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BATHYAL MYODOCOPID OSTRACODA FROM THE
NORTHEASTERN GULF OF MEXICO

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Myodocopid ostracods of the deeper waters of the Gulf of Mexico are virtually unknown . . . only 1 species, *Cypridina flatus* Tressler, 1949, having been previously reported from 1200 meters near Tortugas (Tressler, 1949, p. 336, p. 431). Therefore, I was quite pleased to receive from Dr. Willis E. Pequegnat and Mr. Thomas J. Bright a small collection containing myodocopid ostracods collected in a mid-water trawl that accidentally dragged along the bottom at a depth of 1000-1200 meters for 1.5 hours during the Texas A&M University cruise 66-A-9 of the R/V Alaminos on July 11, 1966. The Myodocopida are described in the systematic part of this paper. Ostracods in the sample are listed below:

Order Myodocopida

Suborder Myodocopina

Superfamily Cypridinacea

Tetragonodon rhamphodes new

species 1 ♀

Paramekodon poulsenii new

species 1 ♀

Bathyvargula optilus new

species 2 ♀ ♀, 1 juv.

Suborder Halocypridina

Superfamily Halocypridacea

Conchoecia atlantica (Lubbock) 2 ♀ ♀

Conchoecia valdiviae Müller 2 ♀ ♀

Conchoecia macrocheira Müller 1 ♀

Order Podocopida (ident. by Drs. R. H. Benson
and R. F. Maddocks)

Suborder Podocopina

<i>Bairdoppilata ?hirsuta</i> (Brady)	1♀, 4 MT shells
<i>Bairdia</i> new species	2♀♀, 9 MT shells, 2 single valves
<i>Echinocythereis echinata</i> (Sars)	1 single valve

Four specimens of bottom fish collected in the trawl contained ostracods in their stomachs or intestines: *Nezumia hildebrandi* (2 specimens), *Dicrolene intronigra* (1 specimen), and *Dicromita agassizii* (1 specimen). *Nezumia hildebrandi* contained 4 specimens of the podocopid *Kriithe* sp. (identified by Dr. J. E. Hazel), 1 specimen of a halocyprid (new genus)^a and 3 specimens of the myodocopid *Philomedes* sp. in the intestine, and 1 specimen of *Bathyvargula optilus* and 1 specimen of a halocyprid (new genus) in the stomach. *Dicrolene intronigra* contained in its intestine 1 specimen of the cladocoid ostracod *Polycopsis* sp. The intestine of *Dicromita agassizii* contained 5 specimens of a halocyprid (new genus) and 1 specimen belonging to the family Cypridinidae (not *Bathyvargula*; furca missing from specimen).

Because the trawl was open in the water as well as on the bottom, it is not possible to specify with certainty the depths at which those ostracods not inside fish were collected. The absence of *Conchoecia* in the stomachs and intestines of bottom fish suggests that specimens of that genus collected free in the trawl were living above the bottom. The presence of a specimen of *Bathyvargula optilus* in the stomach of a bottom fish indicates that members of the species collected in the trawl were obtained at the bottom. The absence of natatory setae on the exopodites of the 2nd antennae suggests that *Tetragonodon rhamphodes* is a bottom dweller. It cannot be determined with certainty at what depth specimens of *Paramekodon poulsoni* were collected, but it was probably on the bottom.

I have taken the opportunity to redescribe herein the type-species of *Paramekodon* Brady and Norman 1896, which is in

^a This new genus of halocyprid with several new species is being described separately by Dr. Georgiana Deevey.

the collection of the Hancock Museum, Newcastle-on-Tyne.

I wish to thank Dr. Georgiana Deevey for assistance in identification of the halocyprids, Mr. John R. A. Gray of the Hancock Museum for permission to study the holotype of *Paramekodon inflatus*, Dr. J. P. Harding of the British Museum (Natural History) for permission to study the shell of a specimen of *T. ctenorhynchus*. I wish also to thank Mrs. Raymond B. Manning for preparing text-figures for publication from my penciled camera lucida drawings. Criticism of the manuscript by Drs. Thomas E. Bowman and Raymond B. Manning are greatly appreciated. I am grateful to Dr. Willis E. Pequegnat and Mr. Thomas J. Bright, Department of Oceanography, Texas A&M University, for the ostracods and station data from the Gulf of Mexico. These were collected on the *R/V Alaminos* under contract Nonr 2119 (04) of the Office of Naval Research.

Listed below are known depths from which specimens have been reported belonging to the three genera of Myodocopina represented in the sample from the Gulf of Mexico.

Species	Locality	Depth (meters)	Reference
<i>Tetragonodon ctenorhynchus</i>	Atlantic Ocean, Mauritania to Gibraltar	636-1485	Brady, 1884-1887
<i>Tetragonodon ctenorhynchus</i>	Atlantic Ocean, off Puerto Rico	92-152	Baker, (MS, 1965)
<i>Tetragonodon ctenorhynchus</i>	Colon Harbor, Panama	7	Bold (1967)
<i>Tetragonodon rhamphodes</i>	Gulf of Mexico	1000-1200	herein
<i>Paramekodon inflatus</i>	Atlantic Ocean, off Spanish Sahara	1435	Brady and Norman, 1896
<i>Paramekodon poulsenii</i>	Gulf of Mexico	1000-1200	herein
<i>Bathyvargula parvispinosa</i>	West Indies, St. Croix	900	Poulsen, 1962
<i>Bathyvargula walfordi</i>	Tasman Sea	610	Poulsen, 1962
<i>Bathyvargula optilus</i>	Gulf of Mexico	1000-1200	herein

Hydrographic data from Station XV slightly downslope of where the ostracods described herein were collected are presented below:

Depth (m)	Temp, °C	Sal. ‰	Dissolved O ₂ ml/l
0	28.66	36.210	4.56
25	30.00	36.272	4.78
50	21.71	36.359	4.77
100	18.74	36.384	4.35
201	14.14	35.821	2.87
301	11.54	35.422	2.68

401	9.40	35.118	2.76
601	6.84	34.888	2.94
801	5.48	34.895	3.00
1,000	4.84	34.935	4.18
1,251	4.39	34.977	4.45

Sediment: Foraminiferal lutite.

ORDER MYODOCOPIDA POKORNÝ, 1953

SUBORDER MYODOCOPINA SARS, 1866

SUPERFAMILY CYPRIDINACEA BAIRD, 1850

Family Cypridinidae Baird, 1850

Bathyvargula Poulsen, 1962

Type-species: Bathyvargula parvispinosa Poulsen, 1962 Dana Report No. 57, p. 216, figs. 103-104, designated herein. Gender: feminine.

Discussion of classification: Bathyvargula optilus n. sp., described herein, has some morphological characters of the genus *Paravargula* Poulsen, 1962, and others of the genus *Bathyvargula*. Characteristic of *Paravargula* is the presence of spines along the ventral margin of the bristle on the 2nd joint of the exopodite of the 2nd antenna. Characteristic of *Bathyvargula* are the reduced lateral eyes and the strongly developed medial spine in the terminal pair on the ventral margin of the mandible. Both *Paravargula* and *Bathyvargula* have a pair of posterior tusk-like processes on the upper lip and an unjointed or weakly 2-jointed endopodite on each 2nd antenna. These two genera are very closely related. I have assigned the new species described herein to *Bathyvargula* rather than *Paravargula* primarily because of the strongly developed medial spine of the mandible. The medial eye of *B. optilus* is much larger than those on previously described species of both *Bathyvargula* and *Paravargula*. As males of *B. optilus* are not present in the collection it is not possible to ascertain whether they have blade-like filaments of the sensory bristle of the 1st antenna, which are peculiar to the genus *Bathyvargula*.

Diagnosis (amended): This genus was defined by Poulsen, (1962, p. 215). In order to include *B. optilus*, it is necessary to expand the genus to include species having spines along the ventral margin of the bristle on the 2nd joint of the exopodite of the 2nd antenna.

***Bathyvargula optilus* new species**

Plate 1a-f, 2a, b, Figures 1, 2

Etymology: The specific name is from the Greek *optilos*: eye, in reference to the large middle eye on this species.

Holotype: USNM 122076; valves and some appendages in alcohol, remaining appendages on slides; ♀ with eggs in brood chamber.

Paratypes: USNM 122077; complete ♀ with eggs in brood chamber in alcohol. USNM 122078; juvenile, in alcohol.

