The background of the slide is a photograph of numerous amphipod crustaceans. These small, worm-like creatures are translucent and yellowish in color, with visible appendages and internal structures. They are scattered across the frame, some appearing in profile and others from a dorsal or ventral view. The lighting is soft, highlighting their delicate forms against a dark, slightly grainy background.

**Taxonomy & biogeography of
macrofaunal amphipod crustaceans
with a focus on the abyssal Pacific
fauna relevant to the CCFZ**


Tammy Horton

National Oceanography Centre,

Southampton, UK

Diversity of the Amphipoda in the Deep-sea

- Major Sources of reference:
 - WoRMS and WAD and WoRDSS
 - Barnard & Karaman, 1990
 - Thurston, 2000



WoRDSS: The World Register of Deep-Sea Species

Home | Search taxa | Browse taxa | Keys & guides | Images | Statistics | Contribute | Log in

News Update: The World Register of Deep Sea Species is pleased to announce the availability of our first iOS app: [Deep Sea ID v1.0](#)

The app is free to download and works on both iPhone and iPad. It allows offline access to the [World Register of Deep-Sea Species](#) and currently stores on your device the taxonomic information for over 20,000 deep-sea species, over 350 high-resolution photographs of deep-sea specimens as well as links

Quick search - Scientific name

e.g. *Gorgonocephalus arcticus*

23,312 species listed



World Amphipoda Database

About | Search taxa | Taxon tree | Distribution | Specimens | Literature | Images | Stats | Log in



World Amphipoda Database

Introduction

The amphipods belong to the very diverse crustacean class Malacostraca, which includes crabs, lobsters and shrimp. The order Amphipoda is part of the superorder Peracarida, a group of crustaceans that includes shrimp-like taxa that brood their young in a pouch, with no independent larval dispersal.



WoRMS
World Register of Marine Species

Home | About | Search taxa | Taxon tree | Literature | Distribution | Specimens | Match taxa

Towards a World Register of Marine Species

The aim of a World Register of Marine Species (WoRMS) is to provide an authoritative and comprehensive list of names of marine organisms, including information on synonymy. While highest priority goes to valid names, other names in use are included so that this register can serve as a guide to interpret taxonomic literature.

The content of WoRMS is controlled by taxonomic experts, not by database managers. WoRMS has an editorial management system where each taxonomic group is represented by an expert who has the authority over the content, and is responsible for controlling the quality of the information. Each of these main taxonomic editors can invite several specialists of smaller groups within their area of responsibility to join them.

WoRMS integrates:
Global Species Databases (GSD)

With an interface:
World List of Amphipoda
World List of Ascidiacea
World List of Asteroidea
World List of Brachinoida

Amphipod Classification

[World Amphipoda Database](#)

Phylum: Arthropoda

Subphylum: Crustacea

Class: Malacostraca

Superorder: Peracarida

Order: Amphipoda

Suborders: Hyperiidea

Ingolfiellidea

Senticaudata

Gammaridea

Myers A.A. & Lowry J.K. (2003). A phylogeny and a new classification of the Corophiidea Leach, 1814 (Amphipoda). *Journal of Crustacean Biology*, 23: 443-485.

Lowry, J.K. & Myers, A.A. (2013) A Phylogeny and Classification of the Senticaudata subord. nov. (Crustacea: Amphipoda). *Zootaxa* 3610 (1): 1-80.

Hyperiidea

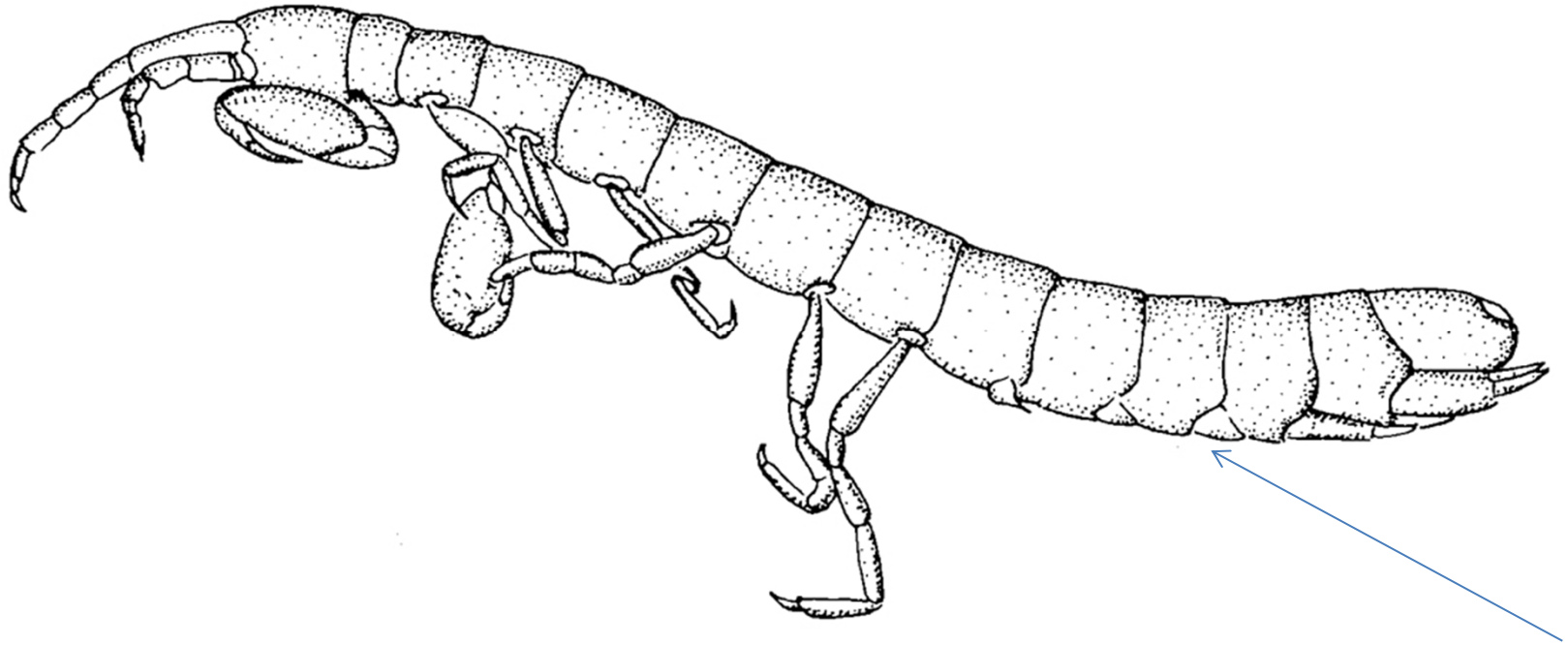


Phronima sedentaria (Forsk., 1775)

Marine Pelagic
amphipods

Lack a
maxillipedal
palp.

Ingolfiellidea



Ingolfiella ischitana Schiecke, 1973
Typical Ingolfiellidean body plan

Some species found in Bathyal & abyssal sediments.

Senticaudata

A monophyletic clade defined by the presence of robust setae on the apices of uropods 1–2. (Lowry & Myers, 2013)

