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TWO NEW WEST INDIAN HERMIT CRABS
OF THE GENUS *PAGURISTES*
(CRUSTACEA: DIOGENIDAE)¹

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ABSTRACT

Paguristes starcki, sp. n. is described from a single male collected at Alligator Reef in the Florida Keys. *P. anaryballus*, sp.n. is based upon nine specimens from shallow water at Curaçao, Netherlands Antilles. *P. starcki* is most similar to *P. cadenati* among West Indian congeners and *P. anaryballus* is most similar to *P. anomalus*. Neither of the new species is yet known from more than one locality, but both can be recognized in the field and should be accessible to collectors in shallow reef habitats.

INTRODUCTION

Paguristes, the largest genus in the hermit crab family Diogenidae, is distributed in shallow waters of all tropical and subtropical seas and is well represented in the West Indian faunal region with more than 20 nominal species. In the last decade, three new species of the genus have been described from this area (Forest, 1954; Wass, 1955; Provenzano, 1961a), and continuing studies indicate that the pagurid fauna of the tropical Western Atlantic is still imperfectly known. There are a number of species problems in the genus as it is represented in the West Indies. Some of the nominal species are synonyms, others are so poorly described that they are difficult to identify, and the literature needed to recognize the described species is inadequate and scattered. A review of the Diogenidae of the West Indian region is currently in progress by the writer. One of the results of this study will be an illustrated key for the identification of all known West Indian species of *Paguristes*. As it will be many months before this can be published, the descriptions of two new species are presented here to make names available and to call attention to the species, both of which occur in shallow water in or near reef habitats.

Descriptions, illustrations and original citations of other species referred to herein may be found in Provenano (1959) or in other papers cited.

The author gratefully acknowledges the support of the National Science Foundation and the assistance of Miss Barbara Stolen who made the illustrations.

Paguristes starcki, sp. n.
Figs. 1 and 2

Material.—HOLOTYPE: male, shield length 6.6 mm; total carapace length, 9.5 mm. Collected approximately one-third mile south-southwest of Alli-

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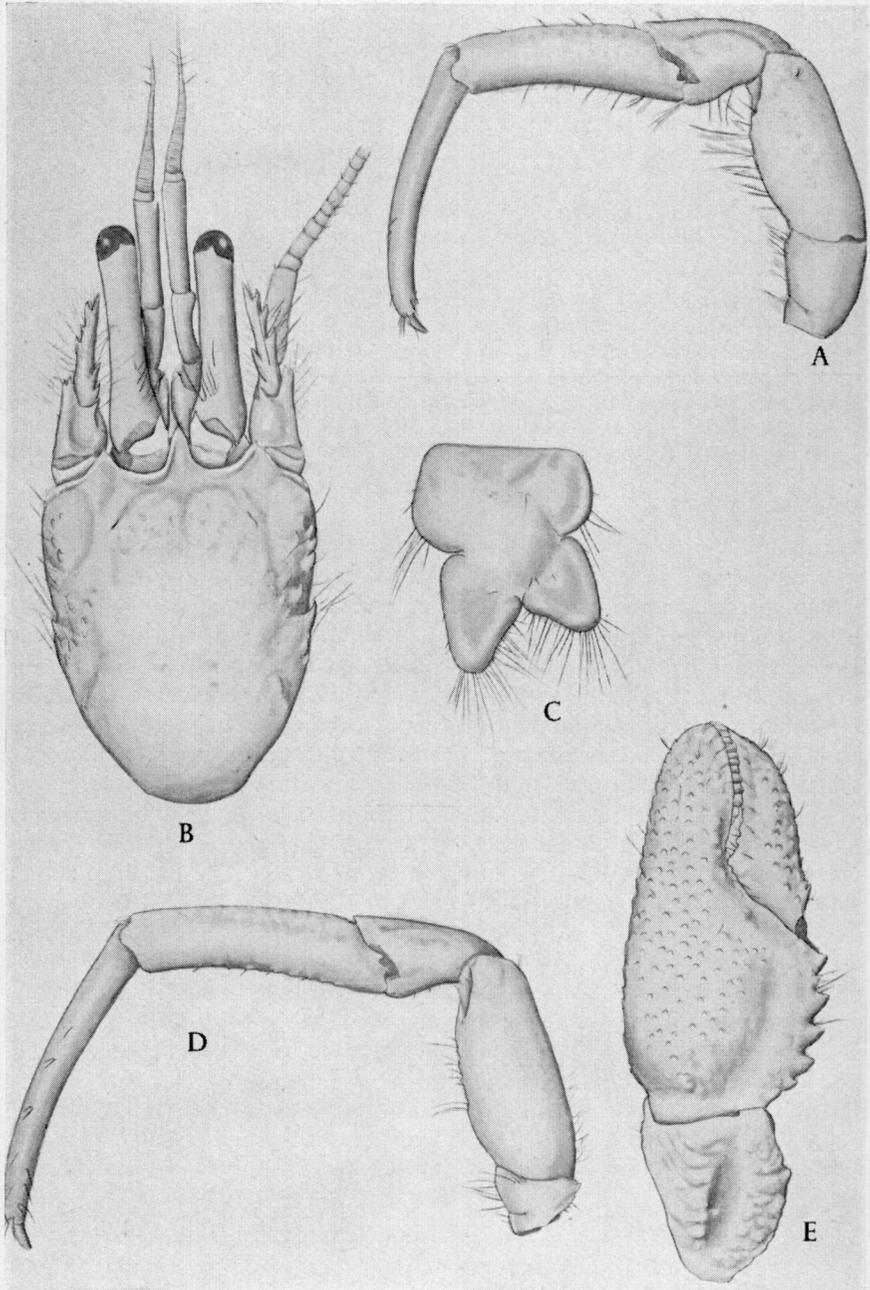


