

SHRIMPS ASSOCIATED WITH COELENTERATES, ECHINODERMS, AND MOLLUSCS IN THE SANTA MARTA REGION, COLOMBIA

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ABSTRACT

Commensal shrimps associated with echinoderms, molluscs, and coelenterates were collected in Tayrona National Park northeast of Santa Marta (11°15'N, 74°13'W). Twenty-nine species belonging to 4 families were found: 19 palaemonids, 6 hippolytids, 3 alpheids, and 1 gnathophyllid. The following shrimps are reported as commensals for the first time: *Synalpheus townsendi* and *Alpheus cristulifrons* (from crinoids), *Latreutes parvulus* (from an echinoid), and *Periclimenes* sp.? and *Tozeuma serratum* (from a hydroid).

Many coral reef shrimps were originally described without mention of the animals with which they may have been associated. Details of these associations have been recently studied through the use of SCUBA (Patton, 1972; Bruce, 1976a).

Bruce (1976a) referred to such relationships as associations rather than commensalisms, as long as the actual nature of the relationship was largely unknown. In this paper the term commensal is used to indicate the existence of a specific association between a shrimp and another animal, so that the former is generally to be found only in association with the latter, and not to imply any precise trophic relationship between the two organisms. However, in many cases specific and obligatory hosts have been confirmed.

Many morphological and color adaptations of these commensal shrimps were discussed by Bruce (1976a). These adaptations are mostly related to feeding and defensive mechanisms.

The purpose of this paper is to contribute SCUBA observations to knowledge of commensal associations between shrimps and their hosts in the southern Caribbean sea.

MATERIAL AND METHODS

The collection of these commensal shrimp took place from June to December 1976 and from April to September 1980. A face mask alone was used in the collection of shallow-water material, and SCUBA equipment in deeper waters. Plastic bags were used to cover the shrimp directly, or to cover the animal on which the shrimps were observed or on which they were suspected to be living. In the latter case the host animals were placed on plastic trays until all the shrimps had detached themselves, thus preventing loss of material. Collections were made aperiodically in Santa Marta bay, and in several outlying bays in Tayrona Park (Fig. 1).

Observations about behavior and dependency on the host were made in an aquarium, but only when the specimens were abundant. The measurements that appear throughout the text correspond to the total length of the shrimps from the tip of the rostrum to the posterior end of the telson, excluding the terminal spines. The material examined is currently a part of the crustacean collection of INVEMAR (Instituto de Investigaciones Marinas), Marine Research Institute of Punta Betón, Colombia. New host records found in this study are marked with an asterisk (*).

RESULTS

Family PALAEMONIDAE
Subfamily PONTONIINAE
Lipkebe holthuisi Chace, 1969

Collections.—7 ♀♀, 13 ♂♂, ranging from 4 to 8 mm, from Santa Marta, Concha, Nenguange, and Granate, depth range from 5 to 22 m. Reg. Crust. Invemar Nos. 433, 471

