Annotated Checklist of Alpheid and Ogyridid Shrimp from the Philippine Archipelago and the South China Sea[1]

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Abstract. A total of 103 species of alpheid and one ogyridid shrimp are listed as coming from Philippine national waters, of which 55 are new records reported for this paper. From the South China Sea, primarily in the Hong Kong area, a total of 48 species of alpheids are listed, of which 41 are new records, including one new species of the genus *Athanas*. As 35 of the listed species are shared between the two areas, the total number of species is 116.

Introduction

This paper is one in our continuing series to increase the knowledge of the distributional patterns of the alpheid shrimp in the Indo-Pacific. The primary focus is upon the alpheids of the Philippine Archipelago and we hope we have covered all references in the literature to records of capture for that area. For reasons given below, we have supplemented the Philippine records with records of species from the South China Sea, mainly in vicinity of Hong Kong. The bulk of the records are upon previously unreported collections, mostly our own personal collections and those of the Hong Kong Fisheries Research Station. The listing is presented in the form of an annotated check list. We do not believe that the list will be found to be exhaustive for either area and we present it merely as a point of departure for future workers in the field. We have not offered any keys to the genera or the species as we hold that keys to an incompletely known fauna can be misleading.

In the past, all save two collections reported from waters of the Philippine Archipelago and adjacent waters of the South China Sea were made on the track of major expeditions passing through the area. The first report in the literature was that of White (anonymously in 1847) who reported two species from the "Philippines." Unfortunately, both species are *nomina nuda* and cannot be attributed with certainty to any presently recognized species. This was followed in 1852 by Dana's report on the crustaceans of the U. S. Exploring Expedition of 1838–42, in which he reported 6 species, all new, and all presently accepted (although one has never been found again) from the Balabac Straits, Sulu Sea. Following Dana's study was the report of Stimpson (1861) who listed three species from the U. S. North Pacific Expedition, 1853–1856, one of questionable identity, one probably correctly identified, and one as a new genus and species, all from Hong Kong. Bate (1888) listed six species collected by the

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CHALLENGER Expedition from the Philippines and one from Hong Kong. Unfortunately, of the seven names he applied, only one may be correct by present standards and the others are misidentifications or identifications of postlarval stages. The next expedition was that of the *SIBOGA*, which focused primarily on Indonesian waters, but which ran 17 dredging stations in the Sulu Archipelago. From these Philippine collections, De Man (1911) reported 21 species of alpheids and one ogyridid. The only other original report of alpheids from the Philippines was that of Cowles (1913), who reported on the tube-making behavior of a single species. All of these reports were summarized by Estampador in 1937 in his checklist. For a person using Estampador's list, it should be noted that he did not include White's names. He omitted some of the species reported by Dana and De Man, he included the erroneous names used by Bate, and he wrongly attributed Cowles' report to Roxas (1930). Estampador gave no additional information on distribution or other details and listed only 30 species.

Still unreported are the collections made by the U. S. Fish Commission Research Steamer *ALBATROSS*, 1907–1910. If the *ALBATROSS* collections from the Philippines are similar to those from Hawaii, they will contain primarily dredged specimens, some from relatively deep water (see Banner, 1953). These are currently being studied, together with other carideans taken by the *ALBATROSS*, by Dr. Fenner A. Chace, Jr., of the U. S. Smithsonian Institution. We expect that he will have a number of species that do not appear in this check list.

To complete the historical resumé on the Philippine alpheids, the most recent collection was made by the MUSORSTOM Expedition in 1976. This short expedition was sponsored by the Muséum National d'Histoire Naturelle of Paris and the Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM) and was made to recover more specimens of *Neoglyphea inopinata* Forest and St. Laurent, a "living fossil" (see Forest, St. Laurent and Chace, 1976: 884). The expedition made a number of deeper dredgings (around 200 m) off the Lubang Islands, near Manila, with a few shallower stations. These collections yielded 19 species, all of which were new records for the Philippines and included one new genus and three new species. The report on this collection is currently in press at the Muséum and should be issued sometime in 1979; we have listed the records below but we have not applied the names to the new taxa to prevent their becoming *nomina nuda* (although they are arranged alphabetically by their names-to-be).

This study is primarily based upon collections we personally made during one month of intensive shallow water collecting about the island of Mindanao in 1968. We had hoped to be able to visit many parts of the island, representing differing habits, but the failure to obtain adequate air transportation confined our work to the area near Kauswagen on the north central coast, the area about Zamboanga on the southeastern tip and near Jolo in the Sulu Archipelago. These collections contained 65 species, of which 50 were new to the Philippines. On this collection we have already issued 2 short papers, one dealing with a new species from the Philippines of the genus *Prionalpheus* (Banner and Banner, 1971), the other establishing the neotype for Dana's *Synalpheus neptunus* and distinguishing it from *S. theano* De Man (Banner and Banner, 1972).

Our personal collections were supplemented by specimens collected from the Philippines by a party from the American Museum of Natural History working on Mindanao in 1937 and identified by Dr. John C. Armstrong of that museum, but never reported upon in the literature. We have personally examined and confirmed his identifications, and list them below. We also had available a very small collection (5 species from 5 localities) made by B. R. Wilson in the southern Sulu Archipelago in 1964 while on the *PELE* Expedition of the Bernice P. Bishop Museum of Honolulu. These specimens were loaned to us by the Western Australian Museum of Perth.

We had originally planned to report separately on the small but interesting collection made by the Hong Kong Fisheries Research Station, primarily by dredging on the continental shelf in the northwestern South China Sea, but we have included it in this paper for two reasons. First, of the 45 species in that collection, 32 are also now known from the Philippine waters. Second, even if the dispersal of planktonic larvae were to be ignored, the 100 fathom contour of the continental and island shelves reach without a deep channel from Taiwan south along the Asiatic coast, as a broad band across the southern end of the South China Sea, and northwards along the coast of Borneo to Palawan, and almost through the Sulu Archipelago, thus permitting easy dispersal of adults of any benthic species. We therefore would expect that when sufficient sampling is done in comparable habitats, fauna of these separately collected areas would be almost identical, with all of those species known from the Hong Kong area also being found in the Philippines, and the reverse. We have already reported on 3 new species from these collections (Banner and Banner, 1968b). The Hong Kong Fisheries Research Station collections were supplemented by small collections made independently in the Hong Kong area by Drs. B. S. Morton and R. G. Wear, and loaned to us by the Smithsonian Institution.

In this connection, we wish to call attention to Tiwari's study on Vietnamese alpheids (1963). He lists 23 species, collected primarily near Nha Trang. Of these, only four are not now known from the Philippines (*Alpheopsis vietnamensis* Tiwari, *Alpheus microstylus* (Bate), *A. pubescens* De Man and *A. bisincisus* Milne-Edwards). We would expect these species also to occur in the Philippines. We have not searched the literature for previous records of alpheids from the South China Sea.

Our personal collections will be deposited in the Bernice P. Bishop Museum, Honolulu, Hawaii, while those from the Fisheries Research Station of Hong Kong will be deposited in the Smithsonian Institution. The MUSORSTOM collections were returned to the Muséum National d'Histoire Naturelle in Paris and the American Museum of Natural History collections were examined at that museum. The Morton and Wear collections have been returned to the Smithsonian Institution.

LIST OF SPECIES FROM THE PHILIPPINES AND SOUTH CHINA SEA

In the following listing, in addition to those species represented in our personal collections, we have listed all species we could find that have ever been reported from the Philippines and the northwestern South China Sea with all earlier references being placed under the heading of "Previous record(s)". We have presented them alphabetically by family, genus and species, with subspecies listed under the nominate species.

Those species that were cited under other than current names are listed under the name that was used, but in brackets. Where possible we give a cross reference to the name currently in use. Inasmuch as Estampador presented only a compilation of earlier works with no new data, we cite his work with an "[E]" after the original record.

To shorten the references to our joint works we will follow the device we started in the last part of our Australian study of using "B & B" with date for our papers. The records presented in the MUSORSTOM paper, now in press, are cited here under "Previous Records" as "B & B, in press." Inasmuch as the original description may not be as readily available to future workers as would be our redescriptions and figures from the Australian studies, those redescriptions we have cited in brackets after the citation of the original description with our initials, the part number and page. Because Part III is also in press, the page reference to that section cannot be given. To distinguish it from the MUSORSTOM paper, we merely cite it as "B & B, III".

FAMILY ALPHEIDAE

Genus *ALPHEOPSIS* Coutière

Alpheopsis diabolus Banner, 1956:325, fig. 3.

SPECIMENS EXAMINED: 2 specimens from BPI 16; 1, BPI 28; 1, BPI 29.

Alpheopsis equalis Coutière, 1896:382. [B & B, I:342]

SPECIMENS EXAMINED: 2 specimens from BPI 6; 2, BPI 7; 1, BPI 15; 2, BPI 16; 2, BPI 18; 3, BPI 22; 1, BPI 23; 1, BPI 24; 1, BPI 25; 4, BPI 26; 3, BPI 28; 2, BPI 29.

REMARKS: The wide range of variation noted by Banner (1953:15) we find also in our Philippine collections. All of the specimens carry a tooth on the pterygostomial angle of the carapace, a variable characteristic in other waters.

Genus *ALPHEUS* Fabricius

Alpheus acutocarinatus De Man, 1909a:104; 1911:401, fig. 94. [B&B, III]

PREVIOUS RECORDS: B&B, in press. Entrance to Manila Bay.

Alpheus acutofemoratus Dana, 1852:550, pl. 35, fig. 2. [B&B, III]

PREVIOUS RECORDS: Dana, 1852. Balabac Straits. [E]

SPECIMENS EXAMINED: 16 specimens from BPI 1; 2, BPI 3; 1, BPI 4; 6, BPI 5; 2, BPI 7; 3, BPI 15; 2, BPI 15c; 7, BPI 18; 17, BPI 19; 22, BPI 21; 13, BPI 22; 1, BPI 24; 2, BPI 25; 4, BPI 27.

REMARKS: Like *A. deuteropus* Hilgendorf, *A. acutofemoratus* lives in branching open-topped galleries in living heads of massive coral such as *Porites*. We have discussed these galleries in some detail for *A. deuteropus* (B&B, III) and, while we have not studied the galleries of *A. acutofemoratus* in a comparative manner, we do not know how the two types can be distinguished in the field. Our field notes from

Indonesia (as yet unreported) state again and again "*A. acutofemoratus* living in *deuteropus*-type burrows".

The question has occurred to us: If they have similar habits, do they have different ecological requirements? A tabulation of our Philippine stations reveals that in 6 collections both species occurred, in 7 only *A. acutofemoratus* occurred, and in 6 only *A. deuteropus* occurred. The stations where both species were collected can tell little, for while the stations were confined to a fairly narrow area, there could be slight differences in wave action, sedimentation, etc. Thus at BPI 1, where 16 *A. acutofemoratus* and 4 *A. deuteropus* were collected, part of the corals were collected from the outer edge of the area where waves were stronger and part from inner, more protected areas. However, in BPI 21, a mangrove-surrounded lagoon in Pangasinan Island, we collected 22 specimens of *A. acutofemoratus* and no *A. deuteropus*, while at BPI 26 and 28, where the currents and waves could be strong, we collected 10 and 7 specimens, respectively, of *A. deuteropus* and no *A. acutofemoratus*.

With that small indication, we have gone over our personal collections from the central Pacific, Thailand and Australia and the rather clouded picture begins to be confirmed. In Hawaii, only *A. deuteropus* occurs (Banner, 1953), but it usually is found in cleaner water with moderate to strong wave or surge action. At Christmas Island in the Line Islands (Banner, 1959) and at Arno in the Marshalls (Banner, 1957), it was collected from the seaward edges of reefs. On the other hand, in these areas *A. acutofemoratus* was collected in Fiji at Korolevu on a broad reef flat on the leeside of the island, in Tonga from the protected lagoon-like harbor area of Nukualofa, in Western Samoa from the very broad fringing reefs near Apia harbor and Vailutai (B&B, 1966a). The greatest contrast from the field collections in this area was between BP 1, the only locality in either American or Western Samoa where *A. deuteropus* was collected, and BP 14, where 37 specimens of *A. acutofemoratus* alone were collected. BP 1 was a narrow fringing reef near a small headland ("Lion's Head") that was swept by waves of clear oceanic water, while BP 14 was from the entrance to a lagoon in "about 3 feet of water from a shallow broad flat where the bottom was silty sand with organic debris" (B&B, 1966a:150).

Similarly, at Phuket in Thailand, specimens of *A. deuteropus* were collected from the outer edge of a reef flat on a beach, while *A. acutofemoratus* were collected from the middle of the reef flat on the same beach (B&B, 1966b:13; BR 31, 32). In Australia, most of the specimens of *A. deuteropus* came from near reef edges of larger reefs while *A. acutofemoratus* was collected from the less clear waters in the Torres Straits. Again, we find another contrast. In the "lagoon" lying to the east of Heron Island, where huge coral mounds grew to the surface from a sand bottom in shallow water, and where the entire area was protected by a ring of reef flats, 11 specimens of *A. acutofemoratus* were collected and only one of *A. deuteropus*.

It appears, therefore, that while these two species may overlap in the range of reef habitats, in general *A. acutofemoratus* is more tolerant of silt and still waters and *A. deuteropus* requires water moved by waves or currents. We suggest that some future student investigate these requirements in greater detail and also determine the degree of similarity between the galleries made by the two species.

Alpheus alcyone De Man, 1902:870, pl. 27, fig. 61 [B&B, III]
PREVIOUS RECORDS: De Man, 1911:351, Siboga Sta. 99. [E]
SPECIMENS EXAMINED: 2 specimens from BPI 5; 1, BPI 7; 1, BPI 10; 3, BPI 13; 1, BPI 18; 6, BPI 19; 3, BPI 24; 1, BPI 25.

[*A. amphitrite* Anon. [=White] a *nomen nudum* – see B&B, 1977:280].
PREVIOUS RECORDS: Anon. [=White] 1847:74, "Philippine Islands".

[*A. avarus* Fabricius]
PREVIOUS RECORDS: Stimpson, 1861:29. Port of Hong Kong.
REMARKS: We have sought the 2 specimens from the Museum of Comparative Zoology at Harvard that are recorded under this name as coming from Hong Kong, collected by the U. S. North Pacific Expedition and identified by Stimpson (Cat. No. 1477) but they are no longer extant. The name *A. avarus*, while still valid, is presently unused and considered as a *nomen dubium* (see B&B, III); it is possibly a senior synonym of *A. strenuus* Dana.

Alpheus barbatus Coutière, 1897a:235; 1899:230, figs. 279–280. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from AMNH 9003.

