Zootaxa 2604: 52–60 (2010)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

A new species of freshwater crab of the genus *Allacanthos* Smalley, 1964 (Crustacea, Decapoda, Pseudothelphusidae) from southern Costa Rica, Central America

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Abstract

A new species of pseudothelphusid crab, *Allacanthos yawi* **n. sp.**, from the Río Volcán drainage, Puntarenas Province, southern Costa Rica, Central America, is described and illustrated. This is the second species to be assigned to the genus *Allacanthos* Smalley, 1964. The new species is distinguished by its congener by having a first gonopod with a mesiolaterally flattened distal portion, a concave and nearly smooth subdistal portion of the lateral and cephalic sides, a narrow marginal process with a nearly straight distal border, and a lateral lobe with a sharp tip on the apex. An amended diagnosis for *Allacanthos* is provided.

Key words: taxonomy, Costa Rica, Central America, Brachyura, Potamocarcinini, Neotropical region

Introduction

Costa Rica in Central America has a remarkably high biodiversity (Wehrtmann & Cortés, 2009) and this is also true for its freshwater crab fauna, which consists of 17 species of pseudothelphusids belonging to six genera (Smalley 1964a; Pretzmann 1972, 1980; Rodríguez 1982, 1992; Rodríguez & Magalhães 2005).

Rathbun (1898) described several new freshwater crab species from Costa Rica, based mainly on somatic characters, in the genus *Pseudothelphusa* de Saussure, 1857, including *Pseudothelphusa pittieri* (see Rathbun 1898, 1905). Smalley (1964a), relying on gonopod structure, divided *Pseudothelphusa* into four subgenera and accommodated *P.* (*A.*) *pittieri* Rathbun, 1898, in *Pseudothelphusa* (*Allacanthos*), which was subsequently raised to full generic status (Smalley, 1970). Later authors considered *Allacanthos* to be a subgenus of *Potamocarcinus* H. Milne Edwards, 1853 (Pretzmann, 1971), a subgenus of *Achlidon* Smalley, 1964a (Pretzmann 1972), and a subgenus of *Ptychophallus* Smalley, 1964a (Pretzmann 1978, 1980). Finally, Rodríguez (1982) treated *Allacanthos* as a monotypic genus, pointing out that its affinities to the other Central American genera are obscure.

Recent aquatic surveys in southern Costa Rican river basins revealed some individuals of a hitherto unknown species of pseudothelphusid crab that was assigned by us to the genus *Allacanthos* (*sensu* Rodríguez, 1982*)*. The new species is here described, illustrated, and compared to *A. pittieri (*Rathbun, 1898), the other species in this genus.

The specimens examined are deposited in the crustacean collection of the Museo de Zoología, Universidad de Costa Rica (UCR-MZ), the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), the Museu de Zoologia, Universidade de São Paulo (MZUSP), and the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM). Other abbreviations used are: cb = carapace

 Accepted by P. Castro: 12 Aug. 2010; published: 7 Sep. 2010

breadth, measured across the carapace at its widest point; cl = carapace length, measured along the midline, from the frontal to the posterior margin; ch = carapace height, the maximum height of the cephalothorax; fb = frontal breadth, the breadth of the front measured along the upper border; P = pereiopods; s = thoracic sternite. Measurements are in millimeters. The word "gonopod", when used alone, refers to the first male pleopod, and "quebrada" is the Spanish word for a small forest stream. The description was based on the male holotype, as no significant variability was noticed among the paratypes. The description of the gonopod morphology is based on the terminology used by Smalley (1964b).

Taxonomy

Family Pseudothelphusidae Ortmann, 1893

Tribe Hypolobocerini Pretzmann, 1971

Allacanthos Smalley, 1964a

Diagnosis (modified from Smalley 1964b). Gonopod straight, apex folded, spermatic channel emerging on cephalic side, with proximal trianguliform lobe on lateral side. Marginal suture on mesial side, straight along most of stem. Subdistal portion of lateral and cephalic sides with field of minute spines. Distal part with large cephalic lobe and narrow lateral lobe. Field of apical spines weakly developed on internal surface of lateral lobe.

