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**A new cavernicolous Crab, *Zilchia falcata*, from Guatemala,
 with notes on the genera of the Potamocarcinini
 (Crustacea Decapoda, Pseudothelphusidae)**

by Gilberto RODRÍGUEZ and Horton H. HOBBS, Jr.

Abstract. — A new cavernicolous freshwater crab of the tribe Potamocarcinini, *Zilchia falcata*, is described from Guatemala. Most members of this tribe exhibit a number of homologies that appear to change gradually in form or position. The species groups recognized according to these morphoclines correspond roughly to the genera already established. Three species that have been included among them, however, should not be placed in the Potamocarcinini: *Allacanthos pittieri* (Rathbun, 1898), *Spirocarcinus garthi* (Pretzmann, 1971) and *Potamocarcinus chacei* Pretzmann, 1967. To receive the last of these species, the new genus *Eidocamptophallus* is erected.

Résumé. — Une nouvelle espèce de crabe d'eau douce cavernicole de la tribu des Potamocarcinini, *Zilchia falcata*, est décrite du Guatemala. Les gonopodes de la plupart des Potamocarcinini montrent plusieurs homologies de forme et de position, lesquelles changent d'une façon graduelle parmi les diverses espèces. Il y a une correspondance générale entre les groupes d'espèces définis par ces morphoclines et les genres établis d'abord dans la littérature. Les définitions des genres de la tribu sont corrigées dans cette contribution. Trois espèces, *Allacanthos pittieri* (Rathbun, 1898), *Spirocarcinus garthi* (Pretzmann, 1971) et *Potamocarcinus chacei* Pretzmann, 1967, doivent être exclues des Potamocarcinini. Un nouveau genre, *Eidocamptophallus*, est érigé pour recevoir la dernière de ces espèces.

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Fifteen species of pseudothelphusids have been reported to occur as troglobites or troglophiles in the subterranean waters of Southern Mexico, Guatemala, and Belize (REDDELL, 1982; RODRÍGUEZ and HOBBS, *in press*). All except two of them belong to the tribe Potamocarcinini. Examinations of crabs collected in caves by the Dreux Expedition to Guatemala in 1975 have revealed the presence there of yet another member of the tribe.

Since the generic allocation of this new crab presents difficulties, comments on the status of the genera of the tribe are offered herein.

PSEUDOTHELPHUSIDAE Rathbun, 1893

Zilchia falcata sp. nov.

(Fig. 1, 2a-k)

ETYMOLOGY. — The specific name is from the Latin “falcatus” (sickle-shaped) in reference to the hooked appearance of the gonopod.

MATERIAL EXAMINED. — Guatemala, Alta Verapaz (DELAMARE DEBOUTTEVILLE, *in litt.*); collected by the Dreux Expedition, 1975 (DELAMARE DEBOUTTEVILLE, 1976 : 115; DELAMARE DEBOUTTEVILLE and JUBERTHIE, 1975, 1976) : male holotype, cl 23.4 mm, cb 42.8 mm; male paratype, cl 24.5 mm, cb 43.5 mm. The specimens are deposited in the Muséum national d'Histoire naturelle, Paris, MP-B20118 and MP-B20352, respectively.

DESCRIPTION

Carapace wide (cb/cl = 1.77, 1.83). Cervical groove shallow, straight, and reaching margin of carapace. Postfrontal lobes small, weakly elevated, but clearly defined; broad depression, but not groove, separating elevations. Surface of carapace between postfrontal lobes and front sloping gently ventromesially. Front high, convex in dorsal view; upper margin well defined by thin ridge composed of small, elongate papillae; lower margin jutting anteriorly, V-shaped. Dorsal margin of orbits sinuous. Lateral orbital angle forming papillate projection followed by shallow notch; remainder of anterolateral margin covered by small, irregularly dispersed denticles. Surface of carapace smooth. Eyes (fig. 2a) with bulging cornea,