Alpheus batesi Banner and Banner, 1964:94.
PREVIOUS RECORDS: Bate, 1888:549, pl. 98, fig. 1. Challenger Sta. 203 (as *A. leviusculus var., nec* Dana. [E] see B&B, 1964).

Alpheus bidens (Olivier), 1811:663. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from HFR 164.

Alpheus bicostatus De Man, 1908:102; 1911:375; fig. 82. [B&B, III]
PREVIOUS RECORDS: De Man, 1908. Siboga Sta. 99. [E]
SPECIMENS EXAMINED: 1 specimen from BPI 18; 1, BPI 28; 1, WM 215–65.

[*A. biunguiculatus* Bate, *nec* Stimpson 1861]
PREVIOUS RECORDS: Bate, 1888:562, pl. 101, fig. 4. Challenger Sta. 208.
REMARKS: This specimen is lost and cannot be identified from the meager description and poor plates of Bate. The long rostrum and orbital teeth are reminiscent of the Comatularum Group of the genus *Synalpheus*, but the tip of the telson is unlike any species found in that group.

Alpheus bucephalus Coutière, 1905:890, pl. 78, fig. 29. [B&B, III]
PREVIOUS RECORDS: De Man, 1908:101; 1911:360, fig. 75. Siboga Sta. 96 (as *A. consobrinus* De Man [E]).
SPECIMENS EXAMINED: 2 specimens from AMNH 8945; 7, AMNH 8948; 5, BPI 1; 5, BPI 3; 1, BPI 5; 2, BPI 6; 1, BPI 7; 4, BPI 8; 8, BPI 13; 15, BPI 15; 3, BPI 16; 15, BPI 18; 2, BPI 21; 8, BPI 22; 22, BPI 23.

Alpheus canaliculatus Banner and Banner, 1968b:141, fig. 1.
PREVIOUS RECORDS: B&B, 1968. HFR Sta. 114; B&B, in press. Off Lubang Is.

Alpheus chiragricus Milne-Edwards, 1837:354. [B&B, III]
SPECIMENS EXAMINED: 1 specimen each from AMNH 7392, 7395, 7401, 7402, 7403, 7417, 7443, 7444.

Alpheus collumianus Stimpson, 1861:30. [B&B, III]
PREVIOUS RECORDS: De Man, 1911:334, fig. 65. Siboga Sta. 93a, 96. [E]
SPECIMENS EXAMINED: 7 specimens from BPI 1; 5, BPI 3; 1, BPI 5; 1, BPI 8; 2, BPI 13; 2, BPI 15; 2, BPI 16; 6, BPI 19; 2, BPI 22; 3, BPI 24; 9, BPI 25; 5, BPI 26; 2, BPI 27; 6, BPI 28; 6, BPI 29.

Alpheus species A. Banner and Banner, in press.
PREVIOUS RECORDS: Banner and Banner, in press. From South China Sea, HFR 198 and from off Lubang Is.

[*A. consobrinus* De Man]: See *A. bucephalus*.

Alpheus coutierei De Man, 1911:409, fig. 97.
PREVIOUS RECORDS: De Man, 1911. Siboga Sta. 96. [E]

[*A. crassimanus* Heller]: See *A. lobidens lobidens* De Haan.

Alpheus crinitus Dana, 1852:548, pl. 34, fig. 8.
PREVIOUS RECORDS: Dana, 1852. Balabac Straits. (?)Bate, 1888:548, pl. 98, fig. 2. Zamboanga reefs and Challenger Sta. 208. [E]
REMARKS: Bate's identification of his only specimen, a female, as *A. crinitus* is doubtful as he showed and described the first carpal article of the second leg about one-third the length of the second, and the dactylus of the third leg as bearing a small secondary unguis. Dana indicated equality of the first two carpal articles of the second leg and a simple dactylus on the third. In these characteristics Bate's specimen is more like *A. paralcyone* Coutière, but differs from that in the form of the rostrum and the tooth on the merus of the third legs. We have not been able to find Bate's specimen.

Alpheus crockeri (Armstrong), 1941:8, figs. 2, 3. Crosnier and Forest, 1965:603; 1966:225, figs. 4, 5a–i (redescription).
SPECIMENS EXAMINED: 2 specimens from BPI 25; 2, BPI 26c; 2, BPI 28.

Alpheus deuteropus Hilgendorf, 1878:834, pl. 4, figs. 8–10. [B&B, III]
SPECIMENS EXAMINED: 1 specimen each from AMNH 8246, 8967, 8981; 4, BPI 1; 6, BPI 5; 5, BPI 11; 4, BPI 15; 2, BPI 18; 3, BPI 19; 2, BPI 22; 1, BPI 23; 1, BPI 25; 9, BPI 26; 1, BPI 26a; 7, BPI 28.

Alpheus diadema Dana, 1852:555, pl. 35, fig. 7. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from BPI 27; 1, BPI 28.

Alpheus distinguendus De Man, 1909b:155, pl. 7, figs. 9–14. [B&B, III]
PREVIOUS RECORDS: B&B in press. Entrance to Manila market and Manila Bay.
SPECIMENS EXAMINED: 1 specimen from HFR 18B; 4, W97.

Alpheus dolerus Banner, 1956:362, fig. 21. [B&B, III]
SPECIMENS EXAMINED: 3 specimens from BPI 13; 4, BPI 26.

Alpheus edamensis De Man, 1911:437, fig. 107. [B&B, III]
SPECIMENS EXAMINED: 2 specimens from AMNH 8248; 1 HFR Sta. 1.

Alpheus edwardsii (Audouin), 1827:274. Banner and Banner, 1973b:1141, Fig. 1 (redescribed on basis of neotype). [B&B, III]
SPECIMENS EXAMINED: 31 specimens from AMNH 8243; 1, AMNH 8915; 1, AMNH 8916; 2, AMNH 8947; 3, BPI 1; 2, BPI 5; 2, BPI 6; 4, BPI 8; 3, BPI 13; 1, BPI 14; 2, BPI 16; 4, BPI 23; 3, BPI 24; 3, BPI 27; 4, BPI 28; 23, HFR 3B, 4, HFR 7B; 1, HFR 266.

Alpheus ehlersii De Man, 1909c:663, pl. 70. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from BPI 1.

Alpheus euchirus Dana, 1852:545, pl. 34, fig. 6a–f. [See discussion, B&B, III].
PREVIOUS RECORDS: Dana, 1852. Balabac Straits. [Not cited by Estampador].

Alpheus eulimene De Man, 1909a:101; 1911:364, fig. 76. [B&B, III]
SPECIMENS EXAMINED: 3 specimens from BPI 5; 1, BPI 15; 2, BPI 19; 1, BPI 29.
REMARKS: The carpus of the third leg in the specimen from BPI 19 is lacking the usual spines.

Alpheus facetus De Man, 1908:100; 1911:340, fig. 67. [B&B, III]
SPECIMENS EXAMINED: 2 specimens from BPI 2; 5, BPI 15; 4, BPI 16; 4, BPI 22; 4, BPI 24; 1, BPI 27; 6, BPI 28; 4, BPI 29.

Alpheus species B. Banner and Banner, in press.
PREVIOUS PHILIPPINE RECORDS: B&B, in press. Off Lubang Is.

Alpheus frontalis Milne-Edwards, 1837:356. [B&B, III]
PREVIOUS RECORDS: De Man, 1911:369. Siboga Sta. 93a. [E]
SPECIMENS EXAMINED: 6 specimens from AMNH 8215; 2 specimens each from AMNH 8454, 8455; 1, AMNH 8456; 1, AMNH 8457; 4, AMNH 8950; 2, AMNH 8975; 1, AMNH 8976; 3, AMNH 8979; 1, AMNH 8987; 2, AMNH 8990; 1, AMNH 8995; 1 specimen each from HFR 126, HFR 171 and HFR Sta. 19; 1, WM 67–65.

Alpheus gracilipes Stimpson, 1861:30. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from AMNH 8968; 5, BPI 15; 3, BPI 16; 10, BPI 18; 3, BPI 19; 1, BPI 21; 6, BPI 22; 2, BPI 22a; 11, BPI 24; 1, BPI 26; 5, BPI 27; 1, BPI 28; 2, BPI 29; 2, HFR Sta. 19; 2, HFR Sta. 20; 1, HFR 164.

Alpheus gracilis Heller, 1861:271, pl. 3, figs. 19, 20 [B&B, III]
SPECIMENS EXAMINED: 3 specimens from BPI 24; 4, BPI 26; 11, BPI 28; 5, BPI 29.

Alpheus hailstonei Coutière, 1905:879, pl. 74, fig. 18. [B&B, III]

PREVIOUS RECORDS: B&B in press. Off Lubang Is.

SPECIMENS EXAMINED: 3 specimens from BPI 25; 1, BPI 26.

REMARKS: In the Australian paper we place all previously known subspecies of *A. hailstonei* into synonymy and recognize only the nominate species. We have only 4 specimens from the Philippines, only one of which is complete, and none larger than 15 mm. The specimens differ from any heretofore described in two ways. 1. The second antennular article is more stout, varying from 1.8–2.2 times as long as broad instead of 3.0–4.0 as in the forms previously described. 2. The carpocerite is also more stout being only a little over 4 times as long as broad instead of nearly 7 times as long as in the previously described specimens. Further, *A. hailstonei* and its previously accepted subspecies has never been collected in water more shallow than 27 meters deep while these specimens were collected from dead coral heads in water not over 5 meters in depth. Our specimens may represent a new Philippine subspecies or a closely related species, but with so few incomplete specimens we hesitate to designate one and are placing our specimens in the nominate species.

Alpheus hippothoe De Man, 1888b:268, pl. 17, figs. 1–5. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:433. Siboga Sta. 104.[E]

SPECIMENS EXAMINED: 1 specimen from AMNH 8925; 10, Morton; 3, W98; 1, W101; 2, W102.

Alpheus inopinatus Holthuis and Gottlieb, 1958:42, figs. 8, 9. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from HFR 3B.

Alpheus ladronis Banner, 1956:360, fig. 20.

SPECIMENS EXAMINED: 1 specimen from BPI 19; 1, BPI 24.

Alpheus leptochirus Coutière, 1905:914, pl. 87, fig. 54.

SPECIMENS EXAMINED: 3 specimens from BPI 3; 2, BPI 15; 1, BPI 23; 1, BPI 28.

REMARKS: We have only one complete male, 17 mm in length, in this collection. The setiferous crests on the dactylus of the small chela are of minimal development and extend only along the margins of the dactylus instead of being the full balaeniceps condition that Coutière described. We suspect our specimen is not sexually mature.

Alpheus leviusculus Dana, 1852:543, pl. 34, fig. 3a–f. [B&B, III]

[PREVIOUS RECORDS: As *A. leviusculus* var. Bate, 1888:547 (see *A. batesi*)].

SPECIMENS EXAMINED: 1 specimen from AMNH 8917; 13, HFR 3B.

REMARKS: In the Australian paper we will designate a new subspecies under this species; the Philippine subspecies is Dana's nominate form.

Alpheus lobidens lobidens De Haan, 1850:179. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:417. Siboga Sta. 99. (As *A. crassimanus* Heller). [Not cited by Estampador].

SPECIMENS EXAMINED: 2 specimens from AMNH 7394; 1 specimen each from AMNH 7398, 7404, 7411, 7412; 3, BPI 14; 4, HFR 11B; 1, HFR 16B; 3, W94.

Alpheus lottini Guérin, 1829, pl. 3, fig. 3; 1838:38. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from BPI 2; 4, BPI 6; 2, BPI 7; 5, BPI 15; 10, BPI 18; 2, BPI 23; 4, BPI 24; 3, BPI 25; 6, BPI 26; 4, BPI 27; 2, BPI 29; 1, HFR Sta. 20; 2, HFR Sta. 68.

Alpheus macroskeles Alcock and Anderson, 1894:153; 1899:pl. 9, fig. 5. [In 1899 the name was spelled *macrosceles*.]

Figure 1

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 4 specimens from HFR 251. [3 males and 1 female, all approximately 10–15 mm in length.]

REMARKS: This is the first time since the original capture of four specimens in the Bay of Bengal and the Andaman Sea that this species has been reported. We have also been able to examine the type series while visiting the Indian Museum in Calcutta. The holotype was in very poor condition and too fragile to manipulate for close observation; it is also lacking its small chela. However, we believe Alcock (1901) was in error in stating that this specimen was a male, for we have found in the South China Sea specimens that the male has a balaeniceps dactylus (see below), a condition that was neither mentioned nor figured by the original authors. We were able to study, however, one ovigerous female (Reg. No. 6759/9) and one incomplete male (Reg. No. 6283/9) of the type series. These are in excellent agreement with the specimens in the present collections. The female in our collection has a small cheliped. The chela is 8 times as long as broad, the fingers and palm being nearly equal. The margins carry long hairs, sweeping forward. The merus carries scattered long hairs and is at present without spines or teeth, but we believe that there may have been one or more spines on the inferior margin that have been broken off.

One male specimen in the South China Sea collection has both chelae attached. The small chela is slender, 10 times as long as broad with the fingers only slightly shorter than the palm. The dactylus is of full balaeniceps development, but the setae of the crest are rather widely spaced and slender. The superior surface bears a row of long, slender setae. The palm is covered with pustules and bears long setae along both margins, sparse on the superior margin and more frequent, but not dense, on the inferior margin. The carpus is cup-shaped with its inferior margin irregular and bearing a few fine setae. The merus is 5 times as long as broad, with the superior margin bearing an acute subterminal tooth and two almost spine-like setae, and with the inferior margin irregular and bearing 5 acicular spines interspersed with long setae. The inferior margin terminates in a short acute tooth. The surface of the merus is also pustulate. The ischium bears one superior spine-like seta and 3 inferior short heavy spines. Alcock stated that on his specimens the abdominal pleura were ". . . a good deal produced vertically". In these specimens of both sexes the pleura are not greatly produced and are rounded, except for those of the fifth abdominal segment which are extended posteriorly into a subacute projection. The second pleopods of our largest male are of normal development, but on the second male specimen the *appendix masculina* is greatly reduced and on the third male it is lacking. We attribute this to sexual immaturity.

