

or into a figure 8. In *Spiroplax* the male pleopods are much stouter and are twisted into a spiral.

### *Thaumastoplax anomalipes* Miers, 1881

#### FIGURE 39

*Thaumastoplax anomalipes* Miers, 1881a:261, pl. 14: fig. 2.

*Hexapus (Thaumastoplax) anomalipes*.—Monod, 1956:363, figs. 471–477.—Rossignol, 1962:118.—Gordon, 1971:108 [discussion].

*Hexapus anomalipes*.—Longhurst, 1958:88.—Gauld, 1960:71.

**MATERIAL EXAMINED.**—*Pillsbury Material*: None.

*Other Material*: Congo: Baic de Pointe-Noire, 7–10 m, A. Crosnier, 1♂, 1♀ (W).

**DESCRIPTION.**—Carapace much broader than long, width 1.45 to 1.63 times length in males, 1.40 to 1.72 times length in females, broadest in ovigerous female; carapace widest in anterior half. Dorsal surface moderately convex from front to back, almost flat from side to side, completely naked, sparsely punctate. Lateral margin a raised, tuberculate ridge. Posterolateral corner with angled prominence over base of posterior pereopods, more prominent in female, scarcely visible in male. Regions poorly marked, H-shaped depression prominent on surface near middle, ver-

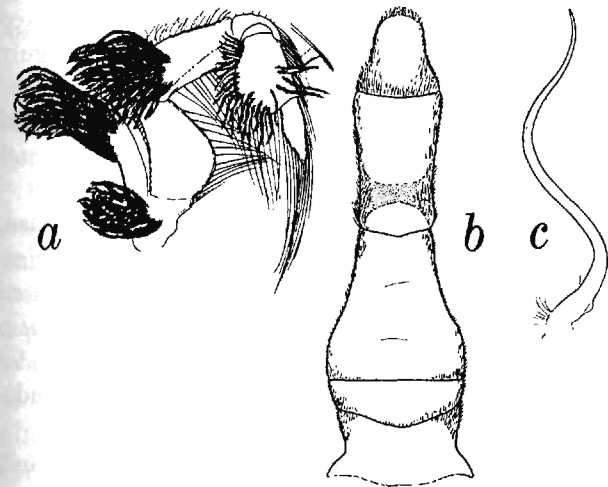


FIGURE 39.—*Thaumastoplax anomalipes* Miers: a, third maxilliped; b, male abdomen; c, male pleopod. (All from Monod, 1956, figs. 472, 474, 476.)

tical parts deepest. Front with distinct thickened ridge, relatively narrow (5 times in carapace width, 1.9 times in frontorbital width), more advanced laterally than in midline, with low, obtuse projection medially, fringed ventrally with setae obscuring antennular fossae. Interantennular septum low, not visible in frontal view. Orbits well formed, eyes movable, cornea black, slightly broader than stalk. Pterygostomial region lacking oblique striae. Lower part of carapace and mouthfield densely hairy.

Third maxillipeds moderately setose, with denser patch of setae laterally at articulation of ischium and merus. Ischium and merus slender, longer than broad, width subequal, ischium longer. Propodus longer than dactylus, distally dilated, only slightly narrower than merus.

Chelipeds small, slightly unequal and heavier in male, subequal in female. Merus short, stout, almost completely obscured by dense fringe of long setae dorsally and ventrally. Carpus naked dorsally, setose laterally, with short, irregular striae proximally, irregular tubercles distally; inner angle blunt, unarmed. Propodus compressed, thin, inner surface densely pubescent, outer surface almost naked, ornamented with sharp tubercles in irregular rows, dorsal and ventral margins lined with tubercles. Movable finger shorter than palm (measured dorsally), more strongly curved and gaping in male than in female. Fingers toothed along entire margin, movable finger with 2 enlarged triangular teeth basally.

Walking legs stout, 3 pairs present, second much the largest, all 3 legs more or less obscured in dorsal view by dense coat of setae; some larger setae present, especially on ventral margin. First walking leg about as long as third, slenderest of all; dactylus slender, curved ventrally, shorter than propodus, latter slender, about 2 times longer than broad; carpus longer than propodus; merus almost as long as carpus and propodus combined, about 0.6 times as long as carapace. Second walking leg much stouter and longer than first or third, much of surface obscured by dense coat of setae, especially on ventral margins and

posteriorly on carpus and propodus; inner surface of carpus and propodus also with some strong tubercles; dactylus slender, curved ventrally, shorter than propodus; latter broad, length only 1.6 times greatest depth; propodus shorter than carpus, merus about 0.8 times as long as carapace, 0.75 times as long as carpus and propodus combined. Third walking leg slightly stouter than first; dactylus straight or slightly curved ventrally, more than half as long as propodus; latter 1.4 times as long as broad, shorter than carpus; merus slender, 2.7 times as long as broad, 0.6 times as long as carapace, as long as carpus and propodus combined.

Male abdomen narrow, composed of 5 free somites, third to fifth fused, about as long as sixth somite. Latter appearing slender, about 1.3 times as long as broad. Terminal somite as long as broad, 0.6 times as long as fused somites, lateral margins sinuous, apex rounded. Abdominal trench in male extending anteriorly to base of third maxillipeds. Abdomen of female with 7 free somites.

Male pleopod as figured by Monod (1956, fig. 476), slender, sinuous, elongate, almost naked, completely concealed under abdomen.

*Figures:* Monod, 1956, figs. 471–477.

*Male Pleopod:* Monod, 1956, fig 476 (Senegal).

**MEASUREMENTS.**—Our male specimen measures  $3.9 \times 5.7$  mm, the female  $4.8 \times 8.0$  mm. The largest specimen studied by Monod was an ovigerous female  $11 \times 19$  mm.

**BIOLOGY.**—*Thaumastoplax anomalipes* is a sublittoral species, living in depths between about 3 m and 34 m. The specimens recorded by Monod (1956) were taken on mud-sand in 19 m, on shelly sand in 8 m, and on muddy sand with gorgonians in 10 m. Longhurst (1958) found the species in estuaries as well as offshore in depths between 6 and 34 m; in the estuary the species occurred on muddy sand and shelly mud, whereas offshore it was taken on shelly sand and shelly mud.

**DISTRIBUTION.**— West coast of Africa, from a few localities between Senegal and Rio Muni; sublittoral, in depths between ca 3 m and 34 m. Monod (1956) recorded material from Senegal

and Guinea; since 1956 the species has been recorded from the following:

Sierra Leone: No specific locality, in 6–34 m (Longhurst, 1958).

Ghana: Off Accra, ca. 3 m (Gauld, 1960).

Congo: Baie de Pointe-Noire (Rossignol, 1962).

### Genus *Tritoplax*, new genus

FIGURE 40

**TYPE-SPECIES.**—*Hexapus stebbingi* Barnard, 1947.

**ETYMOLOGY.**—The feminine name is derived from the Greek, *tritōs* (a third) and *plax* (a plate), alluding to the shape of the terminal somite of the male abdomen.

**DIAGNOSIS.**—Eyes very small, cornea subglobular. Third maxilliped with broad ischium and merus, ischium concave proximally, straight distally, carpus, propodus, and dactylus slender, subcylindrical; exopod of flagellum not described. Pterygostomian region apparently lacking oblique striae. Walking legs short, merus of longest pair shorter than carapace. Sternal grooves restricted to trilobed anterior terminus of abdominal fossa, grooves not extending anterolaterally to bases of third maxillipeds. Male pleopods (Figure 40*b*) slender, sinuous, bent laterally, naked apex recurved anteriorly. Male abdomen (Figure 40*a*) with third to fifth somites fused, sixth longitudinally divided in type-species, terminal somite distinctly trilobed, with angled lateral projections.

**INCLUDED SPECIES.**—*Hexapus stebbingi* Barnard, 1947 (see Barnard, 1950:299), from South Africa. An unnamed species identified by Stephensen (1945, fig. 53B; Figure 40*d* herein) as *Hexapus sexpes*, which also has a distinctly trilobed abdomen, although the sixth somite is not longitudinally divided, may also belong here.

**REMARKS.**—The trilobed male abdomen and the longitudinally divided sixth abdominal somite in the male are both quite characteristic and will serve to distinguish this genus from others in the family. The trilobed shape of the anterior end

of the abdominal fossa is similar to that found in species of *Hexapinus*, but the terminal somite of the male abdomen and the shape of the male pleopod are different in the two genera.

