, 1961: 32. — J.L. Barnard 1969: 305, key K. — Barnard and Karaman 1991: 454 (key), 484, figs 86C, 92P. — Lowry and Stoddart 1993: 67 (in part).

**Type species.** *Eucallisoma glandulosa* J.L. Barnard, 1961, original designation.

**Included species.** *Eucallisoma* includes one species: *E. glandulosa* J.L. Barnard, 1961.

**Diagnosis.** *Mandible lacinia mobilis* a stemmed, distally expanded, irregularly cusped blade. *Maxilla 1* inner plate with pappose setae along inner margin; *palp 2-articulate*. *Maxilla 2* inner and outer plates subequal in length; inner plate broader than outer plate. *Maxilliped palp article 4* well developed. *Gnathopod 1* coxa large, margins subparallel; *basis swollen*, with glandular material; *dactylus* reduced, simple. *Pereopod 3* carpus compressed to short, about as long as wide. *Pereopod 4* with well-developed, subquadrate posteroventral lobe.

**Discussion.** The removal of *E. barnardi* Lowry & Stoddart, 1993 to *Tayabasa* gen. n. leaves *Eucallisoma* as a monotypic taxon. Future deep-sea samples will hopefully uncover associated taxa that will provide a clearer picture of the relationships between these animals.

### ***Eucallisoma glandulosa* J.L. Barnard, 1961**

Figures 19, 20

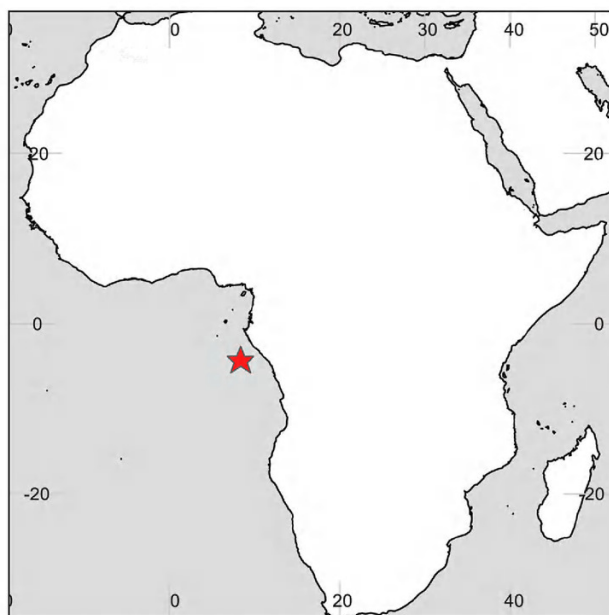
*Eucallisoma glandulosa* J.L. Barnard, 1961: 33, fig. 3. — Barnard and Karaman 1991: 484–485. — Lowry and Stoddart 1993: 67, 72. — Hendrycks and Conlan 2003: 232, fig. 7.

**Type material.** Holotype, ? male, 10 mm, ZMUC CRU-1720.

**Type locality.** Off Gabon, Africa (4°00'S, 8°25'E), 4020 m depth.

**Depth range.** 4020 m.

**Distribution.** *Gabon*: west of Nyanga Province.



**Figure 19.** Distribution of *Eucallisoma glandulosa*.

### ***Paracallisoma* Chevreux, 1903**

*Paracallisoma* Chevreux, 1903: 84. — Schellenberg 1926: 257. — Chevreux 1935: 39. — Gurjanova 1962: 308. — J.L. Barnard 1969: 305, key K. — Barnard and Karaman 1991: 454 (key), 510.

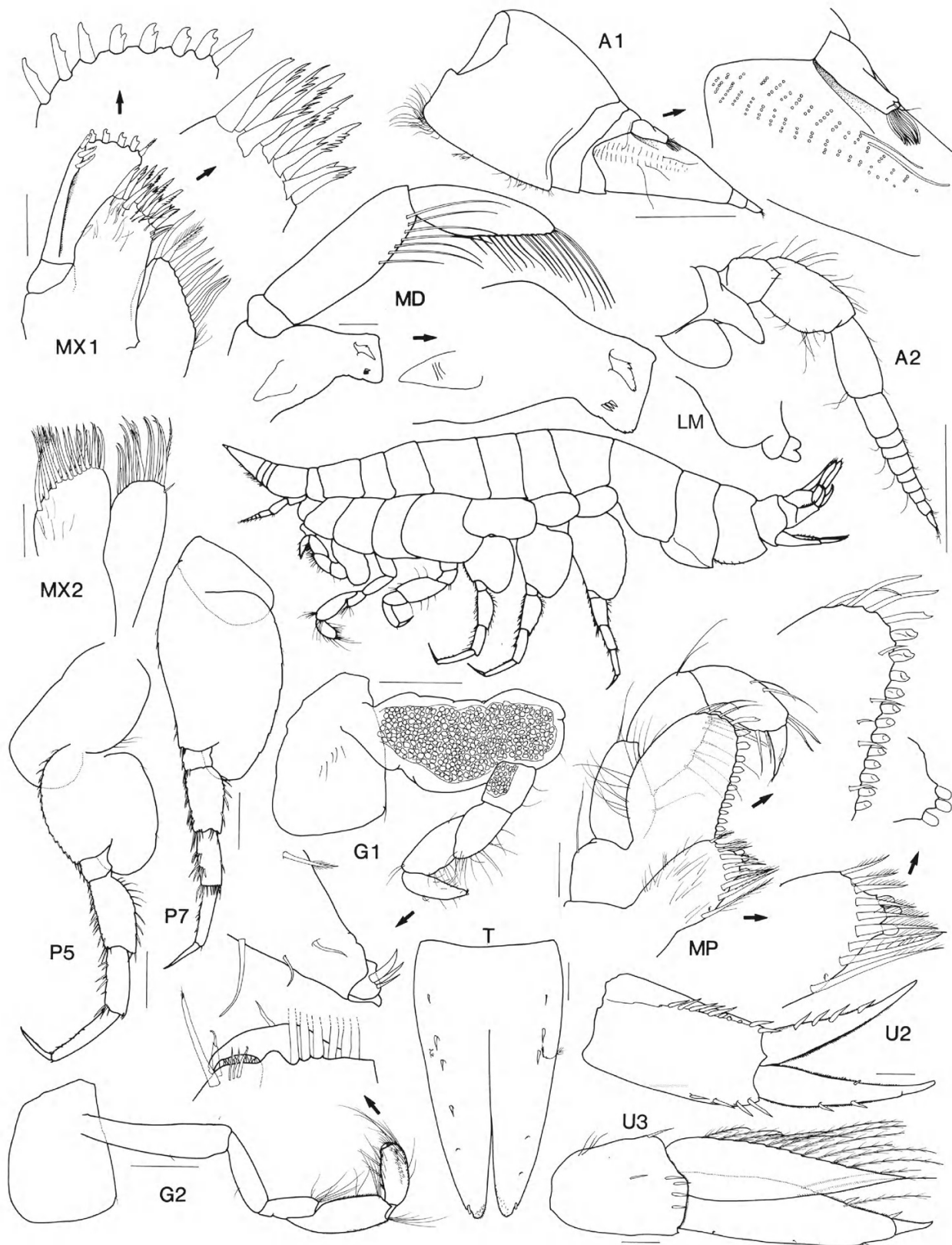
*Scopelocheirus*. — Barnard and Karaman 1991: 528 (in part).

**Type species.** *Paracallisoma alberti* Chevreux, 1903, original designation.

**Included species.** *Paracallisoma* includes seven species: *P. abyssi* Oldevig, 1959; *P. alberti* Chevreux, 1903; *P. coecum* (Holmes, 1908); *P. platepistomum* Andres, 1977; *P. spinipoda* Hendrycks & Conlan, 2003; *P. woolgoolga* sp. n.; *P. zivianii* sp. n.

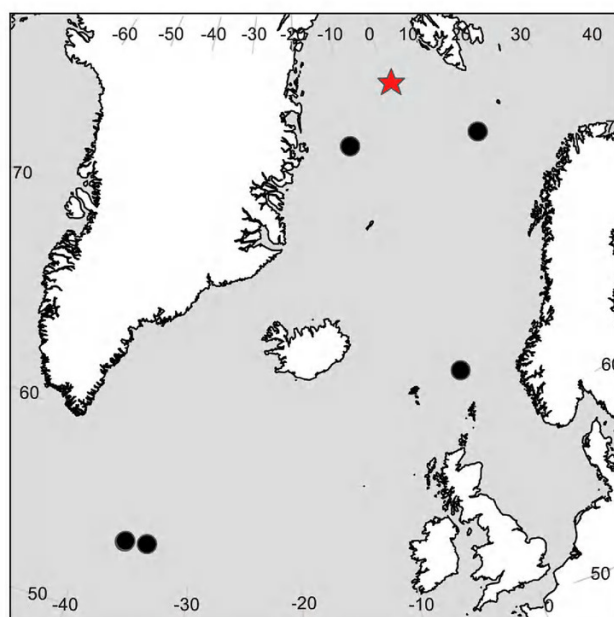
**Diagnostic description.** *Mandible lacinia mobilis* a stemmed, distally expanded, smooth or minutely serrate blade. *Maxilla 1* inner plate with pappose setae lining inner margin; *palp 2-articulate*. *Maxilla 2* inner and outer plates subequal in width or inner plate slightly broader than outer plate, inner plate slightly shorter than or subequal in length to outer plate. *Maxilliped palp article 4* well developed. *Gnathopod 1* coxa large, margins subparallel or diverging distally; *basis* linear; *dactylus* small, simple, highly modified with apical tip. *Pereopod 3* carpus short to long, longer than wide. *Pereopod 4* coxa with strongly-developed, subacutely produced posteroventral lobe.

**Discussion.** In addition to the two new species described herein, Horton et al. (2013) record an additional five undescribed species of *Paracallisoma* from the North Atlantic Ridge, and Duffy et al. (2012) record two undescribed species from submarine canyons of the Iberian Peninsula. These records indicate that there is still a large knowledge gap in the diversity of deep-sea scopelocheirids.



**Figure 20.** *Eucallisoma glandulosa* J.L. Barnard. Holotype, ?male, 10 mm, ZMUC CRU-1720, off Gabon, east Atlantic Ocean. Scales for antennae, gnathopods, pereopods represent 0.5 mm; remainder represent 0.1 mm.





**Figure 21.** Distribution of *Paracallisoma abyssi* (Oldevig, 1959). Star indicates type locality.

### *Paracallisoma abyssi* (Oldevig, 1959)

Figure 21

*Scopelocheirus abyssi* Oldevig, 1959: 16, figs 1–3. — Barnard and Karaman 1991: 528. — Vinogradov et al. 1996: 8. — Brandt 1997: 1540 (table 2).

*Paracallisoma abyssi*. — Horton 2006: 20, table 2. — Horton et al. 2013: 354.

**Type material.** Syntypes, (24 specimens, maximum length about 15 mm), Stockholm Museum.

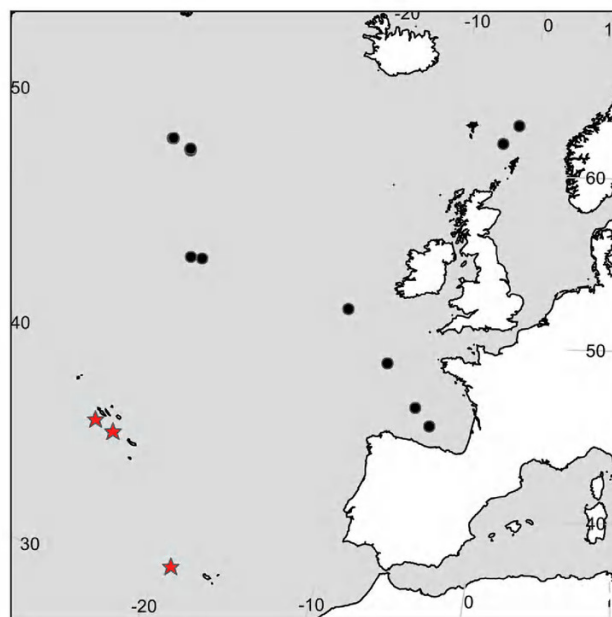
**Type locality.** Swedish Deep (77°39'N, 1°17'E), 3200 m, *Biloculina* ooze, -1.4 °C.

**Depth range.** 1525–3200 m (Brandt 1997, Oldevig 1959).

**Distribution.** North Atlantic Ocean. Greenland Sea (Oldevig 1959, Brandt 1997); Norwegian Sea (Vinogradov et al. 1996); Faroe-Shetland Channel (Horton 2006); Mid-Atlantic Ridge (Horton et al. 2013).

**Ecology.** A scavenger, taken in baited traps (Vinogradov et al. 1996, Horton 2006, Horton et al. 2013).

**Discussion.** This is a poorly described and little-sampled species that was originally described in the genus *Scopelocheirus*. Horton (2006) removed it to *Paracallisoma*. Horton and Thurston (in prep.) have new material of this species and are in the process of re-describing it.



**Figure 22.** Distribution of *Paracallisoma alberti* Chevreux, 1903. Star indicates type locality.

### *Paracallisoma alberti* Chevreux, 1903

Figures 22, 23

*Paracallisoma alberti* Chevreux, 1903: 84, figs 2, 3. — Stebbing 1906: 719. — Chevreux 1935: 39, pl. 1, fig. 3, pl. 9, fig. 2, pl. 16, fig. 5. — Birstein and Vinogradov 1955: 223, 279 (in part). — Schellenberg 1955: 191 (in part). — J.L. Barnard 1958: 97 (list). — Belloc 1960: 4. — Lampitt et al. 1983: 76, table 1. — Desbruyères et al. 1985: 236, fig. 1, 237. — Thurston 1990: 266. — Barnard and Karaman 1991: 511. — Palerud and Vader 1991: 41. — Lopes et al. 1993: 209, table 1. — Dauvin and Bellan-Santini 2002: 316 (table 1). — Horton 2006: 20, table 2. — Horton Thurston and Duffy 2013: 355, table 2.

Not *Paracallisoma alberti*. — Schellenberg 1926a: 258, fig. 11. — Birstein and Vinogradov 1962: 34. — Lowry and Bullock 1976: 102. — De Broyer and Jażdżewski 1993: 73. (= *Paracallisoma* sp. De Broyer et al. 2007).

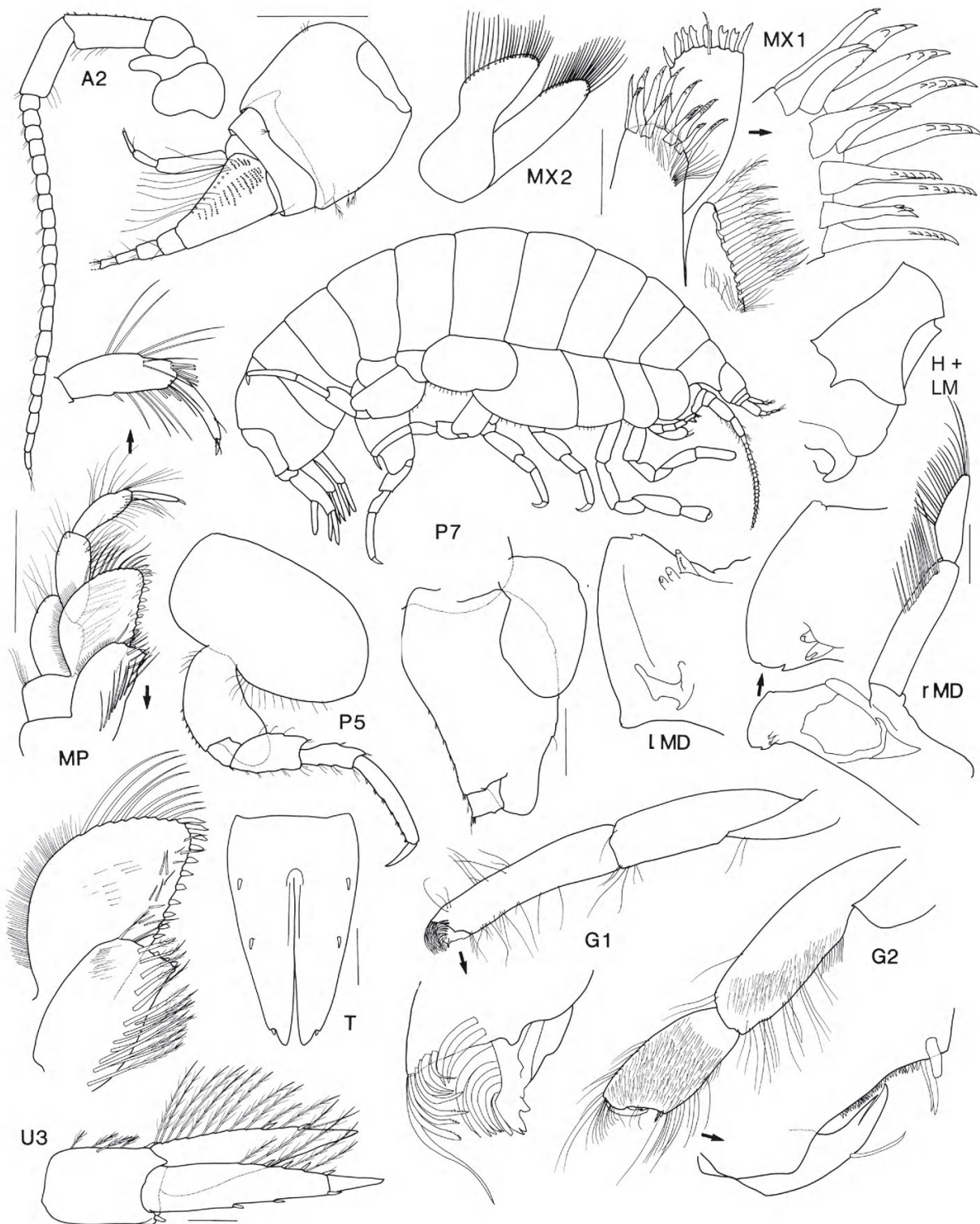
Not *Paracallisoma alberti*. — Birstein and Vinogradov 1958: 228. — Birstein and Vinogradov 1960: 176, fig. 5, 233, fig. 33. — Gurjanova 1962: 309, fig. 102. — Nagata 1963: 1. — Birstein and Vinogradov 1970: table 1, table 3. — Hatch 1983: 194, 195, table 3. — Nysewander 1983: 328, table 7. — Hatch 2013: 275. (= *P. coecum*).

