

**EPULOTHERES ANGELAE, NEW GENUS, NEW SPECIES,
A PINNOTHERID CRAB FROM THE CARIBBEAN SEA
(DECAPODA: PINNOTHERIDAE)**

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A B S T R A C T

The monotypic genus *Epulotheres* is erected with *E. angelae*, new species, from Barbados, as its type species. *Epulotheres* resembles *Ostracotheres* Milne Edwards, 1853, and *Calyptraeotheres* Campos, 1990, in having a 2-segmented palp on the third maxilliped. It differs in that feature from most species of *Pinnotheres* Bosc, 1802, sensu lato, and other pinnotherid genera which have a 3-segmented palp on the third maxilliped. *Epulotheres* differs from *Ostracotheres* in being much smaller, in having a hexagonal rather than subcircular carapace, and in having a much slenderer and shorter propodus on the third maxilliped, with its apex rounded and narrowed rather than having a broad, spatulate propodus that is longer than the carpus. *Epulotheres* differs from species of *Calyptraeotheres* in lacking both sharp lateral edges and anterior longitudinal sulci on the carapace.

In 1991 Angela Fields of the University of the West Indies, Cave Hill, Bridgetown, Barbados, sent me a small pinnotherid crab that she found living in mussels of the genus *Brachidontes*. The crab proved to belong to an undescribed species and to a new genus as well; these are characterized below.

The types of the new species have been deposited in the National Museum of Natural History, Smithsonian Institution (USNM). The third maxilliped is abbreviated to MXP3, and the first to fifth pereopods are indicated as P1-5 (P1 the cheliped, P2-5 the walking legs). Measurements are in millimeters (mm); a measurement of 2 × 5 indicates that a specimen has a carapace length (cl) of 2 mm, a carapace breadth (cb) of 5 mm. Small is used to describe species with a carapace length of 5 mm or less. The descriptions are based on adult females only.

***Epulotheres*, new genus**

Diagnosis.—Adult female: Size small, cl less than 5 mm. Carapace soft, smooth, even, regions undefined, lacking both sharp anterolateral border and longitudinal sulci anteriorly, shape hexagonal, anterolateral border curved, front emarginate. MXP3 with ischium and merus indistinguishably fused; exopod present; palp with 2 articles, carpus subequal to propodus, latter conical, tapering distally. Abdomen with 7 free somites, wider than long, covering sternum and bases of walking legs and extending to buccal area.

Male: Unknown.

Type Species.—*Epulotheres angelae*, new species, by present designation and monotypy.

Etymology.—From the Latin, *epulo*, a guest at a banquet, and the ending *-theres*. The gender is masculine.

Remarks.—Campos (1990) pointed out that five genera of the Pinnotheridae (see Schmitt *et al.*, 1973, for a summary of the genera then known) contained species in which the palp of MXP3 is composed of two rather than three articles: *Dissodactylus* Smith, 1870 (American), *Durckheimia* de Man, 1889 (Indo-West Pacific), *Ostracotheres* Milne Edwards, 1853 (Indo-West Pacific), *Xanthasia* White, 1846 (based on its type species, *X. murigera* White, 1846, from the Indo-West Pacific), and *Pinnotheres* Bosc, 1802, sensu lato (world-wide), some species of which have a two-segmented palp. To these Campos added a sixth genus, *Calyptraeotheres*, from the eastern Pacific. *Durckheimia* should not have been included, since its type species, *D. carinipes* de Man, 1889, has a three-segmented palp (but *D. besutensis* Serène, 1967 has a two-segmented palp on MXP3 and probably should be referred to a new genus). *Epulotheres* lacks the bifid dactyli of P2-4 characteristic of species of *Dissodactylus* and the carapace with up-turned lateral margins and a median mushroom-shaped tubercle characteristic of members of *Xanthasia*, but its member resembles those of three other genera (e.g., *Calyptraeotheres*, *Ostracotheres*, and *Pin-*

notheres) in basic appearance. *Epulotheres angelae* differs from most members of *Pinnotheres*, including its type species, *P. pisum* (Linnaeus, 1767), from the eastern Atlantic, in having only two segments on the palp of MXP3, and lacks the sharp lateral edges and anterior longitudinal sulci on the carapace that are found in *Calyptraeotheres*. Members of *Ostracotheres* are much larger, have a broadly rounded rather than hexagonal carapace lacking a frontal emargination, and have a distinctive MXP3 with a very broad, spatulate propodus that is much longer than the carpus.