FIGURE 1. *Paguristes starcki*, sp. n., holotype. A. Third left pereiopod, lateral view, X 1.5; B. Anterior carapace, X 2; C. Telson, X 3; D. Second left pereiopod, lateral view, X 1.5; E. Left chela, dorsal view, X 2.

gator Light, Monroe County, Florida, at a depth of 20 feet, between 21:30 and 22:30 hours, 28 April 1962, by W. A. Starck, W. P. Davis and R. E. Schroeder. Taken in company with *Pagurus miamensis* Provenzano, 1959, and *Pylopagurus operculatus* (Stimpson, 1859). To be deposited in the U.S. National Museum.

Diagnosis.—Hard parts very sparsely setose; carpus of chelipeds with a dorsal groove; manus with spines on dorsal surface; dactyls of walking legs longer than propodi; lobes of telson bearing setae only, not spines; color solid red, shield not mottled.

Description.—The shield or anterior carapace is longer than wide, the maximum width being about 0.73 the length from tip of rostrum to cervical groove. The surface is smooth medio-dorsally but there are sharp spines along the lateral margins of the shield. The rostrum extends beyond the acute frontal projections.

The length of the eyestalks is three-fourths the maximum width of the shield. The stalks taper from a slightly swollen base to very slightly dilated corneas. The eye scales or ophthalmic acicles are unidentate.

The antennular peduncles when extended reach beyond the eyes by half the length of the terminal segment of the peduncle.

The antennal flagella are very long but the setae borne on the segments are extremely short, not exceeding the length of the segments of the flagella, thus giving an appearance of naked flagella. The segment of the peduncle bearing the flagellum is long and lacking spines. The basal segment of the peduncle is bidentate laterally. The antennal acicle bears two teeth medially and three or two laterally in addition to the terminus.

The chelipeds are subequal and virtually devoid of setae. The dorsolateral surface of the manus is covered with small, low, forwardly directed spines which give the surface a granulated appearance. The carpus has a very conspicuous groove dorsally, the spinulated ridges of which appear to continue onto the manus. The merus is about as long as the manus, smooth on both sides and bears a few small spinules along its margins.

The second pereopods are slightly roughened on the medial surface and smooth on the lateral surface. The slender dactyl is nearly as long as the propodus and carpus together and terminates in a corneous spine. The carpus bears a groove dorso-laterally and a spine at the dorso-anterior margin. There are a few very inconspicuous spinules on the dorsal surface of the carpus. The only other armature of this pair of legs is very sparse setation. A series of punctae runs along the lateral surface of the propodus, giving the appearance of a continuation of the groove on the carpus.

The third pereopods are generally similar, but the dactyl of the third left leg (that of the third right leg is broken) is shorter than the dactyls of the second pair.