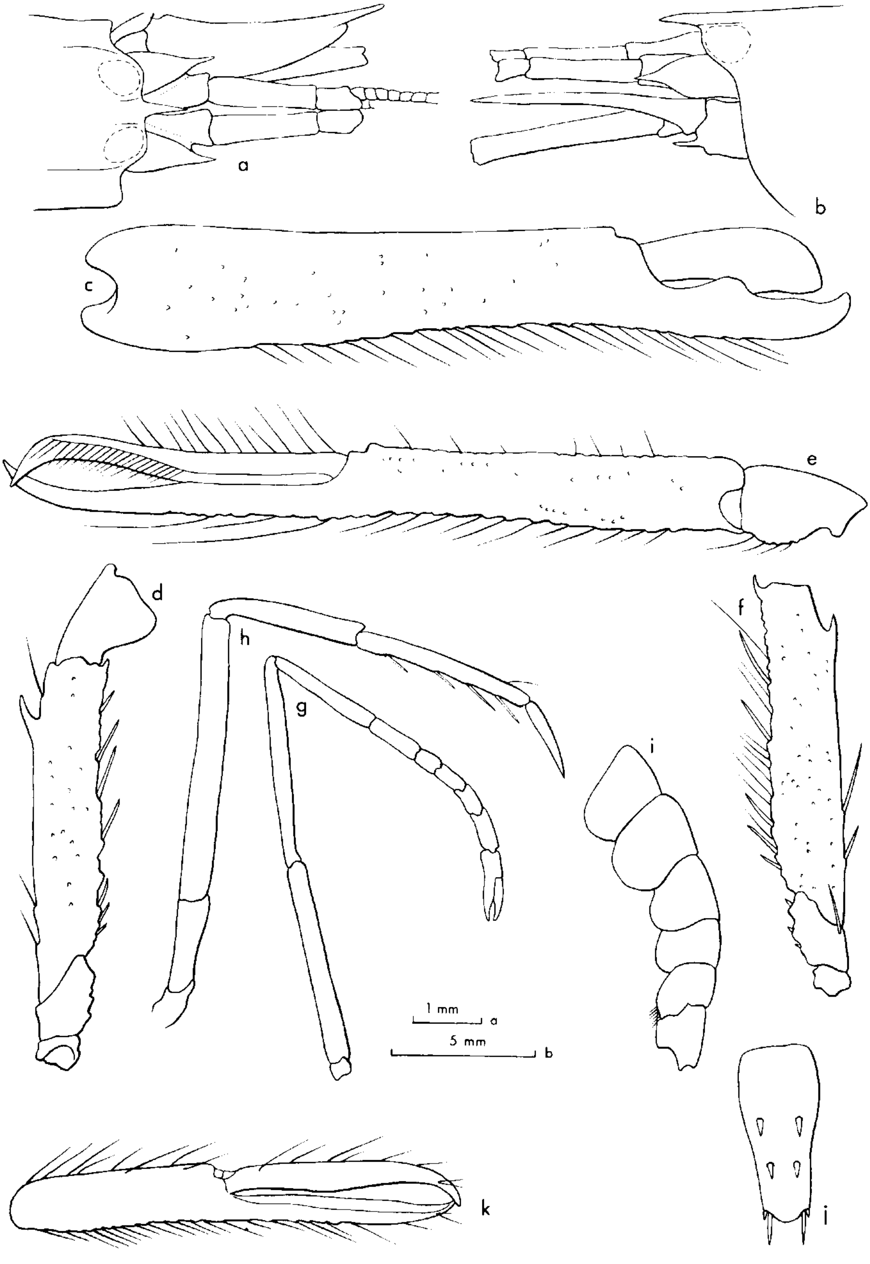

Fig. 1. *Alpheus macroskeles* Alcock and Anderson. 15 mm male from HFR 251: a, b, anterior region, dorsal and lateral view; c, d, large chela and merus, medial face; e, f, small chela and merus, medial face; g, second leg; h, third leg; i, abdominal somites, lateral view; j, telson. 10 mm female from HFR 251: k, small chela, lateral face. All drawings but i scale a.

Alcock and Anderson stated that the eyes were "markedly deficient in pigment", while in these preserved specimens the pigment is dark and heavy. Possibly the development of pigment is a function of depth and light penetration, for the Indian specimens came from 265–494 m, and these from only 77 m. They also remarked that their specimens were a transparent blood-red in life, ivory white in preservation; these specimens are now of a similar ivory white.

We have drawn the chelipeds to the same scale as the anterior body region and the other appendages to illustrate their disproportionate size as emphasized by the name given by Alcock and Anderson.

Alpheus maindroni Coutière, 1898a:133, figs. 2, 2′. [B&B, III]
SPECIMENS EXAMINED: 2 specimens from BPI 6; 1, BPI 8a; 1, BPI 23.

Alpheus malabaricus leptopus De Man, 1911:429, figs. 105a, b, c.
PREVIOUS RECORDS: B&B, in press. From off entrance to Manila Bay.

Alpheus malleodigitus (Bate), 1888:565, pl. 101, fig. 5. [B&B, III]
PREVIOUS RECORDS: De Man, 1911:349. Siboga Sta. 93a, 96, 99 (at Sta. 99 as *A. malleodigitus gracilicarpus* De Man). [E]
SPECIMENS EXAMINED: 4 specimens from Morton; 7, W100.
REMARKS: A cohabiting pair from the Morton collection was noted as coming from a sponge; this is the first record of such an association.

Alpheus miersi Coutière, 1898b:166, fig. 1; 1905:903, pl. 83, 84, fig. 42, [B&B, III]
PREVIOUS RECORDS: De Man, 1911:393. Siboga Sta. 99. [E]

Alpheus mitis Dana, 1852:549, pl. 35, fig. 1. [B&B, III]
PREVIOUS RECORDS: Dana, 1852. Balabac Straits. [E]
SPECIMENS EXAMINED: 1 specimen from BPI 26.
REMARKS: This 10 mm male was discussed and figured in relation to a specimen from Australia and two from Madagascar (B&B, III). It was collected at Zamboanga, 600 km from the type locality, so it cannot qualify as a topotype, but in our discussion we pointed out there were only slight differences in proportions of appendages from Dana's description and that these could be growth differences.

[*Alpheus neptunus* Dana]: See *Synalpheus neptunus*.

Alpheus nonalter Kensley, 1969:172, fig. 15.
PREVIOUS RECORDS: B&B, in press. Off Lubang Is.
SPECIMENS EXAMINED: 2 specimens from HFR 57.

Alpheus obesomanus Dana, 1852:547, pl. 34, fig. 7. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from AMNH 8460; 5, AMNH 8461; 8, BPI 1; 1, BPI 2; 1, BPI 3; 11, BPI 4; 6, BPI 5; 1, BPI 6; 15, BPI 7; 6, BPI 8; 1, BPI 11; 5, BPI 13; 2, BPI 15; 2, BPI 16; 17, BPI 18; 46, BPI 19; 8, BPI 21; 41, BPI 22; 14, BPI 23; 2, BPI 24; 20, BPI 25; 11, BPI 26; 8, BPI 28; 1, BPI 29.

REMARKS: A field note in BPI 13 indicates that the large specimen of a cohabiting pair (a male) had an orange carapace and the dorsal portion of the posterior part of the abdomen was black.

Alpheus ovaliceps Coutière, 1905:888, pl. 77, fig. 27. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from BPI 8b.

REMARKS: These specimens were a cohabiting pair, the ovigerous female is 23 mm long and the male 22 mm. The rostrums in these specimens are more acute than that for the holotype as figured by Coutière and reaches to the end of the first antennular article instead of about half as long. The pleura of the first abdominal somite of the male are rounded and not hooked, unlike many members of the Crinitus Group.

Alpheus pachychirus Stimpson, 1861:30. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:366, fig. 72. Siboga Sta. 99. [Locality not given by Estampador]. Cowles, 1913:121. Puerto Galera (discussion of tube building). [Not cited by Estampador]. Roxas, 1930:16. Mindoro, Puerto Galera. [Not seen, citation taken from Estampador].

SPECIMENS EXAMINED: 1 specimen from BPI 28a; 2, BPI 29; 3, BPI 29a.

REMARKS: Fishelson (1966), followed by others, put Cowles' report on this species into synonymy under *A. frontalis*, but he did not state his justification for the change. We considered the action and rejected it (B&B, III). All six of our specimens were removed from felted tubes made of blue-green algae.

Alpheus pacificus Dana, 1852:544, pl. 34, fig. 5. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:427. Siboga Sta. 93b. [E]

SPECIMENS EXAMINED: 1 specimen each from AMNH 7404, 7390, 7396, 7399, 8919, 8959; 2, AMNH 7391; 36, AMNH 8244; 53, AMNH 8250; 4, 8951; 11, BPI 17; 1, BPI 26; 2, HFR 3B; 1, HFR Sta. 19; 1, HFR Sta. 20.

REMARKS: An 18 mm male from BPI 17 carried the forward-sweeping hairs on the oppositional faces of the dactylus and pollex of the small chela that were described by us in the Australia paper (B&B, III). We have not previously observed this development on such a small specimen.

Alpheus paracrinitus Miers, 1881:365, pl. 16, fig. 6. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from BPI 8; 3, BPI 11; 1, BPI 13; 5, BPI 15; 4, BPI 18; 2, BPI 19; 3, BPI 21; 3, BPI 22; 1, BPI 27.

Alpheus paradentipes Coutière, 1905:880, pl. 74, fig. 17.

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

Alpheus paralcyone Coutière, 1905:895, pl. 80, 81, fig. 34. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:354, fig. 73. Siboga Sta. 99. [E]

SPECIMENS EXAMINED: 1 specimen from BPI 18; 9, BPI 22; 16, BPI 23; 2, BPI 25; 2, BPI 26; 1, HFR 1B.

REMARKS: All of these specimens came from shallow water except the one specimen from HFR 1B which was dredged from about 55–75 m. The depth is not unusual, with Banner (1953:103) reporting them from slightly greater depths from Hawaii, and Banner and Banner (III) reporting specimens from up to 90 fathoms (165 m) off Western Australia.

However, the male specimen from HFR 1B is assigned to this species with slight doubts, for instead of the minimal development of the rostrum usually found in this species, it reaches almost to the end of the first antennular article, and the dactylus of the small chela, always heavier and more hairy in mature males than females, here is markedly broadened and carries a heavy fringe of setae on both margins. It also lacks the medial teeth on the posterior margin of the sixth abdominal somite. As all of these characteristics have been noted to be variable in previous studies (both references above), these differences appear to be merely extensions of the previous ranges of variation.

Alpheus pareuchirus pareuchirus Coutière, 1905:906, pl. 84, fig. 43. [B&B, III]
PREVIOUS RECORDS: De Man, 1911:418, fig. 101, Siboga Sta. 96, 99, and 109. (In 96 and 99 as *A. p. leucothea*). [E]

Alpheus parvirostris Dana, 1852:551, pl. 35, fig. 3. [B&B, III]
PREVIOUS RECORDS: Dana, 1852. Balabac Straits. [E]
De Man, 1911:432, fig. 106, Siboga Sta. 93b. [E]
SPECIMENS EXAMINED: 4 specimens from AMNH 8229; 1, AMNH 9383; 1, AMNH 9385; 32, BPI 1; 32, BPI 2; 6, BPI 3; 5, BPI 4; 1, BPI 5; 12, BPI 6; 15, BPI 7; 16, BPI 8; 3, BPI 11a; 2, BPI 12; 14, BPI 13; 12, BPI 15; 5, BPI 16; 20, BPI 18; 35, BPI 19; 13, BPI 21; 24, BPI 22; 29, BPI 23; 34, BPI 24; 25, BPI 25; 2, BPI 25a; 11, BPI 26; 10, BPI 27; 1, BPI 28; 4, BPI 29; 1, HFR 7B; 2, Morton; 1, W100; 6, W101.

Alpheus polyxo De Man, 1909a:108; 1911:423, fig. 104. [B&B, III]
SPECIMENS EXAMINED: 1 specimen from BPI 19.

Alpheus proseuchirus De Man, 1908:111; 1911:407, fig. 96.
PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

Alpheus pustulosus Banner and Banner, 1968b:143, fig. 2.
PREVIOUS RECORDS: B&B, 1968b. HRF Sta. 363. B&B, in press. Off Lubang Is.

Alpheus rapacida De Man, 1908:105; 1911:394, fig. 91. [B&B, III]
PREVIOUS RECORDS: Bate, 1888:552, pl. 99, fig. 1. Hong Kong, 10 fms. [no station number given] (as *A. rapax* Fabricius – see B&B, 1968b).
SPECIMENS EXAMINED: 2 specimens from HFR 17b; 1, HFR 308; 1, W109.

Alpheus rapax Fabricius, 1798:405. [B&B, III]
PREVIOUS RECORDS: Stimpson, 1861:29. "*Prope oras sinenses* in lat. Bor. 23°" (see remarks). Bate, 1888:552 (see *A. rapacida*).

SPECIMENS EXAMINED: 1 specimen from W93; 2, W95; 1, W97; 2, W109.

REMARKS: There is considerable confusion about Stimpson's record, for the only record of this species by Stimpson in the Museum of Comparative Zoology, Harvard University, reads: "Catalog No. 1466 (original number 1251). *Alpheus rapax* Fabr. Hong Kong, China, Pacific Expl. Ex. Received from Smithsonian Inst. 1 specimen. Detd. by Stimpson." The first difficulty is in the location, for Hong Kong lies about 22°20′N, 114°10′E, and any bay in China that lies near 23 N as given in his publication would be far to the east near Swatow (Shan-t'ou) at about 117°E. The second difficulty lies in the vial stored under the Catalog No. 1466 which we borrowed and found it without label other than "No. 1466" and instead of 1 specimen of *A. rapax* as recorded in the catalog, it contained 11 specimens as follows:

A. brevicristatus De Haan, 6 specimens
A. chiragricus Milne-Edwards, 4 specimens
A. distinguendus De Man, 1 specimen

We suggest that if these specimens were actually examined by Stimpson, it would have been very easy for him to confuse *A. rapax* with *A. brevicristatus* and *A. distinguendus*, but we do not see how such a careful worker could have confused the greatly dissimilar *A. chiragricus* with species in the *rapax*-complex. We conclude, therefore, that somehow the specimens in No. 1466 were mislabeled and might or might not have come from some part of the North Pacific Expedition collections and that Stimpson's reference to *A. rapax* is doubtful.

[*A. rhode* Anon. (=White), a *nomen nudum* – see B&B, 1977:280].

PREVIOUS RECORDS: Anon. [=White] 1847:74. "Philippine Islands".

Alpheus serenei Tiwari, 1963:310, figs. 27, 28. [B&B, III]

SPECIMENS EXAMINED: 1 specimen from BPI 3; 4, BPI 4; 1, BPI 2; 2, BPI 7; 2, BPI 12; 1, BPI 15; 3, BPI 22; 9, BPI 23; 7, BPI 24; 2, BPI 25; 5, BPI 26; 7, BPI 27; 2, BPI 28; 1, BPI 29.

