

# ***Diogenes patae* n. sp., a new species of hermit crab (Crustacea, Decapoda, Anomura, Diogenidae) from American Samoa**

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## **ABSTRACT**

*Diogenes patae* n. sp., a new species of hermit crab (Decapoda, Anomura, Diogenidae) from American Samoa, is described and illustrated. It belongs to a small group in the genus, in which the antennal peduncles are slender and shorter than the ocular peduncles and the antennal flagella lack paired long setae. The new species is easily distinguished by very dense setation only on the left cheliped and the left second and third pereopods, presence of strong spines on the lateral faces of the second pereopod carpi, and the dorsoventrally flattened body with the flat dorsal surface of the shield and the flat and very broad XI and XII sternites (second and third pereopods).

## **KEY WORDS**

Crustacea,  
Decapoda,  
Anomura,  
Diogenidae,  
*Diogenes*,  
Samoa,  
new species.

## **RÉSUMÉ**

*Diogenes patae* n. sp., espèce nouvelle de bernard-l'ermite (Decapoda, Anomura, Diogenidae) provenant des Samoa américaines.

*Diogenes patae* n. sp., une espèce nouvelle de bernard-l'ermite en provenance des Samoa américaines, est décrit et illustré. Il appartient à un petit groupe du genre chez lequel les pédoncules antennaires sont grêles et plus courts que les pédoncules oculaires et les flagelles antennaires dépourvus d'une paire de longues soies. La nouvelle espèce se distingue facilement par une pilosité très dense présente seulement sur le chélicèpe gauche et les second et troisième péréiopodes gauches, la présence de fortes épines sur les faces latérales du carpe des seconds péréiopodes, le corps aplati dorsoventralement présentant un écusson à surface dorsale plate et des sternites XI et XII (second et troisième péréiopodes) plats et très larges.

## **MOTS CLÉS**

Crustacea,  
Decapoda,  
Anomura,  
Diogenidae,  
*Diogenes*,  
Samoa,  
espèce nouvelle.

## INTRODUCTION

Among species of the genus *Diogenes* Dana, 1851, there is a small group of species that have the antennal peduncles slender and shorter than the ocular peduncles, and the antennal flagella lack paired long setae, which in other species are used for filter feeding (e.g., Haig & Ball 1988). This group includes *D. pallascens* Whitelegge, 1897, *D. leptocerus* Forest, 1956, *D. biramus* Morgan, 1987, *D. capricorneus* Grant & McCulloch, 1906, *D. viridis* Haig & Ball, 1988, *D. spinicarpus* Rahayu & Forest, 1995, and *D. tumidus* Rahayu & Forest, 1995. *Diogenes gardineri* Alcock, 1905, and *D. serenei* Forest, 1956 were once included in this group. However, McLaughlin (2002) found that *D. pallascens*, *D. gardineri* and *D. serenei* were conspecific, among which *D. pallascens* is the senior synonym. *Diogenes senex* was also once included in this group (e.g., Haig & Ball 1988). However, McLaughlin & Haig (1996) demonstrated that this was only because the species had been misinterpreted, as the true *D. senex* has well developed antennal flagella, with articles each having paired long setae.

During a survey of the marine fauna of American Samoa in February 2002, the second author collected an undescribed species belonging to this group, which is described herein. The holotype is deposited at Bernice P. Bishop Museum, Honolulu (BPBM). For comparative purpose, material housed in the following museums was examined: Australian Museum, Sydney (AM), Muséum national d'Histoire naturelle, Paris (MNHN), Western Australian Museum, Perth (WAM), and Museum of Zoology, University of Cambridge, UK (MZCU).

