

Axiidea (Micheleidae) and Gebiidea (Laomediidae and Upogebiidae) of Panglao, the Philippines

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Abstract

A summary of species from one axiidean family and two gebiidean families collected during the Panglao Marine Biodiversity Project 2004 is presented. The axiidean family Micheleidae is represented by one damaged specimen, tentatively identified as *Michelea* sp. The gebiidean family Laomediidae is represented by two species, *Naushonia carinata* DWORSCHAK, MARIN & ANKER, 2006 and *Axianassa heardi* ANKER, 2011. The family Upogebiidae is the most diverse and represented by nine species, *Acutigebia* sp., *Neogebicula monochela* (SAKAI, 1967) with one specimen each, *Gebiacantha ceratophora* (DE MAN, 1905) and *G. multispinosa* NGOC-HO, 1994 with two and three specimens, respectively, *G. laurentae* NGOC-HO, 1989 with 21 specimens was the most common followed by *Upogebia barbata* (STRAHL, 1862) and *U. holthuisi* SAKAI, 1982 with 8 and 6 specimens, respectively. Figures for seven species of Upogebiidae are presented. Except for *U. barbata*, all upogebiid species and *Axianassa heardi* are here recorded the first time from the Philippines.

Key words: Axiidea, Micheleidae, Gebiidea, Laomediidae, Upogebiidae, Panglao, Philippines, burrowing shrimp

Introduction

The international Panglao Marine Biodiversity Project in May-July 2004 consisted of an extensive sampling of molluscs and decapod crustaceans around the island of Panglao, southwest of Bohol, Philippines (BOUCHET et al. 2009). The special task of the author during this survey was to collect axiidean and gebiidean shrimp and their associated decapod and mollusc fauna with the aid of a yabby pump.

This sampling of axiideans and gebiideans revealed numerous new records and several undescribed species that have been studied in earlier papers (DWORSCHAK 2006, 2007, 2011a, b, 2014, 2018, DWORSCHAK et al. 2006).

The aim of the present paper is to provide a summary of the species of the axiidean family Micheleidae and the gebiidean families Laomediidae and Upogebiidae. Notes and figures of the species collected at Panglao are presented.

Material and Methods

Specimens from subtidal sediments were collected with several methods indicated by a single letter in station numbers: S, suction (airlift sampler); B, brushing; D, dredge; T, trawl and P, tangle nets (BOUCHET et al. 2009). In addition, shrimps were extracted with

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an improvised PVC pump – “yabby pump”, see DWORSCHAK (2015) – or collected by hand. Shrimp were chilled on ice, then preserved in 75% ethanol. All drawings were made using a camera lucida mounted on a stereomicroscope, digitised and then inked and composed in Adobe Illustrator (COLEMAN 2003). Digital photographs were taken with a Nikon 995 camera mounted on a stereomicroscope. Stacks of several frames of different focal planes were fused using CombineZ5 (HAUG et al. 2011).

The material is deposited in the following repositories: Muséum national d’Histoire naturelle, Paris, France (MNHN); Naturhistorisches Museum Wien, Austria (NHMW); National Museum of the Philippines, Manila (NMCR); Zoological Reference Collection, Lee Kong Chian Natural History Museum (ex Raffles Museum of Biodiversity Research), National University of Singapore (ZRC).

The size is expressed in mm as total length (TL) from the tip of the rostrum to the end of the telson and as carapace length (CL) from the tip of the rostrum to the posterior median edge of the carapace in the form (TL/CL). Other abbreviations: A1, first antenna (antennule); A2, second antenna; Mxp3, third maxilliped; P1–5, first to fifth pereopods, respectively; coll., collector. Numbers preceded by “PD” are field collection numbers. For details on sampling sites and methods of the Panglao Marine Biodiversity Project 2004 see BOUCHET et al. (2009).

Synonyms of species with respective references are listed only for original descriptions and major revisions with more extensive synonymy listings.

Terminology for the orientation of the limbs follows POORE (1997) where “upper” is used to describe the extensor (or anatomically anterior) margin and “lower” the flexor (or posterior) margin.

Systematic account

Axiidea DE SAINT LAURENT, 1979

Micheleidae SAKAI, 1992

***Michelea* KENSLEY & HEARD, 1991**

***Michelea* sp.**

Material examined. Between Momo and Napaling (B42: 9°37.0'N, 123°46.0'E) 30–33 m, ledge on reef wall, 1 female (13/3.6 damaged) NMCR 50817, coll. 6 July 2004.

Remarks. The specimen is much too damaged to be identified to species. First record of the genus for the Philippines.

Laomediidae BORRADAILE, 1903***Naushonia* KINGSLEY, 1897*****Naushonia carinata* DWORSCHAK, MARIN & ANKER, 2006**

Naushonia carinata DWORSCHAK, MARIN & ANKER, 2006: 3, figs. 1–6; — ANKER et al., 2015: 333, fig. 24A; — KOMAI & ANKER, 2015: 344, fig. 1A.