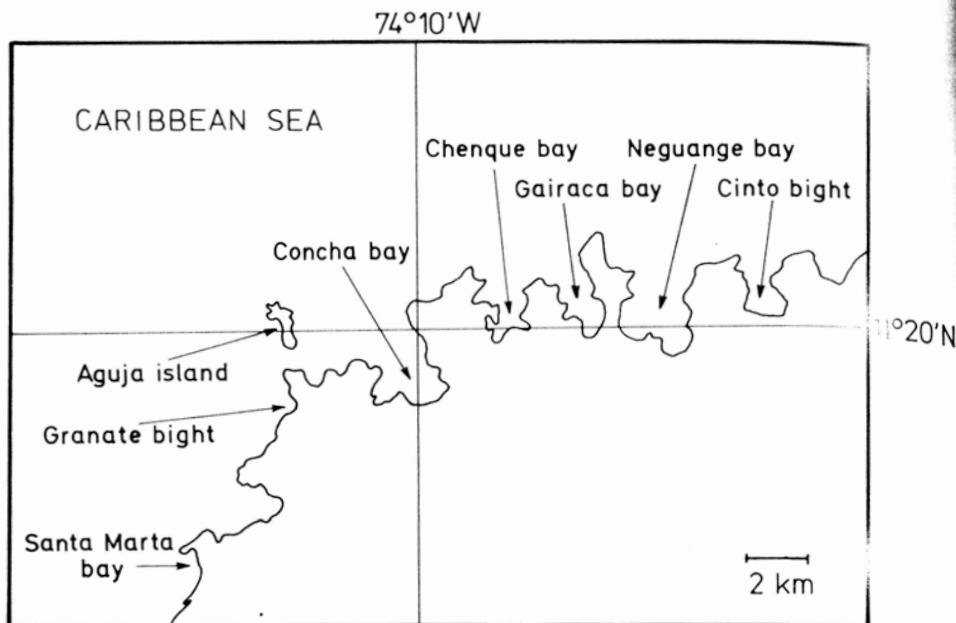


Fig. 1. Localities in the Santa Marta region, Colombia, where collections were made.

Host.—The crinoid *Nemaster grandis*.*

Remarks.—The color is intense, almost violet red. The pereopods, antennal scale, and telson are sometimes darker with large violet spots. It is interesting that, even though the coloration is markedly different from the black and white color of the host, the shrimp is never observed at a casual glance.

This species has been previously recorded only from the southeastern Gulf of Mexico from below 100 m (Chace, 1969; Shaw *et al.*, 1977) and the Brazilian coast (Bruce, 1976b). Shaw *et al.* (1977) reported this species as a commensal of the crinoid *Comactinia meridionalis meridionalis*. This shrimp displayed aggressive behavior toward other commensal species (*Periclimenes crinoidalis*, *Periclimenes meyeri*) on the crinoid, possibly due to the fact that it possesses a more developed second chela than the others.

Periclimenes americanus (Kingsley, 1878)

Collections.—8 ovigerous ♀♀, 5 ♂♂, ranging from 12 to 18 mm, from Santa Marta and Neguange, depth range from 2 to 12 m. Reg. Crust. Invemar Nos. 41, 53.

Hosts.—The crinoid *Nemaster grandis** and the anemones *Bartholomea annulata* and *Bunodosoma granuliferum*.*

Remarks.—The color is variable. When associated with *N. grandis*, the shrimp was transparent with reddish spots along the dorsal and ventral lengths of the body. The second major pereopod had transverse red and black lines. When found with the anemone, *B. annulata*, the shrimp was translucent with orange speckles, while those observed on *B. granuliferum* were white with reddish spots on the abdomen and tiny speckles of the same color on the cephalothorax.

Mahnken (1972) reported it living with *B. annulata*. Chace (1972) also reported the same commensalism, but mentioned that the shrimp occurs on sandy bottoms,

coral reefs, and dead coral, among other habitats. A similar wide range of habitats was also found in this study. It may therefore be considered a "nonobligatory" commensal on the previously mentioned hosts.

Periclimenes anthophilus Holthuis and Eibl-Eibesfeldt, 1964

Collections.—2 ovigerous ♀♀, ranging from 18 to 22 mm, from Granate and Aguja island, depth range from 7 to 10 m. Reg. Crust. Invemar No. 460.

Hosts.—The anemones *Bartholomea annulata* and *Condylactis gigantea*.

Remarks.—This species is closely related to *P. pedersoni*. The two specimens collected in the Santa Marta region showed a small number of purple spots on the third and fourth abdominal segments, and small orange and reddish spots on the uropodal exopod. The antennal flagellum always has white markings interrupted by reddish violet zones. During my survey, these colors were useful for the separation of the two species in the field.

Periclimenes bowmani Chace, 1972

Collections.—1 ♀, 1 ♂, ranging from 13 to 15 mm, from Aguja island, depth 15 m. Reg. Crust. Invemar No. 490.

Host.—The crinoid *Nemaster rubiginosa*.

Remarks.—These shrimp corresponded with their host in color. Chace (1972) reported *P. bowmani* as associated with two species of unstalked crinoids.

Periclimenes crinoidalis Chace, 1969

Collections.—1 ovigerous ♀, 1 ♂, ranging from 15 to 17 mm, from Neguange, depth 15 m. Reg. Crust. Invemar No. 62.

Host.—The crinoid *Nemaster grandis*.

