

Description of a new genus and a new species of the family Camptandriidae Stimpson, 1858 (Crustacea: Decapoda: Brachyura) from Lower Kinabatangan-Segama Wetlands, Sabah, Malaysia

Tohru Naruse^{1*}, Arthur Y. C. Chung² & Joseph Tangah²

Abstract. A new genus and new species of the family Camptandriidae Stimpson, 1858, are described from Lower Kinabatangan-Segama Wetlands, Sabah, Malaysia. *Exagorium fidelisi*, new genus & species, can be distinguished from known camptandriid genera and species by the characters of the carapace, male abdomen and male first gonopod.

Key words. Taxonomy, new genus and species, Camptandriidae, Sabah, Malaysia

INTRODUCTION

The brachyuran family Camptandriidae Stimpson, 1858, currently includes 22 genera and 40 species (Ng et al., 2008, 2009, 2010; Ng & Clark, 2012; Ahyong, 2014). Members of this family share a distinct condition in the male first gonopod, in which the distal part is bent or twisted over the proximal base by about 180°, producing a strongly recurved structure.

A scientific expedition was organised by the Sabah Forestry Department in the Lower Kinabatangan-Segama Wetlands (LKSW), Sabah in 16–26 June 2014, and based at Tundon Bohangin. LKSW is Malaysia's largest Ramsar site, encompassing approximately 80,000 hectares of mangrove and peat swamp forests in eastern Sabah (Sabah Biodiversity Centre, 2010). During the expedition, some interesting crustaceans were sampled, mainly from the mangrove forests and adjacent brackish waters. The present study describes an interesting new crab genus and species belonging in Camptandriidae.

Material examined are deposited in the Institut Penyelidikan Marin Borneo (IPMB), University of Malaysia Sabah, Kota Kinabalu; the Ryukyu University Museum, Fujukan (RUMF), University of the Ryukyus, Okinawa, Japan; and the Zoological Laboratory, Kyushu University, Fukuoka, Japan (ZLKU) (specimens that have been transferred to the Kitakyushu Museum of Natural History and Human History, Fukuoka, Japan). Measurements provided are of the

median carapace length (CL) × maximum carapace width (CW) in millimetres. Abbreviations used are as follows: G1, male first gonopod; juv., juvenile; ovig., ovigerous; P2–5, pereopods 2–5.

TAXONOMY

Superfamily Ocypodoidea Rafinesque, 1815

Family Camptandriidae Stimpson, 1858

Exagorium, new genus

Type species. *Exagorium fidelisi*, new species, by present destination. Gender neuter.

Diagnosis. Carapace hexagonal, CW 1.24–1.40 times CL. Regions poorly defined, epigastric region with one pair of weak convexities, H-shaped gastric groove shallow. Frontal, supraorbital, anterolateral margins connected by rounded, granular ridge; similar ridges present on posterolateral margins (short, oblique), metabranchial regions (short, horizontal), and on intestinal region (long, transverse) just anterior to posterior margin with either end reaching posterolateral corner of carapace. Orbit laterally bordered by low, thin ridge on upper half, lined with long setae, lower half open. Infraorbital crista sinuous, lined with granules, convex dorsally at middle, mesial end forming high triangular inner orbital tooth. Suborbital ridge gently arcuate, lined with small granules, granules becoming longer laterally, ridge lateral to orbit directed downwards, without granules. Posterior margin of pterygostomial region rimmed, lined with granules, arcuate anteriorly, forming distinct Milne-Edwards aperture. Antennule folded obliquely. Antenna entering into orbit, with long flagellum. Eyes weakly compressed dorsoventrally. Third maxillipeds filling entire buccal cavern; ischium wider than long, short, about third length of merus; carpus, propodus, dactylus articulating end to end; exopod narrow, reaching distal third of merus. Thoracic sternum

¹Tropical Biosphere Research Center, Iriomote Station, University of the Ryukyus, 870 Uehara, Taketomi, Okinawa 907-1541, Japan; Email: naruse@lab.u-ryukyu.ac.jp (*corresponding author)

²Forest Research Centre, Sabah Forestry Department, P.O. Box 1407, 90715 Sandakan, Sabah, Malaysia



Fig. 1. Live colouration of *Exagorium fidelisi*, new genus & species. Holotype, IPMB-Cr 08.1, 7.6 × 10.6 mm.

relatively wide. In male, sterno-abdominal cavity deep, long, reaching posterior border of buccal cavern. In female, vulvae horizontally elongated, oblong, entire, placed close to each other at mesial to suture 5/6. Male abdomen with all somites free, somite 1 short, very wide, laterally reaching and partially covering P5 coxae. Female abdomen with all sutures distinct, somites 2–6 functionally fused; telson triangular, proximal portion embraced by distal margin of abdominal somite 6. G1 q-shaped, bent 180°. Distally with two terminal processes, tips pointed. G2 shorter than terminal processes of G1.