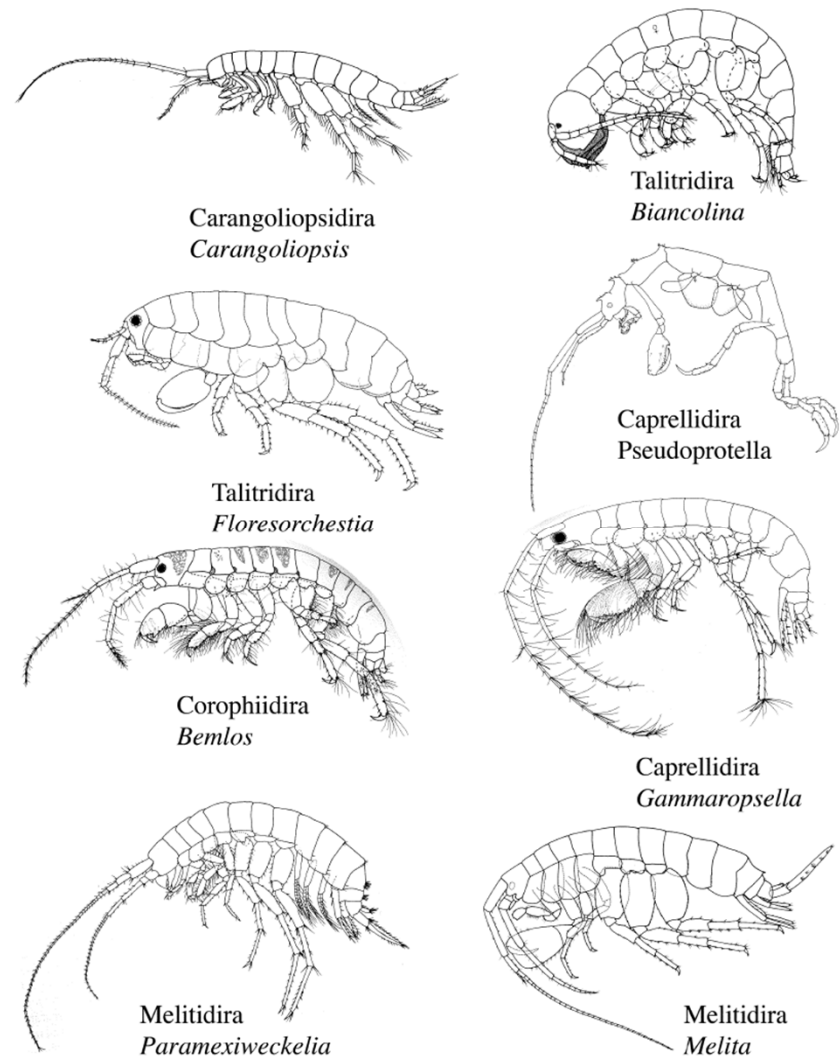
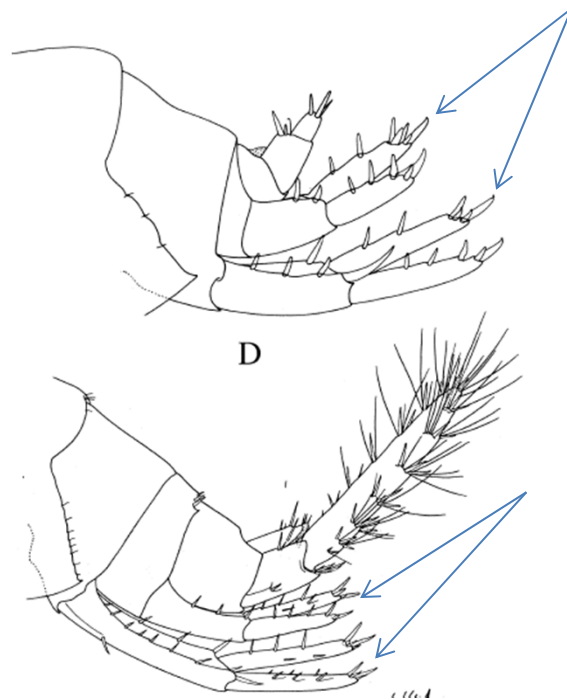
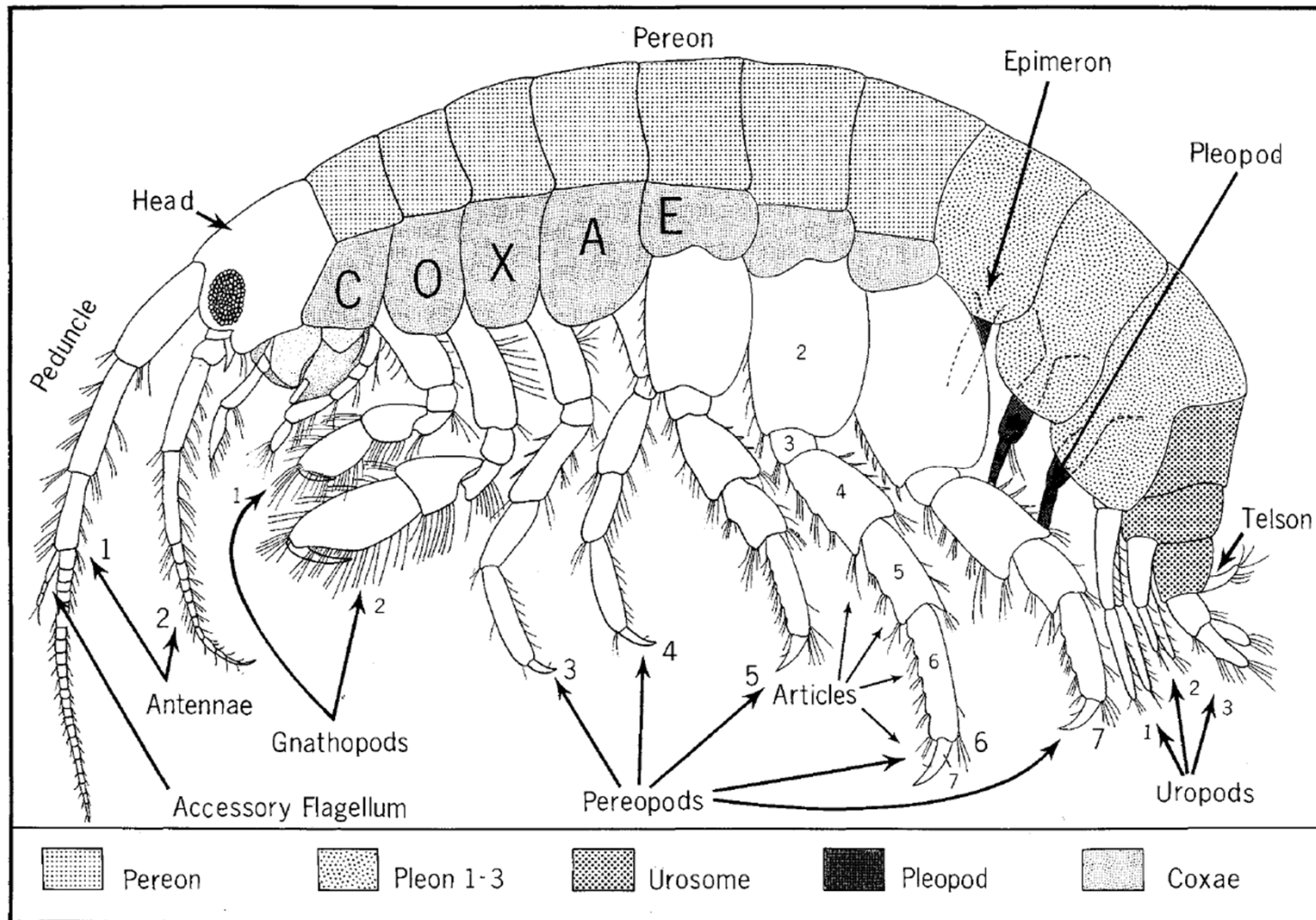


FIGURE 7. Body form in parvorders Carangoliopsidira, Talitridira, Caprellidira, Corophiidira and Melitidira (*Carangoliopsis*, *Melita* after Karaman, 1982; *Floresorchestia* after Lowry & Springthorpe, 2009; *Pseudoprotella* after Krapp-Schickel, 1993; *Bemlos*, *Biancolina*, *Gammaropsella* after Myers, 1995; *Paramexiweckelia* after Holsinger, 1996).

Gammaridea

[World Amphipod Database- Gammaridea](#)