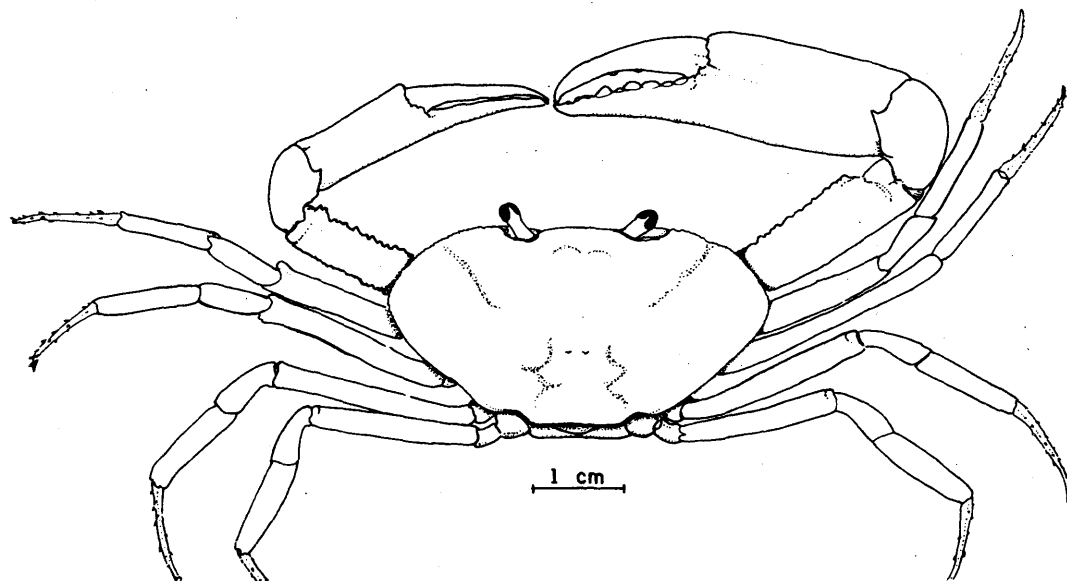


FIG. 1. — *Zilchia falcata*, male holotype.

normally faceted and pigmented, but not filling orbits. Merus of third maxilliped with lateral margin rounded except for shallow impression near distal extremity of palp; exoganth 0.84 times length of ischium. Opening of efferent channel as in figure 2e.

Pereiopods conspicuously slender. Chelae dissimilar in size and shape; palm of larger

