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Taxonomy and systematics

A new species of *Pinnixa* (Crustacea: Brachyura: Pinnotheridae) from Mazatlan, Sinaloa, Mexico

Una nueva especie de Pinnixa *(Crustacea: Brachyura: Pinnotheridae) en Mazatlán, Sinaloa, México*

José Salgado-Barragán

Laboratorio de Invertebrados Bentónicos, Unidad Académica Mazatlán, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México. Apartado postal 811, 82000 Mazatlán, Sinaloa, México

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Abstract

A new pinnotherid crab, *Pinnixa hendrickxi* n. sp., is described from Isla de la Piedra, Mazatlán, Sinaloa, Mexico. The new species can be distinguished from most species of *Pinnixa* of the Eastern Pacific because males have an abdomen narrowed medially and widened distally. However, due to this characteristic, *P. hendrickxi* resembles *P. darwini* Garth, 1960, *P. plectrophoros* Glassell, 1935, *P. transversalis* Milne-Edwards & Lucas, 1842, and *P. bahamondei* Garth, 1957 from the eastern Pacific and *P. faxoni* Rathbun, 1918, from the western Atlantic. *Pinnixa hendrickxi* can easily be distinguished from *P. plectrophoros* and *P. transversalis* by the absence of spines on third and fourth legs. On the other hand, the new species can be separated from *P. transversalis*, *P. bahamondei*, and *P. faxoni* by the absence of dorsal ridges on the carapace. It can be distinguished from *P. darwini* by the fingers of the chelae (which, when closed, leave a gap in *P. darwini*, but close almost completely in the new species), the exopod of the third maxiliped with a non-segmented flagellum in the new species, and first pleopod with slender terminal process and without bulbous subterminal swelling in the new species.

Keywords: Brachyura; Pea crabs; New species; Taxonomy; Mexican Pacific

Resumen

Se describe a *Pinnixa hendrickxi (P. hendrickxi)*, una nueva especie de cangrejo pinotérido de Isla de la Piedra, Mazatlán, Sinaloa, México. La nueva especie puede distinguirse de la mayoría de las especies de *Pinnixa* del Pacífico oriental porque los machos poseen un abdomen angosto en su parte media y ensanchado distalmente. Por esta característica, *P. hendrickxi* tiene mayor similitud con *P. darwini* Garth, 1960, *P. plectrophoros* Glassell, 1935, *P. transversalis* Milne-Edwards y Lucas, 1842 y *P. bahamondei* Garth, 1957 del Pacífico oriental y con *P. faxoni* Rathbun, 1918, del Atlántico occidental. *Pinnixa hendrickxi* puede distinguirse fácilmente de *P. plectrophoros* y *P. transversalis* por carecer de espinas en las patas 3 y 4, y se diferencia de *P. transversalis*, *P. bahamondei* y *P. faxoni* por no presentar crestas o hileras de gránulos en el dorso del caparazón. La nueva especie también puede distinguirse de *P. darwini* porque los dedos de las quelas no forman una abertura interna amplia, el flagelo del exopodito del tercer maxilípedo es más corto y simple en lugar de esbelto y bisegmentado y porque los machos tienen un primer pleópodo con la porción terminal más esbelta y no bulboso en la porción subterminal.

Palabras clave: Brachyura; Cangrejos chícharo; Nueva especie; Taxonomía; Pacífico mexicano