Material examined. Doljo Point, (M5[M8]: 9°35.5'N 123°44.3'E) mixed intertidal platform, fringe mangrove, 1 female (20/8.8, left cheliped missing) NMCR 27006, P. Dworschak coll. with yabby pump from mound of *Glypturus armatus* 2 June 2004 (PD16).

Comparative material. See DWORSCHAK et al. (2006)

Description. See DWORSCHAK et al. (2006).

Distribution. Vietnam (type locality); Philippines, Bohol; Indonesia, Lombok; Japan, Iriomote I. (DWORSCHAK et al. 2007, ANKER et al. 2015, KOMAI & ANKER 2015).

Axianassa* SCHMITT, 1924**Axianassa heardi* ANKER, 2011**

Axianassa heardi ANKER, 2011: 14, figs. 9–13.

Material examined. Lagoon near Doljo Point (R44: 9°33.3'/9°34.6'N, 123°43.9'/123°43.4'E) 2 m, fine sand with seagrass (*Enhalus*), 1 female (11/3.7, right cheliped missing) NMCR 50124, P. Dworschak coll. with yabby pump 14 June 2004 (PD95).

Description. See ANKER (2011).

Remarks. Two species of *Axianassa* show a suture on the uropodal exopod, *A. heardi* and *A. japonica* KOMAI, 2014 (KOMAI 2014). The specimen is assigned to *A. heardi* because it shows a blunt rostrum, lacks spines on the dorsal face of the telson, and lacks the incomplete suture on the uropodal endopod.

Distribution. Australia, Queensland, Lizard Island; French Polynesia, Moorea (ANKER 2011). New record for the Philippines.

Upogebiidae BORRADAILE, 1903***Acutigebia* SAKAI, 1982*****Acutigebia* sp. (Fig. 1a–h)**

Material examined. Pamilacan Island (B25: 9°29.4'N 123°561'E) 16 m, reef slope, 1 ovigerous female, (fragments) NMCR 50801, coll. 25 June 2004 (PD208).

Remarks. The specimen is too fragmented to be identified to species level. From the remains of one cheliped, it is similar to *A. kyphosoma* (SAKAI, 1993) but the telson lacks a median spine and is broader than long, thus keying out to *A. trybeta* (SAKAI, 1970) when using SAKAI (2006: 18).

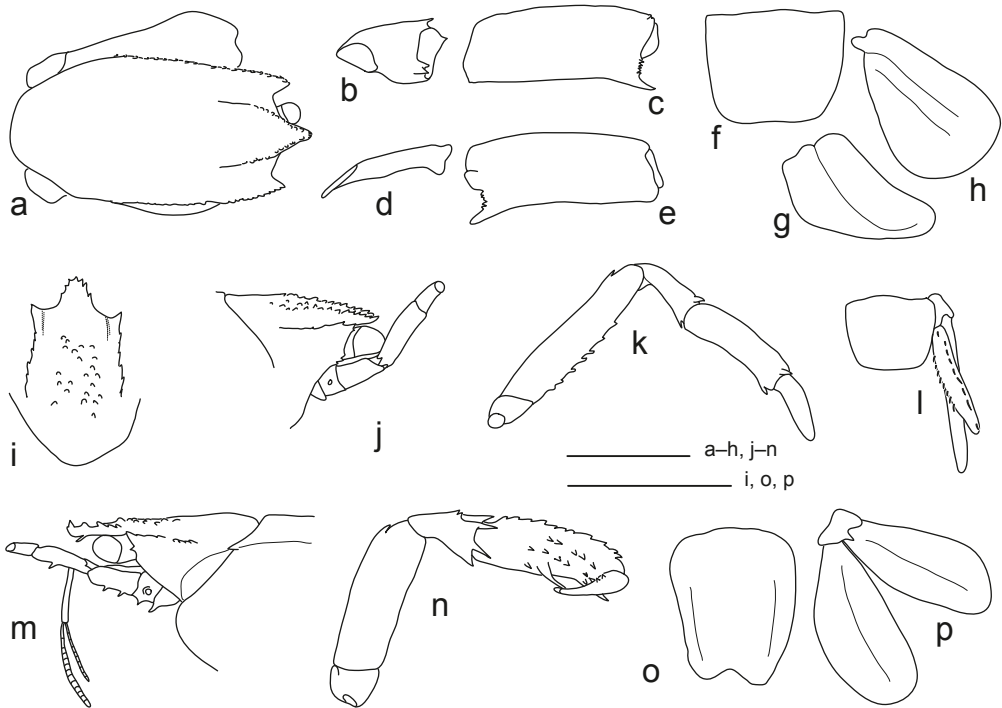


Fig. 1: *Acutigebia* sp., ovigerous female (fragments), NMCR 50801: a, front in dorsal view; P1 carpus (b) and propodus (c), mesial view; P1 dactylus (d) and propodus (e) in lateral view; f, telson; g, uropodal endopod; h, uropodal exopod. *Neogebicula monochela* (SAKAI, 1967), ovigerous female (8/1.9), NMCR 50818: i, front in dorsal view; j, same, lateral view; k, P1, mesial view; l, telson and right uropods. *Gebiacantha ceratophora* (DE MAN, 1905), female (8/3.0), NMCR 50112: m, front, lateral view; n, P1, mesial view; o, telson; p, right uropods. Setae omitted. Scale bar is 1 mm.

