

STOMATOPOD CRUSTACEA FROM ANAMBAS AND NATUNA ISLANDS, SOUTH CHINA SEA, INDONESIA

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ABSTRACT. – The stomatopod Crustacea collected during *Expedition Anambas 2002* to the Anambas and Natuna Islands, Indonesia are reported. Twelve species in seven genera and two families are reported. All are new records for the study area. A lectotype is selected for *Carinosquilla multicolorata* White, restricting the type locality to the Philippines.

KEY WORDS. – Stomatopoda, Crustacea, Anambas, Natuna, Indonesia, taxonomy.

INTRODUCTION

The species presented in this paper were collected during Expedition Anambas 2002 carried out in the southern part of the South China Sea using the Baruna Jaya VIII, the Indonesian Institute of Sciences' research vessel. The expedition made collection around the Anambas and Natuna Islands in the southern South China Sea. The expedition was jointly sponsored by countries surrounding the South China Sea and involved scientists from China, Indonesia, Malaysia, Philippines, Singapore, Chinese-Taipei, Thailand, and Vietnam.

The biological collections were made from various types of habitat using different collecting methods, from hand to seine nets. The collections were sorted at the Raffles Museum of Biodiversity Research of the National University of Singapore and then distributed to the specialists on each taxonomic group.

The most recent summary of the South China Sea fauna listed 120 species in 52 genera and 13 families (Moosa, 2000). Several species have since been added to the South China Sea fauna. Moosa (1991) synonymised *Carinosquilla thailandensis* Naiyanetr, 1983, with *Carinosquilla carinata* (Serène, 1950) but Naiyanetr et al. (2000) subsequently reinstated the former species. *Clorida albolitura* Ahyong & Naiyanetr, 2000 was described from the Gulf of Thailand. *Alima orientalis* Manning, 1978 was recorded from the southern Gulf of Thailand (Naiyanetr et al., 2000). *Quollastris*

subtilis (Manning, 1978), included in the present report, was inadvertently excluded by Moosa (2000). With the addition of *A. orientalis*, *Carinosquilla thailandensis*, *Clorida albolitura*, and *Q. subtilis*, the total known number of stomatopod species in the South China Sea is increased to 124. The present collection comprises 12 species in seven genera and two families. Of the 12 species reported herein, 10 were listed by Moosa (2000). No stomatopods, however, have been recorded from the Anambas and Natuna Islands, so all species reported here are new records for the study area. Although all species reported here are new records for the region, habitats frequented by small, cryptic gonodactyloid species, such as deep crevices in living coral or coralline rock, were not sampled. Numerous species of gonodactyloids are abundant in reef habitats elsewhere in Indonesia (e.g., Moosa & Erdmann, 1994; Erdmann & Sisovann, 1999) and are almost certainly also present in the Anambas and Natuna Islands. Thus, the stomatopod fauna is undoubtedly underestimated. The present study, nevertheless, serves as an initial baseline for future studies.

MATERIALS AND METHODS

Measurements of specimens are in millimetres (mm). Carapace length (CL) is measured along the dorsal midline and excludes the rostral plate. Total length (TL) is measured dorsally from the rostral apex to the apices of the submedian teeth. Abdominal somite and thoracic somite are abbreviated AS and TS respectively. Specimens are deposited in the

Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC) and Research Center for Oceanography (RCO), Indonesian Institute of Sciences. Synonymies are not intended to be complete. Original citations, primary synonyms, major works, and those dealing with the South China Sea are included.

SYSTEMATIC ACCOUNT

GONODACTYLIDAE GIESBRECHT, 1910

Gonodactylellus affinis (de Man, 1902)

Gonodactylus chiragra var. *affinis* de Man, 1902: 912 [type locality: Ternate, Moluccas, Indonesia, 0°48'N, 127°20'E].

Gonodactylus chiragra var. *confinis* de Man, 1902: 912, pl. 27, fig. 66 [type locality: Ternate, Moluccas, Indonesia, 0°48'N, 127°20'E].

Gonodactylus chiragra var. *segregatus* Lanchester, 1903: 448, pl. 23, figs. 6, 7 [type locality: Minikoi, Laccadive Islands, restricted by lectotype designation (Ahyong, 2001)].