Type species. *Allacanthus pittieri* Rathbun, 1898 (by original designation).

Allacanthos yawi new species
(Figs. 1, 2)

Type material. COSTA RICA, Puntarenas Province, Buenos Aires county, Río Grande de Térraba Basin: male, holotype, UCR-MZ 2774-01, unnamed quebrada, tributary of Río Cañas, near Santa María, 9°16'55.37"N 83°22'14.66"W, altitude 1105 m, 11.xi.2009, L.R. Lara leg.; 2 males, paratypes, INPA 1830, unnamed quebrada, tributary of Río Cañas, near Santa Rosa, 9°15'01.32"N 83°23'17.28"W, altitude 920 m, 26.xi.2009, L.R. Lara leg.; 1 male, paratype, MZUSP 22168, unnamed quebrada, tributary of Río Cañas, near Santa Rosa, 9°15'01.32"N 83°23'17.28"W, altitude 920 m, 26.xi.2009, L.R. Lara leg.; 2 males 2 females, paratypes, UCR-MZ 2777-01, tributary of Río Cañas, near Santa Rosa, 9°15'01.32"N 83°23'17.28", 12.iv.2010, L.R. Lara; 1 male, paratype, UCR-MZ 723-01, quebrada Cacao, 43 km E de San Isidro [approx. 9°13'N 83°28'W], altitude approx. 505 m, 5.xii.1971, V. Juarez leg.

Comparative material examined. *Allacanthos pittieri*, male syntype (cb 19.0, cl 12.1), USNM 21243, Costa Rica, Puntarenas, Agua Buena, 9.iii.1897, H. Pittier leg.

Diagnosis. First gonopod with distal part narrow, cephalad bent; marginal process narrow, with distal margin nearly straight; lateral lobe narrow, with small apical spine; subdistal area of cephalic, lateral surfaces smooth.

Description of the holotype. Small-sized species (cb < 30 mm) (Fig. 1A, B). Carapace outline ellipsoid, widest in middle (cb/cl average = 1.62); dorsal surface nearly flat, smooth, regions ill defined. Pair of gastric pits barely distinct, very close to each other on metagastric region. Cervical grooves narrow, shallow, slightly sinuous; extremities not reaching anterolateral margins. Postfrontal lobules distinct, low; median groove shallow between postfrontal lobules. Carapace surface smooth between front and postfrontal lobules, slightly inclined anteriorly. Front margin nearly straight in dorsal view, upper border distinct, smooth, with shallow median notch; lower border carinate, advanced in front of upper border, moderately sinuous in frontal view. Upper orbital margin weakly carinate, continuous with lower frontal border; lower orbital margin marked by row of very faint papillae; exorbital angle low, obtuse. Anterolateral margins of carapace with very shallow

notch just behind exorbital angle, lined by regular series of low, papiliform teeth slightly larger along lateral margin; posterolateral margins smooth, rounded, marked by very faint suture. Metabranchial region with few sparse minute setae laterally. Epistome narrow; epistomial tooth triangular, slightly deflexed, borders carinate. Suborbital, subhepatic regions of carapace sidewall smooth; pterygostomial regions covered by pubescence around mouthparts, otherwise smooth.

Endopod of third maxilliped with outer margin of ischium nearly straight, inner margin straight (Fig. 2E). Exopod of third maxilliped approximately 0.75 as long as outer margin of ischium. Aperture of efferent branchial channel wide, nearly semicircular (Fig. 2F).

First pereiopods moderately heterochelous, right cheliped larger than left. Major cheliped with merus subtriangular in cross section; upper border marked by irregular longitudinal rows of small tubercles decreasing in size distally; internal lower border with row of tuberculiform teeth increasing in size distally; external lower border rounded, with single row of blunt tubercles. Carpus with row of tubercles, prominent subdistal spine on inner side; outer side rounded, smooth. Palm moderately swollen (length/breadth 1.66), smooth on both sides, upper, lower borders rounded. Fingers moderately gaping when closed, tips slightly crossing; both fingers with triangular teeth, smaller distally, smaller teeth sometimes interspersed with larger ones.

