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# *GALATHEA CORALLIOPHILUS,* A NEW DECAPOD CRUSTACEAN (ANOMURA: GALATHEIDAE) FROM SINGAPORE, GULF OF THAILAND, AND WEST IRIAN

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*Abstract.*—*Galathea coralliophilus,* a new galatheid crustacean, is described and illustrated. The new species is common in association with reef corals in Singapore and the Gulf of Thailand. *Galathea spinosorostris* reported by Johnson (1970:6) from Singapore and *Galathea* aff. *consobrina* described by Gordon (1935:5) from West Irian are synonymized with the present species.

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During ecological studies on the coral communities of the Gulf of Thailand in 1984, Dr. Y. Nakasone collected galatheid crustaceans commensal with several species of reef corals and made them available to one of us (KB) for identification; they were immediately identified as an undescribed species of *Galathea.* Recently, Singaporean galatheids in the collection of the National University of Singapore (Zoological Reference Collection [ZRC]), taken mostly on coral reefs, rarely from crinoids or fouling rubbles on a ship or among fouling community, were made available for study. They comprise two species: one of them is *Allogalathea elegans* (Adams & White), a common crinoid associate in the Indo-West Pacific, and the other is identical with the Thailand species, as well as with the species reported by Johnson (1970:6) as *Galathea spinosorostris,* which, according to him, is the only shore galatheid in Singapore. However, Johnson's identification is incorrect, as the identity of *Galathea spinosorostris* Dana, 1852 has recently been established (Baba 1988:78). In addition, examination of the literature discloses that *Galathea* aff. *consobrina* from West Irian (Gordon 1935: 5) should also be merged with the new species.

Most of the material from Thailand is retained in the collection of Kumamoto University, and part will be sent to the Smithsonian Institution. Locations of stations where the Thailand survey was carried out can be found in Nakasone et al. (1986: fig. 1). The measurements of the specimens examined are given in parentheses under "Material," showing minimum and maximum carapace lengths in millimeters taken between the rostral tip and midpoint of the posterior margin of the carapace. The host corals from Thailand have been identified by Kazuhiko Sakai (see Nakasone et al. 1986:155), and those, as well as a host crinoid, from Singapore have been determined by Beverly Goh (Peter Ng, pers. comm.).

## *Galathea coralliophilus,* new species
Fig. 1

*Galathea* aff. *consobrina.*—Gordon, 1935: 5, figs. 2, 3a, b.

*Galathea spinosorostris.*—Johnson, 1970:6, fig. 1b. [Not *G. spinosorostris* Dana, 1852.]

*Material.*—Thailand: Khang Khao Island, sta. B, 26 Oct 1984, on *Pavona frondifera* Lamarck: 1 ovig. ♀ (3.5); on *Pocillopora damicornis* Linnaeus: 4 ♂ (3.1–5.5), 2 ovig. ♀ (3.7, 5.1); 15 Nov 1984, on *P. damicornis*: 1 ♂ (4.5), 1 ovig. ♀ (3.8), 1 ♀ (3.2); sta. C, 25 Oct 1984, on *P. damicornis*: 1 ♂ (3.0). Samui Island, sta. 1, 10 Nov 1984, on *Acropora* sp.: 1 ♀ (3.5); on *Psammocora con-*