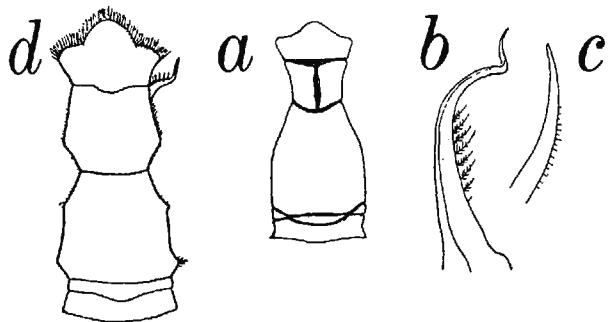


FIGURE 40.—*Tritoplax stebbingi* (Barnard): a, abdomen of male; b, male pleopod; c, apex; d, abdomen and apex of pleopod of male (a-c, from Barnard, 1950, fig. 56e,f; d, from Stephensen, 1945, fig. 53b).

### Family PINNOTHERIDAE de Haan, 1833

PINNOTHERIDEA de Haan, 1833:2, 5 [corrected to Pinnotheridae by Bell, 1845:119].

ASTHENOGNATHIDAE Stimpson, 1858b:107.

XENOPHTHALMIDAE Stimpson, 1858b:107.

DISSODACTYLIDAE Smith, 1870:172.

PINNOTHERELINAE Alcock, 1900:294, 335.

ANOMALOFRONTINAE Rathbun, 1931:84.

EASTERN ATLANTIC GENERA.—Two, *Asthenognathus* and *Pinnotheres*, both represented by species living off tropical West Africa.

EASTERN ATLANTIC SPECIES.—Fourteen, ten of which are named; some are of doubtful taxonomic standing.

Schmitt, McCain, and Davidson (1973) listed 2 genera and 10 species of Pinnotheridae from West Africa: *Asthenognathus atlanticus* Monod, *Pinnotheres pinnotheres* (Linnaeus), *Pinnotheres pisum* (Linnaeus), *Pinnotheres leloeufti* Crosnier, *Pinnotheres mccainae* Schmitt, *Pinnotheres* sp. A, B, C, D, of Monod (1956) and *Pinnotheres* sp. of Guinot and Ribeiro (1962). *Pinnotheres* sp. C of Monod is described herein as a new species, *Pinnotheres conicola*. *Pinnotheres tellinae*, which also is described

here as new, includes in part Monod's species A.

The only West African records of *Pinnotheres pinnotheres* are those by Balss (1922). Unfortunately, Balss did not give any details of his material that would confirm the correctness of his identification, and it seems likely that his specimens, which were collected in Cameroon and Gabon, actually belong to one or more of the true West African species that were described since 1922. Until Balss' material can be reexamined, *Pinnotheres pinnotheres* has to be included in the list of West African species, be it with great reserve. Also the otherwise European species, *P. pisum* (Linnaeus), has been recorded from Morocco and Mauritania. At present, therefore, six named species of *Pinnotheres* are known from West Africa (*P. leloeufti*, *P. mccainae*, *P. conicola*, *P. tellinae*, *P. pisum*, *P. pinnotheres*; the last doubtfully), and four unnamed species (species A (part), B, and D of Monod, 1956, and *Pinnotheres* sp. of Guinot and Ribeiro, 1962).

The pinnotherids were not represented in the Pillsbury collections. The following species of pinnotherids are extralimital:

*Pinnotheres ascidicola* Hesse, 1872. Atlantic coast of France; in ascidians.

*Pinnotheres marioni* Gourret, 1887. Mediterranean (Bay of Marseilles); in ascidians.

*Pinnotheres pectunculi* Hesse, 1872. Atlantic coast of Brittany (France); in *Glycimeris* (Lamellibranchia).

### Subfamily ASTHENOGNATHINAE Stimpson, 1858

#### Genus *Asthenognathus* Stimpson, 1858

*Asthenognathus* Stimpson, 1858b:107 [p. 53 in separate; type-species: *Asthenognathus inaequipis* Stimpson, 1858, by monotypy; gender: masculine; name 287 on *Official List*].

#### *Asthenognathus atlanticus* Monod, 1933

*Asthenognathus atlanticus*.—Monod, 1956:383, figs. 541-545 [Mauritania, Senegal, Ghana].—Gauld, 1960:71

[Ghana].—Guinot and Ribeiro, 1962:65 [Angola].—Rosignol, 1962:119 [Congo].—Monod, 1963: fig. 39 [no material].—Zariquiey Alvarez, 1968:410, fig. 137 [Spain; references].—Schmitt, McCain, and Davidson, 1973:128 [synonymy].—Noël and Amouroux, 1977:135 [Mediterranean].

**DISTRIBUTION.**—Eastern Atlantic, from Normandy, NW France to Angola and Mediterranean; on echinoids and commensal with polychaetes; sublittoral, in depths between 8 and 70 m.

### Subfamily PINNOTHERINAE de Haan, 1833

#### Genus *Pinnotheres* Bosc, 1802

*Pinnotheres* Bosc, 1802:59, 239 [type-species: *Cancer pisum* Linnaeus, 1767, by selection by Latreille, 1810:422; gender: masculine; name 352 on *Official List*].

*Holothuriophilus* Nauck, 1880:66 [type-species: *Holothuriophilus trapeziformis* Nauck, 1880, by original designation; gender: masculine; name 319 on *Official List*].

*Arcotheres* Bürger, 1895:361 [type-species: *Pinnotheres palaensis* Bürger, 1895, by selection by Rathbun, 1918:62; gender: masculine].

*Zaops* Rathbun, 1900b:588, 590 [type-species: *Pinnotheres depressum* Say, 1817, a subjective junior synonym of *Pinnotheres ostreum* Say, 1817, by original designation and monotypy; gender: masculine].

*Pinnozoea* Aikawa, 1933:130, 246 [type-species: *Cancer pisum* Linnaeus, 1767, by selection by Schmitt, McCain, and Davidson, 1973:37; gender: feminine].

#### *Pinnotheres conicola*, new species

FIGURES 41, 42

*Pinnotheres* sp. C.—Monod, 1956:380, figs. 508, 509, 526–538 [not figs. 524, 525 = *Pinnotheres* sp. B].—Longhurst, 1958: 88.

*Pinnotheres* sp. C.—Silas and Alagarwami, 1967:1214 [listed].—Schmitt, McCain, and Davidson, 1973:92 [synonymy].

**MATERIAL EXAMINED.**—*Pillsbury Material*: None.

*Other Material*: Cameroon: Kribi, in large *Conus* obtained by native fishermen who fished with a canoe ("pirogue") near the shore, 10 Mar 1964, B. de Wilde-Duyfjes, holotype, 1♂ (L).

**DESCRIPTION.**—Carapace (Figure 41) firm, almost circular in outline, about 1.1 to 1.3 times wider than long. Surface of carapace naked, smooth, except for coarsely pitted branchial regions, slightly convex dorsally, falling off more steeply laterally; anterolateral margin broadly and evenly rounded. Lateral surface with long, soft hairs, which, with similar hairs on pereopods, enclose naked upper surface in hirsute ring. Front almost square, slightly produced in middle, in dorsal view anterior margin scarcely produced beyond circular outline of carapace. Eyes small, short, with reduced cornea; orbit subcircular.

Third maxilliped (Figure 42a) placed obliquely, almost transversely. Merus operculiform, very wide, 2/3 as wide as long, greatest width in anterior half, anterointernal angle evenly rounded. Carpus short. Propodus oval. Dactylus very short, narrow, inserted on posterior half of lower margin of propodus, falling short of apex of propodus. Carpus and propodus together less than half as long as merus.

Chelipeds (Figure 42b–d) well developed, fingers about 6/7 as long as palm. Dactylus with single large tooth on basal half of cutting edge, distal half with some small granular denticles. Cutting edge of fixed finger also with large tooth, placed before that of dactylus, continued posteriorly as crenulated ridge. Base of fingers, upper surface of dactylus, lower surface of fixed finger, and cutting edges densely covered with soft, slender, plumose hairs. Palm with upper half of outer surface pilose, lower half naked; inner surface completely covered with long, smooth hairs except for naked spot anteriorly near base of fingers. Carpus short, rounded, upper surface naked, remainder covered by long hairs. Merus with upper and outer part naked, remainder clothed with long hairs. Ischium with distinct lobe on anterointernal angle of upper margin.