Etymology. The genus name “*Exagorium*” is derived from an arbitrary combination of hexagonal shape of the carapace of the type species (*L. exagonum*) and a suffix for the type genus of the family Camptandriidae “-rium”.

Remarks. *Exagorium*, new genus, is distinct from other known camptandriid genera by the combination of the following characters: hexagonal carapace outline (Fig. 1), male abdomen that covers the G1 completely when closed (Fig. 2b), male abdominal somite 1 that reaches and partially covers P5 coxae (Fig. 3a), and the G1 with two terminal processes.

Manning & Holthuis (1981) observed that the male abdominal somite 1 of *Cleistostoma* De Haan, 1833, and *Ilyogynnis* Manning & Holthuis, 1981, reaches the P5 coxae. Close examination of these genera revealed that the male abdominal somite 1 of *Exagorium* reaches and even partially covers the P5 coxae (Fig. 3a), whereas there is a slight space between somite 1 and the P5 coxae in *Cleistostoma* (Fig. 3b) and *Ilyogynnis* (Fig. 3c). Among the genera that were not treated by Manning & Holthuis (1981), the male abdominal somite 1 does not reach the P5 coxae in *Nasima* Manning, 1991 (Manning 1991: 304). Of the genera examined in the present study (e.g., *Moguai* Tan & Ng, 1999, *Mortensenella* Rathbun, 1909, *Paramoguai* Ahyong, 2014, and *Takedellus* Tan & Ng, 1999), the male abdominal somite 1 does not reach the P5 coxae as well. The male abdominal somite 1 of *Moguai*, *Paramoguai* and *Takedellus* is concealed under the posterior margin of the carapace (Fig. 3d; posterior margin of the

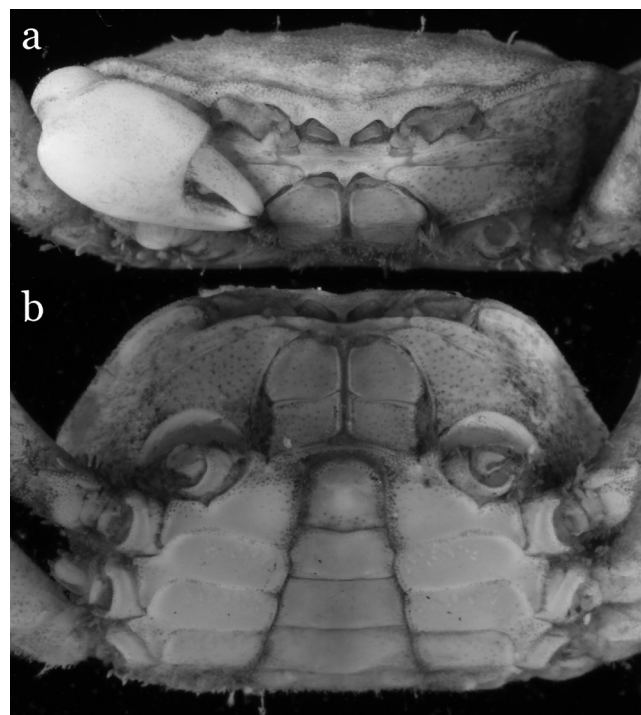


Fig. 2. *Exagorium fidelisi*, new genus & species. Holotype, IPMB-Cr 08.1, 7.6 × 10.6 mm.

carapace is lifted up dorsally) and only the distal margin of the somite 1 is exposed in situ, but the lateral end of the somite 1 falls short of P5 coxae.

Four camptandriid genera are also known to possess two long processes at the distal end of the G1: *Camptandrium* Stimpson, 1858, *Moguai*, *Paramoguai* and *Takedellus* (Tan & Ng, 1999: figs. 2A–C, 4F, 6G, H; Kishino et al., 2014: fig. 2G; Ahyong, 2014: fig. 1H). *Exagorium* is, however, easily distinguishable from the above four genera by its distinct hexagonal carapace outline, the relatively smooth dorsal surface of the carapace, the general shape of the third maxilliped, and the wide male abdominal somite 1 that reaches the P5 coxae.