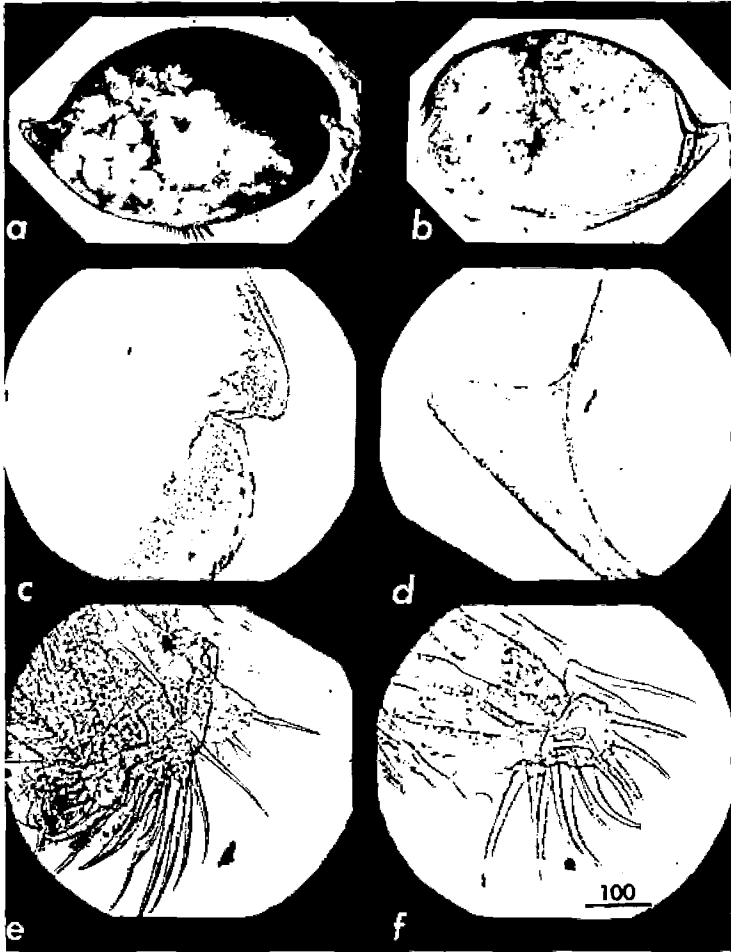


PLATE 1. a-f, *Bathyvargula optilus*, holotype, L = 3.70mm: a, complete specimen; b, complete carapace without soft parts, lateral view; c, anterior left valve, medial view; d, caudal process left valve, medial view; e, fifth limb; f, maxilla (same scale in microns: e, f.)

Type-locality: Gulf of Mexico; Lat. 28°13'N, Long. 87°16'W; on bottom at depth of 1000–1200 M.

Description of female:

Shape (fig. 1a): Carapace oval in lateral view with greatest height near middle; anterior with broadly rounded rostrum and fairly deep

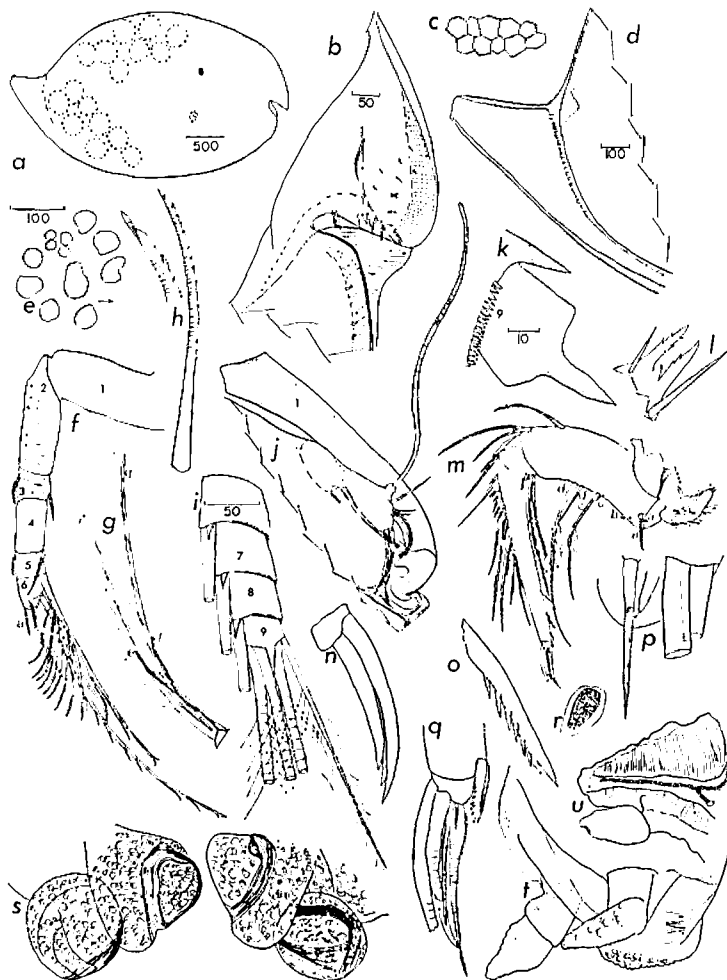


FIG. 1. *Bathylvargula optilus*, complete specimen: a, outline showing eggs, lateral eye and position of muscle scars; b, anterior, medial view; c, shell pattern; d, caudal process, medial view; e, muscle scars right valve, lateral view. Right 1st antenna: f, medial view (bristles of 8th joint not shown); g, lateral view 8th joint. 2nd antenna: h, bristle on 2nd joint of exopodite; i, joints 6-9 left exopodite, lateral view; j, right endopodite, medial view; k, joints 8-9 right exopodite, lateral view. Mandible: l, tip of coxale endite; m, right medial view; n, claws of left end joint; o, ventral spine of 2nd joint of right endopodite; p, ventral bristles of 1st joint of right endopodite; q, joints 2-3 of right

incisur (fig. 1b); posterior with elongate caudal process below valve middle (fig. 1d).

Ornamentation: Surface smooth, but faintly reticulate under high magnification (fig. 1c); hairs not present; shells thin, not strongly calcified (no microconcretions observed).

Inner lamella: Infold broad in area of rostrum and caudal process, narrower elsewhere; infold behind rostrum with about 21 bristles including 1 long bristle on list (fig. 1b); infold of anteroventral and ventral margins with about 16 short stout bristles followed by about 32 somewhat longer bristles being fairly equally spaced from incisure to caudal process; list on infold in front of caudal process with about 18 blunt backward pointing processes followed by 4-5 short bristles (fig. 1d).

Selvage: Wide lamellar prolongation with smooth outer margin present along anterior and ventral margins, being quite broad in area of incisur.

Muscle scars: Central muscle scars in anteroventral part of shell indistinct, but consisting of about 12 individual scars (fig. 1e).

Size: ♀ holotype—length 3.70 mm, height 2.19 mm; ♀ paratype with eggs in brood chamber—length 3.65 mm, height 2.01 mm; juvenile paratype (probably ♀)—length 2.97 mm, height 1.63 mm.

First antenna (fig. 1f, g): 3rd and 4th joints each with a dorsal and ventral bristle; sensory bristle of 5th joint with 10 long proximal filaments, 2 shorter distal filaments, and bifurcate tip; medial bristle of 6th joint longer than joint and with few marginal spines; 7th joints with 3 bristles: a-bristle with few marginal spines and about same length as bristle of 6th joint; b-bristle with 5 filaments, the proximal 2 having marginal teeth; c-bristle with 10 filaments; 8th joint with 4 bristles: d- and e-bristles bare and about half length of c-bristle and about one and one-half length of b-bristle, f- and g-bristles each with 8-11 filaments and about same length as c-bristle; some filaments of c-, f- and g-bristles with marginal teeth; surfaces of 2nd and 3rd joints with short spines.

Second antenna (fig. 1h-k): Protopodite with short bare medial bristle; endopodite weakly 2-jointed: 1st joint with 3 bare proximal bristles, 1 long and 2 short, and 1 long distal bristle with spines; 2nd joint short and with extremely long terminal bristle. Exopodite with usual 9 joints: bristle of 2nd joint with 12-13 spines along ventral margin, 1-2 minute spines, proximally on dorsal margin, and bifurcate tip (fig. 1h) reaching 7th joint; bristles of joints 3-9 with natatory hairs and without spines; 9th joint with 3 long bristles and 1 shorter

←

endopodite, medial view; r, left lateral eye; s, genitalia; t, upper lip, oblique view; u, medial eye above and rod-shaped organ below. (All figures from holotype except e which is from paratype. Same scale in microns: d, f, g, m; b, c, j, r, t, u; h, i, n, q, s; k, l, o, p.)

dorsal bristle equal in length to joints 4-9; joints 2-8 with short teeth in row along distal margins; joints 2-9 with basal spines; basal spines smaller on proximal joints.

Right Mandible (fig. 11, m, o-q): Coxale endite spinose with 2 terminal spines with marginal teeth; short process present at base of endite; dorsal margin of basale with 1 bristle distal to middle and 2 terminally, all with short spines distally; ventral margin of basale with 2 spinous a-bristles, 1 long and 1 short, both on medial surface, 1 short spinous b-bristle on lateral surface, 2 c-bristles, 1 short and bare, other long and spinous, 2 d-bristles, 1 short with short spines, 1 long with long spines; exopodite slightly longer than 1st joint of endopodite and with 2 spinous bristles; tip of exopodite hirsute. Endopodite: ventral margin of 1st joint with 4 bristles, 2 long and 2 short, long bristles spinous, short bristles bare, shorter of short bristles peglike and with filament at tip; ventral margin of 2nd joint spinous and with 3 groups of bristles having 1, 1, and 2 bristles, all short; medial bristle of terminal group broad and with teeth along inner margin; dorsal margin of 2nd joint with 7 long bristles and about 14 short bristles; end joint with 3 claws and 3 bristles: broad proximal part of ventral bristle with spines along ventral margin; proximal part of ventral margin of lateral claw with rounded tip, probably deformed; outer medial claw broken on specimen examined.

Left Mandible: Similar to right mandible except for lateral claw of end joint of endopodite not being deformed and outer medial claw not being broken (fig. 1n).