The fourth pereopods bear numerous long simple setae. There are a

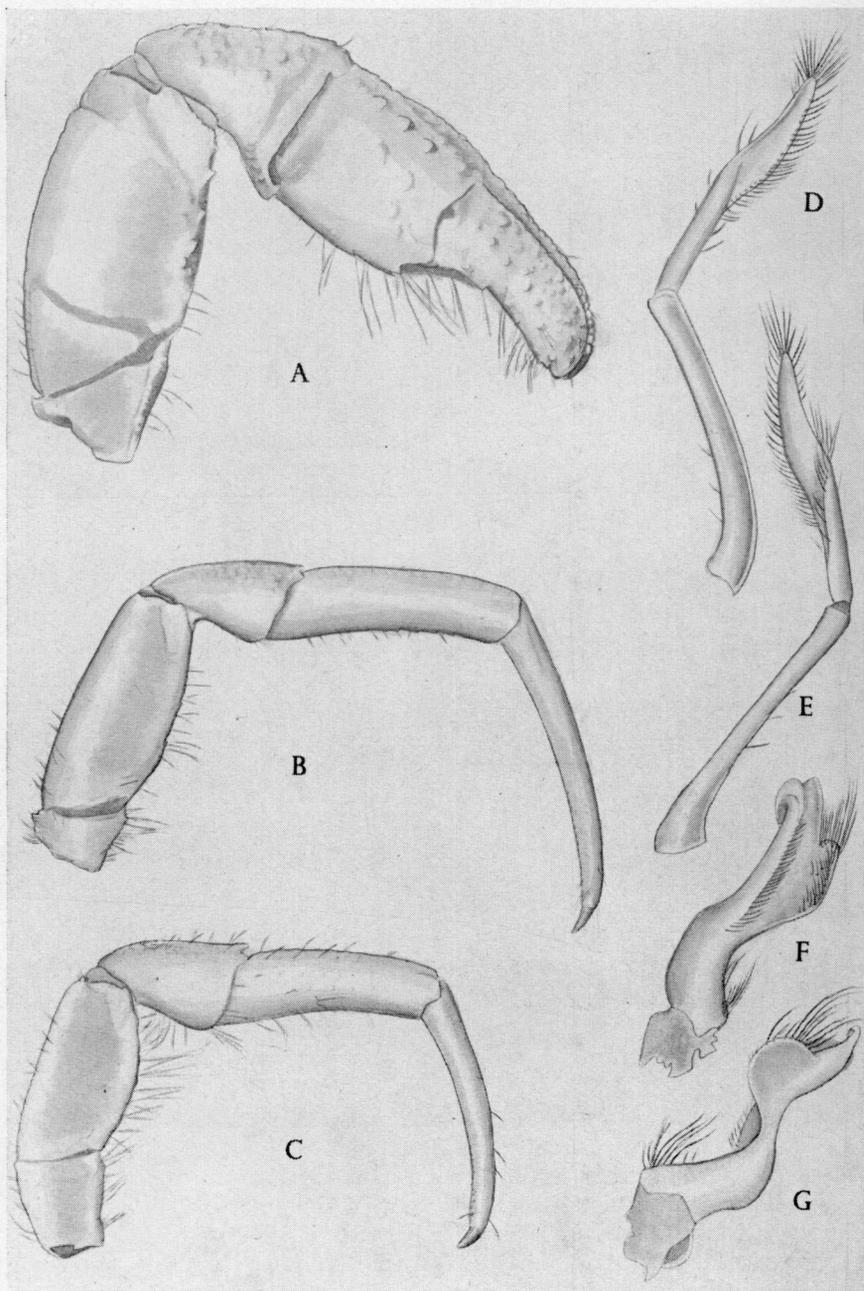


FIGURE 2. *Paguristes starcki*, sp. n., holotype, A. Left cheliped, medial view, X 2; B. Second left pereiopod, medial view, X 2; C. Third left pereiopod, medial view, X 2; D. Gonopod of right side, second abdominal somite, dorsal view, X 4; E. Same, ventral view; F. Gonopod of right side, first abdominal somite, ventral view X 4; E. Same, dorsal view.

very few plumose setae on the ventral surface of the segments. The propodus bears a poorly developed rasp and there are only three corneous granules on the dactyl in addition to the terminus.

The fifth pereopods are chelate, setose, and there are moderately developed rasps on the dactyl and propodus of each.

The telson is asymmetrically bilobed, the left lobe being the larger. Neither lobe bears spines but both carry long setae.

The sexual appendages of the first and second abdominal somites indicate the holotype is a mature male.

