

A new species of *Stratiotes* Thomson, 1899 (Anomura, Paguroidea, Diogenidae) from the eastern tropical Pacific

Manuel AYON PARENTE
Michel E. HENDRICKX

Laboratorio de Invertebrados Bentónicos, Unidad Académica Mazatlán,
Instituto de Ciencias del Mar y Limnología,
Universidad Nacional Autónoma de México,
PO Box 811, Mazatlán, Sinaloa 82000 (Mexico)
michel@ola.icmyl.unam.mx

Ayon Parente M. & Hendrickx M. E. 2006. — A new species of *Stratiotes* Thomson, 1899 (Anomura, Paguroidea, Diogenidae) from the eastern tropical Pacific. *Zoosystema* 28 (2): 487-494.

ABSTRACT

A new species of hermit crab, *Stratiotes mclaughlinae* n. sp., is described from the Pacific coast of Mexico, and represents the first record of this genus from this region. The only discrepancy with *Stratiotes* diagnosis consists in the absence in *S. mclaughlinae* n. sp. of pleopods on female first somite. The new species also differs from all previously described species of *Stratiotes* by a combination of one or several characters related to the size and shape of the ocular peduncle and ocular acicle, the antennal acicle, the armature of the antennal peduncle, the chelipeds, the telson and the male first pleopod.

RÉSUMÉ

Une nouvelle espèce de *Stratiotes* Thomson, 1899 (*Anomura*, *Paguroidea*, *Diogenidae*) de l'Est-Pacifique tropical.

Une nouvelle espèce de bernard-l'ermite, *Stratiotes mclaughlinae* n. sp., est décrite de la côte pacifique du Mexique et représente la première mention du genre dans la région. La seule divergence avec la diagnose de *Stratiotes* est l'absence, chez la femelle de *S. mclaughlinae* n. sp., de pléopodes sur le premier somite. La nouvelle espèce se différencie aussi de toutes les espèces de *Stratiotes* décrites à ce jour par divers caractères concernant la taille et la forme du pédoncule et de l'écaille oculaires, de l'acicule antennaire, de l'armature du pédoncule antennaire, des chélicèdes, du telson et du premier pléopode du mâle.

KEY WORDS

Crustacea,
Decapoda,
Anomura,
Paguroidea,
Diogenidae,
Stratiotes mclaughlinae n. sp.,
hermit crab,
tropical eastern Pacific,
new species.

MOTS CLÉS

Crustacea,
Decapoda,
Anomura,
Paguroidea,
Diogenidae,
Stratiotes mclaughlinae n. sp.,
bernard-l'ermite,
Est-Pacifique tropical,
espèce nouvelle.

INTRODUCTION

Thirteen species of the genus *Paguristes* Dana, 1851 are currently recognised in the tropical eastern Pacific (Hendrickx & Harvey 1999). Recent revisions of species of *Paguristes* worldwide, however, have shown that some should be reassigned in different genera. McLaughlin (2002) erected the genus *Pseudopaguristes* for species featuring the characteristic male and female gonopods of *Paguristes* but differing by having only eight functional pairs of gills and a pronounced sexual dimorphism. Rahayu (2005) reinstated the genus *Stratiotes* Thomson, 1899, originally erected to accommodate *Pagurus setosus* Filhol, 1885, a species with 12 pairs of gills (see Forest & McLaughlin 2000 for further consideration regarding the status of *Pagurus setosus* Filhol, 1885 and *Paguristes setosus* (H. Milne Edwards, 1848)) and which presently includes 16 species, 13 previously included in *Paguristes*. No species of *Stratiotes* has been reported for the eastern or western Atlantic.

While reviewing material identified by the late Janet Haig years ago and deposited in the reference collection of the Benthic Invertebrates Laboratory, Mazatlán, Mexico, and additional specimens from the same locality, an undescribed species of *Stratiotes* was recognized.