Alpheus sibogae De Man, 1908:107; 1911:398, fig. 93.

SPECIMENS EXAMINED: 3 specimens from HFR 13; 1, HFR 110.

Alpheus spatulatus Banner and Banner, 1968b:146, fig. 3.

PREVIOUS RECORDS: 1968b. South China Sea. HFR 312, 317, 371. B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 2 specimens from HFR 267.

REMARKS: Until now the male of this species has not been known, either from the type series from the northwestern South China Sea or from off Lubang Island. Here the relatively small male (of 30 mm, as contrasted to the 45 mm long holotype) is intact and shows no sexual dimorphism in the development of the small cheliped. However, this may be due to immaturity, for neither this male nor the 31 mm female in this collection have the transverse groove proximal to the dactylar articulation of the palm found in the female holotype. This may be a subspecific difference (these specimens came from off Datu Bay, Sarawak, at 2°51′N, 110°17′E), but we doubt it in view of the continuity we have seen in the other fauna. If it is a growth difference, known in some other species of the genus, then sexual differentiation in the small cheliped could still develop with maturity.

[*A. spiniger* Stimpson]: See *Synalpheus demani* Borradaile.

Alpheus splendidus Coutière, 1897a:235. [B&B, III]

SPECIMENS EXAMINED: 1 specimen each from AMNH 8249, 8450; 2, BPI 8; 3, BPI 29; 6, HFR 3B.

Alpheus spongiarum Coutière, 1897a:236. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from BPI 1; 2, BPI 15; 1, BPI 24; 5, W99.

Alpheus stanleyi Coutière, 1908:207; 1921:423, pl. 63, fig. 18.

A. stanleyi var. *dearmatus* De Man, 1911:367, fig. 78.

Figure 2a–e

SPECIMENS EXAMINED: 1 specimen from BPI 15; 1, BPI 15b; 2, BPI 19; 2, BPI 23; 1, BPI 24; 1, BPI 26; 2, BPI 26b.

REMARKS: The separation by De Man of his variety from Indonesia from the nominate species of Coutière from Amirante in the Indian Ocean was based entirely upon the fact that on Coutière's sole specimen the merus of the fourth leg carried a strong inferodistal tooth that was lacking in De Man's three specimens; however, De Man did remark that the appendage carried "a trace of an extremely small, rudimentary tooth". Otherwise, in his discussion De Man remarked upon the similarity of the variety to the nominate species.

We have sought the holotype of Coutière in a number of museums of Europe, but evidently it is lost. We were able to examine the three specimens of De Man's variety in the *Zoologisch Museum* in Amsterdam. We found only the specimen from Siboga Sta. 240 did carry the rudimentary tooth on the merus of the fourth leg, but on the two specimens from Sta. 152 the tooth was not discernable to us. In 3 of our 11 specimens a similar tooth occurred, but it was lacking in the other eight. We know of no published account of the variation in the armature on the fourth leg, but from our own observations it appears to be more variable than in the third, and in the third the species in the Crinitus Group do vary in the number of spines on the carpus and at times on the merus (see under *A. eulimene* De Man in B&B, III).

One additional characteristic which could have been used to separate the variety from the species was not remarked upon by either previous author: Coutière described the dactylus of the third leg as without a trace of biunguiculation and De Man did not note that his variety did indeed carry a trace of biunguiculation in the form of the inferior shoulder (see fig. 2c). This shoulder was present in De Man's specimens and all of the specimens in the present collection. However, we again attach little importance to the shoulder which was overlooked by De Man and possibly by Coutière for it is also a variable characteristic in the Crinitus Group (B&B, III).

The nominate form and the variety show their close relationship in the form of the small chela, unique in its development within the genus. It is the same in both sexes, and

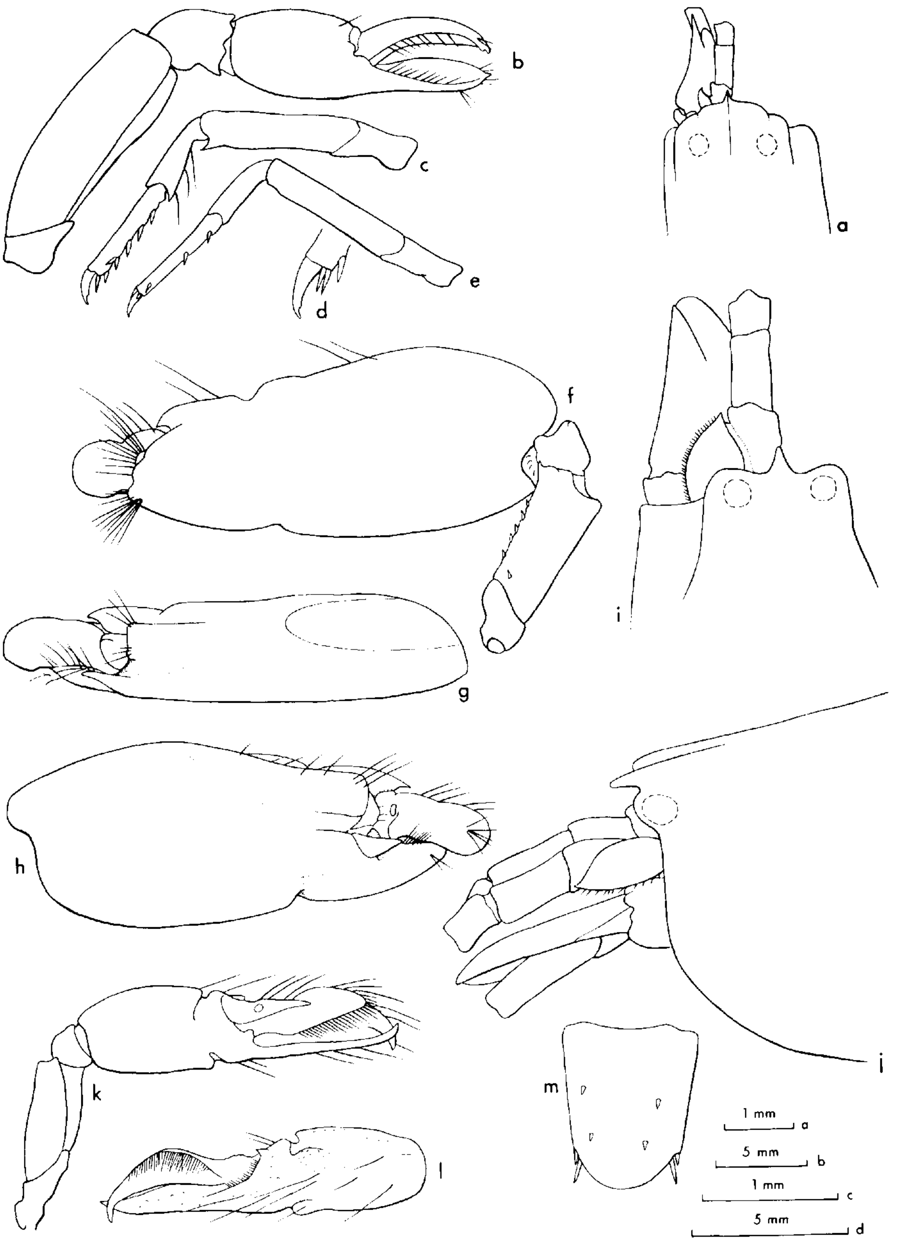

Fig. 2. *Alpheus stanleyi* Coutière. 16 mm female from BPI 19: a, anterior region, dorsal view; b, small cheliped, lateral face; c, d, third leg, dactylus enlarged; e, fourth leg. *A. staphylinus* Coutière. 14 mm male from BPI 29: f, large cheliped, superomedial view; g, h, large chela, lateral and inferolateral view.
(?)*A. trirmiziae* Kazmi. 50 mm male from HFR Sta. 18b: i, j, anterior region, dorsal and lateral view; k, small cheliped, lateral face; l, small chela, medial face; m, telson. a, c, d, f, g, h scale a; k, l scale b; b, e scale c; d, i, j, m scale d.

has a relatively slender subcylindrical palm, with both fingers broadened, slightly excavate on the oppositive faces and carrying short, stiff, and regularly but broadly spaced setae along their margins (fig. 2b). Not remarked upon by either previous author are the tips of the finger which are produced into short, broadly acute teeth that curve so they cross when the fingers are closed; that of the pollex is simple, but that of the dactylus bears a shoulder against which the opposing tooth fits. The development is reminiscent of a small group in the genus *Synalpheus* which have a similarly developed broadened, excavate and tooth tipped fingers (B&B, II:297–313); some of these were found living only in sponges.

It may well be that the Indonesian-Philippine form is constant and always different from that of the Indian Ocean; if so, then De Man's variety should be raised to a geographically separated subspecies. With only 3 specimens from Indonesia, 10 specimens from the Philippines and one from the central Indian Ocean differing so slightly in inherently variable characteristics, we do not believe that such conclusion is justified at this time.

Alpheus staphylinus Coutière, 1908:204; 1921:418, pl. 62, fig. 13.

Figure 2f–h

SPECIMENS EXAMINED: 4 specimens from BPI 6; 5, BPI 15; 3, BPI 25; 2, BPI 29.

REMARKS: This is the first time this species has been reported since its original description from the Chagos Archipelago in the Indian Ocean except for one fragmentary specimen we reported from Australia with questionable identification (B&B, III). The species is very close to *A. crockeri* Armstrong, but the two species are well differentiated by the grooves and notches on the palm of the large chela and by the form of the dactylus of that appendage. In *A. staphylinus* the superior (anatomically medial) surface carries a groove arising in mid-palm and broadening and deepening distally to terminate between the rounded crest carrying the palmar adhesive plaque and the medial tooth flanking the dactylar articulation; moreover, the ridge running to this medial tooth is interrupted by a notch. In *A. crockeri* the corresponding area is flat and with only a slight depression in the most distal portion and the rounded ridge running to the medial tooth is without a notch. The dactylus of *A. staphylinus* is heavy, rounded on the superior surface, neither compressed nor twisted, its tip is rounded but not bulbous and the plunger is heavy, rounded, connected by a narrow isthmus to the tip and is seated in a well-developed socket on the pollex, while the dactylus in *A. crockeri* is compressed, twisted, swelling distally to a bulbous tip, and the plunger is modified into an acute tooth. We have examined the holotype of this species at the *Muséum National d'Histoire Naturelle* in Paris and found it to be so badly dessicated that it was difficult to recognize these characteristics.

It is interesting to note that in the collections from BPI 25 both *A. staphylinus* and *A. crockeri* were represented.

In the collections made in Mombasa, Kenya and loaned to us by Dr. A. J. Bruce (now of the Heron Island Research Station, Qld., Australia), he noted that the species in life was lemon-yellow in color.

Alpheus strenuus Dana, 1852:543, pl. 34, fig. 4. [B&B, III]

PREVIOUS RECORDS: De Man, 1911:425. Siboga Sta. 93. [E]

SPECIMENS EXAMINED: 2 specimens from BPI 1; 1, BPI 3; 2, BPI 13; 2, BPI 14; 7, BPI 19.

Alpheus sudara Banner and Banner, 1966b:153, fig. 59. [B&B, III]

SPECIMENS EXAMINED: 5 specimens from HFR 7B; 6, HFR 19B.

Alpheus sulcatus Kingsley, 1878:193. [B&B, III]

SPECIMENS EXAMINED: 1 specimen from AMNH 8962; 1, BPI 4; 1, BPI 6; 4, BPI 8; 1, BPI 8c; 1, BPI 11a; 4, BPI 19; 2, BPI 24; 7, BPI 25.

REMARKS: The specimen from BPI 8c was found living commensally with the brittle star, *Macrophiothrix longipeda* (Lamarck), identified by Dr. Dennis Devaney of the Bishop Museum, Honolulu, Hawaii.

(?) ***A. tirmiziae*** Kazmi, 1974:170, 4 figs.

Figure 2i–m

SPECIMENS EXAMINED: 2 specimens from HFR Sta. 18B. 1 specimen from the Museum of Comparative Zoology, Cambridge, Mass., #1743. Collected by W. H. Putman, March, 1861, Hong Kong.

REMARKS: These specimens very closely resemble the single female specimen that Kazmi described from the northern continental shelf of the Bay of Bengal, in the form of the antennular peduncles, carpocerite and squame, large chela, second and third legs. There are differences, especially in the development of the rostrum, which Kazmi described and depicted as almost vestigial while in these specimens it is well-developed, triangular and reaching with its slightly rounded tip to the middle of the visible part of the first antennular article. The condition found in the holotype may be a growth anomaly. Other differences are slight: Kazmi described the surfaces of the carapace and abdominal segments as "finely pitted" while in these specimens they are smooth. He also did not describe nor depict the exceedingly long hairs on the superior surface of the middle article of the third maxilliped, which in these specimens reach beyond the tip of the last article, nor upon the long inner spines of the posterolateral angles of the telson. We believe these differences should be regarded as variations, at least until more specimens are studied.

If the two forms are the same species, then the species has a strong sexual dimorphism in the small chela. In Kazmi's female, the fingers are long and slender, over twice the length of the palm, with their tips hooked and crossing. Our only specimen with an intact small cheliped is a 48 mm male from the HFR Sta. 18b. Here the chela is heavy, with the palm bearing sculpturing similar to the large chela but in a reduced development, and with the medial face of the palm bearing a strong but rounded longitudinal ridge down its middle. The medial face of the palm also bears papillose areas, but not as extensive as the areas on the large chela. The fingers are broadened and the dactylus is strongly balaeniceps; the tips of both fingers are hooked and crossing. The merus of the cheliped is inermous, 2.3 times as long as broad.

Alpheus villosus (Olivier), 1811:664. Milne-Edwards, 1837:354. [B&B, III]

SPECIMENS EXAMINED: 1 specimen from WM 21–65.

REMARKS: In Australia we found a "northern form" with spines on the meri of the third legs and a "southern form" lacking these spines. This lacks the spines and is therefore like the forms found south of about 37° in Australia (see B&B, III).

[Genus ***ARETE*** Stimpson]

[*Arete dorsalis* Stimpson]: See *Athanas dorsalis*.

Genus ***ATHANAS*** Leach

Athanas areteformis Coutière, 1903:79, figs. 17, 17′, 18; 1905:860, fig. 132. [B&B, I:304]

SPECIMENS EXAMINED: 2 specimens from BPI 1; 3, BPI 3; 1, BPI 12; 2, BPI 18; 2, BPI 19; 2, BPI 22; 1, BPI 24; 4, BPI 26; 4, BPI 28; 1, BPI 29.

