



A checklist of the marine Anthuroidea (Crustacea: Isopoda: Cymothoida) from the reefs of Peninsular Malaysia, with some new distributional data

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Abstract

Background

An up-to-date checklist of the Peninsular Malaysian marine Anthuroidea is presented, based on previous taxonomic or ecological literature and recent collections. The present study, a part of the subproject on the Biodiversity of Sultan Iskandar Marine Park, recognised 24 species in 12 genera and 5 families from Peninsular Malaysia. An extensive list of bibliographical references, detailed information on habitat and distributional records, museum locations of type material are provided for each species. Amongst the listed species, 11 are recently discovered Malaysian species belonging to the genera *Amakusanthura* Nunomura, 1977, *Apanthura* Stebbing, 1900, *Expanathura* Wägele, 1981, *Leptanthura* G. O. Sars, 1897, *Kupellonura* Barnard, 1925, *Pendantthura* Menzies & Glynn, 1968 and *Tinggianthura* Chew, Rahim & bin Haji Ross, 2014. Our records were limited to shallow subtidal reefs of peninsular Malaysian coast, suggesting that the number of species in the list may rise with an extensive survey.

New information

The up-to-date checklist of marine Anthuroidea of the Peninsular Malaysia comprises 24 species in 12 genera and 5 families, including some new distributional data.

Introduction

Tropical reefs are known to support enormous biodiversity and portray a high priority for conservation action amongst marine ecosystems (Roberts 2002). A faunal inventory of our planet remains an urgent task. A basic taxonomic knowledge is necessary for bio-evolutionary studies, as well as for understanding biogeography. The Isopoda is one of the most successful and rapidly evolving malacostracan orders, displaying a tremendous diversity in marine, terrestrial and continental waters. Although isopods have colonised almost every niche and are the most important group in terms of specific diversity, they have been largely ignored in studies dealing with conservation strategies. According to Wilson (2007), the isopods contain over 10,300 species that are primarily marine, but they can also be found in brackish water and freshwater environments. In addition, more than 3,600 terrestrial species of isopods are known (Schmalfuss 2003). Isopods play an important role in marine food chains due to their scavenging nature in benthic communities Keable (2006). Placed strategically within the Sundaland region of biodiversity hotspot and the coral Indo-Malaysian triangle (Hoeksema 2007, Myers et al. 2000), Malaysia is expected to hold a high diversity of isopods, particularly the anthuroids. The aim of this work is to update the knowledge the anthuroids inhabiting the shallow water reef of the Malaysian Peninsular (MP).

Materials and methods

The material collected was obtained from both west and east coasts of the Peninsular Malaysia. The following collection localities were from the west coast of MP: Pulau Langkawi (6°21'56.05"N, 99°40'31.13"E), Pulau Payar (6°03'23.0"N, 100°01'55.0"E), Pulau Pangkor (4°11'22.32"N, 100°32'50.22"E) and Port Dickson (2°24'57.0"N, 101°51'10.3"E). The following collection localities were from the east coast of MP: Pulau Perhentian (5°52'59.48"N, 102°44'31.66"E), Pulau Tioman (2°54'15.44"N, 104°6'1.08"E), Pulau Seri Buat (2°41'13.59"N, 103°55'25.99"E), Pulau Aur (2°28'17.24"N, 104°30'53.14"E), Pulau Dayang (2°28'40.90"N, 104°30'19.12"E) and Pulau Tinggi (2°17'37.96"N, 104°6'1.97"E) (Fig. 1). See Chew et al. (2016) for an explanation of the biological material collection and Chew et al. (2018) for the identification and morphological study procedures. The identification was done using the specialised literature and identification keys from Kensley (1980), Kensley and Poore (1982), Negoescu 1997, Kensley (2001) and Poore and Lew Ton (2002). Only primary synonyms are included for each species under the "Nomenclature" field. The checklist of the marine anthuroids from MP included an updated list of materials, habitat and distribution records. Materials are located in the following museums: Muzium Zoologi, Universiti Kebangsaan Malaysia (UKMMZ); Lee Kong Chian Natural History

Museum, National University of Singapore (ZRC); Museum d'Histoire Naturelle, Genève (MHNG); Zoologisches Museum Berlin (ZMB); and Muséum National d'Histoire Naturelle, Paris (MNHN).