Walking legs (Figure 42e–h) subsimilar, all rather robust, none longer or slenderer than others. Dactylus of each walking leg similar to that of other legs, about 2/3 as long as propodus (measured dorsally), short, simple, terminating in

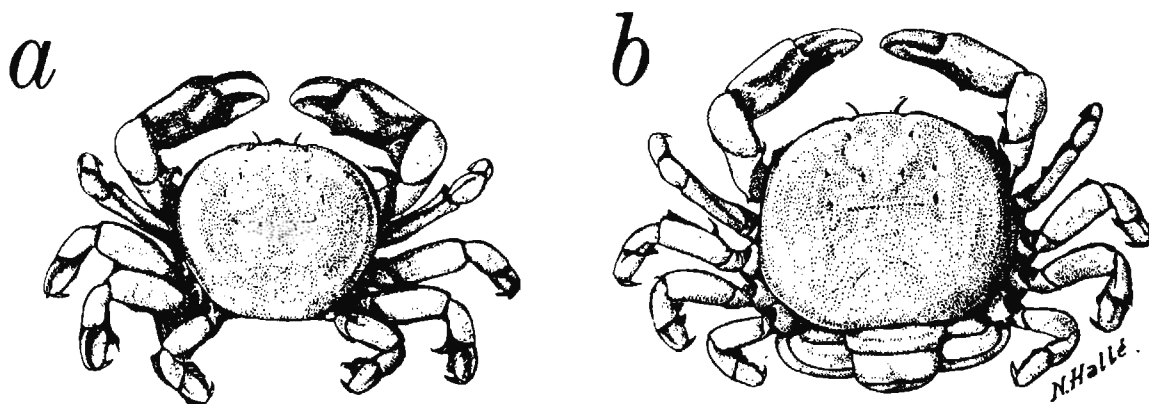


FIGURE 41.—*Pinnotheres conicola*, new species: a, male; b, female.  
(From Monod, 1956, figs. 524, 525.)

narrow, slightly curved tip. Propodus, carpus, and merus each high, with thick coat of hairs dorsally and ventrally but with lateral surfaces bare. Propodus about twice as long as high, merus somewhat more slender.

Male abdomen (Figure 42*i*) elongate, with fifth and sixth somites fused, line of separation scarcely distinct but present; Monod (1956:378, fig. 508) showed 7 free somites on male abdomen. Telson triangularly rounded.

*Male Pleopod:* Monod, 1956:382, figs. 537, 538.

**MEASUREMENTS.**—The holotype has a carapace length of 10 mm and a carapace width of 11.5 mm. The two male specimens reported upon by Monod had cl 9 and 9.5 mm, and cb 11 and 10 mm, respectively; his ovigerous female had cl 15 mm, cb 18 mm, and a juvenile female cl 8 and cb 9 mm.

**REMARKS.**—In Monod's (1956) fundamental work on the crabs of West Africa, his figures 508 and 509 are labeled *Pinnotheres* sp. B, while figures 524 and 525 are labeled *Pinnotheres* sp. C. However, a comparison of these figures with the measurements of these specimens given in the text and with the details shown in his figures 510 to 523 and 526 to 538, indicate that the explanation said to be of his figures 524 and 525 actually is that of his figures 508 and 509 and vice-versa. Judging by the enlargement indicated, the male and female of Monod's figures 508 and 509 have

cb 11 and 14 and cl 9 and 11 mm, respectively, which agrees with the measurements given for *Pinnotheres* sp. C from Conakry; the male and female of Monod's figures 524 and 525 have, respectively, cb 20 and 20 mm, and cl 16 and 18 mm, which agree well with the specimen of *Pinnotheres* sp. B from Gorée. There can, therefore, be little doubt that Monod's figures 508, 509, 526–538 show *Pinnotheres* sp. C, and figures 510–525 show *Pinnotheres* sp. B. Monod's (1956:382, figs. 539, 540) *Pinnotheres* sp. D shows a great resemblance to the present species, and might well be specifically the same. As Monod did not provide a description of his species D, this problem can only be solved by an examination of the material in question.

The short stubby legs fringed with heavy rows of setae distinguish this species immediately from most other named species of this genus known from the eastern Atlantic: *Pinnotheres pinnotheres* (Linnaeus), *P. pisum* (Linnaeus), and *P. mccainae* Schmitt. From *P. leloeuffi* Crosnier it can be distinguished by the less wide carapace, by the dorsal and ventral fringes of hair on all the segments of the legs except the dactylus, the wider merus of the third maxilliped and the shape of the male abdomen. Actually it seems closest to Monod's (1956) *Pinnotheres* sp. D with which it may prove to be identical. In its pubescence the new species shows some resemblance to *Pinnotheres*

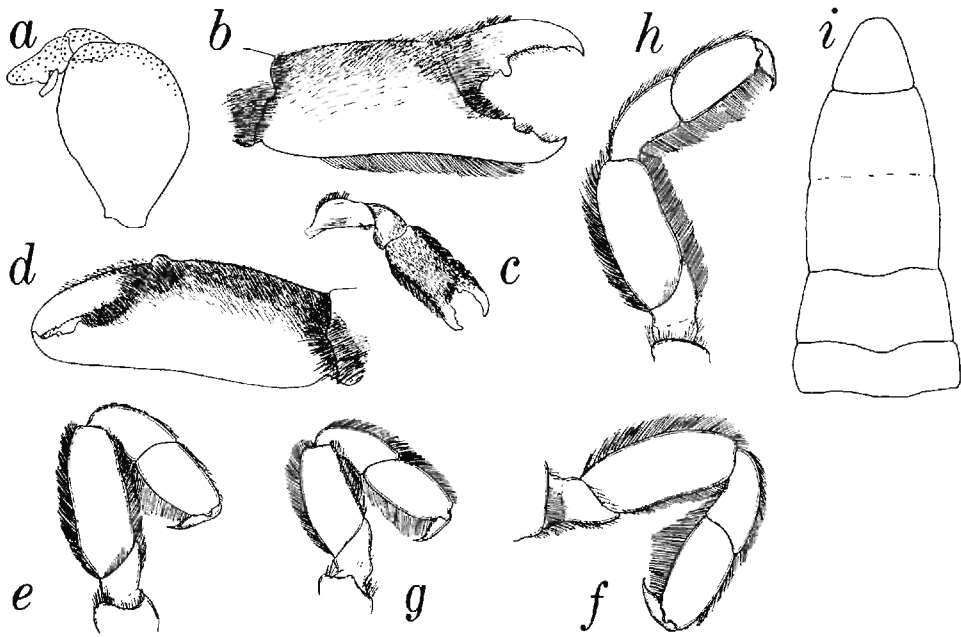


FIGURE 42.—*Pinnotheres conicola*, new species: *a*, third maxilliped; *b-d*, chelipeds; *e-h*, second to fifth pereopods; *i*, abdomen of holotype, male, cl. 10.0 mm, Kribi (*a-h* from Monod, 1956, figs. 526-532).

*barbatus* Desbonne from the West Indies, and also resembles that species in the robust walking legs, which are of similar size and shape and which have all dactyli short and falcate. It differs strongly, however, in the shape of the third maxilliped and the male abdomen. In *P. barbatus* the dactylus of the third maxilliped is implanted at the tip of the propodus, and the male abdomen has all somites free. Furthermore the carapace of the American species is softer and shows a large pit on either side of the middle (see Rathbun, 1918:88, pl. 19: figs. 8-11).

TYPE-LOCALITY.—Kribi, Cameroon.

DISPOSITION OF TYPE.—The holotype (Crust. D. 28792) is in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden.

The specimens reported by Monod (1956) from Conakry are probably in the collection of the Institut Fondamental d'Afrique Noire, Dakar, Senegal. The specimen reported by Longhurst (1958) may be in the collection of the British Museum (Natural History), London.

ETYMOLOGY.—The specific epithet is derived from the Latin generic name *Conus*, referring to the association of the species with a species of that genus.

BIOLOGY.—All specimens of this species known so far were found to live commensally with gastropod mollusks of the genus *Conus*; only the host of the Sierra Leone specimens is identified to species, viz. *Conus papillionaceus* Hwass. The Cameroon specimen was said to be from a large *Conus*. The depths at which the specimens were found is not accurately known: Longhurst (1958) gave the depth at which his specimens were taken as "shallow" and as "0-40 m." The Cameroon specimen evidently also was taken in shallow water as it was obtained from native fishermen fishing near the coast in a canoe.

One of the specimens reported from Sierra Leone was an ovigerous female; the date of collection was not recorded.

DISTRIBUTION.—West Africa, where it has been recorded from Guinea, Sierra Leone, and now

Cameroon; our specimen represents a considerable range extension to the south. Records in the literature include the following:

Guinea: Conakry (Monod, 1956).

Sierra Leone: No specific locality (Monod, 1956; Longhurst, 1958).

