

THE PONTONIINID SHRIMPS COLLECTED
BY THE YALE SEYCHELLES EXPEDITION, 1957-1958
(DECAPODA, PALAEMONIDAE)

BY

A. J. BRUCE

East African Marine Fisheries Research Organization, P.O. Box 81651, Mombasa, Kenya

The small collection of pontoniinid shrimps made by the Yale Seychelles Expedition, 1957-1958, (YSE), includes a number of well known Indo-West-Pacific species, with some specimens from the Maldive Islands as well as from the Seychelle Islands. The most important feature of the collection is the rediscovery of a species described by Miers as *Pontonia? brevirostris* in 1884 and which was collected by H.M.S. "Alert" from the Seychelle Islands in 1882. No further specimens of this species have been reported but a new genus, *Platypontonia*, has been subsequently created for its inclusion (Bruce, 1968). The host animal for the original specimens was not clearly indicated and the host has now been properly determined for the first time.

In the following account full synonymies are given only for the rarer species. In the case of the common species full synonymies can be obtained from Holthuis (1952), but more recent references or references to records from the western Indian Ocean are included.

In the systematic section of this report, under measurements, the carapace length refers to the postorbital carapace length, measured from the posterior margin of the orbit immediately behind the origin of the eye peduncle. All specimens are now deposited in the collections of the Yale Peabody Museum (YPM).

SYSTEMATIC ACCOUNT

***Periclimenes grandis* (Stimpson, 1860)**

Restricted synonymy:

Anchistia grandis Stimpson, 1860: 34.

Periclimenes (Harpilius) grandis; Holthuis, 1952: 11, 79-81; Holthuis, 1958: 8, 9; Johnson, 1961: 58, 61, 62, 76.

Material examined:

(1) 1 ♂, Beau Vallon, Mahé, Seychelle Islands. YSE Stn. 33. Coll. A. H. Kohn. 1 January 1958. YPM No. 4302.

— A small intact male with well developed appendix masculina. The disto-ventral

spine of the merus of the second pereiopod bears a distinct spine and the inner distal border of the carpus bears a single large acute spine. The supra-orbital spines are well developed and the rostrum bears seven dorsal and three ventral teeth.

Measurements. — Carapace length 1.9 mm.

Habitat. — No data.

Distribution. — Widespread in the Indo-West-Pacific region from the Red Sea to Moçambique to Indonesia. The species has not been previously recorded from the Seychelle Islands although it has been reported from Zanzibar (Lenz, 1905) and Dar-es-Salaam (Ortmann, 1894).

***Periclimenes brevicarpalis* Schenkel, 1902 (fig. 1a, b)**

Restricted synonymy:

Ancylocaris brevicarpalis Schenkel, 1902: 563, pl. 13 fig. 21.

Periclimenes (Harpilius) brevicarpalis; Holthuis, 1952: 10, 69-73, fig. 27; Barnard, 1955: 78 (key); Johnson, 1961: 59, 62, 63, 75; McNeill, 1968: 7, 22; Miyake & Fujino, 1968: 410-413, 431, fig. 4.

Periclimenes brevicarpalis Macnae & Kalk, 1962: 111, 117.

Material examined:

- (1) 1 ovigerous ♀. Between Rat Island and South East Island, Mahé, Seychelle Islands. YSE Stn. 48. Coll. A.J. Kohn. 5 January 1958. YPM No. 4287.
- (2) 1 ♂, 1 ovigerous ♀. West North Island, Cosmoledo Atoll. YSE Stn. 43. Coll. W. D. Hartman. 12 December 1957. YPM No. 4286.
- (3) 1 ovigerous ♀. Gan Island, Addu Atoll, Maldive Islands. YSE Stn. 25. Coll. W. D. Hartman. 1 October 1957. YPM No. 4269.

Description. — The specimens all agree well with the previous descriptions of this species. The female specimens have five dorsal and one ventral rostral tooth and the single male has six dorsal and one ventral tooth. The Gan specimen has a slightly damaged rostrum and the middle dorsal tooth is missing. The endopod of the male first pleopod is 2.3 times longer than broad and slightly expanded distally. The borders of the distal two thirds bear sixteen plumose setae, of which the distal are shorter than the proximal. Six simple submarginal setae are present along the distal third of the medial border. Ten short, curved, subequal, simple setae are present along two thirds of the medial border proximal to the plumose setae. The endopod of the male second pleopod bears a slender appendix masculina which slightly exceeds the appendix interna, and bears a single simple seta terminally with eight similar setae, of decreasing length proximally, along its lateral border.

