

**A new species of *Parapinnixa* (Decapoda: Brachyura: Pinnotheridae)
from Isla del Coco, Costa Rica**

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Abstract.—A single ovigerous female of *Parapinnixa cortesi*, a new species, was collected from the calcareous tube of an unidentified serpulid polychaete on Isla del Coco, Costa Rica. The new species most closely resembles *P. glasselli* Garth, 1939, *P. hendersoni* Rathbun, 1918, and *P. nitida* (Lockington, 1876), but it can be distinguished from these and all other members of the genus by the morphology of the chelae and the proportions of the carapace.

The genus *Parapinnixa* Holmes, 1894 appears to be confined to the tropical and temperate waters of the Americas (Schmitt et al. 1973), with the exception of one questionable record of *P. affinis* Holmes, 1900 from Siberia (Kobjakova 1967). Currently eight species are known in this genus, five of which occur in the western Atlantic and three in the eastern Pacific (Table 1).

The members of the genus *Parapinnixa* have a firm carapace that is oval and approximately twice as wide as long, and can be distinguished from members of other pinnotherid genera by: 1) having walking legs that decrease in size from the noticeably largest first walking legs to the smallest last walking legs and 2) having males with the telson linguiform.

During a taxonomic survey of the marine invertebrate fauna from Costa Rica, a single ovigerous female specimen of an undescribed species of *Parapinnixa* was collected on Isla del Coco, located 365 miles (584 km) offshore from Guanacaste Province on the northwestern Pacific coast of Costa Rica. The specimen was in the calcareous tube of an unidentified serpulid polychaete in the lower intertidal zone at Bahía Chatham, near the mouth of the Río Sucio. This

new species joins *P. affinis*, *P. nitida* (Lockington, 1876), and *P. glasselli* Garth, 1939, as the fourth known species of this genus in the waters of the Pacific. The description of this new species and illustrated keys to the members of the genus are presented here.

Materials and methods.—All measurements given in millimeters (mm). Carapace length (CL) is measured on the midline, from the frontal to the posterior margins of the carapace. Carapace width (CW) is the greatest width of the carapace, which is measured between the lateral extremes of the carapace.

The holotype has been deposited at the University of Costa Rica, School of Biology, Zoology Museum (UCRZM); other museums from which comparative material was examined include the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), and the Los Angeles County Museum of Natural History, Los Angeles, California (LACM).

Family Pinnotheridae
Parapinnixa cortesi, new species
Figs. 1–2, 3C

Material examined.—Holotype, 1 ovigerous female, 2.3 mm CL by 4.8 mm CW;

Table 1.—Type localities and described sexes for the known species of *Parapinnixa*.

Species	Type-locality	Described sexes
<i>Parapinnixa affinis</i> Holmes, 1900	Dead Man's Island, San Pedro, California, United States	Male, Female
<i>Parapinnixa beaufortensis</i> Rathbun, 1918	20 miles off of Beaufort Inlet, North Carolina, United States	Male
<i>Parapinnixa bouvieri</i> Rathbun, 1918	Off Cape Catoche, Yucatan, Mexico	Male, Female
<i>Parapinnixa cortesi</i> n. sp.	Mouth of the Rio Sucio, Bahía Chatham, Isle del Coco, Costa Rica	Female
<i>Parapinnixa cubana</i> Campos, 1994	Diego Pérez Reef, Cuba	Male
<i>Parapinnixa glasselli</i> Garth, 1939	Tagus Cove, Albemarle Island, Galapagos Islands, Ecuador	Female
<i>Parapinnixa hendersoni</i> Rathbun, 1918	Los Arroyos, Cuba	Male, Female
<i>Parapinnixa magdalensis</i> Werding & Müller, 1990	Santa Marta Reef, Colombia	Male
<i>Parapinnixa nitida</i> (Lockington, 1876)	Angeles Bay, Gulf of California, Mexico	Male, Female

Costa Rica, Isla del Coco, Bahía Chatham, mouth of Río Sucio, rocky intertidal zone, low tide; Rita Vargas coll.; 2 Nov 1999; UCRZM 4013.