Neogebicula SAKAI, 1982

Neogebicula monochela (SAKAI, 1967) (Fig. 1i–l)

Gebicula monochela SAKAI, 1967: 322, fig. 2, pl. 11B.

Upogebia (*Neogebicula*) *monochela*; — SAKAI, 1982: 75.

Neogebicula monochela; — SAKAI, 1993: 95; — NGOC-HO, 1995: 78; — SAKAI, 2006: 6; — 2015b: 580 (key).

Material examined. North of Doljo, (B35: 9°35.9'N, 123°44.5'E), 31 m, reef wall, 1 ovigerous female (8/1.9) NMCR 50818, coll. 1 July 2004.

Remarks. The specimen keys out to *N. monochela* in the keys of SAKAI (2006, 2015b). It has a P1 with a small fixed finger and spines on the anterior border of the carapace. It differs from *N. monochela* in lacking spines on the cervical groove.

Distribution. Known only from the type locality, Uze, off Tomioka, Amakusa, Kumamoto Prefecture, Japan (SAKAI 2006). New record for the Philippines.

Gebiacantha* NGOC-HO, 1989**Gebiacantha ceratophora* (DE MAN, 1905) (Fig. 1m–p)**

Upogebia (*Upogebia*) *ceratophora* DE MAN, 1905: 602; — 1928: 69, pl. 6, fig. 9–g; — SAKAI, 1982: 49 (part).
Upogebia ceratophora; — DE SAINT LAURENT & NGOC-HO, 1979: 63–65, figs. 6–8, 22–24; — Sakai, 2006: 101 (extended synonymy).

Gebiacantha ceratophora; — NGOC-HO, 1989: 122; — 1994a: 64, fig. 5.

Paragebicula ceratophora; — SAKAI, 2015b: 581 (key).

Material examined. Maribohoc Bay (P1: 9°36.1'N, 123°45.0'E) 90–200 m, tangle nets from local fishermen, 1 female (8.2/3.0) NMCR 50112, 1 male (7.6/2.7) NMCR 50113, coll. 30 May 2004 (PD210).

Description. See DE MAN (1928).

Remarks. SAKAI (1982) synonymised *U. acanthochela* SAKAI, 1967 from the Yellow Sea with *U. ceratophora*, but later considers it as a valid species (SAKAI 2006). SAKAI (1982: 49–52) referred two specimens from Holothuria Bank to *U. ceratophora*, without being aware that DE SAINT LAURENT & NGOC-HO's (1979) *U. acutispina* was based on those two specimens. Only in the addendum (SAKAI, 1982: 105) he came to the conclusion that *U. acutispina* specimens are in fact adults of *U. ceratophora*. Later SAKAI (2006) regarded both *U. acanthochela* and *U. acutispina* as valid. The generic placement of these species was controversial, but they are currently placed in the genus *Gebiacantha* (see KOMAI 2017).

Distribution. Indonesia (SAKAI 2006). New record for the Philippines.

***Gebiacantha laurentae* NGOC-HO, 1989 (Fig. 2)**

Gebiacantha laurentae NGOC-HO, 1989: 140, fig. 9; — 1994a: 61 (key); — 1994b: 193, fig. 1; — 2001: 54.
Upogebia laurentae; — SAKAI 2006: 123.

Paragebicula laurentae; — SAKAI, 2015b: 581 (key).

Material examined. Cortes (T19: 9°42.2'N, 123°50.8'E) 10–26 m, mud, 1 male (13.4/4.5) NMCR 39115, 1 female (damaged) NMCR 39116, 1 juv. (10.2/3.7) NMCR 39117, 1 juv. (8.1/2.9) ZRC 2017.0422, 1 juv. (10.3/3.7) MNHN-2016-3502, 1 juv. (11.4/4.1) MNHN-2016-3503, coll. 20 June 2004 (PD153–158); — Cortes (D10: 9°42.4'N 123°50.6'E) 15–22 m, mud, 1 juv. (7/2.5) ZRC 2017.0423, coll. 20 June 2004 (PD159); — Manga (S20: 9°41.8'N, 123°51.1'E) 10 m, mud, 1 ovigerous female (17.1/5.4) NHMW 25879, 1 male (16.9/5.7) NHMW 25880, 1 juv. (8.6/3.0) ZRC 2017.0424, coll. 20 June 2004 (PD168–170); — Ubajan (S25: 9°41.5'N, 123°51.0'E) 21 m, mud, 1 female (18.5/5.7) NHMW 25881, 1 ovigerous female (16.4/5.2) NHMW 25882, 1 male (14.1/4.6) NHMW 25883, 8 juv. (8.8–10.2/3.2–3.9) NHMW 25884, 1 juv. (7.7/2.8) MNHN-2016-3504, coll. 23 June 2004 (PD189–191); — Cortes (T22: 9°42.5'N, 123°50.7'E) 11–20 m, mud, 1 juv. (11.6/4.3) MNHN-2016-3505, coll. 21 June 2004.

