

A NEW GENUS AND TWO NEW SPECIES OF DIOGENID HERMIT CRABS (DECAPODA, ANOMURA) ¹⁾

BY

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INTRODUCTION

In the course of separate studies on the pagurid faunas of the Pacific and Atlantic coasts of the Americas the authors each discovered one of a pair of species which could not be placed in any described genus. During a visit to Miami, Dr. J. Forest pointed out to one of us (AJP) some of the features which set the West Indian species apart from described genera. Subsequently, following correspondence among the three of us, it became apparent that both undescribed species belonged to the same new genus.

We wish to thank Dr. Jacques Forest for his suggestions; Dr. Fenner A. Chace, Jr., for making available to one of us the Bredin-Smithsonian pagurid collections for study; Dr. Marvin L. Wass for the loan of a specimen collected by the U. S. Fish and Wildlife Service exploratory fishing vessel "Silver Bay"; and Mr. Harvey R. Bullis, Jr., for data on two other specimens taken by the "Silver Bay". Isolda Wisshaupt prepared figures 1a-1f and 2a-2f. The remainder were done by one of us (AJP) with assistance from Won Tack Yang.

MEASUREMENTS

Carapace length is measured from the tip of the rostrum to the posterior transverse margin of the carapace. Shield (anterior carapace) length is from the tip of the rostrum to the cervical groove. Eyestalk length is from the tip of the cornea to the most proximal point on the calcareous stalk. Length of manus is from the articulation of the manus and carpus to the distalmost margin of the closed fingers. Length of palm is from the same articulation to the articulation of the movable dactyl. Height of manus excludes spines.

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Allodardanus n. gen.

Rostrum present but not very prominent. Regions of anterior portion of carapace not well marked, only the mesogastric region being delimited laterally by parallel grooves. Anterior portion of cardiac area with a transverse suture. Antennal flagellum long, non-setose. Ophthalmic scales small, well separated.

Palp of maxillule (maxilla 1) with a recurved appendage on its lateral outer margin. Exopodite of maxilliped 1 with basal article reaching or passing distal third of lacinia media; flagellum biarticulate. Exopodite of maxilliped 2 with large article approximately same length as endopodite. Maxillipeds 3 contiguous at their bases; basis and ischium of endopodite with a dentate crest on inner surface; ischium elongate; large article of exopodite a little more than twice as long as merus.

Left cheliped larger than right. Axis of carpal-propodal articulation very oblique in relation to sagittal plane. Fingers with corneous hoof-shaped nails. Fourth pereopod almost chelate; fifth chelate.

Abdominal terga well developed on somites 2 to 5. Telson with right lobe scarcely developed, left lobe strongly developed. No paired pleopods in male; unpaired pleopods present on terga 2 to 5, each with one large and one reduced ramus. In female no paired pleopods present; a biramous pleopod on left side on terga 2 to 5; both branches of each pleopod well developed.

Gills 14 pairs (5th pereopod with a pleurobranch).

Type species: *Allodardanus rugosus* n. sp.

Relationships. — *Allodardanus* seems to be rather closely related to *Pseudopagurus* Forest, with which it agrees in having obliquely oriented chelae with corneous-tipped fingers, the left chela being larger than the right; 14 pairs of gills (these two characters shared by *Dardanus* as well); maxillule with an appendage on the palp; female with 4 unpaired, biramous pleopods. *Pseudopagurus* differs very strongly in the form of the maxillipeds (Forest, 1952: 800-803, 807, text-figs. 7-9, 12-13). The external appearance of *Allodardanus*, in general, is like that of some species of *Dardanus*; and the maxillipeds are very similar in form to those of *Dardanus* (cf. Forest, 1952: 807, text-figs. 10, 14 of *D. arrosor* (Herbst)). Members of the latter genus, however, are characterized by the absence of an appendage on the palp of the maxillule, the presence of triramous pleopods in the female, lack of a transverse suture posterior to the cervical groove, grooved shield and inconspicuous or obsolete rostrum.