From Coleman, 2007

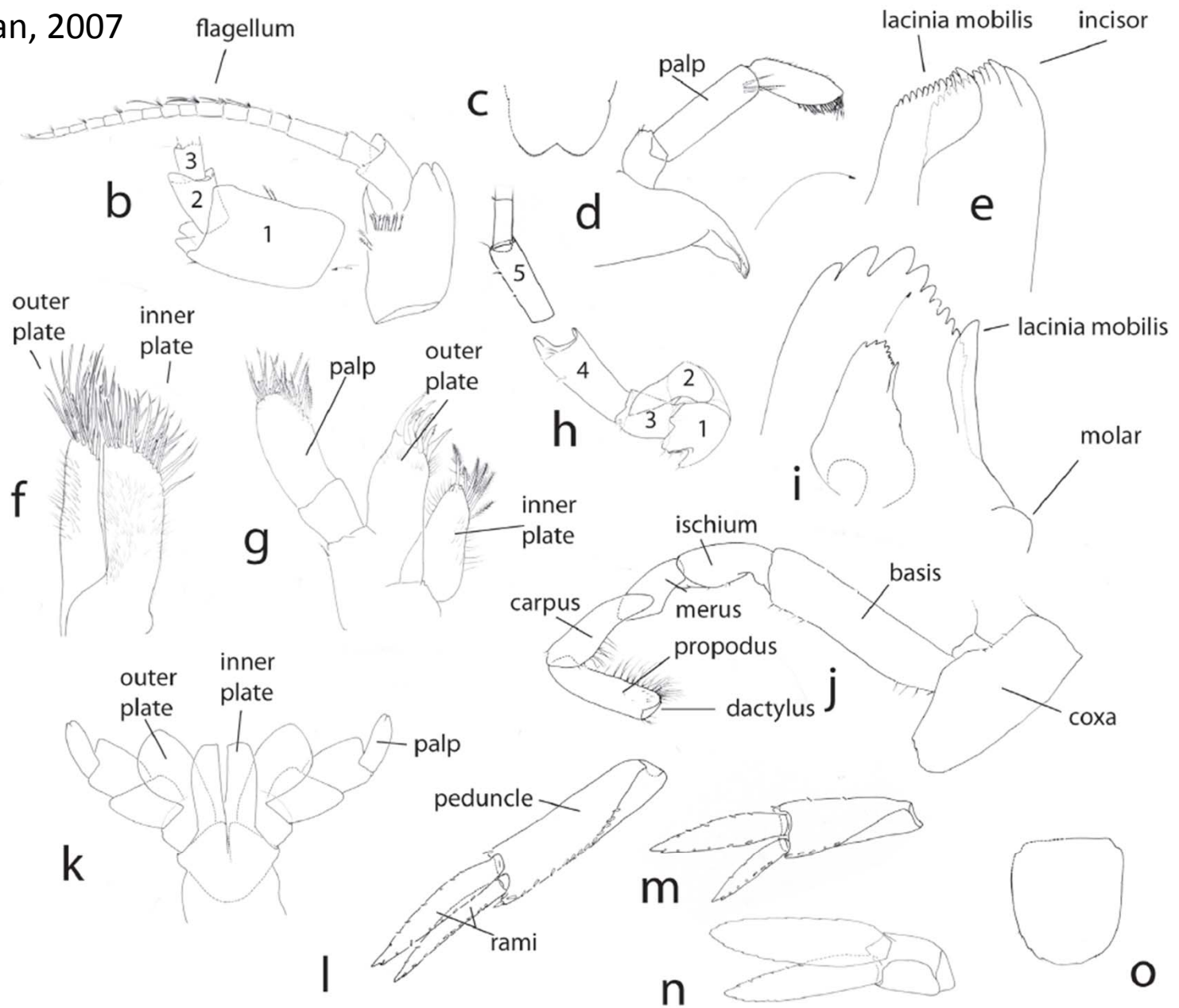
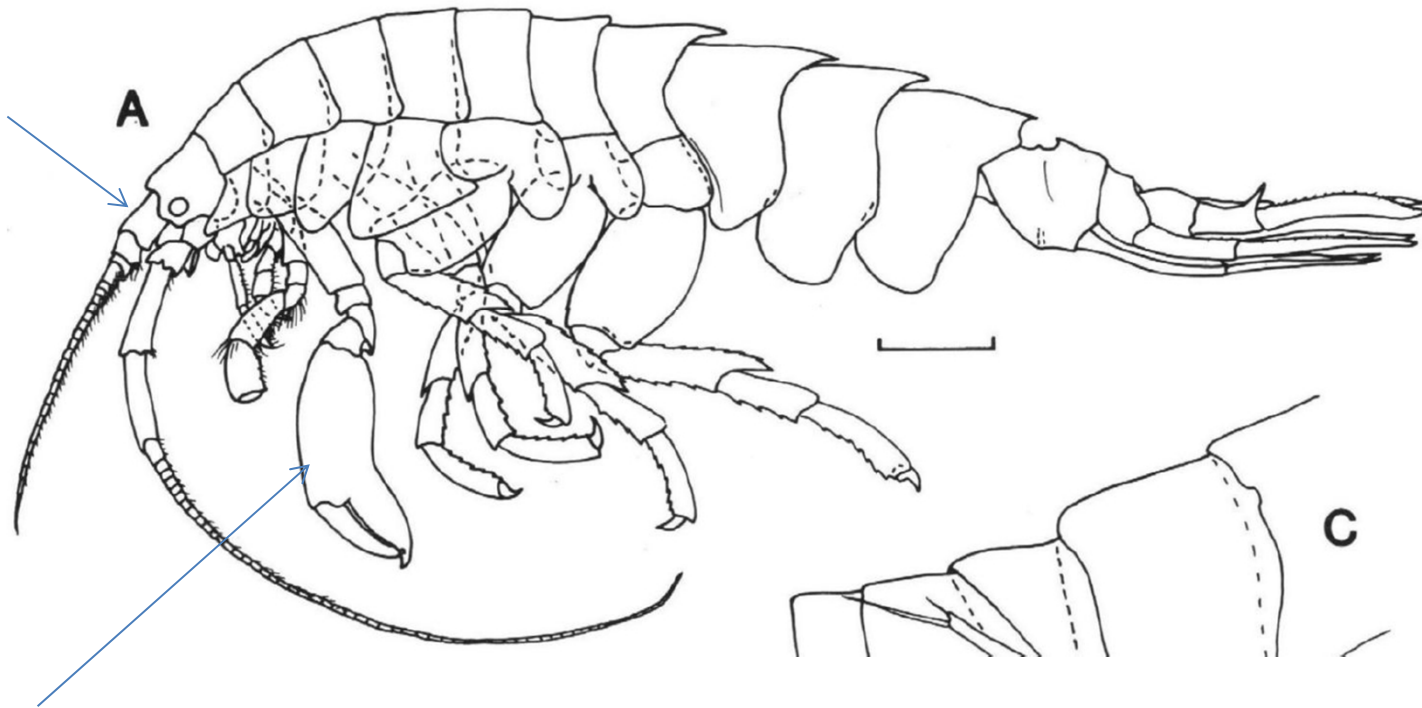


Fig. 1 a-n. Morphological structures of an amphipod crustacean. a) left aspect of body; b) antenna 1 with peduncular articles 1-3; c) upper lip (upper lip); d) mandibular body with palp; e) medial view of distal part of left mandible; f) maxilla 2; g) maxilla 1; h) antenna 2 peduncular articles 1-5; i) right mandible with lacinia mobilis and rudimentary molar; j) maxilliped, setation omitted; k) uropod 1; l) uropod 2; m) uropod 3; n) telson.

Families exclusively deep-sea

- Thurstonellidae
- Cyphocarididae
- Vitjazianidae
- Cebocaridae
- Cyclocaridae
- Thoriellidae
- Alicellidae
- Valettiopsidae

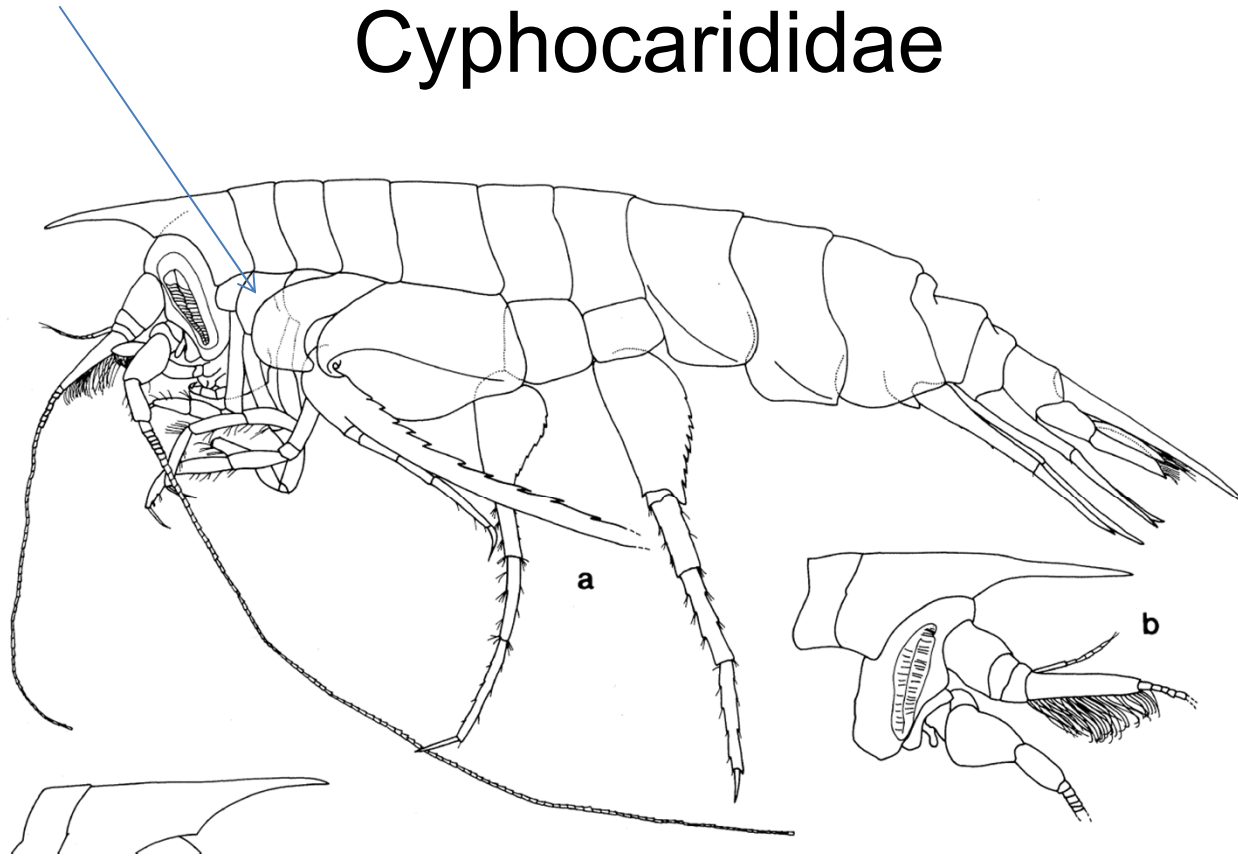
Thurstonellidae



- Until recently (Lowry & Zeidler, 2008) was called Clarenciidae.
- Only a single species, Antarctic, 145-552m depth, sponge associate.