The single species of *Epulotheres* is associated with bivalves of the genus *Brachidontes*. Members of *Ostracotheres* inhabit tunicates, clams, and holothurians (Schmitt *et al.*, 1973).

Epulotheres angelae, new species

Fig. 1

Material.—Barbados: Bath (17°08'N, 62°37'W), in *Brachidontes* from reef flat, 29 February 1992, collected by Angela Fields, 4 posthard females, 2 spent, 2.2 × 2.6 and 2.6 × 3.2 mm, 2 ovigerous, 2.5 × 3.0 and 2.7 × 3.1 mm. Smaller spent female is holotype, USNM 256975; other specimens are paratypes, USNM 256976.

Description.—Adult female: Size small, cl of spent adults 2.2–2.7 mm, of ovigerous specimens 2.5–2.7 mm. Carapace thin, membranous, hexagonal in shape, width greater than length, regions indistinct, lateral slopes very steep, lacking marginal setae. Front emarginate. Eyes visible in dorsal view.

Chela (P1) with movable finger about as long as palm, cutting edge with tooth in proximal third, spiniform tip crossing inside spiniform tip of fixed finger; latter with low tooth distal to tooth of movable finger; palm length and height subequal or length slightly greater.

Walking legs (P2–5) equal right and left, largely naked, P3 and P4 lacking swimming setae; relative lengths, in decreasing order, P4 > P3 > P2 > P5; dactylus of P4 longest of dactyli, of P2 shortest; merus of P5 shortest of meri of walking legs. P2 with dactylus 0.6 times as long as propodus; latter 2.7 times longer than high, 1.1 times as long as carpus; merus 1.6 times as long as carpus. P3 with dactylus 0.6 times as long as propodus; latter 4 times longer than high, 1.3 times as long as carpus; merus 1.7 times as

long as carpus. P4 length slightly greater than cb, dactylus 0.7 times as long as propodus, with row of short setae on opposable margin; propodus 4.2 times longer than high, 1.2 times as long as carpus; merus 1.8 times as long as carpus. P5 situated dorsally to P4, with dactylus 0.8 times as long as propodus, fringe of long setae present on opposable margin; dactylus longer than dactyli of P2 and P3 and shaped differently, tapering to slightly bent apex; propodus 3.2 times longer than high, 1.3 times as long as carpus; merus 1.6 times as long as carpus.

Abdomen extending beyond bases of legs and to buccal mass (only somites visible in ventral view are shown in Fig. 1h).

Size.—Four adult females examined. Two spent, 2.2 × 2.6 and 2.6 × 3.2 mm, and two ovigerous, 2.7 × 3.1 and 2.5 × 3.0 mm. Ova are small, measuring 0.3 mm.

Host.—The mussel *Brachidontes modiolus* (Linnaeus), living attached to substrates on a reef flat exposed to the air at low tide.

Etymology.—Named for the collector, Ms. Angela Fields.

Remarks.—This new species can be distinguished easily from the two other western Atlantic species now in *Pinnotheres* that resemble *E. angelae* in having a two-segmented palp on MXP3 (the comparison is based on ovigerous or spent females of each species). In *P. chamae* Roberts, 1975a, an inhabitant of bivalves, genus *Chama*, the lateral margin of the carapace is densely setose, the eyes are not visible in dorsal view, the front is not emarginate, the propodus of MXP3 is styliiform rather than conical, the movable finger of the chela is shorter than the palm, P2 is much longer (1.25 times) than P5, and the merus of P2 is twice as long as that of P5; the relative lengths of its walking legs, in decreasing order, are P2 > P3 > P4 > P5 (rather than P4 > P3 > P2 > P5); the lengths of the dactyli are similar. In *P. moseri* Rathbun, 1918, an inhabitant of ascidians, the carapace is as long as broad (longer than broad according to Rathbun, 1918), the propodus of MXP3 is oblong, not tapering distally, and the dactyli of P5 are distinctly longer than those of the other legs; the relative lengths of its walking legs are P3–5 > P2. Further, in *P. moseri* the carapace is relatively firm in all specimens, with