***Allodardanus rugosus* n. sp. (text-fig. 1, pl. IV)**

Material examined: Holotype female, Allan Hancock Foundation Cat. No. 3818; Bahía de Chatham, Isla del Coco (Cocos Island), eastern Pacific Ocean, 5° 33' 50" N 86° 59' 05" W; 40-46 fms., substrate of coarse white sand; 14 January 1938; "Velero III" Sta. 780-38.

Description. — Anterior part of carapace (shield) only a little longer than maximum shield width; its surface roughened by shallow pits and grooves, except for most of gastric region which is smooth; many small, projecting granules toward

lateral margins (fig. 1a). Front with small obtuse rostrum in advance of poorly marked lateral projections. Anterolateral angles rectangular and as far advanced as rostrum. Clusters of dark setae in a transverse row posterior to cervical groove.

Ophthalmic acicles small, well separated, triangular, 1 or 2 spinules at tip and outer margins indistinctly serrate.

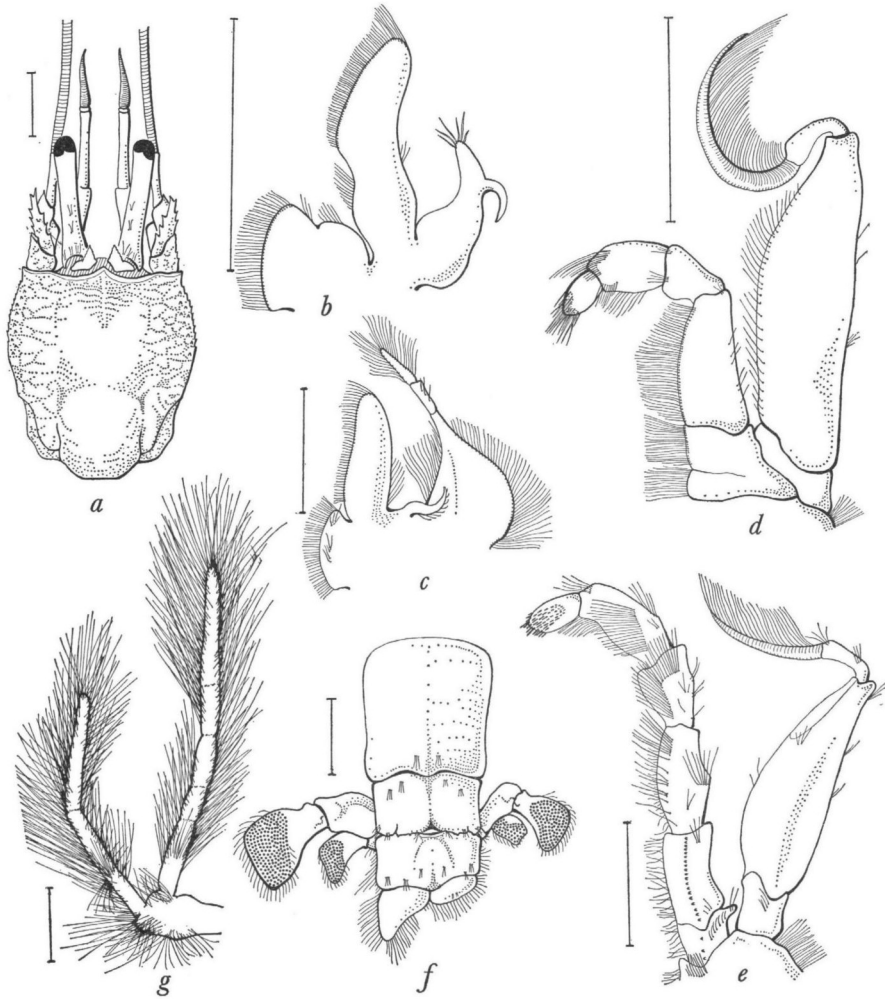


Fig. 1. *Alloedardanus rugosus* n. sp., holotype. a, shield; b, maxillule; c, first maxilliped; d, second maxilliped; e, third maxilliped; f, tail fan; g, pleopod of the third abdominal somite. Scales represent 5.0 mm.