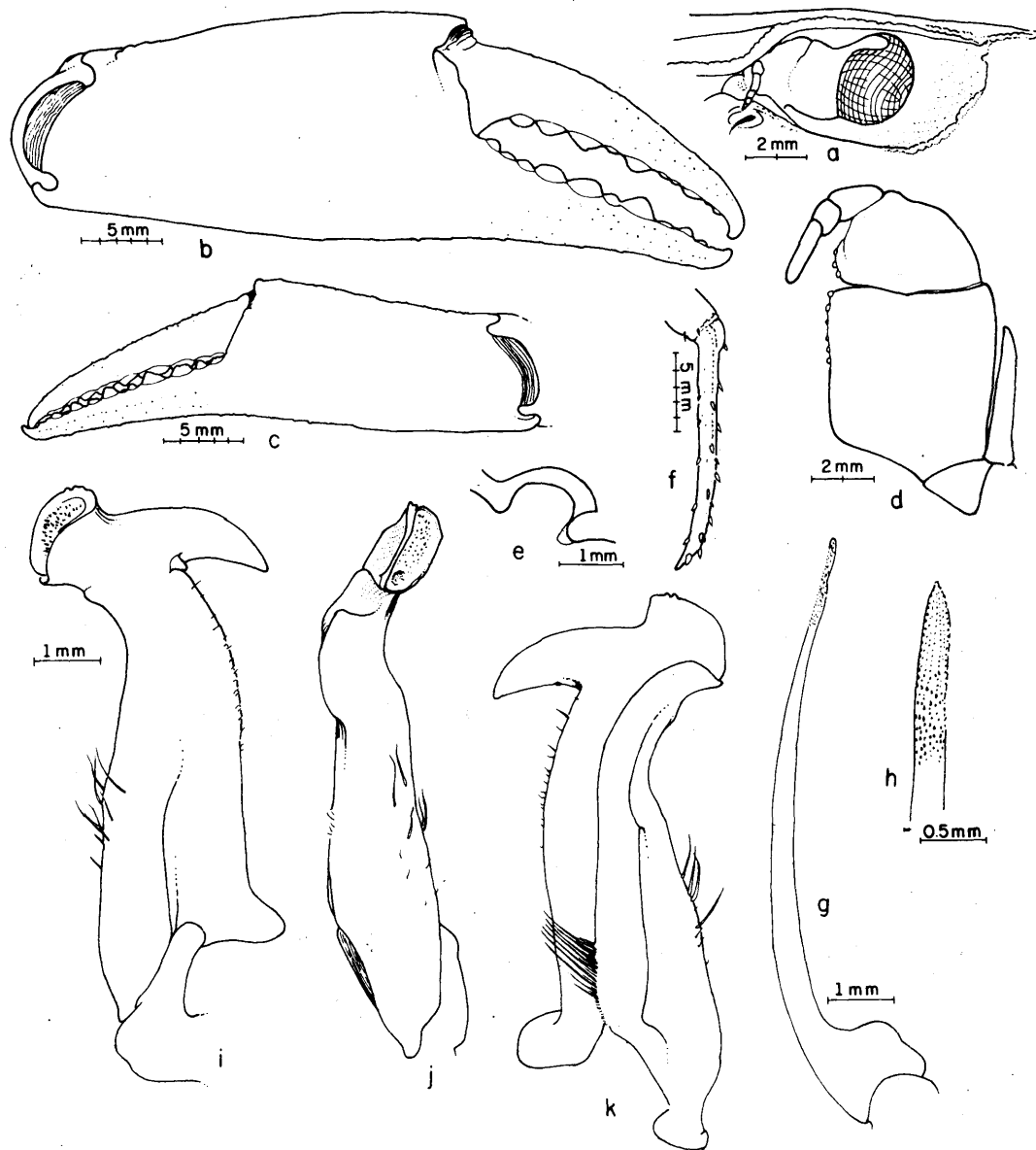


FIG. 2a-k. — *Zilchia falcata*, male holotype : a, orbit and eye ; b, large chela ; c, small chela ; d, third left maxilliped ; e, opening of left efferent channel ; f, dactylus of third left gonopod, cephalic view ; i, gonopod ; j, same, lateral view ; k, same, caudal view.

elongate, ratio height/length (including fixed finger) 0.34; upper margin slightly arcuate and lower sinuous; fingers slightly gaping. Carpus with strong mesial spine preceded by four smaller ones; merus elongate, overreaching margin of carapace by 0.7 of its length, and bearing row of small spines on dorso- and ventromesial ridges and smaller ones on lateral ridge; walking legs very long, length of third pair 1.3 times breadth of carapace, merus 6 times as long as broad; relations between podomeres as follows : merus 1, carpus 0.4, propodus 0.54, dactylus 0.67. Dactylus with 5-7 spines in upper and 2 lateral rows, 4-5 spines in 2 lower rows. Gonopod (fig. 2i, j, k) thick, with distal half arched laterally; sickle-shaped in caudal aspect, due to presence of strong subterminal cephalic process, in caudal aspects; latter process subtriangular, recurved, and bearing small basal spine on mesial side; apex of gonopod cup-shaped, with field of spines elongated in lateromesial plane and directed cephalad, caudomesial margin toothed. In addition to strong marginal setae, gonopod bearing short stiff hairs on middle part of mesial margin and few long setae on proximal half of lateral margin. Terminal part of second pleopod (fig. 2g, h) covered cephalically by closely set spinules.