Description. See NGOC-HO (1989)

Remarks. The specimens were identified as *G. laurentae* using the key to species in NGOC-HO (1994a) because the small lateral teeth on the rostrum and the propodus that strongly protrudes backward over the carpus. The number of spines on the dorsal and ventral face of P1 merus, however, is not as constant as given in NGOC-HO (1989: table 1), and ranges from 4 to 6 dorsally and 6 to 9 ventrally, instead of 8 and 10, respectively. In addition, most specimens had only two infrarostral spines. A constant character is the single strong spine on the cervical groove. This species shows an unusually strong distortion of the cheliped propodus at the articulation with the carpus (almost 90° to the outside) and a strong setation on its anatomical mesial faces of the carpus and propodus (Fig. 2).

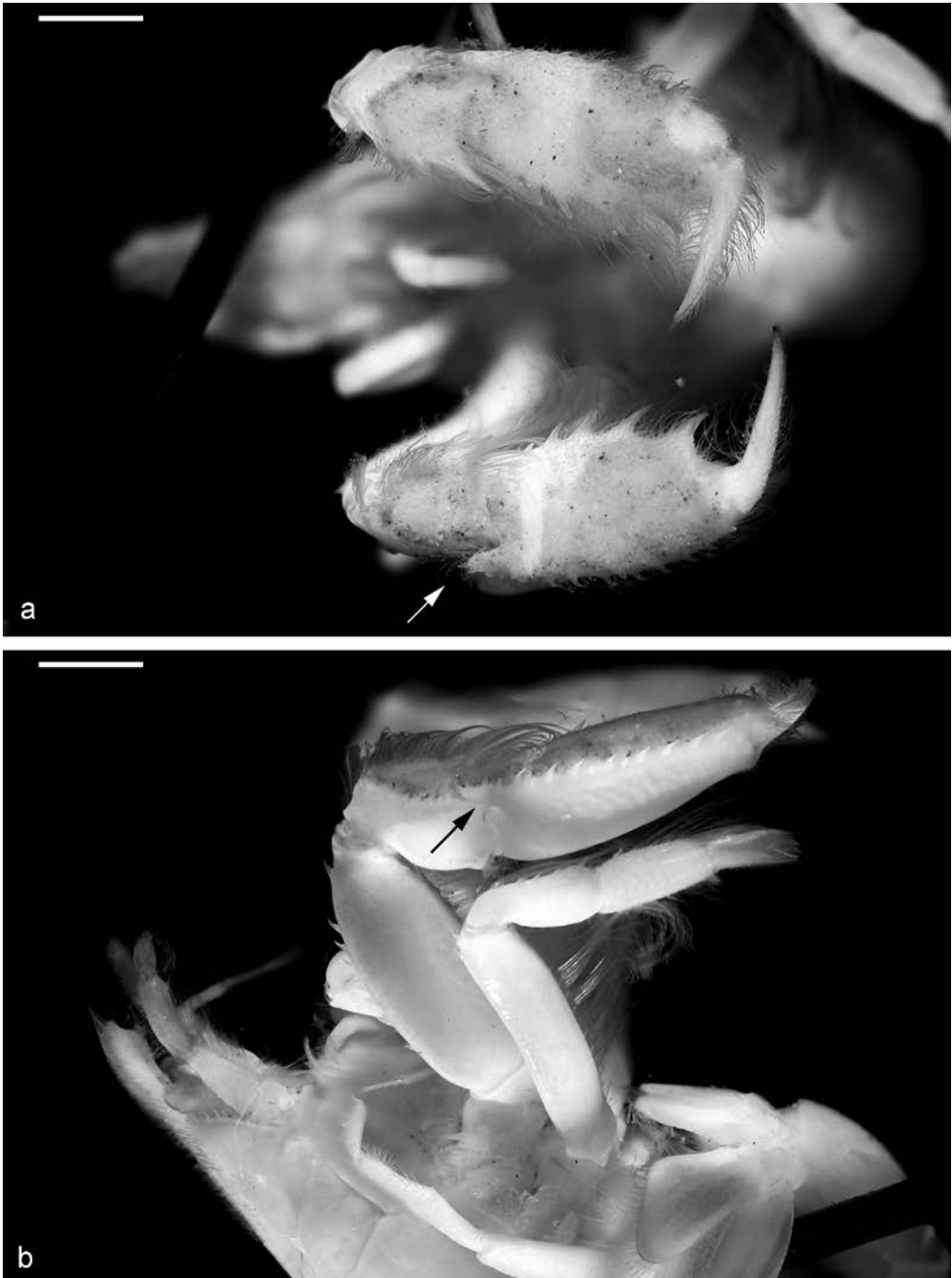


Fig. 2: *Gebiacantha laurentae* NGOC-HO, 1989, NHMW 22880 (male 17/5.7). a, frontal view showing dorsal (anatomical mesial) face of P1; b, lateral view of front, P1, P2, P4 and tailfan. Arrow points to propodus extension over carpus. Scale bare is 1 mm.