Exagorium fidelisi, new species

(Figs. 1, 2, 3a, 4, 5)

Material examined. All type specimens were collected from Sungai [= River] Kulamba, Tundon Bohangin, Sabah, Malaysia. Holotype: Male (7.6 × 10.6 mm) (IPMB-Cr. 08.1), 5°35.188' N 118°37.391' E, coll. T. Naruse & F. Koret, 18 June 2014. Paratypes: 1 ovig. female (5.7 × 7.9 mm) (IPMB-Cr. 08.2), same data as holotype; 2 males (4.9 × 6.5, 5.4 × 7.2 mm) (RUMF-ZC-3680) 5°35.010' N 118°37.545' E, coll. T. Naruse & F. Koret, 20 June 2014; 1 male (5.9 × 7.7 mm), 1 female (4.9 × 6.6 mm) (RUMF-ZC-3682), same data as RUMF-ZC-3680; 1 female (7.0 × 9.5 mm) (RUMF-ZC-3681), 5°35.188' N 118°37.391' E, coll. T. Naruse & F. Koret, 19 June 2014; 1 juv. (2.8 × 3.7 mm) (IPMB-Cr. 08.3), 5°35.530' N 118°36.894' E, coll. T. Naruse & F. Koret, 19 June 2014; 1 juv. (2.5 × 3.1 mm) (IPMB-Cr. 08.4), 5°36.021' N 118°35.588' E, coll. T. Naruse & F. Koret, 20 June 2014.