Eyestalks long and slender, approximately half the length of carapace shield; upper and lateral surfaces with short, scattered setae.

Antennular peduncle surpassing eyestalk. Fifth article of antennal peduncle reaching about to end of eyestalk. Antennal flagellum practically devoid of hairs; very minute setules visible under high magnification. Flagellum with a few seg-

ments missing but probably reaching about to tip of major chela. Antennal acicle with 3 or 4 spines on either margin. Basal segment of antennal peduncle with 3 or 4 low tubercles on outer margin. Basal segment and acicle with dorsal surface rough, uneven, and with tufts of scattered long setae.

Palp of maxillule (maxilla 1) with 6 distal hairs and with a long, hooklike secondary appendage on outer lateral margin (fig. 1b). Distal article of flagellum of exopodite of maxilliped 1 slightly longer than proximal article (fig. 1c). Crest of ischium of maxilliped 3 with about 19 corneous tubercles; basis with 2 of similar size and, proximally, a much smaller one; distal end of dactyl with short hairs (fig. 1e).

Chelae unequal, left considerably larger than right. Dactyls of both chelae ending in black, corneous spooned tips. Major cheliped: manus and dactyls paved with small, close-set tubercles tipped with minute corneous spinules; toward outer and lower margin, at base of fixed finger, a deep, smooth pit. Width of movable dactyl less than one-half dactyl length; upper medial margin with a broad, shallow pit. Lateral surface of carpus covered with large, conical, wide-spaced tubercles, tipped with corneous spinules; toward distal end of segment tubercles smaller and close-set like those on chela. Merus covered with granules. Laterally, these granules elongate and in transverse rows over most of surface, crowded together and spinuliform toward distal end of segment; nearly smooth medially, with a crest of 4 tubercles along the ventro-medial margin. Lateral surface of all segments covered with short, fine setules; lateral surface of manus and distolateral portion of carpus with short, stiff, dark bristles (pl. IV fig. a).

Minor cheliped: chela with entire surface laterally and ventrally, and medial surface to articulation of dactyl, covered with sharp corneous-tipped spines, inconspicuous setae scattered among them; no crest of spines along upper margin as in following species. Both surfaces of carpus covered with spines similar to those of chela. Lateral surface of merus covered with flattened, scale-like granules tipped with anteriorly-directed spinules arranged so that surface is smooth to touch when one's finger moves anteriorly, but rough to touch when movement is posteriorly; medial surface smooth on mid-portion but roughened along dorsal, anterior, and ventral margins (pl. IV figs. b, c).

All surfaces of dactyl, propodus, and carpus of second and third pereopods covered with small sharp spines or large spinule-tipped granules, dorsal surface of carpus being especially well armed, but without single definable row of spines. Dactyls of both third pereopods broken in type, but dactyls of second pereopods with prominent row of spines along ventral margin. Propodus of each walking leg also with a row of spines along ventral margin, that on propodus of third left pereopod composed of flattened, keel-like spines which have lost their acute tips. Propodus of third left pereopod relatively higher than that of other legs. A groove along lateral surfaces of carpus and anterior part of merus of each walking leg, least pronounced in second right pereopod, most pronounced in third left pereopod (pl. IV fig. a).



Allodardanus rugosus n. sp., holotype. a, lateral view of anterior portion of animal, showing armature of left pereiopods; b, dorso-medial and c, lateral views of minor chela. Scales represent 10.0 mm.



Allodardanus bredini n. sp., holotype. a, b, dorsal and lateral views of major chela; c, d, dorsal and lateral views of minor chela; e, second left pereiopod; f, third left pereiopod. Scales represent 10.0 mm.

Fourth pereopods almost chelate, with large oval rasp. Fifth pereopods chelate, but dactyls occupying only one-third length of propodus.