*tigua* (Esper): 4 ♂ (2.8–4.8). Singapore: Pulau Hantu, North, 12 Aug 1986, coll. B. Goh, on *Acropora* (*Acropora*) *tenuis* (Dana): 1 ♂ (4.7) (ZRC 1987.2555); Pulau Hantu, South, 19 Aug 1986, on *Pavona frondifera*: 2 ♀ (4.1, 4.3) (ZRC 1987.2558–2559); Pulau Hantu, West, 19 Sep 1986, on *Pocillopora damicornis*: 3 ♂ (3.7–5.3), 1 ♀ (4.9) (ZRC 1987.2582–2585). Cyrene Reef, 15 Aug 1986, coll. B. Goh, on *Pavona decussata* (Dana): 1 ovig. ♀ (4.3+), 1 ♀ (3.7+) (ZRC 1987.2556–2557). Pulau Semakau, 22 Aug 1986, coll. B. Goh, on *Pavona frondifera*: 1 ♂ (4.5), 2 ovig. ♀ (4.4, 4.1+), 1 ♀ (cephalothorax missing) (ZRC 1987.2560–2563); on *Cyphastrea serailia* (Forskål): 1 ♂ (3.9), 1 ♀ (carapace missing) (ZRC 1987.2564–2565); on *Pavona cactus* (Forskål): 1 ♂ (4.8) (ZRC 1987.2566); coll. G. Lim, on crinoid *Comaster gracilis* (Hartlaub): 1 ♂ (5.3) (ZRC 1987.2596). Pulau Jong, 26 Aug 1986, coll. B. Goh, on *Pocillopora damicornis*: 1 ovig. ♀ (4.4+) (ZRC 1987.2567). Pulau Jong, South, 24 Oct 1986, coll. B. Goh, on *Pavona frondifera*: 1 ovig. ♀ (5.5) (ZRC 1987.2595). Raffles Lighthouse, 2 Sep 1986, coll. B. Goh, on *Acropora* (*Acropora*) *willisae* Veron & Wallace: 1 ♂ (5.1) (ZRC 1987.2568); on *Pocillopora damicornis*: 3 ♂ (3.7–4.8), 1 ovig. ♀ (4.2), 1 ♀ (4.7) (ZRC 1987.2569–2573); 16 Oct 1986, on *Pocillopora damicornis*: 1 ♂ (4.9), 1 ovig. ♀ (5.9) (ZRC 1987.2586–2587); on *Pavona frondifera*: 3 ♂ (4.5–6.3), 1 ♀ (6.0) (ZRC 1987.2588–2591) [largest male is holotype]; on *Pavona decussata*: 2 ♂ (4.5, 5.6), 1 ovig. ♀ (4.5) (ZRC 1987.2592–2594). Terembu Pempang Laut, South, 9 Sep 1986, coll. B. Goh, on *Pocillopora damicornis*: 5 ♂ (4.0–6.4), 3 ovig. ♀ (3.7–5.2) (ZRC 1987.2574–2581). Southern Islands, Dec 1986, coll. J. B. Sigurdson, from fouling rubble on ship: 1 ♂ (6.4), 1 ovig. ♀ (4.8) (ZRC 1987.2597–2599). Sentosa Reef, Dec 1985, coll. P. Ng: 2 ♂ (3.7, 4.1), 2 ovig. ♀ (3.9, 4.1) (ZRC 1987.2600–2603). Pulau Busing, 1 May 1987, coll. J. B. Sigurdson, from fouling community: 2 ovig. ♀ (4.5, 5.2) (ZRC 1987.2604–2605).

*Description of holotype.*—Carapace excluding rostrum and lateral spines nearly as long as wide, dorsal surface with distinct transverse ridges as figured, cervical groove indistinct; first transverse ridge with pair of submedian spines, each spine accompanied by feathered seta mesial to it, also lateral to it on left side only; scale-like ridge present directly behind second transverse ridge, bearing 4 pits for roots of stiff feathered setae. Lateral margins convex, bearing 7 spines, first (anterolateral) pronounced, second small and somewhat dorsal in position, third to seventh located behind end of cervical groove, fifth largest. Another spine ventral to level of second lateral marginal spine and somewhat anterior to anterior end of linea anomurica. Outer angle of orbit strongly produced, ending in sharp point.

Rostrum broadly triangular, 1.4 times as long as wide when measured between incisions formed by 2 proximal teeth, dorsal surface with several pronounced feathered setae in addition to fine simple ones, lateral margin with 4 sharply incised teeth, basal lateral tooth smaller, ultimate lateral tooth terminating opposite midlength of rostral median spine.