Zeidler, W. (1994) New information and locality records for the Antarctic amphipod *Clarencia chelata* K.H. Barnard, 1931, and a reappraisal of the family Clarenciidae J.L. Barnard & Karaman, 1987 (Amphipoda, Gammaridea). *Crustaceana*, 66, 219–226

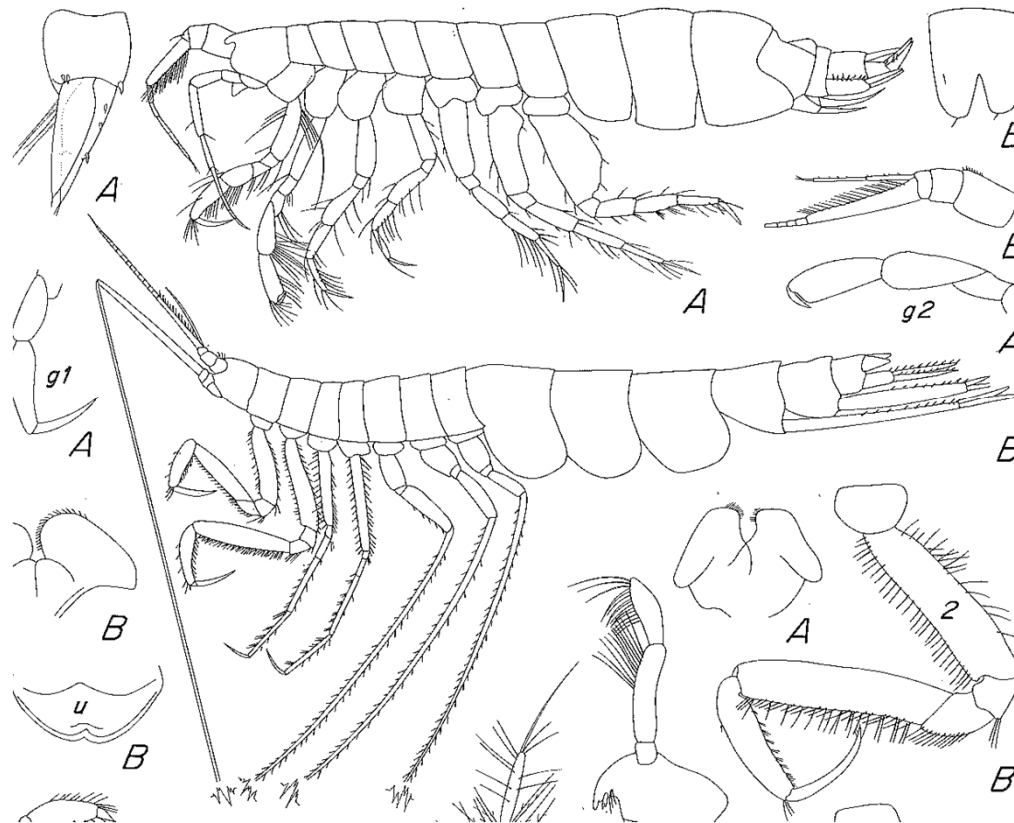
Cyphocarididae



Cyphocaris tumicola Lowry & Stoddart, 1997

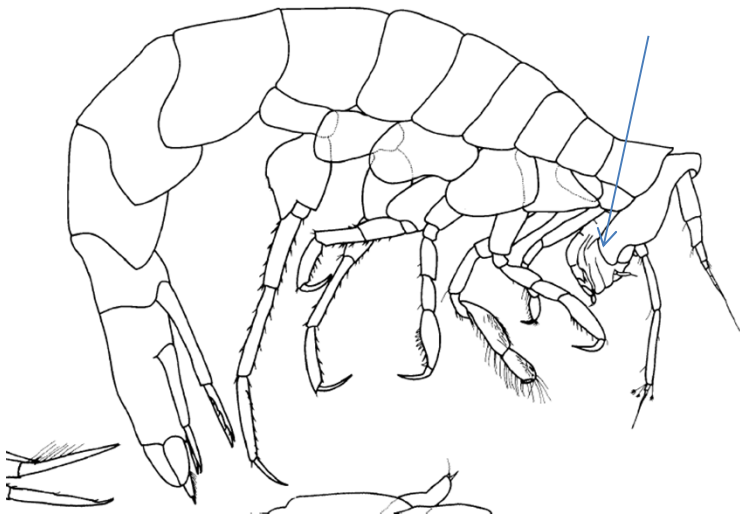
- 13 spp in 2 genera, *Cyphocaris* and *Procyphocaris* (1 sp)
- Characterised by the mouthparts and **coxae 1-3 reduced**.
- Most are pelagic species and not likely to be encountered but ***C. bouvieri* is benthic.**

Vitjazianidae



- 5 species, in 2 genera *Vemana* and *Vitjaziana*
- Bathyal and Abyssal, species. Atlantic and Indian Oceans.

Cebocaridae, Thoriellidae & Cyclocaridae



- The Cebocaridae includes 15 species in 9 genera. Coxae 1 & 2 vestigial.
- The Cyclocaridae includes 4 species in one genus (see Horton & Thurston, 2014).
- The Thoriellids includes 7 species in 4 genera. They are deep-sea pelagic species. (urosome 3 vestigial or absent and telson absent).

Lowry J.K. & Stoddart H.E. (2011). The new deep-sea families Cebocaridae fam. nov., Cyclocaridae fam. nov. and Thoriellidae fam. nov. (Crustacea: Amphipoda: Lysianassoidea). *Zootaxa* 2747: 53-68.

Alicellidae



Alicella gigantea

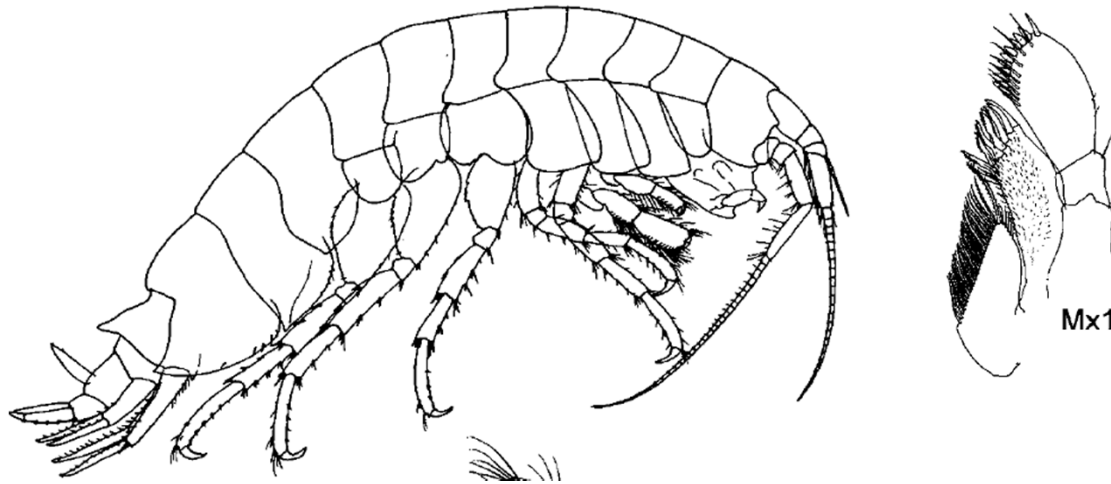
16 species in 6 genera.

Deep-sea scavenger species, allied to but not Lysianassoids.

Alicella & *Paralicella* spp. Are found in the CCFZ

Lowry J.K. & De Broyer C. (2008). Alicellidae and Valettiopsidae, two new callynophorate families (Crustacea, Amphipoda). *Zootaxa* 1843: 57-66.

Valettiopsidae



Valettiopsis macrodactyla

12 species in 2 genera.

Lowry J.K. & De Broyer C. (2008). Alicellidae and Valettiopsidae, two new calynophorate families (Crustacea, Amphipoda). *Zootaxa* 1843: 57-66.

Deep-sea scavenger species, allied to but not considered Lysianassoids.
Known from the Pacific.

Common amphipod families in the deep sea

- These form >1% of the 773 species found >200m (Thurston, 2000)

Amathillopsidae

Ampeliscidae

Aristiidae

Lepechinellidae

Calliopiidae

Epimeriidae

Eusiridae

Iphimediidae

Ischyroceridae

Leucothoidae

Melitidae

Oedicerotidae

Pardaliscidae

Phoxocephalidae

Stegocephalidae

Stenothoidae

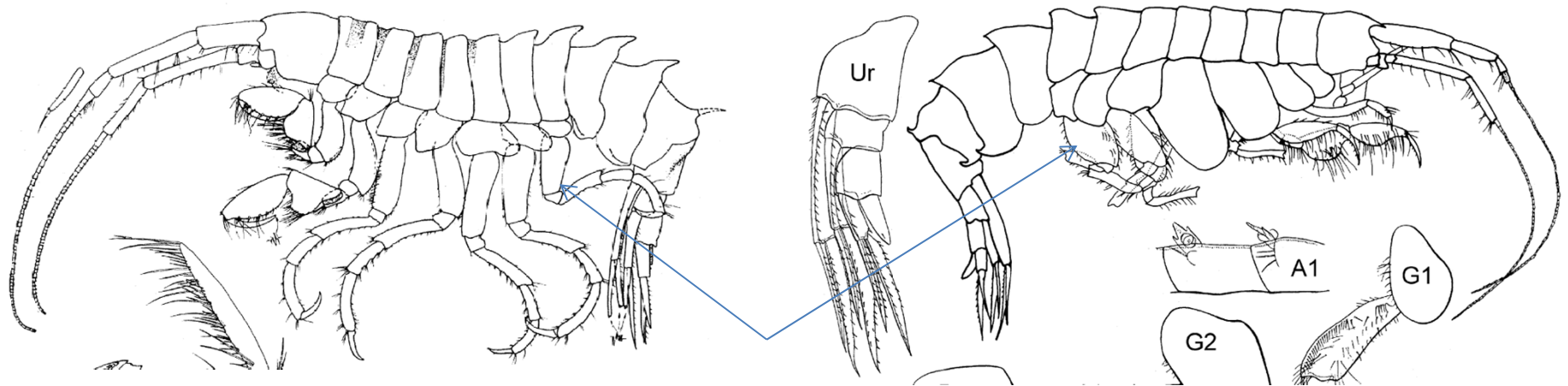
Synopiidae

Tryphosinae

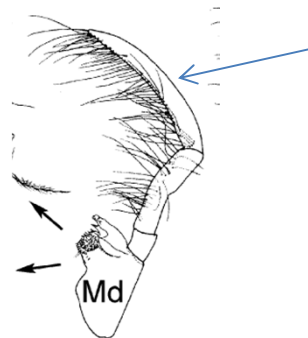
Uristidae

Amathillopsidae

- **identification resource** Lowry, J.K., 2006. New families and subfamilies of Amphipod Crustaceans. Zootaxa 1254: 1-28. page(s): 6-15
- *Amathillopsis*, *Cleonardopsis* (previously in *Eusiridae*) and *Parepimeria* (previously in *Iphimediidae*) 21 species in all three genera.