MATERIAL AND METHODS

The material was obtained in June 1979, and April 1981, from a series of samples in the Bay of Mazatlán, Sinaloa, Mexico. Specimens were collected with a c. 10 liters Van Veen dredge and are deposited in the reference collection of Benthic Invertebrates in the Laboratorio de Invertebrados Bentónicos, ICML, UNAM, in Mazatlán, Sinaloa. McLaughlin (2002, 2003) is followed for general terminology. Measurements are in millimetres (mm), and include shield length (SL), measured from the tip of the rostrum to the midpoint of the posterior margin of shield; and shield width (CW), measured at its widest point. Other abbreviations used are: Pl₁-Pl₅, first to fifth pleopod; EMU, reference collection of Estación Mazatlán, Universidad Nacional Autónoma de México; LACM, Los Angeles County Museum.

SYSTEMATICS

Family DIOGENIDAE Ortmann, 1892

Genus *Stratiotes* Thomson, 1899

Stratiotes mclaughlinae n. sp.

(Figs 1-3)

TYPE MATERIAL. — Holotype: **Mexico**. Bay of Mazatlán, Sinaloa, RV *FCI*, Van Veen dredge, 23°13'N, 106°27'W, 9 m, 25.VI.1979, ♂ SL 2.0 mm, CW 1.7 mm (EMU-752).

Paratypes: **Mexico**. Bay of Mazatlán, Sinaloa, RV *FCI*, Van Veen dredge, 23°13'N, 106°27'W, 5-27 m, 30.IV.1981, ♀ SL 1.4 mm (EMU-5671, ex EMU-752); ♀ SL 1.58 (EMU-6712); ♀ SL 1.66 mm (LACM CR 1981-263.1).

ETYMOLOGY. — The species is named to honor Patsy A. McLaughlin in recognition of her enormous contribution to the study of hermit crabs, and the countless occasions in which she has shared her experience and knowledge on anomurans with us.

DISTRIBUTION. — Known only from the type locality.

DESCRIPTION

Shield (Fig. 1A) slightly longer than wide, with few scattered granules, spines and tufts of long setae; a well marked, anterior median concavity. Rostrum short, terminating sharply, reaching bases of ocular acicles. Lateral projections obtuse, each armed with small marginal spine, reaching level of rostrum tip. Margin between rostrum and lateral projections concave, thickened. Anterolateral angle of carapace armed with one strong, or moderately strong, corneous spine; posterior margin truncate, rounded. Branchiostegites each with row of strong or moderately strong spines on dorsal margin, and tufts of long setae on distal margin.

Ocular peduncles (Fig. 1A) 0.6 shield length, wider basally, circular in cross section, cornea small, not dilated, its diameter about 0.25 of peduncular length, mesial surfaces each with row of long setae. Ocular acicles subtriangular, mesial margins contiguous, terminating in multifid tip, lateral margin armed with one or two small spines, mesial margin entire.

Antennular peduncles (Fig. 1A) long, overreaching ocular peduncles by 0.66 the length of ultimate segment when fully extended; ultimate and penultimate