Color.—When examined a few weeks after preservation in formalin the specimen was dull red, almost maroon. After being in alcohol for many months it is now completely faded.

Remarks.—The species is named for the collector, Dr. Walter A. Starck II, who, while making numerous collections of fishes over the past few years, has paid particular attention to crustaceans and other invertebrates, bringing many unusual forms to the attention of specialists. This is the second undescribed species of *Paguristes* he has discovered at Alligator Reef.

In its nearly complete lack of setation, its solid reddish color and the presence of a groove on the carpus, the species bears some resemblance to *P. cadenati* Forest but differs from the latter in coloration of the cephalothorax, which is mottled in *P. cadenati*, in the shape and armature of the shield and chelipeds, and in a few details of the gonopods.

The specimen was collected during a night dive on the reef. According to Starck, the fauna of the reefs appears to be richer at night than in the day. Some species of hermit crabs, very scarce during the day, are seen commonly at night. This is particularly true for *P. cadenati* to which the present species seems to bear closest resemblance. (Since the discovery of the first specimens of *P. cadenati* in Florida (Provenzano, 1961b) it has been taken many times.) The presence of *Pagurus miamensis* and *Pylopagurus operculatus* in the same collection suggests that reef habitats where these forms are known to occur would be likely localities for future collections of *Paguristes starcki*.

***Paguristes anaryballus*, sp. n.**

Figs. 3 and 4

Material.—HOLOTYPE: male, shield length 2.9 mm; total carapace length 3.8 mm. ALLOTYPE: ovigerous female, shield length 2.2 mm. Collected from under a rock at Boca St. Michael, Curaçao, Netherlands Antilles, at a depth of approximately 1 m, 5 August 1963, by Dr. Brian A. Hazlett. To be deposited in the U.S. National Museum.