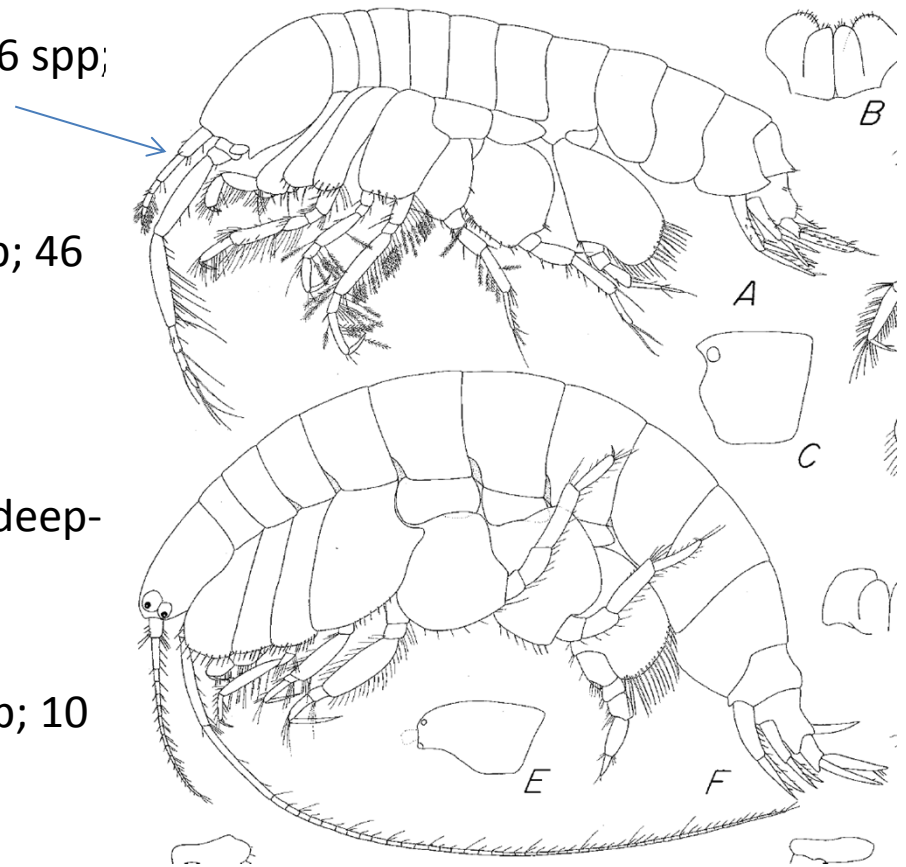
Amathillopsis grevei



Cleonardopsis carinata

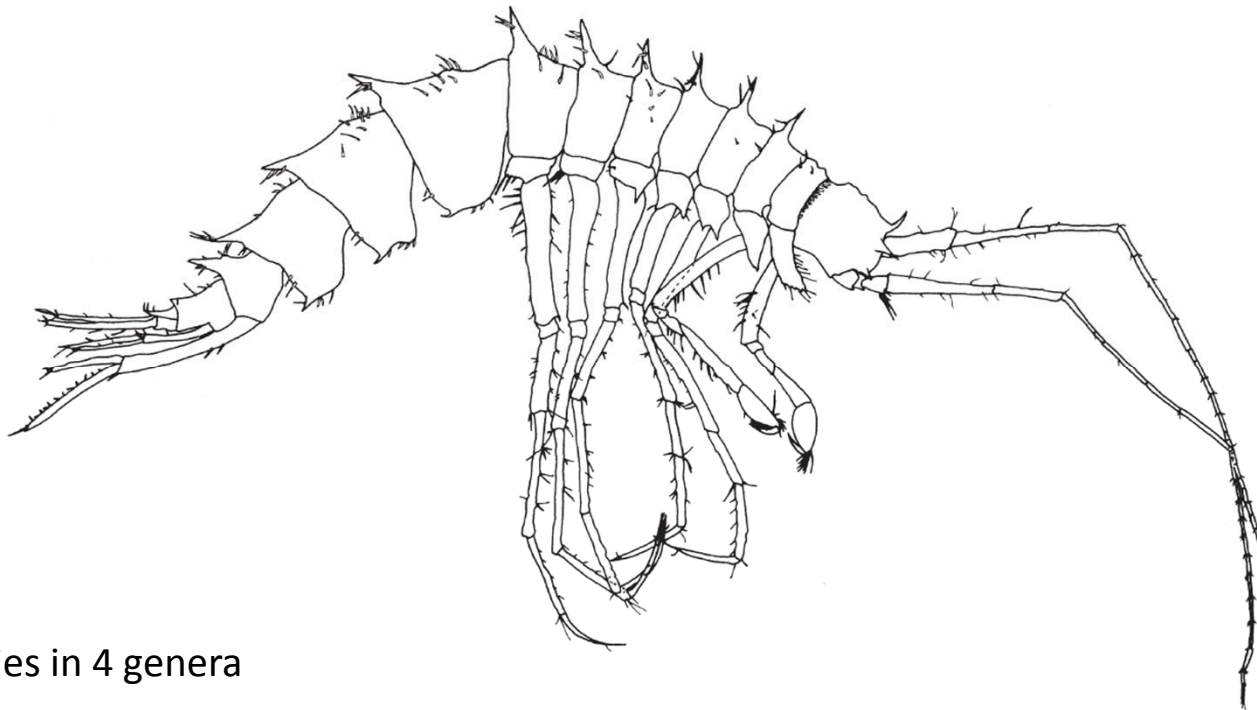
Ampeliscidae

- Genus [*Byblisoides* K.H. Barnard, 1931](#) (6 spp; all bathyal or abyssal)
- Genus [*Ampelisca* Krøyer, 1842](#) (198 spp; 46 deep-sea (from WoRDSS))
- Genus [*Byblis* Boeck, 1871](#) (74 spp; 24 deep-sea (from WoRDSS))
- Genus [*Haploops* Liljeborg, 1856](#) (19 spp; 10 deep-sea)



Key to genera: Barnard J.L. & Karaman G.S. 1991. The families and genera of marine gammaridean Amphipoda (except marine gammaroids). Part 1 Rec. Aust. Mus., Suppl. 13(1): 1–417. Page 85

Lepechinellidae



- 38 species in 4 genera

- South Atlantic spp Key - Sittrop, D.J.P.; Serejo, C.S. (2009). Three new species of the genus *Lepechinella* (Amphipoda: Gammaridea: Lepechinellidae) collected from Campos Basin slope, RJ, Brazil. *Scientia Marina*, 73(3), 473-485.

- Andres, H.G. and A. Brandt. – 2001. Lepechinellid genera *Paralepechinella* Pirlot, 1933 and *Lepechinelloides* Thurston, 1980: first records from Antarctica (Crustacea: Amphipoda. *Mitt. Zool. Mus. Inst.*, 98: 77-97.

Epimeriidae



Epimeria ~ 25 deepwater spp. and [*Uschakoviella echinophora* Gurjanova, 1955](#)

Coleman CO, 2007. Acanthonotozomellidae, Amathillopsidae, Dikwidae, Epimeriidae, Iphimediidae, Vicmusiidae. In: De Broyer C (Ed.). Census of Antarctic Marine Life. Synopsis of the Amphipoda of the Southern Ocean. Vol. 2. Bull. Inst. r. Sci. nat. Belg., 77 Suppl. 2: 1-136.

