

## THE PONTONIINE SHRIMP FAUNA OF AUSTRALIA

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## Introduction

The caridean family Palaemonidae Samouelle consists of two major subfamilies. The Palaemoninae are conspicuous in tropical freshwater and temperate marine habitats and are almost entirely free-living. The Pontoniinae are almost exclusively tropical and subtropical marine commensals and are rarely found in temperate or fresh waters. They occur most abundantly in the warm shallow waters of tropical coral reefs and the species probably present in deeper waters here have so far been little studied. The use of scuba-diving as a collecting method in recent years has greatly increased the efficiency of sampling coral reefs and other shallow water marine animals. Precise information can now be obtained for many species with regard to their habitats or associations. Many of the more cryptic species could not be reliably collected by any earlier method and so remained 'rare' and little known. Coral reefs are famous for the diversity of the fauna that they support, and the Great Barrier Reef and the caridean shrimps are no exception to this generalisation. Among the marine shrimps in Australian seas only the snapping shrimps of the family Alpheidae exceed the number of species of the subfamily Pontoniinae.

The continent of Australia is provided with a richer fauna of pontoniine shrimps than has been reported from any other major geographical area. At present some 136 species have been recorded (and numerous new species, particularly of the genera *Periclimenaeus* and *Pontonia*, remain to be described).

The majority of these are well-known Indo-West Pacific species and they have been recorded principally from the shallow waters of Queensland and the associated Great Barrier Reef.

The fauna is represented by 36 genera, all except two of which are considered to contain species adapted to a 'commensal' way of life. That is to say, the adults live in permanent obligatory associations, often of a high degree of specificity, with a wide variety of other marine animals, particularly sponges, coelenterates, molluscs, echinoderms and ascidians. The hosts of many species are inadequately known, so that information concerning the degree of host-specificity between closely related species is incomplete.

The first pontoniine shrimp recorded from Australia was *Periclimenes aesopius*, described by Bate in 1863, and still known only from St. Vincent Gulf, South Australia from a small number of specimens. Although it is probably an associate of a coelenterate, its host animal has yet to be identified and the shrimp remains one of the least-known Australian species. Saville-Kent (1893) in his monograph of the Great Barrier Reef next illustrated the well-known species *Periclimenes brevicarpalis*, an associate of giant anemones, such as *Stoichactis* spp., throughout most of the Indo-West Pacific region. Miers (1884) reported on four species collected from Australian waters by H.M.S. "Alert", and Baker (1907) described the unusual and possibly endemic species *Pontonia minuta* from South Australia. Two species, *Anchistus custos* and *Periclimenes brevicarpalis* were reported from the Monte Bello Islands, Western Australia by Rathbun (1914). Balss (1921) reported a further six species from Cape Jaubert in the same state, in his report on the results of Dr E. Mjöberg's 1910-1913 Swedish Expedition. McCulloch and McNeill (1923) recorded more *Periclimenes brevicarpalis* from a number of Queensland localities and McNeill (1926) recorded *Periclimenes spiniferus*, *P. elegans* and *Conchodytes tridacnae* from North-West Island in the Capricorn Islands, at the southern end of the Great Barrier Reef. Hale (1927) confirmed the presence of these species in South Australian waters. The first detailed information concerning the coral-associated species in Queensland waters was provided by Patton (1966), and McNeill (1968) provided details of eight species collected mainly from the Low Isles by the Great Barrier Reef Expedition, 1928-1929. Preliminary descriptions of five new species of *Periclimenaeus* were provided by Bruce (1969b, 1970a), and details of a further eight species from Queensland waters and a report on pontoniine material in

the Australian Museum (Bruce, 1971, 1977c). Several other papers dealing with isolated species have also appeared. Wadley (1978) recorded several species of *Periclimenes* from Moreton Bay, Queensland. The fauna has been studied in most detail at Heron Island, the Capricorn Islands, in subtropical waters, at the southern end of the Great Barrier Reef. Over a hundred species occur at this locality and have been reported upon by Bruce (in press f).

The present report includes details of ten species not previously recorded from Australian waters.

These are:

<i>Dasycaris zanzibarica</i> Bruce	<i>Periclimenes attenuatus</i> Bruce
<i>Hamodactyloides incompletus</i> (Holthuis)	<i>Periclimenes investigatoris</i> Kemp
<i>Mesopontonia gorgoniophila</i> Bruce	<i>Periclimenes kororensis</i> Bruce
<i>Periclimenaeus rastrifer</i> Bruce	<i>Periclimenes pectiniferus</i> Holthuis
<i>Periclimenes alcocki</i> Kemp	<i>Periclimenes platycheles</i> Holthuis

Further information on most of these shrimps, including descriptions, illustrations and synonymies are to be found in the works of Borradaile (1917), Kemp (1922) and Holthuis (1952).

### Key to the genera of the pontoniine shrimps of Australia

1. Telson with at least three distinct pairs of posterior marginal spines ..... 2  
— Telson with fewer than three pairs of posterior marginal spines ..... 36
2. Mandible with palp ..... *Palaemonella*  
— Mandible without palp ..... 3
3. Maxilla with basal endite absent ..... 4  
— Maxilla with basal endite present ..... 9
4. Rostrum absent, scaphocerite rudimentary; inhabiting galls in *Acropora* ..... *Paratypton*  
— Rostrum present, scaphocerite distinct ..... 5
5. Rostrum toothless; body form strongly depressed; second pereopods with large subequal similar chelae; associated with Scleractinia ..... *Platycaris*  
— Rostrum with several distal teeth; body not strongly depressed ..... 6
6. Third maxilliped with fully functional exopod ..... 8  
— Third maxilliped with exopod greatly reduced or absent ..... 7
7. Body compressed; lateral border of exopod of uropod dentate; associated with oculinid corals ..... *Anapontonia*  
— Body not compressed; lateral border of exopod of uropod not dentate; associated with Alcyonaria ..... *Propontonia*
8. Dactyls of ambulatory pereopods with rounded basal protuberance; several small post-antennal spines present; associated with Scleractinia ..... *Fennera*  
— Dactyls of ambulatory pereopods without basal protuberances, single large acute antennal spine present; associated with Corallimorpharia ..... *Pliopontonia*
9. Third maxilliped with fully functional exopod ..... 10  
— Third maxilliped lacking fully functional exopod ..... 14
10. Dactyls of ambulatory pereopods with distinct basal process ..... 11  
— Dactyls of ambulatory pereopods without distinct basal process ..... 18
11. Basal process of ambulatory dactyls compressed ..... 12  
— Basal process of ambulatory dactyls hoof-like ..... 13
12. Basal process of ambulatory dactyls rounded; third maxilliped with an arthrobranch; movable hepatic spine present; associated with Ascidiacea ..... *Dasella*  
— Basal process of ambulatory dactyls acute or angular; third maxilliped without arthrobranch; hepatic spine absent; associated with Bivalvia ..... *Conchodytes*