Gonodactylellus affinis – Moosa, 2000: 407, 417-418; Ahyong, 2001: 46-48, fig. 21.

Material examined. – 1 female (TL 11 mm), Anambas: east coast of Jemaja Island, mouth of Teluk Jebung, trawled, 13 Mar.2002 (St. EA-TT04) (ZRC 2003.0501).

Remarks. – The species inhabits coarse substrates comprised of sponge, coral rubble, lithothamnion nodules, shelly grit and gray sand at depths of 25-57 m as reported by Moosa (1973). Moosa & Erdmann (1994) collected the species from rubble on barren sand flats and Moosa (1991) reported New Caledonian material from 13-80 m on moderately rough substrates composed of fine white sand, coarse muddy sand, coarse sand blocks and fragments with algae or Foraminifera. Ahyong (2001) reported the species from rocky and coral reefs, crevices in rock, coral, sponge, or coralline algae from the reef flat to 60-80 m depth. The distribution of *G. affinis* in the South China Sea was given by Moosa (2000).

Distribution. – Western Indian Ocean to Australia, Indonesia, the South China Sea and New Caledonia (Moosa, 2000; Ahyong, 2001).

Gonodactylellus viridis (Serène, 1954)

Gonodactylus chiragra var. *viridis* Serène, 1954: 6, 7, 10, 74-76, 87, fig. 13-3 [type locality: Cauda Bay, Vietnam].

Gonodactylinus viridis – Moosa, 2000: 407, 419.

Gonodactylellus viridis – Ahyong, 2001: 63-65, fig. 31.

Material examined. – 4 males (TL 26-35 mm), Anambas: Jemaja Island, northern edge of Tiru Bay, opposite Punisan Island, 12 Mar.2002 (St. EA-ZJ01) (3 males to ZRC 2003.0502, 1 male to RCO).

Remarks. – *Gonodactylellus viridis* is a shallow water species, commonly found on the reef flat. The records of this

species in the South China Sea, mostly from Vietnam, were reviewed by Moosa (2000). Ahyong (2001) reported a specimen collected from an intertidal reef flat from a cavity of *Spongodes* (Porifera) and two others collected by plankton net from the same locality.

Distribution. – Andaman Sea to Malaysia, Japan, Indonesia, Vietnam, the Philippines, Australia, New Caledonia, and Samoa (Ahyong, 2001).

Gonodactylus chiragra (Fabricius, 1781)

Squilla chiragra Fabricius, 1781: 515 [type locality: restricted to Ambon, Indonesia, 3°43'S, 128°12'E, by neotype selection (Manning, 1981: 217)].

Gonodactylus chiragra – Moosa, 2000: 408, 419-420; Ahyong, 2001: 67-70, fig. 34.

Material examined. – 1 male (TL 49 mm), Anambas: Jemaja Island, northern edge of Tiru Bay, opposite Punisan Island, 12 Mar.2002 (St. EA-ZJ01) (RCO); 1 female (TL 48 mm), Anambas: Matak Island, south-eastern coast of the Niulwan Peninsular, off Peninting Strait, 14 Mar.2002 (St. EA JL04) (ZRC 2003.0503); 1 female (TL 17 mm), Natuna: north-eastern coast of Panjang Island (north-west of Bunguran Island), 17 Mar.2002 (St. EA JL07) (ZRC 2003.0504).

Remarks. – *Gonodactylus chiragra* inhabits shallow water, where it forages for prey among coral boulders, especially in the upper intertidal zone. Records of this species in the South China Sea are given by Manning (1995) and Moosa (2000), while records for Australia are given by Ahyong (2001).

Distribution. – Western Indian Ocean to Australia, Indonesia, the South China Sea and French Polynesia (Ahyong, 2001).

SQUILLIDAE LATREILLE, 1802

Areosquilla indica (Hansen, 1926)

Squilla indica Hansen, 1926: 12-14, pl. 1, fig. 4a-c [type locality: Lohio Bay, Buton Strait, South East Sulawesi, Indonesia].

Areosquilla indica – Manning, 1976: 5-6, fig. 2; Moosa, 2000: 436.

Material examined. – 1 male (TL 28 mm), Natuna: west coast of Bunguran Island, trawled, 18 Mar.2002 (St. EA TT08) (ZRC 2003.0505).