Remarks.—The only known report is by Chace (1969), who also found this shrimp living with the crinoid *N. grandis*.

Periclimenes iridescens Lebour, 1949

Collections.—20 ♀♀, 12 ♂♂, ranging from 8 to 25 mm, from Santa Marta, Gairaca, and Neguange, depth range from 3 to 25 m. Reg. Crust. Invemar Nos. 472, 473, 474.

Hosts.—The anemones *Condylactis gigantea*,* *Lebrunia danae*.* The hydroid *Eudendrium carneum*.* The antipatharian *Cirripathes lutkeni*.*

Remarks.—The color of this shrimp is variable, depending on the type of host on which it is found. However, there is a tendency toward a translucent white which is accentuated when the shrimp is found on hydroids or antipatharians.

Chace (personal communication) examined four commensal specimens from *C. lutkeni* and compared them with the holotype of *P. iridescens*. He found that they seem to differ in having the rostrum slightly less high, the third abdominal somite somewhat more strongly convex in lateral aspect, and the sixth somite noticeably longer. Were it not that *P. iridescens* is believed to be variable, these specimens could be referred to a distinct, undescribed species. For this reason, more detailed systematic studies are needed.

Periclimenes meyeri Chace, 1969

Collections.—31 ovigerous ♀♀, 14 nonovigerous ♀♀, 28 ♂♂, ranging from 5 to 15 mm, from Santa Marta, Neguange, Concha, Granate, and Aguja island, depth range from 3 to 25 m. Reg. Crust. Invemar Nos. 475, 476.

Host.—The crinoid *Nemaster grandis*.*

Remarks.—This species seems to be an obligatory and exclusive commensal of the crinoid *N. grandis*. It imitates the color pattern of its host by extending itself longitudinally over the pinnules of the crinoid, in such a way that its black and white sections coincide with those of the crinoid. Once dislodged from the host, it sometimes retains its coloration, or begins to redden after a period of time. This shrimp was the most abundant commensal of the crinoid *N. grandis*. In one case, 25 specimens were found associated with one host. These commensals were more common on crinoids found at greater depths.

Periclimenes pedersoni Chace, 1958

Collections.—15 ovigerous ♀♀, 11 ♂♂, ranging from 18 to 32 mm, from Santa Marta, Neguange, Gairaca, Concha, Cinto, Granate, and Aguja island, depth range from 3 to 40 m. Reg. Crust. Invemar Nos. 47, 58, 71, 73, 78.

Hosts.—The anemones *Bartholomea annulata*, *Aiptasia palida**, *Bunodosoma granuliferum**, *Lebrunia danae**, the benthic medusa *Cassiopea xamachana**, and the ceriantharian *Cerianthus* sp.*

Remarks.—The same coloration described by Chace (1958) was also found. Until now this species has always been described as living with anemones (Chace, 1958; Limbaugh *et al.*, 1961; Mahnken, 1972; Criales, 1979). It was not known to live in any other habitat.

Periclimenes perryae Chace, 1942

Collections.—1 adult ♀, 13 mm, from Neguange, depth 13 m. Reg. Crust. Invemar No. 506.

Host.—The basket star *Astrophyton muricatum*.

Remarks.—This shrimp was so effectively concealed that it was finally detected only when it left its host a long time after the basket star had been collected. Chace (1972) reported three of these associations. This is a fourth report of commensalism involving these two species. Since this shrimp has been observed only in this habitat, it could be considered as an obligatory commensal of *A. muricatum*.

Periclimenes rathbunae Schmitt, 1924

Collections.—17 ♀♀, 8 ♂♂, ranging from 14 to 23 mm, from Santa Marta, Neguange, Gairaca, Aguja island, and Cinto, depth range from 3 to 15 m. Reg. Crust. Invemar Nos. 79, 478, 479.

Hosts.—The anemones *Condylactis gigantea**, *Bunodosoma granuliferum**, *Bartholomea annulata*, *Lebrunia danae**, and *Stoichactis helianthus*.

Remarks.—The translucent body of this species with its large brown or carmine spots arranged irregularly on the abdomen, the largest spots generally found on the third somite, makes it very conspicuous.

Criales (1980) reported *P. rathbunae* from the Curaçao region as a commensal on Octocorallia, the only report of this commensal on hosts other than the anthozoans mentioned above.