Iphimediidae

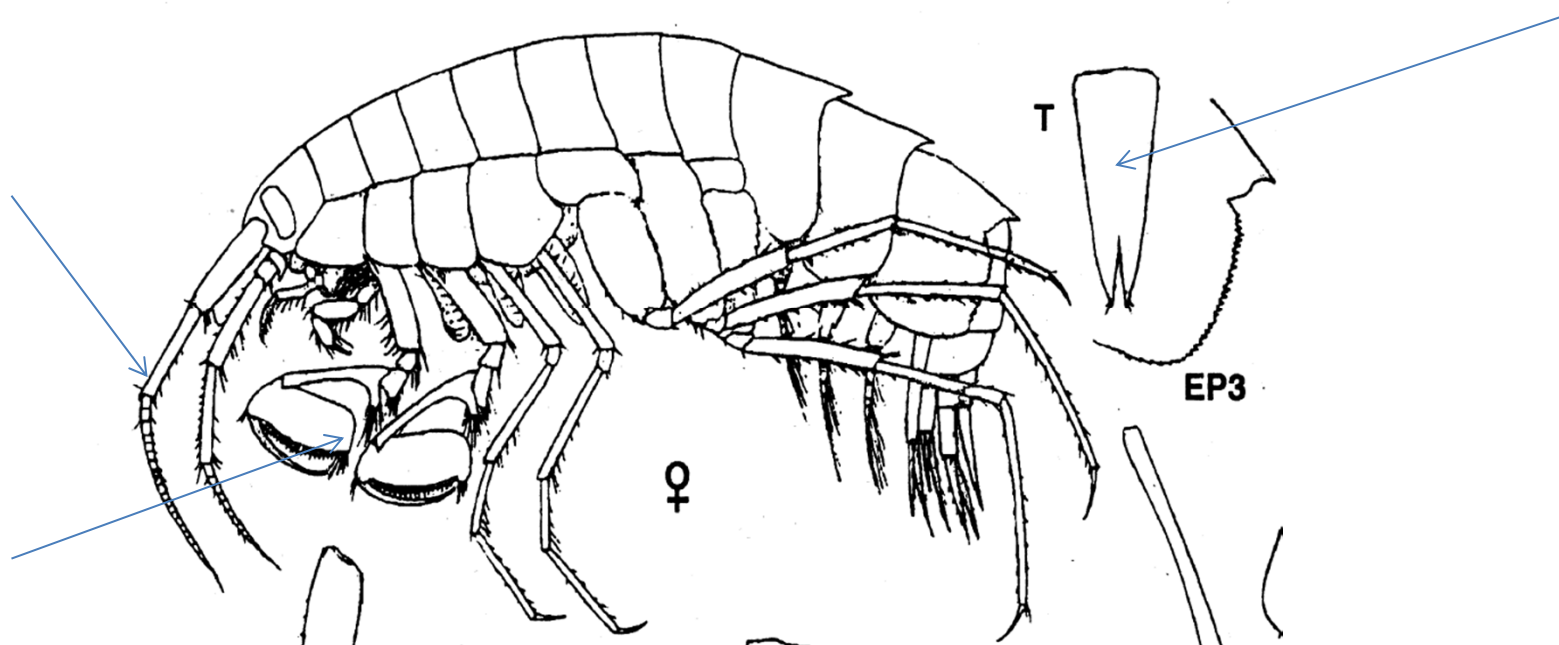


Coleman CO, 2007. Acanthonotozomellidae, Amathillopsidae, Dikwidae, Epimeriidae, Iphimediidae, Vicmusiidae. In: De Broyer C (Ed.). Census of Antarctic Marine Life. Synopsis of the Amphipoda of the Southern Ocean. Vol. 2. Bull. Inst. r. Sci. nat. Belg., 77 Suppl. 2: 1-136.

Eusiridae

- 11 genera 115 spp of which 8 genera and ~80 spp are deep sea. Well represented in the CCFZ.

AMPHIPACIFICA VOL. I NO. 4 JANUARY 30, 1995



Eusirus leptocarpus Sars, 1895

Bousfield & Hendrycks 1995 Eusiroidea Paper - Key to Genera of Eusiridae (all except *Meteusiroides*). Other recent works by Lorz & D'Udekem D'Acoz. Have keys to *Rhacotropis*.

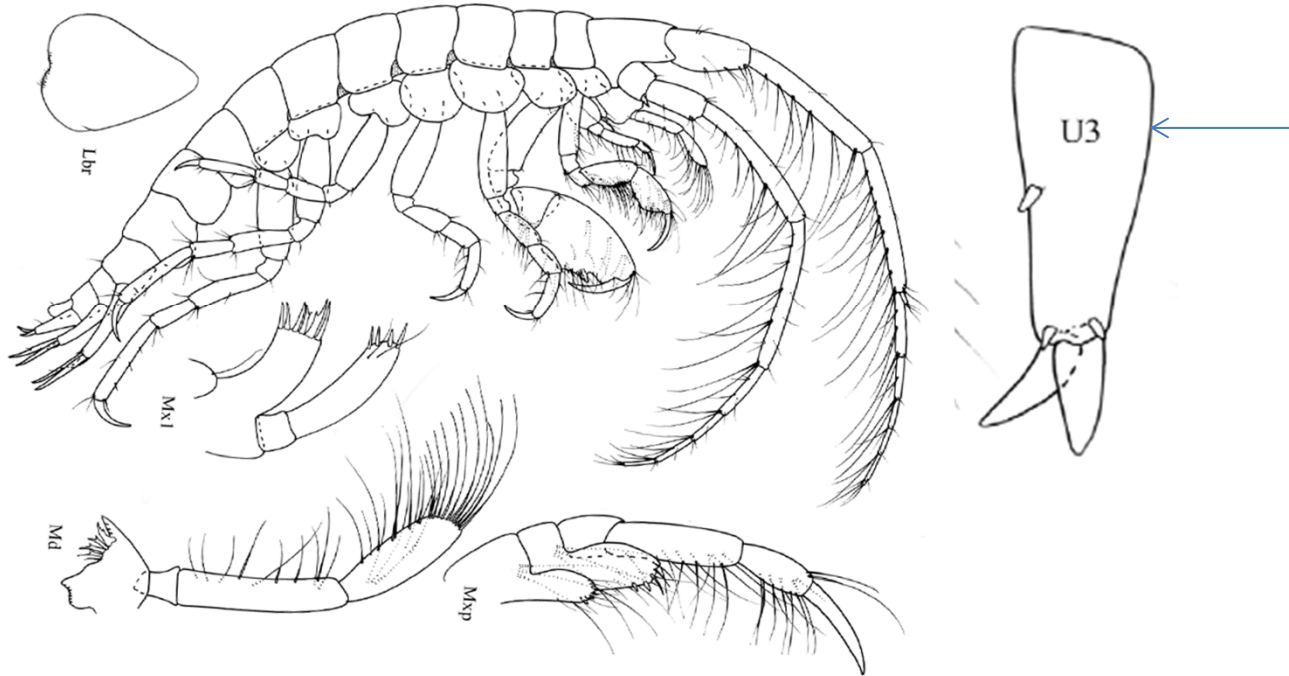
Calliopiidae

- ~27 deep-sea species in 14 genera (102 spp in 27 genera).



Halirages cainae D'Udekem D'Acoz, 2012

Ischyroceridae

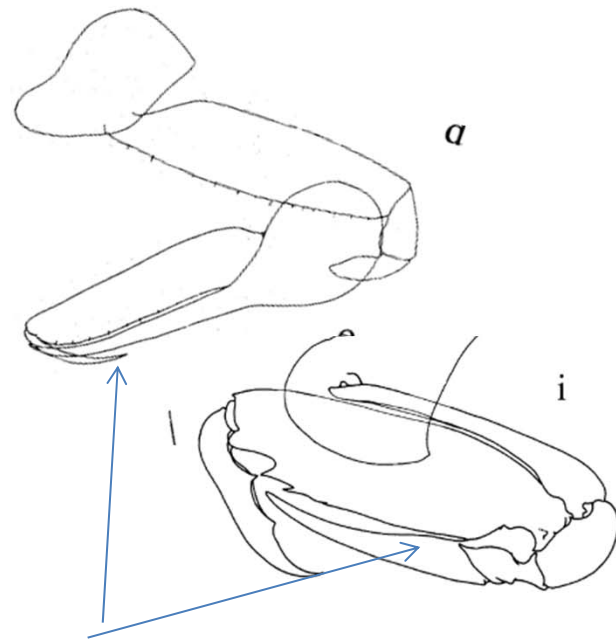


Bonnierella compar Myers & Cunha, 2004

Bonnierellidae – all deep sea. 9 spp keyed in Souza-Filhou & Serejo, 2014

Ischyroceridae characterised by uropod 3 with peduncle broad proximally and narrow distally with tiny apical setae and outer ramus with recurved apical spines.

Leucothoidae

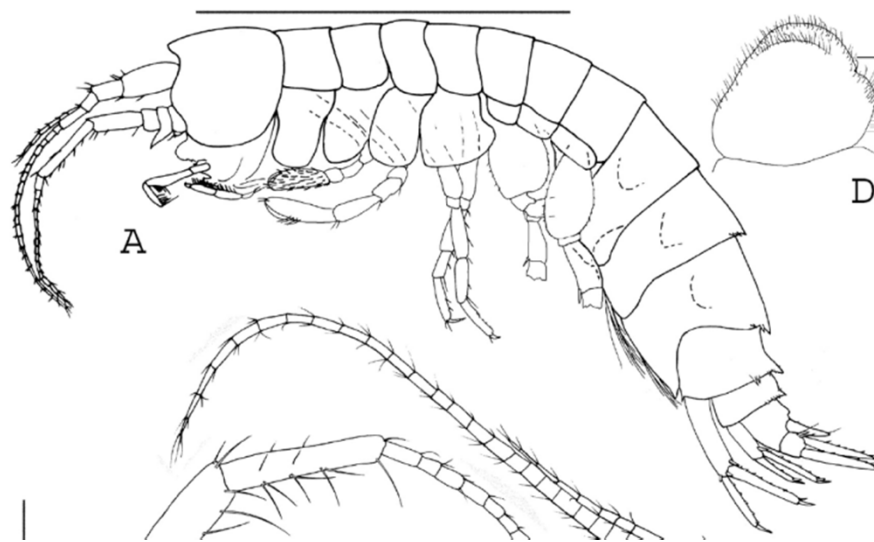


Genus *Leucothoe* contains some deep-sea representatives. Coral/sponge associates.