Measurements. — Carapace length (1) ♀ 7.0 mm; (2) ♂ 5.4, ♀ 8.5 mm; (3) ♀ 5.8 mm.

Host. — The Seychelle and Cosmoledo specimens were noted as obtained from among the tentacles of large actinians.

Remarks. — This well known commensal of giant anemones has not been previously reported from the Seychelle Islands although it has been recorded from Zanzibar (Lenz, 1905) and Moçambique (Barnard, 1950).

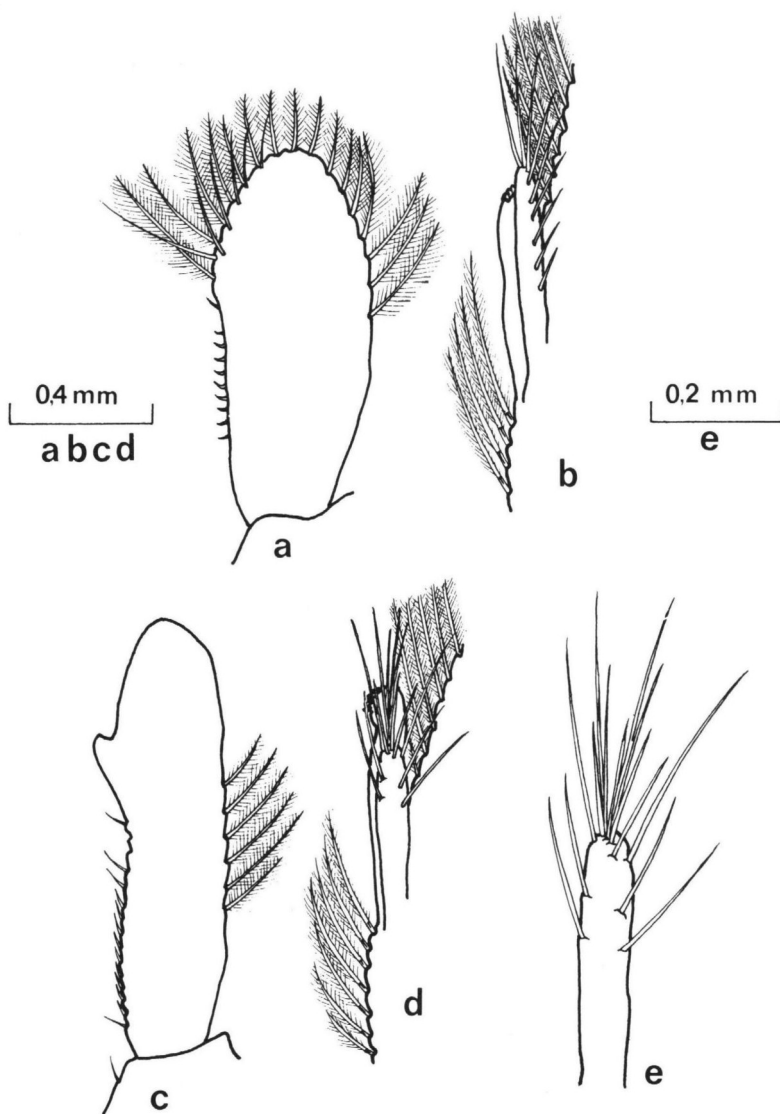


Fig. 1. a, b, *Periclimenes brevicarpalis* Schenkel, male. a, endopod of first pleopod; b, appendix interna and appendix masculina of second pleopod. c-e, *Anchistus miersi* (De Man), male. c, endopod of first pleopod; d, appendix interna and appendix masculina of second pleopod; e, appendix masculina.

The endopod of the male first pleopod has not been previously described. The appendix masculina is generally similar to the description given by Kubo (1940) but the setae are much more numerous.

Distribution. — Widespread in the Indo-West-Pacific region from the Red Sea to Moçambique to the Palau Islands, Santa Cruz Island and the Great Barrier Reef.