Periclimenes yucatanicus (Ives, 1891)

Collections.—8 ovigerous ♀♀, 2 juvenile ♂♂, 5 adult ♂♂, ranging from 15 to 23 mm, from Santa Marta, Neguange, Gairaca, and Concha, depth range from 3 to 25 m. Reg. Crust. Invemar Nos. 494, 495.

Hosts.—The anemones *Bartholomea annulata*, *Condylactis gigantea*, *Lebrunia danae**, and the benthic medusa *Cassiopea xamachana*.*

Remarks.—This species has always been described as living with anemones (Limbaugh *et al.*, 1961; Mahnken, 1972). The specimens collected in the study area differ from the description in Holthuis (1951) as follows: the dactylus of the three last pereopods is longer and sharper; the chelae of the second pereopods are thinner and shorter; and the number of anterolateral spines on the basal segment of the antennular peduncle was always 4.

Periclimenes sp. ?

Collections.—1 ♀, 1 ♂, ranging from 12 to 14 mm, from Aguja island, depth 22 m. Reg. Crust. Invemar No. 492.

Host.—The hydroid *Plumularia habereri*.*

Remarks.—The living specimens were translucent with a red band running dorsally along the body.

Chace (personal communication) thinks that this palaemonid is almost certainly a species (probably undescribed) of *Periclimenes*. It keys out to *P. harringtoni*, but comparison of this specimen with a male of *P. harringtoni* in the Smithsonian collection indicates that the rostrum is quite different.

Pontonia domestica Gibbes, 1850

Collections.—1 ovigerous ♀, 1 ♂, ranging from 20 to 36 mm, from Concha, depth 10 m. Reg. Crust. Invemar No. 54.

Host.—The bivalve *Atrina seminuda*.*

Remarks.—This species has previously been reported living in *Atrina* and *Pecten* at depths down to 42 m (Chace, 1972). Among the individuals of *Pontonia* seen, the ovigerous female of *P. domestica*, living inside a bivalve 20 cm long, was the largest specimen found.

Pontonia mexicana Guérin-Méneville, 1855

Collections.—3 ovigerous ♀♀, 3 ♂♂, ranging from 11 to 24 mm, from Santa Marta, Concha, and Gairaca, depth range from 5 to 10 m. Reg. Crust. Invemar Nos. 46, 49, 51.

Host.—The bivalve *Pinna carnea*.*

Remarks.—The body color of the males was always translucent white, and that of the females was pale pink. On the three occasions when this species was collected, males and females were always in pairs. The females, which were much larger than the males, always carried a large number of eggs.

Pontonia miserabilis Holthuis, 1951

Collections.—1 juvenile ♀, 7 mm, from Santa Marta, depth 10 m. Reg. Crust. Invemar No. 470.

Host.—The bivalve *Spondylus americanus*.*

Remarks.—No host has previously been cited for this species. This shrimp has the same color as *P. mexicana*. Unlike other species of this genus, in which the shrimps are always found in pairs, only one specimen, of comparatively small size, was observed.

Pseudocoutierea antillensis Chace, 1972

Collections.—2 ovigerous ♀♀, 1 ♂, ranging from 5 to 8 mm, from Chenque, depth 15 m. Reg. Crust. Invemar No. 480.

Host.—The octocoral *Leptogorgia virgulata*.*

Remarks.—The shrimp has the same color as the host. At Curaçao island it was the most abundant species found during nocturnal dives, living among *Octocorallia* (Criales, 1980).

Pseudocoutierea conchae Criales, 1981

Collections.—4 ovigerous ♀♀, 6 ♂♂, ranging from 8 to 12 mm, from Santa Marta, Concha, and Granate, depth range from 15 to 25 m. Reg. Crust. Invemar Nos. 484, 485.

Hosts.—The gorgonids *Leptogorgia virgulata*, *Ellisella barbadensis*.* and the antipatharian *Stichopathes gracilis*.*

Pseudocoutierea edentata Criales, 1981

Collections.—5 ovigerous ♀♀, 9 ♂♂, ranging from 7 to 11 mm, from Santa Marta, Neguange, and Concha, depth range from 1 to 15 m. Reg. Crust. Invemar Nos. 481, 482, 483.