Remarks. – The specimen of this seldom-reported species agrees well with the lectotype in the Zoological Museum, University of Copenhagen, as well as the New Caledonian specimen in the Muséum National d'Histoire Naturelle, Paris.

Distribution. – Maldives, Andaman Sea, Indonesia, and New Caledonia (Moosa, 1991). The presence of this species from the South China Sea was questionably reported by Moosa (2000) based on the report of Nguyen & Pham (1995). The present specimen of *A. indica* constitutes a new record for the study area and confirms its presence in South China Sea waters.

***Carinosquilla carinata* (Serène, 1950)**

Squilla carinata Serène, 1950: 571 [type locality: Cauda Bay, Nhatrang, Vietnam].

Carinosquilla carinata – Naiyanetr, 1980: 43; Manning, 1995: 173, figs. 101-104, 105b, 106b, 107b, 108b, pl. 30; Moosa, 2000: 436.

Material examined. – 2 males (TL 86-89 mm), 2 females (TL 93-97 mm), Anambas: Tarempa Bay, 14 Mar.2002 (St. EA TT-06) (ZRC 2003.0506).

Remarks. – The present specimens agree well with published accounts and exhibit typical variation in the armature of the raptorial claw. The largest female bears six teeth on the dactylus of one raptorial claw and seven on the other. All other specimens have six teeth on the dactyli of both claws.

Carinosquilla carinata inhabits mud or muddy-sand substrates between 15 and 50 m depth. Moosa's (1991) records of *C. carinata* from New Caledonia are based on *C. australiensis* Ah Yong, 2001, and *C. redacta* Ah Yong, 2001.

Distribution. – Vietnam, the Gulf of Thailand, and now from Indonesia. The distribution of this species in Vietnam and Thailand is given by Moosa (2000).

***Carinosquilla multicarinata* (White, 1849)**

(Fig. 1)

Squilla multicarinata White, 1849: 144, pl. 6, fig. 1 [type locality: the Philippines, fixed by present lectotype designation].

Carinosquilla multicarinata – Naiyanetr, 1980: 43; Moosa, 2000: 437.

Material examined. – 1 male (TL 68 mm), Anambas: Tarempa Bay, 14 Mar.2002 (St. EA TT-06) (RCO); 1 male (TL 59 mm), 1 female (TL 81 mm), Anambas: Matak Island, south-eastern coast of the Niulwan Peninsular, off Peninting Strait, 14 Mar.2002 (EA TT04) (ZRC 2003.0507).

Diagnosis. – Eyestalk without carinae. Ocular scales entire, not bifurcate. Carapace anterior with anterior bifurcation of median carina opening posterior to dorsal pit. Raptorial claw dactylus with 5 teeth; merus outer face with longitudinal carina. Mandibular palp present. TS5 dorsal carinae transverse, except medially. TS6-8 and AS1-6 dorsal carinae subparallel, most or all posteriorly armed above intermediate carinae. AS1-6 with supplementary carinae unarmed below intermediate carinae. Abdominal somites with normal complement of carinae spined as follows: submedian 1-6, intermediate 1-6, lateral 1-6, marginal 1-5. Telson prelateral lobe with sharp apex; dorsolateral surface with numerous supplementary longitudinal carinae, uninterrupted proximally. Uropodal protopod inner margin with slender spines. Uropodal exopod exopod distal segment black.

Description of lectotype. – Eyestalk without carinae. Ocular scales entire, not bifurcate. A1 somite dorsal processes with acute apices; directed anterolaterally. A2 scale length 0.55 CL. Rostral plate as long as broad; lateral margins convergent,

upturned, straight to sinuous; apex truncate to rounded; with long, distinct, median carina flanked by long supplementary carina. Carapace anterior width 0.52 CL; anterior bifurcation of median carina opening posterior to dorsal pit. Raptorial claw dactylus with 5 teeth; merus outer face with longitudinal carina. Mandibular palp present. Maxilliped 1-4 with epipod. TS5 lateral process with anterior lobe a slender spine directed anterolaterally; posterior lobe short, broad with rounded apex directed laterally. TS6 lateral process anterior lobe quadrate,



