

THE *PROVENZANOI* GROUP OF HERMIT CRABS  
(CRUSTACEA, DECAPODA, PAGURIDAE)  
IN THE WESTERN ATLANTIC

PART III. *PAGURUS PROTUBEROCARPUS*, A NEW SPECIES  
FROM THE SOUTHERN CARIBBEAN

*Patsy A. McLaughlin*

ABSTRACT

A new species of hermit crab of the genus *Pagurus* has been discovered off the northern coast of South America. In addition to its description, an observed morphological abnormality is reported.

Among the many specimens of hermit crabs of the *Provenzano*i group of *Pagurus* collected during cruises of the Rosenstiel School of Marine and Atmospheric Science's R/V PILLSBURY, five specimens have come to the author's attention that are unique and represent yet another undescribed taxon of this group. The holotype has been deposited in the collections of the National Museum of Natural History, Smithsonian Institution (USNM). Paratypes have been deposited at the Allan Hancock Foundation, University of Southern California (AHF), Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RMNH), and Rosenstiel School of Marine and Atmospheric Science, University of Miami (RSMAS). Measurements of shield length (SL) and symbols used in Table 1, conform with those used in Parts I and II of this series.

*Pagurus protuberocarpus* new species  
Figures 1-3

*Holotype*.—♂ (SL = 1.4 mm), USNM 184218; PILLSBURY station 773, 12°17'N, 72°15'W.

*Material Examined*.—See Table 1.

*Description*.—Shield longer than broad; anterolateral margins sloping; anterior margin between rostrum and lateral projections somewhat concave; posterior margin truncate; dorsal surface with few short setae. Rostrum broadly rounded, obtusely triangular, or obsolete; without terminal spinule. Lateral projections obtusely triangular; usually without terminal spine or spinule.

Ocular peduncles moderately short, stout, narrowing basally and with corneae slightly dilated. Ocular acicles subsemicircular, with single strong submarginal spine; separated basally by distance equal to or greater than basal width of 1 acicle.

Antennular peduncles moderately long, exceeding ocular peduncles by approximately one-half length of ultimate segment. Ultimate and penultimate segments with few scattered setae; basal segment with spine on distolateral margin.

Antennal peduncles moderately short, overreaching the ocular peduncles only slightly; with supernumerary segmentation. Fifth and fourth segments with few scattered setae. Third segment with or without tiny spine at ventrodistal margin. Second segment with dorsolateral distal angle produced, terminating in strong acute spine, lateral and mesial margins unarmed; dorsomesial distal angle with small spine, mesial face with few setae. First segment with or without small spinule at dorsolateral distal angle; ventrodistal angle produced and with 1 small