13. Hepatic spine present; second pereiopods with chelae unequal and dissimilar; rostrum dorsally and ventrally dentate; associated with Scleractinia ..... *Jocaste*  
 — Hepatic spine absent; second pereiopods typically equal, similar; rostrum dentate or edentate; associated with Scleractinia ..... *Coralliocaris*
14. Dactyls of ambulatory pereiopods simple ..... 15  
 — Dactyls of ambulatory pereiopods biunguiculate ..... 17
15. Rostrum short, with lateral carinae broadly expanded, toothless; chelae of second pereiopods unequal; associated with Gorgonacea, Antipatharia, Scleractinia ..... *Pontonides*  
 — Rostrum normal, compressed, dorsally toothed, without expanded lateral carinae ..... 16
16. Second pereiopods greatly reduced; dactyls of ambulatory pereiopods slender without basal swelling; associated with Gorgonacea, Alcyonacea ..... *Hamodactylus*  
 — Second pereiopods not reduced, normal size, unequal; dactyls of ambulatory pereiopods proximally swollen; associates of *Millepora* hydroids ..... *Hamodactyloides*
17. Rostrum well developed, compressed, toothed; telson with three pairs of posterior spines; of slender body form; associated with Gorgonacea ..... *Mesopontonia*  
 — Rostrum short, stout, swollen and toothless; telson with about six pairs of posterior spines; of stout body form; possibly associated with Annelida "*Pontonia*" *minuta*
18. Hepatic spine present ..... 19  
 — Hepatic spine absent ..... 26
19. Hepatic spine mobile ..... 20  
 — Hepatic spine fixed ..... 22
20. Rostrum with a few small or minute teeth only; associates of Bivalvia ..... *Paranchistus*  
 — Rostrum with numerous acute teeth dorsally ..... 21
21. Fingers of chela of first pereiopods spatulate with pectinate cutting edges; associates of Asterozoa ..... *Zenopontonia*  
 — Fingers of chela of first pereiopods subspatulate, cutting edges entire; associates of Echinozoa ..... *Allopontonia*
22. Postero-ventral angles of pleura of fourth and fifth somites rounded ..... 23  
 — Postero-ventral angles of pleura of fourth and fifth somites acutely produced ..... 25
23. Second pereiopods with chelae markedly unequal and dissimilar; rostrum toothless with broadly expanded lateral carinae; associated with Echinozoa .. *Stegopontonia*  
 — Second pereiopods generally with chelae subequal and similar ..... 24
24. Rostrum generally strongly dentate; epistomal horns absent; associated with Porifera, Coelenterata, Nudibranchia and Echinodermata ..... *Periclimenes*  
 — Rostrum toothless, supra-orbital spines and epistomal horns present; associated with Crinozoa ..... *Parapontonia*
25. Rostrum compressed, ventral teeth present; second pereiopods subequal in size, similar in form; dactyls of ambulatory pereiopods laterally twisted, carinate; associates of Scleractinia ..... *Harpiliopsis*  
 — Rostrum styliiform, ventral teeth absent; second pereiopods unequal; dactyls of ambulatory pereiopods not twisted or carinate; associates of Pennatulacea .... *Dasycaris*
26. Second pereiopods generally markedly unequal, dissimilar; fingers of major chela with a pit and hammer mechanism; associates of Porifera and Ascidiacea ..... *Periclimenaeus*  
 — Fingers of major second pereiopod without pit and hammer mechanism ..... 27

27. Maxilla with basal endite simple ..... 28  
 — Maxilla with basal endite bifid or bilobed ..... 32
28. Fourth thoracic sternite with conspicuous median process; associated with Scleractinia ..... *Philarius*  
 — Fourth thoracic sternite without conspicuous median process ..... 29
29. Body strongly compressed; rostrum with numerous dorsal teeth; second pereopods subequal, similar, elongate; dactyls of ambulatory pereopods simple; exopod of uropod with strong hooked disto-lateral spine; associates of Scleractinia ..... *Ischnopontonia*  
 — Body not strongly compressed, rostrum generally feebly toothed or toothless; dactyls of ambulatory pereopods biunguiculate ..... 30
30. Scaphocerite rudimentary; second pereopods with chela generally unequal in size and dissimilar; associates of Porifera ..... *Typton*  
 — Scaphocerite normal or small; second pereopods with chelae equal or subequal in size and generally similar in form ..... 31
31. Chelae of second pereopods short, with deep strongly compressed palm, subspatulate fingers, with a small lateral accessory flange on the fixed finger of minor chela; associates of Porifera ..... *Oxycocaris*  
 — Chelae of second pereopods elongate, palm subcylindrical, fingers simple and without accessory flanges; associates of Porifera ..... *Onyccocaridella*
32. First pereopod with carpus segmented; associates of Porifera ..... *Thaumastocaris*  
 — First pereopod with carpus entire ..... 33
33. Dactyl of third pereopod biunguiculate, with additional accessory spines ..... 34  
 — Dactyl of third pereopod biunguiculate, without additional accessory spines ..... 35
34. Second pereopods with chelae generally large, unequal in size and dissimilar in form; associates of Ascidiacea and Bivalvia ..... *Pontonia*  
 — Second pereopods with chelae small, subequal in size and similar in form; associates of Porifera ..... *Apopontonia*
35. Rostrum short, slender, acute, edentate; lateral carinae broadly expanded forming deep orbits; associates of Crinoidea ..... *Pontoniopsis*  
 — Rostrum not slender, acute; lateral carinae and orbits obsolete; associates of Bivalvia ..... *Anchistus*
36. Telson with a pair of stout hook-like terminal processes; associated with Scleractinia and Actiniaria ..... *Hamopontonia*  
 — Telson with two pairs of stout posterior spines only; associates of Porifera ... *Anchistioides*

CHECKLIST OF THE PONTONIINE SHRIMPS OF AUSTRALIA  
(PALAEMONIDAE SAMOUELLE, 1819; PONTONINAE KINGSLEY, 1878)*Allopontonia* Bruce, 19721. *Allopontonia iaini* Bruce, 1972

*A. iaini* is the only species in the genus. It is known from Heron Island where two specimens have been collected from the echinoid *Salmacis sphaeroides* at 24 m. It is also known from the western Indian Ocean.

*Anapontonia* Bruce, 19662. *Anapontonia denticauda* Bruce, 1966.

*A. denticauda* is the only species in the genus. It is recorded only from Orpheus Island in association with the oculinid coral *Galaxea fascicularis* in shallow water. It is otherwise known from Zanzibar and Singapore living on the same host.

*Anchistioides* Paulson, 18753. *Anchistioides australiensis* Balss, 1921

This species is known in Australian waters from two juvenile specimens reported from Cape Jaubert, Western Australia. The only other record is from Bensback River, New Guinea.

4. *Anchistioides compressus* Paulson, 1875

*A. compressus* is recorded in sponges from the reef flat to 4.5 m from Heron Island, Wilson Island and Dunwich, Moreton Bay. It is also known from the Red Sea and western Indian Ocean to the South China Sea, Japan and the Tuamotu Islands.

5. *Anchistioides willeyi* (Borradaile, 1899)

In Australian waters *A. willeyi* is known from sponges on the reef slope at Heron Island from 9 to 12 m at One Tree Island and also in sponges from sea grass flats at Dunwich, Moreton Bay. It is otherwise known from the western Indian Ocean, Indonesia, the South China Sea and New Britain.

*Anchistus* Borradaile, 18986. *Anchistus australis* Bruce, 1977a

The type specimens of *A. australis* were collected from Capre Cay, Swain Reefs. The species has subsequently been recorded from Heron Island, and specimens from Michaelmas Reef have been examined. The species is otherwise known only from the Great Astrolabe Reef, Fiji. The hosts are the giant clams, *Tridacna derasa* and *T. squamosa*.

7. *Anchistus custoides* Bruce, 1977a

This species was first described from specimens collected at Gillet Cay, Swain Reefs. It is also found at Heron Island in the fan mussel *Atrina vexillum* from 3 to 6 m, and is otherwise known only from the Palau Islands.

8. *Anchistus custos* (Forskål, 1775)

The species was first recorded in Australian waters by Miers (1884) from Port Molle and Bowen, Queensland, and Shark Bay, Western Australia. It was later reported from Monte Bello Islands, Western Australia (Rathbun, 1914) and from St. Vincent Gulf, South Australia (Hale, 1927). Other Australian records are the Low Isles, Magnetic Island and Swain Reefs. The species is common and widespread throughout the Indian Ocean and most of the western Pacific Ocean east to the Fijian Islands. It occurs mainly in association with bivalves of the genus *Pinna*.

9. *Anchistus demani* Kemp, 1922

*Anchistus demani* is recorded from One Tree Island in association with the giant clam *Tridacna maxima*. Specimens have also been examined from Heron Island and Michaelmas Reef from *T. maxima* and *T. gigas*. The species is otherwise known from the western Indian Ocean to the Marshall Islands.

10. *Anchistus gravieri* Kemp, 1922

In Australian waters *A. gravieri* is known only from the Herald Islands in association with a type of giant clam *Hippopus hippopus*. The species is otherwise recorded from the type locality Vanikoro, Santa Cruz Islands and from New Caledonia.

11. *Anchistus miersi* (de Man, 1888)

This species is recorded only from Tijou Reef in Australian seas, living at 2 m in the giant clam *Hippopus hippopus*. Specimens have also been examined from the giant clam *Tridacna gigas* at Magnetic Island. *Anchistus miersi* is otherwise known throughout the Red Sea, Indian Ocean and the Pacific Ocean to the Gambier Archipelago in association with species of *Tridacna*.

12. *Anchistus pectinis* Kemp, 1925

First reported from Keppel Bay and Magnetic Island with the scallop *Amusium balloti*, additional specimens have since been examined from the same host collected off Townsville and from Bowden Reef at about 30 m. *Anchistus pectinis* is also known from Zanzibar, the Nicobar Islands and Japan.