On ventral surface of thorax, a single rounded projection anterior to sternal plate between third pereopods, but only sternal plate present between fourth pereopods. Fifth pereopods almost touching at coxae. On each side of body, between fourth and fifth pereopods, a single fleshy lobe fringed with golden setae on lateral surface of body wall. Posterior to this, in approximately the position occupied by a second such lobe in males of the following species, a chitinous, convex plate present.

Telson distinctly asymmetrical, left lobe very much larger than right (fig. 1f).

Four unpaired pleopods biramous (fig. 1g).

Remarks. — A water color sketch of the freshly caught type specimen (in shell, with only legs and distal part of eyestalks showing) was made by Mr. Anker Petersen, former staff artist of the Allan Hancock Foundation. The pereopods appear to have had a ground color of scarlet with areas of Brazil red. The color of the entire animal after more than 25 years in alcohol is now a uniform yellowish-buff, with corneous areas dark brown.

The carcinoecium is no longer with the specimen, but the color sketch and a note in the bottle identify it as a spindle shell (presumably *Fusinus* sp.).

Isla del Coco, or Cocos Island, a small island lying about 300 miles west of Costa Rica and 350 miles northeast of the Galapagos Islands, supports a rather high percentage of endemism in its fauna. The affinities of the Cocos Island fauna have most recently been summarized by Hertlein (1963). With only a single known specimen, it is useless to conjecture whether or not *Allodardanus rugosus* represents an addition to the list of endemic animals of the island.

TABLE I

Measurements of female holotype of *Allodardanus rugosus*, in mm

| | | | |
|-------------------------|------|-----------------------|--------------|
| Shield length | 17.2 | Height | 8.1 |
| Shield width | 15.3 | Thickness | 5.4 |
| Approx. carapace length | 33.6 | Length of dactyl | (tip broken) |
| Eyestalk length | 9.5 | Length of palm | 6.7 |
| Major manus | | Second left pereiopod | |
| Total length | 18.6 | Length of dactyl | 16.3 |
| Height | 13.5 | Length of propodus | 13.8 |
| Thickness | 8.5 | Height of propodus | 3.9 |
| Length of dactyl | 10.2 | Third left pereiopod | |
| Length of palm | 9.5 | Length of dactyl | (broken) |
| Minor manus | | Length of propodus | 12.5 |
| Total length | 13.9 | Height of propodus | 5.4 |

***Allodardanus bredini* n. sp. (text-fig. 2, pl. V)**

Material examined: Holotype female, U. S. National Museum Cat. No. 111172; off Nevis, West Indies; 126 fms., in a "Finley" trap; 17 April 1958; Bredin-Smithsonian Expedition Sta. 71-58. Paratypes, two males, University of Miami Marine Laboratory Accession No. 32.2496; off southwest coast of Great Inagua Island, Bahamas, 20° 53' N 73° 44' W; 145 fms.; 4 November 1961; "Silver