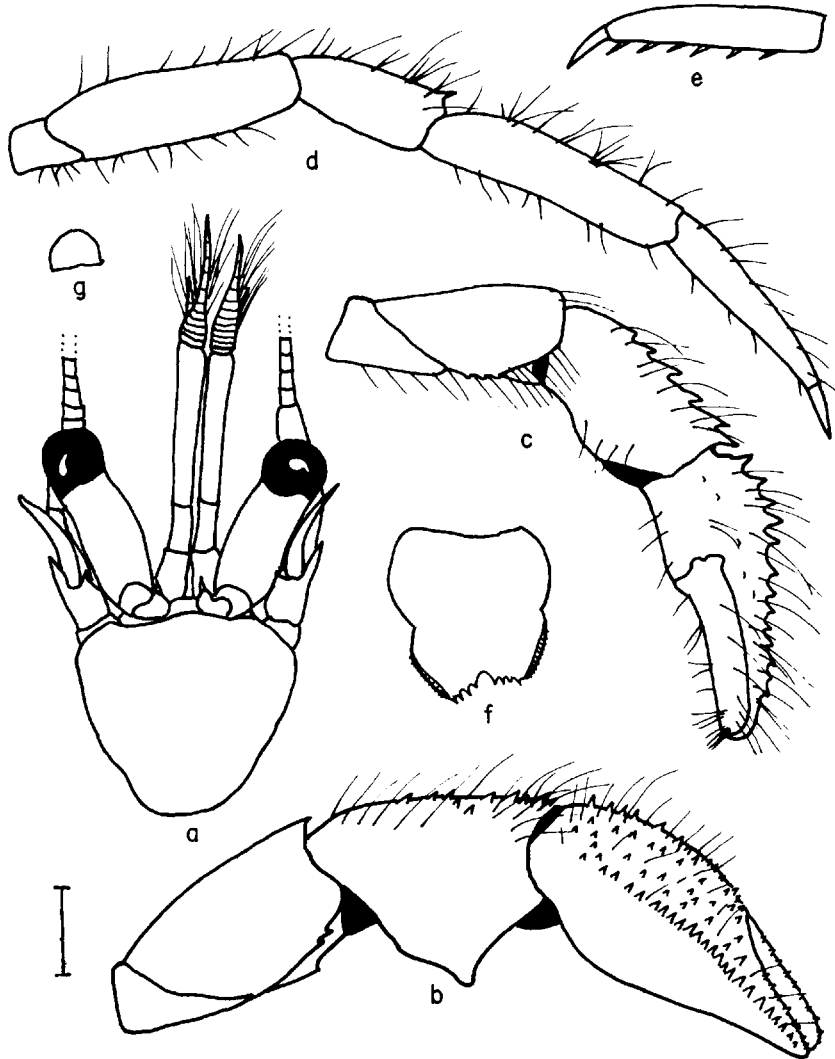


Figure 1. *Pagurus protuberocarpus* new species. a, Shield and cephalic appendages; b, Right cheliped (lateral view); c, Left cheliped (mesial view); d, 2nd right pereopod (lateral view); e, Dactyl of 2nd right pereopod (mesial view); f, Telson; g, Anterior lobe of sternite of 3rd pereopods. Scale equals 0.5 mm, a-e; 0.25 mm f, g.

spine laterally. Antennal acicle slightly arcuate, terminating in small spine encircled by moderately long setae, mesial margin with few tufts of setae. Antennal flagella reaching at least to dactyl of right cheliped; with alternating short (less than 1 article) and slightly longer (1-2 articles in length) setae.

Mandible without distinguishing characters. Maxillule with proximal endite somewhat tapering; internal lobe of endopod with 1 strong bristle, external lobe produced, not recurved. Maxilla with endopod somewhat inflated basally, exceeding scaphognathite in distal extension. First maxilliped with endopod moderately short; exopod somewhat inflated basally, narrowing distally. Second maxilliped with basis-ischium fusion complete. Third maxilliped with basis-ischium

Table 1. *Pagurus protuberocarpus* new species (Material examined)

Locality	Depth (m)	Station Deposition	Date	Sex		SL (mm)	Collector
				♂	♀		
Caribbean Sea							
12°20.2'N, 71°55.1'W	11	PILLSBURY 72 USNM, RSMAS	7/29/68	2		1.2, 1.5	RSMAS
12°17'N, 72°15'W	60-64	PILLSBURY 773 USNM	7/29/68	1		1.4	RSMAS
12°09'N, 69°49'W	35-37	PILLSBURY 759 RMNH	7/27/68	1		1.2	RSMAS
11°08'N, 63°18'W	24-27	PILLSBURY 712 AHF	7/19/68	1		1.1	RSMAS

fusion incomplete; ischium with crista dentata moderately well developed, 1 accessory tooth; merus and carpus unarmed. Sternite of third maxillipeds with triangular, subacute, median projection.