Eyestalks with few feathered setae near mesial limit of terminal fringe of very fine setae proximal to cornea.

Abdominal segments sparsely provided with feathered setae as illustrated; second and third segments each with 4 transverse ridges, first (anterior) ridge elevated, second ridge medially interrupted by considerable space, third ridge uninterrupted, accompanying groove anterior to it, fourth ridge faint and medially interrupted.

Pterygostomian flap anteriorly ending in sharp spine, bearing small spine on second ridge.

Basal segment of antennule with 3 well developed terminal spines, distal segment with tuft of pronounced terminal setae. First (proximal) segment of antennal peduncle with rather long distomesial spine nearly reaching end of third segment; second seg-

ment with distomesial and distolateral spines of subequal size; third segment with small distomesial spine.

Third maxilliped having ischium with small distoventral and short but stout distodorsal spines, mesial ridge with 23 denticles; merus with 2 well developed ventral spines on distal half of length, distal one present at midlength of space between proximal spine and distal end of ventral margin; dorsal margin with distodorsal spine of small size and eminence proximal to it; carpus unarmed but with 3 eminences on dorsal margin; dactylus elongate.

Third thoracic sternum depressed below level of following sternum, anteriorly narrowed, anterior margin with distinct median notch.

Chelipeds 2.7 times as long as carapace, provided with coarse setae in moderate density and very spinose as illustrated; merus with 5 rows of spines, distal 2 of mesial marginal spines prominent; carpus with 5 rows of spines, penultimate of mesial marginal spines very strong; palm about 3 times as long as wide, with 4 rows of spines on dorsal surface and mesial and lateral margins; fingers gaping, touching each other with several intermeshing teeth at tip when closed; movable finger 0.57 as long as palm, bearing few spinules slightly dorsal to proximal mesial margin, opposable margin with prominent but short basal process proximal to opposing process at midlength of fixed finger.

Walking legs sparsely provided with pronounced feathered setae. First and second walking legs subequal in size, third one shorter; meri dorsally provided with 10 spines on first leg, 9 or 10 on second leg, 4 on third leg proximal to distodorsal spine, distolaterally with pronounced spine on all these legs, accompanying tiny one proximal and ventral to it on first and second legs; carpi with few tiny spines on dorsolateral surface parallel to 4 dorsal marginal spines. Dorsal margins of propodi with 2 proximal spines, ventral margins with 4 spinelets on first leg, 3 on second leg and 3 or 4 on third leg; dactyli ending in strongly curved sharp claw, ventrally bearing 5 teeth each with stiff seta at base, all these teeth and setae decreasing in size toward base of segment.

Epipods present on chelipeds, absent from walking legs.

*Variation.*—The scale-like ridge immediately behind the second transverse ridge is absent in only two of the 66 specimens examined. In these two, the second stria is interrupted at midpoint and both of their mesial limits are directed posteriad. The feathered seta mesial to each epigastric spine is consistently present, and an additional one lateral to it is present in two specimens including the holotype. The spine on the pterygostomian flap is usually very tiny, occasionally discernible only under high magnification, and very rarely obsolete (in two specimens). The propodal ventral spinelets vary from two to five (mostly four) on the first walking leg, two to four (mostly three) on the second walking leg, one to four (mostly three, occasionally two) on the third walking leg. The merus of the third walking leg bears three to five (mostly four) spines on the dorsolateral surface near dorsal margin, in addition to a distodorsal one. The dorsal margin of the merus of the third maxilliped bears at most three spines; the median one is mostly tiny and rarely missing; the proximal one tends to be obsolete; and the distal one is constantly present.

*Habitat.*—The specimens examined are mostly reef associates, very frequently taken from *Pocillopora damicornis* Linnaeus, occasionally from *Pavona frondifera* Lamarck, rarely from *Pavona decussata* (Dana), *P. cactus* (Forskål), *Acropora tenuis* (Dana), *A. willisae* Veron & Wallace, *Cyphastrea serailia* (Forskål) and *Psammocora contigua* (Esper); a few lots are taken from a crinoid *Comaster gracilis* (Hartlaub), fouling rubble on a ship, and among fouling community.