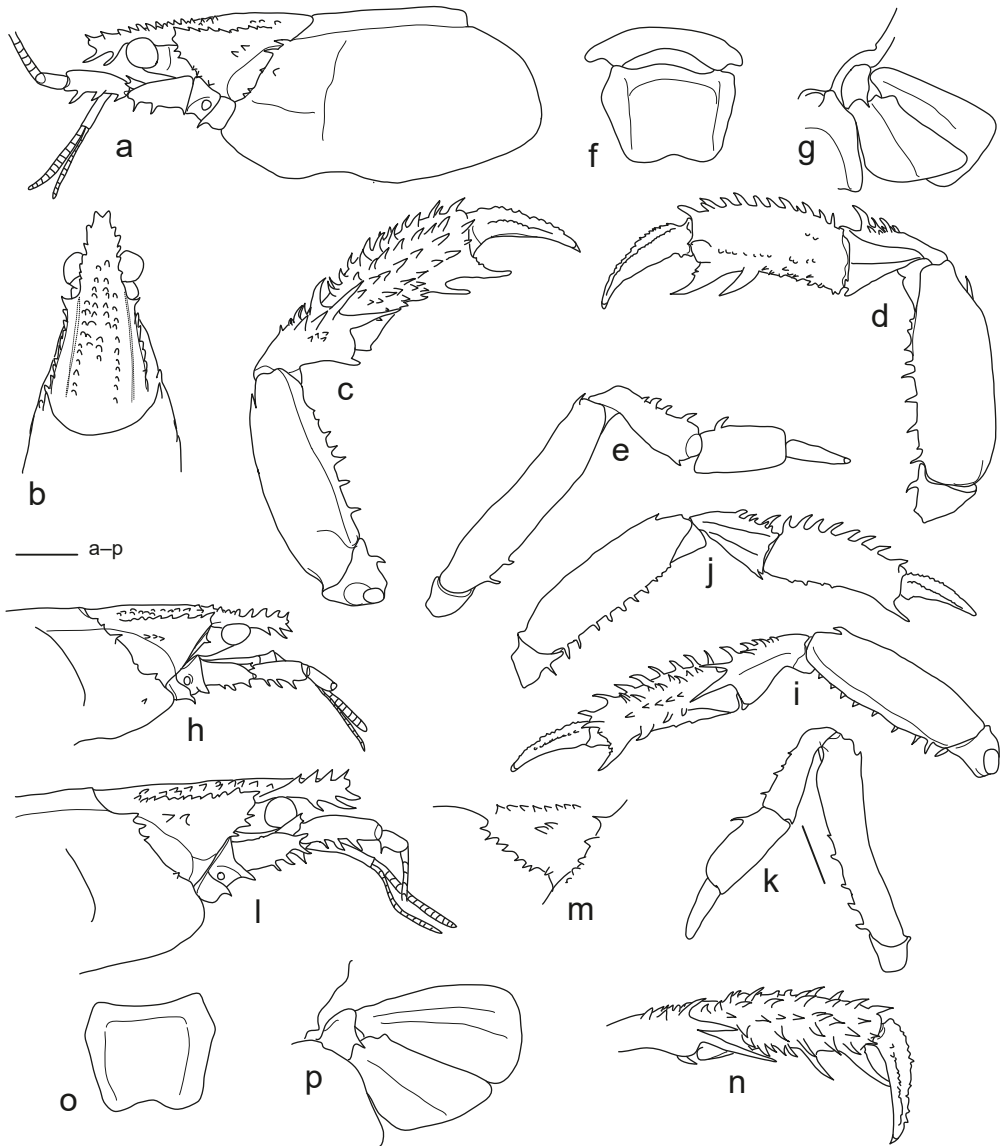


Fig. 3: *Gebiicantha multispinosa* NGOC-Ho, 1994, a–g, ovigerous female (21/6.7) NHMW 26061; h–k, female (16/5,6) NMCR 50105; l–p, male (19/6.8) NHMW 26060. a, carapace in lateral view, b, front in dorsal view; h, l, front in lateral view; m, hepatic region on left side; c, i, n, P1 in mesial view; d, j, same, lateral view, e, k, P2, lateral view; f, o, telson; g, p, right uropods. Setae omitted. Scale bar is 1 mm.

Distribution. Indonesia, Papua New Guinea (NGOC-Ho 1994b). New record for the Philippines.

***Gebiicantha multispinosa* NGOC-Ho, 1994 (Fig. 3)**

Gebiicantha multispinosa NGOC-Ho, [1994a: 60(list), 61(key)]; — 1994b: 194, fig. 2; — Sakai, 2006: 80(key), 130.