Not *Paracallisoma alberti*. — Birstein and Vinogradov 1964: 161. (= *Paracallisoma* sp.)

Not *Paracallisoma* aff. *alberti* Treude et al., 2002: 1284, table 2. (= *Paracallisoma* sp.)

**Type material.** Syntypes: 1 female, 13 mm (stn 532); 3 females (stn 730); 5 males and 9 females (stn 792).

**Type locality.** Azores region (37°52'N, 24°42.75'W), trap, muddy bottom with *Globigerina*, 2178 m [*Prin-*



**Figure 23.** *Paracallisoma alberti* Chevreux, 1903. Syntype female, MOM, near Madeira, North Atlantic Ocean. Whole animal after Chevreux 1903; A2, MX2, P5 after Chevreux 1935. Scales for MD, MX1, U3, T represent 0.2 m; remainder represent 0.5 mm.

*cesse-Alice* stn 532]; Azores region (37°58'N, 26°13.25'W), trap, muddy sand, 2660 m [*Princesse-Alice* stn 730]; Madeira region (32°32.16'N, 17°04.42'W), trap, bottom of blackish grey mud and fine grained sand, 2480 m [*Princesse-Alice* stn 792]. The co-ordinates given here are based on those reported in Chevreux (1935)

rather than in the original publication (Chevreux 1903), which used the Paris rather than the Greenwich meridian for calculating longitude.

**Depth range.** 1396–4780 m (Horton 2006, Chevreux 1935).



**Distribution.** North Atlantic Ocean. Porcupine Seabight (Lampitt et al. 1983); Mid Atlantic Ridge (Horton et al. 2013); Faroe-Shetland Channel (Horton 2006). *Portugal*. Azores and Madeira region (Chevreux 1903). *France*. Bay of Biscay (Chevreux 1935, Desbruyères et al. 1985).

**Ecology.** A scavenger, frequently taken in baited traps (Chevreux 1903, 1935, Horton 2006, Horton et al. 2013).

**Discussion.** The distribution of *Paracallisoma alberti* given here (Fig. 22) is much more limited than what has been reported in the literature. This follows Thurston (1990), who concluded that *P. alberti* is restricted to the north-east Atlantic, as material recorded in the literature as *P. alberti* from the Pacific Ocean was confirmed as or presumed to belong to *P. coecum* (Holmes, 1908). The identity of material from the Indian Ocean and Arabian Sea (Birstein and Vinogradov 1964, Treude et al. 2002) is unknown, but it is unlikely to be *P. alberti*. Material from the Southern Ocean appears to be closely related to *P. platepistomum* Andres, 1977 (Thurston 1990).

### *Paracallisoma coecum* (Holmes, 1908)

Figure 24

*Scopelocheirus coecus* Holmes, 1908: 500, figs 10–12. — Shoemaker 1945: 186 (in part, part ?*P. platepistomum*). — J.L. Barnard 1954: 54, figs 4, 5. — Gurjanova 1951: 241 (key).

*Paracallisoma coecum*. — Hurley 1963: 61, fig. 18. — Barnard and Karaman 1991: 511. — Thurston 2001: 685 (table 2).

*Paracallisoma coecus*. — J.L. Barnard 1958: 97 (list). — J.L. Barnard 1964: 319, fig. 3. — Brusca 1967: 384, 385, table 4. — Childress and Nygaard 1974: 228, table 1. — Childress 1975: 788 (table 1a). — Quetin et al. 1980: table 1. — Smith and Baldwin 1982: 292 (table 3). — Austin 1985: 601. — Vermeer and Devito 1988: 65, 67, table 2. — Ikeda 2013: 342 (table 1).

*Paracallisoma alberti*. — Birstein and Vinogradov 1955: 223, 279 (in part). — Birstein and Vinogradov 1958: 228. — Birstein and Vinogradov 1960: 176, fig. 5, 233, fig. 33. — Gurjanova 1962: 309, fig. 102. — Nagata 1963: 1. — Birstein and Vinogradov 1970: table 1, table 3. — Hatch 1983: 194, 195, table 3. — Nysewander 1983: 328, table 7. — Hatch 2013: 275.

**Type material.** Holotype, female, 20 mm, USNM 38538.

**Type locality.** Off San Clemente Island, California, United States, 1196–1287 m depth.

**Depth range.** 549–4023 m (Shoemaker 1945, Barnard 1964). Some depth records (e.g. 0–9000 m, Birstein and Vinogradov (1958)) are excluded from this range as exact depth of capture is unknown due to the sampling technique.

**Distribution.** *Pacific Ocean*: off San Clemente Island, California, United States (Holmes 1908); Pacific City, Oregon, United States (from the stomach of a duck) (Shoemaker 1945); San Nicolas Basin and off Santa Barbara Island, California, United States (Barnard 1954); outer Santa Barbara Passage, California, United States (Hurley 1963); off Kamchatka, Russia (Shoemaker 1945, Gurjanova 1962); Gulf of Alaska (Barnard 1964); Kuril-Kamchatka Trench (Birstein and Vinogradov 1958); near the Tenji Seamount, south-south-west of the Aleutian Trench (Birstein and Vinogradov 1958); near the Makarov Seamount (Birstein and Vinogradov 1960); Japan Trench (Nagata 1963).

**Discussion.** Schellenberg (1926) first considered *Paracallisoma coecum* to be a junior subjective synonym of *P. alberti*, a move that was accepted by many subsequent authors. However, Barnard (1964), and many more recent works (e.g. Thurston 1990, Barnard and Karaman 1991, Thurston et al. 2001) have again treated *P. coecum* as a valid species, a decision with which we agree. *Paracallisoma coecum* can be differentiated from *P. alberti* by following characters: gnathopod 1 coxa much longer than wide, margins slightly tapering distally (coxa slightly longer than wide, margins subparallel in *P. alberti*); gnathopod 1 propodus margins tapering distally (gnathopod 1 propodus margins subparallel in *P. alberti*); gnathopod 2 propodus subovate, palm transverse to slightly acute, dactylus fitting palm (gnathopod 2 propodus diverging distally, palm acute, dactylus shorter than palm in *P. alberti*).

Due to its taxonomic history, many records of *P. coecum* have erroneously been attributed to *P. alberti*. Pacific Ocean material reported as *P. alberti* has now been confirmed as or is presumed to be *P. coecum* (Thurston 1990). According to Thurston (1990), the record of Shoemaker (1945) of *P. coecum* (as *Scopelocheirus coecus*) from Bermuda is referable to *P. platepistomum* Andres, 1977. Indian Ocean material recorded as *P. alberti* is unconfirmed.

### *Paracallisoma platepistomum* Andres, 1977

Figure 25

*Paracallisoma platepistomum* Andres, 1977: 61, figs 3, 4. — Andres and Lott 1977: 62. — Barnard and Karaman 1991: 511.

*Scopelocheirus coecus*. — Shoemaker 1945: 186 (in part, part *Paracallisoma coecum*).

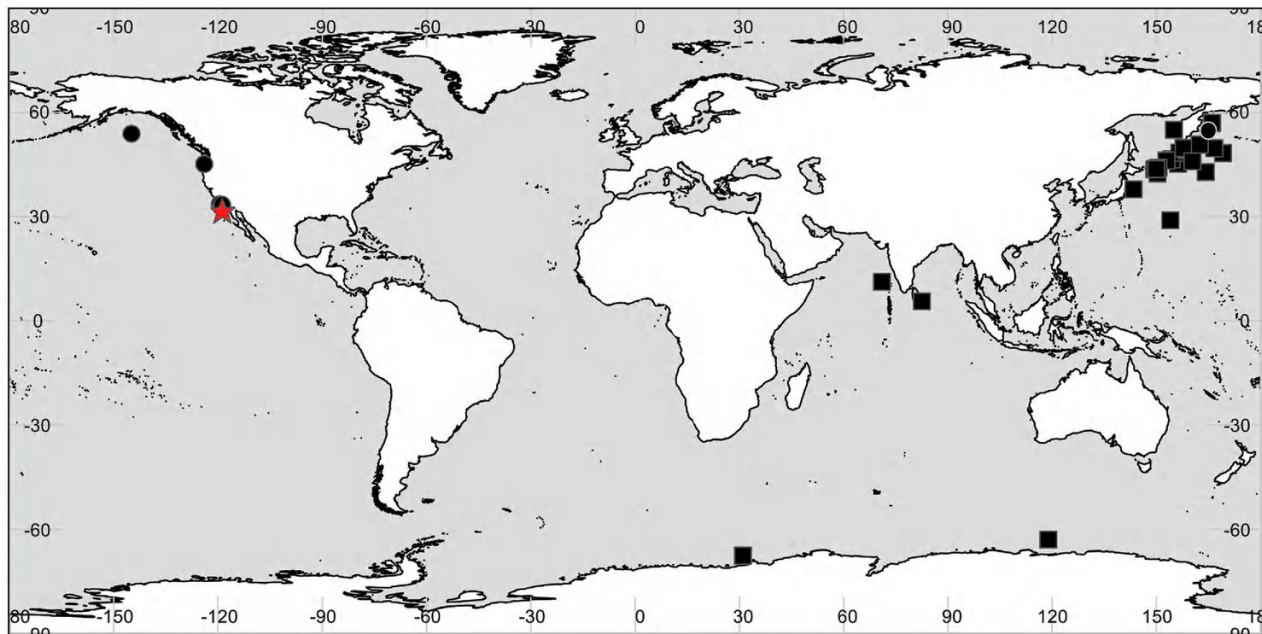
**Type material.** Holotype, female, 28 mm, ZMH K 30455.

**Type locality.** Iberian deep-sea, *Meteor* Station 3/24 (42°26.8–40.9°N, 14°49.0–49.2°W), 5325 m depth

**Depth range.** 1463(?)–5325 m (Shoemaker 1945, Andres 1977).

**Distribution.** *North Atlantic Ocean*: Iberian Basin (Andres 1977); off Bermuda (Shoemaker 1945).





**Figure 24.** Distribution of *Paracallisoma coecum* (Holmes, 1908). Circles (●) represent records of *Paracallisoma coecum*; squares (■) represent misidentifications of *P. alberti* that may represent *P. coecum* or another species. Star indicates type locality.

***Paracallisoma spinipoda* Hendrycks & Conlan, 2003**

Figure 26

*Paracallisoma spinipoda* Hendrycks & Conlan, 2003: 2322, figs 8, 9.

**Type material.** Holotype, male, 10 mm, CMNC 2002-0029. Paratype: juvenile, 5.0 mm, CMNC 2002-0030.

**Type locality.** North-east Pacific off Point Conception, California, United States (34°47.94'N, 123°03.80'W), 3450 m depth.

**Depth range.** 3450–4000 m

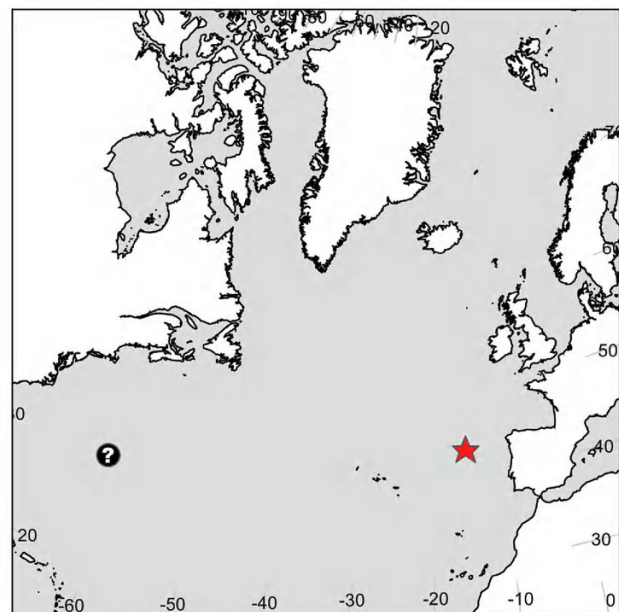
**Distribution.** *United States:* North-east Pacific off Point Conception, California (Hendrycks and Conlan 2003).

***Paracallisoma woolgoolga* sp. n.**

<http://zoobank.org/B429CB96-1624-4FF2-AB89-239C9FE45719>  
Figures 27–30

**Type material.** Holotype, female, 10.0 mm, AM P.69088, north-east of Coffs Harbour, New South Wales, Australia (30°10.88'S, 153°32.22'E), 1000 m, baited trap, 12–13 August 1993, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee* [NSW-877]. Paratypes: 1 male, 7.5 mm, AM P.69089; many specimens, 7.0–9.3 mm, AM P.69090, with same collection details as holotype.

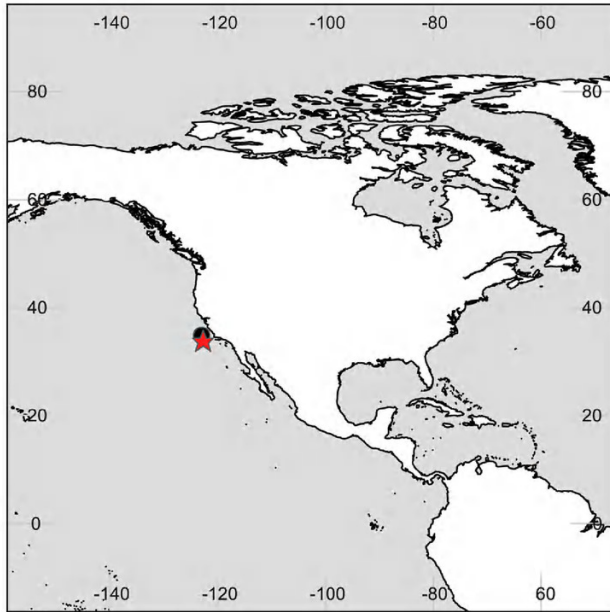
**Other Australian material examined.** *New South Wales:* 564 specimens, AM P.48095, [NSW-862]; 175 specimens, AM P.48121, [NSW-863], north-east of Coffs



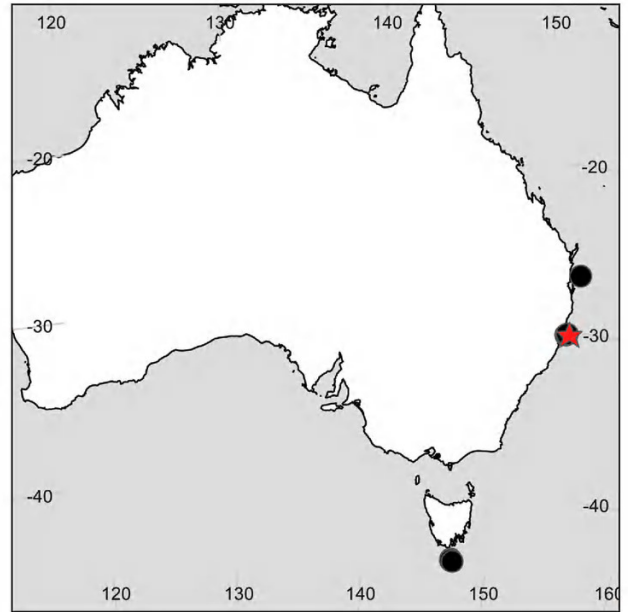
**Figure 25.** Distribution of *Paracallisoma platepistomum* Andres, 1977. Star indicates type locality, question mark indicates possible misidentification of *Scopelochirus coecus* by Shoemaker (1945).

