

FRESHWATER CRABS ASSOCIATED WITH CAVES
IN SOUTHERN MEXICO AND BELIZE, WITH
DESCRIPTIONS OF THREE NEW SPECIES
(CRUSTACEA: DECAPODA)

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Abstract.—Records of nine freshwater crabs frequenting subterranean habitats in Belize and Mexico are reported. Three of them are described as new: *Potamocarcinus leptomelus*, a troglophile from Veracruz; *Odontothelphusa monodontis*, also a troglophilic species, from Tabasco; and *Typhlopseudothelphusa hyba*, a troglobite, from Chiapas. The remaining crabs are troglophiles, one of which occurs in Belize, and the others, two of which because of inadequate material cannot be fully identified, were found in caves in the states of Chiapas, Guerrero, Oaxaca, and Tabasco, Mexico.

A study of several collections of cave-dwelling crabs, kindly donated to the Smithsonian Institution by James R. Reddell, has prompted us to record additions to his list of Brachyura known to occur in subterranean habitats in Mexico, Guatemala, and Belize (Reddell 1981). His list includes three troglobites and six others that are probable troglophiles. Subsequently, one troglobitic form, *Typhlopseudothelphusa acanthochela* Hobbs (1986), was described from Blind Crab Cave, 12 km SW Millionario, Cayo District, Belize, and a troglophilic one, *Pseudothelphusa mexicana* Alvarez-Noguera (1987), from La Jolla [sic, Joya?] Cave in the State of Guerrero, Mexico. Records of the occurrence of eight additional species, two of which cannot be fully identified because of inadequate material, are reported herein from spelean waters of Belize and Mexico.

All of the "Material" cited herein is deposited in the National Museum of Natural History, Smithsonian Institution (USNM). Other abbreviations employed are: cl = carapace length, and cb = carapace width.

Pseudothelphusidae Ortmann, 1893

Potamocarcinus leptomelus, new species
Fig. 1a-h

Material.—Mexico: Cueva del Túknel, Mahoilca, Porvenir Zongolica, Veracruz, 31 Dec 1986, Steve and Lori Robertson, male holotype, cl. 13.3 mm, cb. 21.1 mm (USNM 230080).

Description.—Cervical groove narrow, almost straight, very shallow, reaching margin of carapace. Postfrontal lobes obsolete, their position marked by slight depressions; median groove absent except for notch on upper margin of front. Surface of carapace between postfrontal lobes and front sloping gently ventromesially. Front low, of equal height throughout, bilobed in dorsal view, upper margin defined by series of irregularly placed papillae; lower margin V-shaped in median part, straight in lateral parts. Dorsal margin of orbits sinuous. Lateral orbital angle forming papillated tooth, followed by deep notch; rest of anterolateral margin covered by small, irregularly placed, conical papillae. Surface of carapace covered by very