Material examined. North of Doljo (B36: 9°35.9'N, 123°44.5'E) 24 m, reef wall, 1 female (16/5.6) NMCR 50105, coll. 1 July 2004; — between Momo and Napaling (B42: 9°37.0'N, 123°46.0'E) 30–33 m, ledge on reef wall, 1 ovigerous female (21/6.7) NHMW 26060, 1 male (19/6.8) NHMW 26061, coll. 6 July 2004.

Description. See NGOC-Ho (1994b).

Remarks. The specimens are assigned to this species because of the prominent knob on the uropodal endopod. SAKAI (2006) stated that this species is hardly distinguishable from *G. acutispina*, but gave as further discriminating character, the shape of the infra-rostral spines: the median one of the three infra-rostral spines is more projecting forward than the others in *G. multispinosa*, whereas in *G. acutispina* it is the proximalmost spine of the three that is more projecting forward. This also appears quite variable in species of *Gebiacantha*, as well as the number of infra-rostral spines. Two of the present three specimens here had three, one had two infra-rostral spines. One specimen had a spine on the lower border of ultimate article of the antennal peduncle, the other two specimens lacked this spine. Spines on the anterolateral margin and along the cervical groove are also variable in number, differing even between the left and right sides (see Fig. 3l and m).

Distribution. Only known from the type locality, New Caledonia. New record for the Philippines.

Upogebia LEACH, 1814

Upogebia barbata (STRAHL, 1862) (Fig. 4)

Gebia barbata STRAHL, 1862a: 1062 (part.), figs. 7–9; — STRAHL, 1862b: 388; — ESTAMPADOR, 1937: 499; — 1959: 46.

Upogebia (Calliadne) Darwinii; — NOBILI, 1906: 97; — DE MAN, 1928: 24 (list), 84, pl. 8 fig. 12–12b, pl. 9 fig. 12c–f.

Upogebia darwini; — NGOC-HO, 1977: 444 (part), fig. 4f–i.

Upogebia (Upogebia) barbata; — SAKAI, 1982: 34, figs. 6c, 8b–c; — 1984: 159.

Upogebia barbata; — SAKAI, 2006: 94 (extended synonymy); — 2015a: 441; — NGOC-HO, 2008: 143, fig. 6.

Material examined. North of Doljo (B35: 9°35.9'N, 123°44.5'E) 31 m, reef wall, 1 female (9.7/2.8) NMCR 50108, coll. 1 July 2004; — North of Doljo (B36: 9°35.9'N, 123°44.5'E) 24 m, reef wall, 1 male (20.3/6.1) NHMW 26065, 1 male (19.4/5.5) NHMW 26066, 1 male (20/5.7) NHMW 26067, 1 ovigerous female (16/4.7) NHMW 26068, 1 ovigerous female (21/5.7) NHMW 26069, coll. 1 July 2004; — Catarman (B7, 9°35.9'N, 123°51.8'E) 4–30 m, reef slope with caves, 1 ovigerous female (17/5.1) NMCR 50106, 1 male (17/5.2) NMCR 50107, coll. 5 June 2004.

Description. See NGOC-Ho (2008).

Remarks. DE MAN (1928: 84) considered *U. barbata* identical with *U. carinicauda*. According to SAKAI (1982: 35), the original type series of this species, comprising seven specimens, actually included two specimens of *U. barbata*, one of *U. ancylodactyla* and four of *U. carinicauda*. The female lectotype of *Gebia barbata* was selected, described and figured by SAKAI (1982: 34, figs. 6c, 8b, c) (see also NGOC-HO 2008). SAKAI (1982) assigned also the specimens figured by DE MAN (1928) as *U. darwini* to *U. barbata*, while NGOC-HO (2008) considered it belonging to *U. intermedia* (DE MAN, 1888). The latter species has been synonymised with *U. darwini* (= *U. barbata* fide SAKAI) by DE MAN (1928) and its lectotype (selected by SAKAI, 1982) is identical with *U. carinicauda* while the paralectotype has been assigned to *U. barbata* by SAKAI (1982, 2006).