### *Pinnotheres leloeuffi* Crosnier, 1969

*Pinnotheres leloeuffi* Crosnier, 1969:531, figs. 1–10, 17 [Ivory Coast].—Schmitt, McCain, and Davidson, 1973:52 [synonymy].

DISTRIBUTION.—West Africa, from Vridi, Ivory Coast, in 20 m. Host unknown.

### *Pinnotheres mccainae* Schmitt, 1973

#### FIGURE 43

*Pinnotheres rouxi* Rossignol, 1957:84, fig. 4.—Silas and Alagarwami, 1967:1208 [listed].—Schmitt, McCain, and Davidson, 1973:2, 57 [synonymy]. [Preoccupied by *Pinnotheres rouxi* H. Milne Edwards, 1837.]

*Pinnotheres rouxi*.—Rossignol, 1962:118.

*Pinnotheres mccainae* Schmitt, in Schmitt, McCain, and Davidson, 1973:2, 5, 11, 57.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

*Other Material*: Congo: Pointe-Noire, from mantle cavity of *Donax rugosus* Linnaeus, 25 Apr 1955, A. G. Humes, 10♀ ov (L, W).

DESCRIPTION.—Carapace quadrangular anteriorly, semicircular posteriorly. Anterolateral angles rounded, about as wide as front, each occupying about 1/3 of length of anterior margin of carapace. Lateral margins of carapace diverging posteriorly toward posterolateral angles. Carapace with surface naked, somewhat convex, integument thin. Front slightly convex in dorsal view, extending anteriorly to level of anterolateral angles; front bent strongly downward, coarsely pitted, at each anterolateral angle.

Third maxilliped (Figure 43a,b) placed very obliquely, almost transversely. Dactylus narrow, elongated, articulated just before middle of lower margin of propodus, extending almost to end of propodus. Merus about twice as long as palp and about twice as long as broad. Exopod almost entirely covered by merus, basal segment rather broad, more than twice as long as wide. Distal 2

segments of exopod narrow, together somewhat more than half as long as first segment.

Cheliped of female (Figure 43c) elongate, chela more than 3 times as long as high. Fingers about 3/4 as long as palm, tips sharp, curved. Basal part of cutting edges of both fingers with distinct tooth, that on fixed finger proximal to that on dactylus. Palm twice as long as high. Chela with fringe of long hairs on lower part of inner surface extending over all of fixed finger and distal part of palm. Dactylus with hairs scattered over surface. Row of hairs present on upper inner surface of carpus, merus with scattered hairs on inner surface.

Pereiopods (Figure 43d–g) similar, of same length, on both sides of body. Third leg longest, about twice as long as fifth, 1½ times as long as second or fourth. Dactyli of second and fifth legs shortest, that of fourth slightly longer, that of third about 1½ times length of shortest dactyli. In all legs, dactylus terminating in hook-shaped claw. Dactylus of second leg slightly more than 1/3 as long as propodus, half as long as carpus; merus twice as long as carpus. Dactylus of third leg 2/5 as long as propodus, half as long as carpus; merus less than twice as long as carpus. Dactylus of fourth leg 2/5 as long as propodus, 2/3 as long as carpus, 1/3 as long as merus. Fifth pereiopod shortest, stoutest; dactylus 2/5 as long as propodus, 2/3 as long as carpus, latter 3/4 as long as merus. Pereiopods not markedly hairy, only some scattered hairs present, densest proximally.

Abdomen of ovigerous females distinctly wider than carapace.

Eggs numerous, small, spherical, diameter about 0.2 mm.

*Figures*: Rossignol (1957) provided figures of the general shape of an ovigerous female, a rather poor figure of the third maxilliped, and one of the chela. Some additional sketches are provided here (Figure 43).

*Male Pleopod*: The shape of the male pleopod is unknown. The single type-specimen is a female, and our material consists entirely of females. Rossignol (1962) evidently had males at his disposal, as he reported that many of the *Donax* specimens

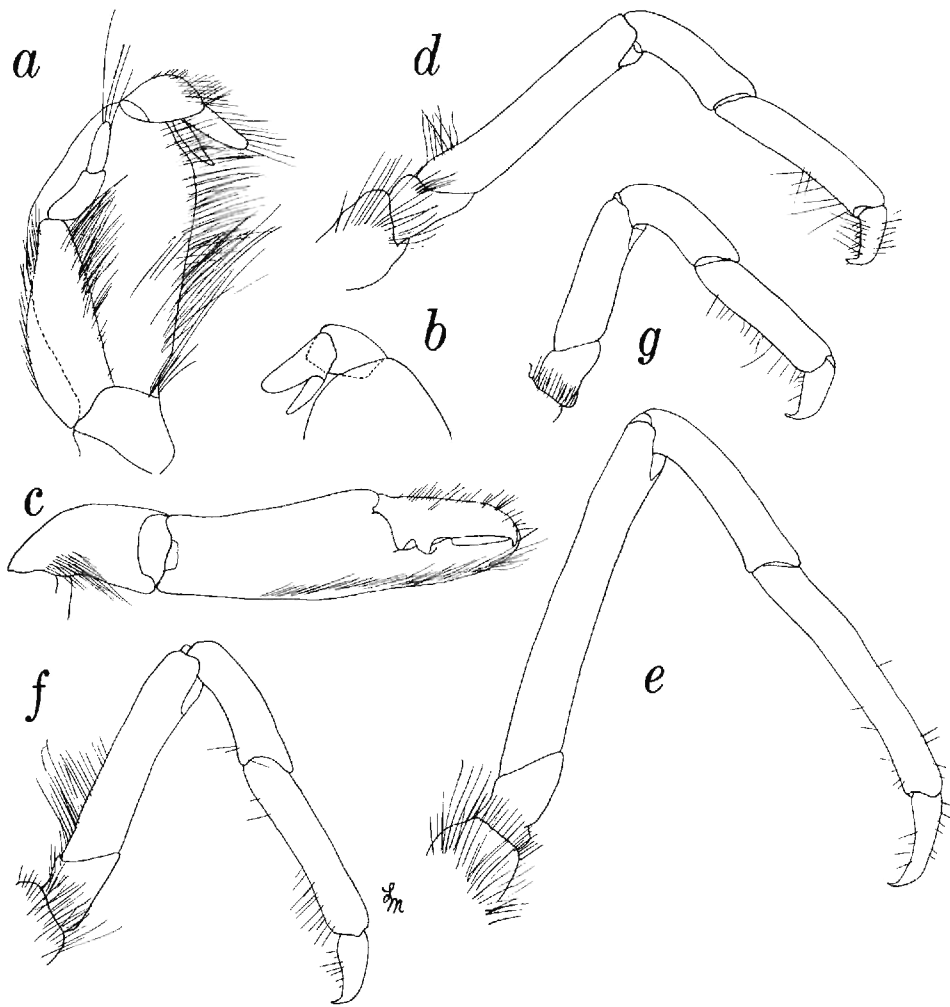


FIGURE 43.—*Pinnotheres mccainae* Schmitt, ovigerous female, cl 5.3 mm, Pointe-Noire: *a, b*, third maxilliped; *c*, chela; *d*, second pereiopod; *e*, third pereiopod; *f*, fourth pereiopod; *g*, fifth pereiopod.

collected by him were “habitée par un couple de cette espèce”; however, he gave no details of the male specimens.

**MEASUREMENTS.**—Our ovigerous females have carapace lengths varying from 4 to 6.5 mm, and carapace widths from 5.5 to 7 mm. The holotype, also an ovigerous female had the carapace 6 mm long and 7 mm wide. The diameter of the eggs is about 0.2 mm.

**REMARKS.**—The species was first described under the name *Pinnotheres rouxi* by Rossignol (1957) based on a single specimen. Silas and Alagar-swami (1967) correctly pointed out that the name

*Pinnotheres rouxi* had already been used by H. Milne Edwards (1837) for a different (Indo–West Pacific) species and that therefore the West African species needed a new name. It was Schmitt (in Schmitt, McCain, and Davidson, 1973), who provided this new name, *Pinnotheres mccainae*.

**BIOLOGY.**—All the specimens so far mentioned in the literature (Rossignol, 1957, 1962) were found to be commensals of *Donax* sp. The present specimens were found in the mantle cavity of *Donax rugosus* Linnaeus. Rossignol (1962) indicated that a large proportion of the *Donax* found at Pointe-Noire was infested with this commensal;



the bivalves were taken sublittorally in the sand at the lower limit of the lowest low tides.

Rossignol's (1957) ovigerous female was collected in November, ours in April.

**DISTRIBUTION.**—So far the species is only known from the area of Pointe-Noire, Congo. The holotype was reported from the beach at Pointe-Noire (Rossignol, 1957); additional material was mentioned by Rossignol (1962) from the Baie de Pointe-Noire. Also the present material is from that locality.