Athanas dimorphus Ortmann, 1894:12, pl. 1, fig. 1. [B&B, I:313]

SPECIMENS EXAMINED: 2 specimens from BPI 11a; 1, HFR Sta. 2B; 5, HFR Sta. 3B; 5, W96; 1, W107.

Athanas djiboutensis Coutière, 1897a:233; 1905:856, fig. 129. [B&B, I:306]

SPECIMENS EXAMINED: 1 specimen from HFR Sta. 19.

Athanas dorsalis (Stimpson), 1861:32; Banner and Banner, 1960:141, figs. 5, 6. [B&B, I:324]

PREVIOUS RECORDS: Stimpson, 1861. Hong Kong (as *Arete dorsalis*).

SPECIMENS EXAMINED: 1 specimen from HFR 3B; 3, Morton; 2, WM 68–65.

Athanas gracilipes sp. nov

Figure 3a–g

HOLOTYPE: 17 mm male from HFR 347 – 12°02′N, 112°49′E; 365–385 m; bottom "pteropod shells" (=pteropod ooze?)

ALLOTYPE: 17 mm female from same station

DIAGNOSIS: Rostrum acute, 2.5 times as long as wide at base, reaching to near end of first antennular article, with sharp carina reaching just posterior of eyes. Extracorneal tooth twice as long as wide at base and reaching well past middle of cornea. Infracorneal tooth rounded, not greatly projecting. First antennular article twice as long as second antennular article if measured from orbitorostral margin of carapace; second article 1.7 times as long as broad distally, third article almost as long as second. Stylocerite with slender, acute spine reaching just beyond end of first article; mediodistal margin of second article projecting as a strong but rounded tooth. Lateral margin of scaphocerite straight, lateral tooth reaching to distal third of third antennular article, squamous portion produced and reaching to end of antennular peduncle. Carpocerite nearly length of third article past that article. Basicerite with small acute lateral tooth.

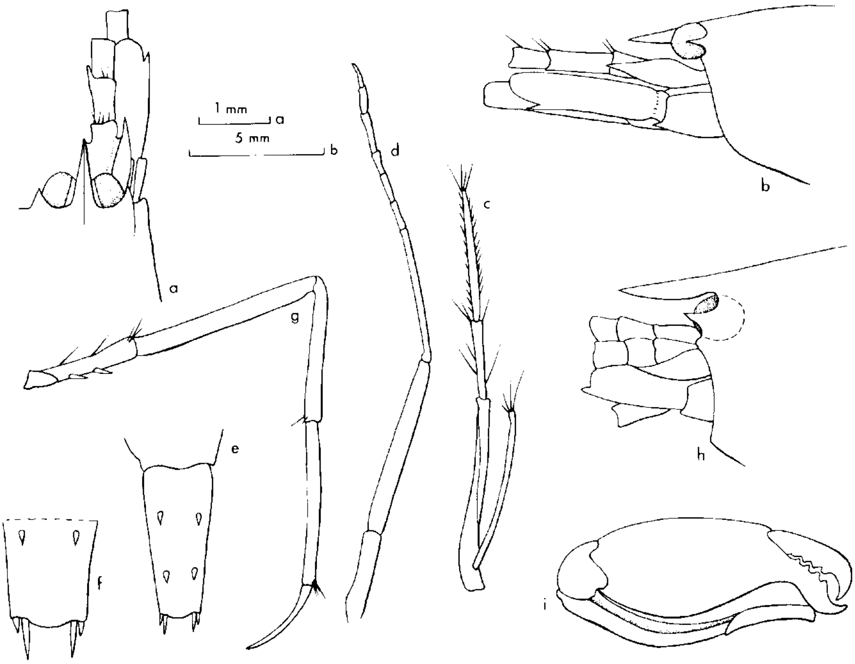

Fig. 3. *Athanas gracilipes* sp. nov. Holotye—17 mm female from HFR 347: a, b, anterior region, dorsal and lateral view; c, third maxilliped, lateral face; d, second leg; e, f, telson with tip enlarged. Paratype—17 mm female from same station: g, third leg. *Athanas marshallensis* Chace. 10 mm male from BPI 22: h, anterior region, lateral view.
Salmoneus mauiensis Edmondson. 13 mm male from BPI 24: i, large chela, lateral face.
a, b, c, d, e, g, i scale a; f, h scale b.

Ratio of articles of third maxilliped 10:4:6, tip of third article bearing several long setae.

Chelipeds missing.

Second leg thin, first article 12.5 times as long as broad, remaining articles longer than broad. Ratio of carpal articles: 10:2.2:2.2:1.8:3.0.

Third leg slender, ischium 0.5 as long as merus and bearing 2 spines on inferior margin, superior margin with a few stiff setae. Merus inermous, 6 times as long as broad. Carpus 0.5 as long as merus. Propodus 0.8 as long as merus, unarmed save small tuft of distosuperior bristles. Dactylus simple, thin, long and strongly curved, 0.45 as long as merus. Ischium of 4th legs also bearing two spines, ischium of 5th leg inermous.

Telson 3.5 times as long as posterior margin is broad. Posterior margin arcuate, outer spine of posterolateral pair on one-third, inner pair half as long as tip is broad. Dorsal spines heavy, but about equal in length to outer pair of posterolateral spines.

REMARKS: In many respects these specimens resemble the description and figures of the species De Man described as *A. tenuipes* from 0°58′N, 122°42′E from 72 m (1911:157, fig. 8) but they differ from De Man's in the following characteristics:

1. The terminal spine of the scaphocerite surpasses the end of the squamous portion, while in these it falls markedly short of the end of the squame.

2. De Man described the carpocerite as equal in length to the antennular peduncle and depicted it as even yet shorter, while in these specimens it reaches considerably beyond the end of the peduncles.

3. In De Man's figure the telson is shown to be 1.9 times as broad at maximum breadth as at tip, with the tip straight except for a slight indentation at the mid-line and with the bases of the two pair of posterior spines occupying almost all of the width of the tip. The spines themselves are robust, with lengths of the outer pair equalling the breadth at the tip, those of the inner pair are 1.4 times the breadth of the tip. The dorsal spines are correspondingly large. In these specimens the maximum breadth is 1.7 times that at the tip; the margin of the tip is convex between the bases of the inner spines, and the outer spines are 0.3, the inner 0.5 the breadth of the tip.

We have doubts about the separation of the two species, for De Man's specimen was only 7 mm in length and ours are both 17 mm, and these differences, including those of the telson and its armature, could be caused by the immaturity of De Man's specimen. Both, also, are deep water forms. Adding to the uncertainty is the fact that De Man's sole specimen and these two specimens lack both chelae. However, with the differences as noted above, especially the strong differences in the telson, we feel obliged to describe these specimens as new, but we hope that additional specimens are found in the future.

There are three other species of the genus *Athanas* with the long, slender and curved dactyli on the third legs. These are: *A. amazone* Holthuis, known from the west coast of equatorial Africa and off the Mediterranean coast off Israel from 45 to 130 m (Holthuis, 1951:111, fig. 23, Crosnier and Forest, 1973:160, and Holthuis and Gottlieb, 1958:32); *A. polymorphus* Kemp from the shallow (2 to 3 m) brackish and muddy Chilka Lake in India (Kemp, 1915:295, fig. 31, 32); and *A. sp.* near *polymorphus* Banner and Banner from under intertidal rocks on gravel and sand beach in the Gulf of Thailand (B&B, 1966b:23, fig. 2). In all of these three species the middle articles of the carpus of the second leg are about as broad as long, instead of being 3 to 4 times as long as long as broad as in this species, and none have 2 spines on the ischium of the third legs. *A. amazone* has the squamous portion of the scaphocerite extending beyond the lateral spine and the rounded infracorneal spine as in this species, but the third maxilliped is much heavier in *A. amazone* with the middle article being 4 times as long as broad in that species while it is over 7 times as long as broad in this species. In the other two species, *A. polymorphus* and *A. sp.* near *polymorphus* the slender rostrum reaches to near the end of the second antennular article while in this species it extends only to near the end of the first article.

The specific name refers to the slenderness of the third maxillipeds and the second to fifth legs. The holotype and paratype will be placed in the Smithsonian Institution, Washington, D. C.

Athanas indicus (Coutière), 1903:84, figs. 25 30. Banner and Banner, 1960:149. [B&B, I:327]

SPECIMENS EXAMINED: 1 specimen from BPI 4; 1, BPI 19.

Athanas marshallensis Chace, 1955:17, fig. 8. Banner and Banner, 1960:142, fig. 2. Figure 3h

SPECIMENS EXAMINED: 3 specimens from BPI 2; 4, BPI 22; 3, BPI 24; 1, BPI 28.

REMARKS: We have 8 females and 3 males ranging in size from about 8–10 mm. These agree with Chace's description except for the extra corneal teeth which, instead of falling short of the anterior margin of the cornea, extend well past the cornea. This is an extension of the variation already noted by Banner (1957:193, fig. 2).

Athanas sibogae De Man, 1910:314; 1911:151, fig. 6. [B&B, I:321]

SPECIMENS EXAMINED: 8 specimens from BPI 1; 1, BPI 6; 1, BPI 7; 1, BPI 8; 5, BPI 15; 3, BPI 16; 12, BPI 18; 1, BPI 19; 8, BPI 21; 2, BPI 22; 15, BPI 23; 1, BPI 26; 1, BPI 27; 1, BPI 28.

REMARKS: De Man (1911:148, as *A. parvus*) stated that the carpus of the small cheliped is two-thirds the length of the merus in the female. We measured the articles in 15 female specimens from this collection and found that the carpus varied from 0.4 to 0.8 times as long as the merus with the majority having a carpus about half as long as the merus.

Genus *AUTOMATE* De Man

Automate dolichognatha De Man, 1888a:529, pl. 22, fig. 5. [B&B, I:299]

SPECIMENS EXAMINED: 1 specimen from BPI 13d, 7, HFR 10B.

REMARKS: Our field notes indicated that the specimen from BPI 13d was salmon-orange color when alive.

Genus ***BETAEUS*** Stimpson

Betaeus granulimanus Yokoya, 1927:173, pl. 7, fig. 17–22; Miya, 1972:30, pls. 1,2.

SPECIMENS EXAMINED: 13 specimens from HFR 3B.

REMARKS: Miya (1927) has shown that this species is quite variable with size in the development of the chelae, the frontal indentations and the telsal armament.

Genus *METALPHEUS* Coutière

Metalpheus paragracilis (Coutière), 1897b:303; Chace, 1972:78. [B&B, III]

SPECIMENS EXAMINED: 1 specimen from BPI 6; 1, BPI 24; 4, BPI 28.

New Genus Banner and Banner

Genus and species nov. Banner and Banner, in press.

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

Genus *NEOALPHEOPSIS* Banner

Neoalpheopsis euryone (De Man), 1910:308; 1911:184, fig. 19; Banner, 1953:25, fig. 7.

SPECIMENS EXAMINED: 1 specimen from BPI 28.

REMARKS: De Man's sole specimen of this species came from between "Kawio and Kamboling Islands, Karkarlong Group". This record is from within the political borders of Indonesia, but the Karkarlongs lie only about 44 nautical miles from Balut Island immediately off the southernmost tip of Mindanao and about 180 nautical miles north of Sulawesi (Celebes), the closest major Indonesian island; thus technically the record is Indonesian, but biogeographically more related to the Philippines. We have also reported the species based again on a single specimen from the Hawaiian Islands and have another specimen from there, yet unreported. This, then constitutes the fourth specimen of this species known.

We would like to call attention to the close similarity between this species and that reported by Schmitt (1936:364) from Bonaire, Dutch West Indies as *Alpheopsis hummlincki* (subsequently changed to *Neoalpheopsis* by Chace (1972:78)). The principal difference between these two species, as reported by Schmitt, lies in the projection of the posterior margin of the telson, which in this species is triangular with smooth sides running to an acute tip and which in the Caribbean species has the margins incised for the insertion of the terminal setae which sets off the acute tip that is "narrowly pointed, flattened, lanceolate". Schmitt's sole specimen lacked the large chelae. In spite of the similarities, we believe that *N. hummlincki* is likely to be a separate species, especially in view of the great geographical separation of the two forms.

[Genus *PARATHANAS* Bate]

[*P. decorticus* Bate, 1888:530]

[*P. immaturus* Bate, 1888:532]

REMARKS: These are late larval forms, probably of the genus *Alpheus* or *Synalpheus*, as remarked upon by Coutière (1899:42). They cannot be identified further.

Genus *PRIONALPHEUS* Banner and Banner

Prionalpheus sulu Banner and Banner, 1971:268, fig. 2.

PREVIOUS RECORDS: B&B, 1971, near Zamboanga and Jolo.

SPECIMENS EXAMINED: 1 specimen from BPI 18; 2, BPI 19; 1, BPI 22; 5, BPI 26; 4, BPI 28 (exact collection data not previously listed).

REMARKS: These specimens are the type series of the original description; in our listing of the paratypes we inadvertently added the four specimens from Bitago Beach (BPI 28) to those listed for Great Santa Cruz Is. (BPI 26).

Genus *RACILIUS* Paulson

Racilius compressus Paulson, 1875:107, pl. 14, fig. 2. [B&B, I:350]

SPECIMENS EXAMINED: 3 specimens from BPI 2; 1, BPI 5; 1, BPI 7; 36, BPI 7a; 9, BPI 7b; 75, BPI 13; 120, BPI 15; 11, BPI 18; 3, BPI 19; 1, BPI 20; 1, BPI 22; 28, BPI 23; 5, BPI 25; 42, BPI 26; 1, BPI 27; 3, BPI 28.

REMARKS: This species is an obligate symbiont with corals of the genus *Galaxea*. There appears to be at least 2 species of *Galaxea* in the waters about Zamboanga and the Sulu Archipelago, one with large polyps and with the corallites rather distantly placed (possibly *G. clava* (Dana)) the other with the smaller polyps and corallites closely placed (possibly *G. fascicularis* (L.)). No coral specimens were returned for specific determination. In the first, no *R. compressus* were found; in the second species, where currents and waves caused the corallites to be short when compared to the spaces between the polyps, few of the shrimp were found, but in heads collected from relatively quiet waters where the polyps were long and rather densely packed, the shrimp existed in populations of hundreds on a single head. The basic color of the shrimp in life varies from a semitransparent cream color to a semitransparent brown.

Genus *SALMONEUS* Holthuis

Salmoneus mauiensis (Edmondson), 1930:5, fig. 2. Banner, 1953:12, fig. 2.
Figure 3i

SPECIMENS EXAMINED: 1 specimen from BPI 24.