Maxilla (fig. 2a-e): Coxale with stout plumose bristle. Exopodite large with 3 bristles: proximal bristle almost reaching tip of terminal bristles and plumose proximally; 1 terminal bristle plumose proximally, other with few short spines. Endopodite 2-jointed: 1st joint with cutting edge having 3 large teeth (considerable variation between left and right limbs of specimen examined), 2 alpha bristles consisting of long and plumose outer bristles and shorter inner bristle with few short spines along outer margin, and 3 beta-bristles, consisting of long outer bristle and 2 short inner bristles, all with stout spines along inner margins: 2nd joint with 4 a-bristles consisting of 2 stout outer bristles having strong spines along middle of inner margin and 2 slender and bare inner bristles, and 3 b-, e-, and d-bristles, all with spines along inner margins.

Fifth limb (fig. 2f): Epipodial appendage with 49 hirsute bristles: disto-anterior process on protopodite short and with lobate surface: anterior group of bristles on 1st joint consisting of short bare bristle and long spinous bristle; 1 hirsute bristle present between anterior group of bristles and thumb-like process on protopodite; main tooth with peg and 6 pectinate teeth; bristle with few marginal spines and hairs present near peg; 2nd joint with 3 rows of pectinate bristles having 4 bristles in each row; 1 short spinous bristle present posterior to middle



FIG. 2. *Bathyvargula optilus*: Right maxilla: a, medial view; b, lateral view; c, lateral view showing exopodite; d, tooth on 1st joint of endopodite. Left maxilla; e, tooth on 1st joint of endopodite, medial view. Fifth limb: f, anterior view of left limb; g, h, posterior view of right limb. Sixth limb: i, epipodial bristles on right limb; j, medial view of left limb. Seventh limb: k, distal part; l, enlargement of comb. m, furca, right lamella; n, brush-shaped organ; o, eggs. (All figures from holotype. Same scale in microns: a-c, f, i-k, m, o; d, e, g, h, n.)

row; 2 very long and 1 short spinous bristles present anterior to the pectinate bristles; 1 spinous bristle present near middle of disto-anterior margin of 2nd joint; outer lobe of 3rd joint with 3 bristles: proximal bristle with long spines proximally and short spines distally, terminal bristles longer and bare; 4th joint united to 5th joint; 4th joint with 5 bristles, 5th joint with 2 bristles and spinous terminal process near margin of 4th joint.

Sixth limb (fig. 2i, j): 2-3 small bare bristles present in place of epipodial appendage; 1st endite with 3 bristles, 2 short medial and 1 long terminal; 2nd endite with 3 short medial bristles and 2 long terminal bristles; 3rd and 4th endites each with 3 terminal bristles; end joint with 17 marginal bristles, spines in clusters along disto-lateral margin, and hairs on medial surface.

Seventh limb (fig. 2k, l): Distal group with 9 bristles, 5 ventral, 4 dorsal, each with 3-6 bells; proximal group with 4 bristles, 2 on each side, each with 3-4 bells; terminal comb with 8 elongate teeth with digitate tips; elongate incurved peg present opposite comb; teeth and peg annulate and with marginal spines.

Furca (fig. 2m): Each lamella with 9 claws separated from lamella by suture; 2nd claw almost same length as 1st, each remaining claw smaller than previous claw; minute spines present along anterior margin of each lamella and in clusters on lateral surface.

Genitalia and brush-like bristles: Genitalia with attached ovoid structures (spermatophores?) (fig. 1s). Brush-like cluster of 10 minute bristles present in vicinity of genitalia (fig. 2n).

Upper lip (fig. 1t): Anterior part large, unpaired and with crenulate margin; posterior tusks paired, each with broad base and glandular openings on lateral surface.

Lateral eye (fig. 1r): Eyes small, pigmented, each with about 5 ommatophores.

Medial eye and rod-shaped organ (fig. 1u): Medial eye large, pigmented, tapering anteriorly. Rod-shaped organ ovoid with narrow ridges distally.

Eggs: Holotype with 31 oval eggs of approximately same size in brood chamber (fig. 1a); in addition, about 14 minute eggs with distinct nuclei present inside body (fig. 2o). Paratype with about 12 eggs in brood chamber.

Comparisons: Only 2 species have previously been described in the genus *Bathyvargula*—*B. parvispinosa* Poulsen, 1962, and *B. walfordi* Poulsen, 1962. *B. optilus* differs from these species in having spines along the ventral margin of the bristle on the 2nd joint of the 2nd antenna, a larger medial eye, more claws on the furca, and a considerably larger carapace.

Family Philomedidae Müller, 1912

Discussion of classification: In 1967 (Kornicker, 1967) I proposed the family Pseudophilomedidae containing the genera *Pseudophilomedes*

and *Paramekodon*. One of the morphological criteria upon which the new family was established was the presence of only 2 endites on the maxilla compared to 3 in genera of Philomedidae. Further studies of the species *Pseudophilomedes foveolatus* has convinced me that what I described as a short lobe with 3 bristles located distally of the coxale endite (Kornicker 1967, p. 15) is probably a vestigial 3rd endite. I have learned also from the present study that each maxilla of *Paramekodon inflatus* and *Paramekodon poulsenii* has a 3rd endite at least half the length of the 2nd endite. Therefore, the Pseudophilomedidae is reduced to subfamily status herein, and along with the Philomedinae comprise the family Philomedidae.

The elongate tooth of the 2nd joint of the female 5th limb, the relatively few bristles on the basale and endopodite of the mandible, the reduced 3rd endite of the maxilla and the relatively few bristles of the endites, the elongate process on the end joint of the maxilla of some species, the relatively few bristles on the infold of the shell behind the rostrum and the hirsute bristles on the infold in front of the caudal process serve to distinguish the Pseudophilomedinae from the Philomedinae.

Subfamily Philomedinae Müller, 1912

Tetragonodon Brady and Norman, 1896

Type-species: *Bradycinetus ctenorhynchus* Brady, 1887 Fonds Mer, vol. 4, p. 199, pl. 12, figs. 3-5 (pl. 12 is missing from volumes I examined and may not have been published), designated by Sylvester-Bradley 1961, p. Q400. Gender: Masculine.

Type-locality: Atlantic Ocean, off Spanish Sahara.

Bradycinetus Sars, 1866 (part): Brady, 1887, p. 199.

Philomedes G. W. Müller, 1894 (part): Müller, 1912, p. 25.

Tetragonodon Brady and Norman, 1896, p. 667: Sylvester-Bradley 1961, p. Q400.

Discussion of classification: Müller (1912, p. 25) referred *Tetragonodon* to *Philomedes*. Skogsberg (1920, p. 348) did not entirely agree with Müller, and stated, "With regard to *Tetragonodon* it does not seem impossible to me that it must be regarded as a special unit, perhaps as a subgenus of the genus *Philomedes*. These questions can, however, only be decided after a renewed investigation of these forms." Poulsen (1962, p. 339) stated, "Obviously it is quite correct to include *Tetragonodon* in *Philomedinae*, but the descriptions of the species are so insufficient that the position within the sub-family cannot be determined. The reduced endopodite of the 2nd female antenna may indicate a closer relation to the genus *Paraphilomedes*."

The endopodite of the 2nd antenna of *Tetragonodon rhamphodes*, described herein, is 2-jointed, not reduced as in *T. ctenorhynchus*. It differs from other species of Philomedinae having a 2-jointed endopodite in bearing only 1 bristle on the 1st joint. It also differs from most species in the subfamily in having only 1 bristle on the 2nd joint of the

1st antenna, a squarish tooth on the 2nd joint of the 5th limb, and fewer than 10 bristles on the end joint of the 6th limb. The carapace has a characteristic beak-like rostrum, and the infold behind the rostrum bears only 4 long bristles. These differences are of sufficient magnitude to warrant retention of the genus.

Diagnosis of *Tetragonodon* (emended):

Carapace with beak-like rostrum and a caudal process. Infold behind rostrum with only 4 long bristles; infold in front of caudal process with leaf-like bristles. First antenna with only 1 bristle on 2nd joint. Second antenna: exopodite 1-2 jointed and with total of 1 to 3 bristles; bristles of exopodite without marginal spines or natatory hairs, and relatively short; 9th joint of exopodite with only 3 bristles. Second joint of 5th limb with large quadrate tooth. End joint of 6th limb not prolonged posteriorly and bearing fewer than 10 bristles. Furca with 9-10 claws, all separated from lamella by suture.

Discussion of type-species: Brady (1884-1887, p. 164) presented a list of ostracods collected by the *Travailleur* and *Talisman* expeditions of 1881 to 1883. The list contains the taxon "*Bradycinetus Stenorynchus* Id. n. sp.," which was collected at 8 stations. Brady (1887, p. 199) described the species "*Bradycinetus ctenorynchus*." He did not indicate that it was a new species, so presumably it is the same species previously listed, but with a different spelling. The description refers to Plate XII, but this plate is missing from three volumes I have examined and may not have been published.

Brady and Norman (1896, p. 667-669) proposed a new genus *Tetragonodon* containing two species, *T. ctenorhynchus* and *T. erinaceus*. Both were noted as being new species, but presumably the first was previously described by Brady in 1884-1887 (Although, as discussed below, the date of collection given by Brady and Norman for *T. ctenorynchus* does not agree exactly with that given by Brady for *B. ctenorynchus*). Müller (1912, p. 33) considered them to be synonyms, and Sylvester-Bradley (1961) designated *B. ctenorynchus* as the type-species of *Tetragonodon*.

