

## TWO NEW SPECIES OF FRESHWATER CRABS OF THE GENUS *TEHUANA* (BRACHYURA: PSEUDOTHELPHUSIDAE) FROM SOUTHERN MEXICO

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### A B S T R A C T

Two new species of freshwater crabs of the genus *Tehuana* from the states of Tabasco and Oaxaca, Mexico, are described, and a new diagnosis for the genus is presented. *Tehuana chontalpaensis*, new species, was collected in a mountain river in southwest Tabasco at 900 m above sea level; it is distinguished by a first gonopod with an elongated mesial process and a large laminar lateral process with a strong lateral spine. *Tehuana jacatepecensis*, new species, was collected in the Jacatepec river, in central Oaxaca; it differs from other species in the genus by the first gonopod, which has a reduced, spoon-like lateral process and an ax-shaped mesial process that projects beyond the marginal process.

Freshwater crabs of the family Pseudothelphusidae Ortmann, 1893, have undergone intense speciation in central and southern Mexico. In particular, *Pseudothelphusa* de Saussure, 1857, and *Odonthelphusa* Rodríguez, 1982, are two genera in which a large number of new species have been described in the last two decades (Alvarez, 1987, 1989; Alvarez and Villalobos, 1990, 1991, 1994, 1996, 1997, 1998). In contrast, relatively few species in the genus *Tehuana* Rodríguez and Smalley, 1969, have been described—*T. veracruzana* Rodríguez and Smalley, 1969; *T. complanata* (Rathbun, 1905); *T. lamellifrons* (Rathbun, 1893); *T. poglayenorum* Pretzmann, 1980; *T. diabolis* Pretzmann, 1980; and *T. lamothei* Alvarez and Villalobos, 1998.

The original description of *Tehuana* by Rodríguez and Smalley (1969) recognized the genus on the basis of the marginal process of the first gonopod (partially fused to the mesial process) and the presence of a defined superior frontal border of the carapace. Later, Rodríguez (1982) added characters of the mesial, cephalic, and lateral processes of gonopod one. The present study adds two more gonopod characters to the diagnosis, and extends the distribution of *Tehuana* in Mexico to include the state of Tabasco (Fig. 1).

### MATERIALS AND METHODS

Specimens of *T. chontalpaensis*, new species, were collected with a hand net in open water and under rocks in Arroyo Pueblo Viejo, a small mountain stream with clear

water on the border between the states of Veracruz and Tabasco. The specimens of *T. jacatepecensis* were collected with a gill net while collecting fishes in the Jacatepec River, near the town of Tuxtepec, Oaxaca. All specimens are deposited in the Colección Nacional de Crustáceos (CNCR), of the Instituto de Biología, Universidad Nacional Autónoma de México. The abbreviations used are as follows: cl = carapace length and cw = carapace width. The gonopod terminology used is that proposed by Smalley (1964).

### SYSTEMATICS

*Tehuana* Rodríguez and Smalley, 1969

*Diagnosis.*—Apical portion of first gonopod with distinct projection on distal portion of mesial surface; mesodistal projection either conical or cephalocaudally compressed (except for *T. guerreroensis*, which should be placed in *Pseudothelphusa*). Marginal process well-developed rounded lobe, partially fused to mesial process. Mesial process rounded, ax-shaped or reniform; internal surface with strong straight, rounded, or oval-shaped carina. Lateral process either reduced to spoon-shaped protuberance or well developed as laminar process whose margins and ornamentation vary among species. Carapace with minute blunt tubercles present on superior frontal border.

*Distribution.*—The distribution of *Tehuana* comprises an extensive area in southern Mexico from central Veracruz south to Tabasco and northern Chiapas, along the Gulf of Mexico slope, and from northeastern Guerrero to northern Oaxaca (Fig. 1).



Fig. 1. The distributional range of the genus *Tehuana*.

*Type Species*.—*Pseudothelphusa lamellifrons* Rathbun, 1893.