REMARKS: We compared this 13 mm male specimen with 15 specimens from Hawaii, the type location. In this specimen the carpocerite is a little longer in relation to the third article of the antennule, reaching to the end of the article instead of near the end. The superodistal margin of the carpus of the large chela bears a distinct lobe that is lacking in the specimens from Hawaii. Many of the specimens from Hawaii have a slight pubescence on the carapace while in this specimen the carapace was entirely glabrous. These differences may indicate that the Philippine specimen represents a distinct subspecies, but with only one specimen available we believe such a division would be unwise at the present time.

Salmoneus sibogae (De Man), 1910:303; 1911:158, fig. 9. [B&B, III]

SPECIMENS EXAMINED: 2 specimens from BPI 6; 1, BPI 8; 2, BPI 8a; 2, BPI 24; 1, HFR 9B.

REMARKS: All 8 of these specimens are females. The specimens vary in the following characters:

1. The rostrum reaches from the end of the second antennular article to the middle of the third article.
2. The third article of the antennule ranges from 1.0 to 1.5 times the length of the second; in De Man's specimen it was 1.5 times longer than the second.
3. The notch in the posterior end of the telson varies somewhat in depth.

Genus *SYNALPHEUS* Bate

Synalpheus albatrossi Coutière, 1909:89, fig. 54. Banner, 1953:30, fig. 9.

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

Synalpheus amabilis De Man, 1910:295; 1911:275, fig. 52.

SPECIMENS EXAMINED: 1 specimen from BPI 13; 2, BPI 15b; 1, BPI 18; 1, BPI 26; 2, BPI 26b; 1, BPI 27.

REMARKS: our specimens agree well with De Man's type which we have examined at the Zoologisch Museum in Amsterdam. The upward-tilted acute tooth on the superodistal margin of the large chela is a distinguishing characteristic in this species. The anterior region has an orbitorostral process.

The specimens from BPI 15b and BPI 26b were cohabiting pairs, living in the spongocoels of a sponge; other associations with sponges were not noted in the collections.

Synalpheus antenor De Man, 1910:293; 1911:294, fig. 62.

SPECIMENS EXAMINED: 1 specimen from BPI 1; 1, BPI 8; 2, BPI 8c; 2, BPI 18a; 1, BPI 25.

REMARKS: The 2 specimens from BPI 18a were a cohabiting pair from the spongocoel of a large white branching sponge. In these 2 specimens the squamous portion of the scaphocerite was completely absent.

Synalpheus bituberculatus De Man, 1910:294; 1911:276, fig. 53. [B&B, II:307]

SPECIMENS EXAMINED: 2 specimens from BPI 3; 1, BPI 4; 4, BPI 13a; 3, BPI 13; 2, BPI 15; 1, BPI 16; 4, BPI 18; 4, BPI 19; 2, BPI 21; 10, BPI 23; 5, BPI 24; 1, BPI 25; 14, BPI 26; 2, BPI 28.

Synalpheus carinatus (De Man), 1888a:508, pl. 22, fig. 2; 1911:210, pl. 23. [B&B, II:283]

PREVIOUS RECORDS: De Man, 1909a:111; 1911:212. Siboga Sta. 99 (as *S. carinatus* var. *ubianensis* De Man). [E]

SPECIMENS EXAMINED: 3 specimens from HFR 12; 3, HFR 13.

Fig. 4. *Synalpheus coutierei* Banner. 22 mm male from HFR 170: a, telson. 24 mm female from HFR 170: b, telson.

S. hastilicrassus Coutière. 9 mm female from BPI 18: c, large cheliped. 10 mm female from BPI 3: d, third leg.

S. laticeps Coutière. 12 mm female from BPI 2: e, anterior region, dorsal view; f, second leg; g, dactylus, third leg. 10 mm female from BPI 5: h, small cheliped, lateral view; i, same inferior view.

S. odontophorus De Man. 18 mm male from HFR Sta. 1B: j, anterior region, dorsal view; k, l, m, distal end chela, medial face of specimens from HFR 13, 111 and Sta. 1B.

S. septemispinosus De Man. 15 mm male from BPI 18: n, o. large chela and merus, lateral view; p, q, small cheliped, distal end enlarged; r, sixth abdominal somite and telson.

a, b, c, e, f, h, n, o, p, r scale a; k, l, m scale b; g scale c; d, i, q scale d; j scale e.

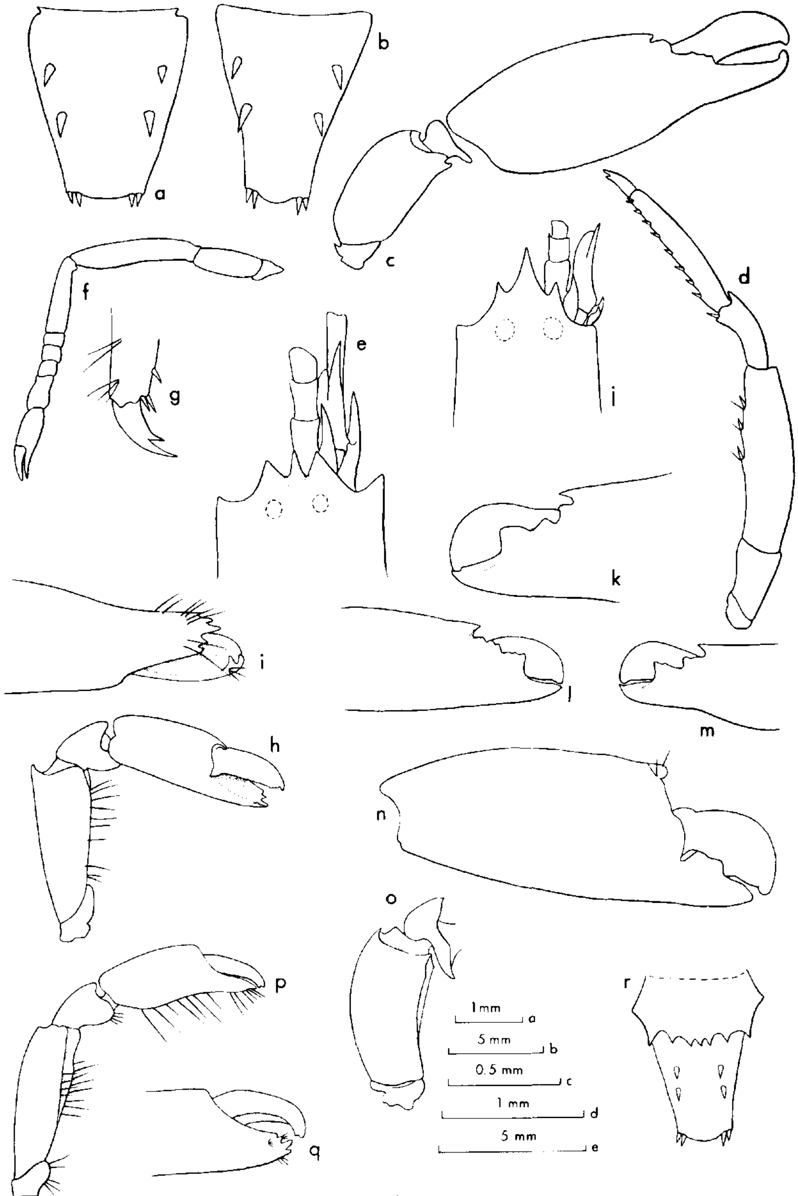

Fig. 4.

Synalpheus charon (Heller), 1861:272, pl. 3, fig. 21. [B&B, II:369]

SPECIMENS EXAMINED: 2 specimens from BPI 18; 2, BPI 26; 2, BPI 27; 3, BPI 28; 2, HFR Sta. 20.

Synalpheus coutierei Banner, 1953:36. [B&B, II:343]

Figure 4a, b

PREVIOUS RECORDS: Bate, 1888:562, pl. 101, fig. 4. Challenger Sta. 208 (as

Alpheus biunguiculatus Stimpson) [E]

SPECIMENS EXAMINED: 1 specimen from BPI 1; 2, BPI 4; 1, BPI 5; 3, BPI 11; 2, BPI 13; 1, BPI 29; 1, HFR 111; 1, HFR 160; 2, HFR 170.

REMARKS: In these specimens, as we noted in previous collections, the telson varies considerably in length-breadth ratio and in shape. In some the lateral margins of the telson are straight and show uniform taper forwards the rather broad tip, in others the margins are concave and the tip is more narrow. Figures 4a and b contrast the telsons of what may be a cohabiting pair taken from a sponge.

The lengths of the telsons of 6 specimens from our personal collections vary from 2.3–3.0 times the breadth of the tip. The difference in proportions is not related to the sex of the specimens. The 12 mm male from HFR 111 carried on the superior surface of the dactylus of the small chela a row of hairs similar to that of *S. hastilicrassus* Coutière (see B&B, II: fig. 21d). However, as it agrees with *S. coutierei* in all other characteristics we have decided to place it in this species with reservations.

We are forced to list Bate's record of *A. biunguiculatus* (= *S. coutieri* – see Banner, 1953:32) with considerable doubts. His description was short and inaccurate (for example, he specified that the second legs had a "carpos six-articulate" but showed the normal 5 articles in his plate), and what few details that are discernable in his plate do not look like *S. coutierei*, *S. biunguiculatus* or even *S. charon* (which he listed as a synonym). His habitat, "depth, 18 fathoms; bottom, blue mud" also does not correspond to the usual habitats of any of the three species. We have been unable to locate his 2 specimens for reexamination so we suggest his record be ignored unless his specimens be found.

Synalpheus demani Borradaile, 1900:416. [B&B, II:324]

PREVIOUS RECORDS: Bate, 1888:560, pl. 100, fig. 3. Challenger Sta. 208 (as *Alpheus spiniger* Stimpson). [E]

REMARKS: As we have reported (B&B, II) we were able to examine Bate's specimen at the British Museum (Natural History) and determined it to be *S. demani*; we also figured the third leg and its dactylus (II, fig. 13 g, h).

Synalpheus fossor (Paulson), 1875:103, pl. 13, fig. 5. [B&B, II:335]

PREVIOUS RECORDS: De Man, 1911:250, fig. 39. Siboga Sta. 96 (as *S. fossor* var. *propinqua* De Man) [E]

SPECIMENS EXAMINED: 1 specimen from BPI 6; 1, BPI 15; 7, BPI 18; 3, BPI 23; 1, BPI 25; 1, BPI 26.

Synalpheus gracilirostris De Man, 1910:291; 1911:269, fig. 49. [B&B, II:372]

SPECIMENS EXAMINED: 2 specimens from BPI 13.

Synalpheus hastilicrassus Coutière, 1905:875, pl. 72, fig. 12. [B&B, II:353]

Figure 4c, d

SPECIMENS EXAMINED: 1 specimen from BPI 1; 1, BPI 3; 2, BPI 4; 5, BPI 15; 2, BPI 16; 13, BPI 18; 3, BPI 19; 5, BPI 21; 7, BPI 22; 12, BPI 23; 1, BPI 25; 1, BPI 26; 1, BPI 27; 2, BPI 28; 1, BPI 29; 1, HFR 9B.

REMARKS: In our Australian monograph, in which we placed *S. acanthitelsonis* Coutière and *S. hastilicrassus acanthitelsoniformis* in synonymy to *S. hastilicrassus*, we gave the percentages of the Philippine specimens bearing certain characteristics. At that time we pointed out that possibly when more collections are studied from other parts of the Indo-Pacific, especially the Indo-Malayan subregion, it may be found that the Philippine form represents a true subspecies.

We also mentioned two unusual forms of the species in the Philippine collections. The first, represented by two females, one from Jolo and the other from Zamboanga, had longer fingers to the large chela than normal; it is shown in fig. 4c. The second, represented by a male and a female from Kauswagen, was like *S. hastilicrassus* in all characteristics except the meri of the third leg which carried one or three spines like *S. ancistrorhynchus* De Man (1911:267, fig. 47). This form is shown in fig. 4d. Again we leave these specimens doubtfully attached to *S. hastilicrassus*.

Synalpheus iocosta De Man, 1909a:119; 1911:235, fig. 33. [B&B, II:368]

SPECIMENS EXAMINED: 2 specimens from HFR 257.

Synalpheus laticeps Coutière, 1905:875, fig. 11.

Figure 4e–i

SPECIMENS EXAMINED: 2 specimens from BPI 2; 1, BPI 5; 1, BPI 21; 1, BPI 23; 1, BPI 24.

REMARKS: There appears to be a variation in the dentition of the fingers of the small chela. Both fingers are broadened and excavate and terminated by teeth. Coutière stated that in his specimens the dactylus had three teeth and the pollex two teeth. Our specimens from Thailand (1966b:68) had two teeth on the dactylus, one on the pollex. In these specimens all have the two dactylar teeth and variously 3 to 5 propodal teeth. This may represent a geographic difference of subspecific value, but with only 2 specimens known from the Indian Ocean, one from the Gulf of Thailand and 12 specimens in this collection, such a division is not warranted.

We find other minor variations in this small collection. One of the two specimens from BPI 2 has a longer and thicker superior unguis on the dactylus of the third leg and bears more slender antennular peduncles and carpocerites, with the carpocerites longer in respect to the antennular peduncles. In this specimen also the first carpal article of the second leg is equal in length to, rather than shorter than, the four following articles. A specimen from BPI 21 has similar antennal peduncles and carpocerites, but is otherwise normal. Finally, in a specimen from BPI 24 the squamous portions of the scaphocerites are almost vestigial, but again in other respects the specimen is normal. These we have interpreted to be variations, but we depict the specimen from BPI 2 for future workers.

Synalpheus neomeris (De Man), 1897:734, fig. 61a, d. e. [B&B, II:357]

PREVIOUS RECORDS: De Man, 1911:212, fig. 24. Siboga Sta. 96, 99. [E]; B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 2 specimens from HFR 1B; 1, HFR 4B; 3, HFR 10; 1, HFR 12; 2, HFR 13; 1, HFR 13B; 2, HFR 72; 4, HFR 269; 12, HFR 277; 3, HFR 361; 1, HFR 362; 1, HFR 370; 2, HFR 374; 3, HFR 375; 4, HFR 379.

REMARKS: Most of these specimens were reported as living commensally with alcyonarians and one with a gorgonian.

Synalpheus neptunus (Dana), 1852:553, pl. 35, fig. 5; Banner and Banner, 1972:24, fig. 3 (neotype established).

Synalpheus neptunus neptunus (Dana), Banner and Banner, 1975:317, fig. 11 (subspecies designated).

PREVIOUS RECORDS: Dana, 1852. Sulu Sea. [E]; Stimpson, 1861:31. Hong Kong. (Both as *Alpheus neptunus*). B&B, 1972:24. Near Zamboanga.