Other material examined.—*Parapinnixa nitida*—1 non-ovigerous female, 2.6 mm CL by 5.5 mm CW; 1 non-ovigerous female, 2.7 mm CL by 5.8 mm CW; 1 non-ovigerous female, 2.5 mm CL by 6.1 mm CW; 1 non-ovigerous female, 2.7 mm CL by 6.3 mm CW; 1 non-ovigerous female, 2.0 mm CL by 4.7 mm CW; 1 non-ovigerous female, 2.8 mm CL by 5.7 mm CW; 1 male, 1.8 mm CL by 4.2 mm CW; Mexico, Baja California, San Felipe Bay, in the tube of an unidentified terebellid worm; S.A. Glassell coll.; 10 June 1933; USNM 1068562. 1 non-ovigerous female, 1.2 mm CL by 2.5 mm CW; 1 male, 1.3 mm CL by 2.8 mm CW; 1 non-ovigerous female, 1.5 mm CL by 3.3 mm CW; 1 non-ovigerous female, 1.9 mm CL by 4.1 mm CW; 1 non-ovigerous female, 1.6 mm CL by 3.5 mm CW; Mexico, Baja California, Magdalena Bay; S.A. Glassell coll.; 12 February 1931; USNM 1068563. 1 male, 2.5 mm CL by 5.3 mm CW; Mexico, Baja California, Pichilingue Bay; M.J. Rathbun coll.; March 1911; USNM 60043. 1 non-ovigerous fe-

male, 4.1 mm CL by 9.0 mm CW; 1 non-ovigerous female, 2.5 mm CL by 5.8 mm CW; 1 non-ovigerous female, 4.1 mm CL by 8.7 mm CW; 1 non-ovigerous female, 3.5 mm CL by 7.3 mm CW; Mexico, Sonora, Punta Peñasco; S.A. Glassell coll.; 3 December 1927; USNM 1068564. 1 non-ovigerous female, 2.6 mm CL by 6.4 mm CW; 1 non-ovigerous female, 2.5 mm CL by 5.7 mm CW; 1 non-ovigerous female, 2.7 mm CL by 6.2 mm CW; 1 non-ovigerous female, 1.9 mm CL by 4.1 mm CW; 1 male, 1.9 mm CL by 4.5 mm CW; 1 male, 2.3 mm CL by 5.0 mm CW; 1 male, 2.5 mm CL by 5.5 mm CW; 1 male, 2.4 mm CL by 4.8 mm CW; 1 male, 2.1 mm CL by 4.8 mm CW; Mexico, Baja California, Magdalena Bay; S.A. Glassell coll.; 26 January 1928; USNM 1068565. 1 male, 2.5 mm CL by 5.2 mm CW; S. Shore of Tiburon Island, Gulf of California, Mexico, Station 1045–40, Allan Hancock Pacific Expedition; 25 January 1940; USNM 1068566.

Parapinnixa hendersoni—1 male, 2.1 mm CL by 4.5 mm CW; 1 non-ovigerous female, 2.3 mm CL by 5.1 mm CW; North Atlantic, off South Carolina, 32°36'N,