Shield length (SL), measured from the tip of the rostral lobe to the posterior end of the shield, is used as an indicator of size. Terminology used herein generally follows McLaughlin (1974), and for posterior carapace, McLaughlin (2000). When referring to the surfaces of the chela and carpus of each cheliped, the terms "upper", "lower", "inner" and "outer" are used, as the carpal/meral articulations of the chelipeds in *Diogenes* species are rotated counterclockwise from the horizontal plane. This means, for example, that the outer surface of the chela represents the morphological dorsal surface of the segment. This terminology has been used in

the descriptions of some diogenid genera including *Diogenes* (e.g., McLaughlin 2002).

## SYSTEMATICS

Family DIOGENIDAE Ortmann, 1892

Genus *Diogenes* Dana, 1851

*Diogenes patae* n. sp.

(Figs 1-3)

HOLOTYPE. — American Samoa, Polynesia. SW side of Tau Island at Si'ufa'alele Point, Manua Islands, cruise TC0201, RV *Townsend Cromwell*, 14°14.824'S, 169°25.127'W, 15 m, scuba, carbonate pavement with low-growing corals, 11.II.2002, coll. Scott Godwin, ♀ SL 1.6 mm (BPBM-S-12268).

ETYMOLOGY. — This new species is named in honour of Dr Patsy McLaughlin. The specific name uses "Pat", the short and collegial version of the honoree's first name, which she prefers. Pat is truly a great carcinologist who has made what will be longstanding contributions to crustacean biology, especially hermit crab taxonomy. The first author has benefited from her generous help, advice and encouragement in his hermit crab studies.

COMPARATIVE MATERIAL EXAMINED. — *Diogenes pallascens*: Funafuti, Ellice Islands, coll. G. Hedley, syntypes, 3 ♂♂, 4 ♀♀ SL 1.8-2.6 mm (AM G1402). — Vietnam, baie de Cauda, 11.IX.1953, coll. R. Serène, 1 ♂ SL 2.3 mm (MNHN-Pg 1502) (lectotype of *Diogenes serenei*). — Maldives, Mahlos, coll. S. Gardiner, 2 ♂♂ SL 1.7-1.8 mm (MZCU) (syntypes of *Diogenes gardineri*). *Diogenes leptocerus*: Vietnam, embouchure du Cuobe, 14.IV.1954, syntype, 1 ♂ SL 2.0 mm (MNHN-Pg 1416).

*Diogenes tumidus*: Indonesia, Sorong, Irian (= New Guinea), holotype, ♂ SL 2.4 mm (MNHN-Pg 5061). — Indonesia, XI.1991, 6 ♂♂ SL 1.4-2.3 mm; 3 ♀♀ SL 1.3-1.4 mm (MNHN-Pg 5085).

*Diogenes spinicarpus*: Indonesia, Tanjung Tiram, Amboine, holotype, ♂ SL 1.8 mm (MNHN-Pg 5071); paratype, ♀ SL 1.8 mm (MNHN-Pg 7638). — Indonesia, Marsegu, Ceram, 16.IX.1993, 1 ♂ SL 2.0 mm (MNHN-Pg 7639).

*Diogenes biramus*: Australia, Northern Territory, Coral Bay near headland, Port Essington, 4 m, 12.VIII.1986, holotype, ♂ SL 3.1 mm (WAM 156-87). — Australia, Beagle Reef, Kimberleys, 4-12 m, 24.VIII.1991, coll. Gary J. Morgan, 1 ♀ SL 2.5 mm, (WAM 173-91).

*Diogenes capricorneus*: Australia, Queensland, Coral sand, Masthead Island, 23°32'S, 151°44'E, coll. F. E. Grant, 1904, holotype, ♀ SL 2.5 mm (AM G5626).

DISTRIBUTION. — Known only from the type locality.