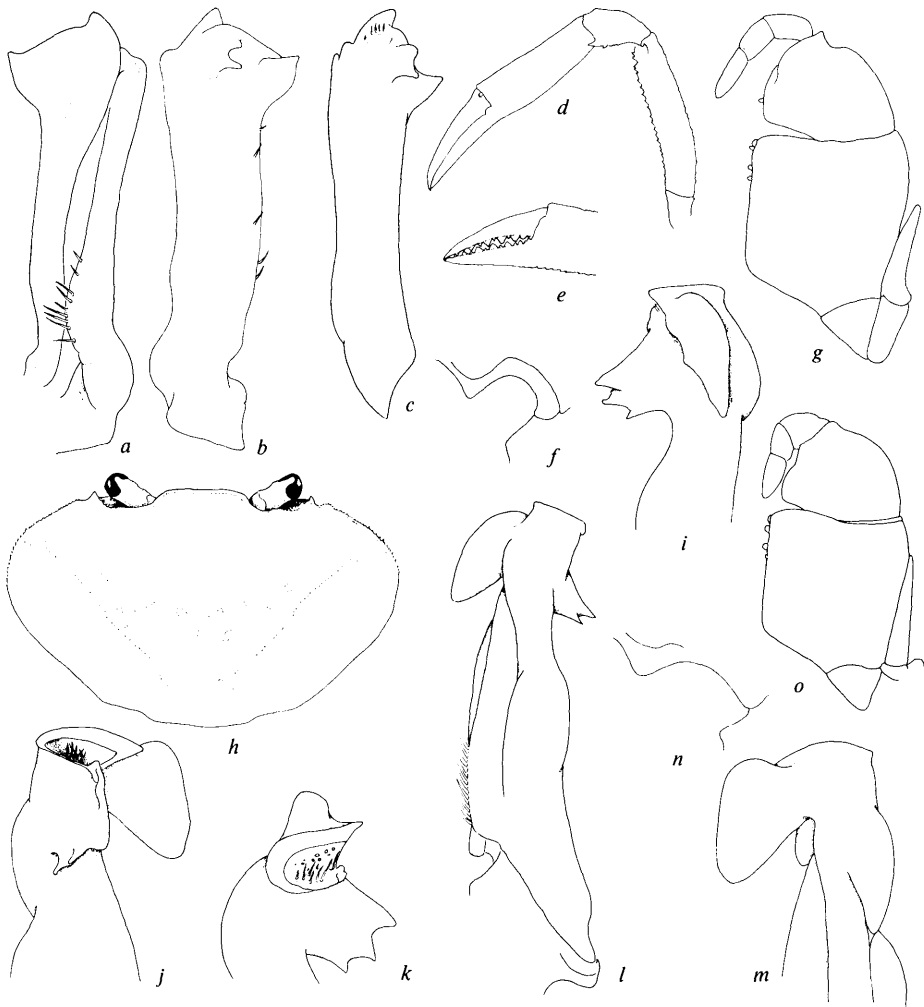


Fig. 1a-o. a-h, *Potamocarcinus leptomelus*, male holotype: a, Left gonopod, caudal view; b, Same, cephalic view; c, Same, lateral view; d, Right cheliped; e, Distal part of chela; f, Opening of efferent channel; g, Left third maxilliped; h, Dorsal view of carapace. i-o, *Pseudothelphusa mexicana*, male, from Resumidor de la Joya: i, Left gonopod, mesial view; j, Same, cephalic view; k, Same, subapical view; l, Same, lateral view; m, Same, caudal view; n, Opening of efferent channel; o, Left third maxilliped.

small papillae, invisible to naked eye, particularly in branchial region.

Eyes small, with distinct faceted cornea and pigment, of usual shape, not filling orbit. Third maxilliped with conspicuous notch on external margin of merus, near insertion of palp; external margin of ischium convex; exognath 0.59 times length of ischium. As name suggests, all pereio-

pods conspicuously slender. Chelae only slightly dissimilar in size and shape; palm of larger one very elongate with straight upper and lower margins; fingers not gaping; carpus with strong internal spine preceded by four spinules; merus elongate with row of spinules on internodorsal and internodorsal ridges and smaller spinules on outer ridge. Walking legs very long, length of third

pair 1.6 times breadth of carapace, and merus 6.3 times as long as broad; relations between podomeres as follows: merus 1, carpus 0.33, propodus 0.54, dactylus 0.54. Dactylus with seven spines in upper row and four in two lower ones.

Gonopod subcylindrical, straight; apical part bearing triangular marginal process overreaching apex, spiniform mesial process directed distomesially, and bifid cephalic process with apices pointing mesially. Field of spines very narrow, with few setae placed on distal surface of apex.

Remarks.—The gonopod of this species resembles that of *Potamocarcinus magnus* (Rathbun 1896:377); the mesial process is similar but directed distomesially instead of mesially; the bifid process is present in both, although distinctly reduced in *P. leptomelus*; and the marginal process of the latter is rudimentary rather than well developed and cup-shaped as in *P. magnus*.

Potamocarcinus aspoekorum (Pretzmann)

Pseudothelphusa (Zilchia) aspoekorum
Pretzmann, 1968a:12.

Potamocarcinus (Zilchia) mexicanus Pretzmann, 1968a:12 [nomen nudum].

Potamocarcinus (Zilchia) aspoekorum.—Pretzmann, 1971:20; 1972:75, figs. 405–407, 417–420.

Potamocarcinus aspoekorum.—Rodríguez, 1982:115, figs. 69d; 70f, m; 71e, i; 74a–c.

Material.—Belize: Balam's Cave (Uchen Balam), Cayo District, 22–26 Mar 1979, L. McNatt, 1 male cl. 18.6 mm, cb. 30.1 mm (USNM 230082).