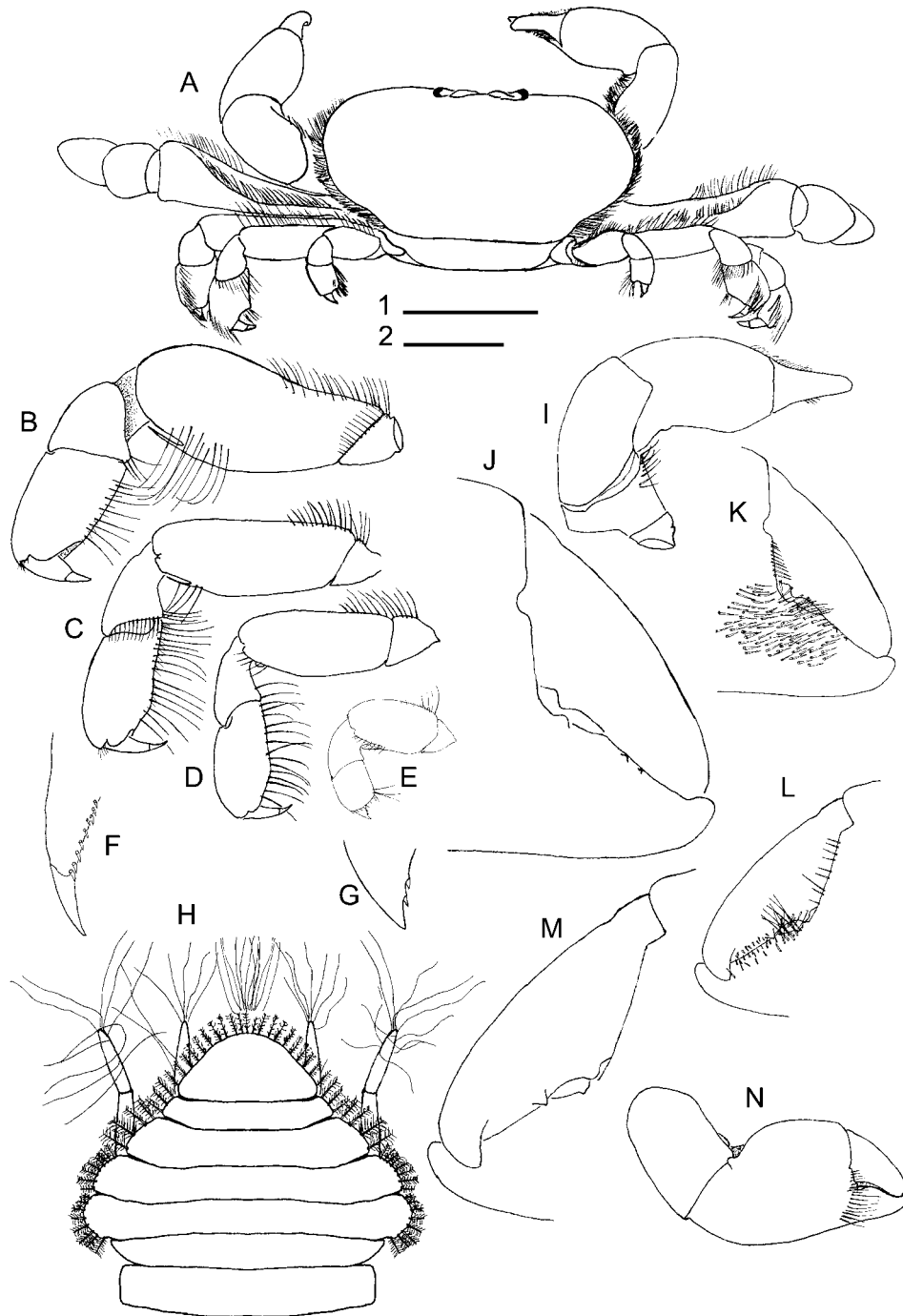


Fig. 1. *Parapinnixa cortesi*. Female holotype, Isla del Coco, Costa Rica, 2.3 mm CL, 4.8 mm CW, UCRZM 4013. A, dorsal view; B, first walking leg, right, anterior view; C, second walking leg, right, anterior view; D, third walking leg, right, anterior view; E, fourth walking leg, right, anterior view; F, dactylus of second walking leg; G, dactylus of fourth walking leg; H, abdomen; I, left cheliped, dorsal view; J, gape of right chela, outer view, setae removed; K, gape of right chela, outer view; L, gape of right chela, inner view; M, gape of right chela, inner view, setae removed; N, right chela and carpus, outer view. Scale 1 = 2 mm (A), 1 mm (H); scale 2 = 1 mm (B-E, I, N), 0.25 mm (F, G), 0.33mm (J, M), 0.50 mm (K, L).