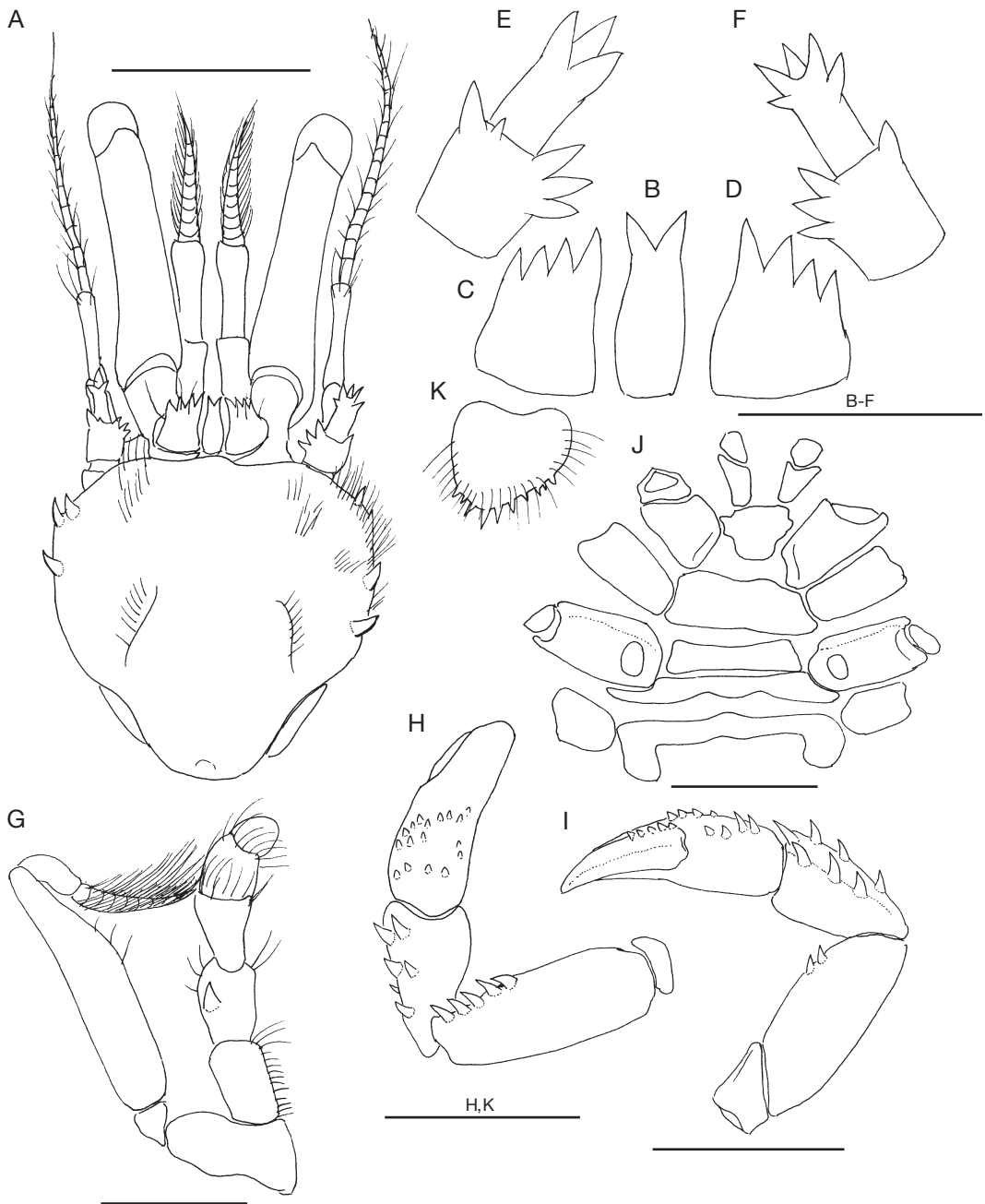


FIG. 1. — *Diogenes patae* n. sp., holotype ♀ SL 1.6 mm, American Samoa, Polynesia (BPBM-S-12268): **A**, shield and cephalic appendages, dorsal; **B**, intercalary rostral process, dorsal; **C**, left ocular acicle, dorsal; **D**, right ocular acicle, dorsal; **E**, second segment and acicle of left antenna, dorsal; **F**, second segment and acicle of right antenna, dorsal; **G**, third maxilliped, left, inner; **H**, **I**, right cheliped; **H**, lower view; **I**, same, upper (and slightly inner) view; **J**, coxae and sternites of third maxillipeds, chelipeds and second through fourth pereopods, ventral; **K**, telson, dorsal. Setae omitted in B-F and H-J. Scale bars: A, H-K, 1 mm; B-G, 0.5 mm.