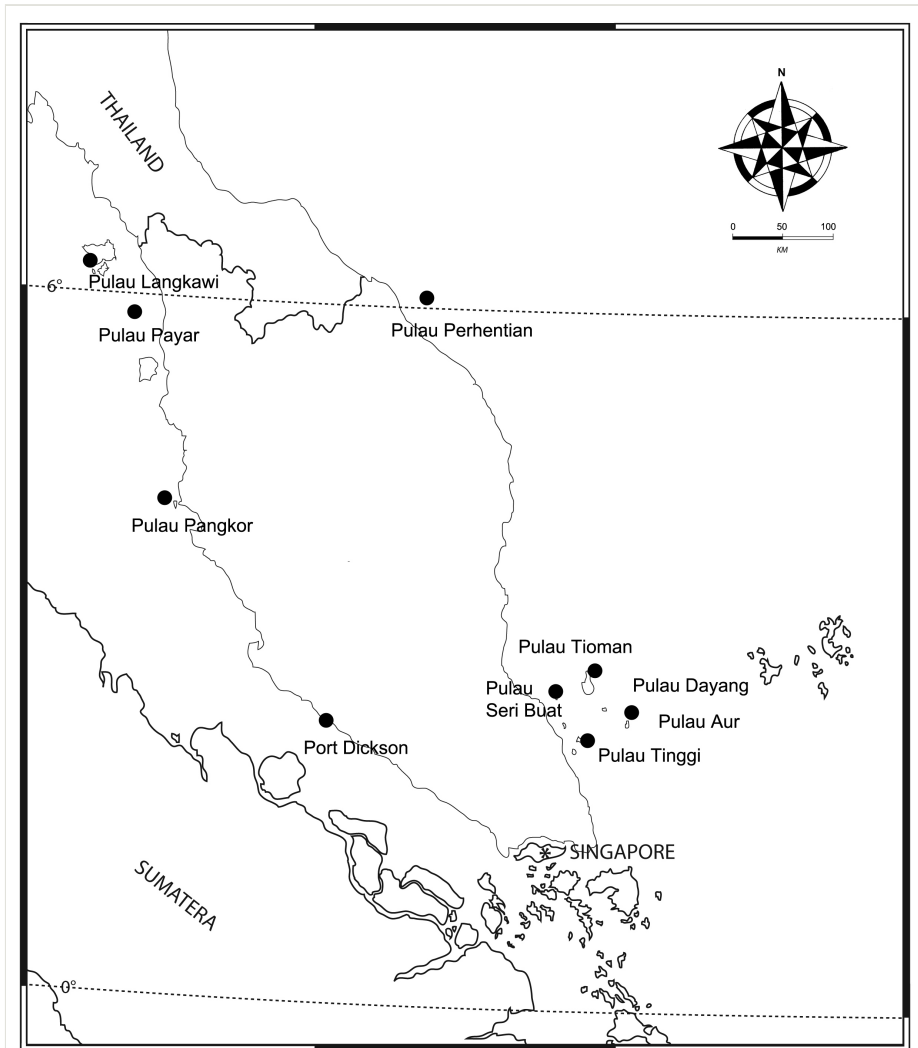


Figure 1. [doi](#)

Map of collection localities in the Malaysian Peninsular.

Data resources

All Anthuroidea records were cross-checked for their taxonomy in the World Register of Marine Species (WoRMS Editorial Board 2020).

Checklist of marine Anthuroidea known to occur in Peninsular Malaysia

Amakusanthura koonyumae Bamber, 1997

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255360>

Nomenclature:

Amakusanthura koonyumae Bamber 1997: 81–85, figs. 3-5; Bamber 2008: 860–861.

Material

- island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104°3'54.65"; eventDate: 18 April 2014; habitat: In fine sand to medium sand from around '*Cerianthus*' at 2 to 3 m depth (Bamber, 1997); amongst coral rubble. Littoral 0.5 to 15 m depth (present study); eventRemarks: C. Melvin; collectionCode: (1 female) UKMMZ-1571

Distribution: HONG KONG—Tolo Channel (type locality), Conic Island Cave. MALAYSIA—Pahang State: Pulau Tioman (new record).

Notes: Fig. 2a

Apanthura bruscai Müller, 1992

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255383>

Nomenclature:

Apanthura bruscai Müller 1992b: 156–161, figs. 1–19.

Material

Holotype:

- island: Pulau Babi Besar; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°50.483', E104°9.566'; habitat: Fringing-reef and reef-flat under coral rocks mainly covered with coralline algae, intertidal (Müller 1992a); modified: male, 3.4 mm; datasetID: ZMB 26953

Distribution: Only known from type locality (Pulau Babi Besar, east coast Peninsular Malaysia).

Notes: This species record is based on literature only. No specimen was collected during the present study.

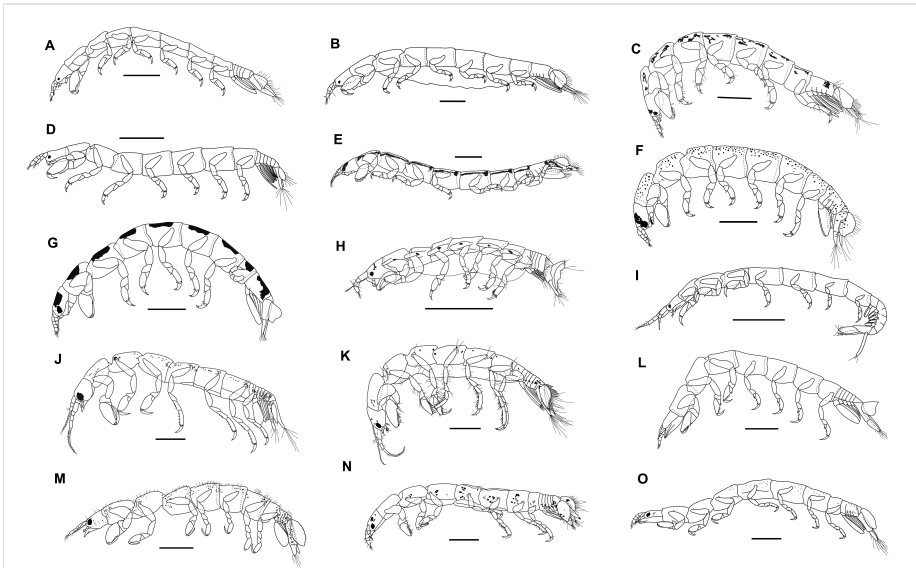


Figure 2. [doi](#)

Habitus of Anthuroidea (females) of the reefs of Peninsular Malaysia: **A.** *Amakusanthura koonyumae* Bamber, 1997; **B.** *Apanthura pariensis* Negoescu, 1997; **C.** *Apanthura stocki* (Müller, 1991); **D.** *Apanthura tiomanae* Müller, 1992; **E.** *Mesanthura asiatica* Müller, 1993; **F.** *Mesanthura protei* Kensley, 1980; **G.** *Mesanthura quadrata* Kensley & Schotte, 2000; **H.** *Expanthura collaris* (Kensley, 1979); **I.** *Kupellonura gidgee* Poore & Lew Ton, 1988; **J.** *Accalathura barnardi* (Nierstrasz, 1941); **K.** *Accalathura borradailei* (Stebbing, 1904); **L.** *Leptanthura coralliophila* Müller, 1992; **M.** *Paranthura astrolabium* Kensley, 1979; **N.** *Paranthura setigera* Negoescu, 1997; **O.** *Paranthura seychellensis* Kensley & Schotte, 2000. All species are illustrated here for the first time.