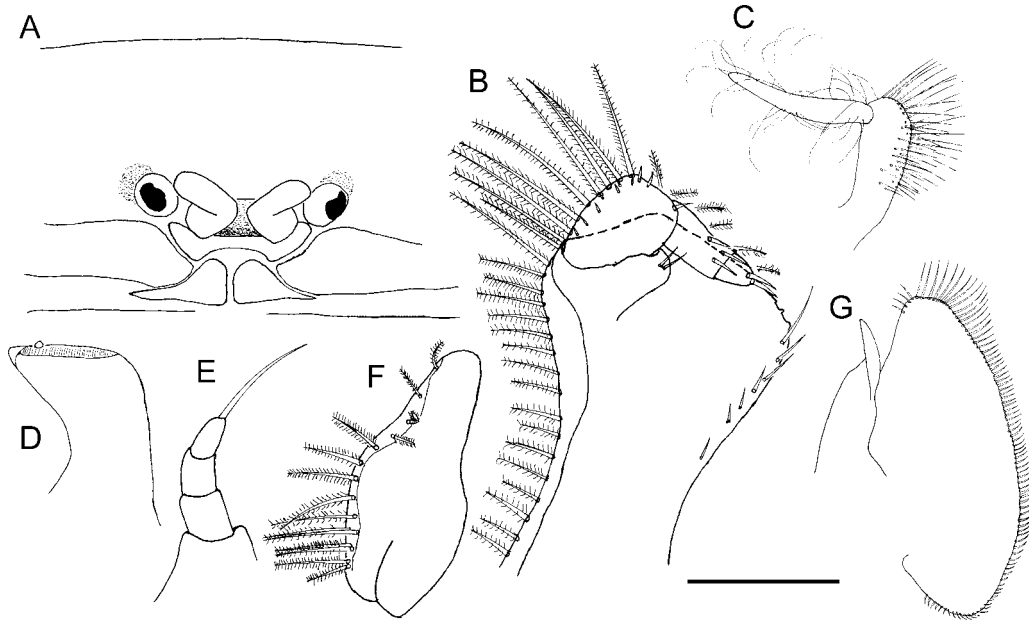


Fig. 2. *Parapinnixa cortesi*. Female holotype, Isla del Coco, Costa Rica, 2.3 mm CL, 4.8 mm CW, UCRZM 4013. A, frontal view; B, left third maxilliped, inner view (ischium not shown); C, epipod of left third maxilliped; D, left mandible; E, left antennal flagellum; F, exopod of left third maxilliped; G, left maxilla. Scale = 2 mm (A), 0.25 mm (B, E, F), 1 mm (C), 0.20 mm (D), 0.50 mm (G).

78°39'; 15 September 1977; USNM 174326.

Parapinnixa glasselli—Paratype, 1 non-ovigerous female, 2.1 mm CL by 5.6 mm CW; South East Pacific, Galapagos Islands, Tagus Cove, 00°16'17"S, 91°22'41"W; 4–5 meters, baited roach trap; R/V Velero III coll.; 9 Feb 1933; LACM CR 1933-067.1.

Etymology.—We dedicate this species to Dr. Jorge Cortés, University of Costa Rica, School of Biology, for his many contributions to marine biology, especially coral reef ecology.

Description of female holotype.—Carapace (Fig. 1A) ovate, width slightly more than twice length; cuticle thin; surface smooth, shiny; lateral margins strongly rounded, setose; posterior margin nearly straight; front depressed, slight median sulcus present. Orbits (Fig. 2A) nearly round; orbital hiatus occupied by basal antennal article. Antennules (Fig. 2A) plicate, in oblique fossettes. Antennal flagellum (Fig.

2E) with 3 articles, distal article with single terminal seta.

Third maxilliped (Fig. 2B, C, F), with ischium rudimentary; merus broadly triangular, dorsal margin concave, crenulate, with plumose setae, ventral margin with stout, simple setae distally, distal margin with shorter, plumose setae; palp of 3 articles; carpus subquadrate, largest of 3 articles, extending beyond distal margin of merus, articulated on platform-like structure of merus, dorsal margin with long, plumose setae, short stout simple setae inserted among bases of longer setae; propodus cylindrical, articulated distolaterally on carpus, with several stout, simple setae distally; dactylus conical, smallest article of palp, terminating in single, stout, simple seta. Exopod (Fig. 2F) oblong, constricted distally; flagellum absent. Epipod (Fig. 2C) having 2 articles; proximal article elongate, expanding distally, becoming bulbous near distal end, distolateral margin with dense,