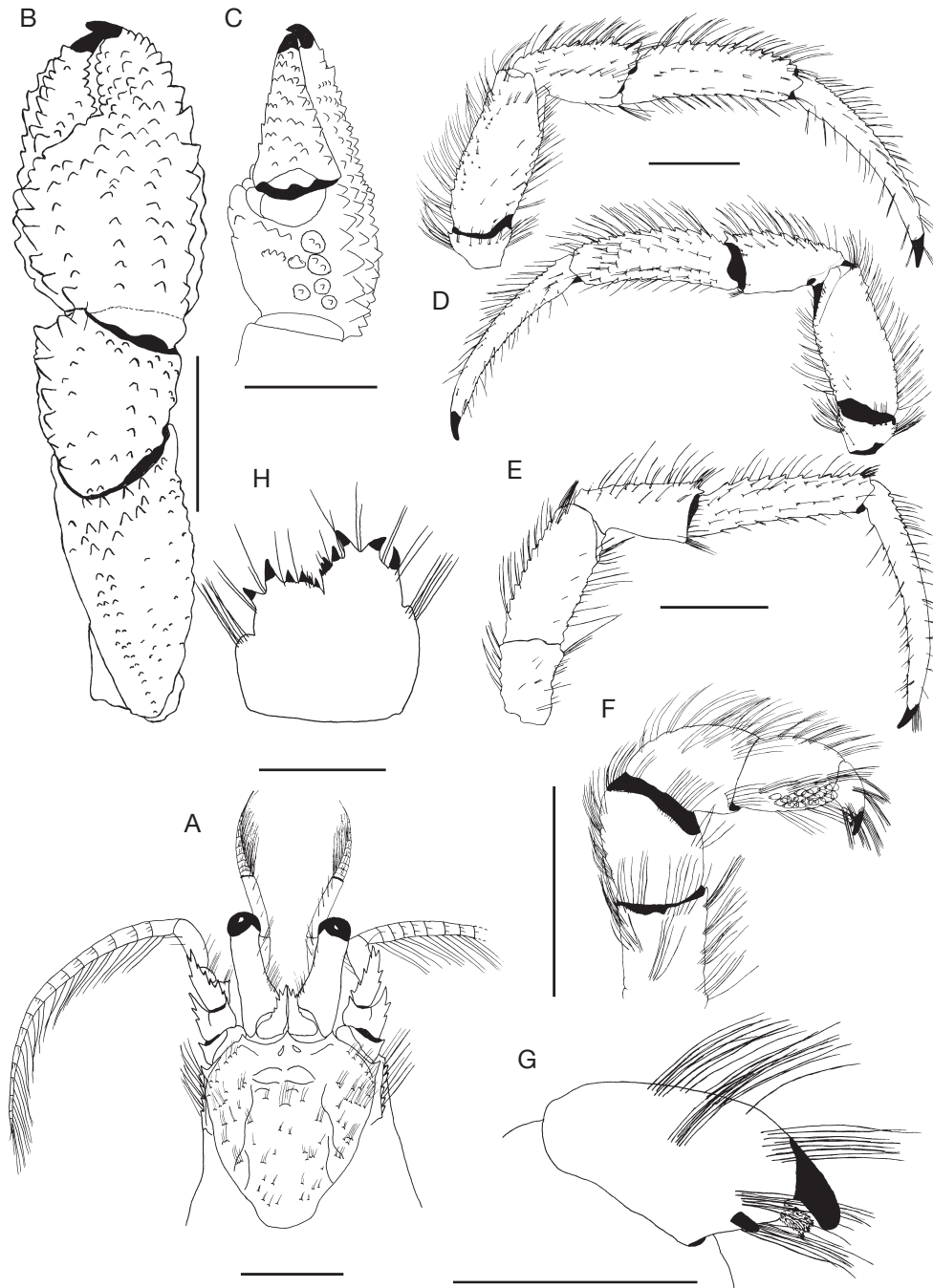


FIG. 1. — *Stratiotes mclaughlinae* n. sp., σ holotype (EMU-752): **A**, shield and cephalic appendages, dorsal view; **B**, right cheliped, dorsal view (setae omitted); **C**, right dactyl and palm, lateral view; **D**, right second pereopod, inner and outer views; **E**, left third pereopod, inner view; **F**, right fourth pereopod, lateral view; **G**, dactyl of right fourth pereopod, lateral view; **H**, telson, dorsal view. Scale bars: A-F, 1 mm; G, H, 0.5 mm.

segments unarmed, basal segment with one spine on laterodistal margin and tufts of setae.

Antennal peduncles (Fig. 1A) reaching or slightly exceeding distal margin of ocular peduncles. Fifth segment unarmed, with some short setae on ventrolateral margin and dorsal surface. Fourth segment with one small spine on dorsodistal margin. Third segment with one strong or moderately strong spine on ventromesial distal angle, and tufts of long setae. Second segment with dorsolateral distal angle strongly produced, terminating in bifid spine; lateral margin with one smaller spine; dorsomesial distal angle terminating in strong spine; mesial margin with tufts of setae. First segment with one small spine in lateral distal margin. Antennal acicle almost reaching to base of cornea, nearly straight, mesial margin armed with three to five spines, lateral margin armed with one to two smaller spines, terminating in bifid tip. Antennal flagellum moderately long, approximately 1.5 length of shield, consisting of about 17 segments and reaching tip of chelae when extended, each article with long, paired setae ventrally.