### *Pinnotheres pinnotheres* (Linnaeus, 1758)

*Pinnotheres pinnotheres*.—Balss, 1922:79 [Cameroon, Gabon].

*Pinnotheres pinnotheres*.—Monod, 1956:376 [references].

*Pinnotheres pinothetes*.—Zariquiey Alvarez, 1968:409, fig. 136b,f [Spain; references].

*Pinnotheres pinnotheres*.—Schmitt, McCain, and Davidson, 1973:68 [synonymy].

**SYNONYMS.**—*Pinnotheres veterum* Bosc, 1802; *Pinnotheres pinnae* Leach, 1814; *Pinnotheres montagui* Leach, 1815; *Pinnotheres pinnophylax* H. Milne Edwards, 1853.

**DISTRIBUTION.**—North Sea to Mediterranean; possibly Gulf of Guinea; commensal in bivalves and ascidians.

### *Pinnotheres pisum* (Linnaeus, 1767)

*Cancer Pisum* Linnaeus, 1767:1039.

*Pinnotheres pisum*.—Capart, 1951:175 [Mauritania].—Forest and Gantès, 1960:353 [Morocco].—Zariquiey Alvarez, 1968:408, figs. 7b, 14f, 135c,d, 136a,c-e [Spain; references].—Christiansen, 1969:88, figs. 36, 37, map 30 [Scandinavia].—Schmitt, McCain, and Davidson, 1973:72 [synonymy].

*Pinnotheres pisum*.—Monod, 1956:375 [references].

**SYNONYMS.**—*Cancer nutrix* Scopoli, 1763; *Cancer mytilorum albus* Herbst, 1783; *Cancer mytilorum fuscus* Herbst, 1783; *Cancer varians* Olivier, 1791; *Pinnotheres mytili* Leach, 1814; *Pinnotheres modiolii* Leach, 1814; *Pinnotheres cranchii* Leach, 1814; *Pinnotheres latreillii* Leach, 1817; *Cancer eubolinus* Nardo, 1847.

**DISTRIBUTION.**—Eastern Atlantic, from Norway southward to Port Etienne, Mauritania; Mediter-

anean; commensal in bivalves and possibly ascidians; intertidal to about 45 m.

### *Pinnotheres tellinae*, new species

FIGURES 44, 45

*Pinnotheres* sp. A.—Monod, 1956:376 [part; not figs. 502–507].—Longhurst, 1958:88.

*Pinnotheres* sp. A.—Silas and Alagarswami, 1967:1213 [part].—Schmitt, McCain, and Davidson, 1973:91 [synonymy; part].

**MATERIAL EXAMINED.**—*Pillsbury Material*: None.

*Other Material*: Sierra Leone: Kissy, near Freetown, from mantle cavity of *Tellina nymphalis* Lamarck, 29 Nov 1954, A. G. Humes, 7♂, 10♀ (holotype; 2 ov) (L, W). Bullom Shore, opposite Freetown, from mantle cavity of *Tellina nymphalis* Lamarck, 12 Nov 1954, A. G. Humes, 11♂, 15♀ (13 ov) (L, W).

**DESCRIPTION.**—Adult female (Figure 44a): Carapace strongly convex, globular, almost circular in outline, appearing as long as or slightly longer than broad, actually slightly (1.02 to 1.06 times) broader than long. Integument thin. Surface of carapace naked, smooth, with indistinct depression on or near anterolateral margin. Hairs implanted on lateral and posterior margins of carapace, not on lateral surface. Front hardly protruding beyond orbit, sinuous in dorsal view, slightly concave medially. In frontal view front (Figure 45a) slightly convex, terminating laterally in ventrally directed tooth forming inner angle of orbit. Orbits oval, almost closed, small inner gap filled by antennae. Eyes small, cornea reduced.

Third maxilliped (Figure 45b) placed only slightly obliquely, situated almost longitudinally. Merus broad, 3/5 as wide as long, greatest width in anterior half, anterointernal angle rounded. Carpus short. Propodus elongate, somewhat more than twice as long as wide. Dactylus, inserted at or slightly behind middle of lower margin of propodus, about 3 times as long as wide, reaching slightly beyond tip of propodus. Carpus and propodus together distinctly more than half as long as merus. Exopod well developed.

Chelipeds (Figure 45c) strong. Fingers about 4/5 as long as palm, gaping. Dactylus with large tooth on basal part of cutting edge, large basal

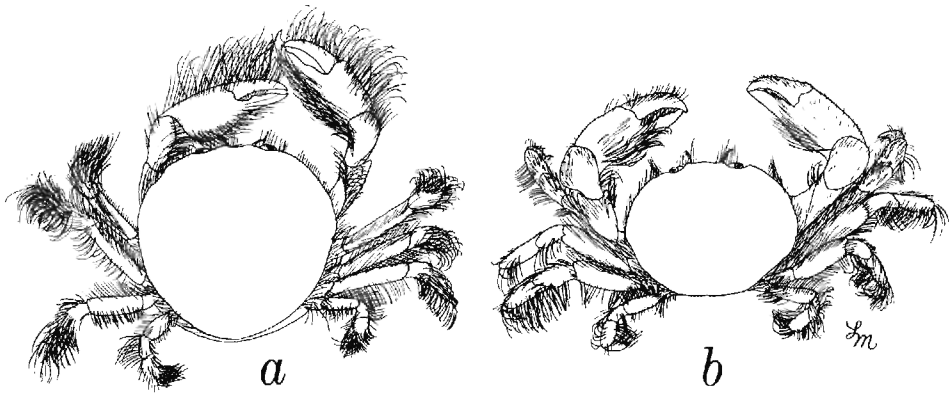


FIGURE 44.—*Pinnotheres tellinae*, new species, paratypes, Kissy: *a*, adult female, cl 4.7 mm; *b*, adult male, cl 3.0 mm.

tooth of fixed finger placed before that of dactylus. Remainder of cutting edges of chela with widely spaced tubercles; subdistally, cutting edges with short ridge, upper margin minutely tuberculate. Upper margin of chela with fringe of long hairs, latter also present on lower part of inner surface of palm and on fingers; shorter hairs present on remainder of chela. No tubercles present on either surface of palm. Carpus short, conical, slightly shorter than merus. Carpus and merus both with long hairs on dorsal and lower inner surface.

Pereiopods of right side of equal size and shape as those on left side. First 3 walking legs (pereiopods 2-4) (Figures 45*d-f*) are of about same length and shape, third pereiopod may be slightly longer than second or fourth. Dactylus of each of these 3 legs rather high, about  $\frac{2}{3}$  as long as propodus. Latter slightly more than twice as long as high. Carpus slightly shorter than propodus. Merus longest segment of leg, less than twice as long as carpus. Fifth pereiopod (Figure 45*g*) shortest. Dactylus of fifth slenderer, less strongly curved than in other legs, but of same length. Dactylus, propodus, and carpus subequal in length, each distinctly shorter than merus. Long, curly hairs present distally on all walking legs.

Abdomen with 7 free somites, wide but narrower than carapace. Eggs numerous and small, measuring 0.2 to 0.3 mm.

Male (Figure 44*b*): Carapace relatively wider than in female,  $\frac{1}{4}$  times as wide as long; differ-

ence in carapace shape of males and females well marked. Integument firmer than in female.

Chelipeds (Figure 45*h*) differ from those of female in having tubercles on middle of inner surface of palm and on lower outer surface.

Pereiopods (Figure 45*i-k*) slenderer than in female, those of third, fourth, and fifth pairs with fringes of long hairs on propodus, carpus, and merus. Fringes less distinct on second pereiopod.

Abdomen (Figure 45*l*) with 7 free somites. Terminal somite wider than long with rounded margin. Sixth somite about  $1\frac{1}{2}$  times wider at base than distally. Fifth somite slightly longer than sixth, width same throughout length,  $\frac{5}{8}$  as long as wide. Fourth somite shorter but wider than fifth. Third somite wider and shorter than fourth. First and second somites shortest, slightly wider than third.

Male gonopods (Figure 45*m*) long, slender, extending beyond sternite of cheliped, curved medially, terminating in simple apex. Inner concave margin with about 20 short, stiff hairs; convex outer margin with fewer hairs.