Brady (1884-1887, p. 166) listed the following 8 stations at which specimens of *Bradycinetus Stenorynchus* [sic] (= *T. ctenorynchus*) were collected by the *Travailleur* and *Talisman*:

	Date		Depth (m)
1882	11	July	932
1882	25	July	770
1882	7	July	1976
1882	11	July	1485
1882	18	July	932
1882	30	July	636
1882	22	Aug.	2995
1883	14	July	1485

Collections were made by the *Travailleur* in 1880–1882 and by the *Talisman* in 1883. Accordingly, the first 7 dates listed above refer to collections of the *Travailleur* and the last date to a collection of the *Talisman*.

Brady and Norman (1896, p. 669), following the description of *T. ctenorhynchus* state: "The exact locality is unknown to us. The specimens were dredged by the 'Talisman,' July 11, 1883, in 932 mètres, and received by us from the Marquis de Folin; the data would lead us to suppose that *T. ctenorhynchus* was taken off the coast of Morocco."

Data in the preceding paragraph is in agreement with that on the label of a specimen (1900-3-6-454) in the British Museum which carries the following information: "*Tetragonodon ctenorhynchus* Brady and Norman, Type ♀, Talisman, 11-7/83, 932 meters, Marquis de Folin."

The day, month, and depth in Brady and Norman's 1896 statement and on the label of the specimen in the British Museum agree with the first item in Brady's list (11 July, 932 m), but do not agree in the year. The list has 1882 instead of 1883.

Smith (1888, p. 111) listed the stations dredged by the *Talisman* in 1883. Five dredgings were made on July 11 but none at 932 m. Six were made on July 12; the first of these was from 932 m. If this is the station from which the specimen was collected, it is necessary to conclude that Brady and Norman (1896) and the label at the British Museum is off 1 day, and that Brady's list for this date is off a year and a day. As the *Travailleur* did not collect on July 11 (or 10) and did not collect at a depth of 932 m on July 12 (Anonymous, 1883, p. 33), it is probably that the holotype was collected by the *Talisman* on July 12, 1883.

The position of the *Talisman* during the collection made on July 12, 1883 at 932 m was Lat. 23°00'N, Long. 17°30'W (Smith 1888, p. 111). This station was off the coast of Spanish Sahara, not Morocco. The bottom consisted of greenish muddy sand; bottom temperature was 7.0°C.

In Table 1, I have attempted to correct Brady's list of stations at which specimens of *T. ctenorhynchus* were collected.

Baker (1965, MS) reported *T. ctenorhynchus* from the outer shelf (92–152m) off Porto Rico. About 56 specimens were collected, but all without "soft parts." Until specimens with appendages are collected from that locality, I think it necessary to consider the specific identification doubtful. Dr. N. C. Hulings kindly allowed me to measure the right valve figured by Baker, (pl. X, fig. 15) and I found it to have a length of 0.88 mm, and height of 0.50 mm (height as percent of length 56.8). This is much smaller than the right valve of the British Museum's specimen of *T. ctenorhynchus* (length 1.83, height 1.18; height as percent of length 64.5), but the valves could be from specimens at different stages of development. The left valve of the British Museum specimen

TABLE 1. Correction of Brady's list of stations at which specimens of *T. stenorhynchus* were collected.

Brady (1884-1887, p. 166)				Corrected				
Year	Day/Month	Depth m	Year	Day/Month	Depth m	Ship	Lat. N/Long.W	Substrate
1882	11/July	932	1883	12/July	932	<i>Talisman</i>	23°00'/17°30'	greenish, muddy sand
1882	25/July	770	—	Same	—	<i>Travailleur</i>	36°40'0"/18°11'30"	mud
1882	7/July	1976	1883	7/July	1975	<i>Talisman</i>	27°318'/14°08'	yellow mud
1882	11/July	1485	1883	11/July	1435	<i>Talisman</i>	23°55'/17°15'	gray mud
1882	18/July	932	(probably	July 12, 1883)	—	? <i>Talisman</i>	(see above)	—
1882	30/July	636	—	Same	—	<i>Travailleur</i>	34°13'30"/7°43'0"	sandy mud
1882	22/August	2995	1883	22/Aug.	2995	<i>Talisman</i>	38°38'/25°06'	soft, white mud
1883	14/July	1485	1883	14/July	1495	<i>Talisman</i>	20°44'/18°07'	greenish, muddy sand

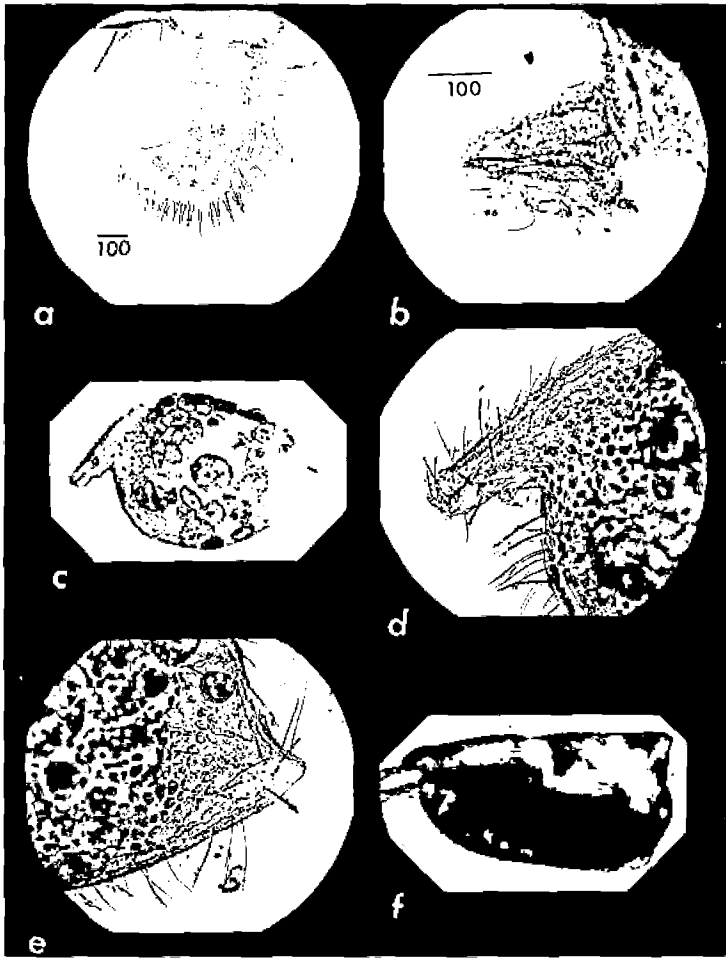


PLATE 2. a, b, *Bathycargula optilus*, holotype: a, 6th limb; b, frontal organ (below), medial eye (above). c-e, *Tetragonodon rhamphodes*, holotype, L = 2.11 mm: c, right valve, medial view (calcareous microconcretions formed while specimen was in glycerine); d, anterior left valve, lateral view; e, caudal process left valve, lateral view. f, *Conchoecia atlantica*, complete specimen, L = 3.86 mm. (Scale in microns.)

has a length of 1.90 mm and height of 1.26 mm (height as percent of length 66.3). Measurements of both the Porto Rico and British Museum specimens are based on dry valves. Brady (1887, p. 199) gave the length



FIG. 3. *Tetragonodon rhamphodes*, complete specimen: a, outline showing representative surface pits. Left valve: b, medial view; c, caudal process, medial view; d, anterior, lateral view; e, anterior, medial view; f, surface structure near posterior, lateral view. Left 1st antenna: g, medial view (b-g bristles not shown); h, tip of b-bristles; i, bristle of end joints, medial view; j, enlargement of bristles on joints 7-8, medial view. Second antenna: k, exopodite of right limb, medial view; l, medial view showing endopodite; m, enlargement of spine on 1st joint of exopodite; n, joints 8-9 of right limb, lateral view; o, joint 8-9 of left limb, medial view. (All figures from holotype. Same scale in microns: a, b; c-f, i, k, l; n, o; h, j, m.)



FIG. 4. *Tetragonodon rhamphodes*: a, endopodite of right 2nd antenna, medial view. Mandible: b, left limb, medial view; c, enlargement of tip of exopodite, medial view; d, enlargement of 2 terminal claw of right limb showing spines, lateral view. Maxilla: e, right limb, lateral view; f, terminal end right limb, medial view; g, lateral view. Fifth limb: h, anterior view right limb; i, endopodites I, II of left limb; j, posterior view left limb; k, main tooth of 1st joint on right limb; l, anterior view left limb. (All figures from holotype. Same scale in microns: a, e-j, l; c, d, k.)

as 2.2 mm; Brady and Norman (1896, p. 668) gave length as 2 mm and height as 1.3 mm (height as percent of length 65).

Bold (1967, p. 44) reported a specimen of *T. ctenorhynchus* from Colon Harbor, Panama. Through the courtesy of Drs. Lewis C. Nichols

and Joseph E. Hazel, I had the opportunity to examine and measure this specimen—a left valve with tip of caudal process missing (No. 8286, Louisiana State University). The length is 0.75 mm; height 0.48 mm (height as percent of length—64). The specimen is much smaller than that described by Brady (1887). The condition of the valve and absence of soft parts does not permit certain specific or generic identification. Its reticulate ornamentation is very similar to that of the specimen described by Baker (1965, MS) and *T. rhamphodes* described herein.