Mandible without distinguishing characters. Maxillule (Fig. 2A) with proximal (coxal) endite subquadrate, distal (basal) endite subrectangular, enlarged distally; endopod with one seta, one apical seta on weakly produced internal lobe, external lobe well developed, recurved, approximately 0.75 length of endopod, with one seta at mid-length. Maxilla (Fig. 2B) with endopod moderately long, equaling or slightly exceeding scaphognathite in distal extension. First maxilliped (Fig. 2C) with endopod moderately short, not reaching distal end of basal segment of exopod; proximal segment of exopod subtriangular, tapering distally; epipod well developed. Second maxilliped (Fig. 2D) with basis-ischium fusion incomplete. Third maxilliped (Fig. 2E) with basis-ischium fusion incomplete; basis with two spines, partially obscured by tufts of long setae; ischium with crista dentata well developed, without accessory tooth; merus with one minute spine on ventral margin, dorsodistal margin with minute spine; carpus without spine at dorsodistal margin.

Chelipeds (Fig. 1B, C, setae not illustrated) short, similar in shape, equal or slightly unequal; chelae, in

dorsal view, oval-shaped, with tufts of setae. Dactyls about 1.3 length of palms; dorsomesial margins with row of strong, corneous-tipped spines decreasing in size distally; dorsal surfaces with row of small tipped spines near to cutting edge; mesial surfaces with transverse rows of single or bifid tubercles; ventral surfaces with spine-tipped tubercles or granules; cutting edges with strong calcareous teeth; terminating in an acute corneous claw overlapped by claw of fixed finger. Palms approximately 0.75 length of carpi; dorsomesial margins with five prominent, corneous-tipped spines; dorsolateral margins with row of strong corneous-tipped spines, largest medially; dorsal surfaces with three rows of moderately strong, corneous-tipped spines running up to penultimate mesial spine, then forming several rows of tipped granules or spines, the latter decreasing in size on fixed finger; mesial faces with irregular rows of single, bifid or trifid spine-tipped tubercles; lateral faces with numerous tipped granules or tubercles; ventral surfaces with tipped tubercles, often forming longitudinal, irregular rows; cutting edge of fixed finger with calcareous teeth. Carpi moderately short, 0.6 to 0.66 length of meri; dorsomesial margins with row of six prominent corneous-tipped spines, posterior smallest and with tufts of long setae basally; dorsal surfaces with few corneous-tipped spines; dorsodistal margins with few spines, largest spine near articulation with palm; dorsolateral margins with row of five strong, corneous-tipped spines; lateral faces and laterodistal margins each with small granules and tufts of setae; ventral surfaces unarmed. Meri subtriangular; dorsal margins with row of spinulose protuberances on proximal 0.75, and transverse rows of corneous-tipped, often multifid tubercles or spines distally; dorsodistal margins with row of moderately strong, corneous-tipped spines extending laterally and mesially; mesial faces smooth, with tufts of very short setae or bristles; lateral faces with numerous scattered corneous-tipped spinules, tubercles or small spines; ventromesial and ventrolateral margins with single or double row of corneous-tipped spines; ventral surfaces with few small granules. Ischia with row of moderately, small corneous-tipped spines on ventromesial margin; dorsolateral margins with row of small corneous-tipped spines; ventrolateral distal