*Apopontonia* Bruce, 197613. *Apopontonia falcirostris* Bruce, 1976

Two separate collections of this species have been made at Heron Island and at One Tree Island. The Heron Island specimen was from a sponge in the genus *Psammascus*. The One Tree specimen came from an unidentified sponge collected at 18 m. Outside Australian waters, this species is known only from Madagascar.

*Conchodytes* Peters, 185214. *Conchodytes biunguiculatus* Paulson, 1875

The records of Miers (1844) of *Conchodytes tridacnae* from a bivalve in the genus *Pinna*, may refer to the occurrence of *C. biunguiculatus* at Keppel Island, Queensland. *Conchodytes biunguiculatus* has not been reported outside the Indian Ocean, Taiwan and Indonesia. However, Miers' (1884) specimens may have been examples of *Conchodytes monodactylus* or even *Anchistus custos*. Two specimens from King Sound, Western Australia are also provisionally referred to *C. biunguiculatus*. The specimens are in the collections of the British Museum (Natural History), registration number 86:20. The host was not recorded.

15. *Conchodytes meleagrinae* Peters, 1852

*Conchodytes meleagrinae* is common in Australian waters in association with pearl oysters in the genus *Pinctada*. It has been reported from several localities along the Great Barrier Reef (the Low Isles, Swain Reefs, Capricorn Islands), Bathurst Island and North West Cape, and occurs widely from the Red Sea to Hawaii.

16. *Conchodytes monodactylus* Holthuis, 1952

This species is recorded only from Magnetic Island, Queensland (Bruce, 1977) in association with a species of the bivalve *Atrina*. It is otherwise known from Taiwan, Hong Kong, Singapore and Indonesia, generally in association with bivalves in the genus *Pinna*.

17. *Conchodytes nipponensis* (de Haan, 1844)

*Conchodytes nipponensis* is reported only from Keppel Bay, Queensland, where it occurs with a scallop, *Amusium balloti*. It is otherwise known only from Japanese waters where it is also found in pectinid hosts.

18. *Conchodytes tridacnae* Peters, 1852

The species has been reported from several Great Barrier Reef localities. Miers (1884) recorded a specimen of *Pontonia tridacnae* from Keppel Island, Queensland, from a giant clam *Tridacna* sp., which is probably referable to this species. Other examples are known from Torres Strait, Warrior Reef, Tijou Reef, Herald Island, Swain Reefs and One Tree Island, usually in association with *Tridacna squamosa*. *Conchodytes tridacnae* is found throughout the Indian Ocean, and western Pacific Ocean east to the Marshall Islands.

*Coralliocaris* Stimpson, 186019. *Coralliocaris brevirostris* Borradaile, 1898

This rare species was reported by Patton (1966) from Willis Island, Coral Sea, in an *Acropora* coral. The species is otherwise known only from the type locality in the Ellice Islands.

20. *Coralliocaris graminea* (Dana, 1852)

First reported from the Palm Islands by Boone (1935) and later from numerous localities on the Great Barrier Reef, *C. graminea* occurs commonly in association with many species of the coral genus *Acropora*. It is found throughout the Indo-West Pacific region with the exception of the Hawaiian Islands.

21. *Coralliocaris superba* (Dana, 1852)

*C. superba* was first recorded in Australian seas by Patton (1966) with numerous specimens from Great Barrier Reef localities in association with *Acropora* corals. The species is known throughout the Indo-West Pacific region from the Red Sea to the Society Islands but is absent from the Hawaiian Islands.

22. *Coralliocaris venusta* Kemp, 1922 ( $\alpha$  form)

*C. venusta* ( $\alpha$  form) occurs at Heron Island, Queensland, on several *Acropora* coral species. It is not distinguishable from preserved specimens of the  $\beta$  form but each form has a characteristic colour pattern in life. The colour pattern of the type material was not recorded. The  $\alpha$  form is characterised by conspicuous patches of white on the body and appendages. The distribution of the two forms is uncertain but both may occur at the same localities.

23. *Coralliocaris venusta* Kemp, 1922 ( $\beta$  form)

This form also occurs at Heron Island, Queensland, on several *Acropora* coral species, and may be distinguished in life by the absence of conspicuous white colour patches. The combined distribution of the two forms extends from the Red Sea to the Samoan Islands.

24. *Coralliocaris viridis* Bruce, 1974

Known in Australian seas only from Heron Island and One Tree Island, Queensland, but probably of widespread occurrence in *Acropora* corals, *C. viridis* also occurs at several localities in the western Indian Ocean and in the Ryukyu Islands.

*Dasella* Lebour, 194525. *Dasella herdmaniae* (Lebour, 1938)

A single damaged female specimen has been collected from the ascidian *Herdmania momus* at Heron Island, Queensland. The species has been previously recorded only from the type locality, Tuticorin, southern India, living in the same host.

*Dasycaris* Kemp, 192226. *Dasycaris ceratops* Holthuis, 1952

First recorded from Lodestone Reef, Queensland, from an unidentified antipatharian coral at 35 m, *D. ceratops* has since been found at Wistari Reef, Heron Island, on the pennatulacean *Pteroides bankanense* at 24 m. The species is otherwise known from Zanzibar and Indonesia.

27. *Dasycaris zanzibarica* Bruce, 1973b

*D. zanzibarica* has not previously been recorded from Australian waters, but specimens have been examined in the collections of the Australian Museum from Lizard Island and from Wheeler Reef off

Townsville at 12 m. The Lizard Island example was associated with an antipatharian coral of the genus *Cirripathes*. *D. zanzibarica* has previously been recorded only from the type locality, Zanzibar, on *Cirripathes anguinis*.

*Fennera* Holthuis, 1951

28. *Fennera chacei* Holthuis, 1951

Recorded from Willis Island, Coral Sea, by Patton (1966) on a coral, *Pocillopora verrucosa*, this species has recently been found at Heron Island, Queensland, on a pocilloporid coral *Stylophora pistillata* at 14 to 15 m. *F. chacei* has been reported from numerous localities in the western Indian Ocean and from the tropical western American seaboard.

*Hamodactyloides* Fujino, 1973

29. *Hamodactyloides incompletus* (Holthuis, 1958)

This species has not previously been recorded from Australian seas. Several examples have been found in association with *Millepora* hydrocorals at Lizard Island, Queensland. It is known elsewhere only from the Red Sea, Kenya, Zanzibar and La Reunion.

*Hamodactylus* Holthuis, 1952

30. *Hamodactylus aqabai* Bruce and Svoboda, in press

Known in Australian waters only from Heron Island, where it occurs in association with alcyonarians *Nephthea* spp., from 4 to 11 m. The species is otherwise known only from the type locality, Aqaba, Gulf of Sinai.

31. *Hamodactylus boschmai* Holthuis, 1952

Specimens have been collected from Heron Island, Queensland, in association with the gorgonians *Subergorgia reticulata* and *Melitheia ocracea*, from 4 to 25 m. *H. boschmai* is otherwise known only from Zanzibar, Kenya, Madagascar, Indonesia and New Caledonia.

32. *Hamodactylus noumeae* Bruce, 1970

In Australian waters, this species is recorded only from Heron Island, Queensland, where it is found in association with a variety of gorgonian hosts, including species of *Euplexaura*, *Rumphella*, *Pseudopterogorgia* and *Subergorgia* from 4 to 27 m. It is also known from New Caledonia, Indonesia, Kenya, Tanganyika and Zanzibar.

*Hamopontonia* Bruce, 1970b

33. *Hamopontonia corallicola* Bruce, 1970b

This species has been recorded intertidally at Heron Island in association with scleractinian corals of the genus *Goniopora*, and in deeper water from *Heliofungia* and on an unidentified anemone. A specimen from a fungiid coral from 10 m at Lizard Island has also been examined. *H. corallicola* was first recorded in Australian waters from Peloris Island, Queensland, from 10 m on *Heliofungia actiniformis*. It is also known from Hong Kong and Japan.

*Harpiliopsis* Borradaile, 1917

34. *Harpiliopsis beaupresii* (Audouin, 1825)

*H. beaupresii* is abundant on corals of the genera *Pocillopora* and *Stylophora* at Heron Island, where it was first recorded from Australian seas by Patton (1966). There have been no subsequent records of this common species, which is found throughout the whole Indo-Pacific region and on Easter Island.