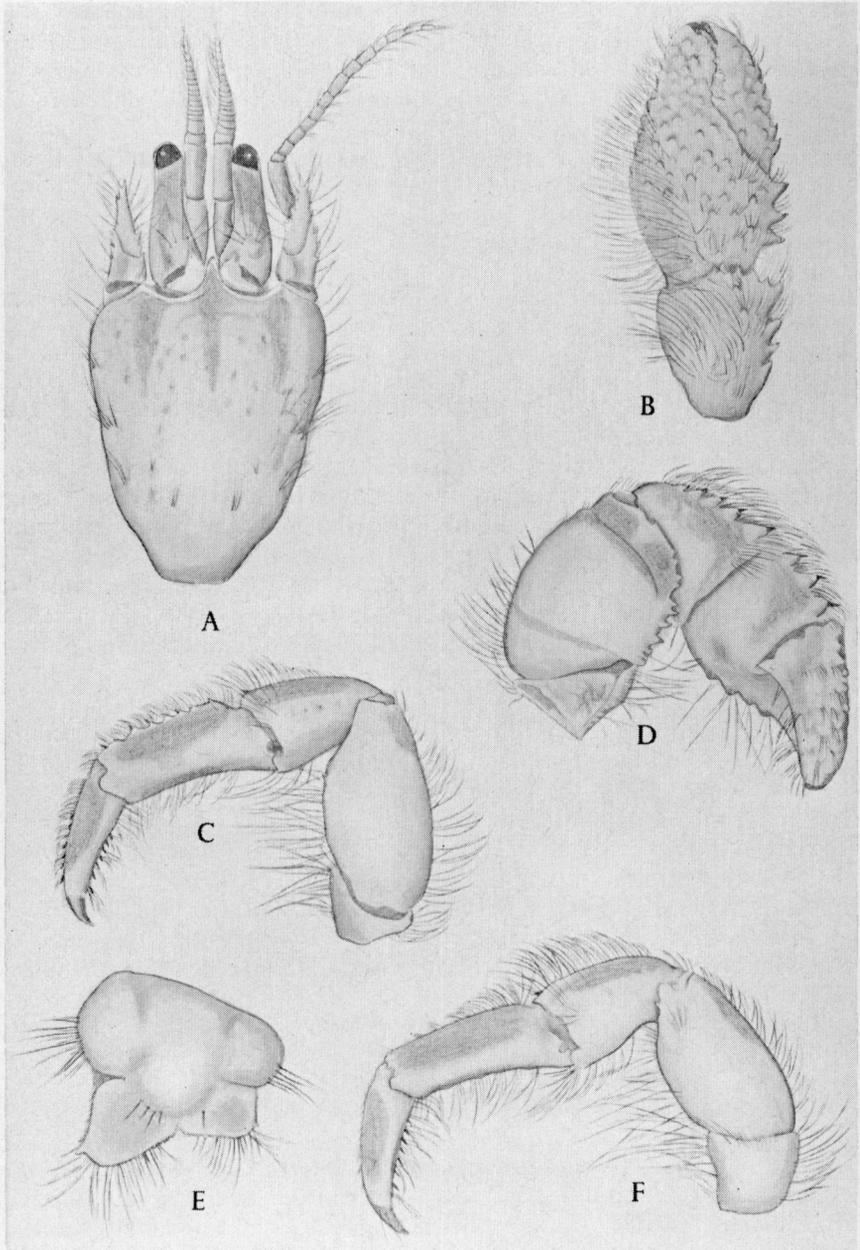


FIGURE 3. *Paguristes anaryballus*, sp. n., holotype. A. Anterior carapace, X 4. The antennules are not fully extended.; B. Left chela, dorsal view, X 4; C. Second left pereiopod, lateral view, X 4; D. Left chela, medial view, X 4; E. Telson, X 8; F. Third left pereiopod, lateral view, X 4. The setules on all setae have been omitted for clarity.

PARATYPES: 4 males, shield length 2.2 - 3.0 mm; 1 non-ovigerous female, shield length 2.4 mm; 2 ovigerous females, shield length 2.1 and 2.5 mm. Collected with the holotype. Deposited in the Museum of the Institute of Marine Science, University of Miami (UMML 32:2758) (part), and the Museum of Comparative Zoology at Harvard (part).

Diagnosis.—Plumose setae obscuring armature; dactyls of walking legs not longer than propodi, each bearing a row of spines on dorsal margin; female lacking brood pouch; lobes of telson bearing stout spines in addition to setae; shield with three red stripes, eyestalks reddish on distal three-fourths with a fan of plumose setae proximally, pereopods with distinct longitudinal patches of red on segments including dactyls.

Description.—The shield or anterior carapace is longer than wide, the maximum width being about 0.77 the length from tip of rostrum to cervical groove. The surface of the shield is smooth except for inconspicuous punctae; prominent spines are lacking, but some plumose setae are present in groups. The well developed rostrum extends well beyond the frontal projections.

The length of the eyestalks is nearly two-thirds the width of the shield. The eyestalks are rather swollen proximally and taper gradually to slightly dilated corneas. Each eyestalk bears a transverse arc of plumose setae on the proximal third. The ophthalmic acicles are bidentate and reach slightly beyond the tip of the rostrum.

The antennular peduncles when fully extended exceed the tips of the eyes by the length of the terminal segment of the peduncle.

The antennal flagella are short, consisting of about 12-14 segments, each segment bearing numerous setae as long as one or two flagellar segments. The peduncular segment bearing the flagellum is unarmed. The basal segment has three to four spines laterally. The antennal acicle has three spines laterally and two or three spines medially, but these are obscured by plumose setae.

The armature of the subequal chelipeds is very much obscured by plumose setae. There are strong spines along the medial margins of the movable dactyl, the manus, and the carpus of each cheliped. There is a row of spines along the ventro-medial margin of the merus. The dorsal surface of the chela is armed with many blunt tubercles. A lateral fringe of plumose setae makes the chelae appear to be wider than they are.

The second pereopods are fringed with plumose setae on the dorsal and ventral margins, a row of spines on dorsal margin of propodus, and the merus has in addition a group of long setae on the medial surface. The dactyl which ends in a stout corneous spine is approximately as long as the propodus on the right side, but on the left, the dactyl is slightly shorter than the propodus. The dactyl bears a row of corneous spines