Thoracic sternites of third maxillipeds, first pereiopods completely fused, except for small notches at lateral edges of sternum; sternal sulci s4/s5, s5/s6, s6/s7 distinct, just failing to reach midline of thoracic sternum; sternal sulcus s7/s8 reaching midline. Midline of thoracic sternum marked by deep groove in sternite VII, shallow groove in sternite VIII.

All abdominal segments free; telson subtriangular, narrow; lateral margins nearly straight, tip rounded.

First male gonopod (Fig. 2A–D) straight in both caudal, lateral views, with proximal trianguliform lobe on lateral side, distal part flattened mesiolaterally, distinctly bent in cephalic direction; apex folded, spermatic channel opening on cephalic side. Marginal suture situated on mesial side, straight along most of stem, curved to cephalic side distally in mesial view, with row of marginal setae proximally. Row of mesial setae on proximal portion of mesial side. Subdistal portion of lateral, cephalic sides with very weakly developed field of scattered minute spines. Marginal process (= apical lobe, *sensu* Smalley, 1964a) narrow, distal border nearly straight. Lateral suture incomplete, marked by rather deep sulcus on proximal half of caudal side. Distal border of cephalic side produced into large, slightly concave cephalic lobe. Apex with narrow lateral lobe bearing very weakly developed field of apical spines on its internal surface, central papilla partially bordering spermatic channel opening, and minute subtriangular, sharp tip. Second male gonopod slender, thinner along distal quarter portion, nearly as long as first gonopod.

Size. Male holotype: cb 25.5, cl 15.7, ch 8.9, fb 8.0. Both carapace breadth and carapace length from male paratypes range from cb 20.0, cl 11.9 to cb 26.8, cl 15.8.

Color in life. Male (Fig. 1C, D): The carapace and pereiopods are dark olive, with certain areas lighter green. Parts of the spines of the merus of the first pereiopod are light green, remaining portion of the merus of the P1 is dark olive; the dactylus of the first pereiopod has a color pattern similar as that of the female. The abdomen and pereiopods I-IV are in yellow tones; pereiopod V is greenish; the ventral side of the chela of the first pereiopod is turquoise.

Female (Fig. 1E, F): The carapace and pereiopods are bluish dark gray. The carapace and pereiopods are covered with numerous small greenish-yellow spots, which are usually larger in size on the carapace than on the legs. The chela of the first pereiopod is dark with brownish spots. The tips of the movable and fixed fingers of the dactylus are black, behind which the fingers are orange-yellow; the posterior part of the peduncle of the eyes is orange-yellow. The buccal area and most of the ventral part of the first pereiopods are light blue, and the abdomen is intensely yellow. The spots present on the dorsal side of the animal are almost absent on the ventral side.

Type locality. Costa Rica, Puntarenas Province, Buenos Aires County, Río Grande de Térraba Basin, Río Cañas drainage, near Santa María.

Distribution. The currently available records suggest that the new species is restricted to the Río Volcán drainage, a tributary of the left bank of Río General, in the Grande de Térraba River Basin (Fig. 3). The area is located within the Buenos Aires County, northwest of Puntarenas Province, in Costa Rica.