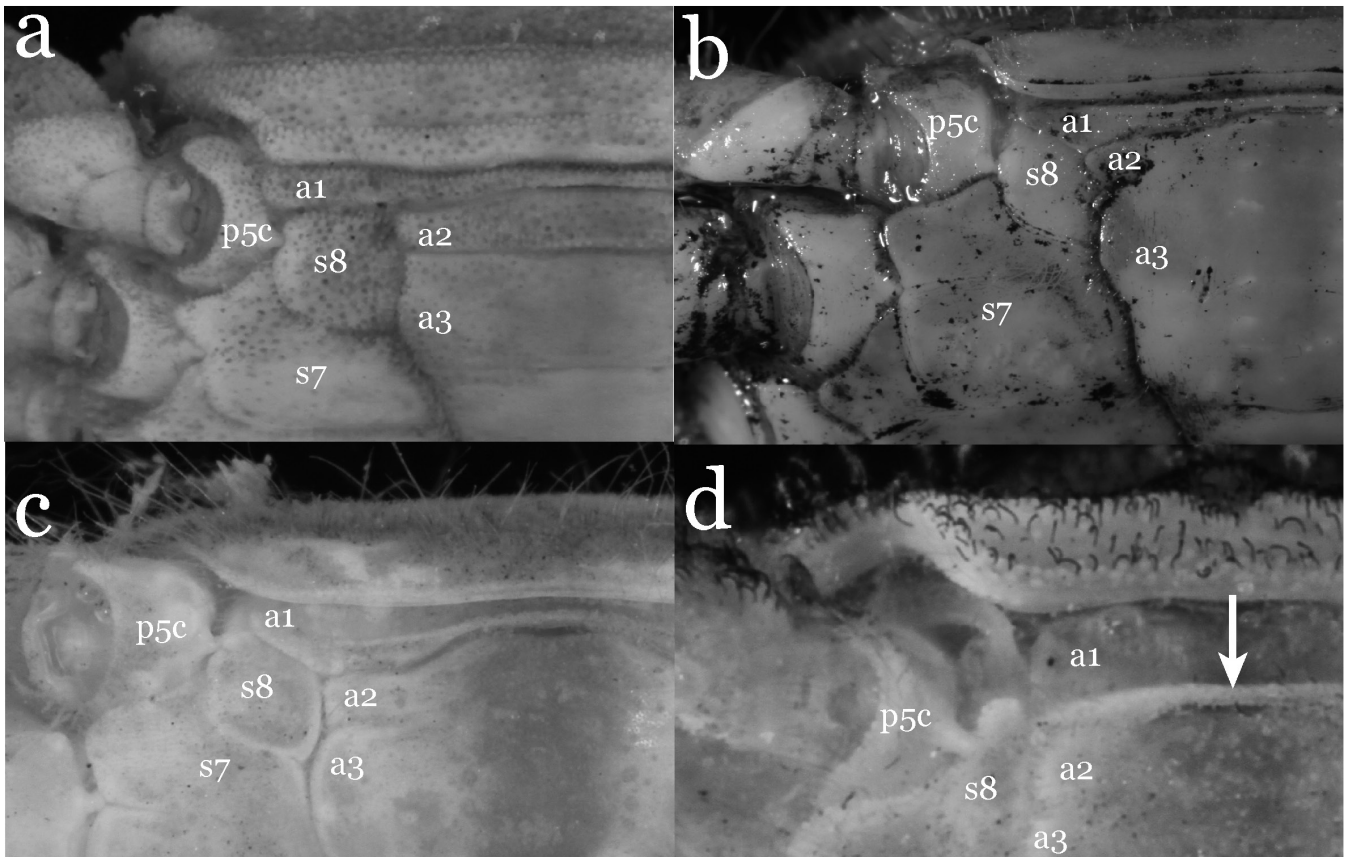


Fig. 3. Posterolateral portion of male thoracic sternite and abdomen. a, *Exagorium fidelisi*, new genus & species, holotype, IPMB-Cr 08.1, 7.6 × 10.6 mm; b, *Cleistostoma dilatatum* (De Haan, 1833), ZLKU11072, 13.4 × 19.1 mm; c, *Ilyogynnis microcheirum* (Tweedie, 1937), RUMF-ZC-357, 6.6 × 8.2 mm; d, *Takedellus ambonense* (Serène & Moosa, 1971), IPMB-Cr 08.5, 4.1 × 4.2 mm (Posterior margin of the carapace is lifted up). Arrow indicates where the posterior margin of the carapace is originally placed. a1–3, abdominal somites 1–3; p5c, coxa of pereopod 5; s7, 8, thoracic sternites 7, 8.

Comparative material. *Cleistostoma dilatatum* (De Haan, 1833): 1 male (13.4 × 19.1 mm) (ZLKU 11072), river mouth of Nakdong-gang, Busan, Korea, coll. Y. Ishii, 13 September 1996; 2 females (11.8 × 16.4, 12.1 × 17.4 mm) (ZLKU 429–431), near Hakomatsu Elementary School, Umi River, Kyushu, Japan, coll. S. Miyake et al., 15 July 1954. *Deiratonotus cristatum* (De Man, 1895): 2 ovig. females (4.3 × 5.9, 4.7 × 6.8 mm) (RUMF-ZC-298), Sumiyo River, Amami-ohshima Island, Ryukyu Islands, Japan, coll. S. Shokita et al., 24–27 December 2001; 1 male (4.2 × 5.7 mm) (RUMF-ZC-3688), Tekebu, Kasari, Amami-ohshima Island, Ryukyu Islands, Japan, coll. T. Maenosono, 25 April 2012. *Deiratonotus japonicum* (Sakai, 1934): 1 ovig. female (6.4 × 8.2 mm) (RUMF-ZC-295), Oura River, Okinawa Island, coll. T. Naruse & C.-C. Han, 23 May 2002; 3 females (4.4 × 5.6 – 7.2 × 9.1 mm) (RUMF-ZC-296), Hentona River, Okinawa Island, Ryukyu Islands, Japan, coll. T. Naruse et al., 10 January 2004; 3 males (2.6 × 3.4 – 4.3 × 5.0 mm), 3 females (2.9 × 3.6 – 3.5 × 4.5 mm), 1 ovig. female (5.4 × 7.2 mm) (RUMF-ZC-297), Tima River, Okinawa Island, Ryukyu Islands, Japan, coll. T. Naruse, 25 December 2004; 5 males (4.0 × 4.7 – 5.2 × 6.3 mm), 8 females (3. × 4.5 – 6.4 × 8.1 mm), 1 ovig. female (7.4 × 9.3 mm) (RUMF-ZC-3687), Konase, Setouchi, Amami-ohshima Island, Ryukyu Islands, Japan, coll. T. Maenosono, 26 April 2012. *Ilyogynnis microcheirum* (Tweedie, 1937): 11 males (5.0 × 5.9 – 7.3 × 8.3 mm), 3 females (4.7 × 5.5 – 5.6 × 7.0 mm), 6 ovig. females (4.6 ×

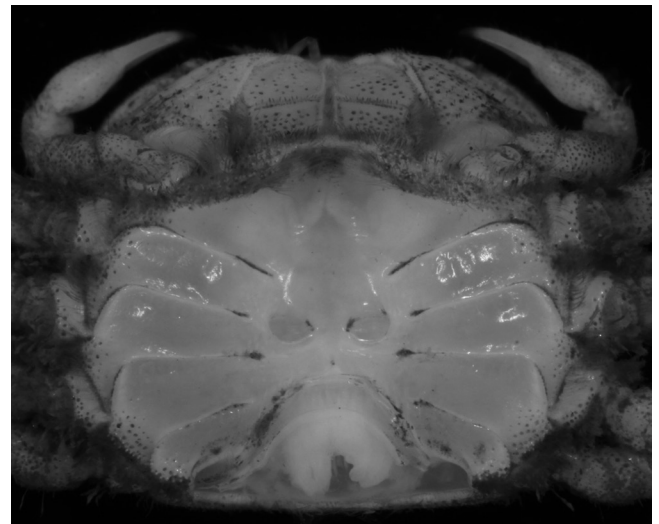


Fig. 4. Female thoracic sternum of *Exagorium fidelisi*, new genus & species. Paratype, IPMB-Cr. 08.2, 5.7 × 7.9 mm.