Harbour (30°10.93'S, 153°32.26'E), 963 m, baited trap, 11–12 August 1994, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee*. 6 specimens, AM P.50024, north-east of Coffs Harbour (30°10.93'S, 153°32.26'E), 1000 m, baited trap, 8–9 September 1994, coll. J.K. Lowry & K. Dempsey, MV *Carrie Ann* [NSW-999]. 26 specimens, AM P.50067, [NSW-1021]; 2 specimens, AM P.50082, [NSW-1022], north-east of Coffs Harbour (30°10.93'S, 153°32.26'E), 1000 m, baited trap, 9–10

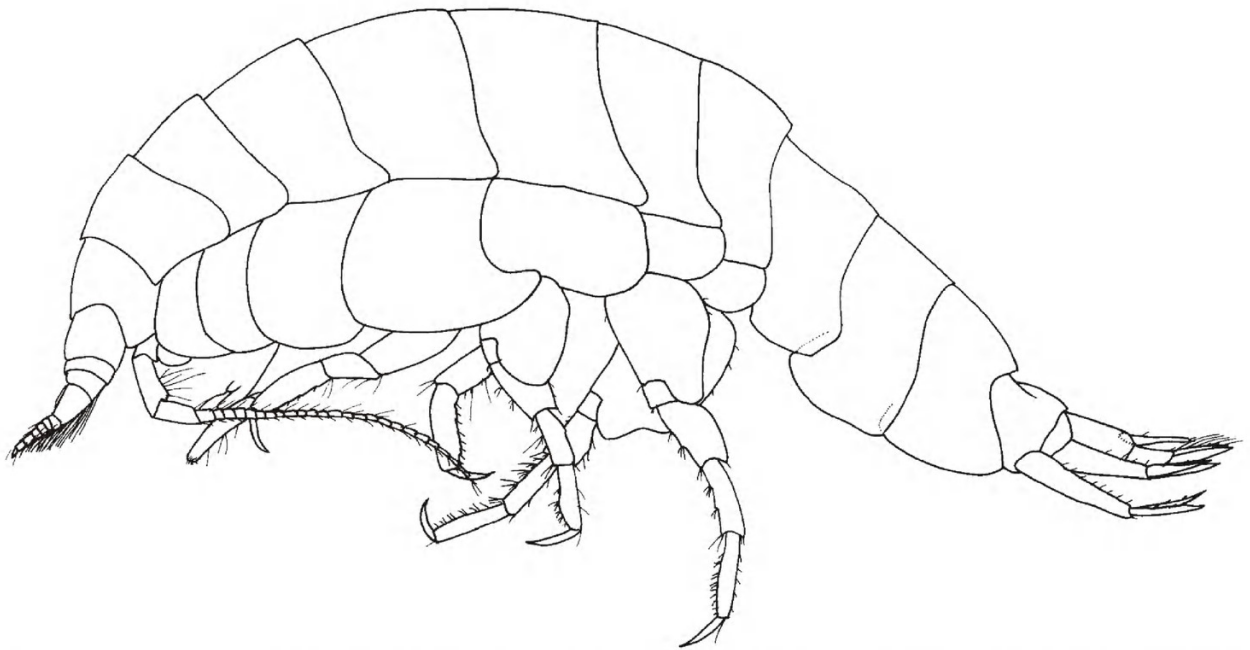




**Figure 26.** Distribution of *Paracallisoma spinipoda* Hendrycks & Conlan, 2003. Star indicates type locality.



**Figure 27.** Distribution of *Paracallisoma woolgoolga* sp. n. Star indicates type locality.

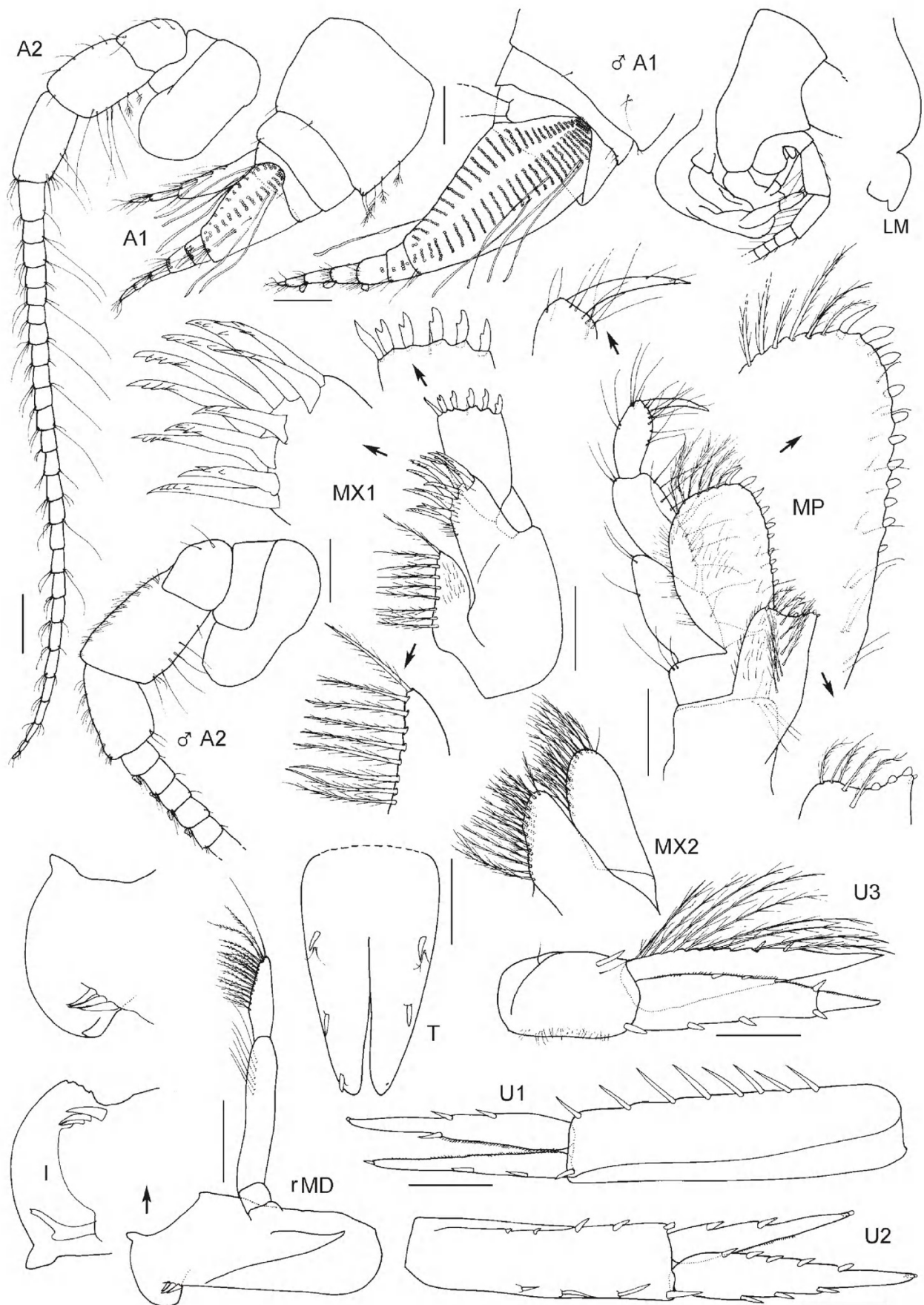


**Figure 28.** *Paracallisoma woolgoolga* sp. n. Holotype female, 10.0 mm, AM P.69088, from north-east of Coffs Harbour, New South Wales, Australia.

September 1994, coll. J.K. Lowry & K. Dempsey, MV *Carrie Ann*. 1 specimen, AM P.51126, north-east of Coffs Harbour (30°14.83'S, 153°27.55'E), 200 m, baited trap, 11–12 August 1993, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee* [NSW-869]. 480 specimens, AM P.49808; 237 specimens, AM P.49827; 17 specimens, AM P.52658, north-east of Coffs Harbour (30°10.88'S, 153°32.22'E), 1000 m, baited trap, 12–13 August 1993, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee* [NSW-876].

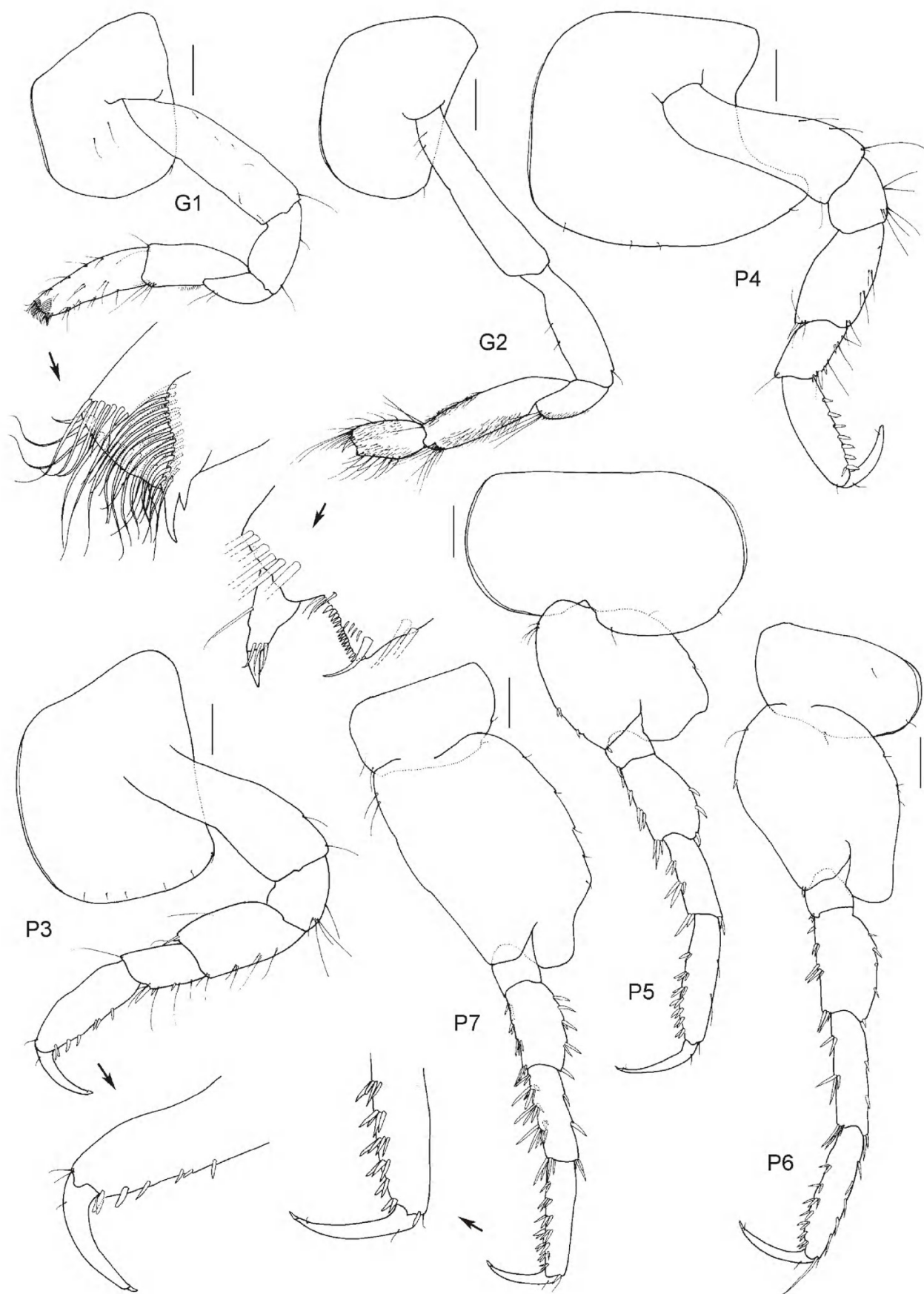
*Queensland*: 3 specimens, AM P.47887, due east of Mooloolaba (26°36.23'S, 153°50.23'E), 1006 m, baited trap, 2–3 August 1994, coll. J.K. Lowry & K. Dempsey, MV *Capricorn I* [QLD-1140].

*Tasmania*: 20 specimens, AM P.73706, Main Pedra Hill, 76.8 km south-south-east of South East Cape (44°15.6'S, 147°07.8'E), 1312 m, baited trap, 21–24 January 1997, coll. CSIRO party, FRV *Southern Surveyor* [SS01/97/08]. Many specimens, AM P.73707, Hill U, 82.8 km south-south-east of South East Cape



**Figure 29.** *Paracallisoma woolgoolga* sp. n. Holotype female, 10.0 mm, AM P.69088; paratype male, 7.5 mm, AM P.69089, from north-east of Coffs Harbour, New South Wales, Australia. Scales represent 0.2 mm.





**Figure 30.** *Paracallisoma woolgoolga* sp. n. Holotype female, 10.0 mm, AMP.69088, from north-east of Coffs Harbour, New South Wales, Australia. Scales represent 0.2 mm.

(44°19.2'S, 147°07.2'E), 1083–1448 m, baited trap, 27–28 January 1997, coll. CSIRO party, FRV *Southern Surveyor* [SS01/97/41]. 132 specimens, AM P.73708, Hill D1, south-south-east of South East Cape (44°23.4'S, 147°16.2'E), 1942 m, baited trap, 31 January 1997, coll. CSIRO party, FRV *Southern Surveyor* [SS01/97/65].

**Diagnosis.** Gnathopod 1 coxa margins subparallel. Gnathopod 2 propodus palm transverse, with straight, minutely serrate margin; dactylus reaching corner of palm. Pereopod 5 basis as long as broad, broadly expanded posteriorly, slightly excavate posterodistally. Epimeron 3 posteroventral corner narrowly rounded. Telson moderately cleft.

**Description.** Based on holotype female, 10.0 mm, AM P.69088.

Lateral cephalic lobe large, triangular, apically subacute. Rostrum absent. Eyes apparently absent. Antenna 1 short; accessory flagellum long, 3-articulate, forming cap covering callynophore; primary flagellum 6-articulate, with strong 2-field callynophore; calceoli absent. Antenna 2 longer than antenna 1; peduncle without brush setae, article 1 greatly enlarged, not covering article 2; flagellum 26-articulate, calceoli absent.

Labrum, epistome slightly produced, rounded; upper lip slightly produced, straight. Mandible incisor with slightly convex margins; lacinia mobilis a stemmed, distally expanded, smooth blade; molar flap-like; palp attached midway, article 2 slender. Maxilla 1 palp 2-articulate. Maxilla 2 inner plate shorter than outer plate; outer plate without long, distally barbed slender setae. Maxilliped outer plate small; palp large, 4-articulate.

Gnathopods 1–4 coxae without setal fringe along ventral margin. Gnathopod 1 coxa large, about as long as coxa 2, margins subparallel; basis slender; ischium long, length  $2.1 \times$  width; carpus long, length  $\times 2.9$  width, subequal in length to propodus; propodus margins slightly tapering distally; anterodistal margin with row of long, slender setae, without robust setae just above dactylus; dactylus small, simple, well developed, posterior margin without setae, with one cusp along posterior margin. Gnathopod 2 minutely subchelate; carpus long, length  $3.7 \times$  width; propodus short, length  $1.7 \times$  width, palm transverse, with straight, minutely serrate margin; dactylus reaching corner of palm. Pereopod 3 weakly prehensile; propodus without posterodistal locking setae; dactylus short, slender. Pereopod 4 weakly prehensile; coxa wider than deep, with subacutely produced posteroventral lobe; propodus without posterodistal locking setae; dactylus short, slender. Pereopod 5 weakly prehensile; coxa equilobate; basis as long as broad, broadly expanded posteriorly, slightly excavate posterodistally, without row of long pappose setae medially; dactylus short, slender. Pereopod 6 weakly prehensile; basis expanded posteroproximally, posterior margin tapering distally, with very weakly excavate posterodistal margin; dactylus short, slender. Pereopod 7 weakly prehensile; basis expanded

posteriorly, slightly rounded proximally, minutely crenate, posteroventral corner excavate; propodus without anterodistal locking setae; dactylus short, slender.

Epimeron 1 anteroventral corner narrowly rounded. Epimeron 3 posteroventral corner produced, narrowly rounded. Urosomite 1 with anterodorsal notch and rounded boss. Uropod 1 peduncle  $1.5 \times$  rami length; rami subequal in length. Uropod 2 rami inner ramus slightly shorter than outer ramus. Uropod 3 peduncle short; rami lanceolate, subequal in length, outer ramus 2-articulate, with plumose setae. Telson longer than broad, length  $2.3 \times$  breadth, moderately cleft (to 64%).

**Sexually dimorphic characters.** Based on paratype male, 7.5 mm, AM P.69089. Antenna 1 flagellum 7-articulate, with strong 2-field callynophore (stronger than in female); calceoli present. Antenna 2 flagellum 35-articulate, calceoli present.

**Etymology.** Named for Woolgoolga, a town west of the type locality on the coast of New South Wales; used as a noun in apposition.

**Distribution.** *Australia*: east of Mooloolaba, Queensland, to south of Tasmania.

**Ecology.** A scavenger taken in baited traps.

**Discussion.** *Paracallisoma woolgoolga* sp. n. is morphologically very close to *P. spinipoda*. It can be distinguished from that species by the gnathopod 2 palm (slightly concave in *P. spinipoda*, straight in *P. woolgoolga*); the shape of the pereopod 5 basis (evenly rounded in *P. spinipoda*, with a slight excavation along the posteroventral margin in *P. woolgoolga*); and the shape of the epimeron 2 posteroventral corner (producing a small spine in *P. spinipoda*, subquadrate in *P. woolgoolga*). In addition the pereopod 6 basis is much less distinctly excavate posteriorly in *P. woolgoolga* compared with that of *P. spinipoda*.

#### *Paracallisoma zivianii* sp. n.

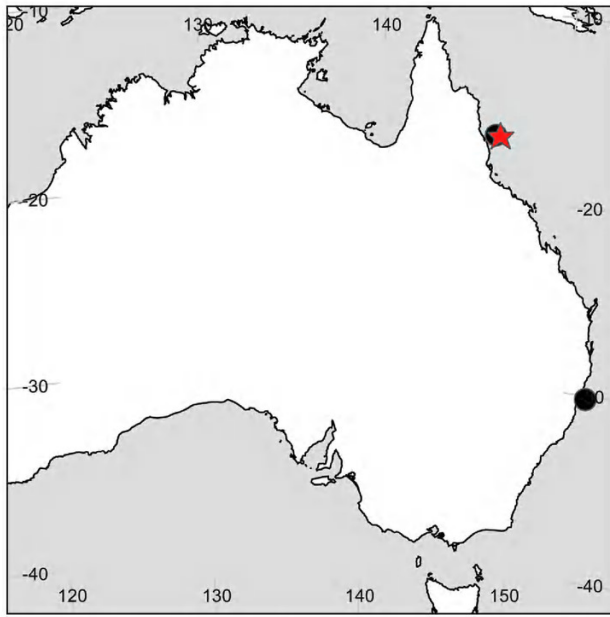
<http://zoobank.org/2DA4860F-478E-4597-B2D6-9E68702B634A>

Figures 31–34

**Type material.** Holotype, male, 12.0 mm, AM P.69091, east of Flynn Reef, Queensland, Australia (16°37.82'S, 146°23.08'E), 1000 m, baited trap, 7–8 June 1993, coll. J.K. Lowry, P. Freewater & W. Vader, RV *Sunbird* [QLD-950/SEAS]. Paratype, 1 specimen, 0.8 mm, AM P.69092, east of Flynn Reef, Queensland, Australia (16°37.82'S, 146°23.08'E), 1000 m, baited trap, 6–7 June 1993, coll. J.K. Lowry, P. Freewater & W. Vader, RV *Sunbird* [QLD-931/SEAS].