REMARKS

The slender pereopods of this species no doubt represent the first stages of cave adaptation in freshwater crabs (RODRÍGUEZ, 1985). The carapace and pereopods of the paratypic specimen are devoid of pigment, but in the holotype a light pigmentation is retained. The gonopod resembles that of *Zilchia zilchi* Bott, 1956, and in the strong cephalic spine, that of *Z. aspeokorum* Pretzmann, 1968. It may be distinguished from both, as well as from other species of the tribe, by the compressed, cup-shaped field of spines.

REMARKS ON THE POTAMOCARCININI

The tribe Potamocarcinini, as understood by recent authors (PRETZMANN, 1972, 1975, 1980; RODRÍGUEZ, 1982), comprises a heterogeneous (in terms of their gonopod morphology) assemblage of species that suggests a polyphyletic origin of the group. In a number of species, however, gonopodal homologies are recognized, which arranged serially (fig. 3), suggest several distinct morphoclines as follows :

a. One of the more persistent traits of the tribe is a strong, recurved cephalic process which is directed mesocephalad (fig. 3A). In *magnus*, *richmondi*, *colombiensis*, *hartmanni*, and *armatus*, this process is terminally situated (in reference to the mesial margin) and moderately strong; in *aspeokorum* and *zilchi* it is also terminal and exhibits progressive increase to *falcata* in which it spans much of the apex of the gonopod; in *leptomelus* it is reduced and subtriangular, and in *Typhlopseudothelphusa* it lies distinctly proximal to the apex. In *Odontothelphusa maxillipes* and *O. monodotis*, the strong mesoproximal spine may well be a homologue of the cephalic process, which has been displaced proximally as in *Typhlopseudothelphusa*.

b. The lateral process is bifid in *magnus*, *richmondi*, *nicaraguensis*, *colombiensis*, and *leptomelus*, and the distal spine is formed by a prolongation of the margin. In *aspeokorum*, *Typhlopseudothelphusa* and *falcata* the lateral process is represented by only one spine, and even that is hardly discernible in *hartmanni*.

