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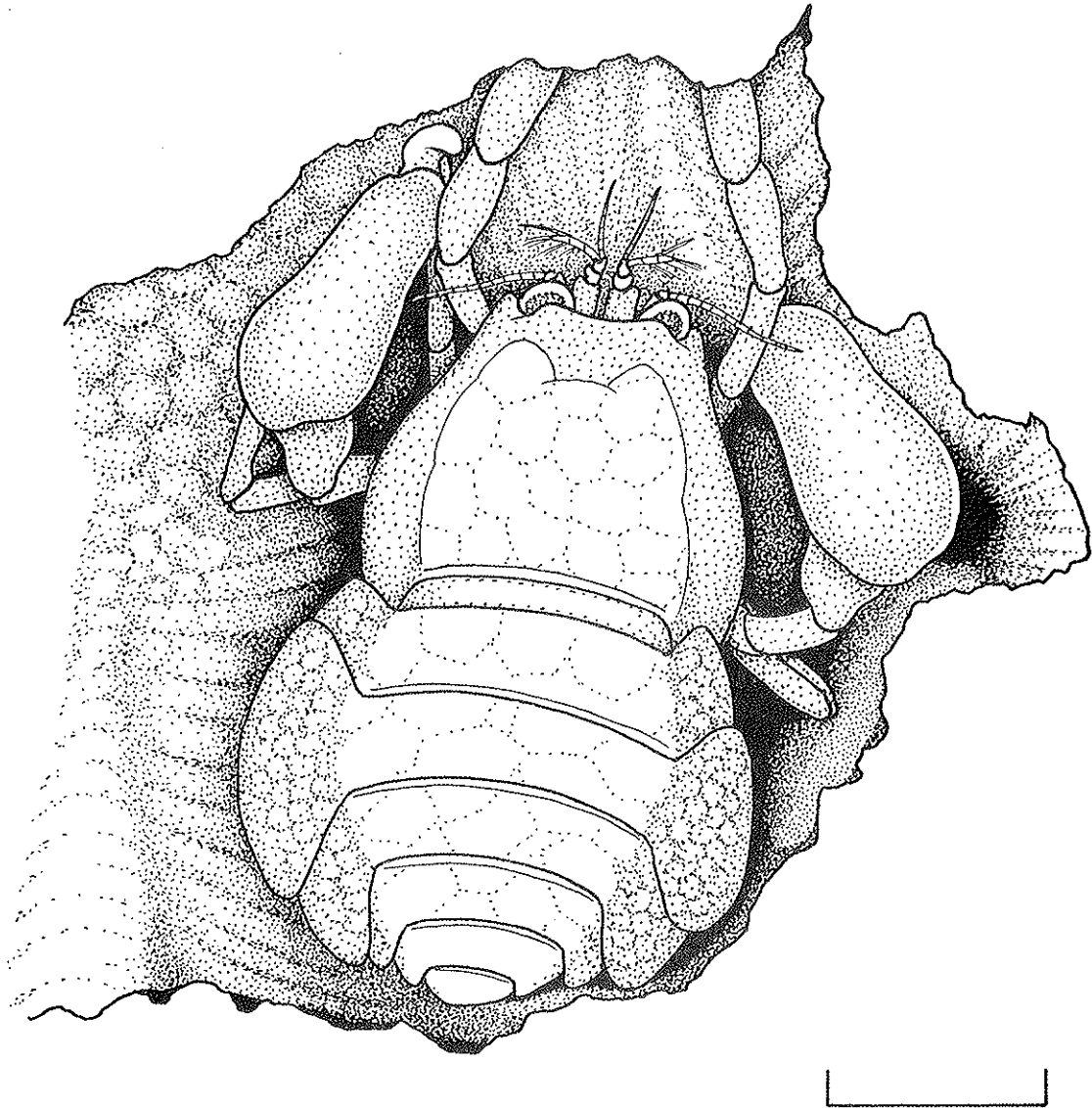
**THE HOSTS OF THE CORAL-ASSOCIATED INDO-  
WEST-PACIFIC PONTONINE SHRIMPS**

**by A. J. Bruce**

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Paratypton siebenrocki Balss



Ovigerous female in situ in cyst in Acropora host coral, Mombasa, Kenya. Drawn from colour transparency, scale approximately 2 mm.

## THE HOSTS OF THE CORAL-ASSOCIATED INDO-WEST-PACIFIC PONTONINE SHRIMPS

by

A. J. Bruce<sup>1</sup>

Many of the shrimps belonging to the subfamily Pontoniinae Kingsley live in permanent obligatory association with scleractinian corals in the Indo-West Pacific region. These shrimps are abundant on most coral reefs and represent a major component of the diversity of the caridean fauna.

Borradaile (1917) mentioned briefly that shrimps of the genera *Harpiliopsis*, *Coralliocaris* and *Harpilius* (→*Periclimenes* spp., *Philarius* spp.) are adapted to life amongst the branches of coral colonies but provided no details. Kemp (1922) provided a list of associations of the Pontoniinae with corals, including again *Coralliocaris*, *Harpilius*, (in which he included *Harpiliopsis*), and *Periclimenes diversipes*, together with *P. spiniferus*, a free-living species frequently found in live or dead coral colonies. Holthuis (1952), in the report on the Pontoniinae collected by the Siboga and Snellius Expeditions, provided further details in tabular form of the species then considered to be associates of corals. The decapod fauna of the Queensland branching corals was analysed by Patton (1966), who added particularly to knowledge of the shrimps associated with the Pocilloporidae. The Proceedings of the Coral and Coral Reef Symposium, 1969, at Mandapam, included a review of the coral associations then known of the Indo-West Pacific Pontoniinae, with a key for their identification, and with further details of the *Acropora* host-species involved, (Bruce, 1972a).