White, K.N. (2011). A taxonomic review of the Leucothoidae (Crustacea: Amphipoda). *Zootaxa* 3078: 1–113.

Melitidae/Maeridae

- Mostly shallow water but:
- Maeridae ~ 20 spp in 12 genera deep-sea (out of ~40 genera and 344 spp.)
- Melitidae ~ 7 spp in 2 genera deep-sea (out of ~45 genera and 150 spp.)
- Krapp-Schickel, T. 2008. What has happened with the Maera-clade (Crustacea, Amphipoda) during the last decades? Bolletino del Museo di Storia Naturale di Verona, 32, Botanica Zoologia: 3-32.



Bathyceradocus wuzzae
Larsen & Krapp-schickel, 2007

Key to some genera in Krapp-schickel & Vader, 2009.

Pardaliscidae

- 22 genera 76 species, most contain deep-sea representatives.
- Key to genera in Biswas T., Coleman C.O., Hendrycks E.A. (2009).
- **Mostly monotypic genera or v. few spp except *Pardalisca*, *Halice* and *Halicoides*.**

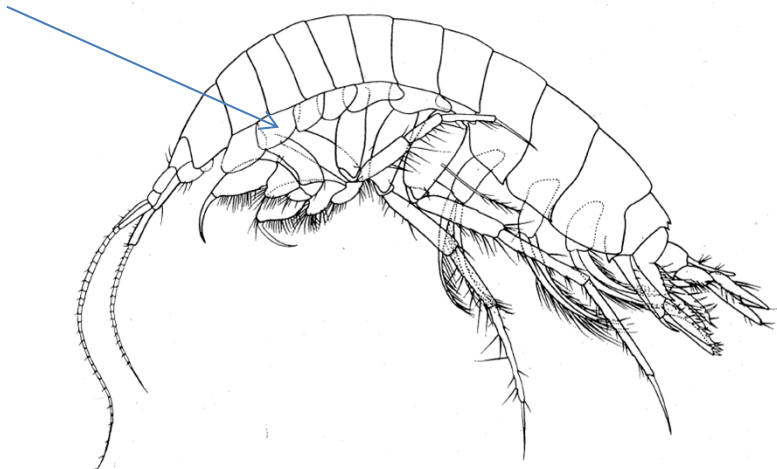


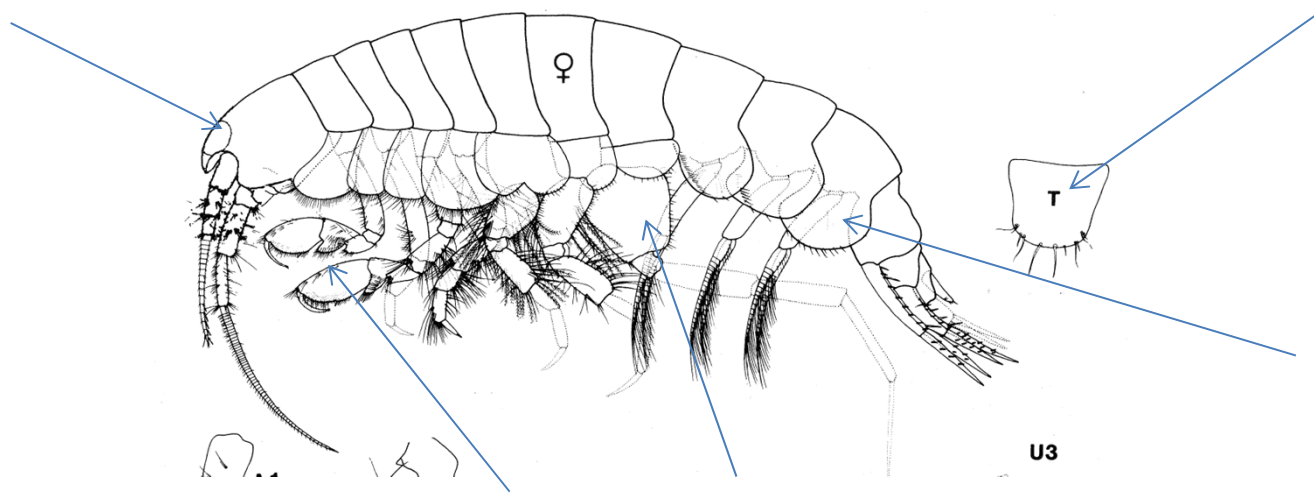
Fig. 1. *Nicippe tumida* Bruzelius. Male, 6.5 mm, station 5098.



Pardalisca abyssis

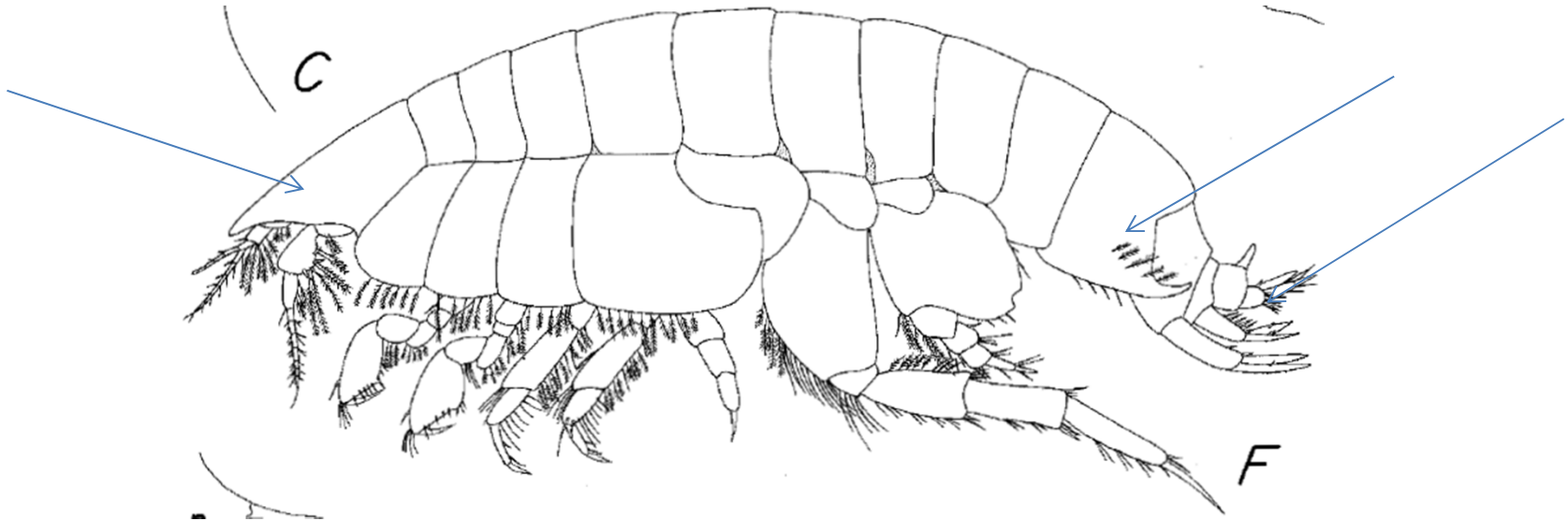


Oedicerotidae



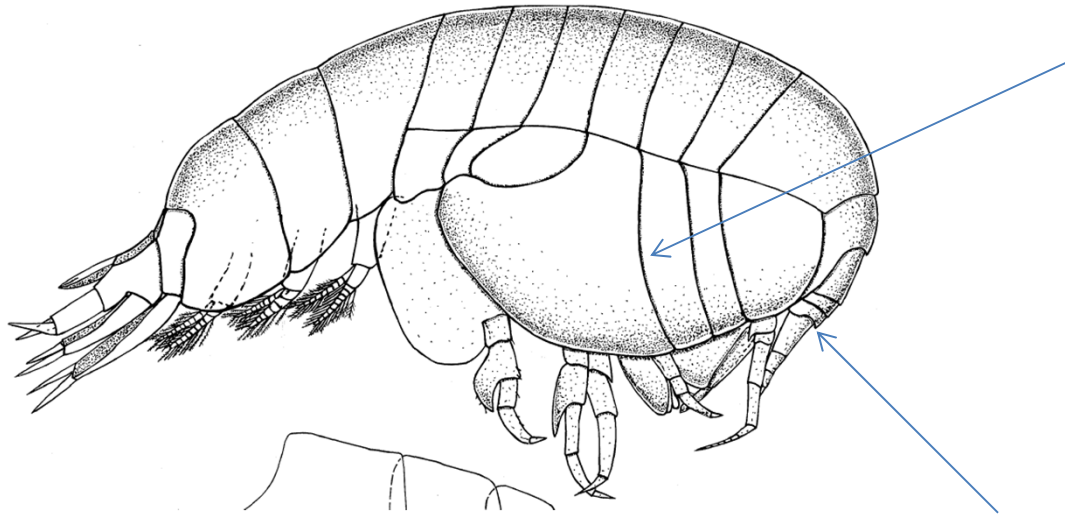
- Very diverse group.
- Well represented in the deep-sea: 23 **genera** of 46 recorded as deep sea.
- Difficult group – It would be good to get to genus.
- Bousfield E.L. & Chevrier A. (1996). The Amphipod Family Oedicerotidae on the Pacific Coast of North America. 1. The Monoculodes & Synchelidium Generic Complexes: Systematics and Distributional Ecology. *Amphipacifica*, 2, 2, 75-148.
- Barnard J.L. & Karaman G.S. 1991. The families and genera of marine gammaridean Amphipoda (except marine gammaroids). Part 2. *Rec. Aust. Mus., Suppl.* 13(2): 419–866