**Other Australian material examined.** *New South Wales*: 3 specimens, AM P.48103, [NSW-862]; 4 spec-



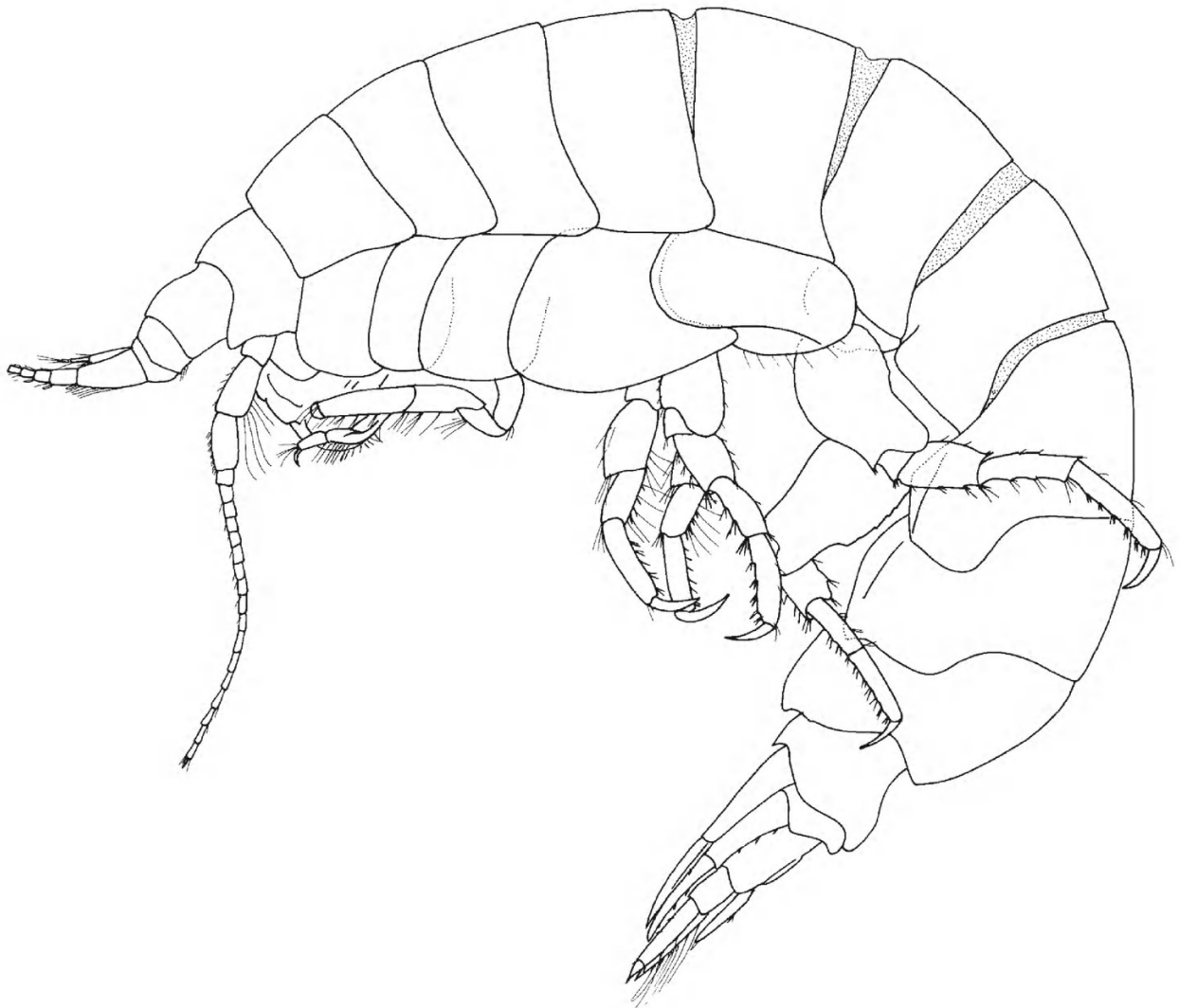


**Figure 31.** Distribution of *Paracallisoma zivianii* sp. n. Star indicates type locality.

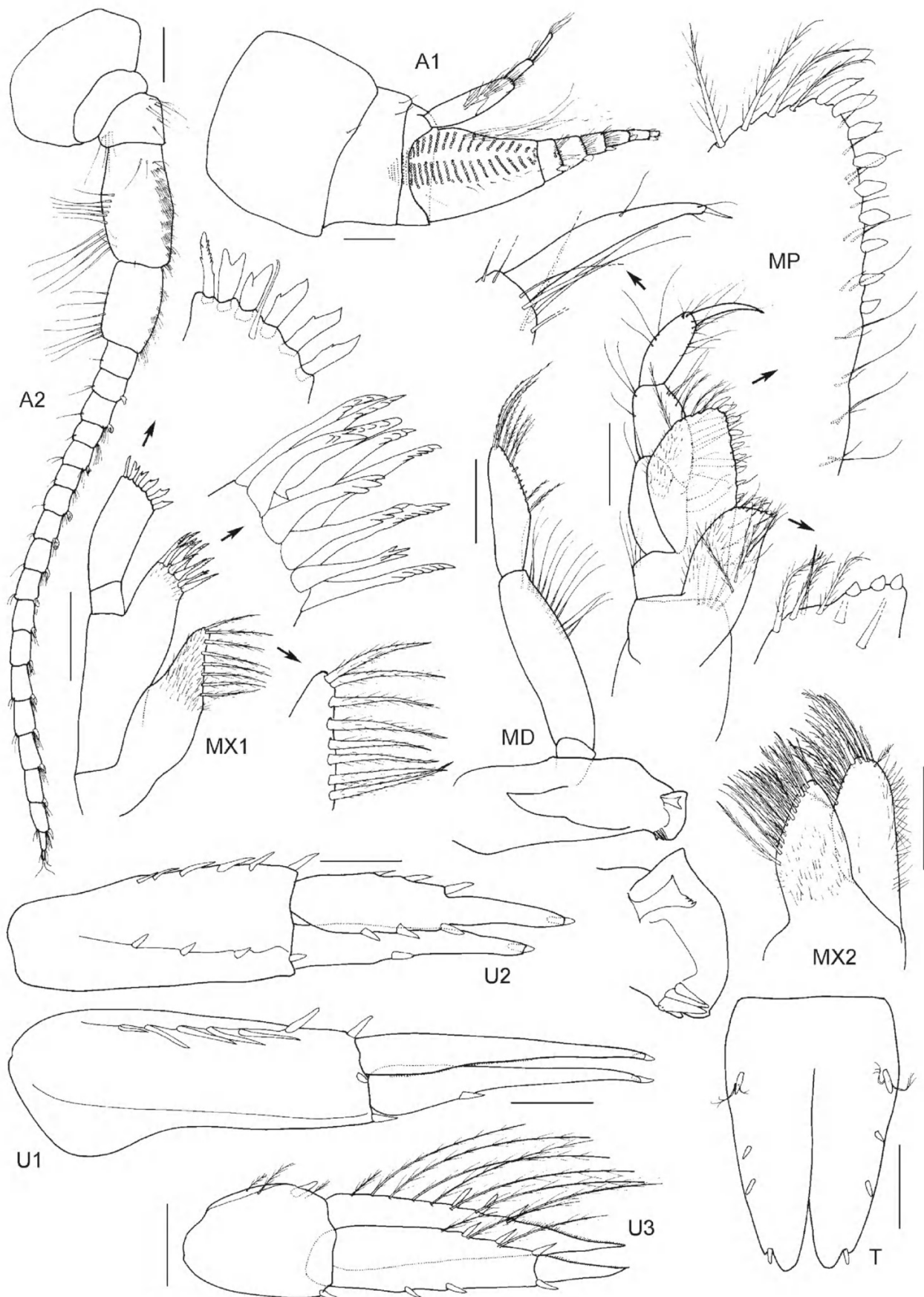
imens, AM P.48127, [NSW-863] north-east of Coffs Harbour ( $30^{\circ}10.93'S$ ,  $153^{\circ}32.26'E$ ), 963 m, baited trap, 11–12 August 1993, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee*. 1 specimen, AM P.49817, [NSW-876]; 4 specimens, AM P.49831, north-east of Coffs Harbour ( $30^{\circ}10.89'S$ ,  $153^{\circ}32.22'E$ ), 1000 m, baited trap, 12–13 August 1993, coll. P.B. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee* [NSW-877].

*Queensland*: 6 specimens, AM P.50236, [QLD-931/SEAS]; 3 specimens, AM P.50245, [QLD-932/SEAS] east of Flynn Reef ( $16^{\circ}37.82'S$ ,  $146^{\circ}23.08'E$ ), 1000 m, baited trap, 6–7 June 1993, coll. J.K. Lowry, P. Freewater & W. Vader, RV *Sunbird*.

**Diagnosis.** Gnathopod 1 coxa margins subparallel. Gnathopod 2 propodus palm transverse, with slightly concave, minutely serrate margin; dactylus reaching corner of palm. Pereopod 5 basis much longer than broad; basis slightly to moderately expanded posteriorly, posterior margin straight. Epimeron 3 posteroventral corner produced into a weak spine. Telson deeply cleft.

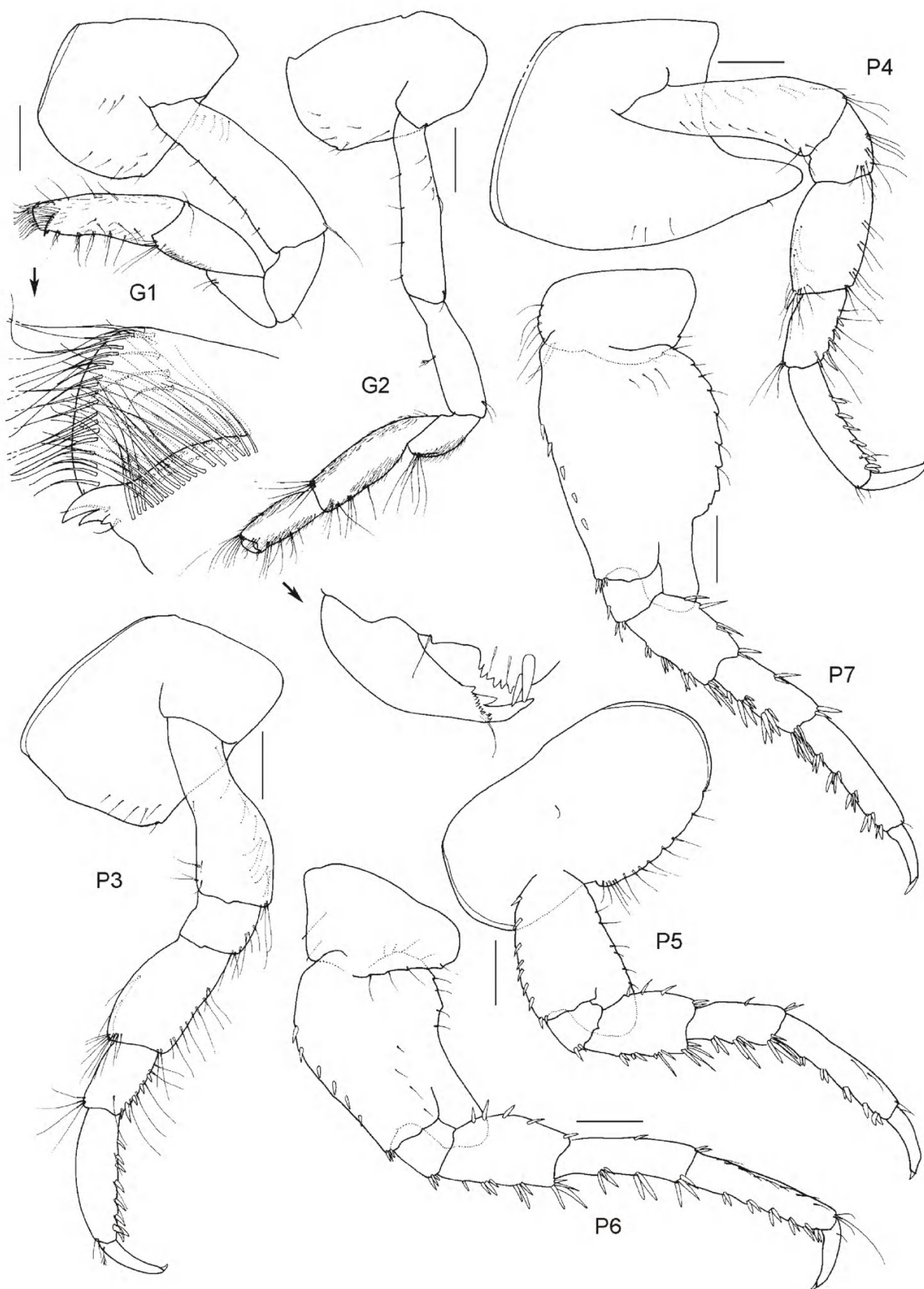


**Figure 32.** *Paracallisoma zivianii* sp. n. Holotype male, 12.0 mm, AM P.69091, from east of Flynn Reef, Queensland, Australia.



**Figure 33.** *Paracallisoma zivianii* sp. n. Holotype male, 12.0 mm, AM P.69091, from east of Flynn Reef, Queensland, Australia. Scales represent 0.2 mm.





**Figure 34.** *Paracallisoma zivianii* sp. n. Holotype male, 12.0 mm, AM P.69091, from east of Flynn Reef, Queensland, Australia. Scales represent 0.2 mm.

**Description.** Based on holotype, male, 12.0 mm, AM P.69091.

Lateral cephalic lobe large, down-turned, narrowly rounded apically. Rostrum absent. Eyes apparently absent. Antenna 1 short; accessory flagellum long, 3-articulate, forming cap covering callynophore; primary flagellum 7-articulate, with strong 2-field callynophore; calceoli present. Antenna 2 longer than antenna 1; peduncle with weak brush setae, article 1 greatly enlarged, not covering article 2; flagellum 19-articulate, calceoli present.

Labrum, epistome slightly produced, rounded; upper lip slightly produced, straight. Mandible incisor with slightly convex margins; lacinia mobilis a stemmed, distally expanded, irregularly cusped blade; molar flap-like; palp attached midway, article 2 slender. Maxilla 1 palp 2-articulate. Maxilla 2 inner plate slightly shorter than outer plate; outer plate without long, distally barbed slender setae. Maxilliped outer plate small; palp large, 4-articulate.

Gnathopods 1–4 coxae without setal fringe along ventral margin. Gnathopod 1 coxa large, about as long as coxa 2, margins subparallel; basis slender; ischium long, length  $2.2 \times$  width; carpus long, length  $\times 2.0$  width, shorter than propodus; propodus margins slightly tapering distally; anterodistal margin with row of long, slender setae, without robust setae just above dactylus; dactylus small, simple, well developed, posterior margin without setae, with two cusps along posterior margin. Gnathopod 2 minutely subchelate; carpus long, length  $3.4 \times$  width; propodus long, length  $2.5 \times$  width, palm transverse, with slightly concave, minutely serrate margin; dactylus reaching corner of palm. Pereopod 3 weakly prehensile; propodus without posterodistal locking setae; dactylus short, slender. Pereopod 4 weakly prehensile; coxa wider than deep, with subacutely produced posteroventral lobe; propodus without posterodistal locking setae; dactylus short, slender. Pereopod 5 simple; coxa equilobate; basis much longer than broad; basis slightly to moderately expanded posteriorly, posterior margin straight, posteroventral lobe moderately broadened, extending beyond ischium, without row of long pappose setae medially; dactylus short, slender. Pereopod 6 simple; basis expanded posteroproximally, posterior margin tapering distally, with excavate posteroproximal margin, with rounded, moderately broadened posteroventral lobe, produced into merus; dactylus short, slender. Pereopod 7 simple; basis expanded posteriorly, slightly rounded proximally, minutely crenate, posteroventral corner excavate; propodus without anterodistal locking setae; dactylus short, slender.

Epimeron 1 anteroventral corner rounded. Epimeron 3 posteroventral corner produced into a weak spine. Urosomite 1 with dorsally smooth. Uropod 1 peduncle  $1.2 \times$  rami length; rami subequal in length. Uropod 2 rami inner ramus slightly shorter than outer ramus. Uropod 3 peduncle short; rami lanceolate, subequal in length, outer ramus 2-articulate, with plumose setae. Telson longer than broad, length  $1.5 \times$  breadth, deeply cleft (to 75%).