Periclimenes soror Nobili, 1904

Restricted synonymy:

Periclimenes soror Nobili, 1904: 232; Nobili, 1906: 50, pl. 2 fig. 6; Jacquotte, 1964: 180; Bruce, 1965: 493; Bruce, 1968: 1167, 1168.

Periclimenes (Periclimenes) soror; Holthuis, 1952: 9, 51-53, fig. 17.

Material examined:

- (1) 2 ovigerous ♀. Anse la Mouche, Mahé, Seychelle Islands. YSE Stn. 36. Coll. W. D. Hartman. 24 November 1957. YPM No. 4282.

Description. — The specimens agree well with the redescription of the species given by Gordon (1939). The larger specimen has ten dorsal rostral teeth and the smaller twelve. Ventral rostral teeth are absent. The disto-lateral process of the basal segment of the antennular peduncle is bispinose in the larger specimen and trispinose in the smaller.

Colouration. — Noted as "red".

Measurements. — Carapace lengths, 2.2, 2.4 mm.

Host. — The specimens were obtained from the oral surface of a starfish, *Protoreaster nodosus* (L.).

Remarks. — The larger female carried 156 ova and the smaller 91, although some of the latter may have been lost. The major diameter of the ova is 0.38 mm.

The species has been previously recorded as *Periclimenes (Cristiger) frater* from Egmont Reef in the Seychelle Islands by Borradaile (1915).

Distribution. — Widespread in the Indo-West-Pacific region from the Red Sea and Madagascar to Hawaii.

Periclimenes imperator Bruce, 1967

Periclimenes imperator; Bruce, 1967: 53-62, figs. 23-25; Bruce, 1968: 1166-1167.

Material examined:

- (1) 1 ♂. Anse la Mouche, Mahé, Seychelle Islands. YSE Stn. 32. Coll. A. J. Kohn. 11 October 1957. YPM No. 6033.

Description. — The single specimen agrees precisely with the original description of this species (Bruce, 1967). The rostrum bears a series of twenty-five small acute teeth. The basal segments of the antennular peduncles bear a single distolateral spine only.

Measurements. — Carapace length, 2.6 mm.

Habitat/Host. — No data.

Remarks. — This species has not been previously recorded from the Seychelle Islands. Previous records have reported the association of this species with the large nudibranch *Hexabranchnus marginatus* Quoy & Gaimard. The specimen is rather immature and this factor will account for the reduced armament of the basal antennular segment, where normally two or three distolateral spines are present.

Distribution. — This species has been recorded from the Red Sea, Zanzibar, Moçambique, Madagascar, New Caledonia and Hawaii.

***Anchistus miersi* (De Man, 1888) (fig. 1c, d, e)**

Restricted synonymy:

Harpilius miersi De Man, 1888: 274, pl. 17 figs. 6-10.

Anchistus miersi; Holthuis, 1952: 110-111, fig. 45; Holthuis, 1953: 56; Johnson, 1961: 59, 62, 63, 76; Johnson & Liang, 1966: 434; Miyake & Fujino, 1968: 414-415, 431.

Material examined:

- (1) 1 ♂. Funadu Island, North Male Atoll, Maldive Islands. YSE Stn. 17. Coll. G. P. Melante and J. Blanchard. 20 September 1957. YPM No. 4265.

Description. — The single specimen agrees closely with the original description and the additional information given by Kemp (1922). The rostrum is acute, with five dorsal teeth and one minute ventral tooth. The antennal spine is long and slender and the small accessory spine on the dactyls of the ambulatory pereiopods is clearly present. The lateral terminal spines of the telson are situated on the dorsal surface immediately anteriorly to the intermediate spines. The endopod of the male first pleopod is slender, about four times longer than broad and with a small medial process on the penultimate quarter of the medial border. The proximal half of the medial border bears a series of fifteen simple spines. The middle third of the lateral border bears six plumose setae. The uropod of the male second pleopod bears a short appendix masculina which is distinctly exceeded by the appendix interna. The appendix masculina bears fourteen slender simple setae on its dorsal aspect and distal extremity.

Measurements. — Carapace length, 5.7 mm.

Host. — *Tridacna* sp.