SPECIMENS EXAMINED: 10 specimens from BPI 2; 48, BPI 6; 2, BPI 8; 4, BPI 15; 52, BPI 15a; 1, BPI 15d; 2, BPI 21; 10, BPI 23; 15, BPI 24; 39, BPI 25; 14, BPI 25b; 8, BPI 26; 2, BPI 27; 6, BPI 28; 11, HFR 111; 2, W99.

REMARKS: The specimen from BPI 15d was taken from the living tissue on the outside of the calices of a massive rounded coral. The specimen was colored yellowish green, the same color as the polyps.

Synalpheus nilandensis Coutière, 1905:871, fig. 4. [B&B, II:327]

SPECIMENS EXAMINED: 14 specimens from HFR 1B; 2, HFR 14B; 1, HFR 105; 2, HFR 111; 1, HFR 375.

REMARKS: In our Australian paper we considered the five variable "forms" of this species and designated them as forms, outside the rules for zoological nomenclature. The 14 specimens in station HFR 1B are of the form *bandaensis* and came from a hard sponge. Two of the others, from HFR 105, and HFR 375, did not have any indication of symbiotic associations and are of form *alpha*. The other four specimens, stations HFR 14B and HFR 111, are also of the form *alpha*, but these were associated with what appears to be a gorgonian. (A pink fragment of the cortex, without the medulla, accompanied the shrimp sample. In our Australian paper we accepted the label, which read *Gorgonocephalus*, without question. Therefore, we were wrong in that paper for listing the host as an ophiuroid rather than a gorgonian.)

Synalpheus odontophorus De Man, 1909a:113; 1911:208, fig. 22.

Figure 4j–m

SPECIMENS EXAMINED: 3 specimens from HFR 1B; 1, HFR 13; 2, HFR 111.

REMARKS: In 1975 (II:292) we studied the variation in over 100 specimens of *S. stimpsonii* (De Man) from Australia and decided that this variation encompassed the characteristics that had been used to separate four other nominal species in the complex. These species were then reduced to synonymy. At that time we also considered the separation of *S. odontophorus*, represented in our collections by the six specimens listed above. We found no overlap between *S. odontophorus* and the variable *S. stimpsonii* on two characteristics, but that other characteristics that had been used by De Man in his separation were more questionable (De Man contrasted his *S. odontophorus* to his *S. consobrinus*, a species we placed in synonymy to *S. stimpsonii*):

1. The tip of the stylocerite reached to near the middle of the first antennular article in *S. odontophorus*, but almost to, or beyond, the end of that article in *S. stimpsonii*.

2. The rostrum was 3.5 to 6 times as long as the orbital teeth in *S. odontophorus* but 1.3 to 3.0 times as long in *S. stimpsonii.*

However, the development of a tooth on the medial side of the pollex of the large chela (marking the distal margin of the socket), shown as well-developed by De Man and emphasized as the basis of his name, was reduced to a nonprojecting right angle in some of these specimens (figs. 4k, l, m) similar to the maximal development of *S. stimpsonii.* We also found in the Australian specimens that neither the lateral spine of the scaphocerite, whether it be straight or slightly incurved, not the shape and armature of the telson were reliable characteristics in the *S. stimpsonii* complex.

We note that the specimens from Japan described and figured by Miya (1972:50, pl. 7) agree with *S. odontophorus* on the two characteristics we have set forth. However, the differences in these characteristics are slight and we strongly suspect that when larger collections are studied from other areas enough inherent variation will be found to reduce this species to synonymy as well. Supporting this suspicion is the fact that 4 of the 6 specimens here listed were reported as coming from crinoids, the normal but not obligatory host of *S. stimpsonii.* In our experience, we have found that many of the fixed characteristics of free-living species can be variable on species living in the protection of a symbiotic association. This conclusion does not apply, of course, to those modifications which aid the species in some way to maintain the association, such as a strongly hooked dactylus of the small cheliped and walking legs of *S. comatularum* (Haswell).

Synalpheus paraneomeris Coutière, 1905:872, pl. 71, fig. 7. [B&B, II:383]

SPECIMENS EXAMINED: 3 specimens from BPI 1; 4, BPI 3; 8, BPI 5; 2, BPI 6; 2, BPI 8; 2, BPI 16; 2, BPI 24; 1, BPI 25; 2, BPI 26.

REMARKS: In all specimens in which chelipeds are present the meri of both chelipeds bear on the distosuperior margin a small triangular tooth. This was neither described nor depicted by Coutière, but since the tooth was found in many of the specimens in the large Australian collection we feel its presence or lack is another variation in this variable species.

Synalpheus pescadorensis Coutière, 1905:877, pl. 73, fig. 15. [B&B, II:301]

PREVIOUS RECORDS: De Man, 1911:298, fig. 63, Siboga Sta. 96. [E]

Synalpheus septemispinosus De Man, 1910:297; 1911:289, Fig. 59.

Figure 4n r

SPECIMENS EXAMINED: 1 specimen from BPI 18.

REMARKS: This is the first time this species has been reported since De Man described it on the basis of a single specimen from Pulu Setengar or the Paternoster Islands. Our specimen agrees well with that of De Man. We have figured the large and small chela which have a remarkable resemblance to those of *S. bituberculatus* De Man and have also figured the posterior section of the sixth abdominal segment and telson. It is notable that this specimen, like those of many other species with spatulate and toothed fingers on the small chelae, came from a sponge.

Synalpheus stimpsonii (De Man), 1888a:513, pl. 22, fig. 3 [B&B, II:292]

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 2 specimens from HFR 10; 1, HFR 12; 2, HFR 72.

REMARKS: The specimens from HFR 72 were reported as living commensally with a crinoid.

Synalpheus streptodactylus Coutière, 1905:870, pl. 70, fig. 1. [B&B, II:362]

SPECIMENS EXAMINED: 2 specimens from BPI 2; 3, BPI 6; 2, BPI 7; 1, BPI 13; 4, BPI 15; 6, BPI 16; 19, BPI 18; 1, BPI 19; 7, BPI 21; 3, BPI 22; 7, BPI 23; 4, BPI 24; 2, BPI 26; 6, BPI 25; 8, BPI 28; 1, BPI 29; 3, HFR 93; 11, HFR 104; 7, HFR 106; 4, HFR 111; 20, HFR 160; 6, HFR 257; 3, HFR 350; 3, HFR 351; 14, HFR 370; 1, HFR 9B; 1, HFR Sta. 30; 1, HFR Sta. 68.

Synalpheus thai Banner and Banner, 1966b:61, fig. 19.

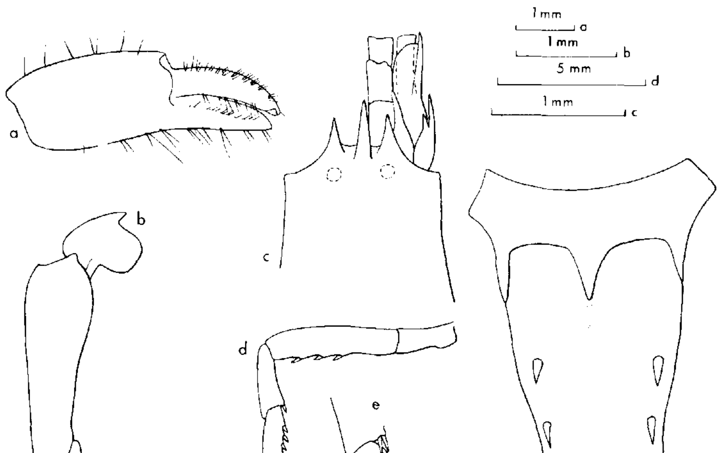

Fig. 5. *Synalpheus thai* Banner and Banner. 12 mm male from BPI 23: a, b, small chela and merus, lateral face.
S. triacanthus De Man. 24 mm female from WM 67-65: c, anterior region, dorsal view; d, e, third leg and enlarged dactylus; f, telson.
f scale a; a, b scale b; e scale c; c, d scale d.

SPECIMENS EXAMINED: · 2 specimens from BPI 23.

REMARKS: The dactylus of the small chela bears a characteristic pattern of setae that was not discussed in the original description. On the dactylus, beside the setae on the oppositive face which cross those of the pollex, there are a number of transverse rows of 2 to 4 setae each placed somewhat medially on the crest of the dactylus reaching from near the articulation almost to the tip. These rows are not as well-developed as the brush found in the Gambarelloides Group characteristic of American waters.

Synalpheus triacanthus De Man, 1910:301; 1911:282, fig. 55.
Figure 5c f

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 1 specimen from WM 57–65.

REMARKS: This specimen agrees well with the original description by De Man of his sole specimen except the orbitorostral teeth are directed straight forward instead of pointing outward and the merus of the third leg bears 3 spines which are lacking in De Man's type. We also have one specimen from the Indian Ocean that shows the same differences. This specimen in all other ways falls well within the variations we noted in the 40 specimens from the MUSORSTOM collection. We have figured the telson which had 3 pairs instead of the usual 2 pairs of posterolateral spines and the posterior margin is not bilateral and bears a small incision near the middle. We feel these are probably growth anomalies.

Synalpheus trispinosus De Man, 1910:300; 1911:288, fig. 58.

PREVIOUS RECORDS: B&B, in press. Off Lubang Is.

SPECIMENS EXAMINED: 2 specimens from HFR 10; 1, HFR 105; 1, HFR 112.

REMARKS: The specimen from HFR 112 was reported living commensally with an alcyonarian.

Synalpheus tumidomanus (Paulson), 1875:101, pl. 13, fig. 2. [B&B, II:377]

SPECIMENS EXAMINED: 32 specimens from BPI 1; 6, BPI 3;7, BPI 4; 1, BPI 5; 1, BPI 6; 1, BPI 8; 6, BPI 15; 1, BPI 15a; 12, BPI 18; 11, BPI 19; 14, BPI 24; 2, BPI 26; 4, BPI 27; 4, BPI 28; 2, BPI 29; 2, HFR Sta. 68.

FAMILY OGYRIDIDAE

Genus *OGYRIDIDES* Stebbing

Ogyridides orientalis (Stimpson), 1861:36. Fujino and Miyake, 1970:255, fig. 6.

PREVIOUS RECORDS: De Man, 1911:135, fig. 1. Siboga Sta. 102 (as *Ogyris sibogae* De Man). [E]

REMARKS: Members of this genus are now considered to constitute a separate family, the Ogyrididae (see B&B, III). We have listed the species here because it was considered in this family by De Man and other previous workers.

Stimpson, 1861, listed his specimens as from *"In mari sinensi"* as well as Kagoshima (Japan); this may or may not have been the South China Sea.

[*O. sibogae* (De Man)]: See *O. orientalis*.

DATA ON COLLECTIONS REPORTED

American Museum of Natural History, New York (originally identified by J. C. Armstrong).
Museum accession number (AMNH):

7390–7401, incl. Padada Beach, Gulf of Davao, Mindanao, from 4/36 to 7/36.

7402. Mouth of Padada River, Gulf of Davao, Mindanao, 6/36. Coll. G. R. Oesch.

7403, 7404. Same as AMNH 7390.

7407. Beach at Davao, Mindanao. 11/28/37. Coll. Anne Fraser and G. R. Oesch.

7411. 2 km north of Digos, Santa Cruz, Gulf of Davao, Mindanao, 11/21/37. Coll. W. G. Van Name, E. H. & G. R. Oesch.

7412. Mangrove swamp near mouth of Padada River, Gulf of Davao, Mindanao, 11/26/37. Coll. W. G. Van Name.

7417. Flats about 1 1/2 mi south of Padada River, Gulf of Davao, Mindanao. 11/5/37. Coll. W. G. Van Name and E. H. Oesch.

7443. Stony Beach, south of Santa Cruz, Gulf of Davao, Mindanao, 11/7/37. Coll. W. G. Van Name, and E. H. Oesch.

7444. Same as AMNH 7411, 11/12/37, with same collectors.

8215, 8229, 8243, 8244, 8246, 8248, 8249. Same as AMNH 7390, coll. G. R. Oesch except for 8246, coll. J. C. Armstrong.

8250. Mariveles Swamp, Mariveles, Bataan, Luzon, 1937. Coll. P. de Mesa.

8450, 8453–8457 incl. Reef about 1 km north of Digos, Gulf of Davao, Mindanao, 11/18/37 and 11/21/37. Coll. W. G. Van Name and E. H. Oesch.

8460, 8461. Reef off Digos, Gulf of Davao, Mindanao, 11/14/37. Coll. W. G. Van Name, E. H. and G. R. Oesch.

8915–8919. Same as AMNH 7390.

8922. Same as AMNH 8460.

8945, 8947, 8950, 8951, 8959, 8962, 8967, 8968, 8975, 8976, 8979, 8981, 8987, 8995, 9003. Same as AMNH 7390.

9383. Same as AMNH 8460.

9385. Same as AMNH 7390, Sept. 1936.

Personal collections of A. H. and D. M. Banner.

Collections, unless otherwise specified, made from dead and overgrown coral heads or, less commonly, living heads. Depths of collections are estimates of depths below the low intertidal zone as marked by limit of upward growth of the coral.

Collection number (BPI):

1. Kauswagen, Mindanao (8°10′N, 124°05′E), from near end of stone groin, 3/5/68. From 2 areas in low intertidal, specimens also from sponges. Area with moderate to strong wave action, but normally without breaking surf.
2. Same as BPI 1, 3/6/68. Immediately beyond end of groin, in water up to 3 m deep. Area with massive living coral separated by sand patches. Specimens also from living *Pocillopora sp.* and *Porites sp.*
3. Same as BPI 1, 3/6/68. Further towards outer edge of reef flats from rubble bottom with scattered living coral masses.
4. Same as BPI 1, 3/7/68. At outermost reef edge, without coralline algal ridge, but gradually sloping off to deeper waters. Area with greatest wave action, but breaking likely only with strong northerly winds; vigorous growth of coral.
5. Same as BPI 1, 3/7/68. Repeat of BPI 2 collection area.
6. Great Santa Cruz Is., (6°52′N, 122°3.5′E) off Zamboanga, Mindanao, 3/9/68. N. side of middle of island. From intertidal to 3 m deep. *Racilius* from heads of *Galaxea sp.*

   6a. Taken from single sponge with many galleries in spongocoel.
7. Same as BPI 6, 3/9/68, but confined to water 1.5 to 5 m deep. (Note: 2 large heads of *Tubipora musica* L. examined without finding any alpheids.)

   7a, b. From 2 species of *Galaxea spp.*

   7c. From a long slender orange-yellow sponge, without large spongocoel; shrimp in cavity close to osculum.
8. Same area as BPI 6, 3/10/69, confined to waters 0 to 0.6 m. deep.

