Establishment of a new genus for Asthenognathus gallardoi Serène & Soh, 1976 within Gaeticinae Davie & N.K. Ng, 2007
(Crustacea: Decapoda: Brachyura: Varunidae)

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Abstract

Recently collected Asthenognathus gallardoi Serène & Soh, 1976 from Thailand and the Philippines are examined. Asthenognathus gallardoi possesses long setae of the palp of the third maxilliped and the fused male abdominal segments that are diagnostic characters of Gaeticinae Davie & N.K. Ng, 2007. Although the species lacks the longitudinal sulcus on the anterior segments of the sternum, which is another diagnostic character of Gaeticinae, the anterior part of the sternum is gently concave. The presences of these features indicate that Asthenognathus gallardoi belongs to Gaeticinae, not Asthenognathinae Stimpson, 1858. A new genus is established for Asthenognathus gallardoi to accommodate it in Gaeticinae.

Key words: Asthenognathus gallardoi, Varunidae, Gaeticinae, new genus, Thailand, Philippines

Introduction

The type species of Asthenognathus Stimpson, 1858 is A. inaequipes by monotypy, (Opinion 85, Direction 37); gender masculine. Stimpson (1858) assigned the genus to the Asthenognathidae. Three additional species have been described and assigned to this genus: A. hexagonum Rathbun, 1909, A. atlanticus Monod, 1933, and A. gallardoi Serène & Soh, 1976. Although the Asthenognathidae has traditionally been assigned to the Pinnotheroidea de Haan, 1833, P.K.L. Ng et al. (2008) established this taxon as a subfamily within the Varunidae H. Milne Edwards, 1853 (Grapsoidea MacLeay, 1838). Furthermore, P.K.L. Ng et al. (2008) considered A. gallardoi to be an unusual species in that it differed from other species assigned to Asthenognathus with respect to the form of its carapace and third maxilliped characters. However, A. gallardoi shares more significant characters with members of the subfamily Gaeticinae Davie & N.K. Ng, 2007 than with Asthenognathinae taxa. The purpose of this paper is to establish a new genus to accommodate Asthenognathus gallardoi within Gaeticinae.

The measurements provided, in millimetres, are carapace width (CW) and length (CL) respectively. Specimens examined are deposited in the Muséum national d’Histoire naturelle, Paris (MNHN); the Natural History Museum, London (NHM); the National Museum of the Philippines, Manila (NMCR); 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); and the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore. Abbreviations used: ovigerous = ovig.; station = stn; coll. = collected by.
Family Varunidae H. Milne Edwards, 1853

Subfamily Gaeticinae Davie & N.K. Ng, 2007

Gopkittisak n. gen.

Asthenognathus — Serène & Soh, 1976: 27 (part); Jiang et al., 2007: 77 (part).

Type species: Asthenognathus gallardoi Serène & Soh, 1976, by present designation.

Diagnosis. Carapace elliptical, dorsal surface with transverse ridges; posterior lateral facet present. Short infraorbital margin extended downwards from external orbital angle, ventral side of orbit demarcated by sub-orbital crista, continuous laterally as far as below lateral end of anterior lateral epibranchial crista of dorsal surface. Epistome short. Eyes well-developed. Antennule basal article large. Antennal basal article reaching lateral frontal angle, inner orbital tooth reaching middle to lateral frontal angle. Third maxillipeds less than two-thirds of buccal cavern when closed; ischium and merus subrectangular, these segments divided by oblique border; carpus attached to lateral half of distal margin of merus, propodus and dactylus attached to distal end of respective proximal segment; dactylus with long setae, reaching concavity of thoracic sternites 1–3. Male thoracic stenites 1/2 fused, stenite 3 demarcated from stenites 1/2 and 4, female thoracic stenites 1/2 and 3/4 fused respectively, both male and female thoracic stenites medially concave. Male third to sixth abdominal segments functionally fused.

Etymology. The genus is named in memory of Mrs Pharadee (Gop) Uchuphab and Mr Kittisak Raksasri who perished when the Tsunami swept through the Ranong Coastal Research Station, Ranong Province, Thailand on 26 December 2004. They are both missed, but still remembered. The name is an arbitrary combination of two first names and the gender is neuter.

Remarks. Peter K.L. Ng et al. (2008) stated that Asthenognathus gallardoi Serène & Soh, 1976 should not be assigned to Asthenognathus, as it is markedly different from the type species (A. inaequipes) in the transversely more elongated elliptical shape of the carapace and the presence of the transverse ridges on the carapace (Fig. 1a, b; Serène & Soh, 1976: Fig. 28B, Pl. VIII A; Ghani & Tirmizi, 1991: Fig. 1A, B; Jiang et al., 2007: Fig. 1a). These morphological differences warrant that A. gallardoi should be placed in its own genus. Gopkittisak, new genus, is here established to accommodate A. gallardoi.