Remarks. — This species has been previously reported from Male Atoll by Borradaile (1917) who also recorded its occurrence in the Seychelle Islands.

The position of the lateral terminal spines of the telson is in agreement with the information given by Holthuis (1952) and not as in *A. custos* as stated by Kemp (1922). The endopod of the male first pereiopod has not been previously described. The appendix masculina resembles the description given by Kubo (1940) but setae are distinctly more numerous in the present specimen.

Distribution. — Widespread in the Indo-West-Pacific region, extending from the Red Sea to the Gambier Archipelago.

***Platypontonia brevirostris* (Miers, 1884) (fig. 2)**

Pontonia? brevirostris Miers, 1884: 562, pl. 51.

Pontonia brevirostris; Borradaile, 1898: 389; Borradaile, 1917: 390 (key), 391; Kemp, 1922: 260; Holthuis, 1952: 15.

Platypontonia brevirostris; Bruce, 1968a: 289-297, figs. 1-3.

Material examined:

- (1) 1 ♂, 1 ovigerous ♀. North Island, Farquhar Atoll. YSE Stn. 38. Coll. A. J. Kohn. 7 December 1957.
YPM No. 4284.

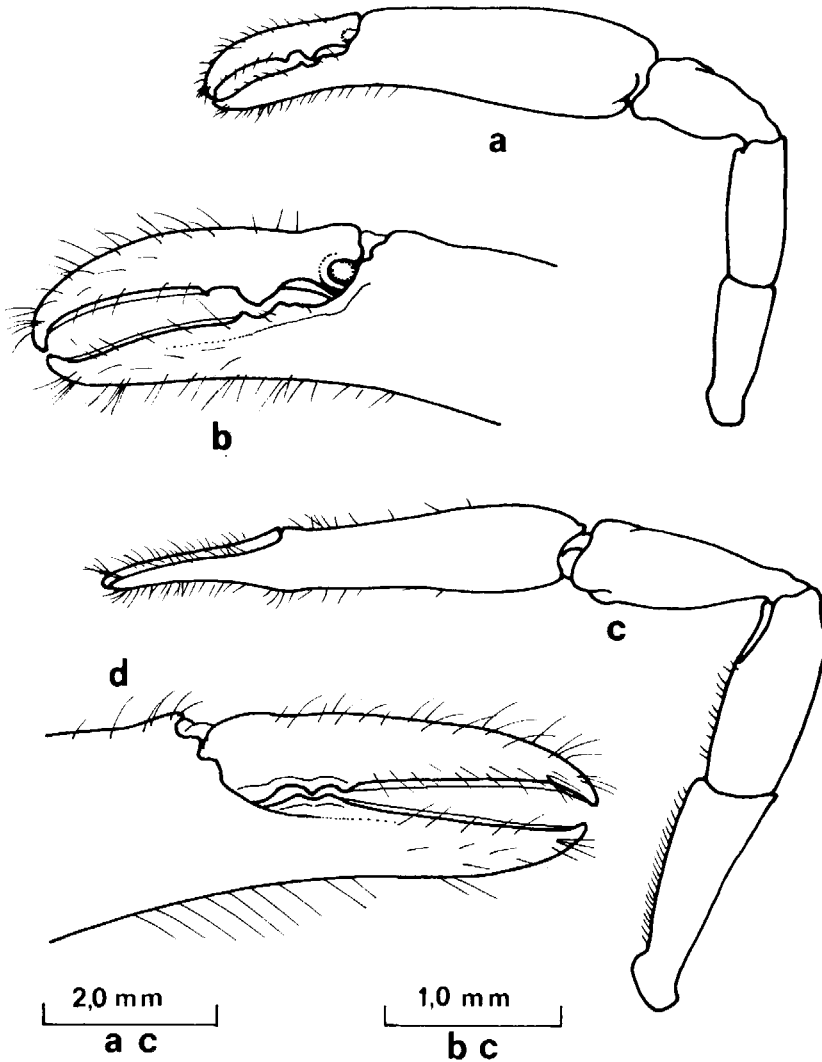


Fig. 2. *Platypontonia brevirostris* (Miers). a, male second pereiopod; b, finger of male second pereiopod; c, female second pereiopod; d, finger of female second pereiopod.