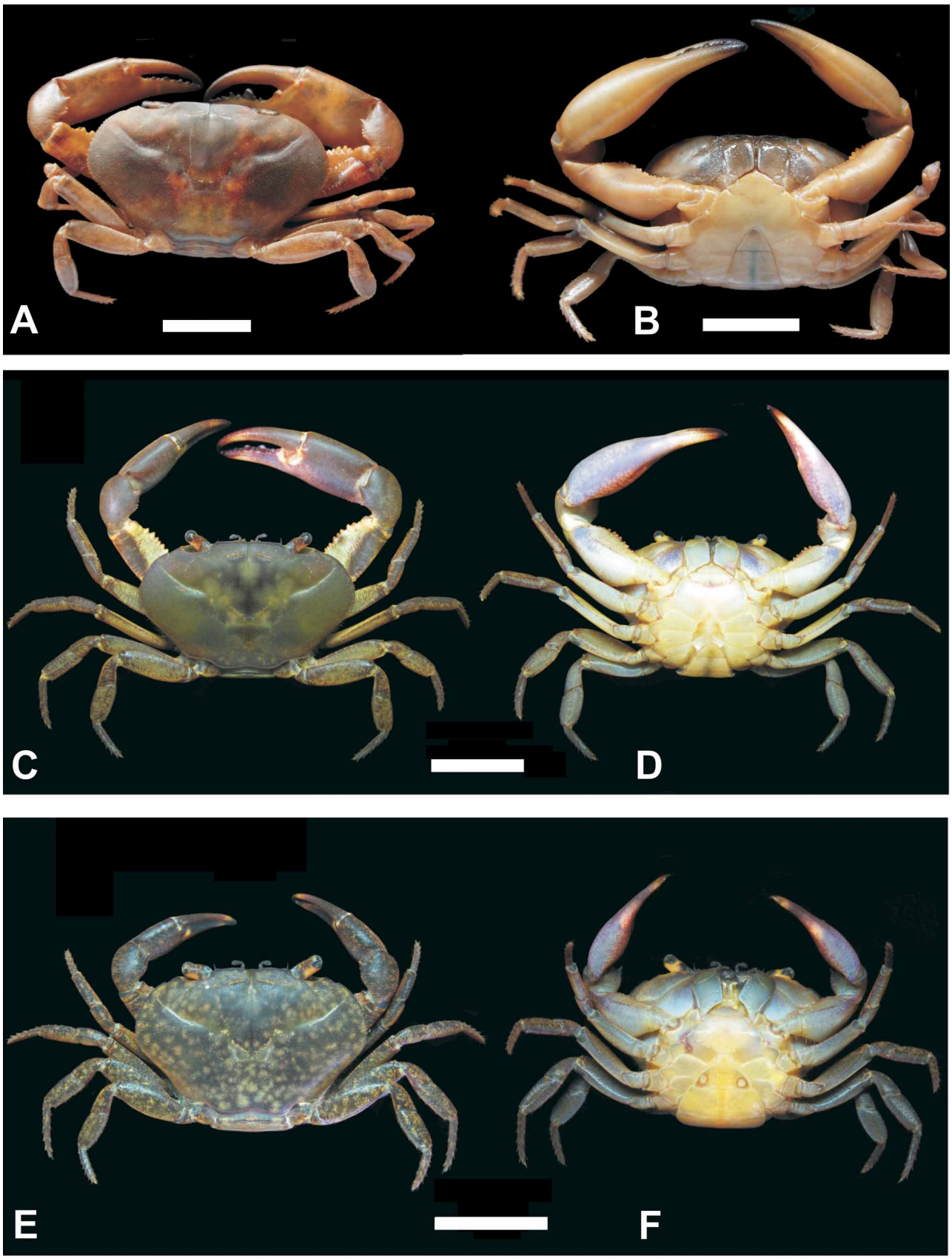

FIGURE 1. *Allacanthos yawi* **n. sp.** A, Holotype male, UCR-MZ 2774-01, preserved in alcohol 70%, dorsal view; B, idem, ventral view; C, UCR-MZ 2777-01, photograph of a live specimen, male, dorsal view; D, idem, male, ventral view; E, idem, female, dorsal view; F, idem, female, ventral view. Scale bars = 10 mm.