35. *Harpiliopsis depressa* (Stimpson, 1860)

*H. depressa* was also first recorded from Heron Island by Patton (1966) and later from Swain Reefs. It is much less common than *H. beaupresii* but not rare. *H. depressa* is found throughout the Indo-West Pacific region to the Galapagos Islands and on to the tropical western American seaboard. It is normally associated with pocilloporid corals.

36. *Harpiliopsis spinigera* (Ortmann, 1890)

Uncommon on *Stylophora* corals at Heron Island, *H. spinigera* also occurs on *Seriatopora*. It has been recorded from numerous localities in the western Indian Ocean, from Indonesia, the Loyalty and Samoan Islands, and from Panama. This species closely resembles *H. depressa* and many records of that species may refer to *H. spinigera*.

*Ischnopontonia* Bruce, 196637. *Ischnopontonia lophos* (Barnard, 1962)

Known from Great Palm, Orpheus, Fantome and Heron Islands, Queensland, *I. lophos* is found in association only with the oculinid coral *Galaxea fascicularis* to a depth of 15 m. It is otherwise recorded extensively from the western Indian Ocean, from Singapore and from the Great Astrolabe Reef, Fiji.

*Jocaste* Holthuis, 195238. *Jocaste japonica* (Ortmann, 1890)

Recorded by Patton (1966) from Willis Island, Restoration Rock, and Heron Island, *J. japonica* is also known from Swain Reefs. All records are from corals of the genus *Acropora* to a depth of 15 m. The species is found throughout the Indo-West Pacific region, excluding the Red Sea, east to New Caledonia and the Marshall Islands.

39. *Jocaste lucina* (Nobili, 1901)

*J. lucina* was also first recorded from Australian waters by Patton (1966) with material from Heron Island, Moreton Bay, Willis Island and Restoration Rock. Material was later collected from Swain Reefs. These shrimps are common associates of *Acropora* corals and occur throughout the Indo-West Pacific region with the exception of the Hawaiian Islands.

*Mesopontonia* Bruce, 196740. *Mesopontonia gorgoniophila* Bruce, 1967

This species has not been previously recorded from Australian seas. One ovigerous female was identified from an unidentified gorgonian from 270 m, collected by the F.V. "Nimbus" on 5 August 1968 at 26° 27' S 153° 51' E. It is otherwise known only from the northern South China Sea.

*Onycoaridella* Bruce, in press, d41. *Onycoaridella monodoa* (Fujino and Miyake, 1969)

*O. monodoa* has been recorded twice from Heron Island and once from Tryon Island, Queensland, in association with sponges of the genus *Paraesperella* from the reef flat. It is otherwise known from the Ryukyu Islands, Pacific Ocean, and La Reunion, Indian Ocean.

42. *Onycoaridella prima* Bruce, in press, d

This species is known only from the type locality, Wistari Reef, Heron Island, where it was found in the sponge *Mycale sulcata*, from a depth of 12 m.

*Onycoaris* Nobili, 190443. *Onycoaris amakusensis* Fujino and Miyake, 1969

In Australian waters this species is recorded only from the reef flat at Heron Island in association with the sponge *Callyspongia* sp. It is also recorded from Zanzibar, Hong Kong, Japan and Hawaii.

44. *Onycoaris oligodentata* Fujino and Miyake, 1969

*O. oligodentata* has been recorded only once from Heron Island, Queensland, at a depth of 17 m, in association with a sponge, *Spongonella* sp. It is also known from Japan and Hong Kong.

45. *Onycoaris quadratophthalma* (Balss, 1921)

In Australian seas this species is known only from Cape Jaubert, Western Australia, the type locality. It has subsequently been reported from the Ryukyu Islands, Wake Island and Hawaii. *Onycoaris quadratophthalma* is probably also an associate of sponges but no hosts have yet been identified.

*Palaemonella* Dana, 185246. *Palaemonella pottsi* (Borradaile, 1915)

First recorded by Borradaile from Torres Strait and later from One Tree Island, Queensland, *P. pottsi* is common at Heron Island in association with the crinoids *Comanthus parvicirrus* and *Comanthina schlegli* to depths of 29 m. It is widespread in Indo-West Pacific waters from East Africa to the Marshall Islands.

47. *Palaemonella rotumana* (Borradaile, 1898)

*Palaemonella rotumana* is one of the commonest and most widely distributed pontoniine shrimps. It was first reported from the Low Isles (McNeill, 1968, as *Periclimenes rotumanus*) and has since been reported from One Tree Island and Heron Island in the Capricorn Islands and from Moreton Bay, Queensland. This free-living species occurs throughout the Indo-West Pacific region from the Red Sea to Hawaii in shallow water to about 125 m. It also extends into the eastern Mediterranean Sea.

48. *Palaemonella spinulata* Yokoya, 1936

A few specimens of this species have been reported from about 25 m at Heron Island, Queensland, and specimens have subsequently been examined from two intertidal localities at Dulwich, Moreton Bay. Previously recorded only from Japan, Tanganyika and La Réunion.

*Paranchistus* Holthuis, 195249. *Paranchistus armatus* (H. Milne-Edwards, 1837)

*Paranchistus armatus* was first recorded from Australian waters by McNeill (1968) with a specimen from Undine Reef, Cape Tribulation, in association with *Tridacna gigas*. The shrimps are apparently abundant in this host and numerous examples from the Cairns area, Michaelmas Cay and Arlington Reef, all from the same host species, have been examined. The distribution of this species is related to that of its single host and it has been recorded from the Moluccan Islands to the Marshall Islands.

50. *Paranchistus pycnodontae* Bruce, 1978a

This species is known only from the holotype collected at Heron Island, Queensland, in association with a bivalve *Hyothisa* sp.

*Parapontonia* Bruce, 196851. *Parapontonia nudirostris* Bruce, 1968

*Parapontonia nudirostris* has been recorded from a variety of crinoid hosts at Heron Island, One Tree Island and Stradbroke Island, Queensland. Additional specimens have been examined from Lizard Island and Sudbury Reef in association with the crinoids *Tropiometra afra* and *Himerometra robustipina*. It is otherwise known only from New Caledonia.

*Paratypton* Balss, 191452. *Paratypton siebenrocki* Balss, 1914

Since its being recorded by Patton (1966) from *Acropora squamosa* at Heron Island, there have been no more records of this species in Australian waters. It is known from numerous localities, from the Red Sea to La Réunion and eastwards to the Samoan Islands.

*Periclimenaeus* Borradaile, 191553. *Periclimenaeus arabicus* (Calman, 1939)

This species is recorded in Australian waters from four specimens collected in association with sponges at Heron Island, Queensland, between 1 and 30 m depth. One host has been subsequently identified as *Callyspongia* sp., and several additional examples have been obtained. The species is known sparsely from southern Arabia and Djibouti to Japan and New Caledonia.

54. *Periclimenaeus ardeae* Bruce, 1970a

*P. ardeae* was first reported from Heron Island, Queensland, where it occurs in association with the sponge *Jaspis stellifera*. It has been subsequently recorded from Kenyan waters from a different sponge host.

55. *Periclimenaeus bidentatus* Bruce, 1970a

Since this species was originally reported from Heron Island further examples have been collected from sponges in the genera *Arenochalina*, *Jaspis* and *Sponginella*. One example from Dunwich, Moreton Bay, has also been examined. The species has been otherwise recorded only from Zanzibar and Kenya.

56. *Periclimenaeus diplosomatis* Bruce, 1980

This species is known only from the type locality, Heron Island, Queensland, where a pair was collected from the colonial ascidian *Diplosoma rayneri*.

57. *Periclimenaeus djiboutensis* Bruce, 1970a

Two specimens of this species have been reported from sponges at Heron Island, Queensland. The identity of the hosts has not yet been established. *Periclimenaeus djiboutensis* is known from Djibouti, Eilat, Zanzibar and Madagascar.

58. *Periclimenaeus gorgonidarum* (Balss, 1913)

In Australian waters this species is known only from Heron Island, Queensland. An ovigerous female and a pair of specimens have been collected from 18 and 24 m off Heron Island and Wistari Reef. The latter were associated with a sponge of the genus *Siphonochalina*. *Periclimenaeus gorgonidarum* is otherwise known only from East Africa and Japan.

59. *Periclimenaeus hecate* (Nobili, 1904)

*Periclimenaeus hecate* was first recorded from Cape Jaubert, Western Australia by Balss (1921). It was reported later from Heron Island and Wistari Reef, Queensland, in association with encrusting colonial ascidians, such as *Diplosoma* spp. Balss' specimen should be re-examined to confirm its initial identification. *P. hecate* has otherwise been recorded only from the western Indian Ocean and Indonesia.