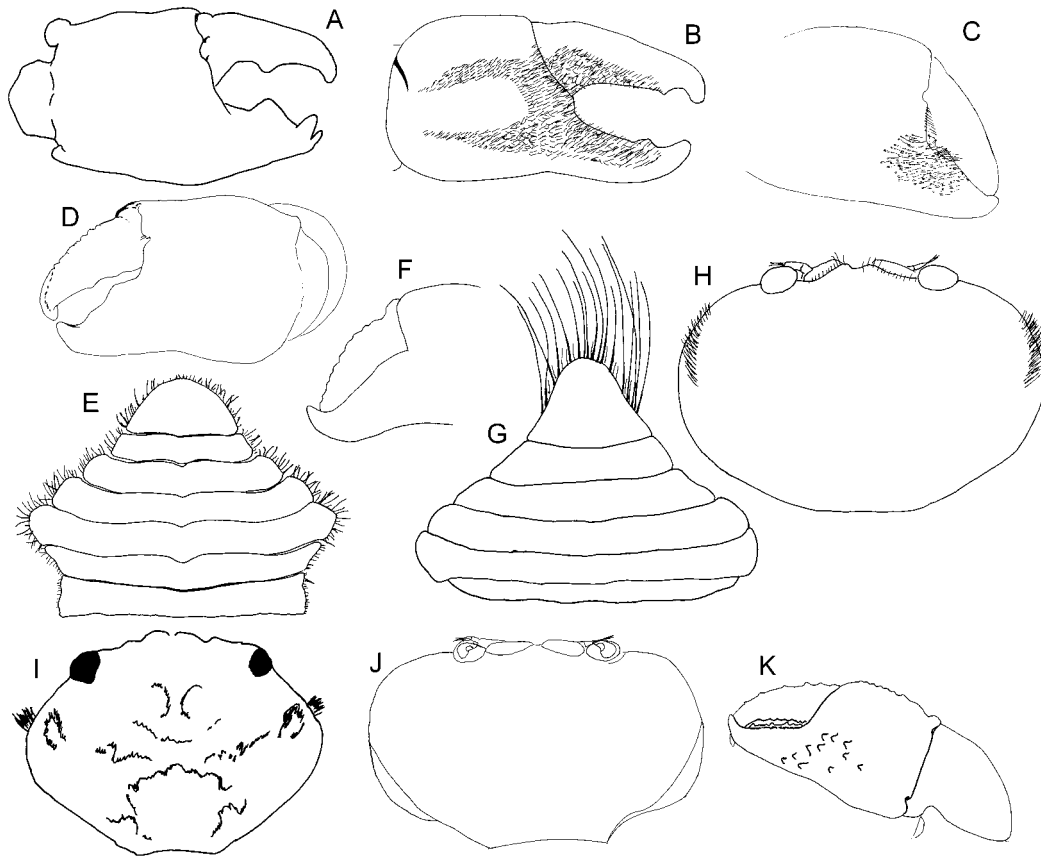


Fig. 3. A, *Parapinnixa affinis*, right chela, outer view, setae removed (after Glassell, 1933); B, *Parapinnixa glasselli*, right chela, outer view (after Garth, 1939); C, *Parapinnixa cortesi*, right chela, outer view; D, *Parapinnixa nitida*, left chela, outer view (after Glassell, 1933); E, *Parapinnixa affinis*, female abdomen (after Glassell, 1933); F, *Parapinnixa hendersoni*, left chela, outer view, setae removed (after Williams, 1984); G, *P. hendersoni*, female abdomen (after Williams, 1984); H, *Parapinnixa magdalenensis*, carapace (after Werding and Müller, 1990); I, *Parapinnixa beaufortensis*, carapace (after Rathbun, 1918); J, *Parapinnixa cubana*, carapace (after Campos, 1994); K, *Parapinnixa cubana*, left chela, outer view, setae removed (after Campos, 1994).

long setae; distal article recurved slightly, with long, fine, marginal setae.

Mandible (Fig. 2D), grinding edge weakly serrate, with corneous tooth.

Maxilla (Fig. 2G) ovate, outer margin with setae, setae longer distally; endopod small, blade-shaped.