*Parasites.*—Six of the 50 specimens from

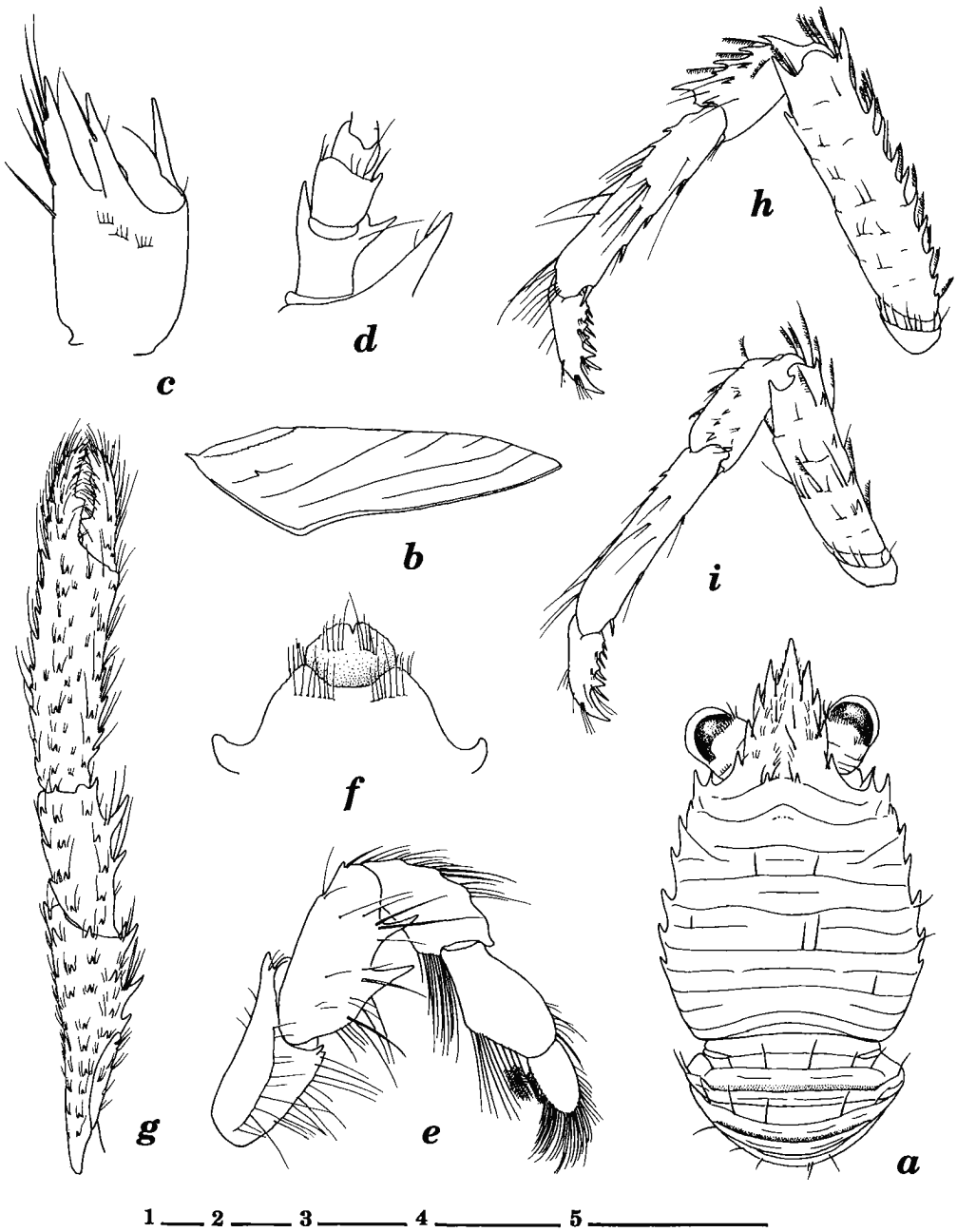


Fig. 1. *Galathea coralliophilus* new species, male holotype, ZRC1987.2588: a, Carapace and abdomen, dorsal view, fine setae on transverse ridges omitted; b, Left pterygostomian flap; c, Basal segment of right antennule, ventral view; d, Right antennal peduncle, ventral view; e, Endopod of right third maxilliped, lateral view; f, Anterior part of sternal segments; g, Left cheliped, dorsal view; h, Left first walking leg, lateral view; i, Left third walking leg, lateral view. Scales = 1 mm; scale 1 for g; scale 2 for a; scale 3 for b, h, i; scale 4 for f; scale 5 for c, d, e.

Singapore have externas of rhizocephalan parasites; no externas on the Thailand specimens.

*Remarks.*—*Galathea* aff. *consobrina,* reported by Gordon (1935:5) from West Irian, the identity of which was questioned because of a lack of two spinules on the hepatic region (Baba 1988:73), is in all probability identical with the present species. The rounded outer orbital angle in *G.* aff. *consobrina,* which Gordon stressed as one of the characteristics that differentiates her unique specimen from *G. consobrina,* is the only one that does not agree with the present specimens. Very possibly she must have overlooked a sharp tip, because, in my experience, such a sharply produced angle as illustrated by Gordon (1930:fig. 2) has not been observed in any of the known species that have a rounded outer orbital angle.

The differences between *G. coralliophilus* and *G. consobrina* De Man, 1902 are apparent in the following particulars that were verified by examination of both the male holotype in the collection of the Senckenberg Museum at Frankfurt am Main (SMF 4556) and additional specimens from the Philippines (Baba 1988:73) of *G. consobrina*: 1) the epipods on the chelipeds are present in *G. coralliophilus,* absent in *G. consobrina*; 2) the hepatic region bears two spinules other than the second of the seven lateral marginal spines of the carapace in *G. consobrina,* none in *G. coralliophilus*; 3) the third thoracic sternum is much wider in *G. consobrina* than in *G. coralliophilus* (see Baba 1988:fig. 30e); 4) a spine on the anterior surface of the pterygostomian flap is usually present though mostly tiny in *G. coralliophilus,* absent in *G. consobrina.*