The following report provides information on the coral species known to act as hosts for the obligatory shrimp associates. A number of other species may frequently be found when coral colonies are examined, i.e. *Palaemonella* spp. specially *P. rotumana* (Borradaile) and *Periclimenes petitthouarsi* (Audouin), and *P. spiniferus* De Man, and probably other related species. These species are free-living micro-predators or browsers. The exact identification of the hosts of some

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rare species, for example *Philarius lifuensis* (Borradaile), have yet to be ascertained, and it is probable that many more hosts of the known shrimp species, as well as new shrimps associated with new hosts, remain to be discovered.

#### SYSTEMATIC ACCOUNT

PALAEMONIDAE, Samouelle, 1819.

Pontoniinae, Kingsley, 1878.

##### 1. *Vir orientalis* (Dana)

Restricted synonymy:

*Vir orientalis*- Bruce, 1972, 64, 65-67, fig.1.

- Hosts. *Pocillopora damicornis* (L.) (Bruce, 1972a; 1972b).  
*Pocillopora verrucosa* (Lam.) (Bruce, in press e).  
*Stylophora erythraea* von Marenzeller (Bruce, 1972a).  
*Stylophora pistillata* (Esper,) (Bruce, 1972a).  
*Acropora* sp. (Bruce, in press, d, h).

Distribution. Sparsely recorded throughout the Indo-West Pacific region from East Africa to Hawaii.

Remarks. A small species that is easily overlooked and usually only present in small numbers in a host colony.

##### 2. *Periclimenes amymone* De Man

Restricted synonymy:

*Periclimenes amymone*- Holthuis, 1972, 10, 82-83, fig.32.

- Hosts. *Pocillopora damicornis* (L.) (Patton, 1966, 1974).  
*Stylophora mordax* (Dana) (Patton, 1966).  
*Stylophora pistillata* (Esper.) (Patton, 1966).  
*Seriatopora hystrix* (Dana) (Patton, 1966).  
*Acropora cymbicyathus* (Brooks) (Bruce, 1972a).  
*Acropora digitifera* (Dana) (Bruce, 1972a).  
*Acropora diversa* (Dana) (Bruce, 1972a).  
*Acropora eurystoma* (Klunz.) (Bruce, 1972a).  
*Acropora hyacinthus* (Dana) (Bruce, 1972a).  
*Acropora kenti* (Brook) (Bruce, 1972a).  
*Acropora sarmentosa* (Brook) (Bruce, 1972a).  
*Acropora syringodes* (Brook) (Bruce, 1972a).  
*Acropora tenuis* (Dana) (Bruce, 1972a).

Distribution. From Singapore and Djakarta in the west to Samoa in the east; not recorded from the Indian Ocean.

Remarks. One of the few commensal shrimps that is found commonly in both acroporid and pocilloporid coral hosts, where it is usually present on the outer branches.

##### 3. *Periclimenes consobrinus* De Man

Restricted synonymy:

*Periclimenes (Harpilius) lutescens*- Holthuis, 1952, 12, 88-91, fig.35 (partim).

*Periclimenes consobrinus* - Bruce, 1975, 27, fig.16.

Hosts. *Pocillopora hemprichi* (Ehrenberg) (Bruce, 1971, as *P. lutescens*).  
*Pocillopora damicornis* (L.) (Bruce, in press e).

Distribution. Due to confusion with the closely related *P. lutescens* auct. this species is known with certainty only from Ternate, Indonesia; the Comoro Islands, and Mombasa, Kenya.

Remarks. Bruce (1971) recorded the association of *P. lutescens* auct. with *Pocillopora hemprichi* in the Comoro Islands. At that time *P. consobrinus* was considered to be a synonym of *P. lutescens*, and the subsequent re-examination of the specimen showed that it should be correctly referred to *P. consobrinus* on account of the characteristic morphology of the second maxilliped (Bruce, 1972a, fig. 1b). This species is moderately common in the fringing lagoons of central East Africa, in *Pocillopora* sp., often also in association with *Harpiliopsis beaupresi*, *H. depressus* and *H. spinigerus*. It has not so far been found on any other host genus.

#### 4. *Periclimenes lutescens* auct.

Restricted synonymy:

*Periclimenes (Harpilius) lutescens* - Holthuis, 1952, 12, 88-91, fig.35 (partim). Patton, 1966, 275, 288, tab.1. 290 tab.2.

*Periclimenes lutescens* - Bruce, 1971:2, 5; 1972a: 404, 405, 406, 407, 409, 410 fig.1a, 412 (key); 1975:27, fig.15.

Hosts. *Seriatopora hystrix* (Dana) (Patton, 1966).

*Acropora convexa* (Dana) (Bruce, 1972a).

*Acropora humilis* (Dana) (Bruce, 1972a).

*Acropora kenti* (Brooks) (Bruce, 1972a).

*Acropora paniculata* Verrill (Bruce, 1972a).

*Acropora squarrosa* (Ehrenberg) (Bruce, in press, d).

*Acropora surculosa* (Dana) (Bruce, 1973).

*Acropora tubicinaria* (Dana) (Bruce, in press, e).

Distribution. Widespread throughout the Indo-West Pacific region from the Red Sea to Madagascar, as far east as Tonga and Samoa, possibly extending to Tahiti and the Marquesas Islands.

Remarks. As noted under *P. consobrinus*, the report of an association of *P. lutescens* with *Pocillopora* in Bruce (1971) is erroneous. This species is commonly found in association with *Jocaste* and *Coralliocaris* spp. The association of three specimens with *Seriatopora hystrix* reported from Heron Island by Patton (1966) is most unusual.

#### 5. *Periclimenes parvus* Borradaile

Restricted synonymy:

*Periclimenes parvus* Borradaile, 1898:384; 1899:407, pl.36, fig.3.