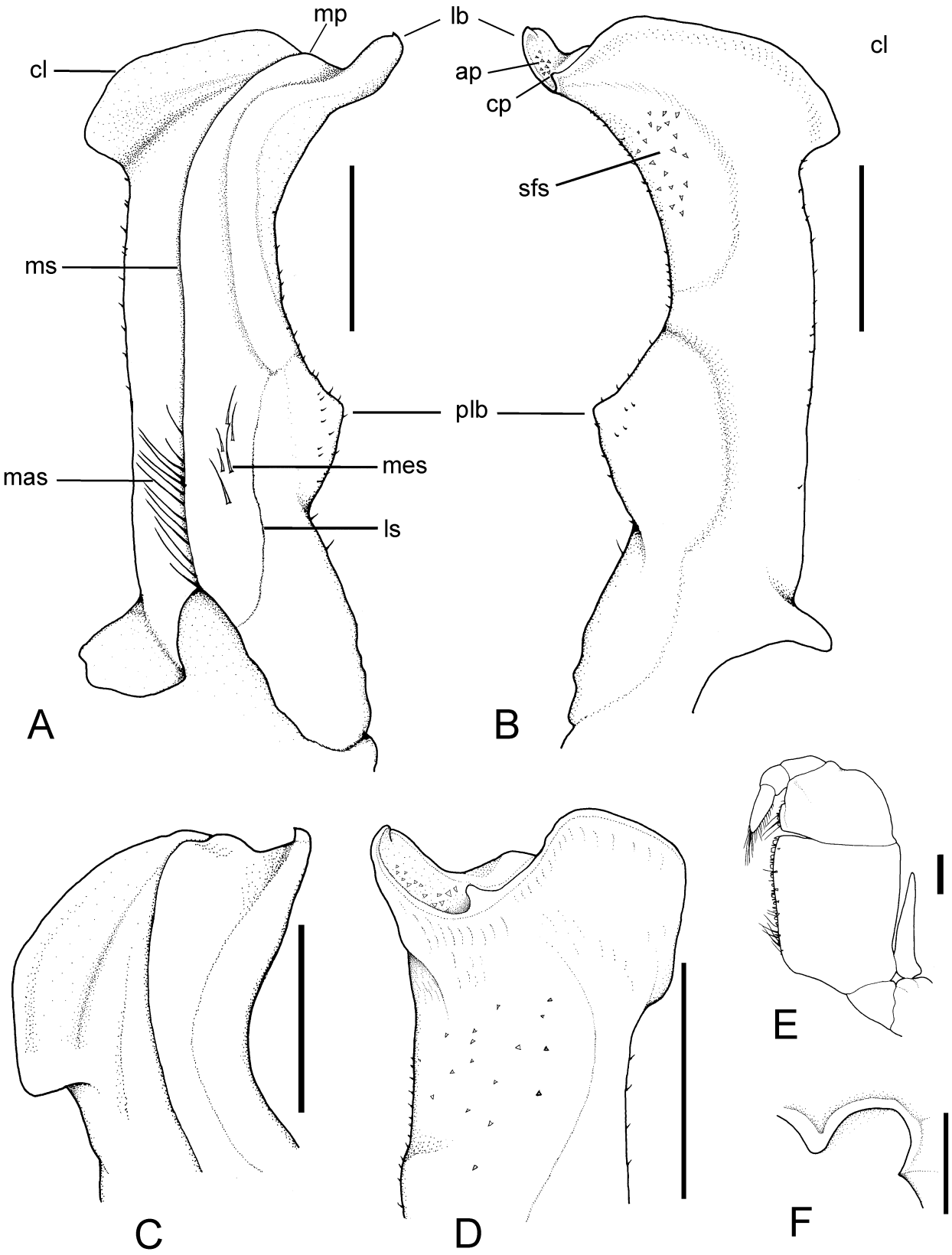

FIGURE 2. *Allacanthos yawi* **n. sp.**, holotype male, UCR-MZ 2774-01. A, left male first gonopod, whole limb, mesial view; B, idem, whole limb, laterocephalic view; C, idem, distal part, mesioapical view; D, idem, distal part, lateral view; E, left third maxilliped; F, left efferent branchial channel. Abbreviations: ap = field of apical spines; cl = cephalic lobe; cp = central papilla; lb = lateral lobe; ls = lateral suture; mas = marginal setae; mes = mesial setae; mp = marginal process; ms = marginal suture; plb = proximal lobe; sfs = subdistal field of spines. Scale bars = 1 mm.