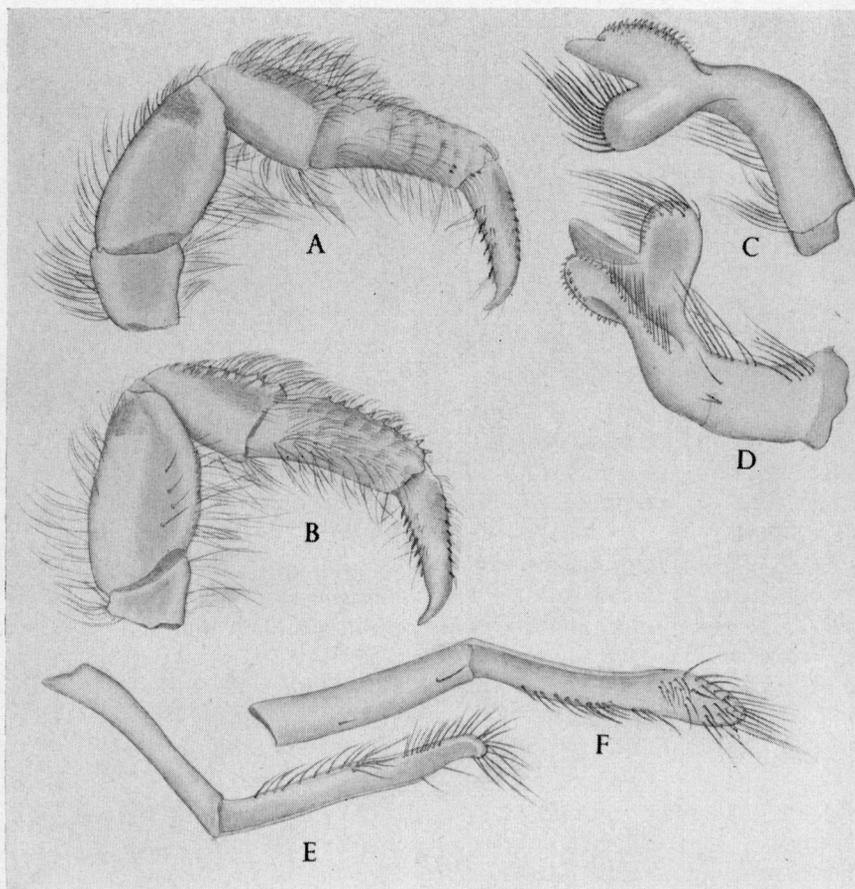


FIGURE 4. *Paguristes anaryballus*, sp. n., holotype. A. Third left pereiopod, medial view, X 4; B. Second left pereiopod, medial view, X 4; C, D. Two views of gonopod of first abdominal somite, right side, X 16; E, F. Ventral and dorsal views of gonopod of second abdominal somite, X 16.

ventrally in addition to a fringe of plumose setae, and an obscured row of small spines dorsally.

The third pereiopods are similar to the second but the dactyl is somewhat shorter, the fringe of setae dorsally is much less prominent, consisting of rather short bristles, and there is no row of prominent spines dorsally on the propodus.

The fourth pereiopods are non-chelate, the propodus of each being nearly two times longer than high and bearing a rasp which reaches nearly

the entire length of the ventro-lateral surface of the segment. There are no corneous granules on the dactyl.

The fifth pereopods are chelate, bearing rasps on each of the two distal segments. In addition to short setae, this appendage bears numerous long, curved simple setae on the terminal segments.

The telson is subequally bilobed, each lobe bearing a number of strong spines or teeth with small ones on the medial margins, and a fringe of long setae along the posterior margins of the lobes.

The males have sexually modified appendages on the first and second abdominal somites as is typical of the genus. The females have a pair of modified appendages on the first abdominal somite only. The females differ from those of most species of the genus in lacking a brood pouch. The ovigerous females examined carry 7, 9, and 11 eggs respectively, but none shows signs of a brood pouch.

Color.—The coloration of this species makes possible immediate field recognition. According to the collector, the now orange-red coloration was much darker in life. Half the series was preserved in alcohol and half in formalin. The specimens in formalin since collection have the following pattern. The eyestalks are red on the distal three-fourths. The anterior carapace has three longitudinal reddish stripes, one reaching from the tip of the rostrum to about the mid-point of the shield, and one extending half as far from each of the frontal projections. The flagella of the antennules and of the antennae are lavender. The chelae are reddish-orange on the medial surfaces of the carpus, the manus, and the distal portion of the merus, laterally on the distal portion of the merus and on the dorsal surface of the carpus. The walking legs are distinctly marked laterally and medially on the dactyl, propodus and carpus, and on the distal portion of the merus as shown in the illustrations. The specimens which have been in alcohol are very much faded, but at this writing even those still show the total pattern.

Remarks.—The name of the species is derived from the Greek *an-*, without, and *aryballos*, pouch or bag.