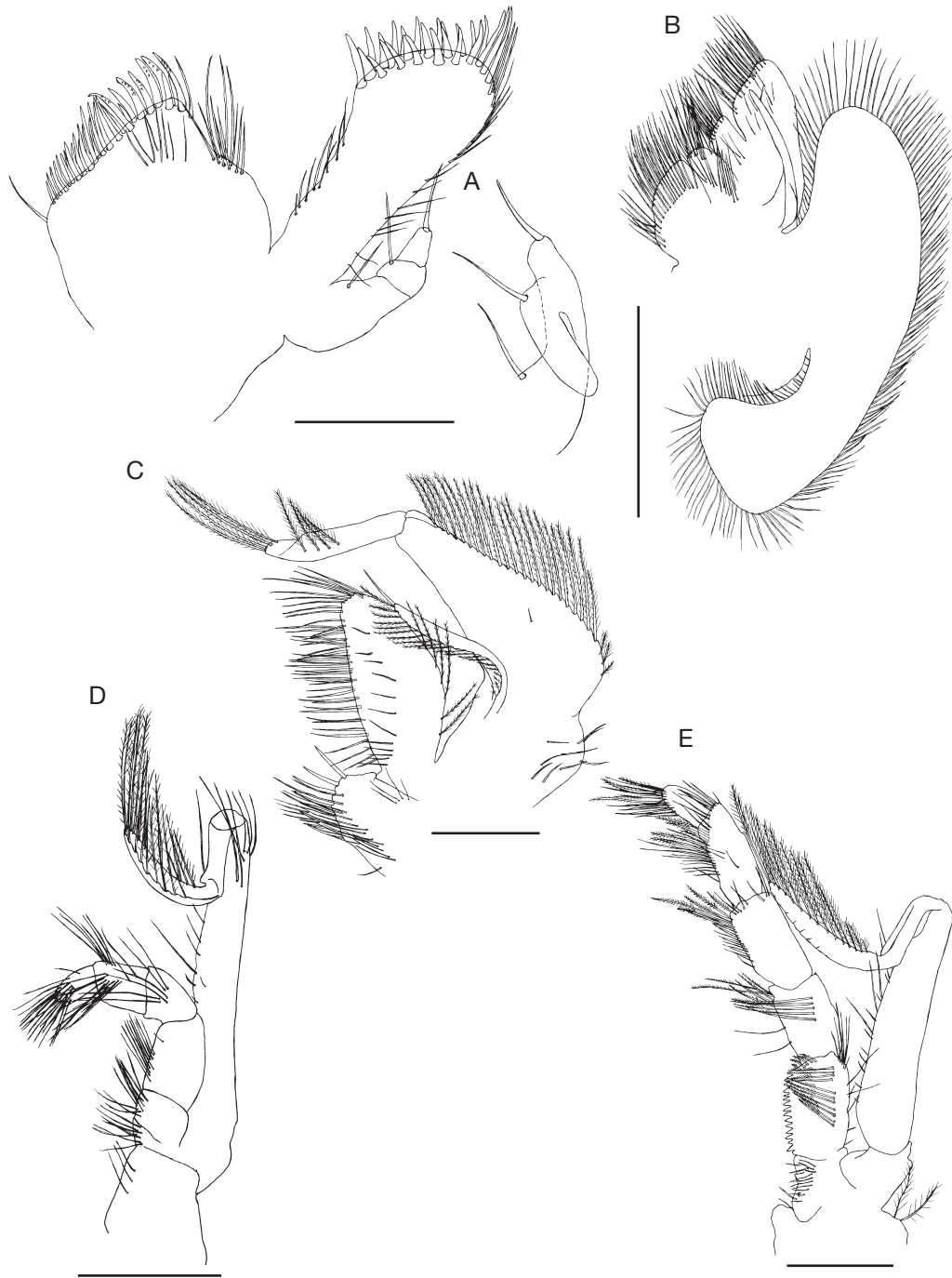


FIG. 2. — *Stratiotes mclaughlinae* n. sp., mouthparts: **A**, ♀ paratype (EMU-6712); **B-D**, ♂ holotype (EMU-752): **A**, right maxillule and magnification of the endopod, internal view; **B**, right maxilla, internal view; **C**, right first maxilliped, internal view; **D**, right second maxilliped, internal view; **E**, right third maxilliped, internal view. Scale bars: 0.5 mm.

angles each with cluster of small spines.