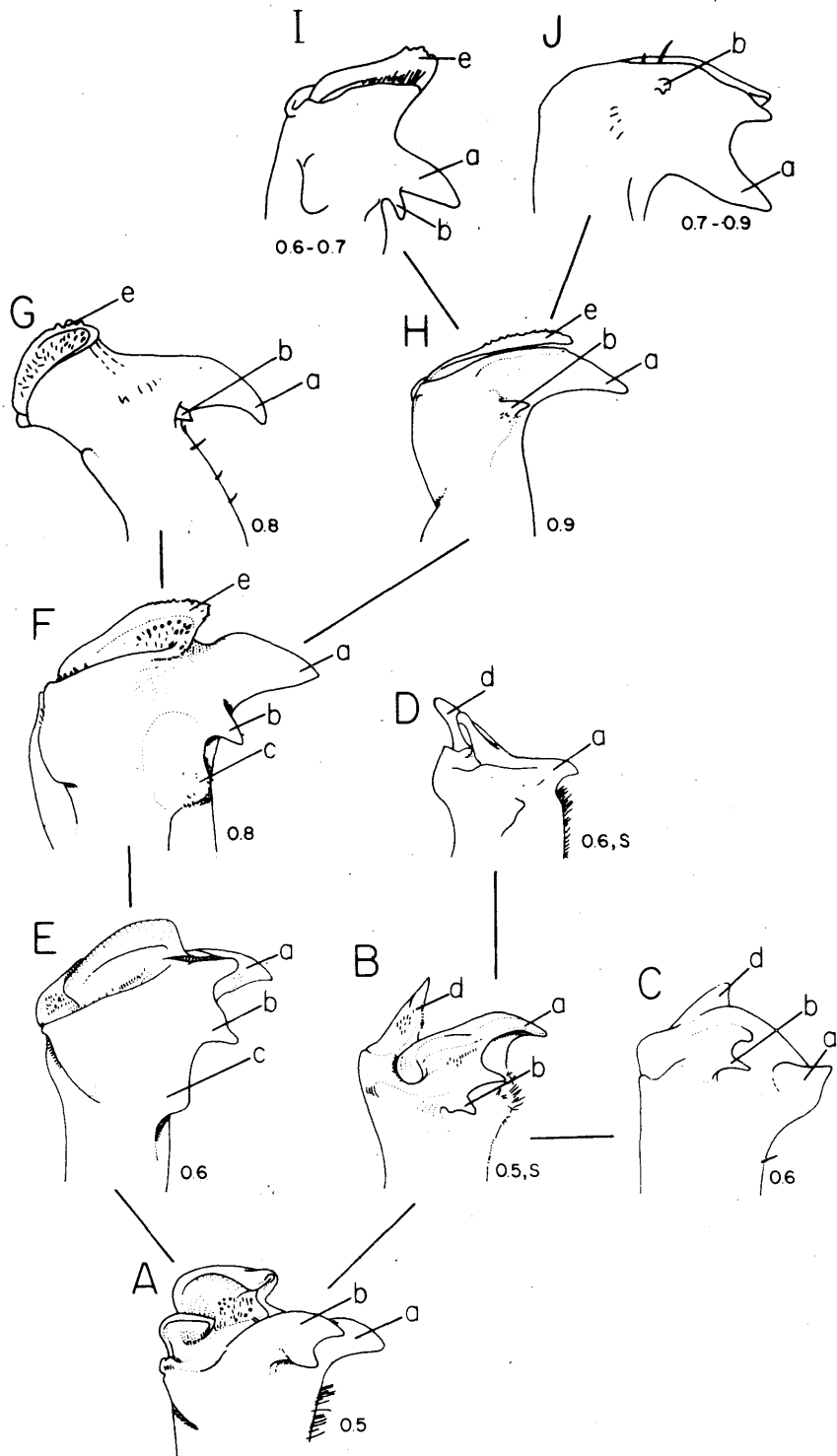


FIG. 3A-J. — Homologies in the gonopods (cephalic view) of the Potamocarcinini: A, *Potamocarcinus magnus*; B, *P. nicaraguensis*; C, *P. leptomelus*; D, *P. hartmanni*; E, *P. richmondi*; F, *P. aspoekorum*; G, *Zilchia falcata*; H, *Z. zilchi*; I, *Typhlopseudothelphusa mocinoi*; J, *Odontothelphusa maxillipes*. a, cephalic process; b, lateral process; c, cephalic lobe; d, distal prolongation of margin; e, crenulation over mesocephalic margin of spine field; s, species with large spines on anterolateral margin of carapace; numbers indicate proportion of exognath to ischium of endognath of third maxilliped.

c. The ridge, which is somewhat rudimentary in *magnus*, becomes a conspicuous "chin-like" lobe in *richmondi*, *aspoekorum*, *zilchi*, and *Typhlopseudothelphusa*. The lobe is not recognizable in *falcata* and *Odontothelphusa*.

d. Three characteristics of the field of spines follow different trends : (1) in *magnus* and *richmondi* the caudal margin of the field forms a conspicuous hood; (2) in *nicaraguensis* a remnant of the hood persists, but a new element appears in the form of a distal prolongation of the border of the field (fig. 3B, "d"); in *hartmanni*, *armatus*, and *leptomelus* this extension is very conspicuous; (3) in *aspoekorum*, *zilchi*, *Typhlopseudothelphusa*, and *falcata*, there is a conspicuous crenulation of the mesocephalic border, and the border itself is strongly reflexed over the field of spines except in *falcata* in which the tip of the gonopod is cuplike. The flattened apex of the gonopod of *Odontothelphusa*, and in particular the reflexed border of *O. monodontis*, evokes the mien of that structure in the gonopod of *aspoekorum*, *zilchi*, and *Typhlopseudothelphusa*.