Fig. 1. *Carinosquilla multicarinata* (White, 1849). Lectotype, female, TL 67 mm, BMNH 709, Philippine Islands (photo: H. Taylor).

apex rounded to subtruncate; posterior lobe broad, rounded. TS7 lateral process anterior lobe short, blunt; posterior lobe broad, rounded, larger than anterior lobe. TS8 anterolateral margin triangular, apex acute; sternal keel triangular. TS5 dorsal carinae transverse, except medially. TS6-8 and AS1-6 dorsal carinae subparallel, most or all posteriorly armed above intermediate carinae. AS1-6 with supplementary carinae unarmed below intermediate carinae. AS6 submedian carinae unicarinate with supplementary longitudinal carinae laterally and medially; sternum with continuous transverse proximal carina and a V-shaped median carina flanked by transverse carina. Abdominal somites with normal complement of carinae spined as follows: submedian 1-6, intermediate 1-6, lateral 1-6, marginal 1-5. Telson as long as broad; prelateral lobe longer than margin of lateral tooth, with sharp apex; dorsolateral surface with numerous supplementary longitudinal carinae, uninterrupted proximally; denticles submedian 3, intermediate 8-9, lateral 1. Uropodal protopod inner margin with 8 slender spines; with ventral tubercle anterior to endopod articulation; protopod terminal spines with lobe on outer margin of inner spine rounded, as broad as or narrower than adjacent spine, proximal margin concave. Uropodal exopod proximal segment outer margin with 9 movable spines, distalmost not exceeding midlength of distal segment, distal margin with 2 slender ventral spines outer longest; exopod distal segment black, ventrally carinate, length subequal to proximal segment; endopod dorsally and ventrally carinate.

Remarks. – We take this opportunity to designate the female syntype from the Philippines as the lectotype. The lectotype is a 67 mm TL dry female specimen in the collections of the Natural History Museum, London, registration number 709. The increasing numbers of species recognized in *Carinosquilla*, including a species nearly identical to *C. multicarinata* (see Ahyong, 2001), and that *C. multicarinata* is the type species of the genus justifies the present action.

Distribution. – Eastern Indian Ocean to Vietnam, the Gulf of Thailand, Indonesia, the Philippines and Japan. Moosa (2000) presented records of this species in the South China Sea.

Carinosquilla thailandensis Naiyanetr, 1983

Carinosquilla thailandensis Naiyanetr, 1983: 394-399, figs. 2, 4 [type locality: Ko Phai, Chon Buri province, Thailand, 12°56'N, 100°41'E]; Naiyanetr et al., 2000: 1292-1294; Ahyong, 2001: 214, fig. 104.

Material examined. – 2 males (TL 104-105 mm), 1 female (TL 81 mm), Anambas: east coast of Jemaja Island, mouth of Teluk Jebung, 13 Mar.2002 (St.EA TT04) (1 male, 1 female to ZRC 2003.0508, 1 male to RCO).

Remarks. – The three specimens agree well with published accounts (Naiyanetr, 1983; Naiyanetr et al., 2000; Ahyong, 2001) and constitute the first records of the *C. thailandensis* from Indonesia. The species was previously known only from the Gulf of Thailand and northeastern Australia, so the present records are the first from an intermediate locality.

Distribution. – Gulf of Thailand, northeastern Australia, and now from Anambas, Indonesia.

Cloridina chlorida (Brooks, 1886)

Squilla chlorida Brooks, 1886: 21, 40, pl. 2, figs. 1-5 [type locality: Amboina, Indonesia, 3°43'S, 128°12'E, 27 m].

Cloridina chlorida – Moosa, 2000: 439; Ahyong, 2001: 232-233, fig. 113.

Material examined. – 1 male (TL 46 mm), Anambas: Teluk Tarempa Bay, 03°15.31-15.28'N, 106°09.50-11.79'E, trawled, 46 m, 14 Mar.2002 (St. EA-TT-06.) (ZRC 2003.0509).

Remarks. – The single specimen agrees well with published accounts (Brooks, 1886; Manning, 1968; Ahyong, 2001). *Cloridina chlorida* occupies muddy substrates at depths of 30-64 m (Manning, 1968).

Distribution. – Madagascar, Vietnam, Indonesia, the Philippines, New Caledonia and Australia (Ahyong, 2001).