Apanthura pariensis Negoescu, 1997

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255402>
- GenBank [MF680510](#)

Nomenclature:

Apanthura pariensis Negoescu 1997: 186–194, figs. 6–10; Chew et al. 2018: 74–75, fig. 1.

Materials

- island: Pulau Pangkor; country: Malaysia; stateProvince: Perak; verbatimCoordinates: N4°11'22.32", E100°32'50.22"; eventDate: 15 Apr 2014; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); collectionCode: (1 female) UKMMZ-1583; (1 male) UKMMZ-1584; (43 females, 2 males) UKMMZ-1585
- island: Pulau Langkawi; country: Malaysia; stateProvince: Kedah; verbatimCoordinates: N6°21'56.05" E99°40'31.13"; eventDate: 4 Nov 2013; habitat: Intertidal, amongst coral rubble; collectionCode: (9 females) UKMMZ-1586

- c. island: Pulau Langkawi; country: Malaysia; stateProvince: Kedah; verbatimCoordinates: N6°21'56.05" E99°40'31.13"; eventDate: 8 Mac 2015; habitat: Intertidal, amongst coral rubble; collectionCode: (8 females, 2 males) UKMMZ-1587

Distribution: INDONESIA—Pari Island, Java Sea (type locality). MALAYSIA—Perak State: Pulau Pangkor (new record).—Kedah State: Pulau Langkawi (new record).

Notes: Fig. 2b

Apanthura stocki (Müller, 1991)

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255410>
- GenBank [MF680509](https://www.ncbi.nlm.nih.gov/GenBank/entry/view.cgi?accession=MF680509)

Nomenclature:

Amakusanthura stocki Müller 1991: 595–600, figs. 30–56.

Apanthura stocki Müller 1992b: 166; Chew et al. 2018: 75-76, fig. 2.

Materials

- a. island: Mentinggi, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°16'21.67", E104°7'18.61"; eventDate: 19 April 2013; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (1 female, 1 male) UKMMZ-1576
- b. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 18 Dec 2012; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (3 females, 1 male) UKMMZ-1577
- c. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104°05.616'; eventDate: 18 Apr 2013; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (14 females) UKMMZ-1578
- d. island: Pulau Seri Buat; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°41'13.59", E103°55'25.99"; eventDate: 19 Apr 2014; habitat: Littoral 0.5 to 7 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (1 male) UKMMZ-1579
- e. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 15 Jun 2015; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (4 females) UKMMZ-1580
- f. island: Pulau Dayang; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'40.90", E104°30'19.12"; eventDate: 26 Jul 2016; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (27 females) UKMMZ-1581
- g. island: Pulau Aur; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'17.24", E104°30'53.14"; eventDate: 26 Jul 2016; habitat: Littoral 0.5 to 3 m depth, amongst coral rubble (Chew et al. 2018); recordedBy: C. Melvin; collectionCode: (6 females) UKMMZ-1582

Distribution: SRI LANKA—Indian Ocean (type locality); MALAYSIA—Johor State: Pulau Besar; Pulau Tinggi; Pulau Seri Buat (new record).

Notes: Fig. 2c

***Apanthura tiomanae* Müller, 1992**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255413>

Nomenclature:

Apanthura tiomanae Müller 1992b: 161–166, figs 20–39.

Material

- island: Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; recordedBy: C. Melvin; collectionCode: (1 female) UKMMZ-1572

Distribution: MALAYSIA—Pahang State: Pulau Tioman (type locality).

Notes: Fig. 2d

***Cyathura bentotae* Müller, 1991**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255423>

Nomenclature:

Cyathura bentotae Müller 1991: 603–607, figs. 57–80; Müller 1992b: 166.

Material

Holotype:

- habitat: Fringing-reef and sabellid reef; dead coral substratum, 1 to 3 m depth; collectionCode: (male, 3.4 mm) ZMB 26953; 1 cr (ZMB 26956)

Distribution: SRI LANKA—Indian Ocean (type locality); MALAYSIA—Pahang State: Pulau Tioman.

Notes: This species record is based on literature only. No specimen was collected during the present study.

***Mesanthura albolineata* Barnard, 1925**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=258320>

Nomenclature:

Mesanthura albolineata Barnard 1925: 144, fig. 9c; Wägele 1984: 394–398, figs. 5–7; Negoescu and Wägele 1984: 125; Kensley 1987: 118; Müller 1993: 20.

Material*Holotype:*

- a. country: Singapore; habitat: Fringing reef, outer reef-flat, reef-margin and upper coral-slope; dead coral substratum, *Acropora* sp. and *Pocillopora damicornis* (Linnaeus, 1758).; collectionCode: (2 immature adults, 1 manca) ZMB 26938

Distribution: SINGAPORE—(type locality); MALAYSIA—Johor State: Pulau Babi Besar.

Notes: This species record is based on literature only. No specimen was collected during the present study.

***Mesanthura asiatica* Müller, 1993**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=258321>

Nomenclature:

Mesanthura asiatica Müller 1993: 20–25, figs. 1–25.

Materials*Holotype:*

- a. habitat: Fringing reef, outer reef-flat, reef-margin and upper coral-slope; dead coral substratum, *Acropora* sp. and *Pocillopora damicornis* (Linnaeus, 1758); collectionCode: (female, 4.0 mm) ZMB 26939a.

Paratype:

- a. collectionCode: (2 immature adults, 1 preparatory male; 1 manca) ZMB 26939b

Other materials:

- a. island: Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104°6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (1 female) UKMMZ-1588; (1 male) UKMMZ-1589; (6 females, 1 male) UKMMZ-1590
- b. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 16 Jun 2015; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (1 female) UKMMZ-1591

Distribution: MALAYSIA—Johor State: Pulau Babi Besar (type locality); Pulau Tinggi (new record);—Pahang State: Pulau Tioman (new record).