Taking these homologies into account, the species become aligned into several distinct groups. Those with a relatively small cephalic process and a bifid mesial process become grouped with *armatus* in the genus *Potamocarcinus*; this includes those species in which a distal prolongation of the margin has developed. Those species with an extraordinarily developed cephalic spine and a mesial process consisting of only a single spine compose a readily recognizable group worthy of generic rank. For it the subgeneric name *Zilchia* Pretzmann, 1968, is available. *Typhlopseudothelphusa* Rioja, 1953, and *Odontothelphusa* Rodríguez, 1982, stand as separate genera, both evidencing affinities to *Zilchia* in the narrow, slit-like field of spines.

Aside from the gonopodal characters discussed above, there are also a few somatic features which show a similar generic differentiation. For example, the length of the exognath of the third maxilliped has undergone a trend of progressive reduction in certain species of the tribe (fig. 3). In addition, the increase in size of the spines on the anterolateral margins of the carapace occurs only in some species of *Potamocarcinus* (fig. 3A, B, D, "S"). But other distinctive somatic features that have been recognized, some of which are almost certainly adaptive, do not seem to be helpful in deciphering the phylogeny of the tribe. The five known species of *Typhlopseudothelphusa*, one of six species of *Potamocarcinus*, one of three of *Zilchia*, and one of two of *Odontothelphusa*, show different stages of troglobitic adaptation. For this reason, the acquisition of characters associated with obligate subterranean life must be viewed as representing parallel development (convergence) in most, if not all, of the genera in which they appear (RODRÍGUEZ, 1985).

The generic arrangement outlined above requires revised diagnoses of these taxa as follows.

Potamocarcinus H. Milne Edwards, 1853

DIAGNOSIS. — Exognath of third maxilliped 0.5 length of ischium of endognath. Lateral spines of carapace unusually well developed in some species. Gonopod with conspicuous cephalic process located distally, and bifid mesial process arising from cephalic surface; distally projecting marginal lobe present in some species; field of spines wide, partly covered by hood derived from produced caudal margin of field.

TYPE-SPECIES : *Potamocarcinus armatus* H. Milne Edwards, 1853. Cf. RODRÍGUEZ (1982 : 102) for validity of this species.

OTHER SPECIES : *Potamocarcinus nicaraguensis* Rathbun, 1893; *P. richmondi* (Rathbun, 1893); *P. magnus* (Rathbun, 1896); *P. hartmanni* Pretzmann, 1975, *P. colombiensis* von Prahll and Ramos, 1987; *P. leptomelus* Rodríguez & Hobbs, *in press*.

Zilchia Pretzmann, 1968

DIAGNOSIS. — Exognath of third maxilliped 0.8-0.9 length of ischium of endognath. Gonopod with strong distally situated cephalic process, its length subequal to width of apex of gonopod; single mesial process arising from cephalic surface, and rounded spinous lobe proximal to it in some species; field of spines narrow, elongate, its caudodistal margin crenulate and either erect or projecting cephalically to overhang field of spines.

TYPE-SPECIES : *Pseudothelphusa (Zilchia) aspoekorum* Pretzmann, 1968.

OTHER SPECIES : *Zilchia zilchi* (Bott, 1956); *Z. zilchi germani* Pretzmann, 1978; *Z. falcata* n. sp.

Typhlopseudothelphusa Rioja, 1953

DIAGNOSIS. — Exognath of third maxilliped 0.1-0.7 length of ischium of endognath. Apex of gonopod with strong cephalic process located preapically; field of spines narrow, its caudodistal margin crenulated or papillated and projecting distally.

TYPE-SPECIES : *Typhlopseudothelphusa mocinoi* Rioja, 1953.

OTHER SPECIES : *Typhlopseudothelphusa mitchelli* Delamare Deboutteville, 1976; *T. juberthiei* Delamare Deboutteville, 1976; *T. acanthochela* Hobbs, 1986; and *T. hyba* Rodríguez & Hobbs, *in press*.