MEASUREMENTS.—The carapace length of the females in our material varied from 2 to 6 mm (in ovigerous females from 4.5 to 6 mm), and the carapace width from 2.2 to 6.5 mm (in ovigerous females from 5 to 6.5 mm); in the males the carapace length ranged from 2 to 3.5 mm and the carapace width from 2.5 to 4 mm. Monod (1956: 376) gave both the carapace length and width of

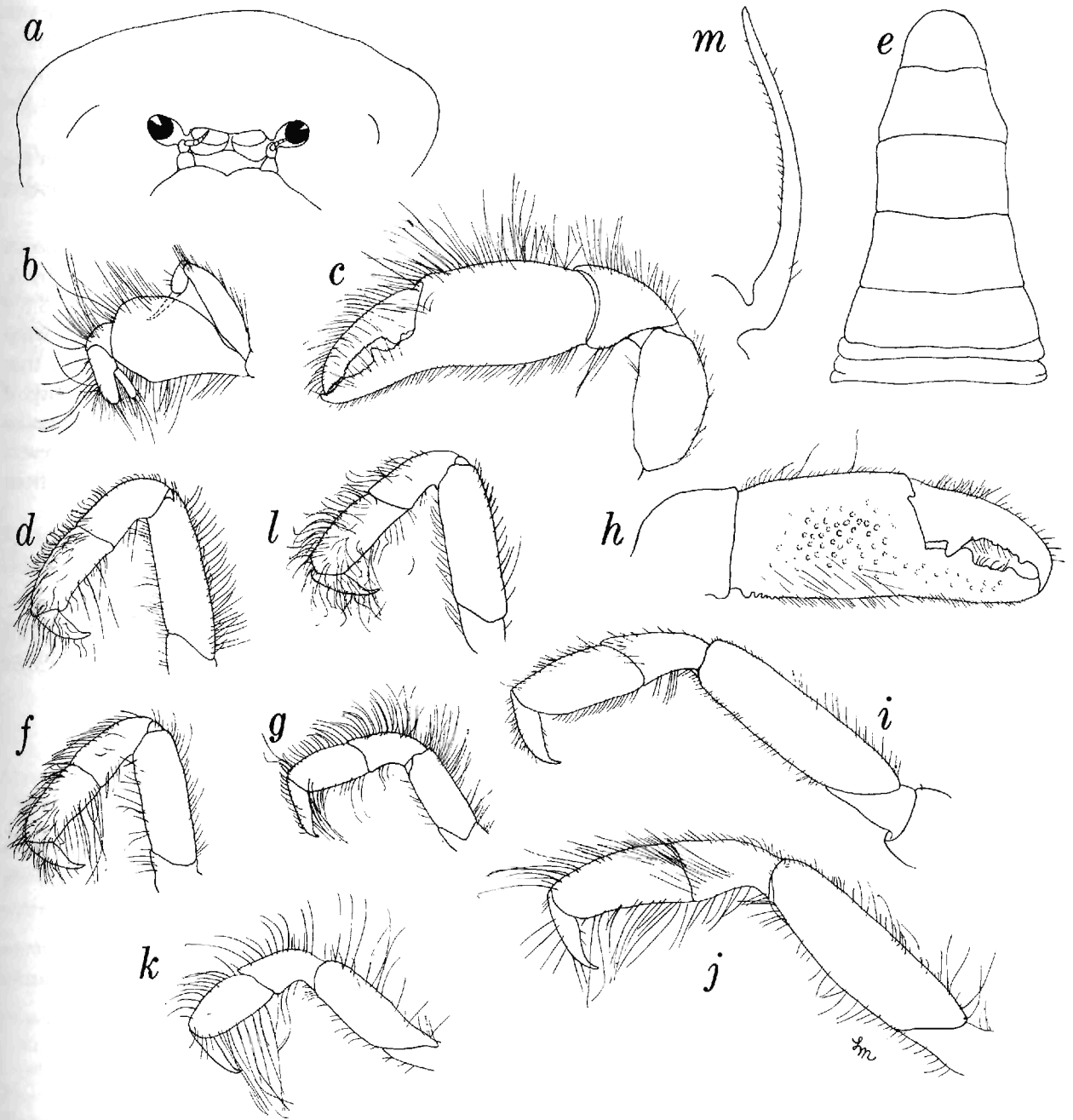


FIGURE 45.—*Pinnotheres tellinae*, new species, paratypes, Kissy. Female, cl 5.9 mm: *a*, front; *b*, third maxilliped; *c*, cheliped; *d*, second pereopod; *e*, third pereopod; *f*, fourth pereopod; *g*, fifth pereopod. Male, cl 2.5 mm: *h*, chela; *i*, second pereopod; *j*, third pereopod; *k*, fifth pereopod; *l*, abdomen; *m*, gonopod.

his single ovigerous female as 5.5 mm. The diameter of the eggs is 0.2 to 0.3 mm.

REMARKS.—The species is characterized by the almost equal walking legs that have the dactylus of equal length, by the third maxilliped that has the dactylus implanted on the lower margin of the propodus, reaching slightly beyond the top of the propodus, by the hairiness of the legs, and by the naked carapace. It resembles *Pinnotheres pholadis* de Haan from Japan, which, however, has more slender and hairless legs. The hairy legs of the female *P. tellinae* distinguish it from the West African species *P. mccainae* and *P. pinnotheres*; in *P. leloeffi* the carapace is much wider and the shape of the third maxilliped and that of the male abdomen are quite different.

Monod (1956:376) referred an ovigerous female of a *Pinnotheres* found in *Tellina* sp. in Sierra Leone, to his *Pinnotheres* sp. A. The other specimens referred by Monod to his species A were commensals of *Ostrea tulipa* Lamarck (= *Ostrea gasar*) from Senegal. Monod's (1956, figs. 502–507) illustrations are made after the *Ostrea* commensals, and show a species that is clearly different from *P. tellinae*. In the *Ostrea* commensals the carapace is wider in the females (length 9 mm, width 10 mm) and narrower in the males (length and width 2 mm), the pereopods are more slender and without long hairs, the shapes of the dactylus and propodus of the third maxilliped are different, and the size of the females is much larger. Although it is highly likely that Monod's specimen from Sierra Leone belongs to *P. tellinae*, as it was taken at the type-locality and from the type-host of that species, it is certain that the specimens from the host *Ostrea tulipa* belong to a different species. Monod (1956:376) himself remarked that "la conspécificité de cet exemplaire [i.e., the female from Sierra Leone] avec les précédents [i.e., those from Senegal] n'est pas certaine."

TYPE-LOCALITY.—Kissy, near Freetown, Sierra Leone.

DISPOSITION OF TYPES.—The holotype (USNM 169498) is one of the females from Kissy; all of the other specimens are paratypes. The holotype is deposited in the National Museum of Natural

History, Smithsonian Institution, Washington, D.C. The paratypes are in the same museum and duplicates are placed in the Rijksmuseum van Natuurlijke Historie, Leiden. The specimen mentioned by Monod (1956:376) and Longhurst (1958:88), also a paratype, most likely is in the British Museum (Natural History).

ETYMOLOGY.—The specific epithet is from the generic name *Tellina*, referring to the association of this species with a species of that genus.

BIOLOGY.—Monod (1956) reported the species from *Tellina* sp. His specimen was collected by A. Longhurst in Sierra Leone. Longhurst (1958:88) himself gave more detailed information of what evidently is the same specimen, indicating that his material was found in the mantle cavity of *Tellina nymphalis* Lamarck, taken in an estuarine habitat. The specimens dealt with in the present paper were obtained by Dr. A. G. Humes from the mantle cavity of the same host.

The date of collecting of Monod's and Longhurst's ovigerous female is not known. Our ovigerous females were collected in November.

DISTRIBUTION.—So far the species is only known from Sierra Leone (Monod, 1956; Longhurst, 1958).

### *Pinnotheres* sp. A

*Pinnotheres* sp. A.—Monod, 1956:376, figs. 502–507 [part; Senegal].

*Pinnotheres* sp. A.—Silas and Alagarwami, 1967:1213 [listed].—Schmitt, McCain, and Davidson, 1973:91 [synonymy].

DISTRIBUTION.—Senegal. Commensal of *Ostraea gasar* (Adanson) (= *Ostrea tulipa* Lamarck) (Monod, 1956).

### *Pinnotheres* sp. B

*Pinnotheres* sp. B.—Monod, 1956:378, figs. 510–525 [Senegal].

*Pinnotheres* sp. B.—Silas and Alagarwami, 1967:1213 [listed].—Schmitt, McCain and Davidson, 1973:91 [synonymy].

DISTRIBUTION.—Senegal, in *Panopea aldrovandi* Menard; sublittoral, to at least 5 m.

***Pinnotheres* sp. D**

*Pinnotheres* sp. D.—Monod, 1956:382, figs. 539, 540 [Congo].—Rossignol, 1962:118 [Congo].