5.3 – 5.6 × 6.8 mm) (RUMF-ZC-357) Sungei Buloh East, Singapore, coll. T. Naruse et al., 13 September 2001. *Moguai aloutos* Tan & Ng, 1999: 1 ovig. female (6.8 × 5.9 mm) (IPMB-Cr. 08.6), Sepilok Laut Reception Center, Sabah, Malaysia, coll. T. Naruse, F. Koret & J. Aribin, 4 March 2014; 1 male (4.8 × 4.3 mm) (RUMF-ZC-3683), Sungai Kulamba, Tundon Bohangin, Sabah, Malaysia, 5°35.530'

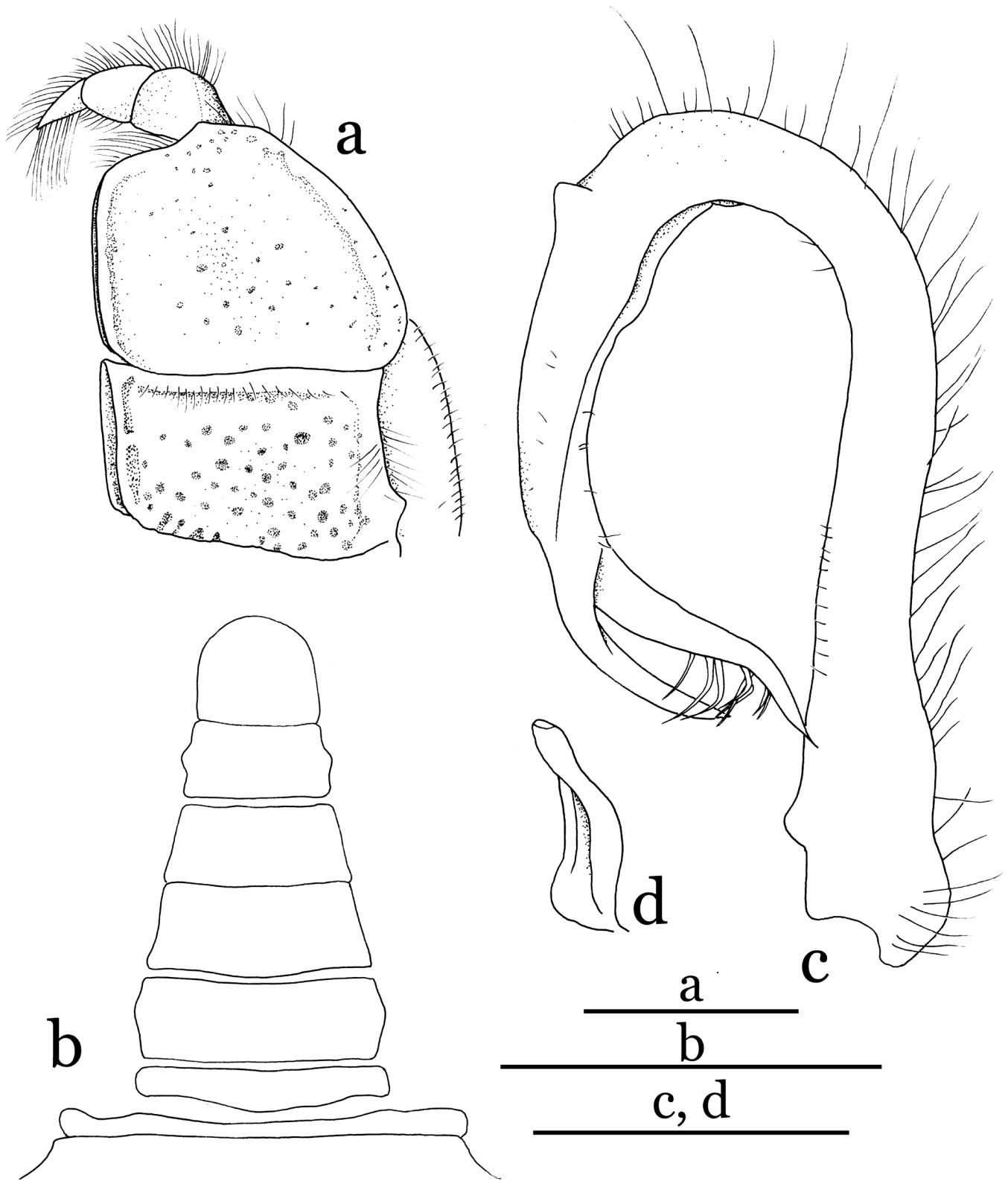


Fig. 5. *Exagorium fidelisi*, new genus & species. Holotype, IPMB-Cr 08.1, 7.6 × 10.6 mm. a, left third maxilliped; b, posterior portion of carapace, abdomen and telson; c, left G1; d, left G2. Scales, a, c, d, 1 mm; b, 5 mm.