Chelipeds (pereopod 1) (Fig. 1A, I–N) strong, well-developed, inflated; surface smooth, contours rounded, palm bulbous, narrowing rapidly nearing fingers, fingers crossing at tips. Fixed finger nearly straight along ventral margin, tip slightly curved upwards; inner surface with row of short

stout setae extending along length of cutting edge, continuing up distal margin of palm, small patch of longer setae near gape; outer surface bearing 2 small, sharp, triangular teeth near mid-point of cutting edge, single, larger more rounded tooth near base of fixed finger, row of short, stout setae along length of cutting edge, slightly longer thinner setae beginning near gape, expanding for short distance onto palm (Fig. 1K). Moveable finger with tip strongly decurved, crossing inside tip of fixed finger; dorsal margin smooth, evenly rounded; inner surface with narrow row of short, stout setae

along length of cutting edge, setae longer near gape, single sharp, triangular tooth near mid-point of cutting edge, slightly larger, more rounded tooth proximally near articulation with palm.

First walking leg (pereopod 2) (Fig. 1A, B) merus deeply excavated anterodorsally to accommodate cheliped, widening distally, dorsal ridge setose, anteroventral margin with setae distally; carpus inflated, nearly as wide as long, few short setae on ventral margin; propodus nearly twice as long as wide, row of setae along ventral margin composed of long and short simple setae, distodorsal margin with few terminal setae; dactylus sub-conical, somewhat falcate, row of denticles along ventral margin reaching corneous tip.

Second walking leg (pereopod 3) (Fig. 1A, C, F) much smaller than first; merus less inflated than that of first walking leg, dorsal margin with setae extending one third of length from proximal margin, ventral margin distally with fewer setae than on that of first walking leg; carpus less than twice as long as wide, distal margin with row of setae anteriorly; propodus like that of first walking leg, ventral margin with row of long setae; dactylus (Fig. 1F) similar to that of first walking leg.

Third walking leg (pereopod 4) (Fig. 1A, D) smaller than second walking leg, otherwise similar.

Fourth walking leg (pereopod 5) (Fig. 1A, E, G) smallest; merus nearly twice as long as wide at widest point, dorsal ridge with few long setae proximally, ventral margin with patch of short setae distally; propodus nearly as wide as long, small patch of long setae on distoventral margin, row of short setae along distal margin; dactylus (Fig. 1G) sub-triangular, much shorter and stouter than those of the first through third walking legs, row of 2 or 3 denticles along ventral margin.

Abdomen (Fig. 1H) composed of 6 free somites and telson; third somite widest, lateral margins convex; fourth through sixth somites tapering gradually, lateral margins

nearly straight, not concave; telson longer than somites 1–6, slightly more than twice as wide as long, subtriangular, with broadly rounded corners.

Male.—Unknown.

Habitat.—The single specimen was found in the calcareous tube of an unidentified species of serpulid polychaete.

Discussion.—*Parapinnixa cortesi* can easily be distinguished from *P. affinis*, *P. beaufortensis*, *P. bouvieri*, *P. cubana*, and *P. magdalenensis*, in that the CW of those five species is less than twice the CL, unlike *P. cortesi*, which has a CW more than twice the CL. In addition, *P. cubana* and *P. magdalenensis* each have tubercles on the outer surface of the palm of the cheliped, as well as the dorsal surface of the dactylus, whereas *P. cortesi* has a cheliped with a smooth palm and dorsal surface of the dactylus. *Parapinnixa affinis* can be further differentiated by the presence of a longitudinal band of setae ventrally on the outer surface of the palm.

Parapinnixa glasselli, *P. hendersoni*, and *P. nitida*, can be separated from *P. cortesi* by the presence of two longitudinal bands of setae on the outer surface of the palm of the cheliped, which are lacking in *P. cortesi*. In addition, *P. nitida* can be differentiated from *P. cortesi* by the morphology of the carpus of the third maxilliped, which appears broadly rounded in *P. nitida* and sub-quadrate in *P. cortesi*. The crenulations along the dorsal margin of the moveable finger of the cheliped of *P. nitida* also can be used to separate it from *P. cortesi*, which has a moveable finger with the dorsal margin smooth.