Odontothelphusa Rodríguez, 1982

DIAGNOSIS — Exognath of third maxilliped 0.7-0.9 length of ischium of endognath. Gonopod flattened in cephalocaudal plane, axe shaped; field of spines narrow, slit-like, with margins parallel, forming triangular projection mesially; strong cephalic process situated proximal to latter, and small spine arising from cephalic surface.

TYPE-SPECIES : *Pseudothelphusa maxillipes* Rathbun, 1898.

OTHER SPECIES : *Odontothelphusa monodontis* Rodríguez & Hobbs, *in press*.

In addition to those species discussed above, the following have been associated in the literature with the Potamocarcinini; however, we have been unable to homologize several features of their gonopods with those that seem to be characteristic of the tribe.

Pseudothelphusa pittieri Rathbun, 1898, was isolated by SMALLEY (1964) in the monotypic subgenus *Allacanthos*, which later was accorded generic status (SMALLEY, 1970), and included in the Potamocarcinini by RODRÍGUEZ (1982). PRETZMANN (1971) considered it a subgenus of *Potamocarcinus* and later (1972) of the genus *Achlidon*, an action that excluded it from the Potamocarcinini. As stated by SMALLEY, 1964, the gonopod of this species is unique within the family, and the species should be excluded from the tribe Potamocarcinini.

Potamocarcinus (Potamocarcinus) garthi Pretzmann, 1971, has been erroneously considered to be a member of the Potamocarcinini. Inasmuch as the available illustrations of the gonopod of this crab (PRETZMANN, 1972, figs. 388, 398; 1975, pl. 7 : figs. 24, 25) are