Fig. 6. Habitat of *Exagorium fidelisi*, new genus & species, beside *Nypa fruticans* forest.

N 118°36.894' E, coll. T. Naruse & F. Koret, 17 June 2014; 1 female (7.2 × 6.1 mm) (RUMF-ZC-3684), Sungai Kulamba, Tundon Bohangin, Sabah, Malaysia, 5°35.010' N 118°37.545' E, coll. T. Naruse & F. Koret, 17 June 2014. ***Moguai elongatum* (Rathbun, 1931)**: 1 male (2.7 × 2.4 mm), 2 females (2.3 × 2.1, 3.3 × 3.0 mm) (RUMF-ZC-32), Motonagura, Ishigaki Island, Ryukyu Islands, Japan, coll. T. Naruse & T. Nagai, 21 December 2004; 1 female (5.0 × 4.7 mm) (RUMF-ZC-33), Motonagura, Ishigaki Island, Ryukyu Islands, Japan, coll. T. Naruse & T. Nagai, 20 March 2005. ***Mortensenella forceps* Rathbun, 1909**: 1 male (3.3 × 4.6 mm) (RUMF-ZC-299), Tsunoko, Amami-ohshima Island, Ryukyu Islands, Japan, coll. J. Nawa, 23 April 2005; 1 female (5.4 × 8.8 mm) (RUMF-ZC-300), Shirahama, Iriomote Island, Ryukyu Islands, Japan, coll. T. Naruse & T. Nagai, 3 August 2005; 1 juv. (2.9 × 4.0 mm) (RUMF-ZC-3690), Funaura Bay, Iriomote Island, Ryukyu Islands, Japan, coll. T. Naruse et al., 1 July 2001. ***Paracleistostoma depressum* De Man, 1895**: 2 males (4.8 × 6.2 – 6.4 × 9.0 mm), 1 female (6.8 × 9.6 mm) (RUMF-ZC-341), Sungei Buloh East, Singapore, coll. T. Naruse et al., 13 September 2001. ***Paramoguai pyriforme* (Naruse, 2005)**: 1 male (4.3 × 3.6 mm), 2 ovig. females (4.9 × 5.0, 6.1 × 5.7 mm) (RUMF-ZC-3689), Konase, Setouchi, Amami-ohshima Island, Ryukyu Islands, Japan, coll. T. Maenosono, 26 April 2012. ***Takedellus ambonense* (Serène & Moosa, 1971)**: 2 males (3.5 × 3.6, 4.0 × 4.2 mm), 2 females (4.6 × 4.9, 5.3 × 5.8 mm), 3 ovig. females (5.1 × 5.3 – 6.7 × 7.8 mm), 1 juv. (2.3 × 2.3 mm) (IPMB-Cr. 08.5), Sungai Kulamba, Tundon Bohangin, Sabah, Malaysia, 5°35.010' N 118° 37.545' E, coll. T. Naruse & F. Koret, 20 June 2014; 1 male (2.9 × 3.0 mm), 1 ovig. female (5.2 × 5.5 mm) (RUMF-ZC-3685) Sungai Kulamba, Tundon Bohangin, Sabah, Malaysia, 5°35.010' N 118° 37.545' E, coll. T. Naruse & F. Koret, 18 June 2014; 1 male (2.9 × 3.1 mm) (RUMF-ZC-3686), Sungai Kulamba, Tundon Bohangin, Sabah, Malaysia, 5°35.188' N 118°37.391' E, coll. T. Naruse & F. Koret, 18 June 2014; 1 male (3.7 × 4.0 mm), 1 female (3.7 × 4.0 mm) (RUMF-ZC-302) Udara River, Iriomote Island, Ryukyu Islands, Japan, coll. T. Naruse & T. Nagai, 23 November 2004.

Description. Carapace (Fig. 1) hexagonal, CW 1.24–1.40 times CL (mean 1.33, n = 9), dorsal surface gently convex longitudinally, transversely, entirely punctate. Regions poorly defined, epigastric region with one pair of weak convexities, H-shaped gastric groove shallow. Frontal, supraorbital, anterolateral margins connected by rounded, granular ridge; similar ridges present on posterolateral margins (short, oblique), metabranchial regions (short, horizontal), and on intestinal region (long, transverse) just anterior to posterior margin with either end reaching posterolateral corner of carapace. Supraorbital margin slightly convex dorsally, weakly concave above cornea, with triangular ventral projection between mesial margin of orbit and antennular fossa (Fig. 2a). Exorbital angle rounded, smoothly continuous with anterolateral margin. Orbit (Fig. 2a) laterally bordered by low, thin ridge on upper half, lined with long setae, lower half open. Infraorbital crista sinuous, lined with granules, convex dorsally at middle, mesial end forming high triangular inner orbital tooth. Suborbital ridge gently arcuate, lined with small granules, granules becoming longer laterally, ridge lateral to orbit directed downwards, without granules. Suborbital, pterygostomial regions (Fig. 2b) punctate, posterior margin of pterygostomial region rimmed, lined with granules, arcuate anteriorly, forming distinct Milne-Edwards aperture.