Hosts. Unidentified.

Distribution. Known only from New Britain, the Makassar Straits and Singapore.

Remarks. The association of this species appears uncertain. Johnson (1961) notes that a single specimen from the Raffles Light, Singapore, in the Bedford Lanchester collection, was obtained from "outer coral" at very low tide. *Periclimenes parvus* possesses a biunguiculate dactylus on the ambulatory pereopods (Holthuis, 1952), a feature that

is not found in any other coral associated pontonine shrimp, and which suggests that the association may have been accidental. In coral-associated pontonine shrimps this dactylus is generally robust and simple, except in *Fennera*, *Jocaste* and *Coralliocaris*, in which a basal process is present.

6. *Periclimenes diversipes* Kemp

Restricted Synonymy:

*Periclimenes (Ancylocaris) diversipes* Kemp, 1922:117, 169 (key), 179-184, figs. 36-39 (partim).

- Hosts. *Psammocora togianensis* Umbgrove (Bruce, 1972a).  
*Pocillopora damicornis* (L.) (Bruce, in press, e).  
*Stylophora erythraea* von Marenzeller (Bruce, 1972a).  
*Seriatopora* sp. (Bruce, 1971).  
*Acropora tenuis* (Dana) (Bruce, 1972a).  
*Acropora variabilis* (Klunzinger) (Bruce, in press, e).  
*Montipora circumvallata* (Ehrenberg) (Bruce, 1971).  
*Montipora prolifera* Breuggemann  
*Pavona danai* (M.-Edw. & Haime) (Bruce, 1972a).  
*Porites nigrescens* (Dana) (Bruce, in press, e).  
*Porites iwayamanensis* Eguchi (Bruce, 1972a).  
*Porites* sp.nov. cf. *andrewsi* (Bruce, 1972a).  
*Galaxea clavus* (Dana) (Bruce, 1972c).

Distribution. Common in the Indian Ocean; from the Red Sea to Madagascar. Also recorded from the Australian Great Barrier Reef on *Acropora* sp. (Patton, 1966).

Remarks. The least host-specific of the pontonine coral associates, with hosts belonging to nine different genera.

7. *Periclimenes madreporae* Bruce

Restricted synonymy:

*Periclimenes madreporae* Bruce, 1969:262-263, 264; 1972a:403, 404, 405, 406, 407, 409, 410, 413 (key). - Patton, 1974:221, 223-226 tab.1, 231, 239, 241 fig.1.  
*Periclimenes (Harpilius) inornatus* Patton, 1966:274-275, 288 tab.2, 291 tab.3, fig.2. - Miyake & Fujino, 1968 400, 402 (key) 413-414, fig.3 g-h, 431 tab.1.

- Hosts. *Pocillopora damicornis* (L.), (Patton, 1966).  
*Pocillopora verrucosa* (Ellis & Solander) (Patton, 1966).  
*Seriatopora hystrix* (Dana), (Patton, 1966).  
*Stylophora mordax* (Dana), (Bruce, 1972a).  
*Stylophora pistillata* (Esper.), (Patton, 1966).  
*Acropora corymbosa* (Lam.), (Bruce, 1972a).  
*Acropora cuneata* (Dana), (Bruce, 1972a).  
*Acropora digitifera* (Dana), (Bruce, 1972a).  
*Acropora nasuta* (Dana), (Bruce, 1972a).  
*Acropora rotumana* (Gardiner), (Bruce, 1972a).  
*Turbinaria* sp., (Bruce, 1972a).

Distribution. NE Australia, and Palau Islands only.

Remarks. The only caridean so far found in association with corals of the genus *Turbinaria*.

8. *Periclimenes holthuisi* Bruce

Restricted synonymy:

*Periclimenes holthuisi* Bruce, 1969:258-259.

Hosts. *Fungia actiniformis* Quoy & Gaimard.

Distribution. Zanzibar, Seychelle Is., Hong Kong, New Caledonia, and N.E. Australia.

Remarks. This species has generally been found in association with actinarians, but it has also been found with scyphozoans (Bruce, 1972d). A pair of specimens were collected from the host at a depth of 60 ft. at Krantet Is., Madang, New Guinea, on 13-9-73 by J.E. Randall and R. Steene.

9. *Periclimenes mahei* Bruce

Restricted synonymy:

*Periclimenes mahei* Bruce, 1969:263-264; 1971:2, 11.

Hosts. *Pocillopora elongata* (Dana), host of type material, (Bruce, 1972a).

*Seriatopora hystrix* (Dana), (Bruce, 1971).

*Acropora corymbosa* (Lam.), (Bruce, in press, e).

Distribution. Known only from the Seychelle and Comoro Islands and Zanzibar.

Remarks. This species appears to occupy the same niche in the western Indian Ocean as *P. madreporae* does in the western Pacific Ocean.

10. *Periclimenes difficilis* Bruce

*Periclimenes difficilis* Bruce, (in press, e).

Hosts. *Porites nigrescens* Dana.

Distribution. Known only from the type locality on Praslin, Seychelle Islands.

Remarks. Closely related to *P. diversipes*, which is the only other species of this genus known to associate with corals of the genus *Porites*.

11. *Periclimenes kororensis* Bruce

*Periclimenes kororensis* Bruce, (in press, f).

Hosts. *Fungia actiniformis* Quoy & Gaimard.

Distribution. Known only from the type locality on Koror, Palau Islands.

Remarks. A rather aberrant species of *Periclimenes*, known only from the incomplete holotype specimen.

12. *Periclimenes goniopora* Bruce

*Periclimenes goniopora* Bruce, (in press, b).

Hosts. *Goniopora stokesi* Milne Edwards & Haime.