Chelipeds typically unequal, right considerably stronger than left. Right cheliped with dactyl approximately equalling length of palm; cutting edge with row of calcareous teeth, 2 usually particularly prominent; terminating in small corneous claw; dorsomesial margin with row of moderately strong spines; dorsal surface slightly elevated in midline and armed with row of acute spines; surfaces

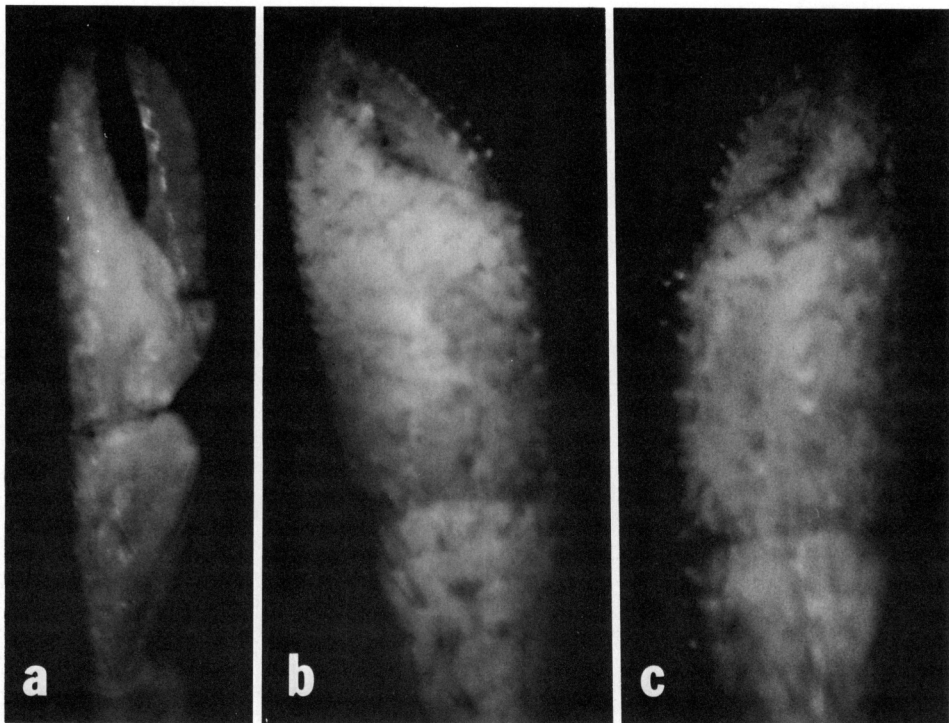


Figure 2. *Pagurus protuberocarpus* new species. a, Normal left cheliped (33.7×); b, Abnormal left cheliped (27.4×); c, Right cheliped (26.3×).

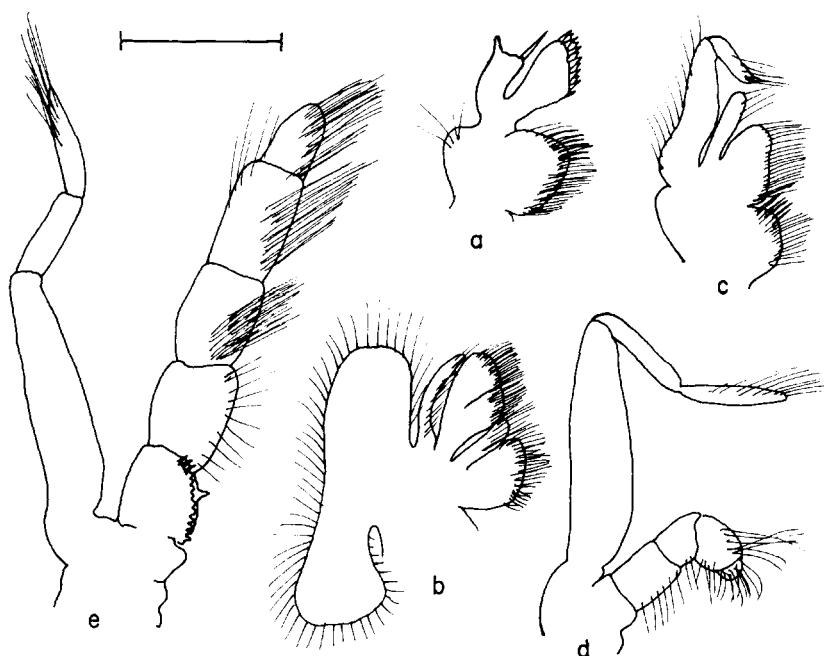


Figure 3. *Pagurus protuberocarpus* new species, mouthparts. a, Maxillule; b, Maxilla; c, 1st maxilliped; d, 2nd maxilliped; e, 3rd maxilliped. Scale equals 0.5 mm.