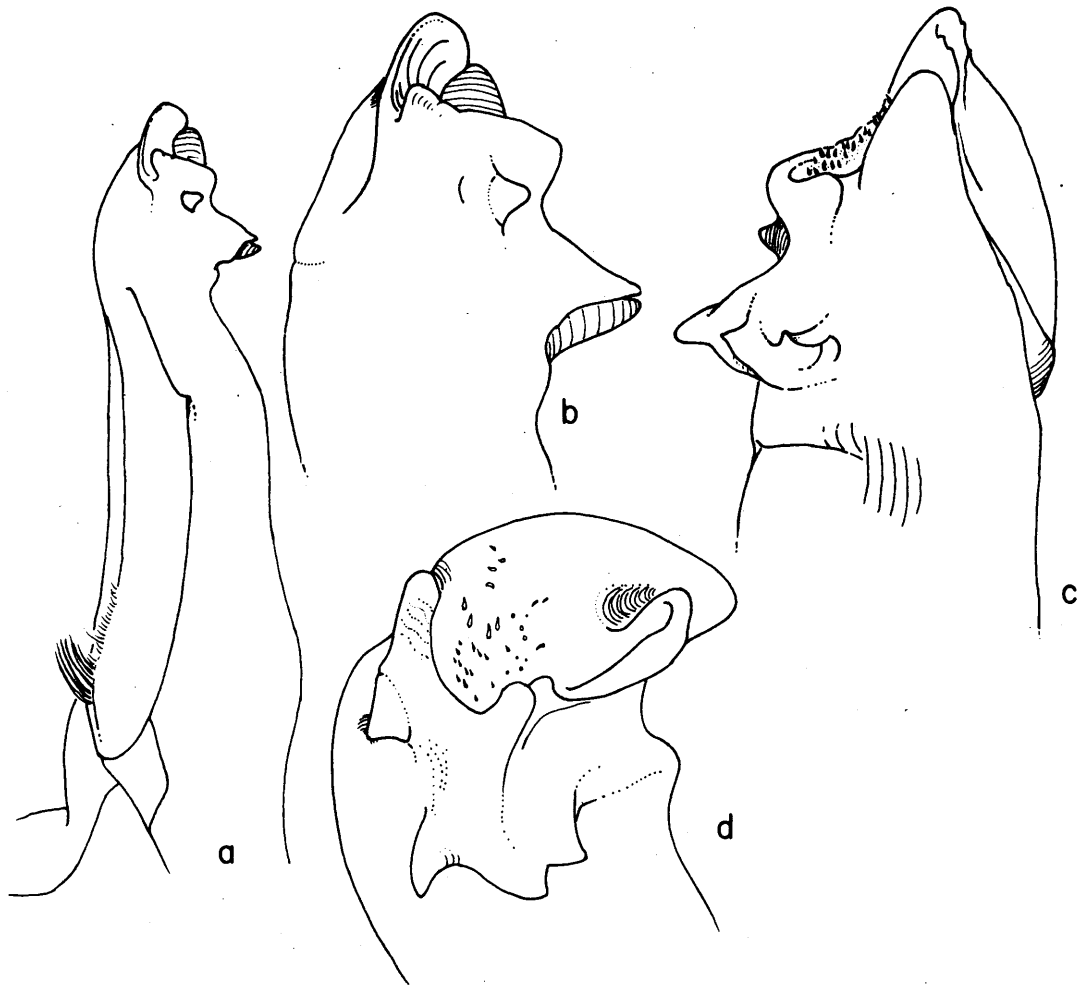


FIG. 4a-d. — *Spirocarcinus garthi* Pretzmann, 1971, male holotype : a, left gonopod, caudal view ; b, same detail of apex, caudal view ; c, same, cephalic view ; d, same, distal view.

inadequate, we are including illustrations (fig. 4) of this appendage from the holotype which was collected from Río Icaudi, tributary of Río Bayano, Eastern Panama, on 13 July 1960, by C. F. BENNETT (USNM 107096). In our opinion, the presence of large teeth on the cephalolateral margins of the carapace does not constitute a criterion of sufficient importance to include this species in the Potamocarcinini, particularly in view of the occurrence of large teeth on the carapace of certain South American species (for example, *Kingsleya sioli* Bott, 1967). The straight, progressively tapering gonopod with an open field of spines located on the auriculariform lobe directed cephalolaterally is reminiscent of similar features of the gonopods of members of the Kingsleyini, to which this species probably belongs, even though the exognath of the third maxilliped (0.49 the length of the ischium of the endognath) is longer than that in most species of this tribe.

A third species that has been associated with the Potamocarcinini and which, in our opinion, has stronger affinities with other groups is *Potamocarcinus (Potamocarcinus) chacei* Pretzmann, 1967. The mesial process and the field of spines of this crab do indeed resemble those of some species of *Potamocarcinus*, but its closest relationships seem to be with *Camptophallus botti* Smalley, 1965, which it resembles in several features of its gonopod : the prominent lateral lobe, the marginal lobe, the mesial process (bifid in *C. botti*, single in *P. chacei*), as well as the mesial and lateral setation. The strong cephalic armature is peculiar to this species. Complicating an assessment of the affinities of this crab is our lack of knowledge of its range, even the whereabouts of the type locality is unknown. In acknowledgement of this disjunct position in respect to the Potamocarcinini, we propose its transposition to the monotypic genus defined below.

EIDOCAMPTOPHALLUS new genus

ETYMOLOGY. — The name of the new genus is from the Greek "eidōs" (resemblance) and *Camptophallus*, in reference to its similarity to this latter genus.

DIAGNOSIS. — Third maxilliped with exognath 0.7 length of ischium of endognath. Gonopod with apex directed cephalically; lateral lobe present only on proximal half; marginal process rounded, well developed; long, undivided mesial process, which together with several hooked spines on cephalic surface, forms strong apical armature; lateral and mesial setae short, strong, and widely dispersed.

TYPE-SPECIES : *Potamocarcinus (Potamocarcinus) chacei* Pretzmann, 1967.

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