## DESCRIPTION

Shield (Fig. 1A) as long as broad; anterior margin between rostral lobe and lateral projections shallowly concave; anterolateral margins rounded, with spine on right anterolateral margin; lateral margins slightly convex, with three (left) or two (right) strong spines; dorsal surface flat, with scattered setae; rostral lobe obsolete; lateral projections blunt. Intercalary rostral process (Fig. 1B) bifid distally.

Posterior carapace with posterolateral plates very small, well calcified, unarmed.

Ocular peduncles (including corneas) (Fig. 1A) 0.8 length of shield, slightly inflated distally. Corneas (Fig. 1A) slightly dilated. Ocular acicles (Fig. 1C, D) with four spines distally.

Antennular peduncles (Fig. 1A) with ultimate segments slightly exceeding half length of ocular peduncles when fully extended; ultimate, penultimate and basal segments unarmed.

Antennal peduncles (Fig. 1A, E, F) short, with fifth segments at most reaching half length of ocular peduncles when fully extended. Fifth and fourth segments unarmed; third segment with ventrodorsal angle produced; second segment with dorsolateral angle bearing strong spine and, on left, with small spine mesiad to it, dorsomesial distal angle with three spines; first segment unarmed. Antennal acicles short, each with three (left) or five (right) spines distally. Antennal flagella (Fig. 1A) short, 0.8 length of shield; articles each with few short setae distally.

Third maxilliped (Fig. 1G) with merus bearing large spine dorsally; ischium without crista dentata; basal unarmed.

Left cheliped (Fig. 2A-C) stout, with very dense, long setae obscuring armature on outer faces of dactyl, palm, carpus and merus. Dactyl and fixed finger each terminating in calcareous claw; cutting edges with several calcareous teeth; dactyl with upper surface bearing row of spines. Palm with upper face bearing row of spines and two additional spines distally. Carpus with upper face bearing one large and two small spines; distal margin of outer face with four spines on upper half and distal margin of inner face with one spine. Merus with two spines on distomesial angle and four large spines on ventromesial margin. Ischium unarmed.

Right cheliped slender (Fig. 1H, I), moderately setose. Dactyl and fixed finger each terminating in calcareous claw; dactyl with row of spines on outer margin of upper face. Palm with many spines on outer and lower faces. Carpus with upper face bearing double row of three strong spines and one strong distal spine; additional two spines present on outer face. Merus with ventrolateral margin bearing row of five strong spines distally; ventromesial margin with two subdistal spines. Ischium unarmed.

Second pereopods with left (Fig. 2D-G) bearing very dense, long setae obscuring armature on entire lateral faces of dactyl, propodus and carpus, and distolateral face of merus; right (Fig. 3A-C) with same surface moderately setose. Dactyls 0.9 length of propodi, each terminating in sharp, semi-transparent claw. Propodi 2.0-2.2 length of carpi, each with three small spines on distal margin of mesial face (Figs 2E; 3B). Carpi 0.7 length of meri; each with sharp dorsodistal spine (Figs 2F; 3A), and, on left, additional two sharp spines on mesial face dorsally (not shown in figure); lateral faces each with four (left, Fig. 2F) or three (right, Fig. 3A) spines. Meri each with four (left, Fig. 2G) or two (right, Fig. 3A) sharp spines on ventrolateral margin, and, on right, two additional sharp spines on ventromesial margin (Fig. 3C).