***Tetragonodon rhamphodes* new species**

Plate 2c–e, Figures 3, 4, 5a–e

Etymology: The specific name is from the Greek *rhamphodes*: beak-like, in reference to the slender rostrum of the carapace.

Holotype: USNM 122073, ♀ without eggs; valves and some appendages in alcohol, remaining appendages on slides.

Type-locality: Gulf of Mexico; Lat. 28°13'N, Long. 87°16'W; on bottom at depth of 1000–1200 M.

Description of female:

Shape (fig. 3a): Carapace oval in lateral view with greatest height in front of middle; anterior with long beak-like rostrum; posterior with caudal process below middle of valve; shell forming lateral fold over rostrum (fig. 3d, e).

Ornamentation: Surface with rather large punctae, otherwise smooth (fig. 3f); hairs fairly abundant over valve surface, especially near edge, those on posterior surface of valve being longer than elsewhere.

Inner lamella (fig. 3b): Infold broad in area of rostrum and caudal process, narrower elsewhere; infold behind rostrum with 4 long bristles in row and 2 smaller bristles at lower margin, infold immediately ventral to rostrum with 1 small bristle; infold in front of caudal process with 5 leaf-like bristles near top and 3 small bristles near lower inner margin (fig. 3c); striations present on infold along anteroventral margin.

Selvage: Wide lamellar prolongation with slender spines present along anterior, ventral, and posterior margins of each valve; prolongation divided below rostrum.

Size: ♀ holotype—length 2.11 mm, height 1.32 mm, height as percent of length 62.6.

First antenna (fig. 3g–j): 1st joint with short spines in clusters on lateral surface; 2nd joint with 1 spinous dorsal bristle; 3rd joint with 1 ventral and 2 dorsal bristles, all with spines; 4th joint with 2 spinous bristles, 1 ventral and 1 dorsal; joints 2–4 with spines in clusters on medial and lateral surfaces; 5th joint with ventral sensory bristles having 3 proximal and 4 terminal filaments; 6th joint with short spinous bristle medially; 6th joint not separated from 5th by visible suture; 7th joint with spinous a-bristle about twice length of bristle on 6th joint, b-bristle with 1 proximal and 3 terminal filaments, c-bristle with 3 proximal and 3 terminal filaments; 8th joint with d- and e-bristles

of equal length, and f- and g-bristles, each with 2 proximal and 3 terminal bristles.

Second antenna (figs. 3k-o; 4a): Endopodite 2-jointed: 1st joint with 1 short spinous bristle; 2nd joint with long spinous anterior bristle and short terminal spine-like bristle. Exopodite: distal margin of elongate 1st joint with short medial spine with blunt tip; bristle of 2nd joint reaching past 9th joint, joints 2-8 with comb of short spines along distal margin and 2 or more short spines on ventral corner; bristles of joints 2-9 without spines or natatory hairs and relatively short; 9th joint with 1 short and 2 long bristles (9th joint and short bristle of joint on right appendage smaller than on left).

Mandible (fig. 4b-d): Coxale endite with bifurcate tip and spinous. Basale with 12 bristles: dorsal margin with 1 near middle and 2 terminal; ventral margin with 4 having long and short marginal spines; medial surface with 4 in cluster proximally and 1 nearer middle. Exopodite with hirsute tip reaching past middle of 1st joint of endopodite and with 2 spinous bristles, outer bristle longer than inner bristle. Endopodite: 1st joint with 3 spinous bristles on ventral margin, 1 short, 2 long; ventral margin of 2nd joint with 2 subterminal and 2 terminal bristles; dorsal margin of 2nd joint with 2 spinous bristles proximally, and 5 bristles near middle; end joint with 2 large subequal claws with few minute teeth along concave margin (fig. 4d), 1 short spine-like claw at dorsal corner, and 3 bristles. Basale and 2nd joint of endopodite with spines in clusters on medial and lateral surfaces.

Maxilla (fig. 4e-g): Precoxale and coxale with anterior fringe of hairs; coxale with long hirsute anterior bristle; 1st endite with 6 spinous bristles; 2nd endite with 7 bristles; 3rd endite with 7 terminal and 1 proximal bristle; basale with 3 bristles along distal margin; exopodite with 1 short and 2 long bristles. Endopodite: 1st joint with 1 alpha-bristle and 2 beta-bristles; 2nd joint with 3 a-, 2 b-, 2 c-, and 3 d-bristles.

Fifth limb (fig. 4h-l): Main tooth of 1st joint consisting of distal tooth with small triangular tooth proximally on anterior surface, and 2 teeth with small anterior spine-like teeth; small tusk-like tooth present proximal to main tooth; distal margin of 1st joint with 2 spinous bristles; short spinous bristle present on anterior surface of 1st joint near main tooth; 2 long stout bristles present near tusk-like tooth of 1st joint; 2nd joint with large quadrate tooth; 3rd joint with 2 spinous outer bristles and 3 inner bristles; 4th joint with 8 spinous bristles; 1st endite with 2 or 3 bristles; 2nd endite with about 9 bristles, 3rd endite with about 6 bristles; epipodial appendage with about 49 hirsute bristles.

Sixth limb (fig. 5a, b): 1st endite with 3 short bristles; 2nd endite with 3-4 spinous bristles; 3rd and 4th endites each with 8-9 spinous bristles. End joint with total of 8-9 bristles: 5-6 bristles followed by space, then, a single bristle followed by another space and 2 long hirsute bristles. Surfaces of appendage hirsute.

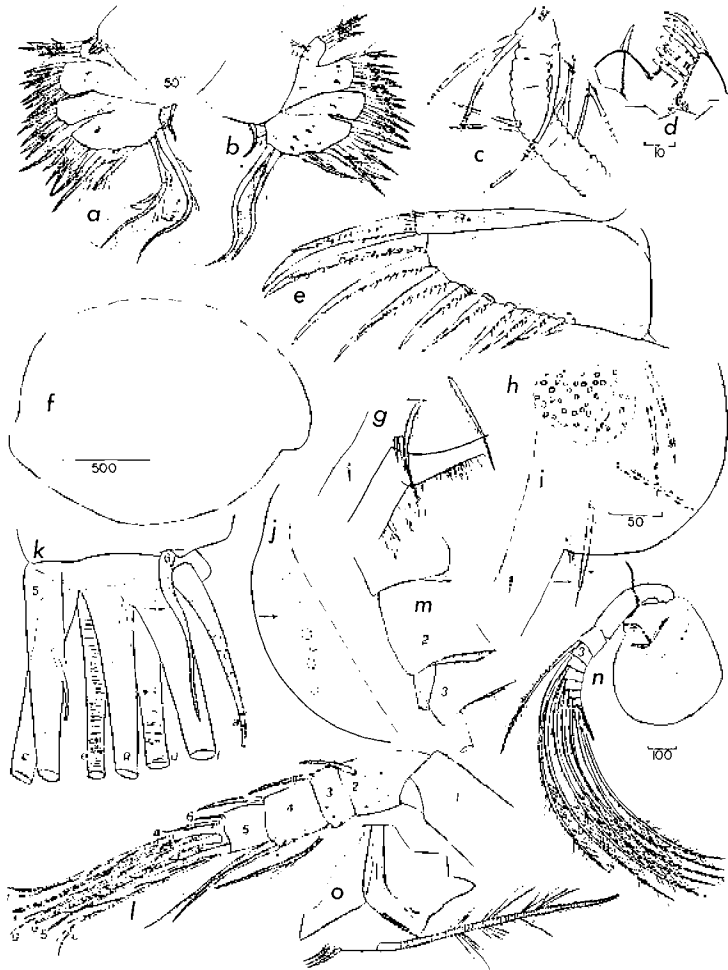


FIG. 5. *Tetragonodon rhamphodes*: 6th limb: a, right limb, medial view; b, left limb, medial view. Seventh limb: c, distal part; d, enlargement of comb. Furca, e, lateral view of left lamella and medial view of claw I of right lamella. *Paramekodon inflatus* right valve: f, outline; g, incisure left valve, medial view; h, surface pits; i, rostrum right valve, lateral view; j, caudal process right valve, lateral view. First antenna: k, end joints left limb, medial view; l, medial view. Second antenna: m, joints 2-3, left exopodite, lateral view; n, left limb, lateral view; o, endopodite of right limb, medial view. (All figures from holotype. Same scale in microns: a-c, e, h, l; g, i, j, m, o; d, k.)



FIG. 6. *Paramekodon inflatus* mandible: a, right limb, lateral view; b, enlargement of coxale endite; c, distal end left limb, lateral view. Maxilla: d, left limb, medial view; e, right limb, medial view; f, enlargement of distal end left limb, medial view. Fifth limb: g, posterior view right limb; h, posterior view left limb. i, 6th limb; j, 7th limb, distal part; k, enlargement of terminus; l, furca. (All figures from holotype. Same scale in microns: a, i, j, l; b-e, g, h; f, k.)

Seventh limb (fig. 5c, d): 4 bristles in distal group, 2 on each side; 6 bristles in proximal group, 3 on each side; all bristles with 1-4 bells and marginal spines; terminus consisting of comb with 12 teeth opposed by 3 pegs.