Remarks.—Troglotic characters are not conspicuously developed in this species. The walking legs are moderately slender (third right pereiopod of largest male with total length 34.0 mm, merus 3.3 times as long as broad), but the dorsal surface of the carapace is not pale, and the eyes are normally developed.

Pseudothelphusa mexicana

Alvarez-Noguera, 1987

Fig. 1i–o

Pseudothelphusa mexicana Alvarez-Noguera, 1987:1.

Material.—Mexico: Resumidero de la Joya, San Gregorio, Guerrero, 23 Feb 1981, Steve Robertson, 2 males, cl. 18.6 and 16.5 mm, cb. 28.7 and 25.8 mm; 1 female, cl. 18.0 mm, cb. 28.2 mm (USNM 230084).

Remarks.—Our specimens are from the type locality. Troglitic characters are not obvious in this crab, although the walking legs are moderately slender (third right pereiopod of largest male with total length 29.5 mm, merus width/length = 0.35). The dorsal surface of the carapace, however, is dark and the eyes are well developed.

Odontothelphusa monodontis, new species
Fig. 2a–f

Material.—Mexico: Grutas del Cocona, Tabasco, 26 Aug 1972, R. W. Mitchell and W. H. Russell, 1 male holotype, cl. 17.0 mm, cb. 25.2 mm (USNM 230078).

Description.—Cervical groove very shallow and wide, not reaching margin of carapace. Postfrontal lobes wide, flat, clearly delimited anteriorly, surface covered by flat papillae not visible to naked eye; median groove well marked between lobes, but not anterior to them. Surface of carapace between frontal lobes and front flat. Upper border of front well marked by overhanging papillae and conspicuous notch in middle; lower margin slightly sinuous and lying slightly anterior to upper one; front high and excavate. Anterior margin of carapace with notch behind orbit, about 5 small papillae situated between notch and cervical groove, and approximately 15 papilliform teeth on rest of lateral margin. Third maxilliped conspicuously wide; merus 1.43 times as wide as long; exognath 0.93 length of ischium of endognath.



Fig. 2a-k. a-f, *Odontothelphusa monodontis*, male holotype: a, Right gonopod, caudal view; b, Same, mesial view; c, Same, cephalic view; d, Same, subapical view; e, Left third maxilliped; f, Opening of efferent channel. g-k, *Typhlopseudothelphusa hyba*, male holotype: g, Opening of efferent channel; h, Left third maxilliped; i, Left gonopod, caudal view; j, Same, lateral view; k, Same, cephalic view.

Gonopod slender with apical part bent laterally at angle of 45 degrees; apex consisting of flat quadrangular lobe with long spur on proximomesial angle and papilliform tubercle and small finger-like tubercle on cephalic surface; field of spines narrow, slitlike.

Remarks. — This crab differs from its congener in possessing two tubercles on the cephalic surface of the gonopod and lacking a spiniform process on the distal angle of the mesial border. Some of the characteristics that have been associated with an obligate spelean existence are lacking in this species,

but the dorsal surface of the carapace is pale, and the walking legs moderately slender (third right pereiopod with total length of 30.3 mm, merus 2.87 times as long as broad); the eyes, however, are well pigmented.

?*Raddus* sp.

Material. — Mexico: Cueva El Chorreadero, Chiapas, 24 Dec 1973, R. Syme, 1 juvenile male, cl. 9.9 mm, cb. 13.8 mm (USNM 230090).

The only specimen available is a distinctly juvenile male; however, the gonopod ex-

hibits the flat quadrangular form characteristic of *Raddus*, and the features of the carapace are those of other members of the genus. This cave is located 12 km E Tuxtla Gutiérrez (Reddell 1981:292), near the range of *Raddus bocourti* (A. Milne-Edwards, 1866).

Typhlopseudothelphusa hyba, new species
Fig. 2g–k

Potamocarcinus (*Typhlopseudothelphusa*) *mocinoi*.—Hobbs et al. 1977:145 [in part: localities 2 and 3].