Notes: Fig. 2e

***Mesanthura kiliani* Müller, 1993**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=258340>

Nomenclature:

Mesanthura kiliani Müller 1993: 25–29, figs. 26–42.

Materials

Holotype:

- a. island: Pulau Tioman; country: Malaysia; habitat: Fringing reef, outer reef-flat, reef-margin and upper coral-slope; dead coral substratum, *Acropora* sp. and *Pocillopora damicornis*; collectionCode: (female, 7.2 mm) ZMB 26940a

Paratype:

- a. island: Pulau Tioman; country: Malaysia; habitat: Fringing reef, outer reef-flat, reef-margin and upper coral-slope; dead coral substratum, *Acropora* sp. and *Pocillopora damicornis*; collectionCode: (2 postmancas, 2 mancas) ZMB 26940b.

Distribution: MALAYSIA—Pahang State: Pulau Tioman;—Johor State: Pulau Babi Besar.

Notes: This species record is based on literature only. No specimen was collected during the present study.

Mesanthura protei Kensley, 1980

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=211377>

Nomenclature:

Mesanthura protei Kensley 1980: 30–32, figs. 22–23; Kensley and Poore 1982: 631–632, fig. 6; Wägele 1984: 748–752, figs. 8–10; Müller 1993: 33–39, figs. 61–99.

Material

- a. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; institutionCode: (1 female) UKMMZ-1592; (14 females) UKMMZ-1593

Distribution: MOZAMBIQUE—South of Inhambane (type locality); MADAGASCAR—Abrolhos Islands; THAILAND—Ko-Sichang; KENYA; MALAYSIA—Johor State: Pulau Babi Besar;—Pahang State: Pulau Tioman, (new record).

Notes: Fig. 2f

Mesanthura quadrata Kensley & Schotte, 2000

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=211379>

Nomenclature:

Mesanthura quadrata Kensley and Schotte 2000: 2080–2083, figs. 17–18.

Materials

- a. island: Pulau Seri Buat; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°41'13.59", E103°55'25.99"; eventDate: 19 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (1 female) UKMMZ-1594, (3 immature females) UKMMZ-1595
- b. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104°6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (1 immature female) UKMMZ-1596
- c. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 15 June 2015; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (1 female) UKMMZ-1597
- d. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104°05.616'; eventDate: 15 June 2015; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (1 female) UKMMZ-1598
- e. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 13 Oct 2012; habitat: Assoc. artificial substrate unit at 3 m depth; collectionCode: (29 juveniles) UKMMZ-1599
- f. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104°05.616'; eventDate: 18 April 2013; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (1 female) UKMMZ-1560

Distribution: SEYCHELLES—Mahé beach, Mahé Island (type locality); MALAYSIA—Pahang State: Pulau Seri Buat, (new record); Pulau Tioman, (new record);—Johor State: Pulau Tinggi, (new record).

Notes: Fig. 2g

Pendanthura tinggiensis Chew, bin Abdul Rahim & Mohd Yusof, 2016

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=882015>
- GenBank [MF680512](https://www.ncbi.nlm.nih.gov/genbank/MF680512)

Nomenclature:

Pendanthura tinggiensis Chew et al. 2016: 232–238, figs. 2–8.

Materials

- a. island: Mentinggi, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°16'21.67", E104°7'18.61"; eventDate: 19 April 2013; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (1 female) UKMMZ-1541; (1 male) UKMMZ-1542; (39 females) UKMMZ-1543; (2 males) UKMMZ-1544; (10 females) ZRC 2016.0013; (2 males) ZRC 2016.0014
- b. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'35.08", E104°6'7.13"; eventDate: 16 Aug 2012; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (63 females, 3 males) UKMMZ-1544
- c. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104°05.616'; eventDate: 18 April 2013; habitat:

Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (10 females) UKMMZ-1545

- d. island: Kg Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'35.08", E104° 6'7.13"; eventDate: 15 June 2015; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (37 females) UKMMZ-1546
- e. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104° 05.616'; eventDate: 15 June 2015; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (54 females) UKMMZ-1621

Distribution: Only known from type locality (Pulau Tinggi, Johor, Malaysia)

***Pendanthura tiomanensis* Chew, bin Abdul Rahim & Mohd Yusof, 2016**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=882016>

Nomenclature:

Pendanthura tiomanensis Chew et al. 2016: 238–241, figs. 9–11.

Material

- a. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble. Littoral 0.5 to 7 m depth; collectionCode: (1 female) UKMMZ-1547; (3 females) UKMMZ-1549; (2 females) ZRC 2016.0015

Distribution: Only known from type locality (Pulau Tioman, Pahang, Malaysia)

***Tinggianthura alba* Chew, bin Abdul Rahim & bin Haji Ross, 2014**

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=1054956>

Nomenclature:

Tinggianthura alba Chew et al. 2014: 1–11, figs 2–9.

Materials

Paratype:

- a. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'35.08", E104° 6'7.13"; eventDate: 16 August 2012; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (12 females, 2 males, 1 juvenile) UKMMZ-1481; (12 females, 2 males, 1 juvenile) UKMMZ-1482; (12 females, 2 males, 1 juvenile) UKMMZ-1483

Other materials:

- a. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'35.08", E104° 6'7.13"; eventDate: 18 Dec 2012; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (92 females, 8 males) UKMMZ-1622

- b. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'35.08", E104° 6'7.13"; eventDate: 28 Feb 2013; habitat: Amongst coral rubble. Littoral 0.5 to 3 m depth; collectionCode: (26 females) UKMMZ-1623

Distribution: Only known from type locality (Pulau Tinggi, Johor, Malaysia)

Eisothistos besar Müller 1992

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255500>

Nomenclature:

Eisothistos besar Müller 1992c: 370–371, figs. 1–26.

Material

Holotype:

- a. island: Pulau Babi Besar; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°50.483', E104°9.566'; habitat: Fringing reef, outer reef-flat, reef-margin and upper coral-slope; dead coral substratum, *Acropora* sp. and *Pocillopora damicornis*; collectionCode: (immature adult, 1.7–2.1 mm) MHNG.