   8a. Commensal with fireworm.

   8b. A cohabiting pair.

8c. Commensal with a brittle star.

9, 10. Without alpheids.

11. Great Santa Cruz Island, middle of south coast, 3/11/68. Outer edge of reef about 5 m deep. This area subject to more wave and current action than north shore. Specimens from a single massively lobulate head of *Porites sp.*

12. Same as BPI 11, 3/11/68. Low in intertidal, from heads of coral lying on sandy substrate in eel grass.

12a. From bases of coral overgrown with algae and encrusting coralline algae.

13. Same as BPI 11, 3/11/68. From about 1.5 m deep.

13a, b. From sponges.

13c. Cohabiting pair.

13d. From under rocks, middle intertidal.

14. Zamboanga City (6 54′N, 122 4′E) 3/12/68. Rubble beach 8 km west of Zamboanga City pier, midintertidal zone. Beach mostly loose coral rubble with terrigenous rock outcroppings, well drained. (Exceedingly numerous brittle stars, but only 4 alpheids found in extensive searching.)

15. Great Santa Cruz Is., northern edge and western tip, 3/13/69. Water from 0.6–5 m deep. On northern side *Galaxea* dominant, in huge formations. At western tip much branching *Acropora*, plate-like *Montipora* and branching *Heliopora* etc. (Many alpheids could be heard snapping, but few could be found.)

15a. From a massive, many galleried, semihorny sponge.

15b. From white sponge, spicular texture firm, with spongocoel up to 1″ in diameter, branching.

15c. From massive heads of *Porites sp.* in a gallery similar to that made by *Alpheus deuteropus*.

15d. From living tissue on outside of calices of massive rounded coral.

16. Bitago Beach, 10 km west of Zamboanga, 3/15/68. Current and wave actions strong to judge from beach and sandy bottom. From small patches of living and dead coral on sandy bottom about 1–1.5 m deep.

17. Zamboanga City, 3/15/68. Shore collection at about 0 to +0.3 m in front of old Spanish fort east of city center. Area evidently subjected to slight wave action. Shrimp mostly from under small rocks embedded in clean sand.

18. Marungus Is. (local name Bangas), off Jolo City, Sulu Archipelago (6 6′N, 120 58′E), 3/18/68. Outer edge of vigorous coral reef, from 2 to 3 m deep. Area with moderate wave action and moderate to strong currents.

18a. Cohabiting pair, presumably from spongocoel of large white branching sponge, but specimens found free.

19. Same as BPI 18, 3/18/68. From reef flat and immediate reef edge, not deeper than 1 m. No consolidated reef front.

20. Same as BPI 18, 3/18/68. Shore collecting at low tide. One specimen under rock in sandy area, second in cracks in a terrigenous rock. (Not a cohabiting pair.)

21. Pangasinan Is., off Jolo City, Sulu Archipelago, 3/19/68. In lagoon on south side of island. Extensive lagoon open to sea by narrow mouth, and surrounded by mangroves; much of bottom coral rubble with living coral in patches on northern side. Specimens collected in water 1 to 5 m deep.

21a. Same, from large white sponge (sponge the same as BPI 18a).

22. Marungus Is., 3/19/68. In water up to 5 m deep.

22a. Cohabiting pair from sponges existing between branches of racimose coral (dead portion). Sponge yellow-green.

23. Tictauan Is., off Zamboanga, Mindanao (6 53′N, 122 08′E), 3/21/68. From northern side of eastern reef; gently sloping vigorous reef, with much *Acropora*, *Galaxea* etc., from 0.7 to 7 m deep.

24. Same, from southern side of eastern reef, 3/21/68. Reef here of only scattered coral, not vigorous, on wide patches of sand and eel grass, possibly because of exposure to southern storm waves, from 0.7 to 5 m deep.

25. Little Santa Cruz Is., 1.5 km NW of Great Santa Cruz Is. 3/23/38. Reef at eastern tip of island; area normally subjected to very vigorous tidal flow with whirlpools, etc. Shallow areas with well washed coral rubble, deeper with vigorous coral growth. Specimens from scattered heads 1 to 7 m deep.

25a. From top of *Heliopora* head where algae and specimens lay packed between growing tips of coral.

25b. From sponge.

26. Great Santa Cruz Is., eastern end, 3/23/68. Reef area rather broad, gradually sloping towards edges, center front possibly exposed at extreme low waters. Coral growth quite vigorous between sandy pockets. Current at time of collection weakest found in whole area, and with no indication of strong currents. Various coral heads, including encrusted types, from 0.7 to 5 m deep.

26a. From pocket in dead coral.

26b. From white sponge.

27. Tictauan Is., 3/24/68. South side. This side of island without strong currents or much wave action, as shown by find sand and sand-silt deposits on dead coral heads; from 1 to 5 m deep.

28. Same as BPI 16, 3/26/68.

28a. From felted algal tubes.

29. Same as BPI 28, 3/26/68. From an unusual growth form of a hydrocoral, possibly *Millepora* (sample lost). Head about 45 cm diameter, with fine branches reuniting to form dense reticulum; on top only distal 3 6 cm of branches alive, yellowish with white tips; base and portions of lower colony covered with coralline algae, zooanthids and at times an algal mat. Most specimens from basal portions, some apparently from dead reticulum.

Challenger Expedition Stations

203. 10/31/1874. Lat. 11°6′N; long. 123°9′E; off Panay, Philippine Islands; depth 20 fathoms; bottom mud. Trawled.

208. 1/17/1875. Lat. 11°37′N; long. 123°31′E, off Manila. Depth 18 fathoms; bottom, blue mud. Trawled.

[Hong Kong - no further data.]

Morton collections Hong Kong

A small collection by Dr. Brian S. Morton of the University of Hong Kong. All were made at Tolo Harbor, Hong Kong, some from 2 6 fathoms, in 1975; collection loaned to us by the Smithsonian Institution. (Accession No. 319653)

Siboga Expedition Stations - 1899

93a. June 24/25. Pulu Sangisiapi, Tawitawi Islands, Sulu Archipelago. 12 m. *Lithothamnion*, sand and coral.

b. Same. Reef.

96. June 27. South-east side of Pearl Bank, Sulu Archipelago. 12 m. *Lithothamnion* bottom.

99. June 28/29/30. 6°7′N, 120°26′E. Anchorage off North-Ubian. 16–23 m. *Lithothamnion*.

104. July 2/3. Sulu Harbor, Sulu Island. 14 m. Sand.

109. July 5/6. Anchorage off Pulu Tongkil, Sulu Archipelago. 13 m. *Lithothamnion* bottom.

U. S. Exploring Expedition - 1838-1842

Balabac Straits, North of Borneo

Sulu Sea

Wear collections, Hong Kong.

A collection made by Dr. Robert G. Wear, Victoria University, Wellington, New Zealand in the Hong Kong area; collection loaned by the Smithsonian Institution. (Accession No. 319653)

Collections made by the Hong Kong Fisheries Research Station.
R. V. "Cape St. Mary (HFR)

Trawl No.	Date	Latitude, Longitude	Depth (fms.)	Bottom
10	1/8/63	20°53′N, 115°11.5′E	75	sand
12	1/8/63	20°57.5′N, 115°55′E	35–39	coarse sand
13	2/8/63	20°57.5′N, 115°55′E	35–36	coarse sand
57	16/9/63	15°53.1′N, 109°26.2′E	112–172	mud
72	8/10/63	17°45.0′N, 108°29.2′E	42–44	mud
93	5/12/63	19°00.5′N, 111°30′E	70–69	mud
104	8/12/63	20°48′N, 112°31.5′E	39–40	sandy mud
105	8/12/63	20°34′N, 112°31′E	43	muddy sand
106	8/12/63	20°20′N, 112°29′E	46–47	sandy mud
110	17/12/63	20°48′N, 113°30.3′E	46	sandy mud
111	17/12/63	20°35′N, 113°30.5′E	50–49	sandy mud
112	18/12/63	20°16′N, 113°29′E	53–55	muddy sand
114	18/12/63	20°03′N, 113°28.3′E	71–78	muddy sand
126	6/1/64	19°31′N, 112°40′E	28–106	coarse sand
139	9/1/63	21°49.4′E, 115°30.9′E	62	mud
160	15/6/64	15°58.8′N, 114°33.8′E	45–46	coral with sand
164	16/6/64	15°37.9′N, 114°22.4′E	38–37	coral and coarse sand
170	17/6/64	15°36.8′N, 114°13.4′E	40–46	coral
171	18/6/64	15°33.2′N, 113°56′E	44–48	coral and coarse sand
198	14/8/64	21°44′N, 115°00′E	46	mud
216	22/8/64	20°05′N, 115°00′E	137–140	sandy mud
251	7/11/64	5°28.9′N, 110°8.9′E	42	mud
257	8/11/64	2°32.5′N, 110°29.5′E	24–23	sand and shells
266	16/11/64	2°52.6′N, 110°17.5′E	27–28	sandy mud
267	16/11/64	2°51′N, 110°17′E	27–26	sandy mud
269	16/11/64	2°31′N, 110°20′E	27	muddy sand
276	19/11/64	7°50′N, 107°36′E	30–34	sand
277	19/11/64	8°01.6′N, 107°42.9′E	32	sand
288	12/2/65	20°53.0′N, 112°31′E	32–34	coarse mud
308	17/2/65	19°53.2′N, 111°51.8′E	51–53	muddy sand
312	18/2/65	20°15.0′N, 111°54.0′E	40–38	muddy sand
317	19/2/65	19°57.2′N, 112°01.5′E	51–52	muddy sand
347	12/3/65	12°02′N, 112°49′E	200–212	pteropod shell
350	24/4/65	21°14.6′N, 114°27.0′E	46	sandy mud
351	24/4/65	21°13′N, 114°21.0′E	44	sandy mud
361	25/4/65	21°00.6′N, 114°30.3′E	48	muddy sand
362	25/4/65	21°00.6′N, 114°32.4′E	48	muddy sand
363	24/4/65	21°02.2′N, 114°33.6′E	48	muddy sand
370	25/7/65	21°06.4′N, 114°32.0′E	46	mud, coral and sand
371	25/7/65	21°04.5′N, 114°30.0′E	46	mud, coral and sand
374	13/8/65	21°15.2′N, 115°16.4′E	62	sandy mud
375	13/8/65	21°14.0′N, 115°16.5′E	62	sandy mud
379	15/8/65	20°59.6′N, 115°28.5′E	92	sandy mud
Station No. (no trawl number) (HFR Sta.)				
19	1/11/64	11°25.6′N, 114°19.6′E		coral
20	2/11/64	11°25.6′N, 114°19.6′E		coral
30	25/4/65	21°03.5′N, 114°35.3′E	47	muddy sand
68	23/6/64	16°25.0′N, 114°45.0′E		coral

Inshore Stations collected by A. J. Bruce except as noted.
(HFR-B; the numbered designations are ours.)

1B	?/4/65	20 55.0′N, 115 56′E	30–40 fms.	
2B	18/4/65	Shau Tau Kok, Mirs Bay, Hong Kong		mud
3B	19/5/65	Rocky Bay, Port Shelter, Hong Kong		
4B	4/8/64	Off Lamma Island, Hong Kong		
5B	31/3/65	Kat O Chau, Mirs Bay, Hong Kong		
6B	31/3/65	Lamma Channel, Hong Kong		
7B	27/7/65	Sharp Is., Port Shelter, Hong Kong	2 ft.	rocky
8B	25/7/65	Lung Ha Wan, Clear Water Bay, Hong Kong		rocky
9B	29/7/65	Sharp Is. east side Port Shelter, Hong Kong		rocky coral
10B	5/8/65	Kat O Chau, Mirs Bay, Hong Kong	low water, spring tide	coral sand and small rocks
11B	7/8/65	Kat O Chau, Mirs Bay, Hong Kong	″	rocks
12B	28/8/65	East Lamma Channel, Hong Kong	ca. 15 fms	
13B		21 01′N, 115 32′E Coll. D. Eggleston	76 fms.	
14B	5/65	"With *Gorgonocephalus*" Coll. D. Eggleston [not *Gorgonocephalus*, but a gorgonian].		
15B	25/7/65	Long Ha Wan, Clear Water Bay, Hong Kong Coll. H. W. Chan.		
16B	18/4/65	Starling Inlet, Sha Tau Kah, Mirs Bay, Hong Kong, Coll. D. Eggleston		In mud, mangrove
17B	3/65	From *Nemipterus virgatus* (Houttuyn) stomach. Coll. D. Eggleston.		
18B	28/8/65	East Lamma Channel, Hong Kong	15 fms.	
19B	31/3/65	Kat O Chau, Mirs Bay, Hong Kong	4 ft.	In suspended dead oyster shells

Collection number (W):

93. Tai Po mudflats, 7/4/74. In burrow.
94. Cheung Shi Tan, Tolo Harbor, 23/4/74. Mudflat.
95. Same as above, mudflat, low tide, in shallow pool - horizontal burrows.
96. Au Chau, Tolo Harbor, 28/4/74. Intertidal rock pools and under stones.
97. East Lamma Channel, 29/4/74. 22 m depth.
98. Tolo Harbor, 200 m north of Au Chau, 17/5/74. From pholad holes in coral base 8 m, occur in pairs.
99. Lamma Channel, 1 km south of Aplei Chau, 9/6/74. 34 m depth, from caverns in sponge; occur in pairs.
100. Mirs Bay, end of Chik Chau, 11/6/74. From holes in coral base, 5 m depth.
101. Chik Chau, north end, 11/6/74. From coral bases 5 m depth.
102. Tolo Harbor, 17/5/74. 200 m north of Au Chau, night trawl.
109. Sai Kung, 22/6/74. In pairs in sand/mud burrows; mid-tide.

Western Australian Museum, Perth, W. A.

These collections were made by E. B. Wilson on the "Pele" Expedition of the Bernice P. Bishop Museum, Honolulu, Hawaii.

Collection number (WM):

57-65. 9 miles and 242° from Zau Is., S. W. Pearl Bank, Sulu Archipelago. 22/2/64. 67–68 fms. From sponges.

67–65. 2 miles and 349° from Zau Is., Pearl Bank, Sulu Archipelago. 22/2/64. 10 fms. *Lithothamnion*, sand and coral.

68–65. One mile and 237° from Tangalan Is. in Maluso Bay, Basilan Is., Sulu Archipelago. 15/2/64.

215–65. About 9 miles and 130° from Bongao Light, Tawitawi Bay, Sulu Archipelago. 29/2/64.

216–65. Zau Is. Pangutaran Group, Sulu Archipelago (5°49′N, 119°41′E). 22/2/64. 3 1/2 fms.

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