Furca (fig. 5e): Each lamella with 10 claws, each separated from

lamella by suture; claw 1 with lateral and medial spines; distal medial spine of claw 1 being extremely large; claws 2-9 with sharp spines along posterior margins; claws 4-7 with few short spines along anterior margins; each lamella with hairs along anterior and ventral margins.

Eyes: Lateral eyes absent; medial eye and rod-shaped organ not observed, probably lost during dissection.

Ecology: The relatively short stout bristles without natatory hairs on the exopodite of the 2nd antenna indicate that the females of the species are incapable of swimming, and therefore must dwell on the bottom.

Comparisons: Only 2 species have been referred to *Tetragonodon*—*T. ctenorhynchus* (Brady, 1886?) and *T. erinaceus* Brady and Norman, 1896. The carapace of *T. rhampodes* differs from the former in having a rostrum that is much less acuminate, and from the latter in having a punctate surface, rather than one covered with the acute spinous processes described by Brady and Norman (1896, p. 669). *T. erinaceus* is known only from its shell and was correctly considered species dubia by Müller (1912, p. 51). The endopodite of the 2nd antenna of *T. ctenorhynchus* is single jointed and bears only 1 bristle (Brady and Norman, 1896, p. 668) whereas, the endopodite of *T. rhampodes* is two jointed and bears 3 bristles. Specimens of *T. ctenorhynchus* described by Baker (1965, MS) and Bold (1967) are known only from their shells which apparently are considerably smaller than *T. rhampodes*.

Subfamily Pseudophilomedinae Kornicker, 1967

Paramekodon Brady and Norman, 1896

Type-species: *Paramekodon inflatus* Brady and Norman, 1896, p. 67, pl. 59, figs. 1-10, by monotypy. Gender: masculine.

Paramekodon Brady and Norman, 1896, p. 670.

Pseudophilomedes G. W. Müller, 1894 (part): Müller, 1912, p. 33.

Pseudophilomedes G. W. Müller, 1894 (part): Skogsberg, 1920, p. 348

Pseudophilomedes G. W. Müller, 1894 (part): Sylvester-Bradley, p. Q399.

Paramekodon Brady and Norman, 1896: Poulsen, 1962, p. 339, p. 345.

Pseudophilomedes G. W. Müller, 1894 (part): Kornicker, 1967, p. 3.

Discussion of classification: With the exception of Poulsen (1962, p. 399) most investigators have considered *Paramekodon* to be a synonym of *Pseudophilomedes* G. W. Müller, 1894 (see discussion in Kornicker, 1967, p. 3). I recognize the validity of the genus herein not on the basis of the diagnosis given by Brady and Norman (1896, p. 670), which is essentially the same as that given for *Pseudophilomedes* by Müller (1894, p. 211), but because of the absence of a b-bristle on the 7th joint of the 1st antenna of known species of *Paramekodon*. It is apparent from Brady and Norman's description and illustration of the 1st antenna of *P. inflatus* that it lacks a b-bristle; however, they did not mention this detail in their diagnosis. A b-bristle is present on the

1st antenna of species of *Pseudophilomedes*, and I am unaware of any other genus in the Cypridinacea lacking this bristle.

Diagnosis (emended): 7th joint of 1st antenna without b-bristle; natatory bristles of 2nd antenna with ventral spines proximally and long hairs distally; endite III of maxilla at least half length of endite II. 5th joint: inner margin of distal tooth of 1st joint with 2 pectinate teeth (always?); inner margin of 2nd joint with at least 1 quadrifid tooth.

Paramekodon inflatus Brady and Norman, 1896

Figures 5f-o, 6

Holotype: ♀, appendages on 1 slide, valves on another at Hancock Museum, Newcastle-on-Tyne; both slides contain labels with following information: "*Paramekodon inflatus*, type, 1435M, 9 July 1883, Travailleur." Slides are without numbers. Holotype by unique specimen.

Type-locality: Atlantic Ocean, off Spanish Sahara, at depth of 1435m.

Paramekodon inflatus Brady and Norman, 1896, p. 670, pl. 59, figs. 1-10.
Pseudophilomedes inflata (Brady and Norman, 1896): C. W. Müller 1912, p. 34 [diagnosis, key].

Material: Two slides from the Hancock Museum, Newcastle-on-Tyne, England, containing appendages and valves of holotype. An anastomising pattern of air chambers surrounds most appendages, but details of morphology are discernible. The valves are somewhat compressed on the slide and details difficult to perceive; the left valve is fragmented.

Discussion of type-species: In their description of the species, Brady and Norman (1896, p. 672) state, "A single specimen was dredged by the 'Talisman' off the coast of Morocco, July 6, 1883, in 1434 metres (Marquis de Folin)." According to the list of dredging stations assembled by Smith (1888, p. 983), the *Talisman* did not dredge in the area of Morocco on July 6, in fact, the ship may not have dredged anywhere on that day.

As noted above, labels on the microscope slides containing the holotype bear the following information: "1435m, 9 July 1883, Travailleur." This information differs from that given by Brady and Norman (1896) in the depth (1435 m compared to 1434m), the date (July 9 compared to July 6) and the ship (*Travailleur* instead of *Talisman*). As the *Travailleur* did not collect in 1883, it is apparent that either the ship name or the year is incorrect on the labels.

The *Talisman* made 7 dredgings on July 9, 1883; one of these was at 1435 m, which coincides with depth information given on the label of the holotype, and is only 1 meter off the depth given by Brady and Norman (1896) for the depth at which their single specimen was collected. The *Travailleur* did not collect deeper than 614 m on either July 6 or July 9, 1882. Therefore, I conclude tentatively that the date of collection stated in their paper as July 6 should have been July 9

(possible the number 9 was inverted in printing); and that the collection was made aboard the *Talisman*, not *Travailleur*.

The position of the station dredged on July 9 at 1435 m was Lat. 25°39'N Long. 16°06'W, which is off Spanish Sahara, and the bottom was composed of muddy sand, corals, and shells (Smith, 1888, p. 983).

Redescription of holotype:

Shape (fig. 5f): Carapace oval in lateral view with greatest height near middle, quite broad in dorsal view; lower margin of rostrum forming obtuse angle with anterior margin of valve below rostrum; posterior margin with caudal process below middle.

Ornamentation: Surface with punctae, otherwise smooth (fig. 5h); hairs scattered over valve surface and along margins.

Inner lamella: Infold behind rostrum with 4 long spinous bristles in row and 2 small bristles at lower margin (fig. 5i); infold in front of caudal process with about 8 pores in row (Some of these probably contain hirsute setae (fig. 5j), but preservation of valve is too poor to see them).

Selwage: Wide lamellar prolongation present with slender spines along outer margin (fig. 5g).

Size: ♀ holotype—measured length of compressed valve under slide 1.69 mm. Length of dried specimen—1.73 mm, height 1.07 mm (from Brady and Norman, 1896, pl. 49, fig. 1, using scale of 30×).

First antenna (fig. 5k, 1): 2nd joint with 1 spinous dorsal bristle; 3rd joint with 1 long ventral and 1 short dorsal bristle, both with marginal spines; 4th joint with 3 bristles, 2 ventral and 1 dorsal, all with spines; joints 2-4 with clusters of spines on surfaces; 5th joint with sensory bristle having about 4 filaments; 6th joint minute, not sharply demarcated from 5th joint, and with 1 short spinous bristle medially; 7th joint reduced and fused to 8th, with spinous a-bristle about twice length of bristle on 6th joint, no b-bristle, and c-bristle with about 5 filaments; 8th joint with long bare d- and e-bristles of almost equal length, and f- and g-bristles with about 4 filaments (filaments on bristles of end joints could not always be seen clearly on specimen).

Second antenna (fig. 5m-o): Endopodite single jointed with 3 short spinous bristles proximally and 1 long hirsute bristle terminally. Exopodite: distal margins of joints 2-8 with combs of slender spines; bristles on joints 2-8 with a few hairs proximally on dorsal margin followed by fairly long spines along the ventral margins and then long natatory hairs along both margins; 9th joint with 2 bristles, 1 long with spines proximally along the ventral margin and natatory hairs distally along both margins and 1 short with marginal spines.

Mandible (fig. 6a-c): Coxale endite bifurcate with each prong widely separated from the other and spinous; outer prong acuminate and with spine at tip, inner prong rounded at tip and more spinous than outer prong; basale with 7 spinous bristles, 4 ventral, 3 dorsal, and with spines in clusters on medial and lateral surfaces; exopodite with 2

bristles, outer bristle about half length of inner bristle. Endopodite: 1st joint with 3 spinous bristles on ventral margin, 1 long, 2 short; 2nd joint with 3 bristles near middle of dorsal margin, 1 short bristle sub-terminal on ventral margin, and 2 short terminal bristles on lateral surface near ventral margin, all bristles with spines; end joint (fig. 6c) with 1 long claw with minute spines distally along concave margin, and total of 4 bristles; clusters of spines present on surfaces of 1st and 2nd joints of endopodite.