*Tehuana chontalpaensis*, new species

Figs. 2, 4b

*Type Locality*.—Arroyo Pueblo Viejo (17°23.75'N, 93°39.75'W), Ejido Carlos A. Madrazo, Municipio de Huimanguillo, Tabasco, 900 m above sea level.

*Holotype*.—♂, cl 35.1 mm, cw 57.3 mm; 8 May 1997; collected by J. L. Villalobos; CNCR 18952.

*Paratypes*.—2 ♂, cl 17.3–24.3 mm, cw 27.7–37.8 mm; 12 June 1997; same locality as holotype; collected by J. L. Villalobos and R. Robles; CNCR 17093. 1 ♂, cl 11.0 mm, cw 17.0 mm; 1 ♀, cl 14.8 mm, cw 23.0 mm; 22 January 1998; same locality and collectors; CNCR 17171.

*Other Material Examined*.—1 ♂, cl 22.0 mm, cw 34.0 mm; 2 ♀, cl 10.0–15.0 mm, cw 14.2–23.2 mm; 22 January 1998; small tributary of Pedregal-Tonalá River, 3 km E of Carlos A. Madrazo town (17°23.87'N, 95°40.86'W),

Municipio de Huimanguillo, Tabasco; collected by J. L. Villalobos and R. Robles; CNCR 17290.

*Description of Holotype*.—Dorsal surface of carapace flat, smooth, covered with fine punctations; anterior and lateral portions with scattered granulations (Fig. 2a). Superior frontal border straight, formed by low tubercles, divided by deep, V-shaped, median notch (Fig. 2b). In frontal view, inferior frontal border continuous, sinuous, thinner and more projected than superior frontal border (Fig. 2b). Median groove narrow, deep, extending posteriorly beyond postfrontal lobes. Postfrontal lobes low, but evident, delimited anteriorly by shallow depressions. Cardiac region discernible. Cervical groove shallow, curved posteriorly, straight anteriorly, becoming obsolete near anterolateral margin, forming shallow notch (Fig. 2a). Anterolateral margin prominent, armed with 18–24 sharp denticles increasing in size posteriorly; portion between orbit and cervical groove granulated, with shallow notch next to orbit. Posterolateral area of carapace with short setae. Merus of third maxilliped with