Johnson (1970:6) mistakenly reported *G. spinosorostris* from Singapore. The true *G. spinosorostris* originally known from the Hawaiian Islands (Dana 1852:480) is characterized by scale-like ridges on the branchial region, the outer orbital angle unarmed, three hepatic spinules including the second lateral marginal spine of the carapace, and lack of a spine on the anterior portion of the pterygostomian flap (Baba 1988:78). The brief account of morphology with an illustration, as well as a note on the habitat, of *G. spinosorostris* provided by Johnson, suggests that his specimens should be referable to the present new species. He stated that the merus of the third walking leg bears seven or eight dorsal spines. This is the only one to be at variance with the present species. However, it is most likely that his note is based on the first or second walking leg, because most of the known species including the present new species has the third walking leg with at most four or five dorsal and one distolateral spines.

The presence of a spine on the anterior stria of the pterygostomian flap and two epigastric and seven lateral marginal spines on the carapace link the species to *Galathea orientalis* Stimpson, 1858 (see Miyake & Baba 1967:233). However, they differ in that: the carpus of the third maxilliped bears a few but usually distinct dorsal spines in *G. orientalis* but lacks them in *G. coralliophilus*; the scale-like ridge immediately behind the second transverse ridge is distinct in *G. coralliophilus,* absent in *G. orientalis*; and the rostrum has a few to several feathered setae on the dorsal surface in *G. coralliophilus* but lacks them in *G. orientalis.*

*Etymology.*—The specific name is a noun in apposition from the Greek, "corallion," coral, and "philos," loving or fond of, for the association of the species mostly with corals.

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amined on loan by the courtesy of Michael Türkay.

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