*Pinnotheres* sp. D.—Silas and Alagarwami, 1967:1214 [listed].—Schmitt, McCain and Davidson, 1973:92 [synonymy].

DISTRIBUTION.—Pointe-Noire, Congo, host and depth range unknown.

***Pinnotheres* sp.**

*Pinnotheres* sp.—Guinot and Ribeiro, 1962:64, figs. 30–33 [Angola].—Schmitt, McCain and Davidson, 1973:94 [synonymy].

DISTRIBUTION.—Baía de Santa Marta, Angola, among mussels on rocks.

**Family RETROPLUMIDAE Gill, 1894**

RETROPLUMIDAE Gill, 1894:1043.

PTENOPLACIDAE Alcock, 1899c:78.

REMARKS.—This family, which contains a single genus, *Retropluma* Gill, 1894, is not represented in the eastern Atlantic.

**Family MICTYRIDAE Dana, 1851**

MYCTIRIDAE Dana, 1851e:247 [corrected to Mictyridae by Alcock, 1900:383].

REMARKS.—This family, which contains a single genus, *Mictyris* Latreille, 1806, is not represented in the eastern Atlantic.

**Family PALICIDAE Rathbun, 1898**

CYMOPOOLIDAE Dana, 1854:9 [corrected to Cymopoliidae by Faxon, 1895:38; name 406 on *Official Index*, under Cymopoliidae Faxon, 1895].

PALICIDAE Rathbun, 1898:280 [name 376 on *Official List*].

PALICAE Bouvier, 1898:56, 58.

EASTERN ATLANTIC GENERA.—One, *Palicus*, occurring off West Africa and in the Mediterranean Sea.

EASTERN ATLANTIC SPECIES.—One, *Palicus caronii* (Roux, 1830), represented by one lot in the

*Pillsbury* collections. It was recorded by Monod (1956) as *Cymopolia caroni*.

**Genus *Palicus* Philippi, 1838**

*Cymopolia* P. Roux, 1830, pl. 21 [invalid junior homonym of *Cymopolia* Lamouroux, 1816 (alga); type-species: *Cymopolia caronii* Roux, 1830, by monotypy; gender: feminine; name 1718 on *Official Index*].

*Palicus* Philippi, 1838:11 [type-species: *Palicus granulatus* Philippi, 1838, a subjective junior synonym of *Cymopolia caronii* Roux, 1830, by monotypy; gender: masculine; name 1640 on *Official List*].

REMARKS.—Holthuis and Gottlieb (1958:104) explained why *Palicus* must be used in place of the older *Cymopolia*.

**\* *Palicus caronii* (P. Roux, 1830)**

*Cymopolia caroni*.—Monod, 1956:387, figs. 546–551.

*Palicus caroni*.—Forest and Guinot, 1966:88.

*Palicus caronii*.—Zariquiey Alvarez, 1968:411, fig. 135e [Spain; references].—Türkay, 1976b:61 [listed], 71.

SYNONYM.—*Palicus granulatus* Philippi, 1838.

MATERIAL EXAMINED.—*Pillsbury material*: Ghana: Sta. 24, 35–37 m, dark red bryozoans, 2♂, 1♀ ov (L, W).

*Other Material*: Canary Islands: No specific locality, 30 m (?), *Talisman*, 1♂ (W).

Cape Verde Islands: Ilhéu Branco, *Talisman*, 2♂, 1♀ ov (W).

Senegal: Near Banc du Séminole, Baie de Gorée, 38 m, I. Marche-Marchad, 18 Feb 1954, 2♂ (W).

DESCRIPTION.—Bouvier, 1940:5; A. Milne Edwards and Bouvier, 1902:46–47 (comparison of *P. affinis* A. Milne Edwards and Bouvier and *P. caronii*).

*Figures*: Monod, 1956, figs. 546–551.

*Male Pleopod*: Monod, 1956, figs. 549–551 (Senegal).

MEASUREMENTS.—Our males have carapace widths of 7.6 to 10 mm; the ovigerous females have carapace widths of 9.3 and 11 mm.

BIOLOGY.—*Palicus caronii* is a sublittoral species, occurring off West Africa in depths between 23 (8–30) and 100 m. Of 16 recent depth records, 12 (75%) are from depths between 23 and 50 m and 4 (25%) are from depths greater than 50 m but less than 100 m, namely 73 m, 75 m, 80 m, and

97–98 m. The *Pillsbury* specimens were taken on bottom with dark red bryozoans. The specimens collected by the *Calypso* were taken on bottoms with calcareous algae (three stations), algae and calcareous algae, and sand, algae, and calcareous algae (Forest and Guinot, 1966).

Off West Africa ovigerous females have been collected in March, May, June, November, and December (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

**DISTRIBUTION.**—Eastern Atlantic, from the Mediterranean and adjacent Atlantic, including the Azores, Ilhas Desertas, Madeira, the Canary Islands, the Cape Verde Islands, off the mainland from Senegal and Ghana, and from the offshore islands of the Gulf of Guinea, Principe, São Tomé, and Annobon, in depths between 23 m and 100 m. Monod (1956) reported material from Senegal and Principe; records since 1956 include the following:

Madeira: No specific locality; Ponta de São Lourenço, 80 m (Türkay, 1976b).

Principe: 01°43'10"N, 07°28'20"E, 73 m; and 01°43'N, 07°28'55"E, 37 m (Forest and Guinot, 1966).

São Tomé: 00°25'40"N, 06°40'10"E, 50 m; and 00°25'15"N, 06°43'05"E, 8–30 m (Forest and Guinot, 1966).

Annobon: N of San Antonio, 23 m (Forest and Guinot, 1966).

### Family OCYPODIDAE Rafinesque, 1815

OCYPODIA Rafinesque, 1815:96 [corrected to Ocypodidae by MacLeay, 1838:63, 64; name 375 on *Official List*].

DOTILLINAE Dana, 1851c:286 [unavailable, based on a homonym].

MACROPHTHALMINAE Dana, 1851c:286.

UCAINAE Dana, 1851c:289.

HELOECIACAENA H. Milne Edwards, 1852:153.

DOTILLIDAE Stimpson, 1858b:98 [p. 44 on separate].

CAMPTANDRIIDAE Stimpson, 1858b:106 [p. 52 on separate].

Gelasimiden Nauck, 1880:8, 17, 23, 64, 66.

GELASIMIDAE Miers, 1886:viii.

SCOPIMERIDAE Alcock, 1900:290, 295, 363.

CAMPTANDRIINAE Serène and Kumar, 1971:75.

CAMPTANDRINI Pretzmann, 1974:443.

CLEISTOTOMATINI Pretzmann, 1977:66.

**EASTERN ATLANTIC GENERA.**—Five, *Calabarium*, new genus, *Ephantor*, new genus, *Lillyanella*, new

genus (see addendum), *Ocylope*, *Telmatothrix*, new genus, and *Uca*, each represented by species off tropical West Africa.

**EASTERN ATLANTIC SPECIES.**—Six, all occurring in tropical West Africa. Two species were taken by the *Pillsbury*: *Ocylope cursor* and *Uca tangeri*. Three species were recorded by Monod (1956) under the same names used here, although he used *Ocyпода* for *Ocylope*.

Three species of this family reported from West Africa appear to be either erroneously labeled or misidentified:

*Ocylope ceratophthalmus* (Pallas, 1772). An Indo-West Pacific species reported from Fernando Poo by Pesta (1911:54) (see Monod, 1956:530).

*Ocylope quadrata* (Fabricius, 1787). A western Atlantic species reported under the name *O. albicans* Bosc from "Westafrika" by Balss (1922:79) (see Monod, 1956:399).

*Uca burgersi* Holthuis, 1967. A western Atlantic species reported from Liberia under the name *Uca mordax* (Smith, 1870) by Rathbun (1900a:276; 1918:393; see also Monod, 1956:404) and Crane (1975:172, 326, 327, 604) and from Cameroon by Crane (1975:327, 604).

It seems highly unlikely that these records are correct. We believe that these species should not be included in the list of West African Ocypodidae.

Most modern authors (Balss, 1957:1663–1665; Guinot, 1967a:280–283; Serène, 1968:97–101) recognized three subfamilies within the family Ocypodidae: Ocypodinae, Scopimerinae, and Macrophthalminae. As the family group name Dotillidae Stimpson, 1858, is older than Scopimerinae Alcock, 1900, it has priority and should be used for the subfamily which contains both the genera *Dotilla* Stimpson, 1858, and *Scopimera* de Haan, 1833. We agree with Serène (1974:59–68) that a fourth subfamily, Camptandriinae Stimpson, 1858, should be recognized; it contains those genera formerly placed in the Macrophthalminae in which the male gonopods are strongly recurved. The four subfamilies of Ocypodidae that we now recognize are, therefore: Ocypodinae Rafinesque, 1815; Dotillinae Stimpson, 1958; Macrophthalminae Dana, 1851; and Camptan-

driinae Stimpson, 1858. Only the first and the last are represented in the eastern Atlantic.