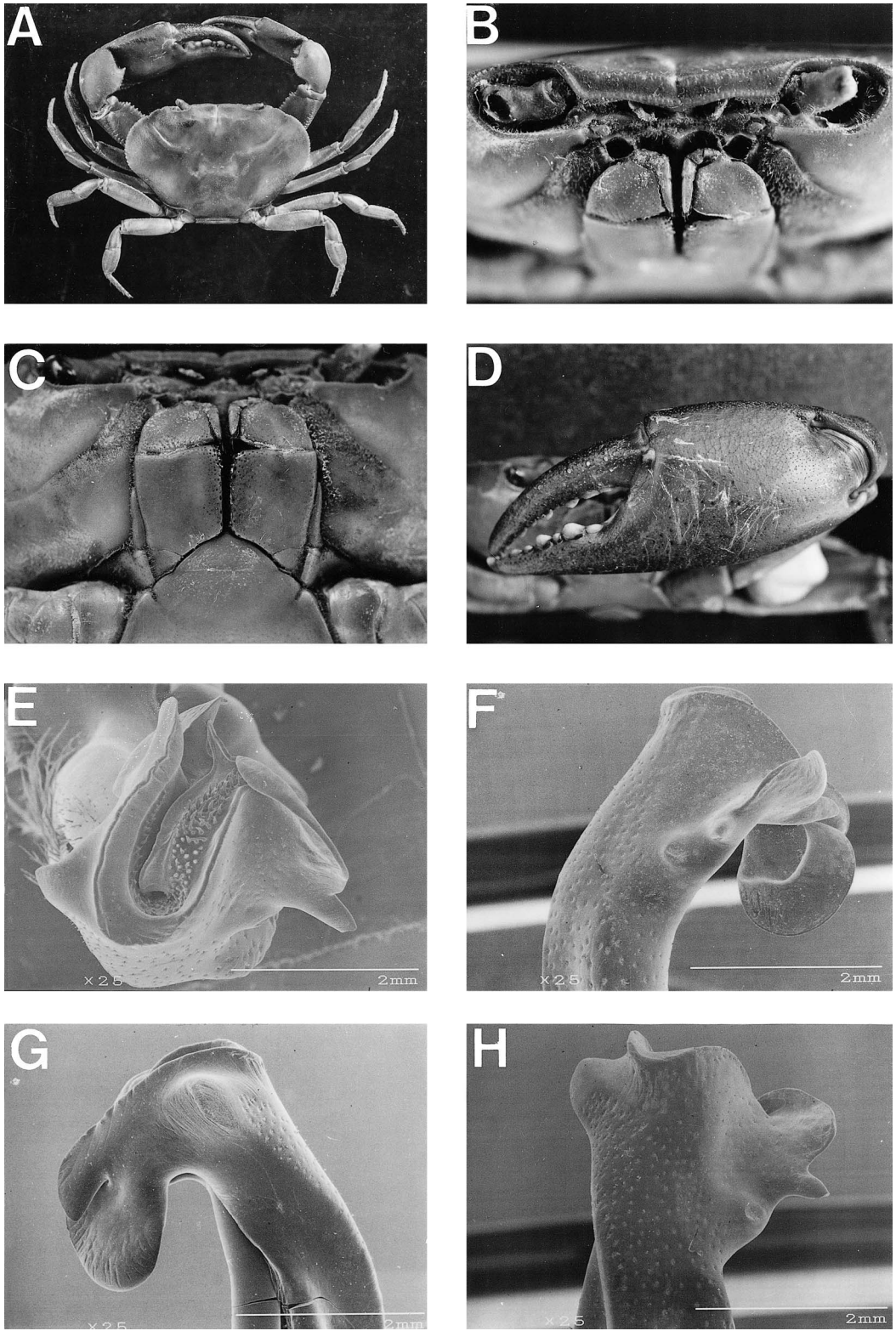


Fig. 2. *Tehuana chontalpaensis*, new species, male holotype: A, total dorsal view; B, frontal view of carapace; C, third maxillipeds; D, major chela; E–H, left first gonopod; E, apical view; F, lateral view; G, mesial view; H, caudal view.

distolateral margin rounded; distal and inner margins straight (Fig. 2c). Ratio exopod/ischium of third maxilliped 0.71 (range 0.60–0.80). Chelipeds asymmetrical. Merus of larger cheliped with row of blunt tubercles along internal margin, carpus with strong triangular spine on internal margin. Chela with internal surface smooth, globose; fingers gaping, curved inward distally, with low, rounded teeth on cutting edges (Fig. 2d). Dactylus dorsally ornamented with longitudinal rows of granules.

In caudal view, gonopod one with proximal half straight, distal half mesially oriented (Fig. 2h). In mesial and lateral views, apex of gonopod one inclined cephalically and proximally, forming 45° angle with respect to longitudinal axis of gonopod (Figs. 2f, g). Apex bearing three distinct processes. In cephalic view, lateral process with superior margin describing a semicircle; laterally with sharp, conical tooth; cephalically with rounded projection closing apex cavity (Fig. 4b). In mesial view, marginal and mesial processes partially fused, oriented proximally. Marginal process with rounded cephalic end, shorter than mesial process (Fig. 2g). Mesial process elongated, rounded. Mesodistal projection prominent, rounded in caudal view, conical in apical view. Lateral and mesial crests even, caudal portion concave. In apical view, field of terminal pore setae on lateral section of apical cavity, somewhat elongated.

*Etymology.*—The specific name is derived from “Chontalpa,” the region where the species was collected.

*Remarks.*—*Tehuana chontalpaensis* is morphologically similar to *T. lamothei* from northern Chiapas. Both species possess a gonopod one with a well-developed lateral process with a strong lateral tooth. *Tehuana chontalpaensis* can be distinguished from *T. lamothei* by examination of gonopod one, which has an inclined apex and elongated mesial and marginal processes.