**Etymology.** The species is named for Bert Ziviani, skipper of the RV *Sunbird*.

**Distribution.** *Australia*: east of Flynn Reef, Queensland, to north-east of Coffs Harbour, New South Wales.

**Ecology.** A scavenger, taken in baited traps.

**Discussion.** With its strongly developed pereopod 4 posteroventral lobe and relatively narrow and posterodistally lobate pereopod 5 basis, this species is most similar to *P. alberti*, *P. platepistomum*, and *P. coecum*. It can be differentiated from the latter two species by the shape of the gnathopod 1 coxa, which is short with subparallel margins (longer than broad and tapering distally in *P. platepistomum* and *P. coecum*) and the shape of the pereopod 7 basis (more distinctly excavate posteriorly in *P. zivianii* sp. n.). It differs from *P. alberti* in the shape of the gnathopod 2 palm, which is transverse, and the dactylus, which fits the palm (palm acute, dactylus distinctly shorter than the palm in *P. alberti*).

#### *Scopelocheiropsis* Schellenberg, 1926

*Scopelocheiropsis* Schellenberg, 1926a: 260. — Schellenberg 1942: 110. — J.L. Barnard 1969: 305, key K, 361. — Barnard and Karaman 1991: 527, 434 (key I).  
*Bathycallisoma*. — Ledoyer 1986: 733 (in part, part *Bathycallisoma*).

**Type species.** *Scopelocheiropsis abyssalis* Schellenberg, 1926, monotypy.

**Included species.** *Scopelocheiropsis* includes three species: *S. abyssalis* Schellenberg, 1926; *S. armata* (Ledoyer, 1986), comb. n.; *S. sublittoralis* Vinogradov, 2004.

**Diagnostic description.** *Mandible lacinia mobilis a stemmed, distally expanded, smooth blade*. Maxilla 1 inner plate with pappose setae lining inner margin; palp 2-articulate. Maxilla 2 inner and outer plates subequal in width, inner plate slightly shorter than outer. Maxilliped palp article 4 reduced or well developed. Gnathopod 1 coxa large, margins diverging distally; basis slender, linear; dactylus small, simple, highly modified with apical tip. *Pereopod 3 carpus compressed, wider than long*. Pereopod 4 coxa with weakly-developed, subacutely produced posteroventral lobe.

**Discussion.** *Scopelocheiropsis* has some variable characters, most importantly the absence of a molar in *S. sublittoralis* (present in the both *S. abyssalis* and *S. armata*), and the blunt, reduced maxilliped palp article 4 in *S. abyssalis* (well-developed in the other two species). Nevertheless, the distinctively compressed carpus of pereopods 3 and 4, as well as the stemmed and distally expanded lacinia mobilis are strong diagnostic characters which separate these taxa from other groups.



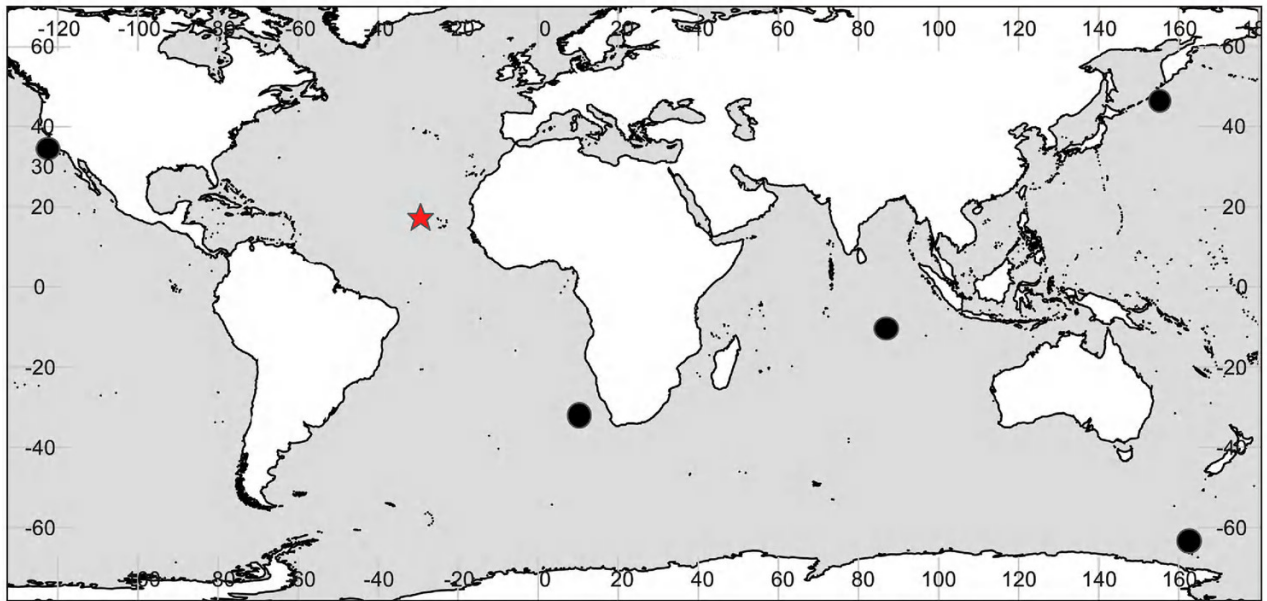


Figure 35. Distribution of *Scopelocheiropsis abyssalis* Schellenberg, 1926. Star indicates type locality.

### *Scopelocheiropsis abyssalis* Schellenberg, 1926

Figures 35, 36

*Scopelocheiropsis abyssalis* Schellenberg, 1926a: 260, fig. 12. — Schellenberg 1926b: 216, fig. 26b. — J.L. Barnard 1958: 99 (list). — Birstein and Vinogradov 1962: 34, fig. 1. — Birstein and Vinogradov 1964: 162. — Birstein and Vinogradov 1970: 402 (table 1), 417 (table 3). — Lowry and Bullock 1976: 105. — Vader 1983: 140 (table 1). — Barnard and Karaman 1991: 527. — Palerud and Vader 1991: 42. — De Broyer and Jażdżewski 1993: 74. — Thurston 2001: table 2. — Hendrycks and Conlan 2003: 2327, fig. 10. — De Broyer et al. 2007: 159.

**Type material.** Syntypes, 2 females, 5 mm, ZMB 20319.

**Type locality.** North Atlantic (17°28'N, 29°42'W), 3000 m.

**Depth range.** 0–4000 m (Schellenberg 1926a, Hendrycks and Conlan 2003).

**Distribution.** *Atlantic Ocean*: approximately 650 kms west-north-west of the Cape Verde Islands (Schellenberg 1926a); west of South Africa (Schellenberg 1926b).

*Indian Ocean*: approximately 1100 kms west-north-west of Cocos (Keeling) Islands (Birstein and Vinogradov 1964).

*Pacific Ocean*: Kurile-Kamchatka region (Birstein and Vinogradov 1970); United States, west of California (Hendrycks and Conlan 2003).

*Southern Ocean*: Antarctica, approximately 600 kms north of the Oates Coast (Birstein and Vinogradov 1962).

**Discussion.** *Scopelocheiropsis abyssalis* was originally described and illustrated as lacking a mandibular molar. Hendrycks and Conlan (2003) described new material and indicated the presence of a small molar. We have re-examined one of the syntypes of this species and can

confirm the presence of a molar on the type material (see Figure 36).

### *Scopelocheiropsis armata* (Ledoyer, 1986)

Figure 37

?*Bathycallisoma armata* Ledoyer, 1986: 733, fig. 282.

?*Scopelocheirus armata*. — Barnard and Karaman 1991: 528.

**Type material.** Holotype, ?male, 4 mm, MNHN-Am4099.

**Type locality.** South-east of les Îles Glorieuses (11°31'S, 47°24.1'E), 335–390 m depth.

**Depth range.** 335–390 m (Ledoyer 1986).

**Distribution.** *Madagascar*: South-east of les Îles Glorieuses (Ledoyer 1986).

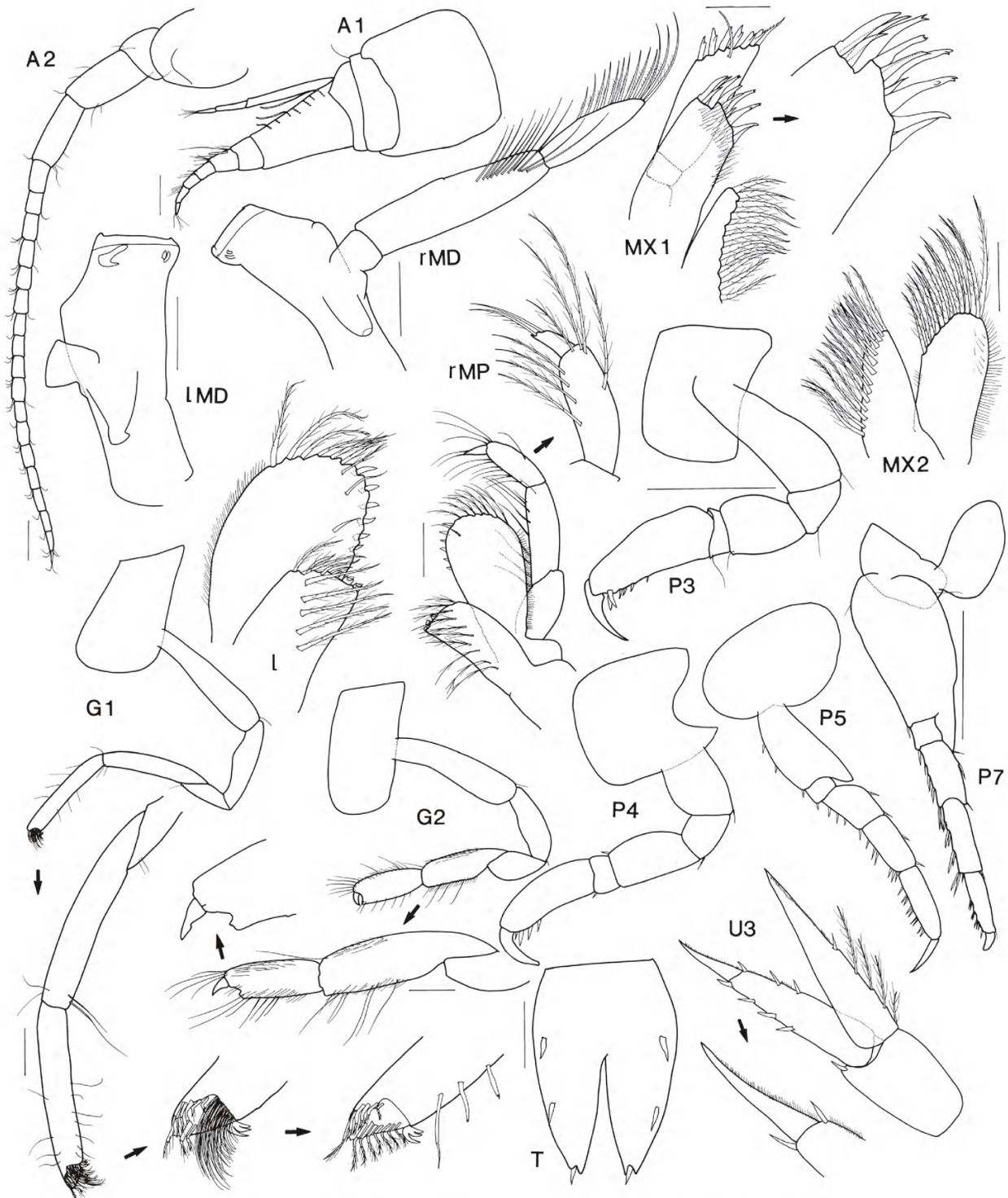
**Discussion.** Ledoyer (1986) originally described this species, tentatively placing it in the genus *Bathycallisoma* based on the relative length of the gnathopod 1 carpus, which is shorter than the propodus. We do not consider this to be a sound diagnostic character and instead refer to the distally broadened lacinia mobilis (slender robust seta in *Bathycallisoma*).

### *Scopelocheiropsis sublitoralis* G. Vinogradov, 2004

Figure 38

*Scopelocheiropsis sublitoralis* G. Vinogradov, 2004: 55, fig. 3.

**Type material.** Holotype, male, 4.5 mm, SAM A40881. Paratype, juvenile, 2.5 mm, P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences.



**Figure 36.** *Scopelocheiropsis abyssalis* Schellenberg, 1926. Syntype female, 5 mm, ZMB 20319, mid Atlantic Ocean. Whole G1, G2, P4, P5 after Schellenberg 1926. Scales for P3, P7 represent 0.5 mm, remainder represent 0.1 mm.

**Type locality.** Indian Ocean, Madagascar, Mozambique Channel (22°13'S, 43°07'E), 258–300 m (2 meters above the bottom).

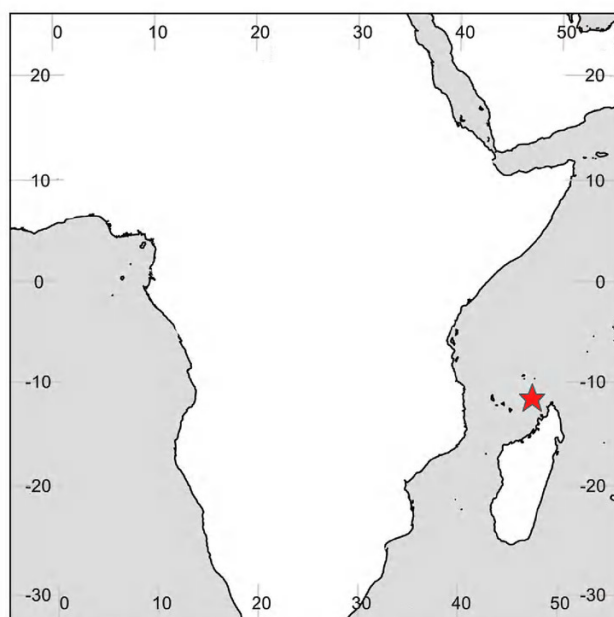
**Depth range.** 258–300 m (Vinogradov 2004).

**Distribution.** Mozambique Channel, Indian Ocean (Vinogradov 2004).

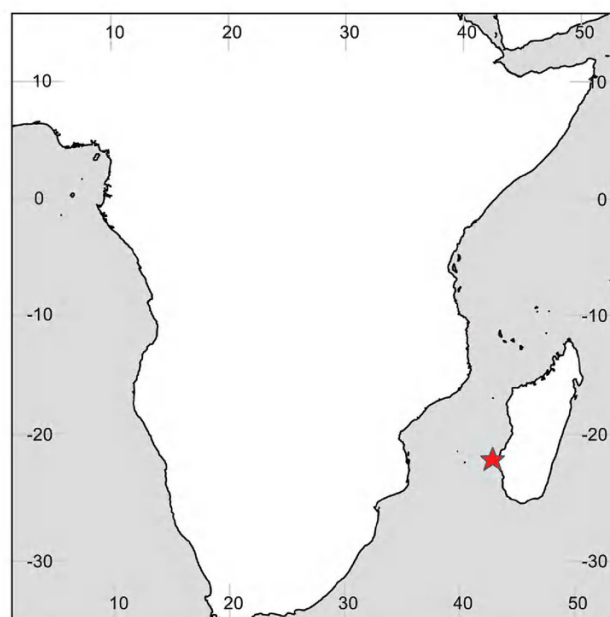
**Ecology.** Living over mud with sand.

**Discussion.** *Scopelocheiropsis sublitoralis* is morphologically close to *S. armata*, both of which have a known distribution that is so far confined to Madagascar. Vinogradov (2004) does not justify his generic placement of the species, but presumably it was due to the absence of a molar, which *S. abyssalis*, the type of the genus, is now





**Figure 37.** Distribution of *Scopelocheiropsis armata* (Ledoyer, 1986).



**Figure 38.** Distribution of *Scopelocheiropsis sublittoralis* Vinogradov, 2004.

known to have. Nonetheless, *S. sublittoralis* exhibits characters which fit within the diagnosis of the genus.

*Scopelocheiropsis sublittoralis* can be distinguished from *S. armata* by the following characters: molar absent in *S. sublittoralis*, present in *S. armata*; mandible palp broadened medially in *S. sublittoralis*, margins subparallel in *S. armata*; pereopod 5 basis almost linear in *S. sublittoralis*, broadly expanded posteriorly in *S. armata*; uropod 3 rami subequal in length in *S. sublittoralis*, inner ramus distinctly shorter than outer in *S. armata*; telson length  $1.5 \times$  width in *S. sublittoralis*,  $1.2 \times$  width in *S. armata*.

*Scopelocheiropsis sublittoralis* can also easily be distinguished from *S. abyssalis* by the absence of a molar (present in *S. sublittoralis*); the shape of gnathopod 1, which is much more elongate and slender in *S. abyssalis*; and the shape of pereopod 7 basis, which has a long, thin posterodistal lobe in *S. sublittoralis* compared to the posteroventrally excavate corner of the pereopod 7 basis in *S. abyssalis*.

#### **Tayabasa gen. n.**

<http://zoobank.org/FC8F22E5-8283-4BF4-AF4D-F0C9C7F9CA01>

*Eucallisoma*. — Lowry and Stoddart 1993: 67 (in part, part *Eucallisoma*).