Systematic position of G. gallardoi is also problematic. Davie & N.K. Ng (2007) recently established the subfamily Gaeticinae for Gaetic Gistel, 1848 and Sestrostoma Davie & N.K. Ng, 2007. The diagnostic characters of this subfamily are: 1) long setae for suspension feeding on the palp of the third maxilliped, 2) a longitudinal sulcus on the anterior segments of the sternum for the long setae of the palp of third maxilliped, and 3) fused third to sixth male abdominal segments. Among these characters, G. gallardoi share the long setae of the palp of the third maxilliped and the fused male abdominal segments (Fig. 2a; Serène & Soh, 1976: Fig. 28A; Ghani & Tirmizi, 1991: Fig. 1C, F; Jiang et al., 2007: Fig. 1d, e). Although G. gallardoi lacks the longitudinal sulcus on the anterior segments of the sternum, the anterior part of the sternum is gently concave so that the long setae can be accommodated. Furthermore, Gaetic and Gopkittisak share a markedly oblique border of the merus and ischium of the third maxilliped. The presence of these similar characters indicates that it is best to place Gopkittisak within Gaeticinae.

Paracleistostoma fossulum Barnard, 1955, also possesses the transverse ridges on the dorsal surface of the carapace (P.K.L. Ng et al., 2008: 229). The systematic position of P. fossulum is uncertain, however. Barnard (1955) placed it under Ocypodidae, but Manning & Holthuis (1981: 209) stated that "[P. fossulum is] certainly no Paracleistostoma and possibly not even an ocypodid". Peter K.L. Ng et al. (2008) argued that the chela and the third maxilliped of P. fossulum is unlikely that of any Camptandriidae, and they transferred it to the Varunidae, although they treated it as "Subfamily incertae sedis". Gopkittisak gallardoi is similar to P. fossulum in
the presence of the dorsal ridges, but *G. gallardoi* can be differentiated from *P. fossulum* by the characters listed in Table 1.

Monod (1933) described *Asthenogathus atlanticus* from Atlantic side of Morocco. The holotype of *A. atlanticus* possesses *Gopkittisak*-type of the third maxilliped, with oblique border between merus and ischium and long setae from dactylus (Monod, 1933: Fig. 8A, B). He described the male abdomen as 7-segmented, but it is not certain whether it is functionally fused or completely segmented. Further study may prove that *A. atlanticus* is indeed a member of Gaeticininae. In that case, a new genus is needed to accommodate *A. atlanticus* as it is different from other gaeticine genera. The taxonomic statuses of the specimens subsequently recorded as “*A. atlanticus*” are also unclear. Monod (1956) reported 6 specimens of *A. atlanticus* from West Africa (2♂ and 2♀ from Mauritania; 1♂ from Senegal; 1♀ from the Gold Coast). Although at least the female specimen from the Gold Coast have a similar third maxilliped with the holotype of *A. atlanticus* (Monod, 1956: Fig. 543), the specimen from Senegal possesses a horizontal border between merus and ischium of third maxilliped (Monod, 1956: Fig. 544), which is same condition with *Asthenognathus* sensu stricto. The Senegal specimens are more similar to *A. inaequipes* than to *A. hexagonum* in its shape of the carapace, but the ischium of the third maxilliped is shorter than that of *A. inaequipes*, suggesting that it is most probably an undescribed species. Moreover, Bocquet (1963: Fig. 1) recorded *A. atlanticus* from France, but it appears to be a different new species as it has relatively wider carapace and ambulatory meri (Bocquet, 1963: 74, Fig. 7). *Asthenognathus atlanticus* has also been recorded from various authors (see Schmitt et al., 1973; Fransen, 1991; d’Udekem d’Acoz, 1999). A taxonomic revision is necessary for the Atlantic *Asthenognathus*-like species.

**TABLE 1.** Characters distinguishing *Gopkittisak gallardoi* from *Paracleistostoma fossulum* Barnard, 1955.

<table>
<thead>
<tr>
<th>CHARACTER</th>
<th><em>Gopkittisak gallardoi</em></th>
<th><em>Paracleistostoma fossulum</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterolateral margin</td>
<td>Straight, merged with posterolateral margin</td>
<td>Undulate, forming angle with posterolateral margin</td>
</tr>
<tr>
<td>Carapace: dorsal surface: ridges on anterior half</td>
<td>Three short hepatic ridges</td>
<td>One long ridge</td>
</tr>
<tr>
<td>Carapace: dorsal surface: posterior ridge</td>
<td>Medial part placed behind of lateral parts</td>
<td>Straight</td>
</tr>
<tr>
<td>Ambulatory dactyli</td>
<td>Long, slender</td>
<td>Short, wide</td>
</tr>
</tbody>
</table>

**Gopkittisak gallardoi** (Serène & Soh, 1976) new combination

(Figs. 1–3)

*Asthengnathus gallardoi* — Serène & Soh, 1976: 1, Fig. 28A, B, Pl. VIII A, B; Ghani & Tirmizi, 1991: 100, Fig. 1; Jiang et al., 2007: 78, Fig. 1.