Material.—Mexico: Cueva de Los Llanos, 15 km ESE San Cristóbal de Las Casas, Chiapas, 29 Aug 1972, J. Cooke, W. Russell, and R. Mitchell, male holotype, cl. 12.4 mm, cb. 18.1 mm (USNM 150633), 1 female paratype, cl. 15.4 mm, cb. 22.8 mm (USNM 230081).—same locality, 5 Feb 1972, D. McKenzie and J. R. Reddell, 1 female, cl. 1.2 mm, cb. 24.6 mm (USNM 143613).—Cueva de los Murciélagos, 15 km ESE of San Cristóbal de Las Casas, Chiapas, 29 Aug 1972, J. Cooke and R. Mitchell, 1 male, cl. 12.6 mm, cb. 19.9 mm, 2 females, cl. 14.7 and 11.6 mm, cb. 20.9 and 16.8 mm (USNM 150629).

Description.—Carapace narrow (cb/cl = 1.46), strongly convex in anterior part. Cervical grooves forming paired, shallow depressions in holotype but absent in topotypic female. Postfrontal lobes and median groove obsolete, but carapace with slight depression immediately posterior to front; latter, lacking upper margin, rounded and projecting forward, its lower margin bilobed in dorsal view. Lateral orbital angle forming well developed triangular tooth, followed by shallow notch. Margins of orbits and front with row of small granules. Lateral margin of carapace with larger, irregularly placed granules. Eyes reduced, lacking distinct faceted cornea and pigment. Third maxilliped with noticeable impression on external margin of merus, near insertion of palp; exognath 0.61 times length of ischium. All

pereiopods extremely slender. Chelipeds subequal in size and shape; palm cylindrical; fingers also very slender, approximately twice as long as palm, and armed with minute teeth; carpus with small, hooked spine on internal margin; merus very elongate, overreaching carapace by half its length, and bearing rows of granules on its three ridges. Third pair of walking legs 1.6 times width of carapace; merus 5.87 times as long as broad, and relations of its podomeres as follows: merus 1, carpus 0.35, propodus 0.66, dactyl 0.74; dactylus with six or seven spines in five rows.

Gonopod wide in lateromesial plane, narrow in cephalocaudal plane; distal part strongly bent; gonopore and field of spines directed cephalad; distal margin rounded and armed with prominent conical spines; marginal process cup-shaped and directed cephalad; and strong, triangular mesial process disposed in same plane as field of spines.

Remarks.—*Typhlopseudothelphusa hyba*, like its congeners, exhibits a combination of advanced characters associated with its adaptations to a spelean environment. It may be distinguished from them by the triangular mesial process of the gonopod with a single apex.

Pseudothelphusidae indet. species

Material.—Mexico: Sumidero de Citlala, Zongolica, Veracruz, 23 Mar 1981, Steve Robertson and Phillipe Ackmann, 1 fragmented female, cl. approx. 19.5 mm, cb. approx. 33.5 mm (USNM 240112).

Description.—Cervical groove very shallow and wide, not reaching margin of carapace. Postfrontal lobes rounded, flat, not well delimited anteriorly; median groove well marked between lobes and narrowly linear anterior to them. Surface of carapace between frontal lobes and over front flat; upper border of latter well marked by overhanging papillae and bearing conspicuous median notch; lower margin slightly sinuous and lying slightly anterior to upper.

Front high and excavate. Anterior margin of carapace with notch behind orbit, about 5 small papillae between notch and level of cervical groove, and approximately 15 papilliform teeth on rest of lateral margin. Eyes normally developed, but unpigmented.

Trichodactylidae

Avotrichodactylus constrictus (Pearse, 1911)

- Trichodactylus constrictus* Pearse, 1911:111, fig. 4.—Rodríguez & Manrique, 37:183.
Trichodactylus (Trichodactylus) constrictus.—Coifmann, 1939:111.
Trichodactylus (Avotrichodactylus) constrictus.—Pretzmann, 1968b:71.
Trichodactylus (Rodriguezia) constrictus.—Bott, 1969:26.—Cottarelli & Argano, 1977:210.

Material.—Mexico: 1 km N of Palenque, Chiapas, 25 Jul 1973, J. Reddell, N. Kawakatsu, D. Denson, and S. R. Mitchell, 2 males, cl. 19.8 and 12.5 mm, cb. 17.9 and 12.9 mm (USNM 230085).—Cueva de Juan Sánchez, NW Acatlan, Oaxaca, 1 Jul 1976, T. Byrd, A. G. Grubbs, and M. Cossey, 1 female, cl. 16.5 mm, cb. 15.8 mm (USNM 230086).