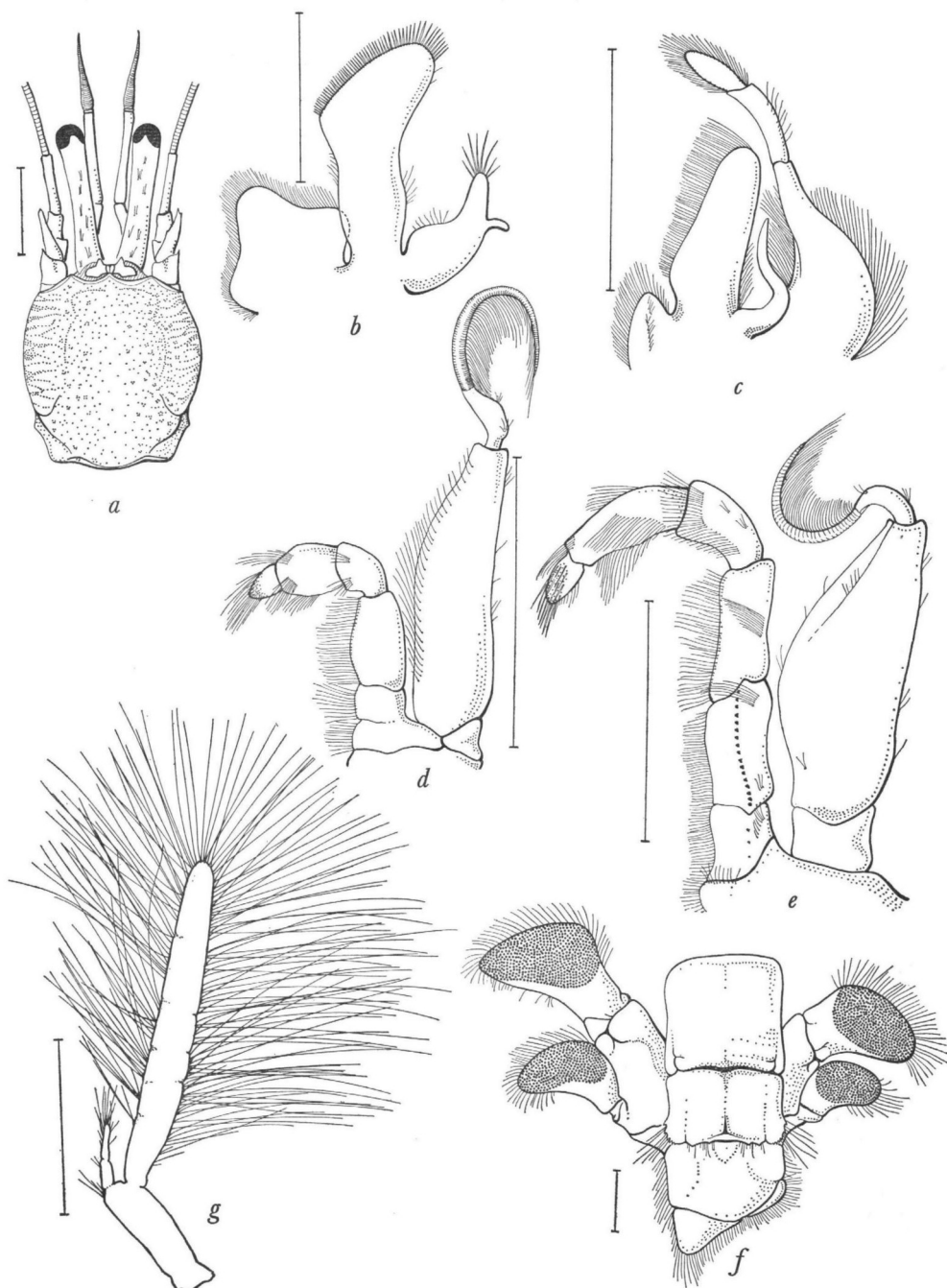


Fig. 2. *Allodardanus bredini* n. sp. a, shield of holotype; b, maxillule of larger male paratype from "Silver Bay" station 3497; c, d, e, first, second and third maxillipeds respectively of holotype; f, tail fan of male paratype; g, pleopod of second abdominal somite of same paratype. Scales represent 5.0 mm.

Bay" cruise 34, Sta. 3497. Paratype male, U. S. National Museum Cat. No. 111173; off north side of Cay Sal Bank, Florida Straits, 24° 08' N 80° 08' W; 138 fms; 3 November, 1960; "Silver Bay" Sta. 2445.

Description. — Anterior part of carapace (shield) including rostrum barely longer than maximum shield width; its surface roughened by shallow pits and grooves, including the gastric region; some very small granules on the lateral margins. Front with small obtuse rostrum reaching line of well-marked lateral projections. Anterolateral angles obtuse and less advanced than rostrum. No clusters of prominent setae arranged transversely posterior to cervical groove (fig. 2a).

Ophthalmic acicles small, well separated, unarmed in female type, but in males ending in a small corneous-tipped spine with additional 2 to 4 spinules on lateral margins.