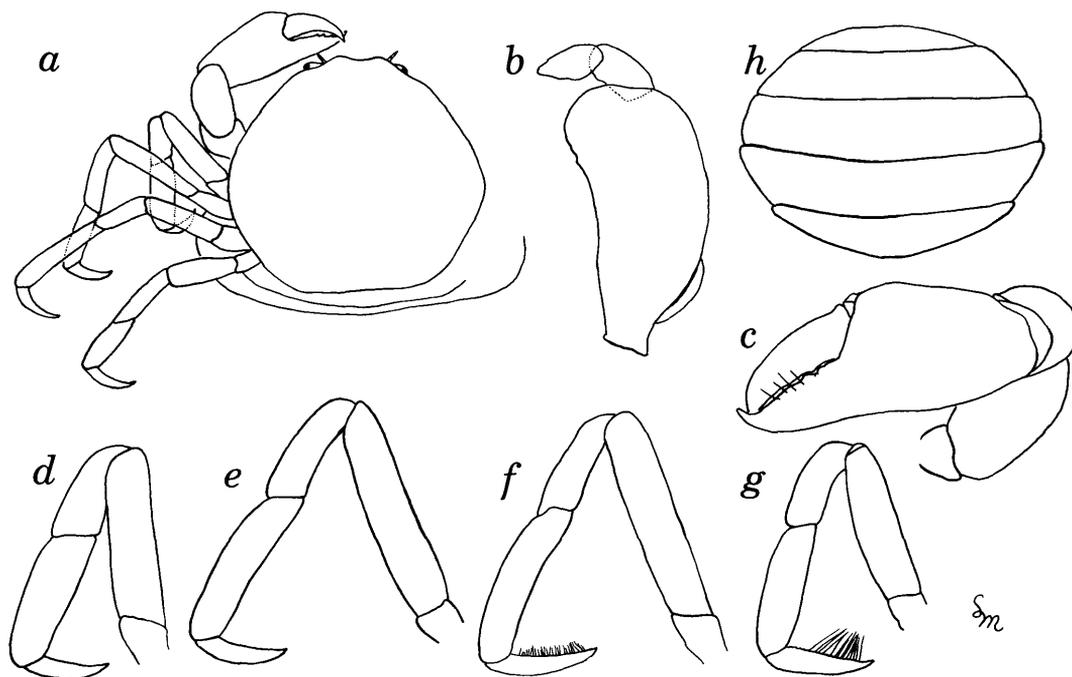


Fig. 1. *Epulotheres angelae*, new genus, new species, female holotype, cl 2.2 mm. a, dorsal view (right legs omitted; extent of abdomen indicated); b, MXP3 (exopod visible at lower right); c, chela; d-g, P2-5; h, abdomen, as seen from ventral view. Setae omitted in a, b, h.

an uneven surface having the regions elevated and well defined; the dactyli of P2-5 have curved, spiniform apices. That species also differs, from *P. chamae*, at least, in having direct development. I agree with E. Campos, who suggested (in correspondence, 12 October 1992) that both *P. moseri* and *P. chamae* are distinct from *E. angelae* at the generic level.

Specimens used for the comparison of species are as follows: *P. moseri*, USNM 66604, Sanibel, Florida, ovigerous female (integument soft, swimming setae present), 7.0 × 7.0 mm (ova measuring 0.5 mm), USNM 23440, Port Royal, Jamaica, ovigerous female paratype (integument firm, swimming setae present) 8 × 8 mm (ova measuring 0.5 mm), USNM 143628, Lemon Bay, Florida, female 6.4 × 6.4 mm with megalopae in the brood pouch (integument firm, swimming setae present); *P. chamae*, USNM 139098, ovigerous female paratype (integument soft, membranous, swimming setae absent), 6.0 × 6.8 mm (ova measuring 0.3 mm). In addition, all of the specimens of *P. moseri* mentioned by Rathbun (1918) were examined but not measured.

Roberts (1975b) found three zoeal stages

and one megalopa in the larval development of *P. chamae* (in which ova measure 0.3 mm); duration of development from first zoea to megalopa was 10.6 days. In contrast, Goodbody (1960) reported that *P. moseri* has abbreviated development, with the single zoeal stage molting to megalopa in 36 h. Even though two ovigerous specimens of *P. moseri* examined had eggs measuring 0.5 mm, suggesting that development might not be too different from that of *P. chamae*, a different adult female of *P. moseri* from Lemon Bay, Florida, has its brood pouch filled with megalopae, substantiating Goodbody's observations.

Christensen and McDermott (1958) demonstrated that members of *Pinnotheres ostreum* Say, 1817, go through a variety of distinct stages between the invasive or first crab stage and the adult. Females were found to have six such stages, prehard, hard (masculine or copulatory stage), and four soft posthard or feminine stages, the last being the mature female. In the invasive stage and the hard stage, P3 and P4 are ornamented with long swimming setae which are absent in the posthard stages. Campos (1989) recognized a second kind of reproductive cycle

in which the crab infects an intermediate host, leaving it in the hard stage to copulate in the open sea before infecting the definitive host. Adult (ovigerous or spent) females of *P. moseri* examined for this study fit neither of these patterns, as they have distinct swimming setae on P3 and P4 (whereas the swimming setae are absent in adult females of *E. angelae* and *P. chamae*). This raises the possibility that members of *P. moseri* may retain the swimming setae in some or all of the posthard stages.