Ambulatory legs (Fig. 1D, E) generally similar, overreaching chelipeds by 0.5 length of dactyls. Dactyls 1.4-1.45 longer than propodi; dorsal surfaces each with row of seven to eight (seconds) or six to seven (thirds) small, calcareous-tipped spines or spine-tipped tubercles proximally and tufts of long stiff setae; mesial and lateral faces with tufts of long to moderately long setae; ventral margins each with row of 10-14 minute corneous spines and tufts of long setae. Propodi 0.22-0.25 longer than carpi; dorsal margins each with one row of strong (second), or double row of moderately strong corneous-tipped spines (third) and tufts of long, stiff setae; mesial and lateral faces rugose, with rows of granules accompanied with tufts of stiff setae; ventral faces with small granules or spine-tipped tubercles and tufts of long stiff setae; ventromesial distal margin with three small spines (second), or row of granules or spine-tipped tubercles (third) and tufts of long setae. Carpi approximately 0.75 length of meri; dorsal margins with double (second) row of tubercles proximally, becoming strong, corneous-tipped spines distally, or with one strong spine distally (third) and tufts of long stiff setae; mesial faces smooth, with scattered tufts of very short setae or bristles; lateral faces inflated or rounded on lateroventral margin (second and third), and with longitudinal row of granules (third) with tufts of long stiff setae; ventral surfaces smooth, with tufts of long stiff setae on distal margin. Meri laterally compressed; dorsal margins each with row of small spines and tufts of long stiff setae; mesial faces smooth, with scattered tufts of very short setae or bristles; lateral faces with few granules and tufts of long stiff setae; ventral margins each with one row (second) of corneous denticles or spines or irregular double row (third) of granules and tufts of long, plumose, stiff setae. Ischia with one strong spine on dorsodistal margins; ventral margins with a few strong granules (third) and tufts of long, plumose, stiff setae. Fourth pereopods (Fig. 1F) weakly semichelate; dactyl short, setose, with one moderately strong spine posterior to preungual process (Fig. 1G) at base of claw; propodi each with three rows of ovate scales in propodal rasp. Sternite of third pereopods (Fig. 3A) with transversally subrectangular

anterior lobe; a pair of weak, lateral protuberances with one tuft of setae.

Male first and second pleopods modified as gonopods. Pl₁ (Fig. 3B) with row of long setae on mesial margin of basal lobe, superior mesial angle with tuft of long bristles, two long setae on proximal lateral margin; inferior lamella with row of setae on lateral margin, distal margin with row of small curved spines extending down mesial face; external lobe subrectangular. Pl₂ (Fig. 3C) with one short seta proximally, two long subterminal setae on lateral margin, endopod with two long setae; appendix masculina slightly twisted, lateral margins and inferior face with long setae, its apex without setae. Pl₃-Pl₅ unpaired, exopod very well developed, endopod vestigial or absent.

Female with paired gonopores; lacking Pl₁; Pl₂ (Fig. 3D) with endopod more developed than exopod; Pl₃ (Fig. 3E) with endopod shorter than exopod; Pl₄-Pl₅ (Fig. 3F, G) with exopod well developed, endopod very reduced.

Uropods and telson asymmetrical (Fig. 1H). Telson with posterior lobes subeliptic, margins with few long setae; right terminal margin with five to seven spines, with one terminal plus one lateral; left terminal margin with six to seven spines, two terminal (diverging) plus one lateral; the smallest spines on margin of middle incision. Anterior lobes unarmed, with tuft of long setae on lateral margins.

Colour

Specimens fixed over a long period of time. Anterior portion of the carapace, ocular peduncles, and ocular acicles cream-coloured, reflecting against light a reddish green or purple colour. Antennular and antennal peduncle, and antennal flagella pale. Cornea honey or light brown. Abdomen straw yellow. Chelipeds and pereopods cream-coloured, reflecting against light a reddish green or purple colour. Claws of chelipeds and pereopods amber.

HABITAT

The four specimens were collected in the Bay of Mazatlán, Sinaloa, Mexico, in a depth range of 5-27 m, on sandy sediment. The specimens were found in empty shell of *Cotonopsis turrita* Sowerby, 1832 and *Anachis* sp.