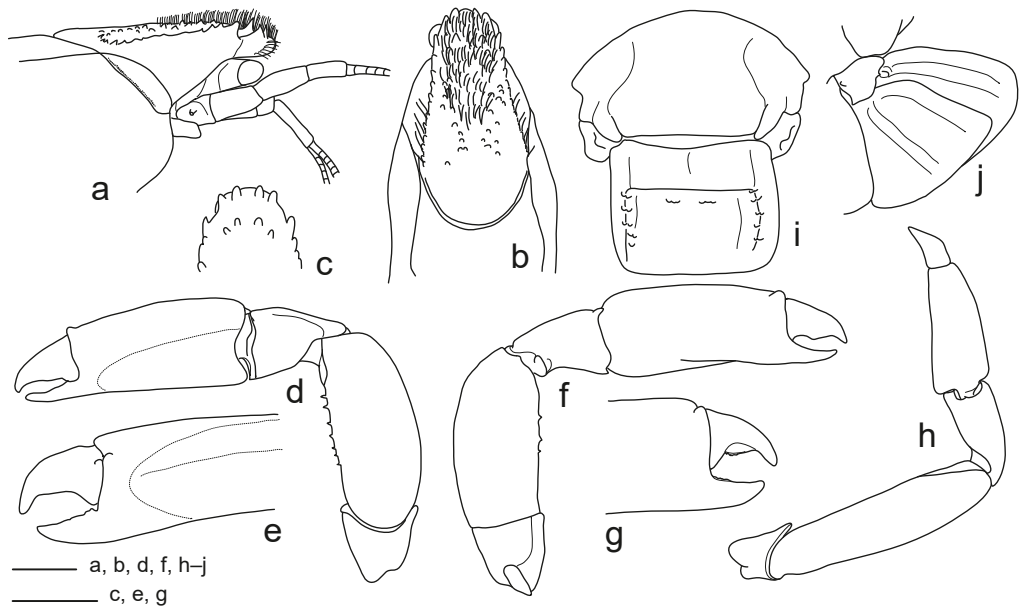


Fig. 4: *Upogebia barbata* (STRAHL, 1862), NHMW 26066 (male 19/5.5). a, front, lateral view; b, same, dorsal view; c, rostrum; d, P1, lateral view; e, same, detail in ventrolateral view; f, same, mesial view; g, same, detail in dorsomesial view; h, P2, lateral view; i, pleomere 6 and telson; j, right uropod. Scale bar is 1 mm.

The present specimens are assigned to *U. barbata* because of 1) the lack of an antennal scale, 2) the antennular peduncle exceeded by the article 5 of antennal peduncle and 3) the lack of upper and lower spines on the P1 carpus.

Distribution. Philippines: Albay, Luzon (type locality, STRAHL 1882); Bay of Djakarta, Indonesia (SAKAI 1984); Dampier Archipelago, Western Australia (NGOC-HO 2008); Red Sea (SAKAI 2015a).

Upogebia holthuisi SAKAI, 1982 (Fig. 5)

Upogebia amboinensis HOLTHUIS, 1953: 51 [not *Gebiopsis intermedia* var. *amboinensis* DE MAN, 1888]

Upogebia (*Upogebia*) *holthuisi* SAKAI, 1982: 33, figs. 6b, 7d–f, 8d; — 1984: 160.

Upogebia holthuisi; — NGOC-HO, 1991: 299, fig. 8; — 2008: 156, fig. 12C–H; — SAKAI, 2006: 117, fig. 19.

Material examined. Doljo point (B12: 9°35.6'N, 123°43.2'E) 24–27 m, reef slope, 1 male (28/8.6) NHMW 26070, coll. , 14 June 2004; — North of Doljo (B36: 9°35.9'N, 123°44.5'E), 24 m, reef wall, 1 female (28/8.2) NHMW 26062, 1 female (16/5.3, with *Phyllodurus*) NHMW 26063, 1 male (29/8.7) NHMW 26064, coll. 1 July 2004; — Cortes, (T21: 9°42.8'N, 123°50.6'E) 12 m, dead corals, 1 female (10/3.1) NMCR 50111, coll. 21 June 2004 (PD180); — Napaling (B21: 9°37.2'N, 123°46.4'E) 20–21 m, reef wall with small caves, 1 juv. (9.6/2.7) NMCR 50110, coll. 24 June 2004.

Description. See SAKAI (1982) and NGOC-HO (1991).

Remarks. The present specimens are assigned to *U. holthuisi* because of the following: 1) the linea thalassinica extending to the posterior margin of the carapace, 2) the rostrum with a pair of subterminal denticles and another pair of proximal ones and 3) the