60. *Periclimenaeus odontodactylus* Fujino and Miyake, 1968

A pair of specimens from an unidentified sponge collected at 11 m off Wistari Reef, Heron Island, has been reported. A further pair of specimens has also been examined from a sponge collected at 20 m depth, 8 km off Lizard Island. This species has been previously recorded only from Japan and the Philippine Islands.

61. *Periclimenaeus orbitospinatus* Bruce, 1969b

This species was first recorded from the Gulf of Carpentaria near Mornington Island, in a sponge from 15 m. There have been no further records.

62. *Periclimenaeus ornatus* Bruce, 1970a

*P. ornatus* was initially described from Heron Island, Queensland. Further examples have since been obtained from the reef flat in association with the sponge *Jaspis stellifera*, often with *Periclimenaeus ardeae*. Elsewhere, this species has been reported only from Zanzibar.

63. *Periclimenaeus pachydentatus* Bruce, 1969b

First described from material collected at the Low Isles in association with the colonial ascidian *Sigillina deerata*, this species has since been reported from the south-eastern Gulf of Carpentaria and from Heron Island at 12 to 15 m. It is known from other parts of the Great Barrier Reef, from the same host. *Periclimenaeus pachydentatus* has not been recorded outside Australian waters.

64. *Periclimenaeus rastrifer* Bruce, 1980a

Recently found in sponges from 12 to 15 m around Heron Island, this species has not been previously recorded in Australian waters. Hosts include sponges of the genus *Ulosa*. *Periclimenaeus rastrifer* was previously known only from New Caledonia.

65. *Periclimenaeus rhodope* (Nobili, 1904)

A single pair of specimens has been recorded at Heron Island, Queensland, in an encrusting sponge on a reef flat coral. It has been reported elsewhere from several localities in the western Indian Ocean.

66. *Periclimenaeus tridentatus* (Miers, 1884)

The type locality for this species is Murray Island, Torres Strait. Further specimens have since been obtained from Heron Island and Wistari Reef, Queensland, at 7 to 12 m depth from species of encrusting colonial ascidians in the genus *Diplosoma*. The species is otherwise known with certainty only from the Sulu Archipelago and Singapore, with several other doubtful reports.

67. *Periclimenaeus tuamotae* Bruce, 1969b

This species has been recorded from Heron Island, Queensland, where seven specimens were found in an unidentified sponge at 12 m. It is otherwise known only from Mururoa Atoll, Kenya and Tanganyika.

*Periclimenes* Costa, 184468. *Periclimenes aesopius* (Bate, 1863)

*Periclimenes aesopius* was the first pontonine shrimp recorded from Australian waters, from St. Vincent Gulf, South Australia. The species has not been reported subsequently from any other locality and its associations remain unknown.

69. *Periclimenes affinis* (Zehntner, 1894)

Several examples of this species have been recorded from Wistari Reef, Heron Island, Queensland, from 25 to 30 m, in association with the crinoids *Comatula cratera* and *Comanthina schlegeli* which they closely resemble in coloration. This rare species has otherwise been reported only from New Caledonia and the South China Sea.

70. *Periclimenes alcocki* Kemp, 1922

This species has not been previously recorded from Australian waters. A single female specimen has been collected from 330 m off Bateman's Bay, New South Wales, by the F.V. "Kapala" in May 1977. The host animal was not collected and the host of this shrimp is yet to be determined. *P. alcocki* has been recorded from Madagascar, the Laccadive Sea, the Philippine Islands and Japan.

71. *Periclimenes amboinensis* (de Man, 1888)

*Periclimenes amboinensis* is a rare species, of which the type material from Ambon, Indonesia, is no longer extant. One female and a pair of specimens have been collected from 15 to 23 m at Wistari Reef, Heron Island on the crinoids *Comanthina briareus* and *Comaster bennetti*.

72. *Periclimenes amymone* de Man, 1902

This species was first recorded from Heron Island, by Patton (1966) and also from One Tree Island, Queensland, from *Pocillopora*, *Stylophora* and *Acropora* corals. It is common on the branching corals of the Heron Island reef flat. *Periclimenes amymone* is distributed from the Nicobar Islands to the Samoan Islands.

73. *Periclimenes attenuatus* Bruce, 1971a

*Periclimenes attenuatus* has not been previously recorded from Australian waters. One male has been examined from an unidentified crinoid collected from 15 m at Lizard Island, Queensland. The species has been previously recorded only from the Duke of York Island, Bismarck Archipelago.

74. *Periclimenes brevicarpalis* (Schenkel, 1902)

First recorded in Australian waters by Saville-Kent (1893) from several Great Barrier Reef localities, *P. brevicarpalis* is also known from several northern Queensland localities and the Monte Bello Islands, Western Australia. It has been recorded from most of the Indo-West Pacific region, excluding Hawaii and south-eastern Polynesia, in association with species of the giant anemone genus *Stoichactis*, and with other anemones.

75. *Periclimenes brockettii* Borradaile, 1915

Three specimens from Heron Island, associated with a yellow crinoid, probably *Comanthina schlegeli*, have been provisionally referred to this little-known species, which is known with certainty only from the holotype from the Maldives, and which may be synonymous with *P. affinis* (Zehntner).

76. *Periclimenes carinidactylus* Bruce, 1969a

*Periclimenes carinidactylus* is known from two examples only. One specimen was collected in Port Jackson, New South Wales, and the other came from Kangaroo Island, South Australia, collected at a depth of 9 m. The latter specimen was associated with the crinoid *Comanthus trichoptera*.

77. *Periclimenes ceratophthalmus* Borradaile, 1915

First recorded in Australian waters from One Tree Island on the crinoid *Himerometra robustipinna* at 43 m, this species was later recorded from Heron Island at 18 m on the same host. *P. ceratophthalmus* is distributed from Zanzibar and Kenya to the Solomon Islands.

78. *Periclimenes colemani* Bruce, 1975

This species was first discovered at Heron Island in association with the echinoid *Asthenosoma intermedium* at 11 m depth. One further example has since been obtained from the same host. It has yet to be recorded at any other locality.

79. *Periclimenes commensalis* Borradaile, 1915

Initially recorded from Murray Island, Torres Strait, this species is one of the commonest crinoid associates. It has since been reported from Heron Island and from Bribie Passage and Myora in Moreton Bay, Queensland. The hosts include *Comanthus parvicirrus*, *Comanthina schlegeli*, *Comaster multifidus* and *Lamprometra palmata*, a new host record. It has been found to a depth of 30 m. The species is widely distributed from the western Indian Ocean to the Great Astrolabe Reef, Fiji.

80. *Periclimenes consobrinus* (de Man, 1902)

This species is recorded in Australian waters only from Heron Island, Queensland, in association with the coral *Pocillipora damicornis*, from the reef flat. It is otherwise known only from several localities in the western Indian Ocean and the Moluccan Islands.

81. *Periclimenes cornutus* Borradaile, 1915

Specimens reported from Wistari Reef, Heron Island, Queensland, collected on the crinoid *Himerometra robustipinna* at 12 to 14 m, have been provisionally referred to this species, which may be a synonym of *P. amboinensis* (de Man). *P. cornutus* is known only from the holotype from the Maldives.

82. *Periclimenes cristimanus* Bruce, 1965

*Periclimenes cristimanus* has been recorded from Heron Island, Queensland, in association with the echinoid *Echinothrix calamaris* from 3 to 17 m depth. It is otherwise recorded only from Singapore, Malaysia and Hong Kong.

83. *Periclimenes diversipes* Kemp, 1922

First recorded from Australia by Patton (1966) with specimens from Restoration Rock, Queensland. *P. diversipes* was later recorded from Heron Island where it occurs sparsely with a variety of hosts including species in the coral genera *Porites* and *Goniopora*. The species is known from the Red Sea to La Réunion and as far east as the Coral Sea.

84. *Periclimenes elegans* (Paulson, 1875)

This is a free-living species first recorded in Australia from Cape Jaubert, Western Australia, by Balss (1921), and later from the Capricorn Islands, Low Islands, Swain Reefs and Heron Island, Queensland. Its distribution extends from the Red Sea to the Marshall Islands.

85. *Periclimenes galene* Holthuis, 1952

*Periclimenes galene* is known in Australian waters from three specimens collected separately at Heron Island, Queensland, on the hydroid *Lytocarpus philippinus* at 18, 24 and 26 m depths. Originally

reported from Indonesia, this species is now known also from Zanzibar, Tanganyika and Kenya, in association with the hydroid genus *Aglaophenia*.