The telson of the female and the crenulate crest of the moveable finger of the cheliped of *P. hendersoni* can further distinguish it from *P. cortesi*. The female abdomen of *P. hendersoni* has numerous long setae on the telson, whereas *P. cortesi* has short plumose setae around the entire margin of the female abdomen, but is lacking the long setae on the telson. In addition, the

moveable finger of *P. cortesi* lacks crenulations on the dorsal surface.

Parapinnixa glasselli can be further distinguished from *P. cortesi* by the dentition of the cheliped and the morphology of the female abdomen. *Parapinnixa glasselli* has a small tooth distally on both the fixed and moveable fingers of the cheliped, but has no tooth near the base of either finger, whereas *P. cortesi* has a large rounded tooth at the base of both the moveable and fixed fingers. The dorsal surface of the moveable finger of the cheliped of *P. glasselli* is sparsely setose with several small denticles present, but in *P. cortesi*, it is smooth and lacking setae. In *P. glasselli* the telson of the female abdomen is much more elongate than that of *P. cortesi*. Additionally, the lateral margins of the female abdomen of *P. glasselli* are very concave from the third somite to the tip of the telson whereas the lateral margins of the female abdomen of *P. cortesi* are nearly straight from the widest point at the third somite to the tip of the telson.

Although the male of *P. cortesi* is unknown, we feel that the differences between the female of *P. cortesi* and the males of *P. cubana*, *P. magdalenensis*, and *P. beaufortensis* are significant enough to separate *P. cortesi* from those species.

To distinguish the species of *Parapinnixa* more easily, we present the following illustrated keys to the known males and females of the genus. Because of the number of species for which only one sex is known, separate keys are provided.

Key to the Known Females of the Genus *Parapinnixa*

1. Carapace width less than twice carapace length (CW 1.30–1.85 times CL) 2
- Carapace width more than twice carapace length (CW 2.08–2.30 times CL) 3
2. Cheliped with single tooth near midpoint on cutting edge of moveable finger (Fig. 3A) *P. affinis*
- Cheliped with single tooth near base on

- cutting edge of moveable finger *P. bouvieri*
3. Cheliped, outer surface of palm with two longitudinal bands of setae (Fig. 3B) 4
- Cheliped, outer surface of palm without band or bands of setae (Fig. 3C) *P. cortesi*
4. Fingers of cheliped gaping medially (Fig. 3D); telson with short setae distally, setae less than length of telson at longest point (Fig. 3E) 5
- Fingers of cheliped meeting medially along entire length (Fig. 3F); telson with long setae distally, setae longer than length of telson at longest point (Fig. 3G) *P. hendersoni*
5. Cheliped, distal portion of cutting edge of both fingers with a single, small tooth near the tip (Fig. 3B) *P. glasselli*
- Cheliped, distal portion of cutting edge of both fingers without teeth (Fig. 3D) *P. nitida*

Key to the Known Males of the Genus *Parapinnixa*

1. Carapace width more than twice carapace length (CW 2.08–2.30 times CL) 2
- Carapace width less than twice carapace length (CW 1.30–1.85 times CL) 3
2. Fingers of cheliped gaping medially (Fig. 3D) *P. nitida*
- Fingers of cheliped meeting medially along entire length (Fig. 3F) *P. hendersoni*
3. Dorsolateral margin of carapace with a row or tuft of setae (Fig. 3H, I) 4
- Dorsolateral margin of carapace without row or tuft of setae (Fig. 3J) 5
4. Dorsolateral margin of carapace with row of setae (Fig. 3H) *P. magdalenensis*
- Dorsolateral margin of carapace with a tuft of setae (Fig. 3I) *P. beaufortensis*
5. Cheliped, outer surface of palm smooth, without acute tubercules (Fig. 3A); carapace, fronto-orbital width less than one third CW 6
- Cheliped, outer surface of palm not smooth, with acute tubercules (Fig. 3K); carapace, fronto-orbital width more than one third CW *P. cubana*
6. Cheliped with single prominent tooth

near mid-point on cutting edge of moveable finger (Fig. 3A) *P. affinis*
 Cheliped with single tooth near base on cutting edge of moveable finger
 *P. bouvieri*

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