E-mail address: salgado@ola.icmyl.unam.mx

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Introduction

Crabs of the family Pinnotheridae are usually small, cryptic, and commonly found as symbionts (mostly commensals) of other invertebrates (e.g., mollusks, holothurians, polychaetes, and crustaceans) and their diversity can be related with the variety of hosts (Palacios-Theil, Cuesta, Campos, & Felder, 2009; Schmitt, McCain, & Davidson, 1973). The genus *Pinnixa* White, 1846 is characterized by a relatively wide carapace, a nearly transverse frontal margin, short eyestalks, and eyes filling the ovate orbit, the third maxilliped with dactylus reaching beyond the distal tip of the propodus and with a lobe on the outer margin of the exopod, and by the third pair of walking legs being larger than the others (Campos, 2006; Rathbun, 1918). The genus contains 56 species distributed from the Western Pacific to both coasts of America (Komatsu & Takeda, 2009; Naruse & Maenosono, 2012; Ng, Guinot, & Davie, 2008), and *P. occidentalis* Rathbun, 1894 has been recently recorded in South Africa as an invasive species (Clark & Griffiths, 2012). Of these, 29 species are currently known from the Pacific coast of America (Garth, 1957; Hendrickx, 2005; Ng et al., 2008; Zmarzly, 1992). This paper deals with the description of a new species of *Pinnixia* from Mazatlán, México, southeastern Gulf of California.

Materials and methods

The specimens were collected from March 2009 to January 2013 at Isla de la Piedra beach, Mazatlán, Sinaloa, México. Crabs were collected by shovel and mesh from the surf line to about 50 cm depth during a series of fortnightly intertidal samplings of "baby" clams, *Donax punctatostriatus* Hanley (Pelecypoda: Donacidae). The collection in January 2013 was performed by using a yabby pump in burrows of the callianassid *Callichirus* cf. *seilacheri* (Bott). Comparisons of the new species with other species described from the Eastern Pacific and Western Atlantic were based on the descriptions and illustrations provided by Garth (1957, 1960), Glassell (1935), Rathbun (1918), and Zmarzly (1992). Drawings were made with the aid of a camera lucida.

Abbreviations and acronyms used are: CL, carapace length; CW, carapace width; EMU, catalog entry number in the Regional Collection of Invertebrates of the Instituto de Ciencias del Mar y Limnología (Unidad Académica Mazatlán), UNAM; CNCR, catalog entry in the National Collection of Crustaceans, Instituto de Biología, UNAM. Measurements are given in millimeters and the latitude and longitude were obtained from Google Earth™.

Description

Family Pinnotheridae De Haan, 1833
Genus Pinnixia *White, 1846*
Pinnixa hendrickxi *new species*
Figures 1-3

Male holotype: carapace wider than long, CW/CL ratio 2.1 (1.7-2.1 in males; 1.9-2.3 in females), oval, almost flat, regions poorly marked, with shallow urogastric depression and slightly elevated cardiac region, covered with sparse setae. Front truncated, slightly produced and emarginated, with shallow median sulcus. Anterolateral margins angled, with short setae and several granules in all specimens. Orbits small, completely filled by eyes (Figs. 1, 2a, 3a). Fourth thoracic sternite with anterior and lateral notches, the anterior the deepest (figures 2b).

Figure 1. Color in life. *Pinnixa hendrickxi* n. sp. Female paratype, dorsal view. (EMU 9518).

Antennular peduncle (figure 3b) 3-segmented, setal formula 1(0); 2(0); 3(4), upper flagellum 2-segmented, setal formula 1(0), 2(5), lower flagellum 4-segmented, aesthetascs distributed as follows: 1(0), 2(0), 3(2), 4(4).

Antennae (figure 3c) 8-segmented. Setae on segments 1(8), 2 (2), 4 (2), 7 (1), 8(2).

Merus of third maxiliped (figure 3d) trapezoidal, with divergent margins, wider distally; carpus longer than propodus; propodus short, inserted subdistally on carpus, laterally projected; dactylus spatulated, broadened distally. Exopod with median protuberance on outer margin; flagellum with slightly bent tip, non-segmented, ending in long setae.

Chelipeds (figure 2c, 2d) subequal, similar in both sexes; merus longer than carpus, with long outer setae; palm longer than dactylus, upper surface with sparse granules, fringed with long setae, with 2 longitudinal rows of setae medially and close to dorsal margin and 1 short longitudinal row of small setae medially on pollex. Setae of the longitudinal rows slightly longer in females. Inner surface with long setae and a proximal, oblique row of short setae located near ventral margin. Cutting edges of both movable and fixed fingers nearly straight, subparallel, tip deflected, pollex with 3 or 4 low proximal teeth, dorsal surface of dactyl with long dense setae.