The site of collection is a small mountain stream surrounded by a well-preserved tropical rainforest. Water quality measurements taken were temperature 21.5–23.4°C, pH 9.6–10.9, and dissolved oxygen concentration 8.5–9.7 mg/l. Other decapods collected in the site were *Macrobrachium heterochirus*, *M. hobbsi*, and *M. olfersii*.

### *Tehuana jacatepecensis*, new species

Figs. 3, 4a

*Type Locality.*—Jacatepec River in Santa María Jacatepec (17°51.36'N, 96°12.30'W), Municipio de Santa María Jacatepec, Oaxaca.

*Holotype.*—♂, cl 30.5 mm, cw 48.0 mm; 23 May 1992; collected by L. Huidobro, C. Rosas, D. Becerril, and R. Palma; CNCR 11920.

*Paratypes.*—1 ♂, cl 28.4 mm, cw 45.8 mm; same date, locality and collectors as holotype; CNCR 11920.

*Description of Holotype.*—Dorsal surface of carapace flat, smooth, covered with fine punctuations (Fig. 3a). Superior frontal border straight, projected, formed by low tubercles, divided by deep, V-shaped, median notch. In frontal view, inferior frontal border continuous, sinuous, more slender and more projected than superior border (Fig. 3b). Median groove narrow, moderately deep, dividing superior frontal border. Postfrontal lobes low, evident, delimited anteriorly by shallow depression. Cardiac region discernible. Cervical grooves deep, arched, ending on anterolateral margin forming well-marked notch (Fig. 3a). Anterolateral margin prominent, armed with 22–24 round granules of the same size; portion between orbit and cervical groove smooth, with shallow notch. Posterolateral region of carapace covered with short setae. Merus of third maxilliped with distolateral margin rounded; distal and inner margins straight (Fig. 3c). Ratio exopod/ischium of third maxilliped 0.67 (range 0.63–0.71). Chelipeds asymmetrical. Merus of larger cheliped with row of blunt tubercles along internal margin, carpus with strong triangular spine on internal margin. Major chela of holotype with internal surface smooth and globose; fingers curved inward distally, with triangular, sharp, alternate teeth on cutting edges, closing completely (Fig. 3d). Dactylus dorsally ornamented with longitudinal rows of granules.

In caudal view, gonopod one with proximal half straight and distal half mesially oriented. Apex of gonopod one forming a 90° angle with respect to longitudinal axis of the gonopod. Apex bearing three distinct processes. In cephalic view, lateral process reduced to spoon-shaped protuberance with concave distal surface, proximal surface on top of mesial process, cephalic portion closing apex cavity