86. *Periclimentes goniopora* Bruce, in press, a

This species is recorded only from Heron Island, Queensland, in Australian waters, where a small number of specimens have been collected from the reef flat to 6 m depth, in association with a variety of coral genera including *Montipora*, *Goniopora*, *Galaxea* and *Porites*. The only previous records of this species are from Kenya and La Reunion.

87. *Periclimentes granulimanus* Bruce, 1978

A single specimen of this species is reported from Wistari Reef, Heron Island, Queensland, collected at 24 m in association with the hydroid *Lytocarpus philippinus*. The species is known by only one other specimen from Tany Keli, Madagascar, found on an antipatharian host.

88. *Periclimentes hertwigi* Balss, 1913

*Periclimentes hertwigi* was first recorded from Australia on the basis of specimens collected off Mooloolaba, Queensland, at a depth of 500 m, in association with the echinoid *Aerosoma thetidis*. There have been no subsequent records of this species from Australia. It has otherwise been recorded only from Japan, the East China Sea and the Kei Islands.

89. *Periclimentes holthuisi* Bruce, 1969a

First recorded in Australia from Bowen Island and later Peloris Island and Moreton Bay, Queensland, *P. holthuisi* has more recently been recorded from Heron Island where it occurs to a depth of 25 m in association with the coral genera *Goniopora* and *Catalaphyllia* and the anemone *Dofleinia armata*. It is otherwise known from Zanzibar to the Caroline Islands and from Hong Kong to New Caledonia.

90. *Periclimentes imperator* Bruce, 1967

This species was first recorded from Heron Island, Queensland, on the nudibranch *Hexabranhus sanguineus*, and has since been recorded from Undine Reef, Orpheus Reef and Lizard Island. Specimens have also been examined from Bligh Reef, associated with the holothurian *Bohadschia argus* and from Heron Island on another holothurian *Thelonota ananas*. *Periclimentes imperator* is extensively distributed throughout the Indo-West Pacific region from the Red Sea and Zanzibar to Hawaii.

91. *Periclimentes incertus* Borradaile, 1915

Reported from Cape Jaubert, Western Australia, by Balss (1921) (as *Palaemonella biunguiculatus*), *P. incertus* is also known from Heron Island, Queensland, in association with sponges of the genera *Arenochalina* and *Leucetta*, from 12 to 15 m. The species is distributed from Aden to Madagascar, east to Indonesia and New Caledonia.

92. *Periclimentes indicus* (Kemp, 1915)

*Periclimentes indicus* has been recorded from Moreton Bay, Queensland, in association with the intertidal anemone *Macroductyla aspera*. It is otherwise known only from India, Singapore and Indonesia.

93. *Periclimentes inornatus* Kemp, 1922

Specimens have been recorded from Heron Island, Queensland, from giant anemones of the genus *Radianthus* in depths of 9 to 18 m. It is also known from Kenya and Zanzibar east to the Great Astrolabe Reef, Fiji.

94. *Periclimentes investigatoris* Kemp, 1922

This species has not been previously recorded from Australian waters. One specimen has been examined from an unspecified locality in Queensland, where it was collected in association with a telestacean host in the genus *Solenocaulon*. The species is otherwise known only from the type locality in the Arabian Gulf at 24 m depth.

95. *Periclimentes kemp* Bruce, 1969a

*Periclimentes kemp* has been reported in association with a variety of reef flat and shallow water alcyonarians, including *Sarcophyton*, *Limnalia*, *Macrospicularia* and *Nephthea*, only from Heron Island, Queensland. It is otherwise known from the Red Sea, Zanzibar, Andaman Islands and Singapore.

96. *Periclimenes kororensis* Bruce, 1977

Although not previously recorded from Australia, a pair of specimens of *P. kororensis* have been examined from Broadhurst Reef, Queensland. They were associated with the coral *Heliofungia actiniformis* from a depth of 17 m. The species has been previously recorded only from the type locality, Koror Island, in the Palau Islands, in association with the same host species.

97. *Periclimenes lanipes* Kemp, 1922

First noted in Australian waters from Double Island Point, Queensland, in association with the basket star *Euryale aspera*, further specimens of *P. lanipes* have been recorded from Heron Island on the same host species. *Periclimenes lanipes* is otherwise known from Somalia to Madagascar, east to the South China Sea and New Caledonia. It is the only pontonine shrimp known to associate with an ophiuroid host.

98. *Periclimenes longirostris* (Borradaile, 1915)

*Periclimenes longirostris* is known in Australian waters from a single example reported from North East Cay, Herald Islands. The species has otherwise been recorded sparsely from the Red Sea, Zanzibar, Maldiv, Seychelle and Andaman Islands, Papua, the Philippines and Enewetak Atoll.

99. *Periclimenes lutescens* auct.

Recorded from Heron Island by Patton (1966) and from Swain Reefs, with further material from Heron Island (Bruce, in press, f), *P. lutescens* lives in association with a variety of *Acropora* coral species. It is common throughout most of the Indo-West Pacific region from the Red Sea to Tonga and probably further east.

100. *Periclimenes madreporae* Bruce, 1969a

The type locality of this species is Erskine Island, Queensland. It is also known from Willis Island, Bet Reef, Restoration Rock, Heron Island, Wistari Reef and Myora, Moreton Bay (Patton, 1966) where it occurs in a wide variety of coral hosts. Outside Australian waters *P. madreporae* has been reported only from La Réunion and the Solomon Islands.

101. *Periclimenes magnificus* Bruce, 1979

This species was first described from specimens collected at Heron Island, Queensland, at 24 m depth, in association with the coral *Catalaphyllia plicata* and is also found in association with the anemone *Dofleinia armata*. Further specimens have since been collected at Heron Island, including four examples from a species of *Cerianthus* anemone. Outside Australian waters, it is known only from southern Japan.

102. *Periclimenes nilandensis* Borradaile, 1915

*Periclimenes nilandensis* is known in Australia from 14 specimens collected from the hydroid *Lytocarpus philippinus* at 24 m on Wistari Reef, Heron Island, Queensland. It is usually found with gorgonian hosts. The species has been reported from Zanzibar, Kenya, Madagascar, Maldiv Islands, Indonesia and the South China Sea.

103. *Periclimenes ornatellus* Bruce, 1971a

This species is known in Australian waters from a single example from an unidentified anemone on the reef flat at Heron Island, Queensland. It is otherwise known only from Enewetak Atoll, on the anemone *Radianthus malu*.

104. *Periclimenes ornatus* Bruce, 1969a

In Australian waters this species is known only from Heron Island, Queensland, in association with anemones of the genus *Radianthus* to a depth of 6 m. It is otherwise known only from Kenya, Hong Kong, Japan and Enewetak Atoll.

105. *Periclimenes pectiniferus* Holthuis, 1952

A single ovigerous female was collected in 30 to 35 m depth, 50 km east of Townsville, Queensland, and represents the only occurrence of this rare species in Australian seas. It was previously known only from the type material from Kabala Dua Island, Indonesia. The host of this species has yet to be identified.

106. *Periclimentes platycheles* Holthuis, 1952

This species has not been previously recorded from Australia. One male and two ovigerous females from Lizard Island, Queensland, have been examined. They were collected from a colony of *Acropora* in 14 m depth. The species has previously been recorded only from Indonesia and the Palau Islands.

107. *Periclimentes psamathe* (de Man, 1902)

Numerous specimens of this species, found in association with the hydroid *Lytocarpus philippinus*, have been reported from 24 to 26 m at Heron Island, Queensland. Although not recorded elsewhere in Australia, this species is known from East Africa, Madagascar, Chagos and Maldivé Islands, Indonesia, South China Sea, Japan, Palau and New Caledonia.

108. *Periclimentes ruber* Bruce, in press, c

At present known only from Australian waters, this species was first reported in association with the crinoid *Zygometa microdiscus* from 9 m in Bribie Passage, Queensland.

109. *Periclimentes seychellensis* Borradaile, 1915

*Periclimentes seychellensis* has been reported in Australian waters in numbers on the reef flat at Heron Island. This free-living micropredator, usually found in algal communities, is also known from the Red Sea to Mozambique, east to Indonesia and Papua.