First walking leg (figure 2e) slender, merus long, 2.5 times as long as wide, as long as carpus and propodus combined, ventral margin convex, dorsal margin concave, smooth, with sparse setae, dorsal setae longer; carpus longer than propodus, both with sparse setae dorsally; inner distal margin of propodus with short setae; dactylus slender, as long as carpus, with very short setae dorsally. Second walking leg (figure 2f) longer than the first one; merus about 3 times as long as wide, as long as carpus and propodus combined, margins convex with long setae; carpus long, with dorsal setae; propodus short, with setae dorsally and ventrally; dactylus long, slender, with minute velvet-like setae dorsally. Third walking leg (figure 2g) strongest; merus broadened, about 1.5-1.7 times as long as wide, with long outer setae, shorter than carpus and propodus combined, dorsal and ventral margins crenulated or granulated distally; propodus with 2 ventral ridges, the inner ridge granulated; dactylus short, stout,

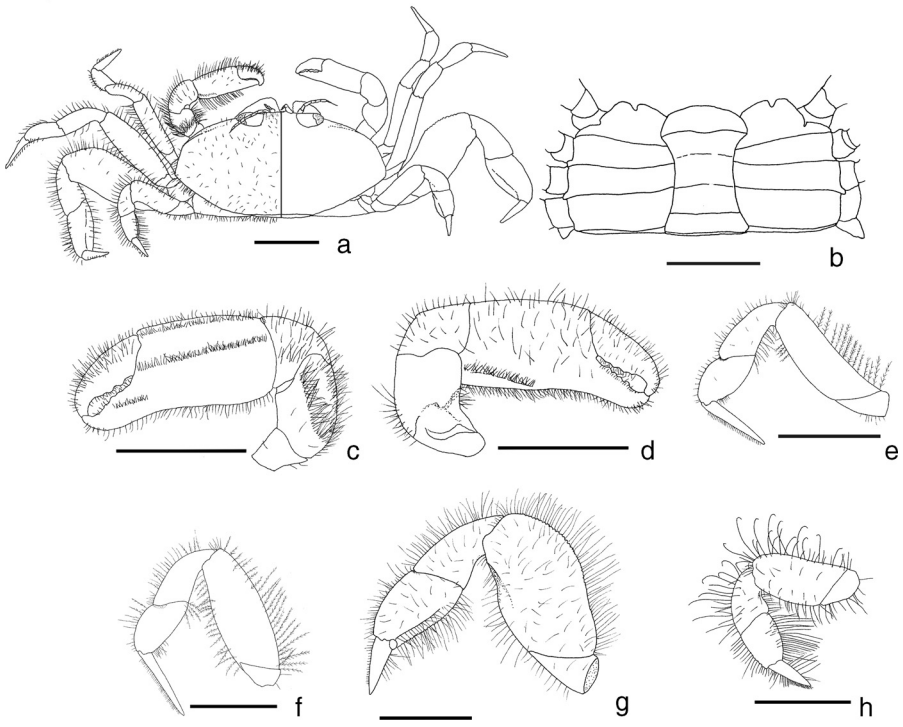

Figure 2. *Pinnixa hendrickxi* n. sp. Male holotype (EMU 9516): a, dorsal view (setae omitted on right side); b, ventral view of sternal plates and abdomen; c, left cheliped, anterior face; d, left cheliped, interior face; e, left first walking leg; f, left second walking leg; g, left third walking leg; h, left fourth walking leg. All legs in dorsal view. Scale bar: 1 mm.

with small granules ventrally, and with velvet-like setae dorsally. Fourth walking leg (figure 2h) smallest, covered with long setae; merus about 1.5 times as long as wide; carpus stout; propodus slightly longer than wide; dactylus stout, with sparse long setae ventrally, with short setae dorsally.