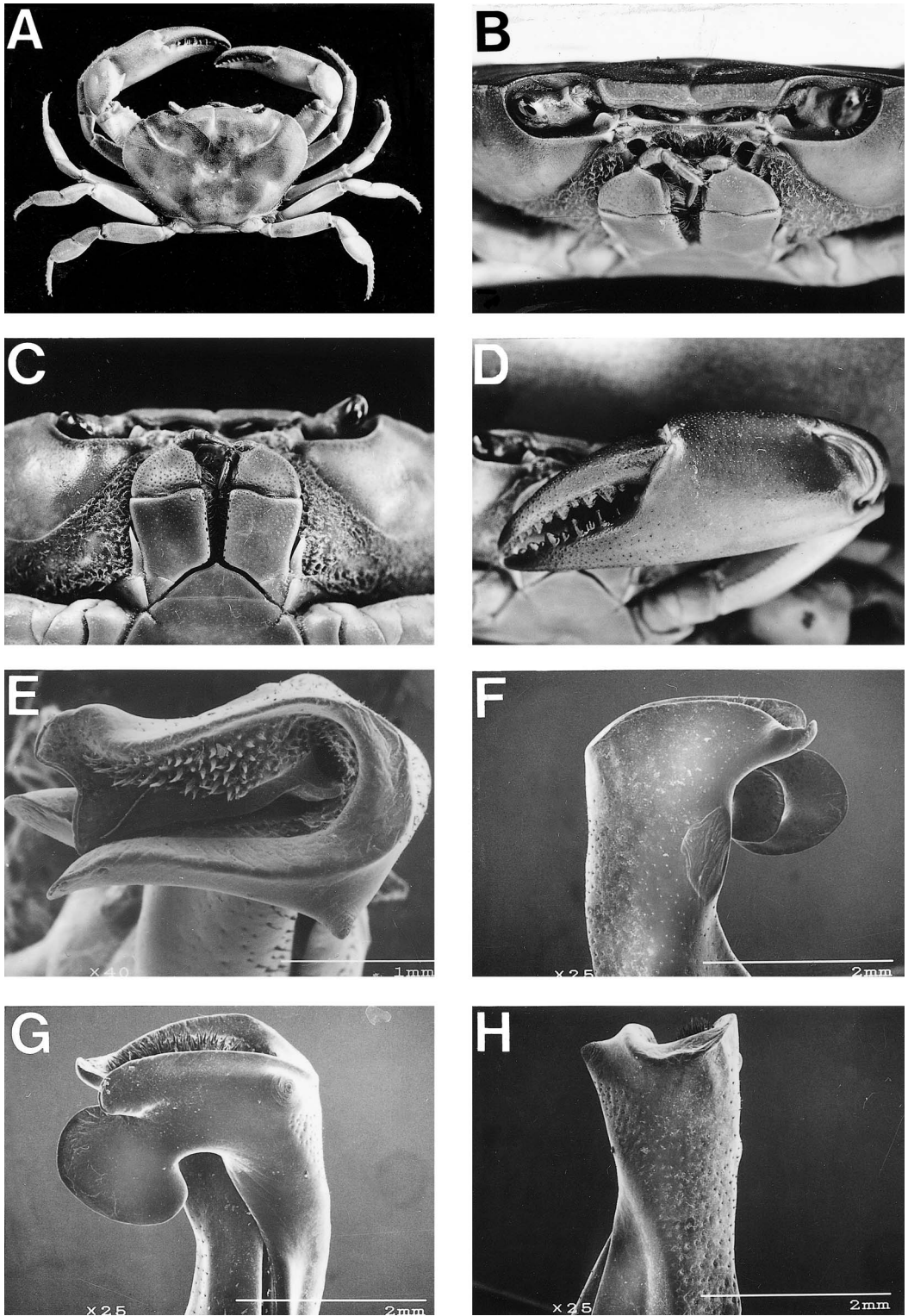


Fig. 3. *Tehuana jacatepecensis*, new species, male holotype: A, total dorsal view; B, frontal view of carapace; C, view of third maxillipeds; D, major chela; E-H, left first gonopod; E, apical view; F, lateral view; G, mesial view; H, caudal view.

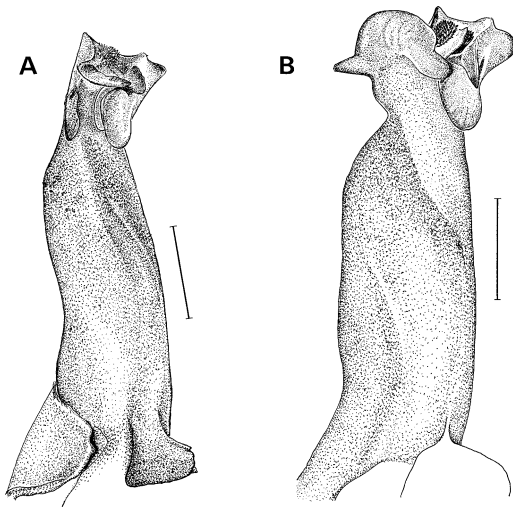


Fig. 4. Total cephalic view of left first gonopod: A, *Tehuana chontalpaensis*, male holotype; B, *Tehuana jacatepecensis*, male holotype. Scale bars represent 2 mm.