**Type species.** *Eucallisoma barnardi* Lowry & Stoddart, 1993, by original designation.

**Included species.** *Tayabasa* includes one species: *T. barnardi* (Lowry & Stoddart, 1993).

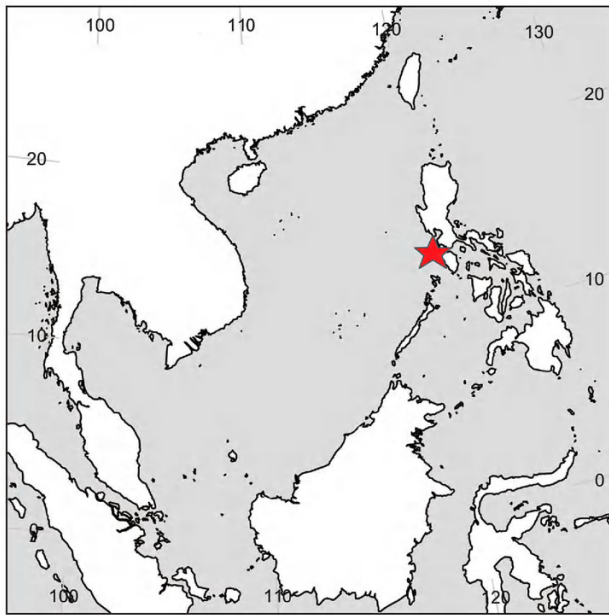
**Diagnostic description.** Mandible lacinia mobilis a cuspidate peg. Maxilla 1 inner plate with pappose setae

lining inner margin; palp 2-articulate. Maxilla 2 inner plate broader than outer, inner and outer plates subequal in length. Maxilliped palp article 4 vestigial. Gnathopod 1 coxa large, almost as long as coxa 2, margins slightly tapering distally; basis swollen, with glandular material; dactylus reduced, simple. Pereopod 3 carpus short to long, longer than wide. Pereopod 4 with well-developed, subacute posteroventral lobe.

**Etymology.** The name *Tayabasa* refers to Tayabas Bay, located on the eastern side of Verde Island Passage in the Philippines, close to the type locality of the type species. Gender feminine.

**Discussion.** *Tayabasa* belongs to a closely related and highly derived complex of genera also comprised of *Anisocallisoma*, *Austrocallisoma* and *Eucallisoma*. See discussion under *Austrocallisoma* for further remarks.

*Tayabasa* can be separated from *Anisocallisoma* by the 2-articulate maxilla 1 palp and inner plate with setae lining the inner margin (palp 1-articulate and inner plate with apical setae only in *Anisocallisoma*). It differs from *Austrocallisoma* in peg-like lacinia mobilis, the 2-articulate maxilla 1 palp, and the well-developed gnathopod 1 coxa (lacinia mobilis a stemmed, distally expanded blade, maxilla 1 palp 1-articulate, and gnathopod 1 coxa reduced in *Austrocallisoma*). Finally, it can be distinguished from *Eucallisoma* in the peg-like lacinia mobilis, the vestigial maxilliped palp article 4, and the subacute posteroventral lobe of the pereopod 4 coxa (lacinia mobilis a stemmed, distally expanded blade, maxilliped palp article 4 well developed, and pereopod 4 coxa with a subquadrate posteroventral lobe in *Eucallisoma*).



**Figure 39.** Distribution of *Tayabasa barnardi* (Lowry & Stoddart, 1993).

### *Tayabasa barnardi* (Lowry & Stoddart, 1993)

Figure 39

*Eucallisoma barnardi* Lowry & Stoddart, 1993: 68, figs 8–10. — Lowry 2000: 323 (list).

**Type material.** Holotype, female, 40 mm, MNHN-Am4449.

**Type locality.** Eastern entrance to Verde Island Passage, Philippines (13°36.7–38.11°N, 120°33.7–32.3°E), 810–820 m depth.

**Depth range.** 810–820 m.

**Distribution.** *Philippines*: Verde Island Passage.

**Discussion.** *Eucallisoma barnardi* is here transferred to its own genus, *Tayabasa* gen. n., on the basis of the cuspidate peg form of the lacinia mobilis, the vestigial maxilliped palp article 4, and the subacute posteroventral lobe on the pereopod 4 coxa.

## Acknowledgements

We wish to gratefully acknowledge the following people: Helen Stoddart (AM) for much preliminary work on the taxa; Roger Springthorpe (AM) for creating the plates; collection management staff at the Australian Museum for their endless hard work in managing the specimens; and finally, Tammy Horton from the National Oceanography Centre, Southampton, for her input and comments. This study was funded by an ABRs, grant (RF212-13).

## References

- Albertelli G, Arnaud PM, Della Croce N, Drago N, Eleftheriou A (1992) The deep Mediterranean macrofauna caught by traps and its trophic significance. *Comptes Rendus de l'Académie des Sciences, Series III, Sciences de la Vie* 314: 139–144.
- Andres HG (1977) Gammaridea (Crustacea, Amphipoda) aus dem Iberischen Tiefseebecken Auswertung des Materials der Fahrten 3 und 15 von F.S. “Meteor”. *Meteor Forschungs-Ergebnisse, Reihe D* 25: 54–67.
- Andres HG, Lott N (1977) Verzeichnis der Typen aus der Sammlung Crustacea des Zoologischen Instituts und Zoologischen Museums der Universität Hamburg. Amphipoda, Gammaridea. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 74: 53–64.
- Andres HG, John HC, Rê P (1992) Fish larvae and Gammaridea plankton off northern Portugal during autumn 1987. *Senckenbergiana Maritima* 22: 179–201.
- Austin WC (Ed.) (1985) *An Annotated Checklist of Marine Invertebrates in the Cold Temperate Northeast Pacific*. 3 (Ed.) Cowichan BC, Khoyatan Marine Laboratory, 682 pp.
- Barnard JL (1954) Four species of bathypelagic Gammaridea (Amphipoda) from California. *Allan Hancock Foundation Publications, Occasional Paper* 13: 52–69.
- Barnard JL (1958) Index to the families, genera, and species of the gammaridean Amphipoda (Crustacea). *Allan Hancock Foundation Publications, Occasional Paper* 19: 1–145.
- Barnard JL (1961) Gammaridean Amphipoda from depths of 400 to 6000 meters. *Galathea Report* 5: 23–128.
- Barnard JL (1964) Some bathyal Pacific Amphipoda collected by the U.S.S. Albatross. *Pacific Science* 18(3): 315–335.
- Barnard JL (1969) The families and genera of marine gammaridean Amphipoda. *Bulletin of the United States National Museum* 271: 1–535. doi: 10.5479/si.03629236.258.1
- Barnard JL, Karaman GS (1991) The families and genera of marine gammaridean Amphipoda (except marine gammaroids). *Records of the Australian Museum Supplement* 13: 1–866. doi: 10.3853/j.0812-7387.13.1991.367
- Bate CS (1856) On the British Edriophthalma. Part 1. The Amphipoda. Report of the British Association for the Advancement of Science, Glasgow, 1855: 18–62.
- Bate CS (1857) A synopsis of the British edriophthalmous Crustacea Part 1. Amphipoda. *Annals and Magazine of Natural History, Series 2* 19: 135–152.
- Bate CS (1862) Catalogue of the Specimens of Amphipodous Crustacea in the Collection of the British Museum. Trustees, British Museum, London, 399 pp.
- Bate CS, Westwood JO (1863) *A History of the British Sessile-eyed Crustacea*. Vol. 1. John Van Voorst, London, 507 pp.
- Bellan-Santini D (1985a) Amphipodes profonds de Méditerranée (campagnes Biomed I, Polymede I et 11). *Bollettino del Museo civico di storia naturale di Verona* 10: 263–313, 11 figs, 1 map.
- Bellan-Santini D (1985b) Etude de la faune profonde de Méditerranée: Les amphipodes des trois campagnes Polymede 1, Polymede 2 et Biomed 1. *Rapports et Procès-verbaux des Réunions. Commission International pour l'Exploration de la Mer Méditerranée* 29: 333–334.



- Bellan-Santini D (1990) Mediterranean deep-sea amphipods: composition, structure and affinities of the fauna. *Progress in Oceanography* 24 (1–4): 275–287. doi: 10.1016/0079-6611(90)90037-3
- Bellan-Santini D (1998) Ecology. In: Ruffo S (Ed.) *The Amphipoda of the Mediterranean*. Part 4. Mémoires de l'Institut Océanographique, Monaco, 869–893.
- Bellan-Santini D, Ruffo S (1998) Faunistics and zoogeography. In: Ruffo S (Ed.) *The Amphipoda of the Mediterranean*. Part 4. Mémoires de l'Institut Océanographique, Monaco, 895–911.
- Belloc G (1960) Catalogue des types d'amphipodes du Musée Océanographique de Monaco. *Bulletin de l'Institut Océanographique, Monaco* 57: 1–28.
- Berge J, Vader W, Lockhart S (2004) A survey of amphipod associates of sea urchins, with description of new species in the genera *Lepidepcerella* (Lysianassoidea: lepidopcerellid group) and *Notopoma* (Photoidea: Ischyroceridae) from Antarctic cidarids. *Deep-Sea Research II* 51: 1717–1731. doi: 10.1016/j.dsr2.2004.06.031
- Bergmann M, Wieczorek SK, Moore PG, Atkinson RJA (2002) Utilisation of invertebrates discarded from the *Nephrops* fishery by variously selective benthic scavengers in the west of Scotland. *Marine Ecology Progress Series* 233: 185–198. doi: 10.3354/meps233185
- Birstein JA, Vinogradov ME (1955) Pelagicheskie gammaridy (Amphipoda-Gammaridea) Kurilo-Kamchatskoi Vpadiny. *Akademiia Nauk SSSR, Instituta Okeanologii, Trudy* 12: 210–287, 35 figs. [In Russian]
- Birstein JA, Vinogradov ME (1958) [Pelagic gammarids (Amphipoda, Gammaridea) from the northwestern part of the Pacific Ocean]. *Akademiia Nauk SSSR, Trudy Instituta Okeanologii* 27: 219–257. [In Russian]
- Birstein JA, Vinogradov ME (1960) [Pelagic gammarids from the tropical Pacific Ocean]. *Akademiia Nauk SSSR, Trudy Instituta Okeanologii* 34: 165–241. [In Russian]
- Birstein JA, Vinogradov ME (1962) [Pelagic Gammaridea (Amphipoda, Gammaridea) collected by the Soviet Antarctic Expedition on the M/V "Ob", south of 40°S]. *Akademiia Nauk SSSR, Issledovaniya Fauny Morei* 1(10): 33–56. [In Russian]
- Birstein JA, Vinogradov ME (1964) [Pelagic gammarid amphipods of the northern part of the Indian Ocean]. *Akademiia Nauk SSSR, Trudy Instituta Okeanologii* 65: 152–195. [In Russian]
- Birstein JA, Vinogradov ME (1970) [On the fauna of pelagic gammaridean amphipods from the Kurile-Kamchatka region of the Pacific Ocean]. *Akademiia Nauk SSSR, Trudy Instituta Okeanologii* 86: 401–419. [In Russian]
- Blankenship LE, Yayanos AA (2005) Universal primers and PCR of gut contents to study marine invertebrate diets. *Molecular Ecology* 14(3): 891–899.
- Blankenship LE, Yayanos AA, Cadien DB, Levin LA (2006) Vertical zonation patterns of scavenging amphipods from the Hadal zone of the Tonga and Kermadec Trenches. *Deep-Sea Research Part I-Oceanographic Research Papers* 53(1): 48–61. doi: 10.1016/j.dsr.2005.09.006
- Blankenship LE, Levin LA (2007) Extreme food webs: Foraging strategies and diets of scavenging amphipods from the ocean's, deepest 5 kilometers. *Limnology and Oceanography* 52(4): 1685–1697. doi: 10.4319/lo.2007.52.4.1685
- Boeck A (1871) *Crustacea Amphipoda borealia et arctica*. Forhandlinger i Videnskabs-Selskabet i Christiania 1870: 81–280, i–viii [index].
- Boeck A (1872) *De Skandinaviske og Arktiske Amphipoder*. Part 1. A.W. Brogger, Christiania, 1–160, pls I–VII.
- Boeck A (1876) *De Skandinaviske og Arktiske Amphipoder*. Part 2. A.W. Brogger, Christiania, 161–713, pls VIII–XXXII.
- Bossanyi J (1957) A preliminary survey of the small natant fauna in the vicinity of the sea floor off Blyth, Northumberland. *Journal of Animal Ecology* 26: 353–368. doi: 10.2307/1752
- Brandt A (1997) Biodiversity of peracarid crustaceans (Malacostraca) from the shelf down to the deep Arctic Ocean. *Biodiversity and Conservation* 6(11): 1533–1556. doi: 10.1023/A:1018318604032
- Britton JC, Morton B (1993) Are there obligate marine scavengers? In: Morton B (Ed.) *The Marine Biology of the South China Sea*. Proceedings of the First International Conference on the Marine Biology of Hong Kong and the South China Sea. Hong Kong, 28 October - 3 November 1990. Hong Kong University Press, Hong Kong, 357–391.
- Brusca GJ (1967) The ecology of pelagic Amphipoda, I. Species accounts, vertical zonation and migration of Amphipoda from the waters off Southern California. *Pacific Science* 21(3): 382–393.
- Bruzeliuss RM (1859) *Bidrag till kannedomen om Skandinaviens Amphipoda Gammaridea*. Kungliga Svenska Vetenskapsakademiens Handlingar, Series 2 3: 1–104.
- Buhl-Jensen L, Fosså JH (1991) Hyperbenthic crustacean fauna of the Gullmarfjord area (western Sweden): species richness, seasonal variation and long-term changes. *Marine Biology* 109: 245–258. doi: 10.1007/bf01319393
- Buhl-Mortensen L (1996) Amphipod fauna along an off-shore-fjord gradient. *Journal of Natural History* 30: 23–49. doi: 10.1080/00222939600770031
- Cartes JE, Sorbe J-C (1999) Deep-water amphipods from the Catalan Sea slope (western Mediterranean): Bathymetric distribution, assemblage composition and biological characteristics. *Journal of Natural History* 33: 1133–1158. doi: 10.1080/002229399299978
- Cartes JE, Jaume D, Madurell T (2003) Local changes in the composition and community structure of suprabenthic peracarid crustaceans on the bathyal Mediterranean: influence of environmental factors. *Marine Biology* 143: 745–758. doi: 10.1007/s00227-003-1090-z
- Castro M, Araújo A, Monteiro P (2005) Fate of discards from deep water crustacean trawl fishery off the south coast of Portugal. *New Zealand Journal of Marine and Freshwater Research* 39: 437–446. doi: 10.1080/00288330.2005.9517323
- Cecchini C (1928) Gli anfipodi del R. Museo Zoologico di Firenze. Fam. Lysianasidae – Gen. *Scopelocheirus*, *Orchomenella*; – Fam. Ampeliscidae, Corophiidae, Amphithoidae, Aoridae. *Atti della Reale Accademia dei Fisiocritici in Siena, Series* 10, 3: 301–319.
- Cecchini C, Parenzan P (1935) Anfipodi del Golfo di Napoli. *Pubblicazioni della Stazione Zoologica di Napoli* 14: 153–250.
- Chevreaux E (1888) Contribution à l'étude de la distribution géographique des amphipodes sur les côtes de France. *Bulletin de la Société d'Etudes Scientifiques de Paris* 11: 1–12.
- Chevreaux E (1895) Les amphipodes des premières campagnes de la Princesse-Alice. *Mémoires de la Société Zoologique de France* 8: 424–435.
- Chevreaux E (1898) Révision des amphipodes de la côte océanique de France. *Compte Rendu, Association Française pour l'Avancement des Sciences* 27: 474–484.
- Chevreaux E (1903) Campagnes Scientifiques de S.A. le Prince Albert Ier de Monaco. Note préliminaire sur les amphipodes de la famille