*Lobophyllia* sp.

Distribution. Known only from fringing lagoons of southern Kenya.

Remarks. Closely related to *P. mahei* and *P. diversipes*, but appears to be specially associated with the genus *Goniopora*.

13. *Philarius gerlachei* (Nobili)

Restricted synonymy:

*Harpilius gerlachei* Kemp, 1922:299 (key), 238-239, figs.74-75.

Hosts. *Acropora corymbosa* (Lam.), (Bruce, in press, e).  
*Acropora cymbicyathus* (Brooks)  
*Acropora digitifera* (Dana), (Bruce, 1972a)  
*Acropora formosa* (Dana), (Bruce, 1972a).  
*Acropora humilis* (Dana), (Bruce, 1972a).  
*Acropora hyacinthus* (Dana), (Bruce, 1972a).  
*Acropora nana* (Studer), (Bruce, 1972a).  
*Acropora surculosa* (Dana), (Bruce, 1973).

Distribution. From the Red Sea, East Africa and Madagascar to the Marshall, Gilbert and Samoan Islands.

Remarks. Distinctly less common, in the *Acropora* hosts, than *Jocaste* or *Coralliocaris* species.

14. *Philarius imperialis* (Kubo)

Restricted synonymy:

*Harpilius imperialis* Kubo, 1940: 1-4, figs. 1-3.

Hosts. *Acropora* spp., (Bruce, 1972a).

Distribution. From the Red Sea to Zanzibar, as far east as the Palau and Marshall Islands.

Remarks. Generally uncommon; particularly in comparison with *Jocaste* and *Coralliocaris* spp. Usually found right at the very innermost bases of the branches of the coral hosts, often on the floor of the grooves between branches. The colour pattern of this species shows the closest resemblance to the illustration given by Dana (1855, pl.37 fig.4) of *Harpilius lutescens*. This species is apparently found in a variety of *Acropora* host species, but none have been identified to specific level.

15. *Philarius lifuensis* (Borradaile)

Restricted synonymy:

*Periclimenes lifuensis* Borradaile, 1898:384; 1899:405, pl.36 fig.1.

Hosts. *Acropora* sp. (Bruce, 1972a).

Distribution. Recorded only from the type locality in the Loyalty Islands.

Remarks. The rarest species of this genus. Additional material has also been recently obtained from Heron Island and Erskine Island, Queensland, Australia.

16. *Hamopontonia corallicola* Bruce

Restricted synonymy:

*Hamopontonia corallicola* Bruce, 1970: 38-48, figs. 1-4.

Hosts. *Fungia actiniformis* Quoy & Gaimard, (Bruce, in press, c).

*Goniopora stokesi* Milne-Edwards & Haime (Bruce, 1970).

Distribution. Known only from Hong Kong and Queensland Australia.

Remarks. The colouration of specimens found in association with the *Fungia* is generally similar to that of the type material on *Goniopora*, although the specimens are distinctly larger in size. Mortensen (1925, in: Balss, 1956) refers to a shrimp from the Kei Islands, which lives among the white tipped tentacles of a *Fungia* coral, and which is colourless with two white spots on carapace, which almost certainly belongs to this species.



17. *Ischnopontonia lophos* (Barnard)

Restricted synonymy:

*Philarius lophos* Barnard, 1962:242-243, fig.2.

*Ischnopontonia lophos*-Bruce, 1966:585-597, figs. 1-5.

Hosts. *Galaxea fascicularis* (L.), (Bruce, 1966).

Distribution. Common in the western Indian Ocean; also Singapore; Pulau Perhentian Besar, Malaysia and Queensland, Australia.

Remarks. This species apparently strictly associated with this single coral host type, where it is often found with *Platycaris latirostris* and occasionally with *Anapontonia denticauda*. The species is remarkable for its particularly strongly bilaterally compressed body form, and it moves actively in the spaces between the host corallites.

18. *Anapontonia denticauda* Bruce

Restricted synonymy:

*Anapontonia denticauda* Bruce, 1967:8-12, figs.1-4.

Hosts. *Galaxea fascicularis* (L.), (Bruce, 1967)

Distribution. Known only from Zanzibar; Singapore; Pulau Perhentian Besar, Malaysia and Queensland, Australia.

Remarks. Of the three species of pontonine shrimps restricted to this host, *Anapontonia denticauda* is the least common.

19. *Metapontonia fungiacola* Bruce

Restricted synonymy:

*Metapontonia fungiacola* Bruce, 1967:24-30, figs.9-12.

Hosts. *Fungia* spp. (Bruce, 1967).

*Halomitra* sp. (Bruce, in press, h).

*Hydnophora microconus* Lam. (Bruce, 1972e).

*Goniastrea pectinata* (Ehrenberg) (Bruce, 1974b).

Distribution. Known only from the western Indian Ocean: Kenya, Tanganyika and the Comoro and Seychelle Islands.

Remarks. One of the smallest pontonine shrimp species. The species of *Fungia* with which this shrimp has been found to associate have so far not included *Fungia actiniformis*, which does not occur in the region where *M. fungiacola* has been found.

20. *Platycaris latirostris* Holthuis

Restricted synonymy:

*Platycaris latirostris* Holthuis, 1952:16, 173-176, figs. 85-86.

Hosts. *Galaxea fascicularis* (L.) (Bruce, 1966).

Distribution. Common in the western Indian Ocean; Flores, Indonesia.

Remarks. This species appears to be strictly associated with this single host species. It is remarkable for its strongly depressed body form. It is sluggish in behaviour, resting in a head down position on the corallites.

21. *Paratypton siebenrocki* Balss

Restricted synonymy:

*Paratypton siebenrocki* - Bruce, 1969:171-185, figs. 1-5, pl.1 a-c.