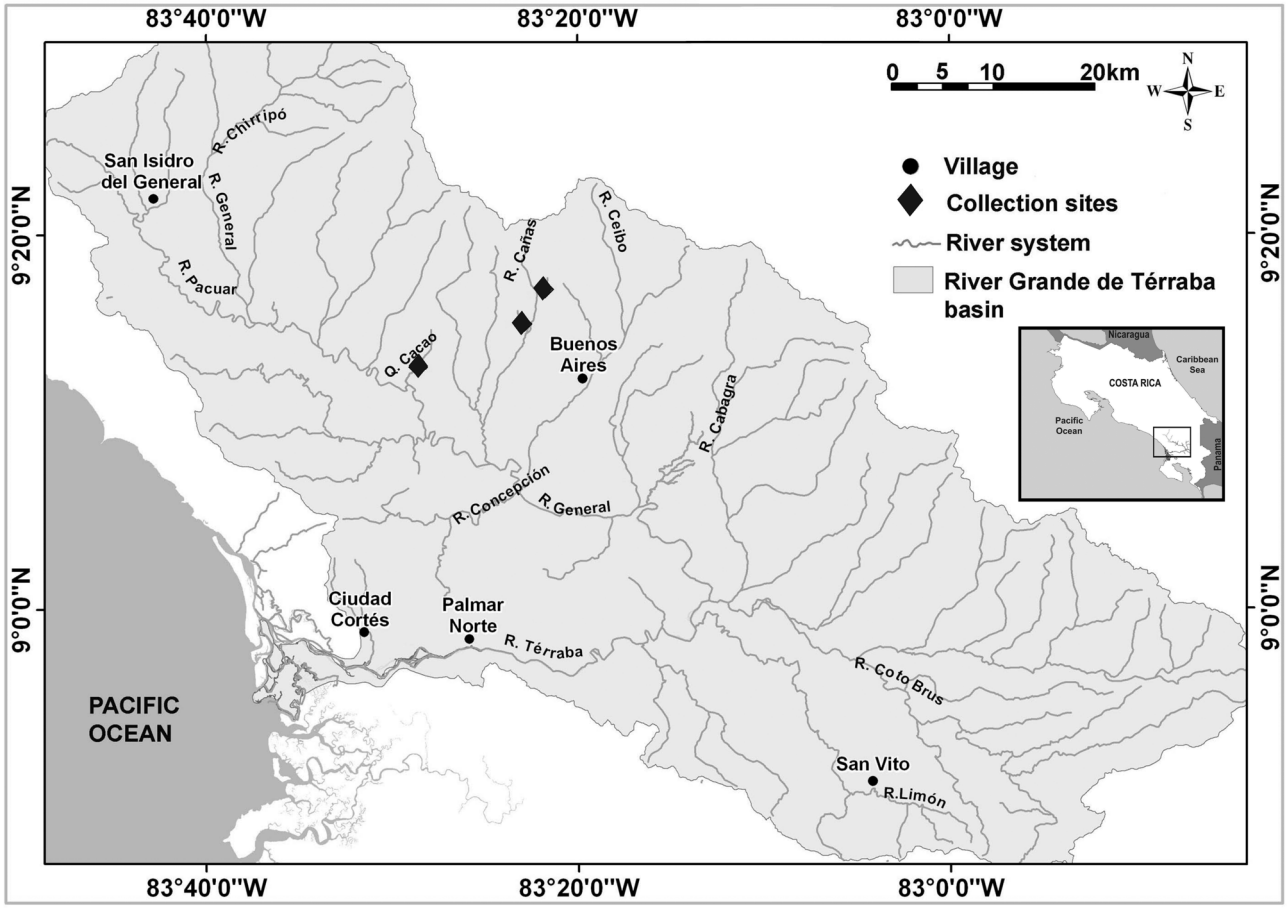

FIGURE 3. Map of the collection sites of *Allacanthos yawi* **n. sp.**

Ecological notes. The specimens were collected in small streams (less than 3 m in width) with steep slopes and medium to low water volume (Figs. 4, 5). The locations were covered by rich vegetation, providing abundant shading from canopy cover. The stream substrate was composed of clay, sand and numerous broken rocks of different sizes (immature alluvial deposits consisting of angular grains of short transport). Crabs preferred places with leaf litter in different stages of decomposition. These streams were surrounded by forest, but typically located close to areas used for agriculture and pastureland. The altitude of the sampling sites ranged from 920 to 1105 m above sea level; the specimens from Quebrada Cacao (UCR-MZ 723-01) were caught in a stream at lower altitude (approximately 505 m above sea level). The temperature and dissolved oxygen of the sampling localities ranged between 19.8 – 21.8°C and 7.81 – 8.44 mg/l, respectively. The majority of specimens were collected under submerged rocks; several specimens, however, were collected in the riparian area, which was not covered by water. No ovigerous females were collected.

Etymology. The species name "yawi" means "crab" in the language of the Cabecar, the indigenous people that inhabit the region where the specimens were collected. The name is used as a noun in apposition.

Remarks. *Allacanthos yawi* **n. sp.** has some gonopodal characters that are very similar to those shown by *Allacanthos pittieri*, which make both species cogeneric. They can be distinguished from each other by the following characters of the first gonopod (Fig. 2; cf. Smalley 1964a: 12, figs. 1-2): (i) distal portion: mesiolaterally flattened in *A. yawi* **n. sp.**, versus distinctly broader in *A. pittieri*; (ii) subdistal portion of lateral and cephalic sides: concave, with very few, sparce, minutes spines in *A. yawi*, versus convex, with a regular, denser field of small spines in *A. pittieri*; (iii) marginal process in *A. yawi* **n. sp.** narrow with distal border nearly straight versus rather broad, with a rounded distal border in *A. pittieri*; and (iv) lateral lobe of the apex with a sharp tip in *A. yawi* **n. sp.** versus and rounded in *A. pittieri*.