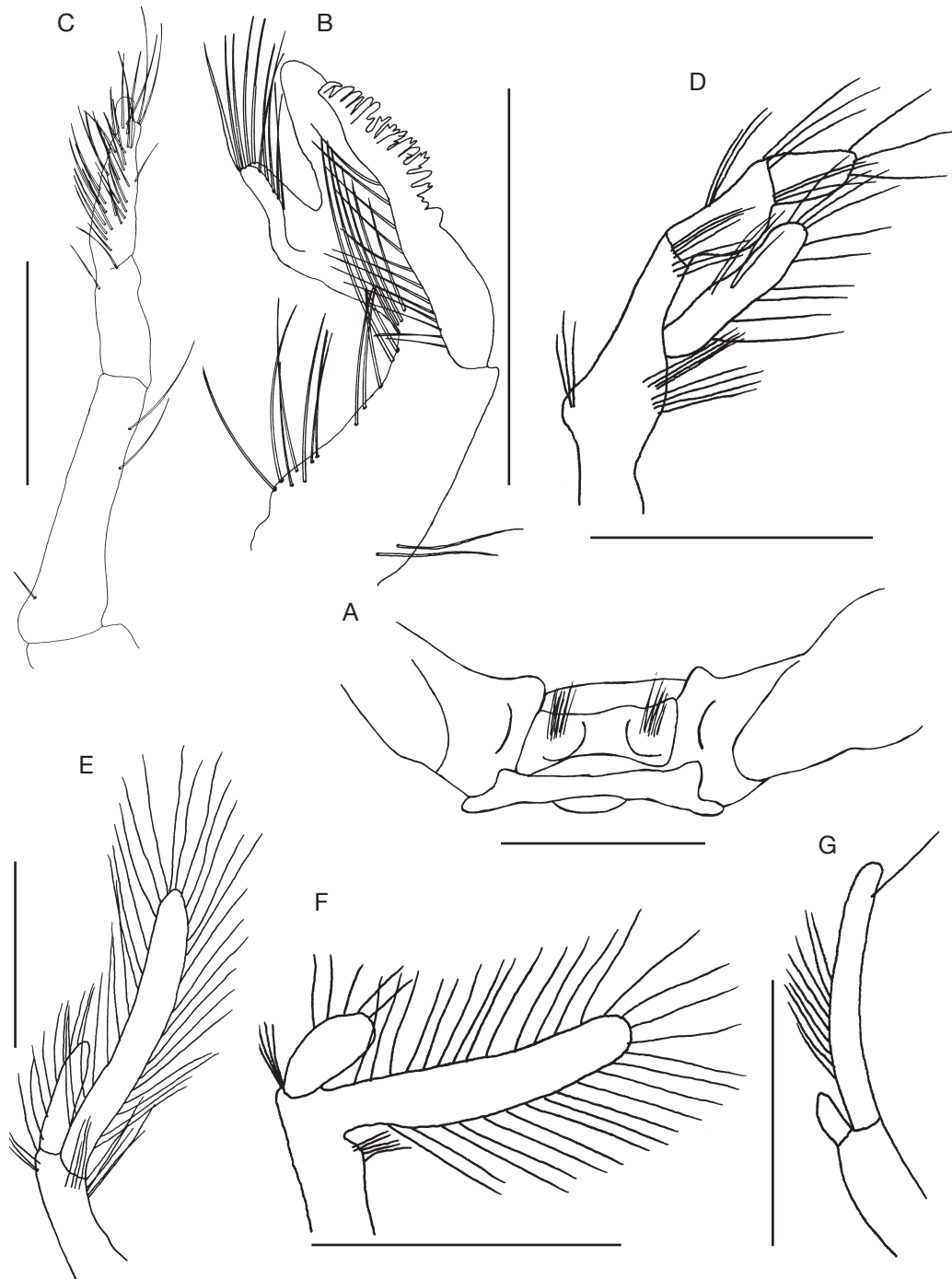


FIG. 3. — *Stratiotes mclaughlinae* n. sp.: **A-C**, ♂ holotype (EMU-752); **D-G**, ♀ paratype (EMU-5671); **A**, sternite XII (third pereopods); **B**, first pleopod, internolateral view; **C**, second pleopod, internal view; **D**, second pleopod, external view; **E**, third pleopod, external view; **F**, fourth pleopod, external view; **G**, fifth pleopod, external view. Scale bars: 0.5 mm.