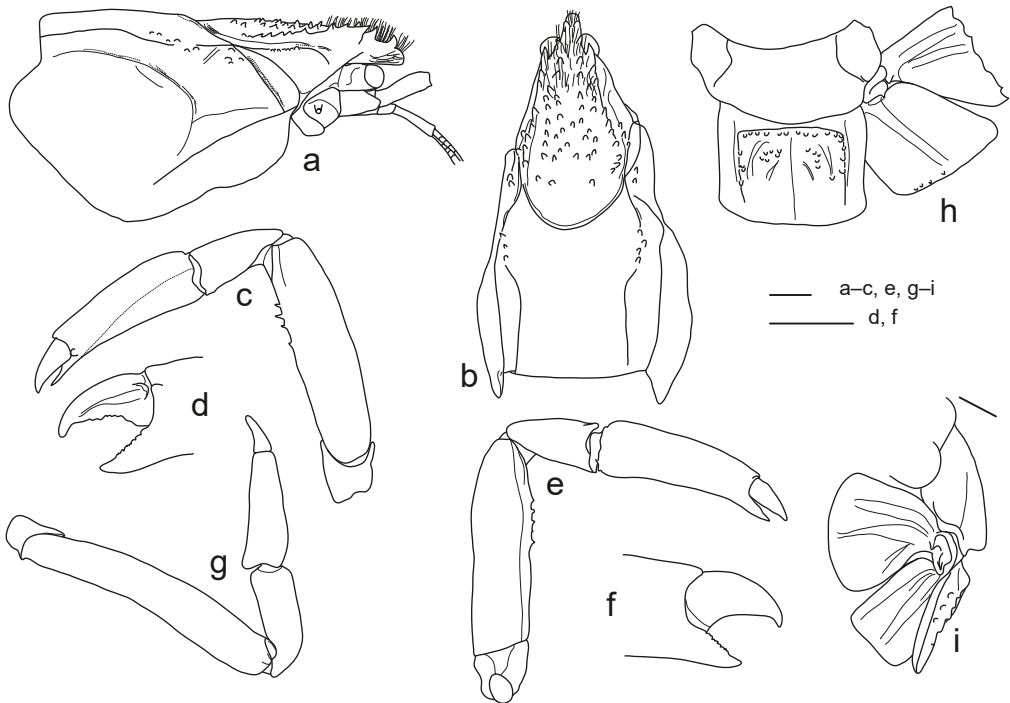


Fig. 5: *Upogebia holthuisi* SAKAI, 1982, NHMW 26062 (female 28/8.2). a, carapace, lateral view; b, same, dorsal view; c, P1, lateral view; d, same, detail in ventrolateral view; e, same, mesial view; f, same, detail in dorsomesial view; g, P2, lateral view; h, pleomere 6, right uropod and telson; i, tailfan, lateral view. Scale bar is 1 mm

posterior part of the carapace bearing dorsolateral tubercles along the cervical groove and along the linea thalassinica (see Fig. 5a, b and SAKAI 1982: fig. 6b).

Distribution. Onotos, Gilbert Islands (type locality); New Caledonia; Sri Lanka; Western Australia (SAKAI 2006, NGOC-HO 2008). New record for the Philippines.

Upogebia hexaceras (ORTMANN, 1894)

Gebia (*Gebiopsis*) *hexaceras* ORTMANN, 1894: 23, pl. 3 fig. 1.

Upogebia (*Calliadne*) *hexaceras*; — DE MAN, 1928: 24 (list), 81, pl. 8 fig. 11–11f.

Upogebia (*Upogebia*) *hexaceras*; — SAKAI, 1982: 23, pls A4, C4.

Upogebia hexaceras; — NGOC-HO, 1990: 979, fig. 8.

Upogebia darwinii; — SAKAI, 2006: 101(part), fig. 16 [not *Upogebia darwinii* (MIERS, 1884)]

Not *Upogebia* (*Calliadne*) *hexaceras*; — POORE & GRIFFIN, 1979: 299, fig. 50 [= *Upogebia darwinii* (MIERS, 1884)].

Material examined. West Tutoland (D14: 9°38.8'N, 123°50.6'E) 2–4 m, coral sand on hard bottom, 1 ovigerous female (19/5.3) NMCR 50109, coll., 29 June 2004.

Description. See NGOC-HO (1990, 2008).

Remarks. *Upogebia hexaceras* has been regarded as a valid species by SAKAI (1982) although he concluded that it is not significantly different from *U. darwinii*. NGOC-HO

(1990) considered it as valid species and outlined the differences between the three similar species *U. darwinii*, *U. hexaceras* and *U. octoceras* NOBILI, 1906. Later, it was considered again as a junior synonym of *U. darwinii* by Sakai (1993, 2006), which has been rebutted by Ngoc-Ho (2008).

The present specimen lacks the P1, but shows all the typical characters of *U. hexaceras*, 1) a semicircular short rostrum with 8 spines, 2) spiny lateral projections on the pleomere 6 with a spiny posterior border.

Distribution. Thursday I., Torres Strait (type locality), Singapore (pers. obs.), Indonesia, Red Sea, Persian Gulf (NGOC-HO, 1990). Exact distribution (especially in Australia) due to confusion with *U. darwinii* uncertain. New record for the Philippines.

Upogebia pugnax DE MAN, 1905

Upogebia (Upogebia) pugnax DE MAN, 1905: 600; — 1928: 66, pl. 5 fig. 8–8e, pl. 6 fig. 8f; — SAKAI, 1982: 52 (partim).

Upogebia pugnax; — NGOC-HO, 1990: 978, fig. 7; — 1991: 305, fig. 10; — 1994b: 202, fig. 6; — SAKAI, 2006: 134 (extended synonymy).

Material examined. Napaling (S28: 9°37.2'N, 123°46.4'E) 28–32 m, reef wall with small caves, 1 male (15.1/5.0) NMCR 50805, coll. 24 June 2004 (PD203).

Description. See DE MAN (1928) and NGOC-HO (1990).

Distribution. Maldives, Indonesia, New Caledonia (SAKAI 2006). New record for the Philippines.

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