Hosts.—The gorgonids *Leptogorgia virgulata*, *Ellisella barbadensis*.* and the antipatharian *Stichopathes gracilis*.*

Tuleariocaris neglecta Chace, 1969

Collections.—15 ♀♀, 13 ♂♂, ranging from 10 to 17 mm, from Santa Marta, Neguange, Concha, and Chenque, depth range from 1 to 15 m. Reg. Crust. Invemar Nos. 115, 493, 499.

Hosts.—The sea urchins *Diadema antillarum* and *Astropyga magnifica*

Remarks.—Details about the behavior and color of this shrimp and its association with the two hosts mentioned above were given by Castro (1974). It is also reported as a commensal of the urchin *D. antillarum* (Chace, 1969; Gooding, 1974). In the study area this shrimp is quite abundant with *D. antillarum*. By contrast, it was less frequently observed with *A. magnifica* in two bays. With the information that exists to date, *T. neglecta* can be considered as a commensal of diadematid urchins.

Family GNATHOPHYLLIDAE

Gnathophylloides mineri Schmitt, 1933

Collections.—8 ♀♀, 5 ♂♂, ranging from 8 to 11 mm, from Neguange, Concha, and Gairaca, depth range from 1 to 5 m. Reg. Crust. Invemar Nos. 105, 500, 501.

Host.—The sea urchin *Tripneustes ventricosus*.

Remarks.—These shrimps are so well concealed on their host that detection is difficult. The shrimp arrange themselves longitudinally along the spines, clinging to them with their ambulatory limbs. Since they are located near the mouth of the urchin, one could suppose that they are using some of the food that the urchin traps.

Lewis (1956) reported sexual dimorphism in pigmentation and in the morphology and size of the large second chelae. However, the material that I examined shows no size differences of the chelae relative to sex. According to Chace (personal communication), who examined the material of *G. mineri* in the collection of the Smithsonian Institution, it seems that the second chelipeds are normally equal in both sexes of the species and the occasional asymmetry that has been observed (especially in the specimen illustrated in Schmitt's original description) is the result of the loss and subsequent partial regeneration of one member of the pair.

Family ALPHEIDAE

Alpheus armatus Rathbun, 1901

Collections.—4 ♀♀, 4 ♂♂, ranging from 30 to 36 mm, from Santa Marta and all other bays, depth range from 3 to 12 m. Reg. Crust. Invemar Nos. 23, 43.

Host.—The anemone *Bartholomea annulata*.

Remarks.—Knowlton (1980) studied the behavior of these animals and their relationship with the anemone. Adults of this species are typically sexually paired.

Alpheus cristulifrons Rathbun, 1900

Collections.—1 ovigerous ♀, 20 mm, from Santa Marta, depth 15 m. Reg. Crust. Invemar No. 503.

Host.—The crinoid *Nemaster grandis*.*

Remarks.—The shrimp is colored dark brown, like its host.

Synalpheus townsendi Coutière, 1909

Collections.—1 ovigerous ♀, 13 mm, from Neguange, depth 18 m. Reg. Crust. Invemar No. 504.

Host.—The crinoid *Nemaster rubiginosa*.*

Family HIPPOLYTIDAE

Latreutes inermis Chace, 1972

Collections.—1 ovigerous ♀, 9 mm, from Aguja island, depth 15 m. Reg. Crust. Invemar No. 487.

Host.—The anemone *Bartholomea annulata*.*

Remarks.—This species was reported by Chace (1972) living on the octocorals *Pseudopterogorgia americana* and *P. acerosa*.

Latreutes parvulus (Stimpson, 1866)

Collections.—1 ovigerous ♀, 2 juvenile ♂♂, ranging from 7 to 12 mm, from Santa Marta, depth 10 m. Reg. Crust. Invemar No. 505.

Host.—The urchin *Astropyga magnifica*.*

Remarks.—This species is light brown with black dots all over its body. The antennal and antennular flagella are translucent. The pereopods and third maxilliped sometimes display the same coloration as the body but in other specimens are translucent. Williams (1965) reported it from littoral waters with sponges, hydrozoans, and among bivalves. Chace (1972) cited it from eroded dead coral.