- des Lysianassidae recueillis par la *Princesse-Alice* dans les eaux profondes de l'Atlantique et de la Méditerranée. Bulletin de la Société Zoologique de France 28: 81–97.
- Chevreaux E (1911) Campagnes de la *Melita*. Les amphipodes d'Algérie et de Tunisie. Mémoires de la Société Zoologique de France 23: 145–285.
- Chevreaux E (1927) Malacostracés (suite). III. Crustacés Amphipodes. Expéditions Scientifiques du “Travailleur” et du “Talisman” pendant les années 1880, 1881, 1882, 1883 9: 41–152, pls 151–114.
- Chevreaux E (1935) Amphipodes provenant des campagnes du Prince Albert Ier de Monaco. Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert Ier Prince Souverain de Monaco 90: 1–214.
- Chevreaux E, Fage L (1925) Amphipodes. Faune de France 9: 1–488.
- Childress JJ (1975) The respiratory rates of midwater crustaceans as a function of depth of occurrence and relation to the oxygen minimum layer off Southern California. Comparative Biochemistry and Physiology 50A: 787–799. doi: 10.1016/0300-9629(75)90146-2
- Childress JJ, Nygaard M (1974) Chemical composition and buoyancy of midwater crustaceans as function of depth of occurrence off Southern California. Marine Biology 27: 225–238. doi: 10.1007/BF00391948
- Christodoulou M, Paraskevopoulou S, Syranidou E, Koukouras A (2013) The amphipod (Crustacea: Peracarida) fauna of the Aegean Sea, and comparison with those of the neighbouring seas. Journal of the Marine Biological Association of the United Kingdom 93(5): 1303–1327. doi:10.1017/S002531541200183x
- Chumley J (Ed.) (1918) The Fauna of the Clyde Sea Area. Glasgow: The University Press, 200 pp.
- Costa A (1851) Catalogo dei crostacei italiani e di moltri altri del Mediterraneo per Fr. Gugl. Hope. In: F. Azzolino, Naples, p. 48.
- Costa A (1853a) Descrizione di tre nuovi crostacei del Mediterraneo scoperti dal Rev. G.F. Hope. Fauna del Regno di Napoli, 83, 10 pp, 13 pls.
- Costa A (1853b) Genere *Callisoma*. Fauna del Regno di Napoli, 6 pp.
- Costa A (1857) Ricerche sui crostacei amfipodi del regno di Napoli. Memorie della Reale Accademia delle Scienze di Napoli 1: 165–235.
- Costa OG (1840) Catalogo dt Crostacei del Regno di Napoli distribuiti secondo il metodo di Latreille. In: Cuv. Regn. An. ed. 2. Fauna del Regno di Napoli, 7 pp.
- Costello MJ, Holmes JMC, McGrath D, Myers AA (1989) A review and catalogue of the Amphipoda (Crustacea) in Ireland. Irish Fisheries Investigations, Series B, Marine 33: 1–70.
- Cunha MR, Sorbe J-C, Bernardes C (1997) On the structure of the neritic suprabenthic communities from the Portuguese continental margin. Marine Ecology Progress Series 157: 119–137. doi: 10.3354/meps157119
- Dahl E (1959) Amphipoda from depths exceeding 6000 meters. Galathea Report 1: 211–241.
- Dallwitz MJ (2010) Overview of the DELTA system. <http://www.deltaintkey.com/www/overview.htm> [25/06/2013]
- Danovaro R, Batista Company J, Corinaldesi C, D'Onghia G, Galil B, Gambi C, Gooday AJ, Lampadariou N, Luna GM, Morigi C, Olu K, Polymenakou P, Ramirez-Llodra E, Sabbatini A, Sardà F, Sibuet M, Tselepidis A (2010) Deep-sea biodiversity in the Mediterranean Sea: The known, the unknown, and the unknowable. PLoS ONE 5(8): e11832. doi: 10.1371/journal.pone.0011832
- Dauvin J-C (1988) Bilan des additions aux inventaires de la faune marine de Roscoff à partir des observations effectuées de 1977 à 1987 en baie de Morlaix avec la signalisation de deux nouvelles espèces d'amphipodes pour la faune: *Ampelisca spooneri* Dauvin et Bellan-Santini et *Scopelocheirus hopei* Costa. Cahiers De Biologie Marine 29: 419–426.
- Dauvin J-C, Iglesias A, Lorgeré J-C (1994) Circalittoral suprabenthic coarse sand community from the western English Channel. Journal of the Marine Biological Association of the United Kingdom 74: 543–562. doi: 10.1017/S0025315400047664
- Dauvin J-C, Sorbe J-C (1996) Suprabenthic amphipods from the southern margin of the Cap-Ferret Canyon (Bay of Biscay, northeastern Atlantic Ocean): abundance and bathymetric distribution. Polskie Archiwum Hydrobiologii 42: 441–460.
- Dauvin J-C, Bellan-Santini D (2002) Les crustacés amphipodes Gammaridea benthiques des côtes françaises métropolitaines: Bilan des connaissances. Crustaceana 75: 299–340. doi: 10.1163/156854002760095408
- De Broyer C, Jażdżewski K (1993) Contribution to the marine biodiversity inventory. A checklist of the Amphipoda (Crustacea) of the Southern Ocean. Documents de Travail de l'Institut Royal des Sciences Naturelles de Belgique 73: 1–154.
- De Broyer C, Lowry J, Jażdżewski K, Robert H (2007) Catalogue of the Gammaridean and Corophiidean Amphipoda (Crustacea) of the Southern Ocean with distribution and ecological data. In: De Broyer C (Ed.) Census of Antarctic Marine Life: Synopsis of the Amphipoda of the Southern Ocean. Vol. 1. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 77 (suppl. 1): 325 pp.
- Della Valle A (1893) Gammarini del Golfo di Napoli. Fauna und Flora des Golfes von Neapel 20: 1–948.
- Desbruyères D, Geistdörfer P, Ingram CL, Khripoudoff A, Lagardère JP (1985) Répartition des populations de l'épibenthos carnivore. In: Laubier L, Monniot C (Eds) Peuplements Profonds du Golfe de Gascogne. Ifremer, Paris, 233–251.
- Diviacco G, Ruffo S (1989) Family Lysianassidae. In: Ruffo S (Ed.) The Amphipoda of the Mediterranean. Part 2. Gammaridea (Haustoriidae to Lysianassidae). Mémoires de l'Institut Océanographique, Monaco, 469–576.
- Duffy GA, Horton T, Billett DSM (2012) Deep-sea scavenging amphipod assemblages from the submarine canyons of the Western Iberian Peninsula. Biogeosciences 9: 4861–4869. doi: 10.5194/bg-9-4861-2012
- Enequist P (1949) Studies on the soft-bottom amphipods of the Skagerak. Zoologiska Bidrag från Uppsala 28: 297–492.
- Escobar-Briones E, Winfield I (2003) Checklist of the Benthic Gammaridea and Caprellidea (Crustacea: Peracarida: Amphipoda) from the Gulf of Mexico Continental Shelf and Slope. Belgian Journal of Zoology 133(1): 37–44.
- Forster JR (1801) In: Bloch ME, Schneider JG (Eds) M.E. Blochii Systema ichthyologiae iconibus ex illustratum. Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit J.G. Schneider, Saxo. Berolini, 1x + 584 pp., 110 pls.
- Goode GB, Bean TH (1885) Descriptions of new fishes obtained by the United States Fish Commission mainly from deep water off the Atlantic and Gulf coasts. Proceedings of the United States National Museum 8: 589–605. doi: 10.5479/si.00963801.8-543.589, <http://www.biodiversityheritagelibrary.org/part/51018#/summary>



- Groenewold S, Fonds M (2000) Effects on benthic scavengers of discards and damaged benthos produced by the beam-trawl fishery in the southern North sea. ICES, Journal of Marine Science 57: 1395–1406. doi: 10.1006/jmsc.2000.0914
- Gurjanova EF (1951) [Amphipods of the seas of the USSR and surrounding waters (Amphipoda-Gammaridea)]. Akademiya Nauk SSSR, Opredeliteli po Faune SSSR 41: 1–1029. [In Russian]
- Gurjanova EF (1962) [Amphipods of the northern part of the Pacific Ocean (Amphipoda-Gammaridea). Part 1]. Akademiya Nauk SSSR, Opredeliteli po Faune SSSR 74: 1–440. [In Russian]
- Haddon AC (1886) First report on the marine fauna of the south-west of Ireland. Proceedings of the Royal Irish Academy 4B: 599–638.
- Hatch SA (1983) Storm-petrels (*Oceanodroma* spp.). In: Baird PA, Gould PJ (Eds) The breeding biology and feeding ecology of marine birds in the Gulf Of Alaska. Final Report, Outer Continental Shelf Environmental Assessment Program Research Unit 341: 171–206. doi: 10.3354/meps10161
- Hatch SA (2013) Kittiwake diets and chick production signal a 2008 regime shift in the Northeast Pacific. Marine Ecology Progress Series 477: 271–284.
- Heller C (1866) Beiträge zur näheren Kenntniss der Amphipoden des Adriatischen Meeres. Denkschriften der Kaiserlichen Akademie der Wissenschaften, Wien. Mathematisch-Naturwissenschaftliche Klasse 26: 1–62.
- Henderson RA, Fell HB (1969) *Taimanawa*, a new genus of brissid echinoids from the Tertiary and recent Indo-West Pacific with a review of the related genera *Brissopatagus* and *Gillechinus*. Breviora 320: 1–29. <http://www.biodiversitylibrary.org/page/4295033#page/451/mode/1up>
- Hendrycks EA, Conlan KE (2003) New and unusual abyssal gammaridean Amphipoda from the north-east Pacific. Journal of Natural History 37: 2303–2368. doi: 10.1080/00222930210138926
- Herbst JFW (1788) Versuch einer Naturgeschichte der Krabben und Krebse. Vol III. Berlin und Stralsund, 216 pp.
- Holmes SJ (1908) The Amphipoda collected by the U.S. Bureau of Fisheries steamer “Albatross” off the west coast of North America, in 1903 and 1904, with descriptions of a new family and several new genera and species. Proceedings of the United States National Museum 35: 489–543.
- Horton T (2006) Deep-sea scavenging amphipods from the Faroe-Shetland Channel. Porcupine Marine Natural History Society Newsletter 19: 17–20.
- Horton T, Thurston MH, Duffy GA (2013) Community composition of scavenging amphipods at bathyal depths on the Mid-Atlantic Ridge. Deep-Sea Research II 98: 352–359.
- Hurley DE (1963) Amphipoda of the family Lysianassidae from the west coast of North and Central America. Allan Hancock Foundation Publications, Occasional Paper 25: 1–160.
- Ide K, Sasaki K, Omori M (2005) Food intake and digestion in the scavenging lysianassid gammaridean *Scopelocheirus onagawae*. Fisheries Science 71(4): 721–730. doi: 10.1111/j.1444-2906.2005.01021.x
- Ide K, Takahashi K, Nakano T, Sato M, Omori M (2006a) Chemoreceptive foraging in a shallow-water scavenging lysianassid amphipod: role of amino acids in the location of carrion in *Scopelocheirus onagawae*. Marine Ecology Progress Series 317: 193–202. doi: 10.3354/meps317193
- Ide K, Takahashi K, Sasaki K, Omori M (2006b) Predation by scavenging amphipods to injured hatchery-raised juvenile Japanese flounder *Paralichthys olivaceus* under laboratory conditions. Fisheries Science 72(6): 1209–1214. doi: 10.1111/j.1444-2906.2006.01278.x
- Ide K, Takahashi K, Omori M (2007) Direct observation of swimming behaviour in a shallow-water scavenging amphipod *Scopelocheirus onagawae* in relation to chemoreceptive foraging. Journal of Experimental Marine Biology and Ecology 340(1/2): 70–79. doi: 10.1016/j.jembe.2006.08.005
- Ikeda T (2013) Metabolism and chemical composition of marine pelagic amphipods: synthesis toward a global bathymetric model. Journal of Oceanography 69(3): 339–355. doi: 10.1007/s10872-013-0177-5.
- Ishimaru S (1994) A catalogue of gammaridean and ingolfiellidean Amphipoda recorded from the vicinity of Japan. Reports of the Sado Marine Biological Station, Niigata University 24: 29–86.
- Jamieson AJ, Fujii T, Solan M, Matsumoto AK, Bagley PM, Priede IG (2009) Liparid and macrourid fishes of the hadal zone: *in situ* observations of activity and feeding behavior. Proceedings of the Royal Society B 279(1659): 1037–1045. doi: 10.1098/rspb.2008.1670
- Jamieson AJ, Kilgallen NM, Rowden AA, Fujii T, Horton T, Lörz AN, Kitazawa K, Priede IG (2011) Bait-attending fauna of the Kermadec Trench, SW Pacific Ocean: Evidence for an ecotone across the abyssal–hadal transition zone. Deep Sea Research Part I: Oceanographic Research Papers 58(1): 49–62. doi: 10.1016/j.dsr.2010.11.003
- Jones NS (1948) the ecology of the Amphipoda of the south of the Isle of Man. Journal of the Marine Biological Association of the United Kingdom 27(2): 400–439. doi: 10.1017/S0025315400025455
- Jones NS (1951) The bottom fauna of the south of the Isle of Man. The Journal of Animal Ecology 20(1): 132–144. doi: 10.2307/1651
- Jones EG, Tselepidis A, Bagley PM, Collins MA, Priede IG (2003) Bathymetric distribution of some benthic and benthopelagic species attracted to baited cameras and traps in the deep eastern Mediterranean. Marine Ecology Progress Series 251: 75–86. doi: 10.3354/meps251075
- Kaartvedt S (1989) Nocturnal swimming of gammaridean amphipod and cumacean Crustacea in Masfjorden, Norway. Sarsia 74: 187–193.
- Kaim-Malka RA (2003) Biology and life cycle of *Scopelocheirus hopei* (A. Costa, 1851), a scavenging amphipod from the continental slope of the Mediterranean. Journal of Natural History 37: 2547–2578. doi: 10.1080/00222930210155693
- Kamenskaya OE (1981) [Ultraabyssal (hadal) amphipods from the trenches of the Pacific Ocean]. Proceedings of the XIV Pacific Science Congress 1: 40–43. [In Russian] [Not seen]
- Krapp-Schickel G (1974) Camill Hellers Sammlung adriatischer Amphipoden — 1866 und heute. Annalen des Naturhistorischen Museums in Wien 78: 319–379.
- Krapp-Schickel T, Zavodnik D (1996) Amphipodology in the surroundings of Rovinj (Marine Institute of Istria, Croatia, N-Adriatic Sea) and adjacent regions. Bollettino del Museo Civico di Storia Naturale di Verona 20: 453–465.
- Lampitt RS, Merrett NR, Thurston MH (1983) Inter-relations of necrophagous amphipods, a fish predator, and tidal currents in the deep sea. Marine Biology 74: 73–78. doi: 10.1007/BF00394277
- Laverack MS, Blackler M (1974) Fauna and Flora of St. Andrews Bay. Scottish Academic Press Ltd, Edinburgh, 310 pp.
- Ledoyer M (1977) Contribution à l'étude de l'écologie de la faune vagile profonde de la Méditerranée nord occidentale I. Les gammariens (Crustacea, Amphipoda). Bollettino del Museo Civico di Storia Naturale di Verona 4: 321–421.



- Ledoyer M (1986) Crustacés Amphipodes Gammariens. Familles des Haustoriidae à Vitjazianidae. Faune de Madagascar 59: 599–1112.
- Lilljeborg W (1865a) On the *Lysianassa magellanica* H. Milne Edwards, and on the Crustacea of the suborder Amphipoda and subfamily Lysianassina found on the coast of Sweden and Norway. Royal Academic Press, Uppsala, 38 pp.
- Lilljeborg W (1865b) Bidrag till kannedomen om underfamilien Lysianassina inom underordningen Amphipoda bland kraftdjuren. Uppsala Universitets Årsskrift 1865: 1–25.
- Lincoln RJ (1979) British Marine Amphipoda: Gammaridea. In: British Museum (Natural History), London, i–v, 1–658.
- Lopes MFR, Marques JC, Bellan-Santini D (1993) The benthic amphipod fauna of the Azores (Portugal): an up-to-date annotated list of species, and some biogeographic considerations. Crustaceana 65(2): 204–217. doi: 10.1163/156854093X00568
- Lörz A-N, Held C (2004) A preliminary molecular and morphological phylogeny of the Antarctic Epimeriidae and Iphimediidae (Crustacea, Amphipoda). Molecular Phylogenetics and Evolution 31: 4–15. doi: 10.1016/j.ympev.2003.07.019
- Lowry JK (2000) Taxonomic status of amphipod crustaceans in the South China Sea with a checklist of known species. The Raffles Bulletin of Zoology supplement 8: 309–342.
- Lowry JK, Bullock S (1976) Catalogue of the marine gammaridean Amphipoda of the Southern Ocean. Royal Society of New Zealand Bulletin 16: 1–187.
- Lowry JK, Stoddart HE (1989) The scopelocheirid genus *Aroui* (Crustacea: Amphipoda: Lysianassoidea) with notes on the association between scopelocheirid amphipods, cassid gastropods and spatangoid echinoids. Records of the Australian Museum 41: 111–120. doi: 10.3853/j.0067-1975.41.1989.139
- Lowry JK, Stoddart HE (1992) A revision of the genus *Ichnopus* (Crustacea: Amphipoda: Lysianassoidea: Uristidae). Records of the Australian Museum 44: 185–245. doi: 10.3853/j.0067-1975.44.1992.32
- Lowry JK, Stoddart HE (1993) Crustacea Amphipoda : Lysianassoids from Philippine and Indonesian waters. Mémoires du Muséum National d'Histoire Naturelle, Series A, Zoology 156: 55–109.
- Lowry JK, Stoddart HE (1995) New lysianassoid genera and species from south-eastern Australia (Crustacea: Amphipoda). Records of the Australian Museum 47: 7–25. doi: 10.3853/j.0067-1975.47.1995.5
- Lowry JK, Stoddart HE (1997) Amphipoda Crustacea IV. Families Aristiidae, Cyphocarididae, Endeavouridae, Lysianassidae, Scopelocheiridae, Uristidae. Memoirs of the Hourglass Cruises 10: 1–148.
- Lowry JK, Stoddart HE (2003) Zoological Catalogue of Australia. Vol. 19.2B. Crustacea: Malacostraca: Peracarida: Amphipoda, Cumacea, Mysidacea. CSIRO Publishing, Melbourne, Australia, 484 pp.
- Macquart-Moulin C (1984) La phase pélagique nocturne et les comportements migratoires des amphipodes benthiques (Méditerranée nord-occidentale). Téthys 11: 171–196.
- Madurell T, Fanelli E, Cartes JE (2008) Isotopic composition of carbon and nitrogen of suprabenthos fauna in the NW Balearic Islands (Western Mediterranean). Journal of Marine Systems 71: 336–345. doi: 10.1016/j.jmarsys.2007.03.006
- Marine Biological Association of the United Kingdom (1931) Plymouth Marine Fauna. Being Notes of the Local Distribution of Species Occurring in the Neighbourhood. In: Marine Biological Association of the United Kingdom, Plymouth, 371 pp.
- Martín A, Díaz Y, Miloslavich P, Escobar-Briones E, Guerra-García JM, Ortiz M, Valencia B, Giraldo A, Klein E (2013) Diversidad regional de Amphipoda en el Mar Caribe. Revista de Biología Tropical 61(4): 1682–1720. doi: 10.15517/rbt.v61i4.12816
- Massy AL (1912) Report of a survey of trawling grounds on the coasts of counties Down, Louth, Meath and Dublin. Part 3. Invertebrate fauna. Department of Agriculture and Technical Instruction for Ireland, Fisheries Branch, Scientific Investigations 1911: 1–225.
- Mateus A, Mateus E (1986) Campagne de la “Calypso” dans le Golfe de Guinée et aux Iles Principe, São Tomé et Annobon (1956). Amphipodes récoltés à bord de la “Calypso”. Anais da Faculdade de Ciências do Porto 66: 125–133.
- Mattson S (1981) The food of *Galeus melastomus*, *Gadiculus argenteus thori*, *Trisopterus esmarkii*, *Rhinonemus cimbricus*, and *Glyptocephalus cynoglossus* (Pisces) caught during the day with shrimp trawl in a West-Norwegian Fjord. Sarsia 66(2): 109–127.
- McGrath D (1981) Benthic macrofaunal studies in the Galway Bay area. Vol. II. The benthic macrofauna of the Galway Bay Area. Part 1. General Introduction., Arthropoda. PhD Thesis, National University of Ireland, 225 pp.
- Meinert F (1890) Crustacea Malacostraca. Det Videnskabelige Udbytte af Kanonbaaden “Hauch” Togter i de Danske Have indenfor Skagen i Aarene 1883–86 3: 149–232.
- Metzger A (1875) Crustaceen aus den Ordnungen Edriophthalmata und Podophthalmata. V. In: Zoologische Ergebnisse der Nordseefahrt vom 21. Juli bis 9. September 1872. Jahresbericht der Commission zur Wissenschaftlichen Untersuchung der Deutschen Meere in Kiel für die Jahre 1872. 1873 [sic] II. und III. Jahrgang, 277–309.
- M’Intosh WC (1874) On the invertebrate marine fauna and fishes of St. Andrews. Annals and Magazine of Natural History Series 4(14): 258–274.
- Miskov-Nodland K, Buhl-Mortensen L, Hoisaeter T (1999) Has the fauna in the deeper parts of the Skagerrak changed?: A comparison of the present amphipod fauna with observations from 1933/37. Sarsia 84: 137–155.
- Monod T (1923) Notes carcinologiques. (Parasites et commensaux). Bulletin de l’Institut Océanographique, Monaco 427: 1–23.
- Moore HB (1937) Marine Fauna of the Isle of Man. Transactions of the Liverpool Biological Society 50: 1–293.
- Moore PG (1984) The fauna of the Clyde Sea area. Crustacea: Amphipoda. University Marine Biological Station Millport, Occasional Publication 2: 1–84.
- Nagata K (1963) Two new gammaridean amphipods (Crustacea) collected by the second cruise of the Japanese expedition of deep sea (jeds-2). Publications of the Seto Marine Biological Laboratory 11(1): 1–5.
- Nagata K (1965) Studies on marine gammaridean Amphipoda of the Seto Inland Sea. I. Publications of the Seto Marine Biological Laboratory 13: 131–170.
- Nickell TD, Moore PG (1991) The behavioural ecology of epibenthic scavenging invertebrates in the Clyde Sea area: field sampling using baited traps. Cahiers De Biologie Marine 32: 353–370.
- Nordgaard O (1905) Hydrographical and biological Investigations in Norwegian fjords. Bergen, 183–186. [not seen]
- Nordgaard O (1911) Faunistiske og biologiske laktagelser ved den biologiske Station i Bergen. Det Kungliga Norske Videnskabers Selskabs Skrifter 6: 1–58.