with scattered tufts of short to moderately long setae. Palm slightly shorter than carpus, dorsoventrally inflated; dorsomesial margin with row of acute spines, dorsal surface with irregular rows of small spines or spinules and scattered short to moderately long setae, generally not extending onto fixed finger; dorsolateral margin with row of spines, strongest distally and on fixed finger; latter with row of small spines or spinules adjacent to cutting edge, which is armed with 1 strong and several small calcareous teeth and terminating in corneous claw; lateral, mesial and ventral surfaces with scattered setae. Carpus approximately equalling length of merus; ventrolateral margin with strong ventrally directed protuberance; dorsomesial margin with row of acute spines, dorsal surface with scattered spinules and numerous tufts of short to long setae; lateral, mesial and ventral surfaces with scattered long setae. Merus subtriangular; dorsal margin with few setae and often 1 acute spine on distal margin; ventromesial margin sometimes with 1 or 2 spines, ventrolateral margin often with 1 or 2 acute spines distally. Ischium with few setae on ventral surface. Coxa with row of setae on ventromesial margin. Left cheliped typically somewhat shorter than right. Dactyl approximately one and one-half times longer than palm; cutting edge with row of fine corneous teeth; terminating in small corneous claw; surfaces unarmed, but with scattered setae. Palm less than one-half length of carpus; dorsal surface prominently elevated in midline and armed with row of strong spines, decreasing in size on fixed finger; dorsolateral margin with row of small spines, strongest on fixed finger, dorsolateral face sometimes with few spinules or tubercles; dorsomesial face strongly depressed, sloping, unarmed. Carpus subtriangular; approximately equalling merus in length; dorsal margin with 1 row of strong acute spines and tufts of long setae; ventral surface with tufts of long setae. Merus subtriangular; dorsal margin

with tufts of short setae; ventrolateral margin sometimes with short row of acute spines distally, ventromesial margin unarmed or with 1 or 2 spines, ventral surface with scattered moderately long setae. Ischium with scattered setae. Coxa with row of long setae on ventromesial margin.

Ambulatory legs approximately equalling length of right cheliped, not dissimilar from left to right. Dactyls shorter than propodi; in dorsal view, straight; in lateral view, slightly curved ventrally; terminating in strong corneous claws; surfaces with scattered setae; ventral margins each with row of strong corneous spines. Propodi somewhat longer than carpi; ventral margins each usually with 1 to several corneous spines or spinules; surfaces with scattered setae. Carpi shorter than meri; dorsal surfaces each with tufts of moderately long setae and 1 acute spine distally. Meri laterally compressed; dorsal and ventral margins with tufts of setae. Ischia with scattered setae. Coxae sometimes with few setae. Sternite of 3rd pereopods with anterior lobe subsemicircular and with marginal tuft of long setae. Fourth pereopods with propodal rasps consisting of several rows of corneous scales; preungual process not apparent.

Males without gonopods or sexual tubes; with 3 unpaired pleopods with external rami well developed, internal rami rudimentary. Females unknown. Telson with posterior lobes somewhat asymmetrical, often separated by broad median cleft; terminal margins almost straight or somewhat oblique, each with 3–5 spines; lateral margins with closely spaced corneous spinules.

*Coloration in Life.*—Characteristic color pattern of segments of ambulatory legs consists of areas of white and red or mottled reddish brown on the dactyls, propodi, and meri, i.e., distal area of white followed by proximal area of color; carpi uniformly red or mottled reddish brown. Meri of chelipeds similarly colored with distal band or white; carpi and chelae generally mottled reddish brown or reddish orange, with the right chela tending to be lighter in color. Shield mottle reddish brown or lighter yellowish brown; corneae yellowish. (From color photographs of Dr. A. J. Provenzano, Jr., 1968.) In preservative, color fading to straw or uniformly opaque.