Distribution: Only known from type locality (Pulau Babi Besar, east coast Peninsular Malaysia)

Notes: This species record is based on literature only. No specimen was collected during the present study.

Eisothistos tiomanensis Chew, bin Abdul Rahim & binti Mohd Yusof, 2018

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=1056465>

Nomenclature:

Eisothistos tiomanensis Chew et al. 2018: 76–79, figs. 5–6.

Material

- a. island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104° 3'54.65"; eventDate: 18 April 2014; habitat: Amongst coral rubble. Littoral 0.5 to 15 m depth; collectionCode: (1 male) UKMMZ-1559

Distribution: Only known from type locality (Pulau Tioman, Malaysia).

Expanathura collaris (Kensley, 1979)

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=260392>
- GenBank [MF680511](https://www.ncbi.nlm.nih.gov/nuclseq/1079080000)

Nomenclature:

Panathura collaris Kensley 1979: 823–827, figs 7–9; Kensley and Poore 1982: 635.

Expanathura collaris Wägele 1981: 89, 121–122; Negoescu 1999: 214–220, figs 9–11; Negoescu and Wägele 1984: 118; Negoescu and Brandt 2001: 121–129, figs 14–18; Poore and Lew Ton 2002: 26–32, figs 16–19, 20a.

Materials

- a. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104° 5.616'; eventDate: 16 May 2013; habitat: Amongst coral rubble, littoral 0.5 to 3 m; collectionCode: (1 female) UKMMZ-1565; (1 Male) UKMMZ-1566; (54 females, 3 males) UKMMZ-1567
- b. island: Mentinggi, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°16'21.67", E104° 7'18.61"; eventDate: 19 April 2013; habitat: Amongst coral rubble, littoral 0.5 to 3 m; collectionCode: (12 females) UKMMZ-1568
- c. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m; collectionCode: (56 females, 9 males) UKMMZ-1569
- d. island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104°3'54.65"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 15 m; collectionCode: (35 females, 2 males) UKMMZ-1570
- e. island: Pantai Kok, Pulau Langkawi; country: Malaysia; stateProvince: Kedah; verbatimCoordinates: N6°21'56.05", E99°40'31.13"; habitat: Intertidal coral rubble; collectionCode: (14 females, 4 males) UKMMZ-1625
- f. island: Batu Bonchek, Pulau Dayang; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'40.90", E104° 30'19.12"; eventDate: 26 July 2016; habitat: Amongst coral rubble, littoral 0.5 to 3 m; collectionCode: (7 females, 1 male) UKMMZ-1568

Distribution: FIJI (Type locality); COOK ISLAND; MOOREA—Chesterfield and Melish Reefs, Coral Sea; LORD HOWE ISLAND—Tasman Sea; PAPUA NEW GUINEA; AUSTRALIA—Northern Territory, Queensland; MALAYSIA—Pulau Dayang, Pulau Tinggi, (New record); Pulau Tioman, Malaysia (New record); Pulau Langkawi (New record).

Notes: Fig. 2h

Kupellonura gidgee Poore & Lew Ton, 1988

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255527>

Nomenclature:

Kupellonura gidgee Poore and Lew Ton 1988: 181, 183, 184, fig 10.

Material

- a. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (1 female) UKMMZ-1602

Distribution: AUSTRALIA—Lizard Island (type locality); MALAYSIA—Pulau Tioman (new record).

Notes: Fig. 2i

Accalathura barnardi (Nierstrasz, 1941)

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=258455>

Nomenclature:

Katanthura barnardi Nierstrasz 1941: 243–247, figs 1–13.

Accalathura barnardi Poore 1980: 59; Poore and Lew Ton 1990: 386, 388, fig 5.

Materials

- island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (1 female) UKMMZ-1603; (1 male) UKMMZ-1604; (6 females) UKMMZ-1605
- island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104° 3'54.65"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 15 m depth; collectionCode: (9 females, 2 males) UKMMZ-1606
- island: Pulau Seri Buat; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°41'13.59", E103° 55'25.99"; eventDate: 19 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 7 m depth; collectionCode: (6 females) UKMMZ-1607
- island: Batu Bonchek, Pulau Dayang; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'40.90", E104° 30'19.12"; eventDate: 26 July 2016; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (13 females, 2 males) UKMMZ-1608
- island: Teluk Rha, Pulau Aur; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'17.24", E104° 30'53.14"; eventDate: 27 July 2016; habitat: Amongst coral rubble, littoral 0.5 to 3 m depth; collectionCode: (1 female, 1 males) UKMMZ-1609

Distribution: INDONESIA—Solo Strait, Java Sea (type locality); MALAYSIA—Pulau Tioman; Pulau Seri Buat (new record).

Notes: Fig. 2j

Accalathura borradailei (Stebbing, 1904)

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=258457>
- GenBank [MF680508](https://www.ncbi.nlm.nih.gov/nuclseq/580508)

Nomenclature:

Calathura borradailei Gardiner 1904: 700, pl. 49A; Chilton 1924: 881.

Accalathura borradailei Barnard 1925: 149; Pillai 1966: 157–158, fig 3.

Materials

- a. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104° 6'1.97"; eventDate: 28 February 2013; habitat: coral rubble, intertidal; collectionCode: (1 female) UKMMZ-1610; (1 male) UKMMZ-1611; (35 females, 3 males) UKMMZ-1612
- b. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104° 6'1.97"; eventDate: 18 December 2012; habitat: coral rubble, intertidal; collectionCode: (34 females) UKMMZ-1613
- c. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104°6'1.97"; eventDate: 15 June 2015; habitat: coral rubble, intertidal; collectionCode: (1 female) UKMMZ-1614
- d. island: Sebirah Kechil, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°18.622', E104° 05.616'; eventDate: 15 June 2015; habitat: coral rubble, intertidal; collectionCode: (20 females) UKMMZ-1615
- e. island: Batu Bonchel, Pulau Dayang; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°28'40.90", E104° 30'19.12"; eventDate: 26 July 2015; habitat: coral rubble, 0.5 to 3 m depth; collectionCode: (14 females, 1 male) UKMMZ-1616

Distribution: MALDIVES—Fadifolu (type locality); THAILAND; INDIA—Chilka Lake; Kollam; MALAYSIA—Pulau Dayang, Pulau Tinggi (new record).