REMARKS

Stratiotes is known from the Indo-Pacific (Indonesia, New Zealand, Red Sea, Persian Gulf, East (“West Africa”) and western Atlantic (North Carolina to Brazil) and included 16 species (Rahayu 2005). *Stratiotes mclaughlinae* n. sp. represents the first record of the genus in the eastern Pacific and differs from all species of *Stratiotes* described for the Indonesian fauna or reassigned to *Stratiotes* by Rahayu (2005) by a combination of characters. Among these species, *Stratiotes mclaughlinae* n. sp. is closer to *S. tuberculatus* (Whitelegge, 1900) and *S. perspicax* (Nobili, 1906). It shares the same thick, setose antennal flagella with the former species but can be differentiated by the shape of the telson. It shares a similar, multispinous ocular acicle with the latter, but *S. mclaughlinae* n. sp. features a proportionally longer shield, lacks a spiny, strongly produced process on antenna second segment, and possesses over 20 spines on telson margin.

Characteristics observed in *Stratiotes mclaughlinae* n. sp. agree well with the diagnosis of the genus provided by Rahayu (2005: 4). The 12 pairs of biserial gills set the species apart from all other recognized genera within the Diogenidae. The only discrepancy with the diagnosis of *Stratiotes* is the absence in *S. mclaughlinae* n. sp. of the paired first pleopods in females. One of the species included in *Stratiotes* by Rahayu (*Paguristes hummi* Wass, 1955), however, also lacks first pleopods on female first somite (*vide* McLaughlin 1974: 19), and it remains unclear if this character alone would either be sufficient to establish another genus or if the diagnosis of *Stratiotes* should be emended. Most genera included in the Diogenidae are characterized by females with unpaired first pleopod (modified as gonopod), except for *Paguristes*, *Pseudopaguristes* (McLaughlin 2002) and *Stratiotes*, which possess paired first pleopods. Hopefully, the revision of species of *Paguristes* s.l.

from the tropical eastern Pacific, currently under progress, might provide additional information with regards to this problem.

Acknowledgements

We thank J. Poupin, S. Williams, C. Ramirez, S. De Grave, and D. L. Rahayu for providing literature. The first author wishes to thank P. A. McLaughlin for her valuable help, and comments, and the support of CONACyT grant (125847). Mercedes Cordero helped in typing and assembling the manuscript.

REFERENCES

- FOREST J. & MCLAUGHLIN P. A. 2000. — Superfamily Coenobitoidea, families Pylochelidae and Diogenidae. *in* FOREST J., SAINT LAURENT M. DE, MCLAUGHLIN P. A. & LEMAITRE R. (eds), The marine fauna of New Zealand: Paguridae (Decapoda: Anomura) exclusive of the Lithodidae. *NIWA Biodiversity Memoir* 114: 31-103.
- HENDRICKX M. E. & HARVEY A. W. 1999. — Checklist of anomuran crabs (Crustacea: Decapoda) from the eastern tropical Pacific. *Belgian Journal of Zoology* 129: 363-389.
- MCLAUGHLIN P. A. 1974. — The hermit crabs (Crustacea, Decapoda, Paguridea) of northwestern North America. *Zoologische Verhandelingen* 130: 1-396.
- MCLAUGHLIN P. A. 2002. — *Pseudopaguristes*, a new and aberrant genus of hermit crabs (Anomura: Paguridea: Diogenidae). *Micronesica* 34 (2): 185-199.
- MCLAUGHLIN P. A. 2003. — Illustrated keys to families and genera of the superfamily Paguroidea (Crustacea: Decapoda: Anomura), with diagnoses of genera of Paguridae. *Memoirs of the Museum of Victoria* 60 (1): 111-144.
- RAHAYU D. L. 2005. — Additions to the Indonesian fauna of the hermit crab genus *Pseudopaguristes* McLaughlin and a further division of the genus *Paguristes* Dana (Crustacea: Decapoda: Paguroidea: Diogenidae). *Zootaxa* 831: 1-42.

*Submitted on 3 October 2005;
accepted on 22 December 2005.*