Third pereopods with left (Fig. 3D-G) bearing very dense, long setae obscuring armature on lateral faces of dactyl, propodus, carpus and merus; right (Fig. 3H, I) with same surface moderately setose. Dactyls 1.0-1.1 length of propodi, each terminating in sharp, semi-transparent claw. Propodi 1.7-2.0 length of carpi, each with three small spines on distal margin of mesial face (Fig. 3E, I), and, on right, two strong spines on lateral face dorsally (Fig. 3H). Carpi 0.7-0.8 length of meri; each with sharp dorsodistal spine and, on left, additional one sharp spine in front of proximal margin of dorsal surface (Fig. 3F); three additional spines present on lateral face of right (Fig. 3H). Meri with lateral faces each bearing four (left, Fig. 3G) or five (right, Fig. 3H) spines ventrally.

Sternite X (Fig. 1J) (chelipeds) flat; sternites XI (second pereopods) and anterior lobe of sternite XII (third pereopods) subrectangular, very broad and flat.

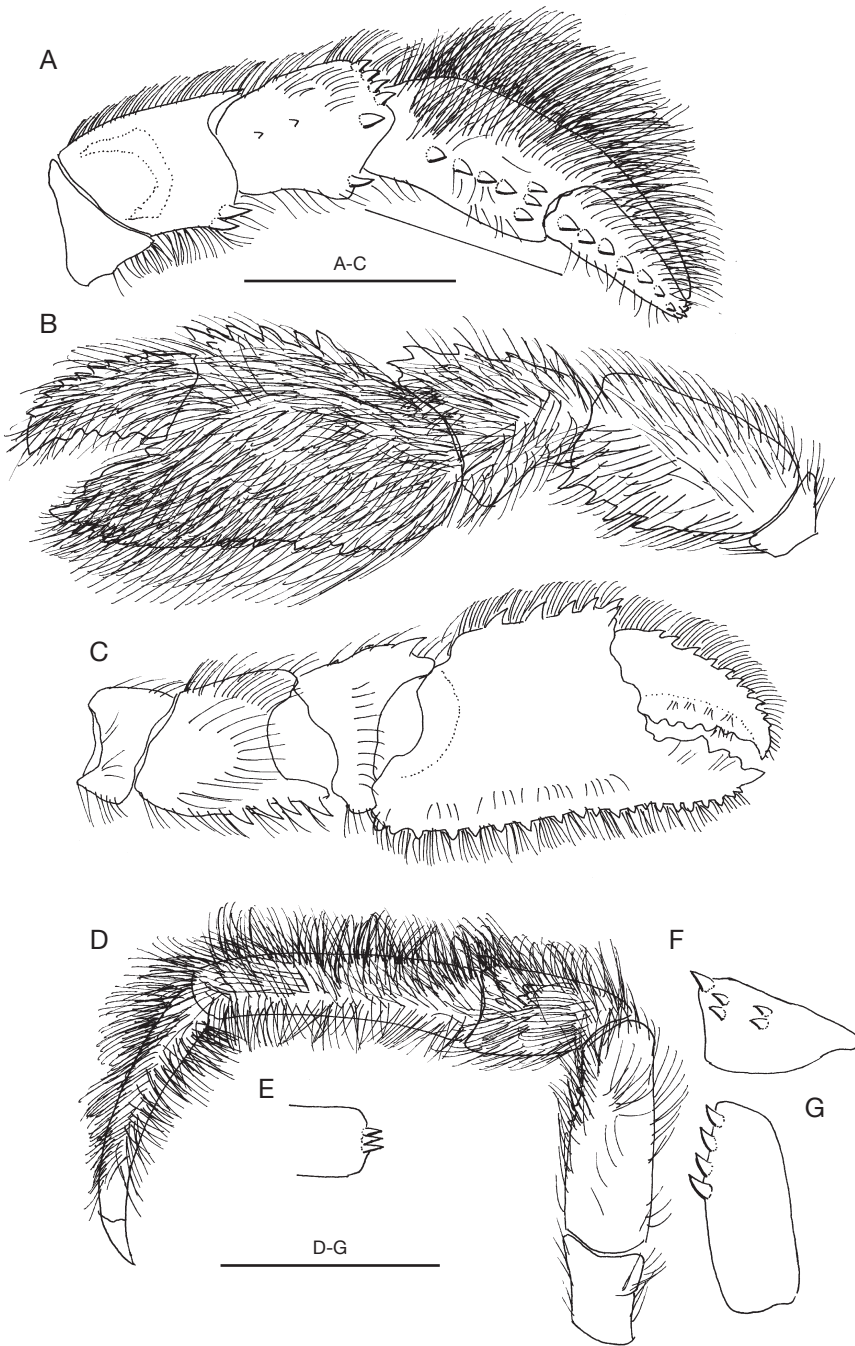


FIG. 2. — *Diogenes patae* n. sp., holotype ♀ SL 1.6 mm, American Samoa, Polynesia (BPBM-S-12268): **A-C**, left cheliped; **A**, upper; **B**, outer; **C**, inner; **D-G**, left second pereopod; **D**, lateral; **E**, distal portion of propodus, mesial; **F**, carpus, lateral (slightly dorsal); **G**, merus, lateral (slightly ventral). Setae omitted in E-G. Scale bars: 1 mm.