- Hosts. *Acropora hyacinthus* (Dana) (Bruce, 1972).  
*Acropora massawensis* von Marenzeller (Bruce, in press, e).  
*Acropora palmerae* Wells (Bruce, 1972a).  
*Acropora squamosa* Brook (Bruce, 1972a).  
*Acropora squarrosa* (Ehrenberg) (Bruce, 1972a).  
*Acropora variabilis* (Klunzinger) (Bruce, 1974b).

Distribution. Recorded from the Red Sea, Kenya, Tanganyika and Zanzibar, the Seychelle Islands, Marshall and Samoan Islands and Heron Island, Australia.

Remarks. This species is remarkable for its habit of living in pairs in small cysts completely enclosed by the host's corallum with only a few minute apertures connecting the chamber with the exterior.

## 22. *Fennera chacei* Holthuis

Restricted synonymy:

*Fennera chacei* Holthuis, 1951: 171-178, pl.54 a-p. Bruce, 1965: 80-82, fig.1; 1974b: 195, fig.4.

- Hosts. *Pocillopora verrucosa* (Ellis & Solander), (Patton, 1966).  
*Pocillopora eydouxi* Milne-Edwards & Haime, (Bruce, 1965).

Distribution. Kenya, Maldives and Seychelle Islands and Willis Island, off NE Australia.

Remarks. One of the smallest pontonine shrimps. It may be found on the same host colonies with *Harpiliopsis depressus* and *H. spinigerus*. Originally discovered in the eastern Pacific region on the shores of Mexico, Costa Rica, Panama and Colombia, on *Porites*.

## 23. *Harpilius beaupresi* (Audouin)

Restricted synonymy:

*Harpiliopsis beaupresi* Borradaile, 1917: 324, 379, pl.55, fig.21. Kemp, 1922: 229-231, figs. 67-68.

- Hosts. *Pocillopora acuta* Lamarck, (Bruce, 1972a).  
*Pocillopora damicornis* (L.) (Patton, 1966).  
*Pocillopora danae* (Verrill), (Bruce, 1972a).  
*Pocillopora elongata* (Audouin), (Bruce, 1972a).  
*Pocillopora eydouxi* Milne-Edwards & Haime, (Bruce, 1972a).  
*Pocillopora verrucosa* (Ellis & Solander), (Patton, 1966).  
*Pocillopora woodjonesi* Vaughan, (Bruce, 1972a).  
*Seriatopora hystrix* (Dana), (Patton, 1966).  
*Stylophora erythraea* von Marenzeller, (Bruce, 1972a).  
*Stylophora mordax* (Dana), (Bruce, 1972a).  
*Stylophora palmata* (Blainville), (Bruce, 1974b).  
*Stylophora pistillata* (Esper.), (Bruce, 1972a).  
*Acropora variabilis* (Klunzinger), (Bruce, 1972a).

Distribution. Widespread throughout the Indo-West Pacific region from the Red Sea to Mocambique and Madagascar as far east as Hawaii; also extending into the East Pacific region.

Remarks. One of the commonest pontonine coral commensals, frequently found in association with *H. depressus* and *H. spinigerus*.

24. *Harpiliopsis depressus* (Ortmann)

Restricted synonymy:

*Harpilius depressus* Stimpson, 1860:38. Kemp, 1922:228 (key), 231-234, figs. 69-70.

*Harpiliopsis depressus* Borradaile, 1917: 379 (key), 380.

Holthuis, 1951:70-75, pls.21-22; 1952:16, 182-184, fig.90.

- Hosts. *Pocillopora damicornis* (L.) (Bruce, 1972a)\*  
*Pocillopora elongata* Dana, (Bruce, 1972a).  
*Pocillopora eydouxi* Milne-Edwards & Haime, (Bruce, 1972a).  
*Pocillopora ligulata* (Dana), (Chace, 1937).  
*Pocillopora meandrina* var. *nobilis* Verrill (Castro, 1971).  
*Pocillopora verrucosa* (Ellis & Solander), (Patton, 1966)\*  
*Pocillopora woodejonesii* Vaughan (Bruce, 1972a).  
*Seriatopora angulata* Klunzinger, (Bruce, 1972a).  
*Seriatopora hystrix* (Dana), (Patton, 1966).  
*Stylophora mordax* (Dana) (Patton, 1966).  
*Stylophora pistillata* (Esper.), (Patton, 1966).  
*Acropora* sp. (Bruce, 1972a).  
*Porites* sp. (Holthuis, 1951).

Distribution. Widespread throughout the whole Indo-West Pacific region from the Red Sea to Madagascar as far east as Hawaii and in the East Pacific to the Galapagos Islands, California, Mexico, Costa Rica, Panama and Colombia.

Remarks. One of the commonest pontonine coral commensals, frequently found in mixed association with *H. beaupresi* and *H. spinigerus*. Juveniles of this species have also been collected on one occasion from a colony of the hydrozoan *Millepora* sp. There has been considerable confusion in the zoological literature between this species and *H. spinigerus* and many of the records are of dubious value. Those indicated with an asterisk have been recently confirmed. The *P. ligulata* record is from the East Pacific region.

25. *Harpiliopsis spinigerus* (Ortmann)

Restricted synonymy:

*Anchistus spinigerus* Ortmann, 1890:511, pl.36 fig.23.

*Harpilius depressus* var. *gracilis* Kemp, 1922:228 (key), 234-235, fig.71.

*Harpiliopsis depressus* var. *spinigerus* Holthuis, 1952:16 184-185.

*Harpiliopsis spinigerus* Bruce, 1974:224; (in press, d).