Maxilla (fig. 6d-f): Coxale with long hirsute anterior bristle and fringe of hairs along outer margin; endite I with 3 short stout pectinate spines, 1 long stout spinous bristle, and 2 short widely separated spinous bristles; endite II with 2 stout pectinate spines and 2 slender bristles; endite III with 1 long proximal bristle and 3 distal bristles, 1 short and 2 long; basale with 3 long bristles along distal margin; exopodite consisting of 3 bristles, 1 short and 2 long. Endopodite: 1st joint with 1 alpha and 1 beta-bristle, both with spines; end joint with 2 a-, 1-2 b-bristles, and 1 long stout c-bristle.

Fifth limb (fig. 6g, h): (Both appendages are mounted on slide with posterior up so that teeth of 1st joint are not clearly visible; the appendage is apparently quite similar to the same appendage of *Paramekodon poulsenii* described in this paper): 1st joint with large pectinate proximal tooth and distal tooth having large tooth followed by 2 smaller teeth. 2nd joint: inner margin with large fang-like tooth followed by small tooth with 2-3 prongs, 1 trifold or quadrifid tooth, and then 1 quadrifid tooth; posterior surface with 3 spinous bristles, 2 near middle and 1 proximal to them. 3rd joint with a pair of spinous bristles; 4th joint with 4 spinous bristles, 3 long and 1 short; epipodial appendages with 40-44 hirsute bristles.

Sixth limb (fig. 6i): 1st endite represented by 3 short bristles, 2nd endite represented by short lobe with 1 spinous bristle; 3rd endite with 5 spinous bristles; 4th endite with 4 spinous bristles (1 missing in fig. 6i); end joint with 6 spinous anterior bristles followed by a space and then 2 long hirsute bristles; 1 short bristle present in place of epipodial appendage; surface of appendage hirsute.

Seventh limb (fig. 6j, k): 6 bristles in distal group, 3 on each side; 2 bristles in proximal group, 1 on each side; all bristles with 1-5 bells and marginal spines distally; terminus consisting of comb with single tooth having a spinous tooth at each side facing a similar but slightly smaller comb.

Furca (fig. 6l): Each lamella with 10 claws separated from lamella by suture; 3rd claw smaller than 4th; claws 1, 2, 4 with backward pointing spines in row on lateral and medial sides and slender hairs along convex margins; hairs present on margins of lamellae at base of claws and following claws.

Paramekodon poulsenii new species

Figures 7-9

Etymology: The species is named in honor of Prof. Erik M. Poulsen who has contributed greatly to the study of myodocopid Ostracoda.

Holotype: Adult ♀ USNM 121760; valves and some appendages in alcohol, remaining appendages on slides.

Type-locality: Gulf of Mexico; lat. 28°13'N, long. 87°16'W; on or near bottom at depth of 1000-1200 M.

Diagnosis: *Paramekodon* with 2 proximal bristles on endopodite of 2nd antenna, quadrifid tooth in middle of inner margin of 2nd joint of 5th limb, 3 bristles on endite I of 6 limb, and 9 claws on each lamella of furca.

Description of adult female:

Shape (fig. 7a, b): Carapace oval in lateral view with greatest height and length near middle, quite broad in dorsal view, width about $\frac{3}{4}$ length; lower margin of rostrum forming obtuse angle and continuous with anterior margin of valve below rostrum; posterior margin of valve with caudal process below valve middle.

Ornamentation (fig. 7e): Surface with small punctae, otherwise smooth; hairs scattered over valve surface and along margins.

Inner lamella: Infold broad in area of rostrum, ventral margin and caudal process, narrower along posterior margin; infold behind rostrum with 4 long spinous bristles in row and 2 small bristles at lower margin (fig. 7f); infold immediately ventral to rostrum with 1 small bristle; infold in front of caudal process with 6 hirsute setae in row near middle and cluster of 2 small bristles at inner edge (fig. 7c); a cluster of 2 small bristles present at inner margin of infold above and below caudal process; striations present on infold along ventral margin.

Central muscle scars (exact number and position could not be determined with certainty): consisting of about 20 individual scars below and anterior to center of each valve (fig. 7d, g).

Selvage: Wide lamellar prolongation with slender spines along outer margin along anterior, ventral, and posterior margins of each valve; prolongation divided below rostrum.

Size: ♀ holotype—length 1.81 mm, height 1.21 mm.

First antenna (fig. 7h, i): 2nd joint with 1 spinous dorsal bristle; 3rd joint with 1 long ventral bristle and 1 short dorsal bristle, both with marginal spines; 4th joint with 1 ventral and 1 dorsal bristle, both with spines; joints 2-4 with clusters of spines on surfaces; 5th joint with 1 long sensory bristle with filaments, spines near base of sensory bristle; 6th joint minute and not separated from 5th by suture, with 1 short spinous bristle medially; 7th joint reduced and fused to 8th, with spinous a-bristle about twice length of bristle on 6th joint, no b-bristle, and c-bristle with about 3 filaments and forked tip; 8th joint with long bare d- and e-bristles of equal length, f-bristle with 2 proximal and 3

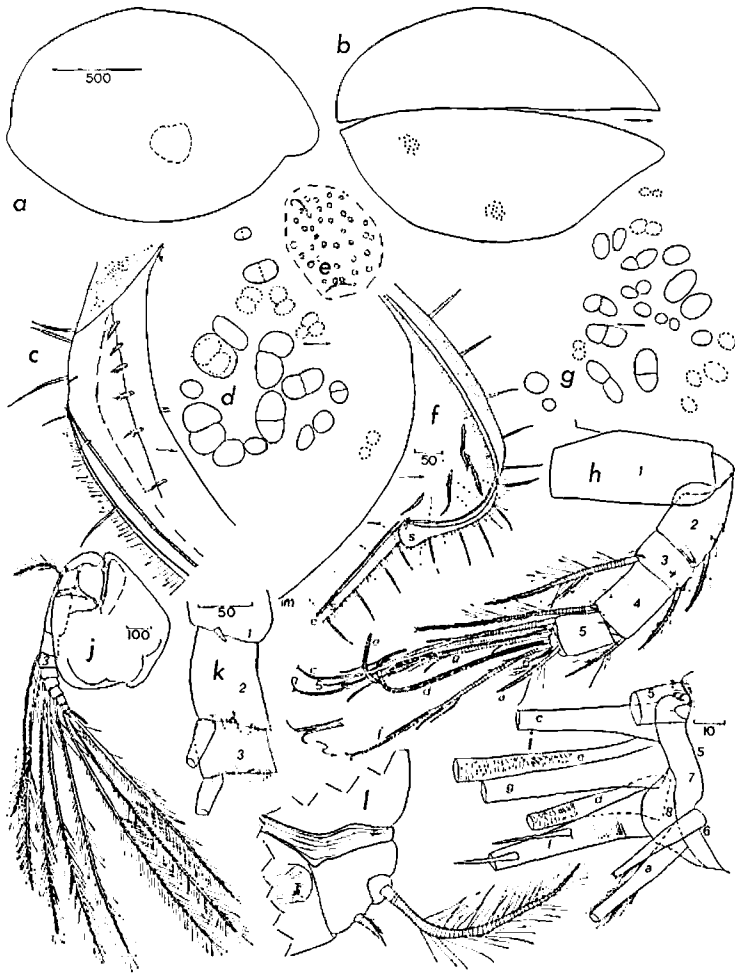


FIG. 7. *Paramekodon poulsenii* complete specimen: a, outline showing position of muscle scars; b, dorsal view showing representative surface pits (valves slightly open) c, caudal process left valve, medial view; d, muscle scars right valve, lateral view; e, surface pits near middle of right valve; f, anterior left valve, medial view; g, muscle scars left valve, lateral view. First antenna: h, lateral view right limb; i, medial view distal end left limb. Second antenna: j, medial view right limb; k, enlargement of joints 1-3; l, medial view endopodite right limb. (All figures from holotype. Same scale in microns: a, b; d-h; c, k, l.)



FIG. 8. *Paramekodon poulseni* mandible: a, medial view right limb; b, enlargement of distal end; c, enlargement of coxale endite; d, lateral view of basale of right limb. Maxilla: e, lateral view right limb; f, enlargement of distal end; g, medial view endite I of right limb; h, medial view endite I left limb. Fifth limb: i, posterior view left limb; j, anterior view right limb; k, enlargement of tip of tooth on 2nd joint; l, posterior view right limb. (All figures from holotype. Same scale in microns: a, d; b, c, e, h-j, l; f, g, k.)

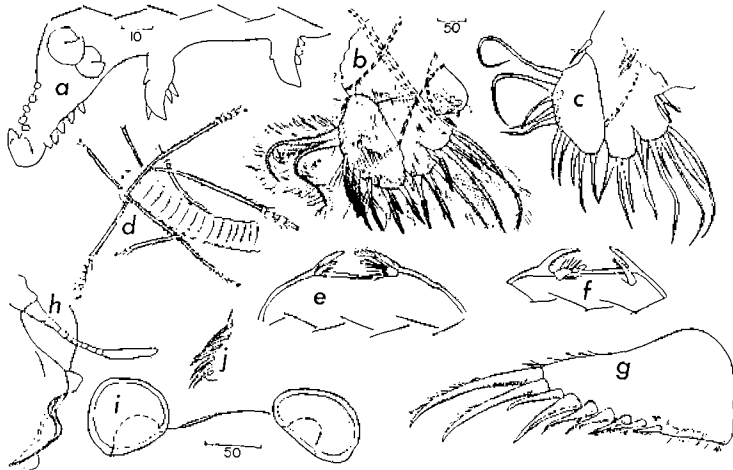


FIG. 9. *Paramekodon poulseni*: a, fifth limb, posterior tooth on inner margin of 1st joint of right limb. Sixth limb: b, medial view left limb; c, lateral view right limb (endite I displaced; hairs on bristles not shown). Seventh limb: d, distal part; e, f, lateral and medial view of terminus. g, furea; h, medial eye, rod-shaped organ, anterior end of body; i, genitalia; j, brush-shaped organ. (All figures from holotype. Same scale in microns: a, e, f, b-d, g, h, i, j.)

distal filaments and forked tip, g-bristle with 1 short proximal filament and 1 long and 2 short distal filaments, tip forked.