Epistome (Fig. 2a) trilobate, median lobe triangular, long, sharp.

Antennular fossa (Fig. 2a) relatively high, antennule folded obliquely. Antenna entering into orbit, with long flagellum.

Eyes (Fig. 2a) weakly compressed dorsoventrally, dumbbell-shaped, enlarged at distal and proximal ends; cornea placed in disto-internal portion (when retracted); outer-lower portion of eystalk punctate, outer-upper portion granular.

Male thoracic sternum (Fig. 2b) shiny, punctate around sutures, episternite of sternites 4–6, posterior half of sternite 7, entire sternite 8. Sterno-abdominal cavity deep, long, reaching posterior border of buccal cavern. Sternal press-button for locking mechanism placed close to suture 4/5 at slope of sterno-abdominal cavity of sternite 5.

Third maxillipeds (Figs. 2b, 5a) filling entire buccal cavern. Ischium wider than long, short, about third length of merus, ischium, merus punctate; merus wider than ischium, anterolateral margin arcuate; carpus, propodus, dactylus articulated by end to end. Exopod narrow, reaching distal third of merus.

Chelipeds symmetrical (Fig. 1), female chelipeds smaller than those of males. Merus simple, slightly granular on outer surface, upper, lower-mesial margins lined with long setae. Carpus rhomboidal in upper view, with inner angle, surface smooth. Palm of chela (Fig. 2b) gently swollen downwards and inwards. Movable finger with single oblong tooth subproximally; with double line of granules distal to this tooth and also on cutting margin of immovable finger, continuing to proximal ends of horseshoe-shaped, corneous fingertips.

Ambulatory legs (Fig. 1) stout, short, combined length of merus to dactylus of P4 ca. 0.97 times CW, punctate, setose especially near margins. Merus with low granular ridge on upper, lower posterior margins of P2–5 and upper, lower, anterior margins of P3–5. P4 propodus with mat of setae on inner surface. Dactylus stout proximally, but strongly sharpened, with thin, long corneous tip.

Male abdomen (Figs. 2b, 5b) with all somites free, punctate on first to third somites and margin of telson. Somite 1 short, very wide, laterally reaching P5 coxae (Fig. 3a); somite 2 about two-thirds width of somite 1, as wide as somite 3, somite 3 to telson gradually tapering.

G1 (Fig. 5c) q-shaped, bent 180°, outer margin lined with setae from subproximal portion to bent portion, with small projection just distal to bent portion on outer margin. Distally with two terminal processes, tips of both pointed; process from inner side sparsely lined with four distally curved long bristles; inner process longer than outer one. G2 (Fig. 5d) shorter than outer process of G1.

Female characters. Sterno-abdominal cavity reaching posterior border of buccal cavern (Fig. 4). Vulvae (Fig. 4) horizontally elongated, oblong, entire, placed close to each other at mesial to suture 5/6. Abdomen with all sutures distinct, somites 2–6 functionally fused; telson triangular, proximal portion embraced by distal margin of abdominal somite 6.

Colouration. The carapace and the pereopods are light brown, but the cheliped carpus and chela are with paler colour (Fig. 1). This is probably because the cheliped carpus and chela are smoother and therefore do not attract as much dirt and mud as the other parts.

Etymology. The species name is dedicated to Fidelis Edwin Bajau, Deputy Director (Development) of the Sabah Forestry Department, who has facilitated and encouraged the authors' study to a great extent.

Ecological note. *Exagorium fidelisi*, new species, was pulled up by a yabbie pump from small vertical burrows that were observed on the surface of muddy sediment with depths of 10–30 cm during low tide. It was found beside the Kulamba River, dominated by the clump-forming palm, *Nypa fruticans* (Fig. 6).

ACKNOWLEDGEMENTS

We are grateful to Sam Mannan (Director), Fidelis Edwin Bajau (Deputy Director – Development), Fadzil Yahya (District Forestry Officer of Sandakan) and other staff of Sabah Forestry Department (SFD), as well as Shigeyuki Baba, Chan Hung Tuck and other staff of the International Society for Mangrove Ecosystems (ISME) for their support in the present collaborative research. Fabian Koret, Jamiss Aribin (SFD), Hideyuki Yamashiro and Shin Watanabe (Tropical Biosphere Research Center (TBRC), University of the Ryukyus) assisted the first author in this study. This

work is part of a SFD-TBRC-ISME capacity-building collaborative project.