Notes: Fig. 2k

Leptanthura coralliophila Müller, 1992

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255547>

Nomenclature:

Leptanthura coralliophila Müller 1992a: 181–186, figs 1–19.

Material

- a. island: Pulau Seri Buat; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°41'13.59", E103°55'25.99"; eventDate: 19 April 2014; habitat: Amongst coral rubble, intertidal to 7 m depth; collectionCode: (1 female) UKMMZ-1617; (1 female) UKMMZ-1618

Distribution: MALAYSIA—Pulau Babi Besar (type locality); Pulau Seri Buat.

Notes: Fig. 2l

Paranthura astrolabium Kensley, 1979

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255571>

Nomenclature:

Paranthura astrolabium Kensley 1979: 830–833, figs. 12–13; Negoescu 1999: 237–242, figs 21–23.

Materials

- a. island: Batu Malang, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°54'15.44", E104° 6'1.08"; eventDate: 18 April 2014; habitat: Amongst coral rubble, intertidal to 7 m; collectionCode: (1 female) UKMMZ-1619; (18 females 1 male) UKMMZ-1621
- b. island: Pulau Seri Buat; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°41'13.59", E103°55'25.99"; eventDate: 19 April 2014; habitat: Amongst coral rubble, intertidal to 7 m; collectionCode: (3 females) UKMMZ-1622

Distribution: FIJI—Great Astrolabe Barrier Reef (type locality); Suva Reef; MALAYSIA—Pulau Tioman, Malaysia; Pulau Seri Buat (new record).

Notes: Fig. 2m

Paranthura setigera Negoescu, 1997

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=255615>

Nomenclature:

Paranthura setigera Negoescu 1997: 232–241, figs. 33–38.

Materials

- a. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E 104° 6'1.97"; eventDate: 18 December 2012; habitat: coral rubble, intertidal; collectionCode: (1 female) UKMMZ-1623; (1 male) UKMMZ-1624; (91 females, 7 males) UKMMZ-1625
- b. island: Kampung Pasir Panjang, Pulau Tinggi; country: Malaysia; stateProvince: Johor; verbatimCoordinates: N2°17'37.96", E104° 6'1.97"; eventDate: 28 Feb 2013; habitat: coral rubble, intertidal; collectionCode: (26 females) UKMMZ-1626

Distribution: INDONESIA—Southeast Bali Island, Sanur beach, Bali Island (type locality); MALAYSIA—Pulau Tinggi (new record).

Notes: Fig. 2n

Paranthura seychellensis Kensley & Schotte, 2000

- WoRMS <http://www.marinespecies.org/aphia.php?p=taxdetails&id=211339>

Nomenclature:

Paranthura seychellensis Kensley and Schotte 2000: 2114–2116, fig 39.

Materials

Holotypes:

- a. island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104° 3'54.65"; eventDate: 18 April 2014; habitat:

Amongst coral rubble, littoral 0.5 to 15 m depth; collectionCode: (1 female) UKMMZ-1627; (1 male) UKMMZ-1628; (1 premature female) UKMMZ-1629

- b. island: Labas, Pulau Tioman; country: Malaysia; stateProvince: Pahang; verbatimCoordinates: N2°53'13.71", E104° 3'54.65"; eventDate: 18 April 2014; habitat: Amongst coral rubble, littoral 0.5 to 15 m depth; collectionCode: (1 female, 4 males) UKMMZ-1630

Distribution: SEYCHELLES—Mahé Beach Mahé Island (type locality); MALAYSIA—Pulau Tioman (new record).

Notes: Fig. 2o

Discussion

Currently five families of the marine Anthuroidea are known from the Malaysian Peninsular, comprising 12 genera and 24 species. Of these, 10 species (*Apanthura bruscai*, *A. tiomanae*, *Mesanthura asiatica*, *M. kiliani*, *Pendantthura tinggiensis*, *P. tiomanensis*, *Tinggianthura alba*, *Eisothistos besar*, *E. tiomanensis* and *Leptanthura coralliophila*) are recently discovered Malaysian species and they contribute about 1.5% of all known Anthuroidea of the world. Clearly, this number is only a fraction of their true diversity, given that habitats like shallow reefs, seagrasses and mangroves have not received much taxonomic attention. More species are yet to be discovered, especially after exploring inaccessible habitats, revealing of cryptic species using molecular methods and exploring east Malaysian (Sabah and Sarawak) waters. The latter is a region of high known marine biodiversity.

The anthuroids of Peninsular Malaysia are similarly taxonomically represented as the adjacent thoroughly studied Indian Ocean region by Kensley and Schotte (2000). In terms of faunistic composition, both the regions show a high proportion of Anthuridae species with 58.3% in the Malaysian region and 45.8% in the Indian Ocean region. It is followed by a small number of Leptanthuridae (12.5% in Malaysia and 20.8% in the Indian Ocean), Paranthuridae (12.5% in Malaysia and 12.5% in the Indian Ocean), Expananthuridae (12.5% in Malaysia and 8.3% in the Indian Ocean) and Hyssuridae (4.2% in Malaysia and 8.3% in the Indian Ocean). Having highlighted the similarity, a minor but crucial difference was also noticed, particularly on the occurrence of Antheluridae species in the Indian Ocean. According to Kensley (2001), most of the Antheluridae species are restricted to deep-water, cool-temperate or polar regions. Although several species are found to inhabit the warmer and shallower seas, particularly the eight species of *Anthomuda* Schultz, 1979, they are mostly captured from the Indian Ocean (Poore and Lew Ton 1988). The high species diversity, particularly in the family Anthuridae (17 species), can be attributed to the fact that the family is the largest and most widespread (Chew et al. 2014, Song and Min 2015). Some of its species-rich genera, *Apanthura* and *Mesanthura*, are recorded with the highest species diversity amongst the Malaysian anthuroid fauna. On the other hand, there is no record of any Antheluridae species occurring in the Malaysian region, most probably due to the fact that they are rare in the warmer seas (Kensley 2001, Poore and Lew Ton 1988).