- Norman AM (1869) Shetland final dredging report. Part II. On the Crustacea, Tunicata, Polyzoa, Echinodermata, Actinozoa, Hydrozoa, and Porifera. Report of the British Association for the Advancement of Science 38: 247–336.
- Norman AM (1895) A month on the Trondhjem Fiord, ctd. Annals and Magazine of Natural History Series 6(15): 476–494.
- Norman AM (1900) British Amphipoda: Fam. Lysianassidae (concluded). Annals and Magazine of Natural History Series 7(5): 196–214.
- Nysegander DR (1983) Black-legged Kittiwake (*Rissa tridactyla*). In: Baird PA, Gould PJ (Eds) The breeding biology and feeding ecology of marine birds in the Gulf Of Alaska. Final Report, Outer Continental Shelf Environmental Assessment Program Research Unit 341: 295–348.
- Oldevig H (1959) Arctic, subarctic and Scandinavian amphipods in the collections of the Swedish Natural History Museum in Stockholm. Göteborgs Kungliga Vetenskaps-och Vitterhets-Samhälles Handlingar Series B 8: 1–132.
- O'Reilly M, Hamilton E, Heaney L (2001) New records of amphipods and leptostracans from the Forth Sea area, with notes on their copepod parasites (Siphonostomatidae: Nicotoidae). Glasgow Naturalist 23: 35–42.
- Ortiz M (1979) Lista de especies y bibliografía de los anfipodos (Crustacea: Amphipoda) del Mediterráneo Americano. Ciencias (La Habana), Series 8, Investigaciones Marinas 43: 1–40.
- Ortiz M, Martín A, Díaz YJ (2007) Lista y referencias de los crustáceos anfipodos (Amphipoda: Gammaridea) del Atlántico occidental tropical. Revista de Biología Tropical 55(2): 479–498. doi: 10.15517/rbt.v55i2.6026
- Palerud R, Vader W (1991) Marine Amphipoda Gammaridea in north-east Atlantic and Norwegian Arctic. Tromsø, Naturvitenskap 68: 1–97.
- Pennant T (1777) British Zoology, vol. IV. Crustacea. Mollusca. Testacea. B. White, London, i–viii, 1–154, pl. 1–93.
- Pocock RI (1889) Report of the deep-sea trawling cruise off the S.W. coast of Ireland, under the direction of Rev. W. Spotswood-Green, M.A., F.R.G.S.: Crustacea. Annals and Magazine of Natural History Series 6(4): 425–431.
- Quetin LB, Ross RM, Uchio K (1980) Metabolic characteristics of mid-water zooplankton: Ammonia excretion, O:N ratios, and the effect of starvation. Marine Biology 59: 201–209. doi: 10.1007/BF00404742
- Raith DS (1937) The benthic Amphipoda of the north-western North Sea and adjacent waters. Proceedings of the Royal Society of Edinburgh 57: 241–254.
- Ramsay K, Kaiser MJ, Moore PG, Hughes RN (1997) Consumption of fisheries discards by benthic scavengers: utilization of energy subsidies in different marine habitats. Journal of Animal Ecology 66: 884–896. doi: 10.2307/6004
- Reibisch J (1905) Faunistisch-biologische Untersuchungen über Amphipoden der Nordsee, Teil 1. Wissenschaftliche Meeresuntersuchungen der Kommission zur wissenschaftlichen Untersuchung der Deutschen Meere, Kiel 8: 145–188.
- Robertson D (1888) A contribution towards a catalogue of the Amphipoda and Isopoda of the Firth of Clyde. Transactions of the Natural History Society of Glasgow 2: 9–99.
- Robertson D (1892) A second contribution towards a catalogue of the Amphipoda and Isopoda of the Firth of Clyde and west of Scotland. Transactions of the Natural History Society of Glasgow 3: 199–223.
- Sanderson JM (1973) A catalogue of the Amphipoda (Crustacea) in the collection of the late D.H. Reid, now in the Royal Scottish Museum, Edinburgh. Royal Scottish Museum Information Series, Natural History 1: 1–79.
- Sars GO (1890) An Account of the Crustacea of Norway, with Short Descriptions and Figures of all the Species. Vol. I. Amphipoda. Parts 1–3. Alb. Cammermeyer, Christiania, 68 pp.
- Schellenberg A (1926a) Die Gammariden der Deutschen Südpolar-Expedition 1901–1903. Deutsche Südpolar-Expedition 18: 235–414.
- Schellenberg A (1926b) Amphipoda 3: Die Gammariden der Deutschen Tiefsee-Expedition. Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer “Valdivia” 1898–1899 23: 193–243.
- Schellenberg A (1942) Krebstiere oder Crustacea IV: Flohkrebse oder Amphipoda. Die Tierwelt Deutschlands, Jena 40: 1–252.
- Schellenberg A (1955) Amphipoda. Reports of the Swedish Deep-Sea Expedition, Zoology 2(14): 182–195.
- Scott T (1898) On the distribution of pelagic invertebrate fauna of the Firth of Forth and its vicinity during the seven years from 1889 to 1895, both inclusive. Annual Report of the Fishery Board for Scotland, Part III. Scientific Investigations 16: 153–210, pls 154–157.
- Scott T (1900) Notes on some crustacean parasites of fishes. Report of the Fishery Board for Scotland 18: 144–188.
- Sekiguchi H, Yamaguchi Y (1983) Scavenging gammaridean amphipods from the deep-sea floor. Bulletin of the Faculty of Fisheries, Mie University 10: 1–14.
- Shoemaker C (1945) The Amphipoda of the Bermuda Oceanographic Expeditions, 1929–1931. Zoologica, Scientific Contributions of the New York Zoological Society 30: 185–266.
- Smith KL, Baldwin RJ (1982) Scavenging deep-sea amphipods: effects of food odor on oxygen consumption and a proposed metabolic strategy. Marine Biology 68: 287–298. doi: 10.1007/BF00409595
- Soreide F, Jamieson AJ (2013) Ultradeep-Sea Exploration in the Puerto Rico Trench. In: OCEANS-Bergen, 2013 MTS/IEEE, 1–4. doi: 10.1109/OCEANS-Bergen.2013.6607944
- Springthorpe RT, Lowry JK (1994) Catalogue of crustacean type specimens in the Australian Museum: Malacostraca. Technical Reports of the Australian Museum 11: 1–134. doi: 10.3853/j.1031-8062.11.1994.68
- Stebbing TRR (1906) Amphipoda. I. Gammaridea. Das Tierreich 21: 1–806.
- Stefanidou D, Voultsiadou-Koukoura E (1995) An account of our knowledge of the amphipod fauna of the Aegean Sea. Crustaceana 68(5): 597–615. doi: 10.1163/156854095x00845
- Stephensen K (1923a) Crustacea Malacostraca, V: (Amphipoda, I). Danish Ingolf-Expedition 3: 1–100.
- Stephensen K (1923b) Revideret fortegnelse over Danmarks arter af Amphipoda (1. Del) (Hyperideae; Gammaridea: Lysianassidae). Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København 76: 5–20.
- Stephensen K (1929) Amphipoda. Die Tierwelt der Nord- und Ostsee 14: 1–188.
- Stephensen K (1932) The Tanaidacea and Amphipoda of the Arctic. Fauna Arctica 6: 343–378.
- Stephensen K (1935) The Amphipoda of N. Norway and Spitsbergen with adjacent waters. Tromsø Museums Skrifter 3: 1–140.
- Stephensen K (1940) Marine Amphipoda. The Zoology of Iceland 3: 1–111.
- Stephensen K (1942) The Amphipoda of N. Norway and Spitsbergen with adjacent waters. Tromsø Museums Skrifter 3: 363–526.



- Stossich M (1880) Prospetto della Fauna del mare Adriatico. Part III. Bollettino Società adriatica di Scienze naturali in Trieste 6: 1–95.
- Stroobants G (1976) Description nouvelle d'*Aroui setosus* Chevreux 1910 (Crustacea Amphipoda) et comparaison de l'évolution morphologique des *Aroui setosus* et *Scopelocheirus hopei*. Bollettino del Museo Civico di Storia Naturale di Verona 3: 239–268.
- Takekawa AT, Ishimaru S (2000) A new species of the genus *Scopelocheirus* (Crustacea: Amphipoda: Gammaridea) from Onagawa Bay, northeastern Japan. Zoological Science 17: 681–687. doi: 10.2108/zsj.17.681
- Takekawa A, Sasaki K, Omori M (2004) Diel activity and vertical distribution of Lysianassoid amphipods dominant in Onagawa Bay, north-eastern Japan. Fisheries Science 70(6): 971–977. doi: 10.1111/j.1444-2906.2004.00896.x
- Thurston MH (1990) Abyssal necrophagous amphipods (Crustacea: Amphipoda) in the northeast and tropical Atlantic Ocean. Progress in Oceanography 24: 257–274. doi: 10.1016/0079-6611(90)90036-2
- Thurston MH (2001) Pelagic amphipods. In: Jazdzewski K, Baldinger A, Coleman CO, De Broyer C, Gable MF, Plaiti W (Eds) Proceedings of the Xth International Colloquium on Amphipoda, Heraklion, Crete, Greece, 16–21 April 2000. Polskie Archiwum Hydrobiologii, 682–694.
- Thurston MH, Allen E (1969) Type material of the families Lysianassidae, Stegocephalidae, Ampeliscidae and Haustoriidae (Crustacea: Amphipoda) in the collections of the British Museum (Natural History). Bulletin of the British Museum (Natural History), Series Zoology 17: 347–388.
- Treude T, Janßen F, Queisser W, Witte U (2002) Metabolism and decompression tolerance of scavenging lysianassoid deep-sea amphipods. Deep Sea Research Part I: Oceanographic Research Papers 49(7): 1281–1289. doi: 10.1016/S0967-0637(02)00023-7
- Vader W (1978) Associations between amphipods and echinoderms. Astarte 11: 123–134.
- Vader W (1983) Prehensile pereopods in gammaridean Amphipoda. Sarsia 68: 139–148.
- Vallet C, Dauvin J-C (1996) Qualitative and quantitative composition of the suprabenthic amphipods from the English Channel. Polskie Archiwum Hydrobiologii 42: 461–481.
- Vermeer K, Devito K (1988) The importance of *Paracallisoma coecus* and myctophid fishes to nesting fork-tailed and Leach's, storm-petrels in the Queen Charlotte Islands, British Columbia. Journal of Plankton Research 10(1): 63–75. doi: 10.1093/plankt/10.1.63
- Vinogradov GM (2004) Near-bottom and pelagic gammaridean amphipods in the western Indian Ocean. Annals of the South African Museum 112: 39–88.
- Vinogradov ME, Vinogradov GM (1993) [Notes about pelagic and benthopelagic gammarids in the Orkney Trench]. Akademiya Nauk SSSR, Trudy Instituta Okeanologii 127: 129–133. [In Russian]
- Vinogradov ME, Vereschchaka AL, Vinogradov GM (1996) Visual observations from DSRV "Mir" in location of the Russian submarine "Komsomolet" wreck. Deep-Sea Newsletter 24: 7–8.
- Walker AO (1892) The lysianassids of the 'British Sessile-eyed Crustacea', Bate & Westwood. Annals and Magazine of Natural History Series 6(9): 134–138.
- Walker AO (1895) Revision of the Amphipoda of the L.M.B.C. district. Liverpool Marine Biological Committee Reports 4: 415–448.
- Walker AO (1896) Higher Crustacea. In: Herdman (Ed.) Ninth annual report of the Liverpool Marine Biology Committee and their Biological Station at Port Erin. Proceedings and Transactions of the Liverpool Biological Society 10: 34–91.
- Walker AO (1898) Malacostraca from the west coast of Ireland. Transactions of the Liverpool Biological Society 12: 159–172.
- Williams G (1938) On the occurrence of *Scopelocheirus hopei* and *Cirrolana borealis* in licing *Acanthias vulgaris* (spiny dogfish). The Irish Naturalists' Journal 7: 89–91.
- Williams G (1954) Fauna of Strangford Lough and neighbouring coasts. Proceedings of the Royal Irish Academy 56B: 29–133.
- Wolff T (1959) La faune hadale ou faune des profondeurs supérieures à 6000–7000 metres. La Terre et la Vie 106(2–3): 244–266, pl. 244.
- Wrzesniewski A (1874) On *Callisoma Branickii*, a new species from Nice. Annals and Magazine of Natural History Series 4(14): 15–16.
- Wrzesniewski A (1879) Vorläufige Mitteilungen über einige Amphipoden. Zoologischer Anzeiger 2: 348–351.
- Zakhama-Sraieb R, Sghaier Y-R, Charfi-Cheikhrouha F (2009) Amphipod biodiversity of the Tunisian coasts: update and distributional ecology. Marine Biodiversity Records 2: e155. doi: 10.1017/S1755267209990820

## Supplementary material 1

### Collection data for new species of Scopelocheiridae described

Authors: Niamh M. Kilgallen, James K. Lowry

Data type: species data

Explanation note: Collection data and registration information for new taxa described in this paper.

Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0/>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.

## Supplementary material 2

### Distribution data for Scopelocheiridae species

Authors: Niamh M. Kilgallen, James K. Lowry

Data type: distribution data

Explanation note: Collection data of scopelocheirid specimens as recorded in the literature. This information is taken from the literature referenced within and includes as much information as available, including locality, depth, habitat, sampling method, museum registration details and the name as originally recorded.

Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0/>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.





Kilgallen, Niamh and Lowry, Jim. 2015. "A review of the scopelocheirid amphipods (Crustacea, Amphipoda, Lysianassoidea), with the description of new taxa from Australian waters." *Zoosystematics and evolution* 91(1), 1–43.  
<https://doi.org/10.3897/zse.91.8440>.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/276360>

**DOI:** <https://doi.org/10.3897/zse.91.8440>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/291733>

#### **Holding Institution**

Museum für Naturkunde, Berlin

#### **Sponsored by**

Museum für Naturkunde, Berlin

#### **Copyright & Reuse**

Copyright Status: In copyright. Digitized with the permission of the rights holder.

Rights Holder: Copyright held by individual article author(s).

License: <https://creativecommons.org/licenses/by/4.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.