Lysmata grabhami (Gordon, 1935)

Collections.—8 ♀♀, 9 ♂♂, ranging from 20 to 35 mm, from Santa Marta and all other bays, depth range from 8 to 18 m. Reg. Crust. Invemar Nos. 83, 88.

Host.—The anemone *Telmatactis rufa*.

Remarks.—Details about the type associations and behavior of this shrimp are discussed in Criales (1979).

Thor amboinensis (de Man, 1888)

Collections.—8 ♀♀, 7 ♂♂, ranging from 8 to 14 mm, from Santa Marta, Neguange, Gairaca, and Cinto, depth range from 2 to 25 m. Reg. Crust. Invemar Nos. 57, 59, 469.

Hosts.—The crinoid *Comactinia echinoptera*,* the anemones *Condylactis gigantea*, *Bartholomea anulata*, *Telmatactis rufa*,* *Lebrunia danae*,* and *Bunodosoma granuliferum*.*

Remarks.—Chace (1972) and Suzuki and Hayashi (1977) reported the association of this shrimp with anemones. Prahl *et al.* (1978) reported it as a commensal of coral. Bruce (1978) considered it as a shrimp that can live with a wide variety of coelenterates. In the study area, *T. amboinensis*, in addition to living with crinoids, is the most abundant commensal of anemones.

Thor manningi Chace, 1972

Collections.—2 ovigerous ♀♀, ranging from 7 to 9 mm, from Santa Marta, depth 20 m. Reg. Crust. Invemar No. 488.

Host.—The crinoid *Nemaster grandis*.*

Remarks.—Chace (1972) mentioned this shrimp in association with two anemones, but it is more commonly found on dead coral and on grass flats.

Tozeuma serratum A. Milne Edwards, 1881

Collections.—2 ovigerous ♀♀, 1 ♂, ranging from 30 to 43 mm, from Aguja island, depth 22 m. Reg. Crust. Invemar No. 486.

Host.—The hydroid *Plumularia habereri*.*

Remarks.—The ovigerous females had a reddish color, and the male was reddish with some gray spots. The depth range in the western Atlantic, according to Chace (1972), is 44–102 m.

DISCUSSION

Some authors (Limbaugh, 1961; Mahnken, 1972; Levine and Blanchard, 1980) consider the association "shrimp-anemone" to be ectocommensalism, since the shrimps depend on the anemone to protect them from predators and thus enable them to feed and reproduce. This hypothesis may be supported by the observation that the majority of the shrimps found in these associations are ovigerous females, since their survival is of particular importance for the population.

Commensalism with octocorals has been reported in the Caribbean for *Hippolyte nicholsoni* and *Latreutes inermis* by Chace (1972), for *Tozeuma carolinense* by Voss (1956), and for *Periclimenes iridescens*, *P. pauper*, and *P. rathbunae* as well as for *Processa fimbriata* (Criales, 1980). All shrimps found associated with octocorals and the antipatharian *Stichopathes gracilis* during this study belong to the genus *Pseudocoutierea*, represented by three species. Also *S. gracilis* has been reported as a host of *Neopontonides beaufortensis* in the Caribbean by Patton (1972), and of *Neopontonides principis* and *Periclimenes iridescens* by Criales (1980). In the study area, three shrimps were found with hydroids: *Periclimenes iridescens*, *Periclimenes* sp.?, and *Tozeuma serratum*.

Among echinoderm hosts, the crinoids were represented by the largest number of associates. The most common commensal shrimps were *Periclimenes meyeri* and *Lipkebe holthuisi*. The crinoid *Nemaster grandis* harbored more than 90% of the commensal specimens, and on this host the number of shrimps increased at greater depths. This preference for one specific crinoid may stem from the facts that *N. grandis* is the most common species in the area; that it is sometimes attached to the substratum with its arms exposed to the currents, while the other crinoids are usually found embedded under rocks or coral; and that the arms of this species are stronger than those of the other crinoids, thereby possibly affording

Table 1. Hosts and their commensal shrimps in the Santa Marta region, Colombia.