Description. — The specimens are well preserved and almost intact although a few pereiopods are detached. They show a very close resemblance to the redescription of the species (Bruce, 1968) and confirm all important characters.

The body, especially in the female, is distinctly flattened and the lateral border of the carapace is angled just below the level of the antennal spine. In the female

a distinct notch is also present immediately below the antennal spine and above the antero-lateral region of the carapace. The carapace is generally well calcified and robust. The telson spines in the female are basally swollen as in the allotype, a feature that is lacking in the male.

Both specimens have the pair of second pereopods. In the male these are similar, subequal and small, slightly smaller than those of the female. The palm and fingers are slightly flattened, especially distally. The tips of the fingers are slightly hooked and the distal half of the cutting edges is entire. The proximal half of the cutting edge of the fixed finger bears a small acute distal tooth separated by a notch from a series of three small blunt teeth. On the dactylus there is a small tooth at the proximal end of the cutting edge, separated by a deep notch from a large acute tooth that opposes into the notch on the fixed finger. A feebly developed dactylar fossa is also present. The merus and carpus are unarmed. In the female, the chela is generally similar but the teeth are much less well developed.

As in the type specimens the dactylus is long and slender with a distinct unguis. It may be noted also that it is strongly compressed and with numerous setae, especially distally. The propod is devoid of spines.

Measurements. — Carapace length 3.3 mm (♂), 6.1 mm (♀); chela of second pereopod, right 5.2 mm (♂), 5.7 mm (♀); left 4.6 mm (♂), 5.8 mm (♀).

Host. — *Lopha cristagalli* (L.) (Ostreidae).

Remarks. — The rediscovery of this species after eighty-four years provides the first record of a pontoniid shrimp living in association with an ostreid bivalve and at the same time clears up any doubts concerning the identity of the "clamp shells" from which the types were obtained.

The greater diameter of the ovum is 0.52 mm.

In the Indo-West-Pacific region there are now six genera of pontoniid shrimps known to live in association with lamellibranchs, i.e. *Anchistus* Borradaile (Pteriidae, Pinnidae, Pectinidae and Tridacnidae), *Paranchistus* Holthuis (Pinnidae, Tridacnidae), *Conchodytes* Peters (Pinnidae, Pectinidae and Tridacnidae), *Chernocaris* Johnson (Placunidae), and *Platypontonia* Bruce (Ostreidae). Exceptionally, a single species of the genus *Pontonia*, *P. hurii* Holthuis, has been reported in association with spondylid molluscs, but this genus, in the Indo-West-Pacific, is normally associated with tunicates.

Distribution. — The only other known specimens of this species were collected in the Seychelle Islands, at a depth of 12 fm., but the exact locality is unknown.

***Conchodytes tridacnae* Peters, 1852**

Restricted synonymy:

Conchodytes tridacnae Peters, 1852: 594; Holthuis, 1952: 17, 195-199, fig. 95 (partim); Holthuis, 1953: 60; Miyake & Fujino, 1968: 426, 428, 431, fig. 8 (partim).

Material examined:

(1) 1 ♀. Bird Island, Seychelle Islands. YSE Stn. 30. Coll. A. J. Kohn. 5 November 1957. YPM No. 6031.

- (2) 1 ovigerous ♀. Funadu Is., North Male Atoll, Maldive Islands. YSE Stn. 17. Coll. G. P. Melante and J. Blanchard. 20 August 1957. YPM No. 4265.

Description. — In these specimens the carpus of the first pereiopod was distinctly longer than the merus, a character that appears to reliably separate this species from the closely related *C. meleagrinae*, as described by Kemp, 1922.

Measurements. — Carapace lengths (1) 7.4 mm., (2) 10.2 mm.

Host. — *Tridacna* sp.

Remarks. — Many of the records in the literature do not distinguish between this species and *C. meleagrinae*. The details of the distribution are therefore in doubt but both appear to be common and widespread in the Indo-West-Pacific region. The species, however, appears not to have been previously recorded from either the Seychelle or the Maldive Islands.

Distribution. — Probably widespread throughout the Indo-West-Pacific region.

***Conchodytes meleagrinae* Peters, 1852**

Restricted synonymy:

Conchodytes meleagrinae Peters, 1852: 594; Holthuis, 1952: 17, 195-199, fig. 95 (partim); Miyake & Fujino, 1968: 426-428, 431, fig. 8 (partim).