(Fig. 4a). In lateral view, lateral process projected cephalically, circular subapical scar, internal surface of mesial process with elevated circular carina (Fig. 3f). In mesial view, marginal and mesial processes partially fused, marginal process with rounded cephalic end, shorter than mesial process (Fig. 3g). Mesial process approximately circular, somewhat cephalically oriented. Mesodistal projection prominent, conical. Lateral and mesial crests even, caudal portion concave. In apical view, mesial crest thicker, lateral crest gradually becoming lateral process, field of terminal pore setae on lateral portion of apex cavity, central section widest.

*Etymology.*—The specific name is derived from “Jacatepec,” the river where the species was collected.

*Remarks.*—The gonopod one morphology of *Tehuana jacatepecensis* is similar to that of *T. complanata* (Rathbun, 1905) and *T. lamellifrons* (Rathbun, 1893) in that all have a reduced lateral process and all possess a subapical scar on the lateral surface. *Tehuana jacatepecensis* can be distinguished from *T. complanata* by the form of the mesial process of gonopod one, which is a small circular blade in the new species and a large ax-shaped process in the latter species. *Tehuana jacatepecensis* can be distinguished from *T. lamellifrons* by examination of gonopod one, which bears an approximately cylindrical

lateral process in the latter species and a spoon-shaped process in the new species.

#### Key to Species of *Tehuana*, Based on Apical Morphology of Male Gonopod One

1. Mesodistal projection absent or faintly insinuated ..... *T. guerreroensis*
  - Mesodistal projection well developed, conical or caudocephalically compressed ..... 2
2. With well-developed lateral process ..... 3
  - With reduced lateral process ..... 7
3. Marginal process reaching beyond distal margin of mesial process ..... *T. poglayenorum*
  - Marginal process short, not reaching distal margin of mesial process ..... 4
4. Mesial process oriented cephalically, longest axis forming a 90° angle with longitudinal axis of gonopod ..... *T. lamothi*
  - Mesial process oriented proximally, ax-shaped or broadly rounded ..... 5
5. Mesial process large (twice as long as wide), ax-shaped; in mesial view, overlapping with the gonopod main body ..... *T. veracruzana*
  - Mesial process broadly rounded (approximately as long as wide or slightly wider than long), not overlapping with the gonopod main body ..... 6
6. In mesial view, marginal and mesial processes not overlapping ..... *T. diabolis*
  - In mesial view, marginal and mesial processes partially overlapping ..... *T. chontalpaensis*
7. In lateral view, marginal process extending well beyond lateral process ..... *T. lamellifrons*
  - In lateral view, marginal process of about the same length or shorter than the lateral process ..... 8
8. In cephalic view, apical cavity widely open; in apical view, lateral process bifid; inferior and proximal margins of mesial process rounded ..... *T. jacatepecensis*
  - In cephalic view, apical cavity partially closed by lateral process; in apical view, lateral process simple; inferior and proximal margins of mesial process straight ..... *T. complanata*

#### DISCUSSION

The detailed revision of the species of *Tehuana* confirmed clear and constant differences with the genus *Pseudothelphusa*. Specifically, two characters used for the first time in this study to describe new species of *Tehuana* and included in the new diagnosis presented herein, are shared by all the species in the genus, except for *T. guerreroensis*, which under the new diagnosis should in the future be placed in *Pseudothelphusa*. The two characters of the gonopod one are: the carina on the internal surface of the mesial process and the mesodistal projection of the gonopod. In contrast, characters such as the well-developed marginal process of the gonopod one and the presence of

a defined superior frontal border of the carapace are also present in *Pseudothelphusa*.

*Tehuana* occupies an intermediate zone in southern Mexico between the distribution ranges of *Pseudothelphusa* to the north and *Odonthelphusa* to the south. With the description of the new species from Tabasco, the distribution range of *Tehuana* now includes a continuous area from central Veracruz to the north and central Guerrero to the west, to southern Oaxaca to the south and central Chiapas to the east.

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