LITERATURE CITED

- Ahyong ST (2014) *Paramoguai kavieng*, a new genus and species of camptandriid crab from Papua New Guinea (Crustacea: Brachyura). *Zootaxa*, 3856(4): 578–584.
- Haan, W de (1833–1849). Crustacea. In: Siebold PF von (ed.) *Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, Qui Summum in India Batava Imperium Tenent, Suscepto, Annis 1823–1830 Collegit, Notis, Observationibus et Adumbrationibus Illustravit*, (Crustacea). Lugduni-Batavorum, Leiden, xvii+xxxix+iix–xvi+243 pp., pls. A–J, L–Q, 1–55, circ. table 2.
- Kishino T, Nomoto A, Yonezawa T, Kimura S & Wada K (2014) Supplemental description of a rare brackish-water crab, *Moguai pyriforme* Naruse, 2005 (Decapoda: Brachyura: Camptandriidae), with an emphasis on male morphology. *Fauna Ryukyuna*, 10: 1–8.
- Man JG de (1895) Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden. *Zoologische Jahrbücher. Abteilung für Systematik, Geographie und Biologie der Thiere*, 8(4): 485–609, pls. 12–14 [vol. 9, 1897]
- Manning RB (1991) The status of *Cleistostoma dotilliforme* Alcock, 1900 (Crustacea: Decapoda: Ocypodidae), with the description of a new genus. *Raffles Bulletin of Zoology*, 39(2): 299–306.
- Manning RB & Holthuis LB (1981) West African brachyuran crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, 306: 1–379.
- Naruse T (2005) Species of *Moguai* Tan and Ng, 1999 (Decapoda: Brachyura: Camptandriidae) from brackish waters in the Ryuku Islands, Japan, with the description of a new species. *Zootaxa*, 1044: 57–64.
- Ng PKL & Clark PF (2012) *Danielita* Ng, Clark & Tan, 2010 (Crustacea: Decapoda: Brachyura: Ocypodoidea: Camptandriidae), preoccupied by *Danielita* Kiriakoff, 1970 (Lepidoptera: Glossata: Heteroneura: Noctuoidea: Notodontidae). *Zootaxa*, 3490: 48.
- Ng PKL, Guinot D. & Davie PJF (2008) *Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world*. *Raffles Bulletin of Zoology, Supplement 17*, 1–286.
- Ng PKL, Rahayu DL & Naser MD (2009) The Camptandriidae of Iraq, with description of a new genus and notes on *Leptochryseus Al-Khayat & Jones*, 1996 (Crustacea: Decapoda: Brachyura). *Zootaxa*, 2312: 1–26.
- Ng PKL, Clark PF & Tan CGS (2010) A new genus for *Cleistostoma edwardsii* MacLeay, 1838 (Ocypodidae, Camptandriidae) from South Africa. In: Castro P, Davie PJF, Ng PKL & Richer de Forges B. (eds.) *Studies on Brachyura: a Homage to Danièle Guinot*. *Crustaceana Monographs*. Vol. 11. Fransen CHJM & von Vaupel Klein JC (series eds.). Brill, Leiden. Pp. 251–260.
- Rafinesque CS (1815) *Analyse de la Nature, ou Tableau de l'Univers et des Corps Organisés*. L'Imprimerie de Jean Barravecchia, Palermo, 224 pp.
- Rathbun MJ (1909) New crabs from the Gulf of Siam. *Proceedings of the Biological Society of Washington*, 22: 107–114.
- Rathbun MJ (1931) New and rare Chinese crabs. *Lingnan Science Journal*, 8: 75–104, pls. 5–15.
- Sabah Biodiversity Centre (2010) Lower Kinabatangan Segama Wetlands Ramsar Site Management Plan 2011–2020. Sabah Biodiversity Centre of the Sabah State Government, Kota Kinabalu, Sabah, 22 + 265 pp.

- Sakai T (1934) Brachyura from the coast of Kyushu, Japan. Science Reports of the Tokyo Bunrika Daigaku, section B, 1(25): 281–330.
- Serène R & Moosa MK (1971) New and few known species of Brachyura from Ambon. Marine Research in Indonesia A, 11: 3–18, pls. 1–6.
- Stimpson W (1858) Prodrumus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. Pars V. Crustacea Ocypodoidea. Proceedings of the Academy of Natural Sciences of Philadelphia, 10: 93–110.
- Tan CGS & Ng PKL (1999) A revision of the genus *Camptandrium* Stimpson, 1858 (Crustacea: Decapoda: Brachyura: Camptandriidae). Raffles Bulletin of Zoology, 47(1): 193–219.
- Tweedie MWF (1937) On the crabs of the family Ocypodidae in the collection of the Raffles Museum. Bulletin of the Raffles Museum, 13: 140–170.