- Hosts. *Pocillopora eydouxi* Milne-Edwards & Haime, (Bruce, in press, j).  
*Pocillopora verrucosa* (Ellis & Solander), (Bruce, 1974).  
*Stylophora mordax* (Dana), (Bruce, in press, d).  
*Stylophora palmata* (Blainville), (Bruce, in press, e).  
*Stylophora pistillata* (Esper.), (Bruce, in press, e).

Distribution. Known with certainty only from Kenya, Farquhar Island, the Andaman Islands, Celebes and Samoa.

Remarks. Some of the host records given under *H. depressus* probably refer to this species, which appears to be common and widespread probably throughout the whole Indo-West Pacific region.

26. *Cavicheles kempi* Holthuis

Restricted synonymy:

*Cavicheles kempi* Holthuis, 1952:17, 205-208, figs. 99-101.  
Bruce, 1966:266-269, figs.1-2.

Hosts. *Acropora* sp., (Bruce, 1966; in press, h).Distribution. Recorded only from Halmahera, the Molucca Archipelago; Kenya, Zanzibar and Tanganyika; and the Comoro Islands.Remarks. The East African and Comoro Islands material was found in *Acropora* colonies generally in association with numerous specimens of *Jocaste* spp. and it is considered probable that this species is a post-larval or early juvenile of *J. japonica* (Ortmann).27. *Jocaste japonica* (Ortmann)

Restricted synonymy:

*Jocaste japonica*-Patton, 1966:279-280, 288 tab.1, 290 tab.2,  
fig.3b. Bruce, 1974b:198-199, fig.7.

Hosts. *Pocillopora damicornis* (L.), (Bruce, 1972a).*Acropora abrotanoides* (Lam.), (Bruce, in press, e).*Acropora assimilis* (Brook), (Bruce, in press, e).*Acropora convexa* (Quelch), (Bruce, 1972a).*Acropora corymbosa* (Lam.), (Bruce, in press, e).*Acropora digitifera* (Dana), (Bruce, 1972a).*Acropora disticha* (Brook), (Bruce, in press, e).*Acropora diversa* (Dana), (Bruce, 1972a).*Acropora haimei* (Milne-Edwards & Haime), (Bruce, 1972a).*Acropora humilis* (Dana), (Bruce, 1972a).*Acropora massawensis* (von Marenzeller), (Bruce, in press, e).*Acropora nana* (Studer), (Bruce, 1972a).*Acropora nasuta* (Dana), (Bruce, 1972a).*Acropora pectinata* (Brook), (Bruce, in press, h).*Acropora rotumana* (Gardiner), (Bruce, 1972a).*Acropora spicifera* (Dana), (Bruce, in press, h).*Acropora squamosa* (Brook), (Bruce, 1972a).*Acropora squarrosa* (Ehrenberg), (Bruce, in press h).*Acropora surculosa* (Dana), (Bruce, 1973).*Acropora valida* (Dana), (Bruce, in press e).*Acropora variabilis* (Klunzinger), (Bruce, 1972a, 1974b).Distribution. Widespread throughout most of the Indo-West Pacific region, but not recorded from the Red Sea, Arabian Sea or Bay of Bengal, nor east of the Marshall Islands.Remarks. Some reports of *J. lucina* may refer to this species. The reference to an association of this shrimp with *Acropora tenuis*, (Bruce, 1972a) was erroneous due to misidentification. As noted above, *Cavicheles kempi* is probably a juvenile stage of this species.28. *Jocaste lucina* (Nobili)

Restricted synonymy:

*Jocaste lucina* - Patton, 1966:278-279, 288 tab.1, 290 tab.2,  
292, fig.3a. Bruce, 1974b:199, fig.8.

Hosts. *Pocillopora verrucosa* (Ellis & Solander), (Patton, 1966).*Stylophora* sp.*Acropora conferta* (Quelch), (Bruce, 1972a).

*Acropora corymbosa* (Lam.), (Bruce, 1972a).  
*Acropora cuneata* (Dana), (Bruce, 1972a).  
*Acropora eurystoma* (Klunzinger), (Bruce, in press, j).  
*Acropora haimeii* (Milne-Edwards & Haime), (Bruce, in press, e).  
*Acropora hebes* (Dana), (Bruce, 1972a).  
*Acropora humilis* (Dana), (Bruce, 1972a).  
*Acropora palifera* (Lam.), (Bruce, 1972a).  
*Acropora ramiculosa* (Dana), (Bruce, 1972a).  
*Acropora squamosa* (Brook), (Bruce, 1972a).  
*Acropora tenuis* (Dana), (Bruce, 1972a).  
*Acropora teres* (Verrill).  
*Acropora variabilis* (Klunzinger), (Bruce, 1972a).  
*Porites* sp.

Distribution. Throughout the Indo-West Pacific region, except the Hawaiian Islands.

Remarks. The associations of *Jocaste* spp. with *Acropora* spp. has been reviewed by Bruce (1969c). Details were provided of eighteen host species with *J. jocaste* exclusively associated with eleven species, *J. lucina* with ten and three coral species, *A. humilis*, *A. squamosa* and *A. variabilis* acting as hosts for both shrimp species. The number of *Acropora* species now known to serve as hosts for *Jocaste* spp., is now increased to twenty nine, with fifteen exclusively for *J. japonica*, nine for *J. lucina*, and with the addition of two species, *A. corymbosa* and *A. haimeii*, to those hosting both species of shrimps. The two specimens found in association with *Porites* are juvenile, but those with *Stylophora* were adult (11, 4 ovig. ) and were associated with *Coralliocariss* and *Harpiliopsis* spp.

29. *Coralliocariss brevisrostris* Borradaile

Restricted synonymy:

*Coralliocariss brevisrostris* Borradaile, 1898:1006, pl.64, fig.7. Bruce, 1972a:405, 406, 407, 415 (key), fig.2c.