110. *Periclimentes soror* Nobili, 1904

First recorded in Australian waters from Green and Fairfax Islands, Queensland, on the seastar *Acanthaster planci*, this species has subsequently been recorded from Chapman Island, Beaver Reef and Heron Island in Queensland, Cuwaton in New South Wales, and Exmouth Gulf and Dampier Islands in Western Australia. Specimens have also been examined from Lizard Island and Wreck Island, Queensland. The species associates with a wide variety of asteroid hosts, most commonly *Acanthaster* and *Culcita* but also species of *Plecaster*, *Halityle*, *Echinaster* and also *Nardoa novaecaledoniae*, a new host record. *Periclimentes soror* occurs throughout the whole Indo-West Pacific region from the Red Sea to Hawaii and the Tuamotu Islands, and also occurs in the Gulf of Panama.

111. *Periclimentes spiniferus* de Man, 1902

McNeill (1926) first recorded *P. spiniferus* in Australia from Northwest Islet, Capricorn Island and later from Heron Island and the Low Isles. The species is abundant on the Heron Island reef flat, and specimens have also been examined from Lizard Island. *Periclimentes spiniferus* is present throughout most of the Indo-West Pacific region with the exception of the north-west Indian Ocean and Red Sea. It is a free-living species commonly found sheltering in coral colonies.

112. *Periclimentes tenuipes* Borradaile, 1898

Four specimens have been reported from Wistari Reef, Heron Island, Queensland from 14 to 24 m. It is also known from Zanzibar, Kenya, Madagascar and east to Palau Islands and Enewetak Atoll. *Periclimentes tenuipes* is apparently a free-living, nocturnally active animal, but it has been reported as an anemone associate at Palau Islands (Read, 1974).

113. *Periclimentes tenuis* Bruce, 1969a

A few examples of this species have been reported from Heron Island, Queensland, in association with crinoids, including *Himerometra magnipinna*. It is known elsewhere only from Zanzibar and Eilat.

114. *Periclimentes toloensis* Bruce, 1969a

*Periclimentes toloensis* has been recorded from Wistari Reef and Heron Island, Queensland, on the hydroid *Lytocarpus philippinus* from 24 m depth. It is otherwise known only from the type locality, Hong Kong, and from Zanzibar.

115. *Periclimentes zanzibaricus* Bruce, 1969

This species is recorded in Australia only from Geraldton, Western Australia (Bruce, 1973) in association with the echinoid *Centrostephanus tenuispinus*. It is otherwise recorded only from Zanzibar, Kenya and the Seychelles.

*Philarius* Holthuis, 1952116. *Philarius gerlachei* (Nobili, 1905)

*Philarius gerlachei* has been recorded by Patton (1966) from Willis Island, Bet Reef, Restoration Rock and Heron Island, Queensland, in association with *Acropora* corals. Further examples have since been examined from Heron Island. This species extends from the Red Sea to the Samoan Islands.

117. *Philarius imperialis* (Kubo, 1940)

Three examples of *P. imperialis* were recorded by Patton (1966) from reef flat *Acropora* colonies at Heron Island and three from Restoration Rock, Queensland. Further specimens from Heron Island and Lizard Island have since been examined. This species is found to depths of 20 m, from the Red Sea to the Marshall Islands.

118. *Philarius lifuensis* (Borradaile, 1898)

Several examples of this little-known species have been reported from Wistari Reef and Heron Island, Queensland, from *Acropora* corals between 6 and 18 m depth. The species has been previously recorded from Heron Island and Erskine Island in the Capricorn Islands and is otherwise known only from the type locality in the Loyalty Islands.

*Platycaris* Holthuis, 1952119. *Platycaris latirostris* Holthuis, 1952

This species was recorded from Australia on the basis of a single pair of specimens collected at 15 m from Heron Island, Queensland, in the oculinid coral *Galaxea fascicularis*. There have been no further examples collected. The species is otherwise known from Kenya to La Réunion, east to the Great Astrolabe Reef, Fiji.

*Pliopontonia* Bruce, 1973a120. *Pliopontonia furtiva* Bruce, 1973a

*Pliopontonia furtiva* was first recorded from Australia by Coleman (1977) from Heron Island, Queensland. Further specimens have since been recorded from 8 m at Wistari Reef, Heron Island and a single example has been examined from 5 m at Cook Island, Tweed Heads, New South Wales. The species is known elsewhere only from the type locality in Kenya.

*Pontonia* Latreille, 1829121. *Pontonia ardeae* Bruce, in press, b

This species was recently described from Heron Island, Queensland, at 18 m depth, in association with the bivalve *Chama reflexa*. It has not yet been recorded from any other localities.

122. *Pontonia katoi* Kubo, 1940a

*Pontonia katoi* was initially reported in Australia from Coil Reef, Queensland, and later from Wistari Reef and Heron Island, in association with species of solitary ascidians in the genera *Herdmania*, *Cnemidocarpa*, *Polycarpa* and *Styela*. Other examples have been examined from Lizard Island, Queensland, in *Polycarpa aurata* and from Cockburn Sound, Western Australia, in *Polycarpa pedunculata*. The species is otherwise known from Tanganyika, Japan, Indonesia and New Caledonia.

123. *Pontonia minuta* Baker, 1907

This species has been recorded only from an indefinite locality in South Australia and from Meroo Point, New South Wales. There have been no reports from outside Australia. A colour slide of a pair of pontoniine shrimps associated with the polychaete *Eunice aphroditois* is provisionally referred to *P. minuta*—the shrimps were not preserved. They were collected by Ms J. Hunter on 18 February 1973 from Long Reef, Sydney, New South Wales. They were uniformly bright red with the outer parts of the fingers of the second pereopods, propod and carpus of the ambulatory pereopods, and distolateral part of the exopod of the uropod white. There are no confirmed records of associations between annelids and pontoniine shrimps. *Pontonia minuta* is the only pontoniine shrimp known to have abbreviated larval development. The species differs in a number of small morphological characters from all other species

of this genus and these, together with abbreviated larval development and possible association with an annelid host suggest that this taxon should probably be placed in a separate genus (Bruce, 1972d).

124. *Pontonia okai* Kemp, 1922

Specimens have been recorded at Heron Island at depths of 15 m, in association with ascidians, including a species of *Ascidia*. *Pontonia okai* is otherwise known from Kenya, Burma, the Lesser Sunda Islands and the South China Sea.

125. *Pontonia sibogae* Bruce, 1972b

*Pontonia sibogae* is recorded in Australia only from Port Curtis and Lodestone Reef, Queensland. The Port Curtis material, from 3 to 6 m depth, was associated with the ascidian *Styela whiteleggii*. The species is also known from Madagascar and Indonesia.

*Pontonides* Borradaile, 1917

126. *Pontonides* sp., aff. *unciger* Calman, 1939

A pair of specimens has been collected from 23 m at Wistari Reef, Heron Island, Queensland, in association with the whip coral *Cirripathes anguina*. These specimens are considered to be distinct from *P. unciger* Calman s.s. Similar material from Lizard Island has also been examined. This species of *Pontonides* occurs extensively throughout the Indo-West Pacific region. *P. unciger* s.s. is known only from the Red Sea and Kenya.

*Pontoniopsis* Borradaile, 1915

127. *Pontoniopsis comanthi* Borradaile, 1915

First described from specimens collected at Mabuag, Torres Strait, the species has since been reported from Wistari Reef and Heron Island at a depth of 6 to 21 m. *Pontoniopsis comanthi* usually occurs on crinoids including *Comatula pectinata*, *C. purpurea* and *Capillaster multiradiatus*. Outside Australia the species ranges from the Red Sea to the Gilbert Islands.

*Propontonia* Bruce, 1969

128. *Propontonia pellucida* Bruce, 1969

A pair of specimens has been recorded from the reef flat at Heron Island, in association with a species in the alcyonarian genus *Lobophyton*. The species is known otherwise from several western Indian Ocean localities.

*Stegopontonia* Nobili, 1906

129. *Stegopontonia commensalis* Nobili, 1906

A single specimen of this species has been reported from Australia, in association with the echinoid *Diadema setosum* at Heron Island (Gillet and McNeill, 1959). This species has not been found subsequently on Heron Island. It has been rarely reported from Kenya to Hawaii and the Tuamotu Islands.

*Thaumastocaris* Kemp, 1922

130. *Thaumastocaris streptopus* Kemp, 1922

*Thaumastocaris streptopus* has been previously recorded from Heron Island and Wistari Reef, Queensland, from 12 m in the sponges *Arenochalina flammula* and *Leucetta microraphis*. A few further specimens have since been collected. The species is known elsewhere from Zanzibar, Kenya, Somalia, Madagascar, Indonesia, New Caledonia and Enewetak Atoll.