Material examined:

- (1) 1 ♂, 1 ovigerous ♀. Anse la Mouche, Mahé, Seychelle Islands. YSE Stn. 37. Coll. W. D. Hartman. 24 November 1957. YPB No. 6034.
 (2) 12 ♂, 12 ovigerous ♀. North Island, Farquhar Atoll. YSE Stn. 38. Coll. A. J. Kohn. 7 December 1957. YPM No. 4283.

Description. — Closely similar to *C. tridacnae* but generally smaller and with the carpus of the first pereiopod definitely much shorter than the merus, as reported by Kemp, 1922. The relationship in length of these two segments appears constant throughout the range of sizes available in the present material.

Measurements. — Carapace length, (1) ♂, 5.4 mm; ♀, 6.1 mm; (2) ♂, 3.7-6.0 mm; ♀, 6.2-8.0 mm.

Host. — (1) Not recorded. (2) All from *Meleagrina margaritifera*, each host specimen examined reported to have contained a pair of *C. meleagrinae*.

Remarks. — The remarks under *C. tridacnae* also apply to this species. It has been previously recorded from the Seychelle Islands by Borradaile, 1917. The female from the Seychelle Islands carried 811 ova, which had a greater diameter of 0.85 mm.

Distribution. — Probably widespread throughout the Indo-West-Pacific region.

***Harpiliopsis depressus* (Stimpson, 1860)**

Restricted synonymy:

Harpilius depressus Stimpson, 1860: 38.

Harpiliopsis depressus Holthuis, 1952: 16, 182-184, fig. 90; Holthuis, 1953: 57-58; Holthuis, 1958: 10; Patton, 1966: 277, 288, 290, 291, 292, tabs. 1-3.

Material examined:

- (1) 2 ♂, 3 ovigerous ♀, 2 juveniles. Funado Is., North Male Atoll, Maldive Islands. YSE Stn. 17. Coll. G. P. Melante and S. Blanchard. 20 September 1957. YPM No. 4266.

Description. — The seven specimens agree well with previously published descriptions, e.g. Kemp, 1922. The armament of the rostrum shows slight variation, ranging from 5-6/3 in males, and 6-7/4-5 in the ovigerous females to 6/2-3 in the juveniles.

Measurements. — Carapace lengths, ♂ 3.8-4.3 mm; ♀ 3.7-4.1 mm; juveniles 2.6-2.8 mm.

Host. — Live branching coral.

Remarks. — This species has been previously recorded from several localities in the Maldive Islands (Borradaile, 1917, who also reported its occurrence at Coetivy in the Seychelle Islands). The species is an obligatory commensal of branching corals in the Indo-West-Pacific region, where it is found in corals of the family Pocilloporidae. This species also extends into the East Pacific region where it has been reported in association with poritid corals (Holthuis, 1951).

Distribution. — The most widely distributed pontoninid shrimp with a range extending from the Red Sea and Moçambique to Hawaii, to the Galapagos Islands and the Pacific coasts of California, Mexico, Costa Rica, Panama and Colombia (Holthuis, 1951, 1952).

***Jocaste japonica* (Ortmann, 1890)**

Coralliocaris superba var. *japonica* Ortmann, 1890: 509, pl. 36 fig 22.

Coralliocaris japonica Borradaile, 1917: 384, pl. 56 fig. 23.

Jocaste lucina Holthuis, 1952: 17, 193-195, fig. 94 (partim).

Jocaste japonica Patton, 1966: 279-280; Bruce, 1969: 300.

Material examined:

- (1) 1 ovigerous ♀. Funado Is., North Male Atoll, Maldive Islands. YSE Stn. 17. Coll. G. P. Melante and J. Blanchard. 20 September 1957. YPM No. 4266.

Description. — The specimen is intact and readily separable from *J. lucina* Nobili by the characteristics given by Patton, 1966. The rostrum bears four dorsal and two ventral teeth. The upper margin of the orbit is smoothly rounded and not subrectangular and the dactylus of the major second pereopod bears only a single acute tooth on the cutting edge.

Measurements. — Carapace length, 4.7 mm.