Eyestalks long and slender, approximately two-thirds the shield length; upper and lateral surfaces with short, scattered, very inconspicuous setae.

Antennules reaching well beyond cornea. Peduncle of antenna extending about to base of cornea. Antennal flagellum devoid of setae longer than about one-fifth width of segments of flagellum. Flagellum reaching or nearly reaching tip of major chela. Antennal acicle in female type with single very small spine on medial margin, but in males two spines on medial margin and sometimes a spine on lateral margin in addition to terminus. Basal segment of antennal peduncle with smooth margins, a single spine dorsally at anterolateral corner. Basal segment and acicle with dorsal surface smooth, covered with fine setae.

Palp of maxillule (maxilla 1) with 8 distal hairs and with a recurved secondary appendage on outer lateral margin (long in holotype female, shorter in a large male) (fig. 2b). Distal article of flagellum of exopodite of maxilliped 1 a little shorter than proximal article (fig. 2c). Crest of ischium of maxilliped 3 with 15 to 17 corneous tubercles; basis with 3 very small, indistinct tubercles; distal end of dactyl with long hairs (fig. 2e).

Chelae markedly unequal, left very much larger than right. Dactyls of both chelae ending in black corneous tips. Major cheliped: manus massive, covered with very small granules tipped with minute corneous spinules; no depression on lateral surface at base of fixed finger. Width of movable dactyl one-half dactyl length; upper medial margin bearing distinct depressed spot. Carpus with irregular row of sharp spines along upper margin and smaller ones over lateral surface. Merus covered with granules laterally but smooth medially and with a high projection on postero-medio-ventral corner. Lateral surface of all segments covered with short, fine setules, these barely rising above surface of manus (pl. V figs. a, b).

Minor cheliped: chela not at all massive, with slender fingers. A row of large, corneous-tipped spines along upper margin of manus and carpus, forming a crest. Smaller spines and long but fine setae on lateral surfaces of manus and dactyls. Medial surface of merus smooth. No projection on ventral posterior medial corner of merus but on medial ventral margin a row of spinules present, poorly indicated in female but strong in large males (pl. V figs. c, d).

Second and third pereopods covered laterally with minute, corneous-tipped spinules. Dorsal surface of carpus, especially that of second pereopod, with a row of very large spines. A row of corneous spines on ventral margins of dactyl and propodus of each walking leg, less pronounced on right side, most pronounced on third left pereopod. Dactyl and propodus of third left leg much deeper than others, proportion of height to length of propodus about one-half in third left leg, about one-third in other walking legs. No groove along lateral surface of carpus and merus of second and third pereopods (pl. V figs. e, f).

Fourth pereopods subchelate, almost chelate, with large oval rasp. Fifth pereopods chelate, but dactyls occupying only about one-fourth total length of propodus.

On ventral surface of thorax, a single rounded projection anterior to sternal plate between third pereopods; only a sternal plate present between fourth pereopods. Fifth pereopods almost touching at coxae. In males on each side of body between fourth and fifth pereopods, two fleshy lobes fringed with many golden setae.

Telson distinctly asymmetrical with left lobe very much larger than right (fig. 2f).

Four pleopods of males apparently uniramous, actually with rudimentary second lobe arising from peduncle of each (fig. 2g).

Remarks. — The female, after being in alcohol and then becoming dry, has faded considerably, but her color pattern apparently was similar to that of the males which are very beautiful indeed. The basic color after about two years in formalin is yellow with pink in certain areas. The distribution of the yellow color: shield and anterior cephalothorax including appendages except for part of the endopodite of the third maxillipeds; the coxae of all legs; entire fourth and fifth pereopods; the tail fan; the dactyl, propodus, and carpus of the second and third pereopods. Pink: lateral and medial surfaces of the merus of the first three pereopods; the ventral surface of the merus of the chelipeds. The chelae are pink on the merus, ischium, medial surfaces of carpus and propodus, with yellow spines on background of light pink. The dactyls are yellow.