Second antenna (fig. 7j-l): Endopodite 2 jointed with 2 short spinous bristles on joint 1, and 1 long hirsute terminal bristle on joint 2. Exopodite: Distal margin of 1st joint with short medial spine; distal margins of joints 2-8 with combs of slender spines; bristles on joints 2-8 with a few hairs proximally on dorsal margin followed by fairly long spines along the ventral margin and then natatory hairs along both margins; 9th joint with 2 bristles, 1 long with spines proximally along the ventral margin and natatory hairs distally along both margins, and 1 short with marginal spines.

Mandible (fig. 8a-d): Coxale endite with bifurcate tip with each prong widely separated from the other and spinose; outer prong acuminate and with spine at tip, inner prong rounded at tip and more spinous than outer prong; basale with 6-7 spinous bristles, 3-4 ventral, 3 dorsal, and with spines in clusters on medial and lateral surfaces; exopodite with 2 spinous bristles, outer bristle about half length of inner bristle. Endopodite: 1st joint with 3 spinous bristles on ventral margin, 1 long, 2 short; 2nd joint with 3 long spinous bristles near middle of dorsal margin, 1 short spinous bristle subterminal on ventral margin,

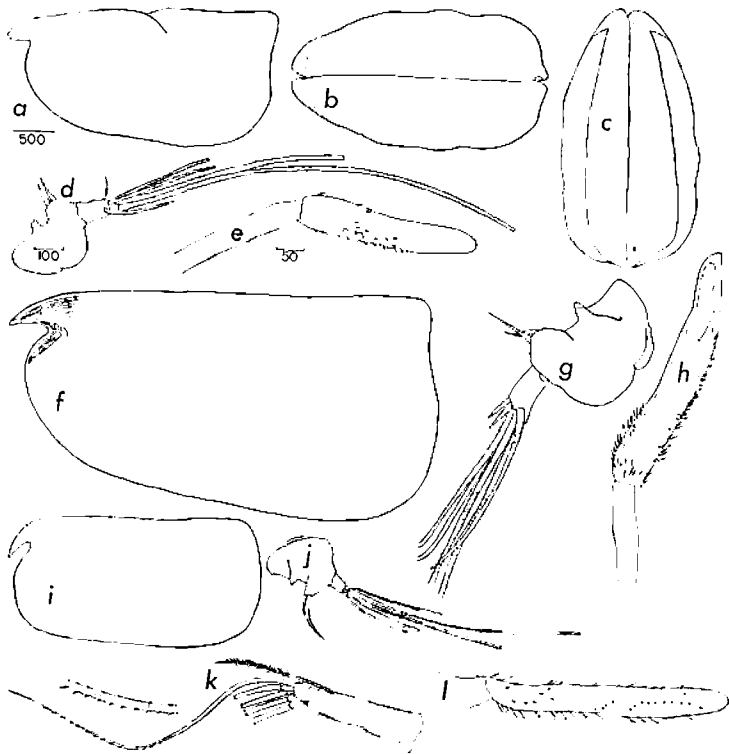


FIG. 10. *Conchoecia atlantica*, complete specimen: a, outline; b, dorsal view (valves open as in ventral view); c, ventral view; d, endopodite left 2nd antenna, medial view (all bristles of end joint broken); e, rod-shaped organ. *Conchoecia valdiviae*, complete specimen: f, outline; g, endopodite left 2nd antenna, medial view; h, rod-shaped organ, ventral margin to right. *Conchoecia macrocheira*, complete specimen: i, outline; j, endopodite (all bristles broken on end joint); k, right 1st antenna, lateral view (4 bristles of end joint broken); l, rod-shaped organ. (Same scale in microns: a-c, f, i, d, g, h, j, k; e, l.)

and 2 short spinous terminal bristles on lateral surface near ventral margin; end joint (fig. 8b) with 1 long claw with minute spines distally along concave margin, and total of 4 additional bristles and bristle-like claws; clusters of spines present on surface of 1st and 2nd joints of endopodite.

Maxilla (fig. 8e-h): Precoxale and coxale with anterior fringe of hairs; coxale with long hirsute anterior bristle; 1st endite with 3 short stout pectinate spines, 1 long stout spinous bristle, and 2 short spinous

proximal bristles; 2nd endite with 2 stout pectinate spines and 2 slender spinous bristles; 3rd endite with 1 proximal and 3 distal spinous bristles; basale with 3 spinous bristles along distal margin; exopodite consisting of 3 spinous bristles, 1 short and 2 long. Endopodite: 1st joint with 1 alpha-bristle and 1 beta-bristle, both with spines; end-joint with 2 spinous a-bristles, 2 spinous b-bristles, and 1 stout c-bristle with short spines distally along the convex margin.

Fifth limb (figs 8i-1; 9a): 1st joint with proximal tooth consisting of 1 large and 3 small pectinate teeth and bearing 4 short bristles, and distal tooth having large tooth followed by 2 smaller pectinate teeth and 1 spine along the inner margin. 2nd joint: inner margin with large fang like tooth followed by 1 small bifid tooth and 2 quadrifid teeth; posterior surface with 3 spinous bristles, 2 near middle, 1 long and 1 short, and 1 long bristle proximal to them. 3rd joint with 2 spinous bristles; 4th joint with 4 spinous bristles, 3 long and 1 short; endites represented by 1 short spinous bristle; epipodial appendage with about 40 hirsute bristles.

Sixth limb (fig. 9b,c): 1st endite with 3 short spinous bristles; 2nd endite with 1-2 spinous bristles; 3rd endite with 5-6 spinous bristles; 4th endite with 4 spinous bristles; end joint with 9-10 spinous bristles; surfaces of appendage hirsute; 1 spinous bristle present in place of epipodial appendage (observed only on 1 appendage, but may have been lost from other during dissection).

Seventh limb (fig. 9d-f): 6 bristles in distal group, 3 on each side; 2 bristles in proximal group, 1 on each side; all bristles with 2-5 bells and marginal spines; terminus consisting of comb with large tooth with shorter spinous tooth on each side opposing comb with large spinous tooth with shorter tooth on each side, latter teeth each with frond of spines at base.

Furca (fig. 9g): Each lamella with 9 claws, each separated from lamella by suture; 3rd claw smaller than 4th; claws 1 and 2 with spines in row on lateral and medial sides of concave margins and slender hairs along convex margins; each lamella with spines along dorsal margin and hairs along ventral margin following claw 7.

Rod-shaped organ (fig. 9h): Segmented proximally and with short spines in vicinity of tip.

Genitalia (fig. 9i): Paired ovals, each in sclerotized sheath.

Eyes (fig. 9h): Medial eye pigmented, lateral eyes absent.

Brush-shaped organ (fig. 9j): 8 minute bristles, some with marginal spines. (These small bristles were observed on integument dissected from the vicinity of the genitalia).

Gut content: The gut contained numerous minute spines blunt at one end acute at other. These are probable polychaete spines (Meredith L. Jones, personal communication).

Egg: Single egg containing well developed embryo present in brood chamber.

Comparisons: *P. poulseni* differs from *P. inflatus* in having 2 instead of 3 small bristles on the endopodite of the 2nd antenna. The endopodite of the 2nd antenna of *P. poulseni* has a small 2nd joint which seems to be absent on *P. inflatus*. The 1st endite of the right maxilla of *P. poulseni* has 2 small closely spaced bristles; on *P. inflatus* these bristles are separated by a wide space. The 4th joint of the 1st antenna of *P. poulseni* bears only 1 ventral bristle; *P. inflatus* has 2 in this position. The furca of *P. poulseni* bears 9 claws compared to 10 on *P. inflatus*. Differences also occur in the number of bristles on the 6th limbs.

SUBORDER HALOCYPRIDINA SKOGSBERG, 1920

SUPERFAMILY HALOCYPRIDACEA Dana, 1852

Family Halocyprididae Dana, 1852

Conchoecia atlantica (Lubbock, 1856)

Plate 2f, Figures 10a-e

Material: 2 ♀ ♀ USNM 122079, complete specimen in alcohol, length 3.86 mm, height 1.88 mm; USNM 122080, specimen on slides and in alcohol, length 3.52 mm, height 1.79 mm.

Conchoecia valdiviae Müller, 1906

Figures 10f-h

Material: 2 ♀ ♀ USNM 122082, length 5.7 mm, height 3.1 mm; USNM 122083, length about same (shell distorted); both specimens preserved in alcohol.

Conchoecia macrocheira Müller, 1906

Figures 10i-l

Material: 1 ♀ USNM 122081, length 3.37 mm, preserved in alcohol.

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