“Asthengnathus” *gallardoi* — P.K.L. Ng et al., 2008: 226.

**Material examined.** Thailand: 1 ovig. ♀ (8.0 × 3.9 mm), NHM 2008.998, Tsunami Impacts in Laem Son Project, stn 120, 6 m, 9.46917°N 98.4039°E, off Laem Son National Park, Ranong Province, Andaman Sea, Thailand, coll. Paul Clark & Bob Foster Smith, by dredging, *Ocean One Ranong*, 29 November 2007; 1♂ (6.2 × 3.4 mm), 1 ovig. ♀ (6.7 × 3.7 mm), NHM 2008.4621–4622, 1♂ (7.4 × 4.0 mm), 1 ovig. ♀ (6.8 × 3.6 mm), ZRC 2008.1053, Rawai Beach, Phuket, Thailand, from under rocks on sandy to silty substratum, during extreme low tide, 0–0.5 m, coll. 7 March 2008. Philippines: 1♂ (9.9 × 5.4 mm), 2 ovig. ♀ ♀ (8.9 × 5.0 mm, 10.2 × 5.5 mm), ZRC 2008.1054, 2♀ ♀ (10.8 × 6.1 mm, 11.7 × 6.3 mm), 1 ovig. ♀ (9.5 × 5.3 mm), MNHN, Alona Beach, Panglao Island, Panglao Marine Biodiversity Project 2004, stn M1, 0–1 m, intertidal to shallow...
subtidal, 9°32.9'N, 123°46.6'E, coll. Panglao Marine Biodiversity Project, 3 June 2004; 1 ♀ (9.2 × 5.2 mm), NMCR, Bohol Island, Panglao Marine Biodiversity Project 2004, stn T24, 35–57 m, 9°42.3'N, 123°50.3'E, coll. Panglao Marine Biodiversity Project, 23 June 2004.

**FIGURE 1.** *Gopkittisak gallardoi* (Serène & Soh, 1976), ♀ (8.0 × 3.9 mm), NHM 2008.998: a, dorsal view of carapace; b, anterior view of cephalothorax; c, third maxilliped; d, left chela; e, dorsal view of right cheliped. Scale bars = 1 mm.

**Comparative material.** *Asthenognathus inaequipes* Stimpson, 1858: 1 ♀ (6.2 × 4.2 mm), ZLKU 8632, Ariake Sea, Kyushu, Japan, coll. 19 December 1957. *Asthenognathus hexagonum* Rathbun, 1909: 1 ♀ (7.8 × 5.5 mm), ZRC 1970.1.21.19, Manila Bay, Philippines, coll. 8 October 1964.

**Description.** Carapace elliptical, CW 1.76–2.05 times CL (mean = 1.83, n = 12), dorsally convex both longitudinally and transversely, dorsal surface smooth, with four transverse ridges (Fig. 1a); longest ridge on posterior third of carapace, medial part of ridge slightly placed posteriorly, laterally divergent, anterior branch reaching lateral carapace margin, posterior margin short, longitudinal, anterior, posterior branches forming posterior lateral facet of carapace; three short ridges on hepatic and branchial regions. Front straight, as wide
as orbit, front to supraorbital margins rimmed, not granulated, fronto-orbital margin as wide as proximal margin; external orbital angle almost at right angle, directed anteriorly; short infraorbital margin extended downwards from external orbital angle, ventral side of orbit demarcated by suborbital crista, continuous laterally as far as below lateral end of anterior lateral epibranchial crista of dorsal surface (Fig. 1b), a row of setae just below crista. Epistome short, with middle triangular projection. Anterolateral margin lined with granules, anterior half convergent anteriorly.

FIGURE 2. Gopkittisak gallardo (Serène & Soh, 1976). a, ♂ abdomen and telson; b, ♂ thoracic sternites 7 & 8 (left); c, left G1, ventral view; d, left G1, inner view; e, left G2, ventral view; f, ♀ abdomen and telson. a, ♀ (6.2 x 3.4 mm), NHM 2008.4621–4622; b–e, ♂ (7.4 x 4.0 mm), ZRC 2008.1053; f, ♀ (8.0 x 3.9 mm), NHM 2008.998. Scale bars = 1 mm.