Ms. Fields (in correspondence, 4 August 1992) provided the following information about *E. angelae*: "I first came across these pinnotherids in May 1976 when I started studying for my Ph.D. The first specimens I found came from the south of the island [Barbados] at Oistins Bay [13°04'N, 59°32'W]. I also found specimens at Brighton [13°07'N, 59°31'W] on the west coast of the island, and then later at Bath in the east. All specimens were found in the mussel *Brachidontes*. It was rather interesting that the highest percentage of occurrence of the pinnotherid was at Bath, but the highest density of the mussel occurred at Oistins Bay. My supervisor at the time had identified the pinnotherid as *Pinnotheres* sp., and it is so referred to in my thesis 'The Biology and Ecology of *Brachidontes modiolus* Linné in Barbados,' 1984 Ph.D. thesis, University of the West Indies, Cave Hill . . ."

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LITERATURE CITED

- Bosc, L. A. G. 1802. Histoire naturelle de Crustacés, contenant leur description et leurs moeurs, avec figures dessinées d'après nature. 1: 1-258.—Deterville, Paris, France.
- Campos, E. 1989. *Tumidothere*, a new genus for *Pinnotheres margarita* Smith, 1869, and *Pinnotheres maculatus* Say, 1818 (Brachyura: Pinnotheridae).—*Journal of Crustacean Biology* 9: 672-679.
- . 1990. *Calyptraeothere*, a new genus of Pinnotheridae for the limpet crab *Fabia granti* Glassell, 1933 (Crustacea, Brachyura).—*Proceedings of the Biological Society of Washington* 103: 364-371.
- Christensen, A. M., and J. J. McDermott. 1958. Life-history and biology of the oyster crab, *Pinnotheres ostreum* Say.—*Biological Bulletin* 114: 146-179.
- Goodbody, I. 1960. Abbreviated development in a pinnotherid crab.—*Nature* 185: 704, 705.
- Linnaeus, C. 1767. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Edition 12, 1(2): 533-1327.—Stockholm, Sweden.
- Man, J. G. de. 1889. Über einige neue oder seltene indopacifische Brachyuren.—*Zoologische Jahrbücher, Abtheilung für Systematik, Geographie und Biologie der Thiere* 4: 409-452.
- Milne Edwards, H. 1853. Mémoire sur la famille des Ocypodiens, suite.—*Annales des Sciences Naturelles, série 3 (Zoologie)* 20: 163-228.
- Rathbun, M. J. 1918. The grapsoid crabs of America.—*United States National Museum Bulletin* 97: 1-461.
- Roberts, M. H., Jr. 1975a. Description of a pea crab, *Pinnotheres chamae*, sp. nov. from the jewel box, *Chama congregata*.—*Chesapeake Science* 16: 238-241.
- . 1975b. Larval development of *Pinnotheres chamae* reared in the laboratory.—*Chesapeake Science* 16: 242-252.
- Say, T. 1817-1818. An account of the Crustacea of the United States.—*Journal of the Academy of Natural Sciences of Philadelphia* 1(1)[1817]: 57-63, 65-80, 97-101, 155-169; 1(2)[1818]: 235-253, 313-319, 374-401, 423-444, 445-458.
- Schmitt, W. L., J. C. McCain, and E. S. Davidson. 1973. Fam. Pinnotheridae: Brachyura I: Decapoda I.—*In*: H.-E. Gruner and L. B. Holthuis, eds., *Crustaceorum Catalogus* 3: 1-160. W. Junk, Den Haag, The Netherlands.
- Serène, R. 1967. Sur deux espèces nouvelles de brachyours (Crustacés Décapodes) et sur une troisième peu connue, récoltés dans la région malaise.—*Bulletin du Muséum National d'Histoire Naturelle, séries 2* 38(6) [for 1966]: 817-827.
- Smith, S. I. 1870. Ocypodoidea. Notes on North American Crustacea, I.—*Transactions of the Connecticut Academy of Arts and Sciences* 2: 113-176.
- White, A. 1846. Notes on four new genera of Crustacea.—*Annals and Magazine of Natural History* 18: 176-178.

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