Host. — Live branching coral.

Remarks. — The distribution of this species has been confused with that of *J. lucina* until the separation of the two species was clarified by Patton in 1966. Many of the earlier records are in need of re-examination in order to ascertain an accurate picture of the distribution of the two species. Both are normally obligatory commensals of corals of the family Acroporidae.

Distribution. — Widespread, from East Africa and southern Moçambique Channel to Japan, the Marianna Islands and New Guinea.

ACKNOWLEDGMENTS

I would like to express my sincere thanks to Dr. W. D. Hartman, Curator, Division of Invertebrate Zoology, Yale Peabody Museum, for enabling me to study the pontoniid shrimps collected by the Yale Seychelles Expedition. I am also grateful to Dr. M. Downey and Dr. A. J. Kohn for the identification of some of the hosts.

RÉSUMÉ

Une petite collection de dix espèces de crevettes pontoniinides récoltée par l'Expédition Yale-Seychelles en 1957-1958, principalement près des Iles Seychelles et des Iles Maldives, est décrite. La plupart des espèces décrites sont des espèces bien connues dans la région Indo-Ouest-Pacifique, et d'une large distribution. La collection est rendue très intéressante par la découverte de quelques nouveaux spécimens de la rare crevette *Platypontonia brevirostris* (Miers), qui n'était connue jusqu'à présent que par les specimens-types découvertes aux Seychelles en 1884. L'hôte de cette crevette est identifié pour la première fois: le bivalve ostréide *Lopha cristagalli* (L.).

LITERATURE CITED

- BARNARD, K. H., 1950. Descriptive catalogue of South African decapod Crustacea. *Ann. S. Afr. Mus.*, 38: 1-837, figs. 1-154.
- , 1955. Additions to the fauna-list of South African Crustacea and Pycnogonida. *Ann. S. Afr. Mus.*, 43: 1-107, figs. 1-53.
- BORRADAILE, L. A., 1898. On some crustaceans from the South Pacific, 3. *Macrura*. *Proc. zool. Soc. London*, 1898: 1000-1015, pls. 63-65.
- , 1915. Notes on carides. *Ann. Mag. nat. Hist.*, (8) 15: 205-213.
- BRUCE, A. J., 1965. Notes on Indo-Pacific Pontoniinae, 10. *Periclimenes cristimanus* sp. nov., a new pontoniid shrimp from Singapore. *Ann. Mag. nat. Hist.*, (13) 8: 487-493, figs. 1-2.
- , 1967. Notes on some Indo-Pacific Pontoniinae, 3-9. Descriptions of some new genera and species from the western Indian Ocean and South China Sea. *Zool. Verh., Leiden*, 87: 1-73, figs. 1-29.
- , 1968. A report on some pontoniid shrimps from New Caledonia (Crustacea, Decapoda Natantia). *Bull. Mus. nation. Hist. nat. Paris*, (2) 39: 1148-1171, figs. 1-10.
- , 1968a. Notes on some Indo-Pacific Pontoniinae, 12. The re-examination of the types of *Pontonia? brevirostris* Miers, 1884, with the designation of a new genus, *Platypontonia* (Decapoda Natantia). *Crustaceana*, 15: 289-297, figs. 1-3.
- , 1969. Observations upon the host specificity and distribution of *Jocaste japonica* (Ortmann) and *Jocaste lucina* (Nobili). *Crustaceana*, 17 (3): 298-302.
- GORDON, I., 1939. Redescription of *Periclimenes soror* Nobili (Crustacea Decapoda). *Ann. Mag. nat. Hist.*, (11) 4: 395-400, figs. 1-3.
- HOLTHUIS, L. B., 1951. A general revision of the Palaemonidae (Crustacea, Decapoda Natantia) of the Americas, 1. The subfamilies Euryrhynchinae and Pontoniinae. *Occ. Pap. Allan Hancock Fnd.*, 11: 1-332, pls. 1-63.
- , 1952. Sub-family Pontoniinae. The Palaemonidae collected by the Siboga and Snellius Expeditions with remarks on other species, 2. The Decapoda of the Siboga Expedition, XI. *Siboga Exped. Mon.*, 39(a¹⁰): 1-253, figs. 1-110, tab. 1.
- , 1953. Enumeration of the decapod and stomatopod Crustacea from Pacific Coral Islands. *Atoll Res. Bull.*, 24: 1-66.
- JACQUOTTE, R., 1964. Notes de faunistique et de biologie marines de Madagascar, 2. Décapodes nageurs associés aux échinodermes dans la région de Tuléar (sud-ouest de Madagascar). *Rec. Trav. St. mar. Endoume*, 32: 179-182.
- JOHNSON, D. S., 1961. A synopsis of the decapod Caridea and Stenopodidea of Singapore with notes on their distribution and a key to the genera of Caridea occurring in Malayan waters. *Bull. nation. Mus. Singapore*, 30: 44-79, pl. 1.