Eyes well-developed. Antennule basal article large. Antennal basal article reaching lateral frontal angle, inner orbital tooth reaching middle to lateral frontal angle. Third maxillipeds (Fig. 1c) filling less than two-thirds of buccal cavern when closed; ischium and merus subrectangular, these segments divided by oblique border, midlength of ischium slightly longer than that of merus; distal end of exopod not reaching to distal end
of merus, with long flagellum; carpus attached to lateral half of distal margin of merus, propodus and dactylus attached to distal end of respective proximal segment; carpus slightly longer than dactylus to propodus, propodus with row of long setae on extensor margin, dactylus lined with long setae on extensor, mesial margins. Buccal cavern wide, third maxillipeds only filling one-third of cavern.

**FIGURE 3.** Fresh colouration of *Gopkittisak gallardoi* (Serène & Soh, 1976). a, ♀ from Ranong, Thailand, NHM 2008.998 (photo taken by Jube, Tsunami Impacts in Laem Son Project); b, ♂ from Panglao Island, the Philippines, ZRC 2008.1054.

Male thoracic sternites 1 and 2 fused, sternite 3 short, demarcated from sternites 1/2 and 4 by transverse rim, sternites 1–3 medially concave; sternal condyle on distal end of thoracic sternite 5. Penis sternal, appearing from distal end of thoracic sternite 8 (Fig. 2b). Female thoracic sternites 1/2 and 3/4 fused respectively, these sternites concave medially. Vulva on anterior half of thoracic stenite 5.

Chelipeds (Figs. 1e, 3) equal, smooth, longer in male; merus with subproximal part of dorsal margin, ventral inner margin with soft setae; carpus without inner angle; chela smooth, with one longitudinal crista from base of palm to immovable finger; dactylus with rectangular tooth, occlusal margin of tooth incised, distal
margin of tooth on middle of cutting edge; cutting edge of immovable finger regularly lined with low, rounded teeth. Ambulatory legs (Fig. 3) somewhat compressed dorso-ventrally, anterior part of proximal half of meri to ischia setose, meri with anterior, posterior margins granular; second leg longest, merus of second leg longer than carapace; fourth leg shortest, both outer, inner margins of propodus, inner margin of dactylus lined with plumose setae.

Male abdomen (Fig. 2a) relatively narrow; first and second segments short, third segment widest, first segment slightly narrower than third segment; third to sixth segments fused, fourth to sixth lacking suture from outer surfaces; proximal lateral angle of sixth segment convex laterally, with socket for sternal condyle on inner side (Fig. 2c, d). G1 stout, subtriangular in cross section, distally slightly curved outwards. Female abdomen (Fig. 2f) wide, fourth segment widest, almost reaching pereiopodal coxae laterally; telson small, short, almost embraced by sixth segment.

**Coloration.** The specimens from Thailand are mottled brown with two anterior white spots on the carapace (Fig. 3a), while the Philippines specimens are beige in background and brown dots (Fig. 3b).

**Distribution.** *Gopkittisak gallardoi* was originally described from Andaman Sea, Thailand (Serène & Soh, 1976). They also recoded it from Nhatrang Bay, Vietnam. Subsequently the species has been recorded from Pakistan (Ghani & Tirmizi, 1991) and Weizhou Island, Gungxi, China (Jiang *et al.* 2007). The present study newly records this species from central Philippines.

**Acknowledgements**

The first author acknowledges a post-doctoral fellowship from the Department of Biological Sciences, Faculty of Science to study brachyuran crabs at the National University of Singapore. Paul Clark was funded by a European Community grant to work on the Tsunami Impacts in Laem Son Project. We thank Jub for allowing us to reproduce her photograph of the new species. We also thank Ernesto Campos and Peter Castro for reviewing our manuscript, Arthur Anker and Joelle Lai for collecting specimens, and Peter K. L. Ng (Raffles Museum of Biodiversity Research) and Michitaka Shimomura (Kitakyushu Museum of Natural History and Human History) for providing us with museum facilities. Some specimens were collected during the Philippine-French-Singapore Expedition, PANGLAO 2004, to the Bohol Sea, and we thank the main organiser, Philippe Bouchet, and his Philippine counterpart, Danilo Largo, for their kind help and support. We gratefully acknowledge the strong financial support of the TOTAL Foundation for this major effort, as well as the support of the ASEAN Regional Centre for Biodiversity and Conservation (ARCBC) in Manila, Philippines; Muséum national d’Histoire Naturelle, Paris, France; and the National University of Singapore. The strong support provided by the University of San Carlos in Cebu, Philippines, notably from Lawrence Liao in the pre-expedition period, is also acknowledged. We also thank two anonymous reviewers for reviewing our manuscript; and our many colleagues who helped in the field collections, notably Marivene Manuel-Santos (NMCR) who was very active in the intertidal collections. This study was supported by research grant R-154-000-334-112.

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