*Typton* Costa, 1944

131. *Typton anomalus* (Bruce, 1979)

This species is known only from the type locality, Darwin, Northern Territory, from three ovigerous females collected between 5 and 13 m, probably from sponge hosts. There have been no further reports of this species, which was originally placed in the genus *Oncocaris*.

132. *Typton australis* Bruce, 1973c

*Typton australis* was first described from Chinaman's Reef, Queensland, and has since been reported from Heron Island reef flat in association with a sponge in the genus *Psammopemma*. There have been no records of this species outside Australian waters.

133. *Typton bawii* Bruce, 1972c

One specimen has been reported from an unidentified sponge on the Heron Island Reef flat. There have been no subsequent specimens collected. The species is elsewhere known only from Zanzibar and Kenya.

134. *Typton dentatus* Fujino and Miyake, 1969

A pair of specimens has been reported from the reef flat at Heron Island, Queensland, in a sponge in the genus *Reniera*. There have been no further records and the species is otherwise known only from the type locality in the Ryukyu Islands.

135. *Typton wasini* Bruce, 1977b

Numerous specimens have been recorded from Heron Island, Queensland, from the reef flat, crest and slope, in a variety of small encrusting sponges, including a species of *Dysidea*. The species has been recorded elsewhere only from Kenya and La Reunion.

***Zenopontonia* Bruce, 1975**136. *Zenopontonia noverca* (Kemp, 1922)

*Zenopontonia noverca* was first reported from Bowen, Queensland, and from Wistari Reef and Heron Island, on the asteroid *Pentacera aster regularis*. There have also been no other Australian records but the species is also known from Zanzibar, Madagascar and New Caledonia.

## DISCUSSION

The subfamily Pontiinae is at present represented by 136 species, belonging to 36 genera, in the waters of the Australian continent. Of these genera, 18 are monotypic, in most cases highly modified morphologically and specialised in their associations with a restricted range of hosts. The fauna is dominated by the genus *Periclimenes* with 48 species, 6 of which are free-living while the others are associated with a wide variety of host animals including particularly sponges, corals, anemones and crinoids. The genus *Periclimenaeus* is also well represented by 15 species, 11 of which are associates of sponges and 4 of colonial ascidians. *Coralliocaris* is represented by 6 species, all associated with corals in the genus *Acropora*. *Typton* is represented by 5 species, all associated with sponges. *Conchodytes* also with 5 species, is associated with bivalves. *Pontonia* has 3 species found in association with solitary ascidians, one with a bivalve mollusc and one species of rather uncertain systematic position possibly associated with an annelid.

Of the species recorded in this report 13 have not yet been found to occur outside Australian waters. Several have recently been described from Queensland waters and may be expected to occur elsewhere but the species from Australia's southern waters may be endemic (indicated by asterisks in the following list):

*Onycocaridella prima*; *Paranchistus pycnodontae*; *Periclimenaeus diplosomatis*, *P. orbitospinatus*, *P. pachydentatus*; *Periclimenes aesopius*\*, *P. carinidactylus*\*, *P. colemani*, *P. ruber*; *Pontonia ardeae*, *P. minuta*\*. *Typton anomalus*, *T. australis*.

With the exception of 8 species (2 *Palaemonella*, 6 *Periclimenes*) regarded as free-living browsers, scavengers or micropredators, all other species are considered to be 'commensals' of other marine invertebrates, although the hosts of 3 species are yet to be identified. These associations are summarised in Table 1.

Coelenterates predominate among the hosts of pontoniine shrimps. They are hosts to 50 shrimp associates in 18 genera; of these 50 shrimp species, 29 (in 11 genera) are associated with scleractinian corals. Sponges are the hosts of 27 species in 8 genera and echinoderms are host to 23 species in 11 genera.

Only very general comparisons of the diversity of the Australian fauna with other regions are yet possible as few regions have been investigated to the same level. The Indonesian Archipelago has a pontoniine fauna of 67 species (Holthuis, 1952), Zanzibar Island has 87 species (Bruce, 1974a), the

Table 1. THE ASSOCIATIONS OF THE AUSTRALIAN PONTONIINE SHRIMPS

Host	Number of associates	Genera associated (number of species in parentheses)
<b>Porifera</b>	27	
Demospongiae	27	<i>Anchistioides</i> (3); <i>Apopontonia</i> (1); <i>Onyccaridella</i> (2); <i>Onyccaris</i> (3); <i>Periclimenaeus</i> (11); <i>Periclimenes</i> (1); <i>Thaumastocaris</i> (1); <i>Typton</i> (5)
<b>Coelenterata</b>	50	
Hydroida	6	<i>Hamodactyloides</i> (1); <i>Periclimenes</i> (5)
Antipatharia	2	<i>Pontonides</i> (1); <i>Dasycaris</i> (1)
Alcyonacea	3	<i>Hamodactylus</i> (1); <i>Periclimenes</i> (1); <i>Propontonia</i> (1)
Telestacea	1	<i>Periclimenes</i> (1)
Gorgonacea	4	<i>Hamodactylus</i> (2); <i>Mesopontonia</i> (1); <i>Pontonides</i> (1)
Pennatulacea	1	<i>Dasycaris</i> (1)
Corallimorpharia	1	<i>Pliopontonia</i> (1)
Actiniaria	3	<i>Periclimenes</i> (3) (+ 2*)
Scleractinia	29	<i>Anapontonia</i> (1); <i>Coralliocaris</i> (6); <i>Fennera</i> (1); <i>Hamopontonia</i> (1); <i>Harpiliopsis</i> (3); <i>Ischnopontonia</i> (1); <i>Jocaste</i> (2); <i>Paratypton</i> (1); <i>Periclimenes</i> (9); <i>Philarius</i> (3); <i>Platycaris</i> (1)
<b>Mollusca</b>	16	
Gastropoda	1	<i>Periclimenes</i> (1)
Bivalvia	15	<i>Anchistus</i> (7); <i>Conchodytes</i> (5); <i>Paranchistus</i> (2); <i>Pontonia</i> (1)
<b>Annelida</b>	1?	
Polychaeta	1?	? <i>Pontonia minuta</i>
<b>Echinodermata</b>	22	
Crinoidea	13	<i>Palaemonella</i> (1); <i>Parapontonia</i> (1); <i>Periclimenes</i> (10); <i>Pontoniopsis</i> (1)
Holothuroidea	1	<i>Periclimenes</i> (1)*
Echinoidea	6	<i>Allopontonia</i> (1); <i>Periclimenes</i> (4); <i>Stegopontonia</i> (1)
Asteroidea	2	<i>Periclimenes</i> (1); <i>Zenopontonia</i> (1)
Ophiuroidea	1	<i>Periclimenes</i> (1)
<b>Chordata</b>	9	
Ascidiacea	9	<i>Dasella</i> (1); <i>Periclimenaeus</i> (4); <i>Pontonia</i> (4)
Host unknown	3	<i>Periclimenes</i> (3)
Free-living	8	<i>Palaemonella</i> (2); <i>Periclimenes</i> (6)
Total	136	

\*paratenic association only.

Seychelle Islands 50 species (Bruce, in press, e) and Japan 33 species. The central East African fauna (Kenya and Tanzania) consists of 134 species (Bruce, 1974a). In all these areas the pontoniine fauna is still inadequately known.

The distribution of most of the 'commensal' species will be largely determined by the distribution of their host animals and their adaptability in utilising other types of host animals. The preponderance of species from Queensland waters reflects the amount of study this region attracts and is not an accurate measure of their relative diversity or of their geographical distribution, although undoubtedly these

shrimps do reach their maximum diversity in the coral reef biotope. The caridean fauna of the tropical northern waters in Western Australia and the Northern Territory has still only been cursorily studied. Undoubtedly many or even most of the species known from Queensland will also occur in these regions, probably with additional species.

At present only 13 species have been recorded in Australia from outside Queensland waters, mainly from single occurrences at scattered localities, but 6 species were reported by Balss (1921) from Cape Jaubert, Western Australia.

**Note added in proof.** The following publications listed as being in press in the "References" section have now been published.

Bruce, A.J., in press, b: *Crustaceana* 40(2): 113-126 (1981).

————— in press, c: *Mem. Aust. Mus.* 16: 191-216 (1982).

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