- JOHNSON, D. S. & M. LIANG, 1966. On the biology of the Watchman Prawn, *Anchistus custos* (Crustacea: Decapoda: Palaemonidae), an Indo-West-Pacific commensal of the bivalve *Pinna*. Journ. Zool. London, **150**: 433-455, figs. 1-10.
- KEMP, S., 1922. Notes on Crustacea Decapoda in the Indian Museum, 15. Pontoniinae. Rec. Indian Mus., **24**: 113-228, figs. 1-105, pl. 3-9.
- KUBO, I., 1940. Studies on Japanese palaemonoid shrimps, 2. Pontoniinae. Journ. imp. Fish. Inst. Tokyo, **34**: 31-75, figs. 1-36.
- LENZ, H., 1905. Ostafrikanische Dekapoden und Stomatopoden gesammelt von Herrn Prof. Dr. A. Voeltzkow. In: A. VOELTZKOW, Wissenschaftliche Ergebnisse der Reisen in Madagaskar und Ostafrika in den Jahren 1889-95, 3. Abh. Senckenb. naturf. Ges., **27**: 341-392, pls. 47-48.
- MACNAE, W. & M. KALK, 1962. The fauna and flora of sand flats at Inhaca Island, Mocambique. Journ. anim. Ecol., **31**: 93-128, figs. 1-5.
- MAN, J. G. DE, 1888. Report on the podophthalmous Crustacea of the Mergui Archipelago, collected for the trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. Journ. Linn. Soc., Lond. (Zool.) **22**: 1-312, pls. 1-19.
- MCNEILL, F. A., 1968. Crustacea, Decapoda and Stomatopoda. Sci. Rep. Great Barrier Reef Expedition, 1928-29, **7** (1): 1-98, figs. 1-2, pls. 1-2.
- MIERS, E. J., 1884. Crustacea. Report of the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert", 1881-2: 178-322, 513-575, pls. 18-36, 46-52.
- MIYAKE, S. & T. FUJINO, 1968. Pontoniid shrimps from the Palau Islands (Crustacea, Decapoda, Palaemonidae). Journ. Fac. Agr. Kyushu imp. Univ., **10**: 399-431, figs. 1-8.
- NOBILI, G., 1904. Diagnoses préliminaires de vingt-huit espèces nouvelles de Stomatopodes et Décapodes Macroures de la Mer Rouge. Bull. Mus. Hist. nat. Paris, **10**: 228-238.
- ORTMANN, A., 1890. Die Unterordnung Natantia Boas. Die Decapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei den Liu-Kiu Inseln gesammelten und z.Z. im Strassburger Museum aufbewahrten Formen, 1. Zool. Jb. Syst. **5**: 437-452, pls. 36, 37.
- PATTON, W. K., 1966. Decapod Crustacea commensal with Queensland branching corals. Crustaceana, **10**: 271-295, figs. 1-3.
- PETERS, W., 1852. Conchodytes, eine neue in Muscheln lebende Gattung von Garneelen. Ber. Verh. Akad. Wiss. Berlin, 1852: 588-595.
- SCHENKEL, E., 1902. Beitrag zur Kenntnis der Dekapodenfauna von Celebes. Verh. naturf. Ges. Basel, **13**: 485-585, pls. 7-13.
- STIMPSON, W., 1860. Prodromus descriptionis animalium evertibratorum, quae in expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, C. Ringgold et J. Rodgers ducibus, observavit et descripsit. Proc. Acad. nat. Sci. Philadelphia, **12**: 22-48.