In its plumose setation, lack of a brood pouch and general appearance this species appears most closely related, among West Indian forms, to *Paguristes anomalus* Bouvier, 1918. It differs from the latter in having a less elongate shield, in lacking spines on the antero-lateral surfaces of the shield, in details of armature and in its completely different coloration. *P. anomalus* has a general green color, the dactyls of the pereopods are cream-yellow, and the brood pouch, while very much reduced, is present as a rudiment. *P. tortugae* (Schmitt, 1933) is somewhat similar to both *P. anomalus* and *P. anaryballus* but although it sometimes has a purple-reddish color, the larger size, the banded cephalic appendages, and the

absence of striping makes that species easy to distinguish in the field. *P. tortugae* differs from both these other species in having a well developed brood pouch. *Paguristes hummi* Wass, 1955, which ranges from Texas eastward to southwest Florida and occurs on the northeast coast of Florida as well, lacks a brood pouch entirely as does the presently described species and the modified appendages of the first abdominal somite of females while present are so greatly reduced that only very careful examination at high magnification will reveal them. In males of all these species however, both pairs of gonopods are present and well developed.

The variation in development of the brood pouch and sexual appendages of females in some species of this genus may be reflected in the growth of individuals of all of them. Provenzano and Rice (In Press.) reported upon the gradual development and variable rate of development of these features in *Paguristes sericeus* A. Milne-Edwards, 1880. Since these characters are among those used as diagnostic features of the genus, it is obvious that small, perhaps immature, specimens of both sexes might not be recognized as belonging to *Paguristes*.

The species was discovered by Dr. Hazlett during his field studies on the social behavior of the hermit crabs of Curaçao. The habitat from which they were collected is a wave-exposed, rocky shelf on the south side of the island, extending from the tide line out to a depth of approximately 1.5 m where it drops suddenly another meter to a broad slightly sloping sand bottom. The specimens were all taken from under a single rock on the shelf. Within a few inches of the rock were specimens of *Pagurus miamensis*, *Pagurus pygmaeus* (Bouvier, 1918), and *Pylopagurus operculatus*, all species which prefer exposed rocky habitats.

SUMMARY

Paguristes starcki, sp. n., known only from the holotype collected at Alligator Reef, Florida, is most closely allied to *Paguristes cadenati* Forest with which it shares the characters of: lack of setation, presence of a groove on the carpus of the chelipeds, dactyls of the second and third pereopods being longer than the propodi, and general reddish color. It differs in the shape of the chelipeds and shield, in having spines on the dorsal surface of the manus of the cheliped, in not having a white and red colored shield.

Paguristes anaryballus, sp. n., is described on the basis of nine specimens collected in about one meter, from a rocky habitat at Curaçao, Netherlands Antilles. It is most similar to *Paguristes anomalus* Bouvier with which it shares the dense plumose setation, lack of a brood pouch in females, and general gross morphological similarity. It differs from *P. anomalus* in having a shorter, unarmed shield, in details of armature, and especially in having completely different coloration, *P. anomalus* having a green color

with yellow dactyls, *P. anaryballus* having very dark red patches on all the hard parts.

SUMARIO

DOS NUEVOS CANGREJOS HERMITAÑOS DEL GÉNERO *Paguristes*
(DECAPODA: DIOGENIDAE)

Paguristes starcki, sp. n., conocido solamente por el holotipo colectado en Alligator Reef, Florida, está muy próximo a *Paguristes cadenati* Forest con el cual comparte los caracteres de: falta de quetas, presencia de un surco en el carpo de los quelípedos, dactilos del segundo y tercer períodos más largos que los propodios y color rojizo en general. Difiere en la forma de los quelípedos y la cubierta, en que tiene espinas en la superficie dorsal de la mano del quelípedo, y que no tiene una cubierta color blanco y rojo.

Paguristes anaryballus, sp. n., se describe basándose en nueve ejemplares colectados en alrededor de un metro, de un habitat rocoso en Curazao, Antillas Holandesas. A quien más se parece es a *Paguristes anomalus* Bouvier con el que comparte las densas quetas plumosas, falta de una bolsa de incubación en las hembras, y similitudes en la morfología general. Difiere de *P. anomalus* en que tiene una cubierta desnuda más corta, en detalles de la armadura y especialmente en tener coloración completamente diferente, *P. anomalus* tiene color verde con dactilos amarillos, *P. anaryballus* tiene manchas color rojo muy oscuro en todas las partes duras.

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