Male gonopod (figure 3e) curved inward, with a long deflected tapering tip, basis of tip surrounded by long plumose setae.

Male abdomen (figure 3f) having somites 4-6 fused, telson and other somites free; first somite wider basally, second somite short, wider distally; proximal margin of third somite rounded, wider basally; somites becoming narrower from fourth somite to base of somite 6 and then wider at the base of telson; telson rounded as figured: abdomen and telson fringed with outer setae (longer and more abundant in telson).

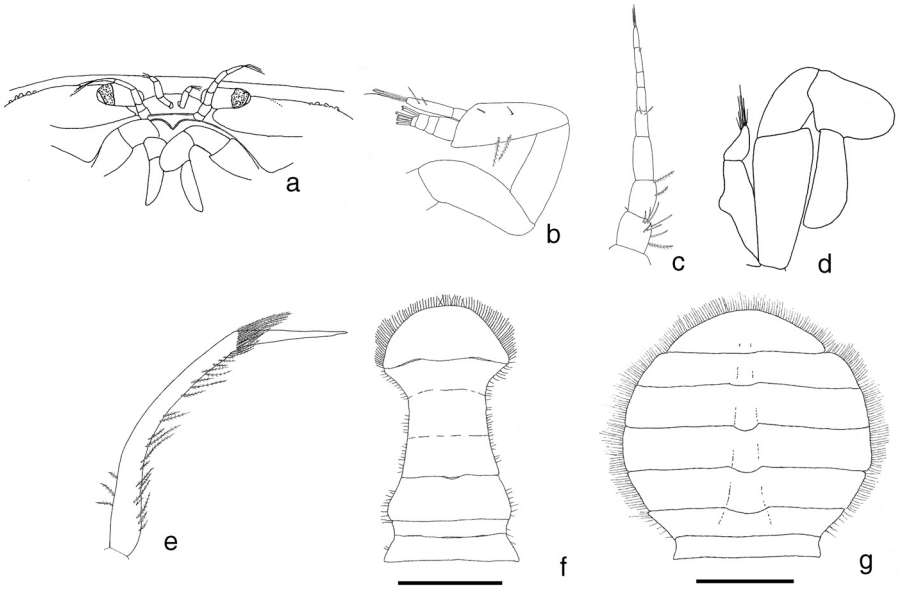

Figure 3. *Pinnixa hendrickxi* n. sp. Male holotype (EMU 9516): a, carapace, frontal view; b, antennule; c, antenna; d, right third maxiliped; e, gonopod; f, male abdomen, ventral view; g, ovigerous female paratype (EMU 9517). Abdomen in ventral view.

Abdomen of female (figure 3g) with 6 free somites plus telson, broadly rounded, not entirely covering sternites in ovigerous specimens; first somite narrower in the middle; third somite widest; outer margin fringed with dense plumose setae, except for first somite.

The only morphological differences observed between holotype and paratypes are attributed to sexual variation. Females feature a slightly larger CW/CL ratio, setae in female chelae appear a little longer than in males, and in the female abdomen all somites are free, while in males the 4-6 somites are fused. Besides that, no other external differences were observed.