Phoxocephalidae



- 7 subfamilies described (deep-sea representatives in most and diverse species).
- Need Key in Barnard & Karaman 1990.
- *Harpinia* and *Harpiniopsis* important in N Atlantic. (26 + 17 species respectively)
- *Leptophoxus* & *Leptophoxoides* important in the Pacific. (CCFZ)

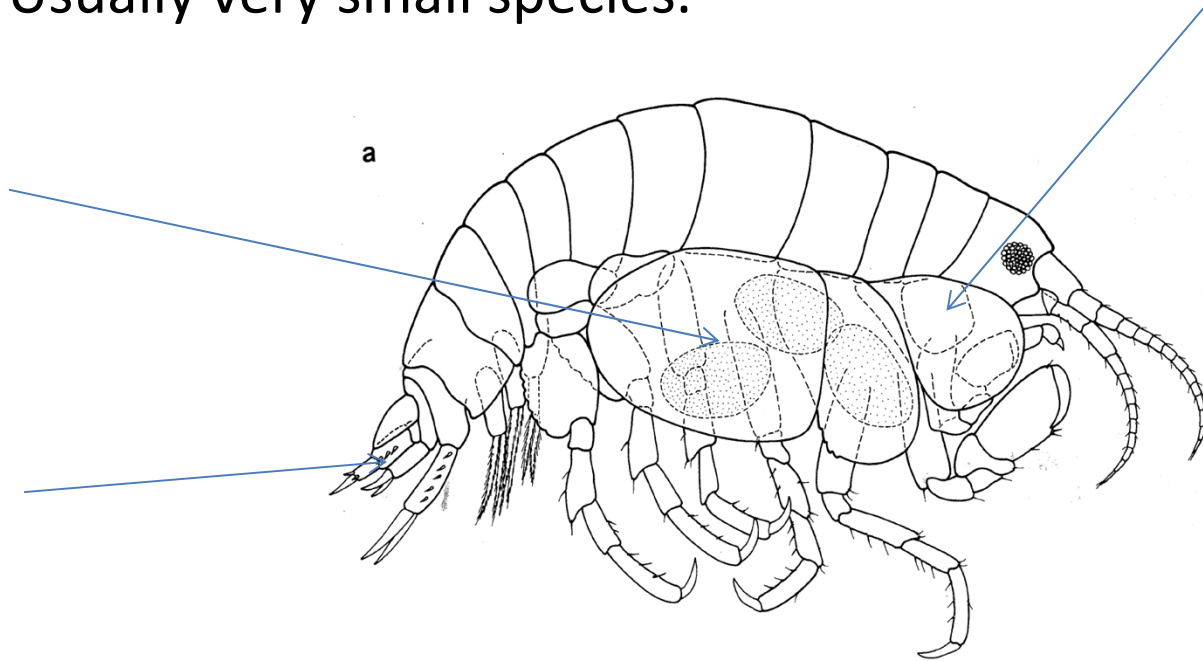
Stegocephalidae



- 100 species in 26 genera.
- True deep-sea species, usually recorded from either the bathyal (200–2000m) or abyssal (2000+) zones
- Key to the 5 sub-families in Berge J. & Vader W. (2001a). Revision of the amphipod (Crustacea) family Stegocephalidae. Zoological Journal of the Linnean Society, 133, pp. 531-592;6 figs.

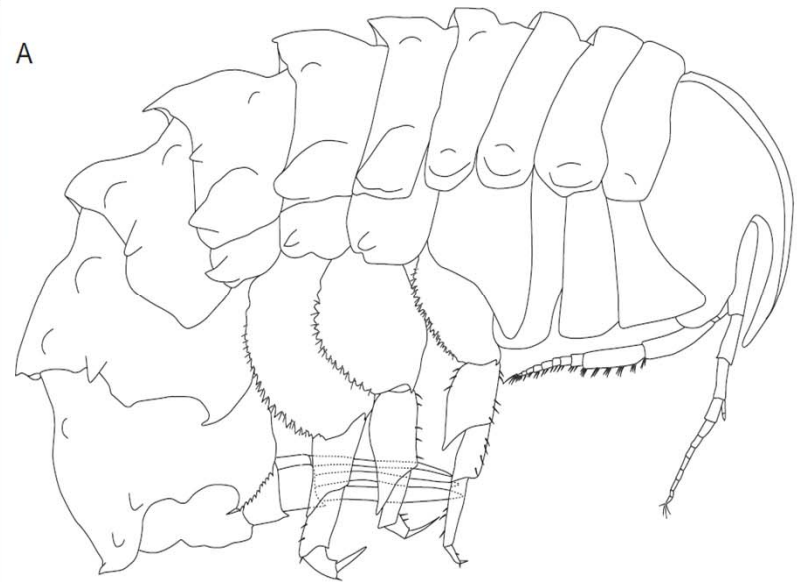
Stenothoidae

- Large group of >200 species in > 40 genera
- Usually very small species.



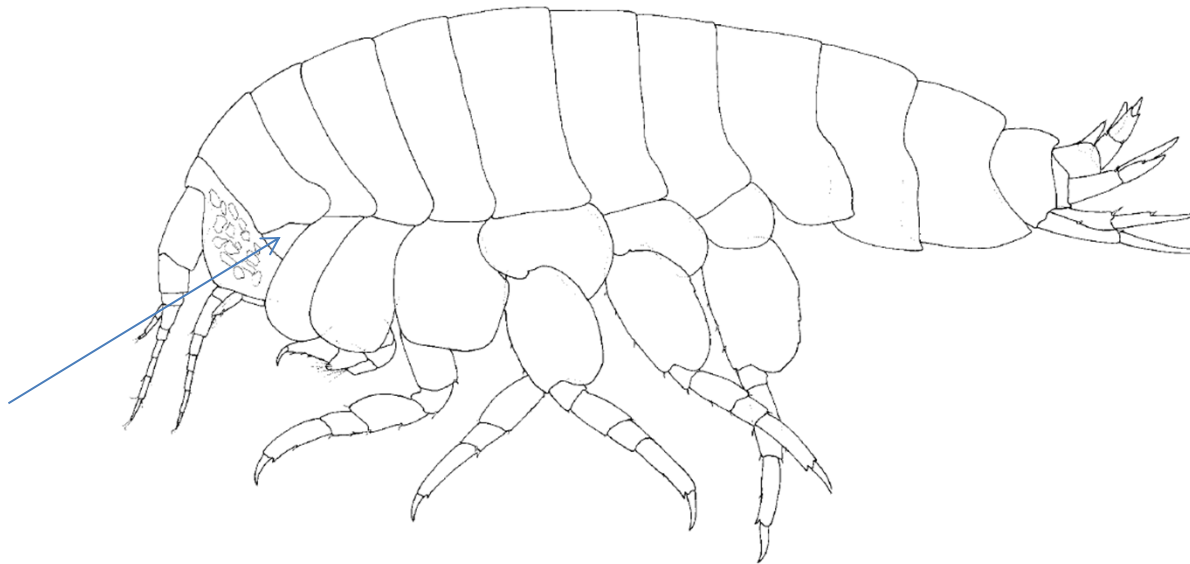
Stenothoe monoculoides (Montague, 1813)

Synopiidae



- 16 genera, many deep-sea spp. Particularly in the genus *Syrrhoites* . I have seen specimens from the CCFZ.
- Key to genera and all *Syrrhoites* spp. = Lörz, A.-N.; Coleman, C.O. (2013). The marine fauna of New Zealand: Amphipoda, Synopiidae (Crustacea). NIWA Biodiversity Memoir, 127. National Institute of Water and Atmospheric Research (NIWA): Wellington. ISBN 978-0-478-23303-2. 160 pp.

Aristiidae (Lysianassoidea)



- 5 genera, 1 with deep-sea spp: *Aristias* (~15 deep-sea spp.)
- Coxa 1 shorter than coxa2
- Stoddart, H.E. & Lowry, J.K., 2010. The family Aristiidae (Crustacea: Amphipoda: Lysianassoidea) in Australian waters. *Zootaxa* 2549: 31-51.


Lysianassoidea: Tryphosinae; Uristidae

- A difficult and very large group. Currently 22 families containing ~177 genera and >1000 species.
- Largest families are
 - the Lysianassidae (containing ~500 spp in 2 sub-families Tryphosinae and Lysianassinae)
 - Uristidae containing 182 species



Tmetonyx, Anonyx & Stephonyx

How to proceed?

- Very diverse at family level
- Difficulties with lack of diagnostic characters in many cases mean unable to ID further
- May require dissection of mouthparts, depending on family
- Produce diagnostic character state sheets for each family  OTUs

Acknowledgements

I would like to thank:

KIOST for hosting this workshop.

The International Seabed Authority for supporting my participation in this workshop.