Oratosquillina perpensa (Kemp, 1911)

Squilla oratoria var. *perpensa* Kemp, 1911: 98 [part][type locality: Hong Kong, restricted by lectotype designation (Manning, 1978)].

Squilla oratoria var. *inornata*. – Holthuis, 1941: 248 [part, not *Squilla oratoria* var. *inornata* Tate, 1883].

Oratosquilla perpensa – Manning, 1978: 21-23.

Oratosquillina perpensa – Manning, 1995: 233-234; Moosa, 2000: 449.

Material examined. – 2 females (TL 82-102 mm), Natuna: west coast of Bunguran Island, 18 Mar.2002 (St. EA TT08) (1 female to ZRC 2003.0510, 1 female to RCO).

Remarks. – The specimens agree well with Manning's (1978) redescription. Although variation in the length of the rostral plate has been observed in *O. perpensa* (e.g., Ahyong, 2001; Ahyong & Naiyanetr, 2002) both specimens examined here have the 'short' rostral plate of the lectotype.

Distribution. – Burma to Indonesia, Vietnam, Hong Kong, Taiwan and Japan (Manning, 1995). The distribution within the South China Sea was given by Moosa (2000).

Oratosquillina quinquentata (Brooks, 1886)

Squilla quinquentata Brooks, 1886: 21, 26, pl. 1: fig. 3, pl. 2: fig. 6 [type locality: Arafura Sea, 09°59'S, 139°42'E].

Oratosquillina quinquentata – Moosa, 2000: 449; Ahyong, 2001: 295-298, fig. 144.

Material examined. – 1 male (TL 112 mm), Anambas: east coast of Jemaja Island, mouth of Jebung Bay, 13 Mar.2002 (St. EA TT04) (ZRC 2003.0511).

Remarks. – *Oratosquillina quinquentata* burrows in muddy or sandy-mud substrates from the shore to at least 51 m depth (Ahyong, 2001).

Distribution. – India to the Gulf of Thailand, Indonesia, and Australia (Ahyong, 2001).

***Quollastria gonypetes* (Kemp, 1911)**

Squilla gonypetes Kemp, 1911: 96 [type locality: vicinity of Cheduba Island., Burma, 18°48'N, 93°38'E, 13 m, restricted by lectotype designation (Manning, 1978)].

Oratosquillina gonypetes – Moosa, 2000: 447.

Quollastria gonypetes – Ahyong, 2001: 304-306, fig. 147.

Material examined. – 1 female (TL 68 mm), Natuna: west coast of Bunguran Island, 18 Mar.2002 (St.EA TT-08) (ZRC 2003.0512).

Remarks. – The specimen agrees well with published accounts, exhibiting the distinctive pair of dark 'squares' on the fifth abdominal somite. This species inhabits muddy sand with *Foraminifera*, with depth ranging from 13 to 180 m (Moosa, 2000).

Distribution. – Western Indian Ocean to Australia, Indonesia, the South China Sea, and Japan (Ahyong, 2001).

***Quollastria subtilis* (Manning, 1978)**

Oratosquilla subtilis Manning, 1978: 33-34, fig. 19 [type locality: off Visakhapatnam coast, Madras, India]; Moosa & Cléva, 1984: 79-80.

Oratosquilla turbata Manning, 1978: 35-36, fig. 20 [type locality: Banc de Pracel, W coast of Madagascar, 17°00'S, 43°30'E]; 1991: 12.

Quollastria subtilis. – Ahyong, 2001: 308-310, fig. 149.

Material examined. – 2 females (TL 43-46 mm), Anambas: Teluk Tarempa Bay, 14 Mar.2002 (St. EA TT-06) (ZRC 2003.0513); 1 female (TL 41 mm), Natuna: west coast of Bunguran Island, 18 Mar.2002 (St. EA TT-08) (RCO).

Remarks. – The specimen agrees well with published accounts, exhibiting the characteristic pair of dark 'triangles' on the fifth abdominal somite. *Quollastria subtilis* occupies sand or silty substrates and is known from depths of 31-111 m (Ahyong, 2001).

Distribution. – Western Indian Ocean to Australia, Indonesia, the South China Sea, and New Caledonia (Ahyong, 2001).

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