Currently, all known Malaysian anthuroids are found to be associated with coral rubble. Other habitats, such as sandy and muddy sediments and algal beds, have not been sampled. Due to the fact that they are very well represented in the high spatial complexity coral rubble (Richmond 2011, Kensley 1998), coral rubble samplings were prioritised in the past works, as well as in the present study. From all coral rubble collections around the world, one generally true characteristic is that the *Eisothistos* species are rare and, if reported, they have usually been collected from breaking open serpulid tubes (Wägele 1981). Moreover, *Amakusanthura koonyumae*, a species previously known to inhabit sandy substratum (Bamber 1997, Bamber 2008), is now found to be associated with coral rubble of the Malaysian coral reefs.

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Author contributions

MC: Sample collection, wrote the manuscript draft and prepared line drawings. ABAR: Conducted sampling trips, provided generic identification, technical expertise, edited the draft, improved the taxonomic concept of the find, wrote the discussion and prepared the manuscript for the publication.

References

- Bamber RN (1997) Peracarid crustaceans from Cape d'Aguilar and Hong Kong, II. Tanaidacea: Apseudomorpha. In: Morton B (Ed.) The marine flora and fauna of Hong Kong and Southern China, Volume IV. Eighth International Marine Biological Workshop: The marine flora and fauna of Hong Kong and southern China, Hong Kong, Hong Kong, 2-20 April 1995. Hong Kong University Press, Hong Kong
- Bamber RN (2008) New species of anthurid and arcturid isopod (Crustacea: Peracarida: Isopoda) from Hong Kong. *Journal of Natural History* 42: 855-876. <https://doi.org/10.1080/00222930701850489>
- Barnard KH (1925) A revision of the family Anthuridae (Crustacea Isopoda), with remarks on certain morphological peculiarities. *Zoological Journal of the Linnean Society* 36: 109-160. <https://doi.org/10.1111/j.1096-3642.1925.tb01849.x>

- Richmond MD (Ed.) (2011) Isopoda. In: Bruce NL A field guide to the seashores of eastern Africa and the western Indian Ocean islands. 3rd Edition. Swedish International Development Cooperation Agency, Stockholm.
- Chew M, Abdul Rahim A, Haji Ross Ob (2014) *Tinggianthura alba*: A new genus and species of Anthuridae (Isopoda, Cymothoidea, Anthuroidea) from Pulau Tinggi, Johor, Malaysia with an updated key to the genera of Anthuridae . PLOS One 9 (6). <https://doi.org/10.1371/journal.pone.0099072>
- Chew M, Abdul Rahim Ab, Mohd Yusof NY (2016) Two new species of *Pendanthura* (Isopoda, Cymothoidea, Anthuroidea) from the east coast of Peninsular Malaysia with an identification key to the species of *Pendanthura* . Bulletin of Marine Science 92 (2): 229-242. <https://doi.org/10.5343/bms.2015.1056>
- Chew M, Abdul Rahim A, Mohd Yusof NY (2018) A new species of *Eisothisetos* (Isopoda, Cymothoidea) and first molecular data on six species of Anthuroidea from the Peninsular Malaysia. Zoosystematics and Evolution 94 (1): 73-81. <https://doi.org/10.3897/zse.94.23000>
- Chilton C (1924) Fauna of the Chilka Lake. Tanaidacea and Isopoda . Memoirs of the Indian Museum 5: 875-895.
- Hoeksema BW (2007) Delineation of the Indo-Malayan Centre of maximum marine biodiversity: The Coral Triangle. Biogeography, Time, and Place: Distributions, Barriers, and Islands 117-178. https://doi.org/10.1007/978-1-4020-6374-9_5
- Keable SJ (2006) Taxonomic revision of *Natatolana* (Crustacea: Isopoda: Cirolanidae). Records of the Australian Museum 58: 133-244. <https://doi.org/10.3853/j.0067-1975.58.2006.1469>
- Kensley B (1979) New species of anthurideans from the Cook and Fiji Islands (Crustacea: Isopoda: Anthuridae). Proceedings of the Biological Society of Washington 92: 814-836.
- Kensley B (1980) Records of anthurids from Florida, Central America, and South America (Crustacea: Isopoda: Anthuridae). Proceedings of the Biological Society of Washington 93: 725-742. URL: <http://biodiversitylibrary.org/page/34599608>
- Kensley B, Poore GCB (1982) Anthurids from the Houtman Abrolhos Islands, Western Australia (Crustacea: Isopoda: Anthuridae). Proceedings of the Biological Society of Washington 95: 625-636.
- Kensley B (1987) A re-evaluation of the systematics of K.H. Barnards review of anthuridean isopods. Steenstrupia 13 (3): 101-139.
- Kensley B (1998) Estimates of species diversity of free-living marine isopod crustaceans on coral reefs. Coral Reefs 17 (1): 83-88. <https://doi.org/10.1007/s003380050100>
- Kensley B, Schotte M (2000) New species and records of anthuridean isopod crustaceans from the Indian Ocean. Journal of Natural History 34 (11): 2057-2121. <https://doi.org/10.1080/002229300750022358>
- Müller HG (1991) New species and records of *Amakusanthura*, *Cyathura* and *Haliophasma* from Sri Lanka (Crustacea: Isopoda: Anthuridae). Revue Suisse de Zoologie. 98: 589-622. <https://doi.org/10.5962/bhl.part.79806>
- Müller HG (1992a) Anthuridae from coral reefs at Bora Bora and Moorea, Society Islands, with description of three new species (Crustacea: Isopoda). Senckenbergiana Biologica 72: 353-371.