FIGURE 4. Collection site of the holotype of *Allacanthos yawi* **n. sp.**, from an unnamed forest stream tributary of Río Cañas, near Santa María, Puntarenas Province, Costa Rica.

Ackowledgements

We thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq, Brazil) and the Consejo Nacional para Investigaciones Científicas y Tecnológicas (CONICIT, Costa Rica) for the funds for Fernando Mantelatto (Universidade de São Paulo) and Ingo S. Wehrtmann, respectively, which allowed the first author to visit the UCR-MZ in October 2009. A special thanks go to Fernando Mantelatto for facilitating the incorporation and travel funds for the first author in this bilateral project (CNPq, Brazil: Proc. 491490/2004-6; 490353/2007-0; CONICIT, Costa Rica: CII-001-08, and Universidad de Costa Rica: VI No. 808-A8-209). The first author is grateful to CNPq for its support in the form of an ongoing Research Grant (Proc. 304468/2009-6). The Hydroelectric Project El Diquís-ICE (PHED) financed the sampling program in the Térraba-Sierpe region, Costa Rica, and provided the equipment that was used during the fieldwork. We are especially grateful to M. Sofía Artavia from the Department of Geographic Information System, PHED, for preparing the map with the sampling locations. We would also like to thank Luis Salazar, Leonel Delgado, and Carlos Canales for their collaboration during the fieldwork. Jorge Picado (ICE) provided technical support and assisted us during the course of the study. Rita Vargas (Universidad de Costa Rica) and Yurlandy Gutiérrez helped us with the shipping of the samples to Brazil, and Melania Pérez facilitated the search for the name of the species. Thanks are also due to P. Castro, N. Cumberlidge and D.C.J. Yeo for comments that greatly improved the manuscript.

FIGURE 5. Collection site of paratypes of *Allacanthos yawi* **n. sp**., from an unnamed forest stream tributary of Río Cañas, near Santa Rosa, Puntarenas Province, Costa Rica.

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