The males were removed from their shells or other carcinoecia and no data regarding them are available.

The female holotype was taken in a shell of *Bursa tenuisculpta* Dautzenberg & Fischer, apparently a new record of that species for the western Atlantic, according to personal communication from Raymond B. Manning of the U. S. National Museum. At the time the crab was removed from the shell, the abdomen with its critical pleopods was torn and left in the shell, to be discarded subsequently when the mollusc was prepared for study by other workers.

The species is named in honor of Mr. J. Bruce Bredin, the sponsor of the expedition which took the first specimen and holotype.

In a previous paper one of us (Provenzano, 1963: 251) referred to "a large, very colorful and distinctive *Dardanus* ... from two localities in the West Indies" which specimens were in fact types of the presently described *Allodardanus bredini*. Thus, there are still only two species of *Dardanus* currently known from the West Indies, *D. venosus* (H. Milne Edwards) and *D. insignis* (de Saussure).

TABLE II

Measurements of four specimens of *Allodardanus bredini*, in mm

| | Female holotype | Male paratypes, "Silver Bay" | | |
|-------------------------|--------------------|------------------------------|----------|----------|
| | | St. 3497 | St. 3497 | St. 2445 |
| Shield length | 11.9 | 20.7 | 25.4 | 11.0 |
| Shield width | 10.5 | 19.0 | 24.0 | 10.2 |
| Approx. carapace length | 20.7 | 40.0 | 49.0 | 21.0 |
| Eyestalk length | 9.1 | 15.5 | 17.4 | 9.0 |
| Major manus | | | | |
| Total length | 18.5 | 31.0 | 40.0 | 18.5 |
| Height | 12.5 | 23.6 | 28.2 | 13.7 |
| Thickness | 9.3 | 16.5 | 21.4 | 9.2 |
| Length of dactyl | 9.7 | 18.0 | 22.5 | 10.0 |
| Length of palm | 12.0 | 19.5 | 25.0 | 11.5 |
| Minor manus | | | | |
| Total length | 11.2 | 22.0 | 27.7 | 11.5 |
| Height | 6.0 | 11.5 | 14.0 | 5.5 |
| Thickness | 4.0 | 8.0 | 10.0 | 3.9 |
| Length of dactyl | 6.8 | 13.0 | 16.0 | 6.7 |
| Length of palm | 5.2 | 10.2 | 12.0 | 5.5 |
| Second left pereiopod | | | | |
| Length of dactyl | 14.0 | 23.5 | 31.0 | — |
| Length of propodus | 9.4 | 18.0 | 22.0 | — |
| Height of propodus | 3.1 | 6.1 | 12.5 | — |
| Third left pereiopod | | | | |
| Length of dactyl | 14.7 | 24.0 | 30.0 | 13.0 |
| Length of propodus | 9.0 | 12.0 | 20.0 | 9.4 |
| Height of propodus | 3.5 | 8.5 | 10.0 | 3.5 |

RÉSUMÉ

Un nouveau genre américain de Pagurides de la famille des Diogenidae, *Allodardanus*, est décrit. Il comprend deux espèces nouvelles: *A. rugosus*, de l'île Cocos, Pacifique oriental, et *A. bredini*, de trois localités des Antilles.

REFERENCES

- FOREST, J., 1952. Caractères et affinités de *Pseudopagurus*, genre nouveau établi pour un Paguridae de la côte occidentale d'Afrique, *Pagurus granulimanus* Miers. Bull. Inst. Franç. Afr. Noire, **14**: 799-812, text-figs. 1-15.
- HERTLEIN, L. G., 1963. Contribution to the biogeography of Cocos Island, including a bibliography. Proc. Calif. Acad. Sci., (4) **32**: 219-289, text-figs. 1-4.
- PROVENZANO, A. J., Jr., 1963. The glaucothoes of *Petrochirus diogenes* (L.) and two species of *Dardanus*. Bull. mar. Sci. Gulf & Carib., **13** (2): 242-261, text-figs. 1-9.