Remarks.—The female specimen from Cueva de Juan Sánchez is assigned to this species with doubt. It has five lateral teeth (not including the external orbital angle) on the right side and four on the left, whereas *A. constrictus* usually has two or three teeth.

Avotrichodactylus bidens (Bott, 1969)

- Trichodactylus (Rodriguezia) bidens* Bott, 1969:25, pl. 24: figs. 68, 69.—Cottarelli & Argano, 1977:207, figs. 3, 4.

Material.—Mexico: Cueva de la Cascada Azufre, 3 km N Tapijulapa, Tabasco, 15 Jun 1975, A. G. Grubbs, 1 juvenile male (USNM 230083).

Remarks.—Bott (1969) designated the type locality "Arroyo del Solpho" near

Tapijulapa, which is almost certainly the same as, or perhaps an extension of, that from which our specimen was taken. This juvenile is very small, and the lateral teeth on the carapace are not well formed, but even at this size, the gonopod is clearly typical of *A. bidens*.

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Literature Cited

- Alvarez-Noguera, Fernando. 1987. *Pseudothelphusa mexicana*, a new freshwater crab from the state of Guerrero, Mexico (Brachyura: Pseudothelphusidae).—Proceedings of the Biological Society of Washington 100(1):1–3.
- Bott, Richard. 1969. Die Süßwasserkrabben Süd-Amerikas und ihre Stammesgeschichte.—Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft (Frankfurt am Main) 518:1–94.
- Coifmann, Isabel. 1939. Potamonidi della Guiana Inglese.—Archivio Zoologico Italiano 27:93–116.
- Cottarelli, Vezio, & Roberto Argano. 1977. *Trichodactylus (Rodriguezia) mensabaki* n. sp. (Crustacea, Decapoda, Brachyura) granchio cieco delle acque sotterranee del Chiapas (Messico).—Quaderni Problemi Attuali di Scienza e di Cultura, Accademia Nazionale dei Lincei 171(3):207–212.
- Hobbs, Horton H., Jr. 1986. A new troglobitic crab (Crustacea: Decapoda: Pseudothelphusidae) from Belize.—Texas Memorial Museum, Speleological Monographs 1:1–4.
- , H. H. Hobbs III, & Margaret A. Daniel. 1977. A review of the troglobitic decapod crustaceans of the Americas.—Smithsonian Contributions to Zoology 244:v + 183 pages.
- Milne-Edwards, A. 1866. Description de trois nouvelles espèces du genre *Bosica*, Crustacés Brachyures de la tribu des Telphusiens.—Annales de la Société Entomologique de France (4)6:203–205.
- Pearse, A. S. 1911. Report on the Crustacea collected by the University of Michigan-Walker Expedition in the State of Vera Cruz, Mexico.—Thir-

- teenth Annual Report of the Michigan Academy of Science 13:108–113.
- Pretzmann, Gerhard. 1968a. Neue südamerikanische Süßwasserkraben (Vorläufige Mitteilung).—Entomologisches Nachrichtenblatt (Wien) 15:1–20.
- . 1968b. Die Familie Trichodactylidae (Milne Edwards 1835) Smth [sic] (Vorläufige Mitteilung).—Entomologisches Nachrichtenblatt (Wien) 15:70–76.
- . 1971. Fortschritte in der Klassifizierung der Pseudothelphusidae.—Sitzungsberichten der Österreichische Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Klasse (1)179(1–4):14–24.
- . 1972. Die Pseudothelphusidae (Crustacea, Brachyura).—Zoologica 42(120), part 1:1–182.
- Rathbun, Mary J. 1896. Descriptions of two new species of fresh-water crabs from Costa Rica.—Proceedings of the United States National Museum 18:(377–389).
- Reddell, James R. 1981. A review of the cavernicole fauna of Mexico, Guatemala, and Belize.—Bulletin of the Texas Memorial Museum 27:1–327.
- Rodríguez, Gilberto. 1982. Les crabes d'eau douce d'Amérique. Famille des Pseudothelphusidae.—Office de la Recherche Scientifique et Technique Outre-Mer, Faune Tropicale 22:1–223.
- , & Fernando Manrique. 1967. El género *Trichodactylus* en México (Brachyura, Potamoniidae).—Anales del Instituto de Biología, Universidad Nacional Autónoma de México 37:183–186.
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