Hydroida	<i>Eudendrium carneum</i> — <i>Periclimenes iridescens</i> . <i>Plumularia habereri</i> — <i>Periclimenes</i> sp.?, <i>Toxeuma serratum</i> .
Rhizostomeae	<i>Cassiopeia xamachana</i> — <i>Periclimenes pedersoni</i> .
Alcyonaria	<i>Ellisella barbadensis</i> — <i>Pseudocoutierea conchae</i> , <i>P. edentata</i> . <i>Leptogorgia virgulata</i> — <i>Pseudocoutierea antillensis</i> , <i>P. conchae</i> , <i>P. edentata</i> .
Zoantharia	<i>Bartholomea annulata</i> — <i>Periclimenes americanus</i> , <i>P. anthophilus</i> , <i>P. pedersoni</i> , <i>P. rathbunae</i> , <i>P. yucatanicus</i> , <i>Alpheus armatus</i> , <i>Latreutes inermis</i> , <i>Thor amboinensis</i> . <i>Bunodosoma granuliferum</i> — <i>Periclimenes americanus</i> , <i>P. pedersoni</i> , <i>P. rathbunae</i> , <i>Thor amboinensis</i> . <i>Condylactis gigantea</i> — <i>Periclimenes anthophilus</i> , <i>P. iridescens</i> , <i>P. pedersoni</i> , <i>P. rathbunae</i> , <i>P. yucatanicus</i> , <i>Thor amboinensis</i> . <i>Lebrunia danae</i> — <i>Periclimenes iridescens</i> , <i>P. pedersoni</i> , <i>P. rathbunae</i> , <i>P. yucatanicus</i> , <i>Thor amboinensis</i> . <i>Stoichactis helianthus</i> — <i>Periclimenes iridescens</i> , <i>P. rathbunae</i> , <i>P. yucatanicus</i> . <i>Telmatactis rufa</i> — <i>Lysmata grabhami</i> , <i>Thor amboinensis</i> .
Antipatharia	<i>Cirripathes lutkeni</i> — <i>Periclimenes iridescens</i> .
Ceriantharia	<i>Cerianthus</i> sp.— <i>Periclimenes pedersoni</i> .
Bivalvia	<i>Atrina seminuda</i> — <i>Pontonia domestica</i> . <i>Pinna carnea</i> — <i>Pontonia mexicana</i> . <i>Spondylus americanus</i> — <i>Pontonia miserabilis</i> .
Crinoidea	<i>Comactinia echinoptera</i> — <i>Thor amboinensis</i> . <i>Nemaster grandis</i> — <i>Lipkebe holthuisi</i> , <i>Periclimenes americanus</i> , <i>P. crinoidalis</i> , <i>P. meyeri</i> , <i>Alpheus cristulifrons</i> , <i>Thor manningi</i> . <i>Nemaster rubiginosa</i> — <i>Periclimenes bowmani</i> , <i>Synalpheus townsendi</i> .
Ophiuroidea	<i>Astrophyton muricatum</i> — <i>Periclimenes perryae</i> .
Echinoidea	<i>Astropyga magnifica</i> — <i>Tuleariocaris neglecta</i> , <i>Latreutes parvulus</i> . <i>Diadema antillarum</i> — <i>Tuleariocaris neglecta</i> . <i>Tripeustes ventricosus</i> — <i>Gnathophylloides mineri</i> .

better protection to the shrimps. The echinoids were hosts for numerous specimens of *Gnathophylloides mineri*, *Tuleariocaris neglecta*, and *Latreutes parvulus*. The shrimp *Periclimenes perryae* was a commensal of the ophiuroid *Astrophyton muricatum*, as previously reported by Chace (1972).

The commensal shrimps of Mollusca, class Bivalvia, belong to the genus *Pontonia*. Bruce (1975) mentioned that in almost all cases just one species, a male and female pair, was found on the host. This coincides with the adult specimens found during this investigation.

The hosts and their commensal shrimps found in the Santa Marta region are summarized in Table 1.

In general, species richness in commensal associations in the southern Caribbean

is lower than reported for the Indo-Pacific region (Bruce, 1976a). This is explained in part by differential size of coral reefs, but partly also by an apparent lack of knowledge of commensalism in the Caribbean. Further investigations employing SCUBA techniques are necessary to increase knowledge of this tropical region.

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