- Müller HG (1992b) Anthuridae of the genera *Apanthura* and *Cyathura* from Malaysia coral reefs, with description of two new species (Crustacea: Isopoda: Anthuridae). *Zoologischer Anzeiger* 228: 156-166.
- Müller HG (1992c) *Eisothistos besar* n. sp. from a coral reef in the Tioman Archipelago, first member of the genus from southeast Asia (Crustacea: Isopoda). *Revue Suisse de Zoologie* 99: 369-376. <https://doi.org/10.5962/bhl.part.79835>
- Müller HG (1993) The genus *Mesanthura* Barnard, 1914 from coral reefs in Kenya and Malaysia, with descriptions of three new species (Crustacea: Isopoda: Anthuridae). *Mitteilungen aus dem Museum für Naturkunde in Berlin. Zoologisches Museum und Institut für Spezielle Zoologie (Berlin)* 69 (1): 19-44. <https://doi.org/10.1002/mmnz.19930690103>
- Myers N, Mittermeier RA, Mittermeier CG, Fonseca GA, Kent J (2000) Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858. <https://doi.org/10.1038/35002501>
- Negoescu I, Wägele JW (1984) World list of the anthuridean isopods (Crustacea, Isopoda, Anthuridea). *Travaux du Museum d'Histoire Naturelle Gigore Antipa* 25: 99-46.
- Negoescu I (1997) Isopoda Anthuridea results of the Zoological Expedition organized by "Grigore Antipa" Museum in the Indonesia Archipelago (1991). *Pericarida (Crustacea). Travaux du Museum National d'Histoire Naturelle Gigore Antipa* 38: 177-251.
- Negoescu I (1999) Isopoda Anthuridae (Crustacea) from Fiji Islands. Three new species. First record of primary and secondary males in Paranthuridae family. *Travaux du Museum d'Histoire Naturelle Gigore Antipa* 41: 199-280.
- Negoescu I, Brandt A (2001) *Apanthura monodi* sp. nov. and *Apanthura forceps* sp. nov. (Isopoda: Anthuridea) from the southwest Pacific Ocean, Papua New Guinea and redescription of two species. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 98: 99-130.
- Nierstrasz HF (1941) Die Isopoden der Siboga-Expedition, IV. Isopoda Genuina. III. Gnathiidea, Anthuridea, Valvifera, Asellota, Phreatochoidea. *Siboga Expedition Monographie* 32d: 235-305.
- Pillai NK (1966) Littoral and parasitic isopods from Kerala: Family Anthuridae, 1. *Journal of the Bombay Natural History Society* 63 (1): 152-161.
- Poore GC (1980) A revision of the genera of the Paranthuridae (Crustacea: Isopoda: Anthuridae) with a catalogue of species. *Zoological Journal of the Linnean Society* 68: 53-67. <https://doi.org/10.1111/j.1096-3642.1980.tb01918.x>
- Poore GCB, Lew Ton HM (1988) A generic review of the Hyssuridae (Crustacea: Isopoda) with a new genus and new species from Australia. *Memoirs of the Museum of Victoria* 49 (1): 169-193. <https://doi.org/10.24199/j.mmv.1988.49.11>
- Poore GCB, Lew Ton HM (1990) *Accalathura* (Crustacea: Isopoda: Paranthuridae) from northern Australia and adjacent seas. *Memoirs of the Museum of Victoria* 50 (2): 379-402. <https://doi.org/10.24199/j.mmv.1990.50.11>
- Kensley B, Brusca RC (Eds) (2001) Families and genera of Isopoda Anthuridea. In: Poore GCB *Isopod systematics and evolution. Crustacean Issues*, 13. Balkema, Rotterdam, 63–173 pp.
- Poore GCB, Lew Ton HM (2002) *Epanathuridae* (Crustacea: Isopoda) from the Australian region. *Zootaxa* 82 (1): 1-60. <https://doi.org/10.11646/zootaxa.82.1.1>
- Roberts CM (2002) Marine biodiversity hotspots and conservation priorities for tropical reefs. *Science* 295 (5558): 1280-1284. <https://doi.org/10.1126/science.1067728>

- Schmalfuss H (2003) World catalog of terrestrial isopods (Isopoda: Oniscidea). Stuttgarter Beiträge zur Naturkunde, Ser. A 654: 1-341.
- Song J, Min G (2015) Two new species, *Caenanthura koreana* sp. nov. and *Apanthura koreaensis* sp. nov. (Crustacea: Isopoda: Anthuridae) from South Korea. Zootaxa 3937 (2): 362-376. <https://doi.org/10.11646/zootaxa.3937.2.7>
- Gardiner JS (Ed.) (1904) Marine crustaceans. XII. Isopoda, with description of a new genus. In: Stebbing TR The fauna and geography of the Maldive and Laccadive Archipelagoes being the account of the work carried on and of the collections made by an expedition during the years 1899 and 1900. University Press, Cambridge. <https://doi.org/10.5962/bhl.title.10215>
- Wägele JW (1981) Study of the Hyssuridae (Crustacea: Isopoda: Anthuridea) from the Mediterranean and the Red Sea. Israel Journal of Zoology 30: 1-2.
- Wägele JW (1984) Two new Littoral Anthuridea from Baja California and redescription of *Mesanthura occidentalis* (Crustacea, Isopoda). Zoologica Scripta 13: 45-57. <https://doi.org/10.1111/j.1463-6409.1984.tb00022.x>
- Wilson GF (2007) Global diversity of Isopod crustaceans (Crustacea; Isopoda) in freshwater. Hydrobiologia 595 (1): 231-240. <https://doi.org/10.1007/s10750-007-9019-z>
- WoRMS Editorial Board (2020) World Register of Marine Species. <http://www.marinespecies.org>. Accessed on: 2020-6-12.