Taxonomic summary

Material examined. Isla de la Piedra, Mazatlán, Sinaloa, Mexico (23°11'10.7" N, 106°24'42.0" W), 8 males (CW 2.4 to 3.9 mm, CL 1.2 to 1.8 mm) and 7 females (5 ovigerous) (CW 2.9 to 4.6 mm, CL 1.9 to 2.0 mm). Holotype: March 15, 2010; 1 male (CW 3.9 mm, CL 1.8 mm) (EMU 9516). Oct 9, 2010; 1 male (CW 3.1, CL 1.5 mm) (EMU 9512). Paratypes: March 11, 2009; 1 ovigerous female (CW 4.6 mm, CL 2.0) (EMU 9513). Sept 16, 2009; 1 male (CW 3.5 mm, CL 1.7 mm) (EMU 9514). Nov 20, 2009; 2 males (CW 2.7 mm and 3.3 mm, CL 1.5 and 1.7 mm) (EMU 9515). March 15, 2010; 1 male (CW 3.3, CL 1.7) (EMU 9788). Aug 12, 2010; 1 male (CW 2.4 mm, CL 1.2 mm), 1 female, (CW 2.9 mm, CL 1.9 mm), 2 ovigerous females (CW 3.4 and 3.5 mm, CL 1.7 and 1.8 mm) (EMU 9517). Aug 12, 2010; 1 male (CW 2.7 mm, CL 1.5 mm), 1 ovigerous female (CW 3.7 mm, CL 1.9 mm) (CNCR 26592). Nov 24, 2011; 1 female (CW 3.4 mm, CL 1.6 mm) (EMU 9518). Jan 25, 2013; 1 ovigerous female (CW 4.1 mm, CL 1.8 mm) (EMU 10543).

Color in life. Creamy-white with irregular, sparse olive green or brown spots on dorsal surface of carapace and legs in both sexes (figure 1).

Habitat. Undetermined.

Distribution. Known only from Isla de la Piedra, Mazatlán, Mexico.

Etymology. The species is named in honor of Michel E. Hendrickx, from the Universidad Nacional Autónoma de México, in recognition of his contributions to Carcinology in Latin America and for his role in my academic development.

Remarks

Pinnixa hendrickxi n. sp. can be distinguished from the majority of the species of *Pinnixa* by the shape of the male abdomen. Males of most species possess an abdomen that tapers evenly from the base to the last segment and telson, whereas in *P. hendrickxi* n. sp. and other species, such as *P. transversalis* Milne-Edwards & Lucas, 1842, *P. bahamondei* Garth, 1957, *P. plectrophoros* Glassell, 1935, and *P. darwini* Garth, 1960, from the Eastern Pacific and *P. faxoni* Rarthbun, 1918 from the Western Atlantic, the male abdomen widens distally. *Pinnixa hendrickxi* n. sp. resembles *P. transversalis*, *P. bahamondei*, *P. darwini*, and *P. faxoni* in the general shape of the carapace, third maxilliped and male abdomen with somites 4-6 fused. *Pinnixa hendrickxi* n. sp. can be easily distinguished from *P. transversalis*, *P. bahamondei*, and *P. faxoni* by the absence of dorsal ridges on the carapace. In *P. bahamondei* and *P. transversalis*, the posterior margins of the merus and propodus of walking legs 3 and 4 are spiny, while in the new species they are at most, slightly serrated; the lateral margins of the male abdomen of *P. transversalis* and *P. bahamondei* are subparallel, but concave in *P. hendrickxi* n. sp., similar to that of *P. faxoni* and *P. darwini. Pinnixia faxoni* and *P. darwini* can also be separated from the new species by the general shape of the telson, being rather triangular in the former 2 species, but rounded in the latter. *Pinnixa hendrickxi* can easily be separated from *P. plectrophoros* because the latter species possesses a wider carapace (W/L ratio = 3) and a heavier third leg armed with spines in basis, ischium, merus, propodus, and dactylus. On the other hand, *P. hendrickxi* n. sp. is most similar to *P. darwini*, known from the Galapagos Islands, but these 2 species can be distinguished by the shape of the fingers of the chelae. The inner margins of the polex and dactylus of *P. darwini* are concave, leaving an evident gap when closed, contrary to the case of the new species, whose inner margins are rather straight, leaving only a small gap with the tips hooked when closed. The exopod of the third maxillped in *Pinnixia darwini* has a 2-segmented slender flagellum, while in *P. hendrickxi* n. sp. it is short, curved at the tip and non-segmented. The first male pleopod of these 2 species is similar, but the distal process is about two-fifths the total length of the appendage in *P. hendrickxi* n. sp., but one-fifth in *P. darwini*, with no evident bulbous subterminal swelling in the new species.

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