Hosts. *Acropora corymbosa* (Lam.), (Bruce, 1972a).  
*Acropora cymbicyathus* (Brooks).  
*Acropora humilis* (Dana), (Bruce, 1972a).  
*Acropora hyacinthus* (Dana).

Distribution. Known only from the Ellice Islands, and Willis Island, NE Australia.

Remarks. The specimen from Mauritius, referred to *C. brevisrostris* by Holthuis (1965), should be referred to *C. nudirostris* Heller. The chelae of the second pereopods in *C. nudirostris* show a close resemblance to *C. brevisrostris*, rather than *C. venusta*.

30. *Coralliocariss graminea* (Dana)

Restricted synonymy:

*Coralliocariss graminea* - Holthuis, 1952:17, 186-189, fig.91.

Hosts. *Pocillopora danae* (Verrill), (Bruce, 1972a).  
*Pocillopora elongata* Dana, (Bruce, 1972a).  
*Seriatopora hystrix* (Dana), (Patton, 1966).  
*Stylophora erythraea* von Marenzeller, (Bruce, 1972a).  
*Acropora corymbosa* (Lam.), (Bruce, 1972a).  
*Acropora cymbicyathus* (Brooks), (Bruce, 1972a).

- Acropora digitifera* (Dana), (Bruce, in press, e).  
*Acropora diversa* (Dana), (Bruce, 1972a).  
*Acropora haimeii* (Milne-Edwards & Haime), (Bruce, 1972a).  
*Acropora hebes* (Dana), (Bruce, 1972a).  
*Acropora humilis* (Dana), (Bruce, 1972a).  
*Acropora nana* (Studer), (Bruce, 1972a).  
*Acropora nasuta* (Dana), (Bruce, 1972a).  
*Acropora ramiculosa* (Dana), (Bruce, 1972a).  
*Acropora squamosa* (Brooks), (Bruce, 1972a).  
*Acropora squarrosa* (Ehrenberg), (Bruce, in press, e).  
*Acropora variabilis* (Klunzinger), (Bruce, 1972a).

Distribution. Probably common throughout the whole Indo-West Pacific region except for the Hawaiian Islands.

Remarks. Many of the records of *C. graminea* probably refer to *C. viridis*, and similarly some of the host records may also refer to this species. Although these two closely related species may be found in the same localities, they do not occur together on the same coral host colonies, as may occur in the species-pair *Harpiliopsis depressus* and *H. spinigerus*. Specimens from *Seriatopora* and *Stylophora* are usually small juveniles and these genera must be regarded as abnormal hosts.

31. *Coralliocaris macrophthalma* (Milne-Edwards)

Restricted synonymy:

*Coralliocaris macrophthalma* - Borradaile, 1898:385. Nobili, 1901:3.

Hosts. Probably *Acropora* spp., but none so far recorded.

Distribution. Known only from "Mers d'Asie", the Red Sea and the Seychelle Islands.

Remarks. This little known species is most closely related to *C. graminea* and *C. viridis*, with sound-producing chelae on the second pereopods.

32. *Coralliocaris nudirostris* (Heller)

Restricted synonymy:

*Oedipus nudirostris* Heller, 1862:279, pl.3 fig.25.

*Coralliocaris nudirostris* - Borradaile, 1971:382 (key), 384 Bruce, 1974c:262, fig.2.

Hosts. *Acropora digitifera* (Dana), (Bruce, 1972a).

*Acropora humilis* (Dana), (Bruce, 1972a).

*Acropora hyacinthus* (Dana), (Bruce, 1972a).

*Acropora spicifera* (Dana), (Bruce, press, h).

*Acropora surculosa* (Dana), (Bruce, 1973).

Distribution. Reported only from the Red Sea, Tanganyika, the Seychelle and Maldiv Islands and Tahiti.

Remarks. On East African fringing reefs, this species seems to prefer hosts situated on the exposed side of the reef crest rather than the lagoon side.

33. *Coralliocaris pavonae* Bruce

Restricted synonymy:

*Coralliocaris pavonae* Bruce, 1972:63, 77-84, figs. 8-11.

*Coralliocaris taiwamensis* Fujino & Miyake, 1972:95-98,  
figs.1-2.

Hosts. *Pavona divaricata* (Lam.), (Bruce, 1972a)

*Pavona minor* Breuggemann, (Bruce, 1972a).

Distribution. Known from Fiji and Taiwan only.

Remarks. The only species of the genus that is apparently normally associated with a coral host not belonging to the genus *Acropora*.

#### 34. *Coralliocaris superba* (Dana)

Restricted synonymy:

*Coralliocaris superba* - Holthuis, 1952:17, 189-191, fig.92.

Hosts. *Pocillopora danae* (Verrill), (Bruce, 1972a)

*Acropora africana* (Brooks), (Bruce, in press, h).

*Acropora convexa* (Dana), (Bruce, in press, e).

*Acropora cymbicyathus* (Brooks), (Bruce, 1972a).

*Acropora digitifera* (Dana), (Bruce, 1972a)

*Acropora disticha* (Brooks), (Bruce, in press, h).

*Acropora diversa* (Dana), (Bruce, 1972a).

*Acropora eurystroma* (Klunzinger), (Bruce, 1972a).

*Acropora humilis* (Dana), (Bruce, 1972a).

*Acropora irregularis* (Brooks), (Bruce, 1972a).

*Acropora leptocyathus* (Brooks), (Holthuis, 1953).

*Acropora nana* (Studer), (Bruce, 1972a).

*Acropora nasuta* (Dana), (Bruce, in press, h).

*Acropora pectinata* (Brooks), (Bruce, in press, h).

*Acropora pulchra* (Brooks), (Bruce, 1972a).

*Acropora variabilis* (Klunzinger), (Bruce, in press, h).