*Distribution.*—Southern Caribbean from off eastern Venezuela to eastern tip of Colombia; 11–64 m.

*Etymology.*—The specific name *protuberocarpus* is derived from the Latin *protubero* meaning to grow forth, and *carpus*, a segment of the appendage, and refers to the prominent protuberant development of the ventrolateral margin of the carpus of the right cheliped.

*Remarks.*—*Pagurus protuberocarpus* currently is known only from five male specimens; however, as these possess all of the characters of the *Provenzanoi* group of *Pagurus* it is improbable that the females would prove this assignment to be incorrect. Among the species of the group in the western Atlantic, Caribbean and Gulf of Mexico, this species is unique in possessing a prominent protuberance on the ventrolateral margin of the carpus of the right cheliped, and in having a subtriangular carpus of the left cheliped armed with a single row of acute spines. In all other species of the group the carpus of the left cheliped is trapezoidal and carries both dorsomesial and dorsolateral spines.

One of the specimens was particularly unique in having the cheliped of the left side a morphological mirror image of the right (Fig. 2b). Although little is known about regeneration in anomurans, it is possible that the development of this second right cheliped has been the regenerative result of an injury loss of the normal left. Development of similar large claws through regeneration has been reported

in the lobster *Homarus* (Przibram, 1905; Emmel, 1907; 1910; Herrick, 1911); however, in the brachyuran genus *Uca*, once the asymmetrical stage has been reached, handedness is genetically fixed (Morgan, 1923; Vernberg and Costlow, 1966; Crane, 1975). It has long been believed that pagurid asymmetry was genetically fixed early in the ancestral lineage, but in view of this presumed regeneration and the complete reversal of a specimen of *P. macLaughlinae* discussed by Lemaitre et al. (1982), it is possible that certain factors, as yet undetermined, can alter genetic patterns in hermit crabs.

#### ACKNOWLEDGMENTS

I wish to acknowledge, with thanks, the permission granted me by Dr. G. Voss, Rosenstiel School of Marine and Atmospheric Science, University of Miami, to examine pagurid collections obtained during the cruises of the R/V PILLSBURY. I am also indebted to Dr. A. J. Provenzano, Jr., Old Dominion University, for the use of his slides. The photographs were taken by E. J. McGeorge with equipment and conditions as specified in Part II of this series.

#### LITERATURE CITED

- Crane, J. 1975. Fiddler crabs of the world. Ocypodidae: Genus *Uca*. Princeton N.J. Princeton University Press. 736 pp.
- Emmel, V. E. 1907. Regenerated and abnormal appendages in the lobster. 37th Ann. Rept. Comm. Inland Fish. R.I. pp. 99-152.
- . 1910. A study of the differentiation of tissues in the regenerating crustacean limb. Amer. J. Anat. 10: 109-158.
- Herrick, R. H. 1911. Natural history of the American lobster. Bull. Bur. Fish. 29: 153-408. Reprinted, 1977, New York. Arno Press.
- Lemaitre, R., P. A. McLaughlin, and J. García-Gómez. 1982. The *Provenzanoi* group of hermit crabs (Crustacea, Decapoda, Paguridae) in the western Atlantic. Part IV. A review of the group. Bull. Mar. Sci. 32: 670-701.
- Morgan, T. H. 1923. The development of asymmetry in the fiddler crab. Amer. Natural. 57: 269-273.
- Przibram, H. 1905. Die "Heterochelie" bei dekapoden Crustaceen. Arch. Entwickl.-mech. Org. 19: 181-247.
- Vernberg, F. J., and J. D. Costlow. 1966. Handedness in fiddler crabs (Genus *Uca*). Crustaceana 11: 61-64.

DATE ACCEPTED: April 24, 1981.

ADDRESS: Department of Biological Sciences, Florida International University, Miami, Florida 33199.