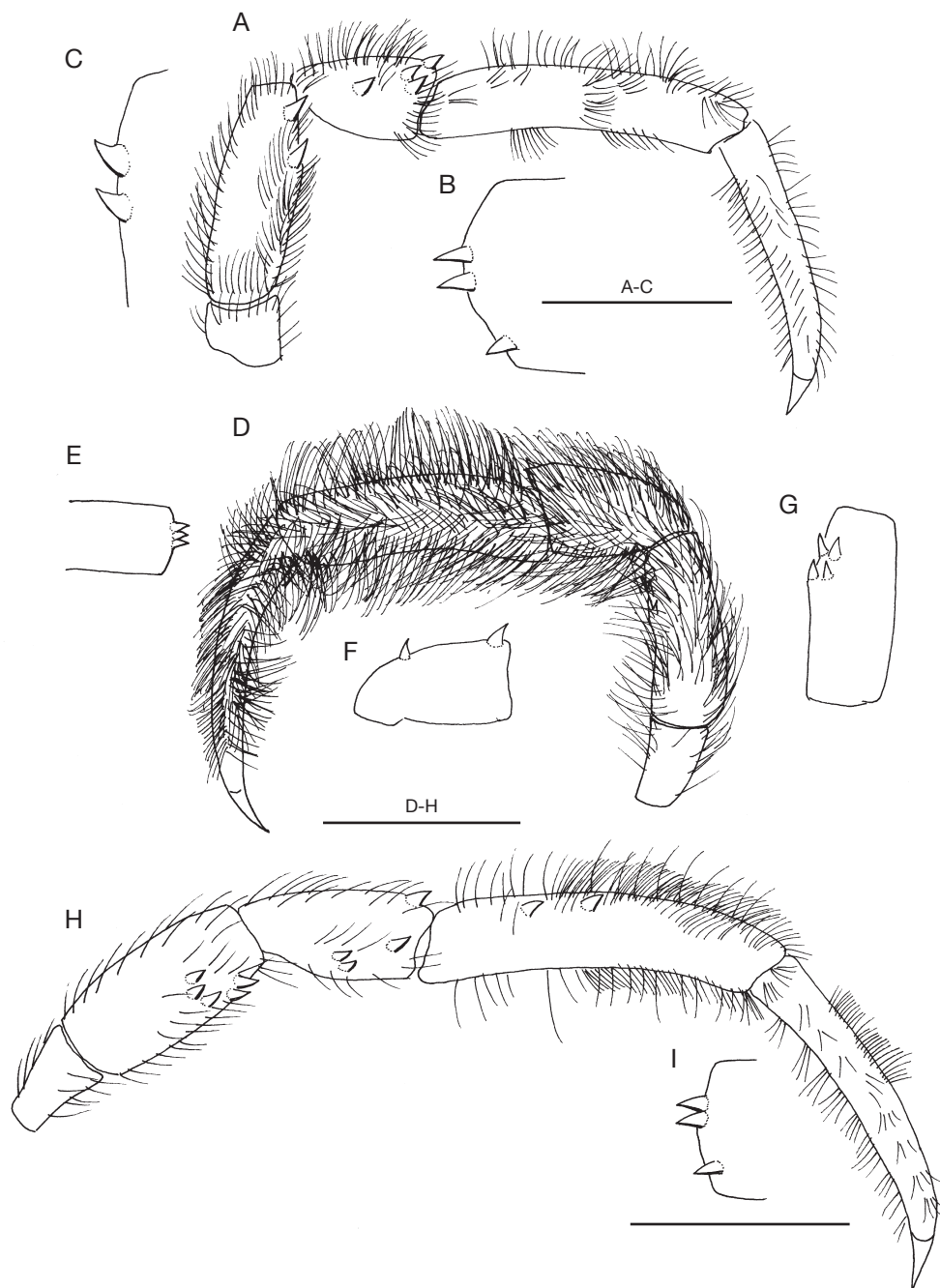


FIG. 3. — *Diogenes patae* n. sp., holotype ♀ SL 1.6 mm, American Samoa, Polynesia (BPBM-S-12268): **A-C**, right second pereopod; **A**, lateral; **B**, distal portion of propodus, mesial; **C**, merus, ventrodistal portion, mesial; **D-G**, left third pereopod; **D**, lateral; **E**, distal portion of propodus, mesial; **F**, carpus, mesial; **G**, merus, lateral (slightly ventral); **H, I**, right third pereopod; **H**, lateral; **I**, distal portion of propodus, mesial. Setae omitted in B, C, E-G, and I. Scale bars: A, D-I, 1 mm; B, C, 0.5 mm.

Fourth pereopods with dactyl terminating in corneous claw; propodal rasp well developed; carpus with sharp dorsodistal spine.

Fifth pereopods chelate.

Abdomen dextrally twisted. Female with unpaired, unequally biramous, left 2-5 pleopods. Male unknown.

Uropods asymmetrical, left larger than right; endopodal and exopodal rasps well developed.

Telson (Fig. 1K) asymmetrical, with posterior margin bearing sharp spines, median cleft obsolete.

#### *Colour in life*

Unknown.

#### REMARKS

The new species has very dense setation on the left cheliped and the left second and third pereopods. Such setation is not found on the right counterparts of these appendages. No such asymmetrical pattern of setation has been found in other species in the group. Generally the species in the group are not so setose except for *D. tumidus*, which has very dense plumose setae on the chelipeds and the ambulatory pereopods. However, the density of setation on the pereopods of *D. tumidus* is similar from left to right.

Presence of many spines on the lateral faces of the ambulatory pereopods is also characteristic to the new species, in particular on the second pereopod carpi.

The body of the new species is flattened, including the nearly flat dorsal surface of the shield and the flat and very broad sternites XI and XII. This appearance is quite similar to *Clibanarius eurysternus* Hilgendorf, 1879, which is specifically adapted to living in *Conus* shells that have very narrow shell apertures and inner spaces. Unfortunately, the shell species used by the new species is unknown. In other species in the group, the shield is more or less vaulted.

In conclusion, the new species is easily distinguished from all other species in the group by the asymmetrical setation on the chelipeds and ambulatory pereopods, presence of strong spines on the lateral faces of the second pereopod carpi, and the dorsoventrally flattened body.

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