Distribution. Widespread throughout the Indo-West Pacific region from the Red Sea to Madagascar as far east as Tahiti and the Society Islands.

Remarks. Five of the host corals also serve as hosts for *C. "graminea"*. This species is one of the most beautifully coloured of pontonine coral commensals (Bruce, 1974c, fig.3), and was accurately illustrated by Dana (1855, pl.37 fig.2).

#### 35. *Coralliocaris venusta* Kemp

Restricted synonymy:

*Coralliocaris venusta* Kemp, 1922:269, 274-276, figs.100-101.

Hosts. *Acropora convexa* (Dana), (Bruce, 1972a).

*Acropora cymbicyathus* (Brooks).

*Acropora humilis* (Dana), (Bruce, 1972a).

*Acropora hyacinthus* (Dana).

*Acropora subulata* (Dana), (Bruce, in press, h).

*Acropora pectinata* (Brooks), (Bruce, in press, h).

Distribution. Red Sea, central East Africa, the Seychelle Islands, Mocambique Channel, Indonesia, the South China Sea, Samoa and the Great Barrier Reef.

Remarks. It has been noted (Bruce, in press, h), that two distinct species have probably been confused under this name. The two "species" are readily separated by their distinct colour patterns in life, but no satisfactory morphological distinction has yet been found.

36. *Coralliocaris viridis* Bruce

Restricted synonymy:

*Coralliocaris viridis* Bruce, 1974a:222-224, fig.1 a-b.

Hosts. *Acropora disticha* (Brooks), (Bruce, in press, h).

*Acropora humilis* (Dana), (Bruce, in press, h).

*Acropora valida* (Dana), (Bruce, in press, h).

*Acropora variabilis* (Klunzinger), (Bruce, in press, h).

Distribution. Known only from southern Kenya, the Mocambique Channel and the Great Barrier Reef. Probably throughout the Indo-West Pacific region.

Remarks. Many records of the closely related *C. graminea* probably refer to this species.

37. *Pontonides maldivensis* (Borradaile)

Restricted synonymy:

*Pontonides maldivensis* - Borradaile, 1917:387, pl.57 fig.28.

Host. *Dendrophyllia micracantha* (Ehrenberg), (Bruce, in press, h).

Distribution. Known only from the Maldive Islands and Mombasa, Kenya.

Remarks. This species and the next are the only known commensals of a-hermatypic corals.

38. *Pontonides unciger* Calman

Restricted synonymy:

*Pontonides unciger* - Holthuis, 1952:219-223, fig.108-110.

Host. *Dendrophyllia ijimae* Yabe & Eguchi, (Fujino & Miyake, 1969).

Distribution. Reported from the Red Sea; Amakusa Islands, Japan, and Indonesia.

Remarks. Other species of the genus *Pontonides* have been found to associate with gorgonian or antipatharian hosts.

### Discussion

Details are given of thirty seven species of Indo-West Pacific pontonine shrimps that are considered to be obligate commensals of scleractinian corals. The criteria for assessing the obligate nature of the association have been provided by Garth (in press), who indicated that the shrimps concerned are not found away from their host, that the association is recurrent, and that adult breeding individuals are involved. One species, *Periclimenes parvus*, is considered to be a doubtful coral-associate. Fourteen genera, out of a present total of forty-three known Indo-West Pacific pontonine genera, have now been found to have some species living in association with corals and of these genera, nine are monospecific. One of these monospecific genera, *Vir* Holthuis, is one of the least specialized pontonine genera, with an unmodified set of palaemonid mouthparts, including a mandible with a small palp. The eight other nonospecific genera consist of highly specialized species, showing an increasing degree of reduction of many parts of the mouthparts.

The hosts are represented by seventy-six different species, of seventeen genera, although forty-one of these belong to the genus



*Acropora* alone and sixteen to the branching corals of the families Thamnasteridae (*Pocillopora*, *Seriatopora* and *Stylophora*). The Acroporidae (*Acropora* spp.) clearly provide the most satisfactory niches for these shrimps. It is certain that many hosts still remain to be identified, especially those from the reef front and from deeper water, as most of the records have been derived from shallow lagoons or pools on the reef flats easily accessible at low tide.

The most favoured host coral is *Acropora humilis* (Dana). This species has been found to provide a niche for a *Periclimenes*, a *Philarius*, two *Jocaste* and six *Coralliocaris* species. Although these do not occur all on a single host colony, it is not uncommon to find *Periclimenes lutescens* with two *Jocaste* and two *Coralliocaris* spp. together in a single host. Similarly, *Pocillopora damicornis* (L.) may act as host for *Vir orientalis*, three *Periclimenes* and two *Harpiliopsis* spp. The number of species and individuals present in a coral colony is largely dependant upon the size of the colony, small colonies often having only a single male-female pair of one species. Large corals may have over a hundred individual shrimps (Bruce, 1972a).

The abundance of coral-associated pontonine shrimps in the Indo-West Pacific region is in marked contrast with findings in other tropical seas (Bruce, in press, g). Of the genera associated with corals in the Indo-West Pacific region, only *Periclimenes* is found to occur elsewhere and none of its extra-Indo-West Pacific species are reported to be specifically associated with corals, although the hosts of several species that are possibly commensals remain to be ascertained. In the Eastern Pacific region two species of pontonine shrimps, *Harpilius depressus* and *Fennera chacei*, are known to live in association with coral hosts. Both these species are of widespread distribution and have probably extended their ranges across the East Pacific barrier, via the Galapagos Islands, by means of the Equatorial Counter Current. In the Caribbean region there are no reported associations between pontonine shrimps and corals and even the *Acropora* species, which provide a niche for so many of the Indo-West Pacific species, are without a similar series of faunal associates.

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