### Subfamily CAMPTANDRIINAE Stimpson, 1858

REMARKS.—Stimpson (1858b:106) erected a new family, Camptandriidae, to include a single genus, *Camptandrium*, which he was also newly describing. Later authors usually have synonymized the Camptandriidae with the subfamily Macrophthalminae Dana, 1851. However, the differences between the genera *Macrophthalmus* Desmarest, 1823, and *Australoplax* Barnes, 1966, on the one hand and the genera *Camptandrium*, *Cleistostoma*, *Paracleistostoma*, *Tylodiplax*, and *Leipoceten* on the other are significant. It seems best, therefore, to separate the latter five genera as a distinct subfamily, for which the name Camptandriinae Stimpson, 1858, is available, confirming the views of Serène and Kumar (1971:75) and Serène (1974:59–68). Our reasons for recognizing Camptandriinae are practically the same as those noted by Serène and Kumar (1971) and Serène (1974).

The characters that distinguish the Camptandriinae from the Macrophthalminae are the following: The most important is the shape of the

male gonopods, which are strongly recurved in the Camptandriinae, straight or slightly bent in the Macrophthalminae. The external maxillipeds in the Macrophthalminae have the merus shorter than the ischium and the last two segments thick; in the Camptandriinae the merus of the maxillipeds is as long as or longer than the ischium and the distal two segments are slender.

The Camptandriinae are represented in West Africa by four genera, all of which are new. In order to ascertain their affiliations with the other genera of Camptandriinae, we had to study each genus within the subfamily Camptandriinae. These genera are very poorly defined and their limits are rather vague, so that a revision on the generic level was badly needed. Fortunately a fair number of species of Camptandriinae was available to us and made it possible to obtain a better idea of the various genera and their limits. At the same time the material showed the necessity to erect several new genera, as a number of species did not fit the older genera as redefined by us. For this reason we give here a diagnosis of the genera of Camptandriinae recognized by us with a discussion of the species that we assign to them, those of which we consider of dubious status and those that in our opinion should be eliminated from the Camptandriinae.

### Key to Genera of Camptandriinae

1. Male abdomen constricted near fifth somite so that gonopods are partly visible when abdomen is pressed against thorax ..... 2
  - Male abdomen gradually tapering towards terminal somite, completely covering gonopods, which are not visible when abdomen is pressed against thorax ..... 6
2. Gonopod of male with 2 distinct appendages at the distal end ..... 3
  - Gonopod of male tapering to narrow pointed apex, without appendages ..... 4
3. Appendages at tip of male gonopod longer than distal recurved part of shaft. Carapace subhexagonal ..... *Camptandrium*
  - Appendages at tip of male gonopod short, at most half length of recurved part of shaft. Carapace transverse quadrangular ..... *Paratyloiplax*
4. Anterolateral margin of carapace with teeth. Meri of ambulatory legs with distinct subdistal dorsal tooth. Male gonopod drawn out into slender, narrow tip ..... *Calabarium*, new genus

- Anterolateral margin of carapace entire. Meri of ambulatory legs without subdistal dorsal tooth. Male gonopod with tip either short and triangular or with subdistal lobe . . . . . 5
5. Carapace only slightly wider than long, subhexagonal, without dorsal carina. Legs slender, merus of third (= longest) leg more than 3 times as long as wide. Male gonopod with broad subapical lobe. Fifth abdominal somite of male only slightly constricted . . . . . *Ecphantor*, new genus
- Carapace distinctly wider than long, transversely quadrangular, with distinct transverse ridge. Legs broad, merus of third leg about twice as long as wide. Male gonopod regularly narrowing to triangular tip, without subapical lobe. Fifth male abdominal somite strongly constricted in basal part . . . . . *Deiratonotus*, new genus
6. First somite of male abdomen much wider than other somites and reaching coxae of fifth pereopods . . . . . 7
- First somite of male abdomen, though usually slightly wider than second, separated from coxae of fifth pereopods by considerable distance . . . . . 8
7. Male gonopod ending in a pointed apex, which is not swollen. Chelipeds with strong sexual dimorphism . . . . . *Cleistostoma*
- Male gonopod ending in blunt swollen apex. Males with chelipeds small, not different from those of females (dactylus of chelipeds without molar-like tooth) . . . . . *Ilyogynnis*, new genus
8. Merus of pereopods with blunt spines on lower (flexor) surface . . . . . *Leipocten*
- Merus of pereopods without ventral spines . . . . . 9
9. Carapace without tubercles or transverse ridges dorsally. Anterolateral margins of carapace without teeth . . . . . 10
- Carapace with transverse dorsal ridges and tubercles. Anterolateral margins of carapace with distinct or indistinct teeth. (Third maxilliped with small lobe at anterolateral angle of merus near base of carpus. Male gonopod without distinct appendages) . . . . . 11
10. Male gonopods swollen distally, provided with 1 or more distal appendages, which are at least half as long as recurved part of shaft. Apex of gonopod usually lying well free from basal part of shaft. Carapace with greatest width before middle . . . . . *Paracleistostoma*
- Male gonopods tapering to narrow, pointed or blunt apex, not widened distally and without distal appendages. Gonopods so strongly recurved that tip lies over basal part of shaft. Carapace with greatest width behind middle . . . . . *Serenella*, new genus
11. Anterolateral margin of carapace with 2 teeth, of which posterior very distinct, larger than anterior. Lateral margins of carapace converging posteriorly. Chelipeds showing strong sexual dimorphism. Propodi of second to fifth pereopods longer than wide. Male gonopod not widened distally, distal margin deeply incised; morphological outer half of apex of gonopod slender and digitiform . . . . . *Telmatothrix*, new genus



Anterolateral margin of carapace with 2 low teeth, posteriormost less distinct than anterior. Lateral margins of carapace diverging posteriorly. Chelae of male small, of same shape and size as those of female. Propodi of second to fifth pereopods hardly longer than wide. Male gonopod slightly widened distally, without an appendage, apex of gonopod not incised; morphological outer half of apex of gonopod a wide and blunt lobe, wider than long . . . . . *Tylodiplax*

### Genus *Calabarium*, new genus

TYPE-SPECIES.—*Calabarium crinodytes*, new species.

ETYMOLOGY.—Derived from the type-locality, the New Calabar River; the gender of the generic name is neuter.

DIAGNOSIS.—A genus of Camptandriinae. Carapace flat and uneven, hardly wider than long, subhexagonal, with prominent front. Regions faintly indicated, with several elevations. Dorsal surface of carapace with sparse pubescence of short, curved, dark colored hairs, densest at elevations and at margins. Prominent front with wide V-shaped incision on anterior margin. Epigastric tubercles obscure, placed on base of front.

Anterolateral margins of carapace with distinct teeth. Posterior margin of orbits lying in single transverse line, showing no indentations.

Cornea well developed, but narrower than eyestalk. Antennules obliquely folded. Antennae entering orbit. Lower margin of orbit distinct in frontal view, suborbital ridge lying some distance below it; both showing only a few denticles.

Epistome short and concave, with anterior and posterior margins elevated. Third maxillipeds not filling oral cavity, distinct space present between anterior margin of merus of maxilliped and posterior margin of epistome. Merus about as long as ischium and partly covering exopod. Anterior margin of merus sloping backwards towards median line of body. Inner anterior angle of ischium produced obliquely forwards.

Chelipeds equal, those of males usually not enlarged, of about same size, or smaller, than those of females. Third and fourth pereopods longer than second and fifth. Merus of second to fifth pereopods with strong subdistal anterodorsal tooth, least pronounced in fifth leg. Dark

colored, curved short hairs and longer plumose soft setae present on legs.

Female abdomen with 7 somites, all somites free, abdomen broadly oval with apex slightly produced. Male abdomen elongate triangular, with the second, third, and fourth somites fused. First somite not wider than second, not reaching coxae of fifth pereopods. Abdomen narrowing suddenly at end of fourth and beginning of fifth somite, with definite constriction, so much so that gonopods partly exposed, even when abdomen fully pressed against thorax. Male gonopods are strongly recurved, ending in simple, narrow, drawn out apex.

REMARKS.—The shape of the carapace of *Calabarium* shows a remarkable resemblance to that of *Camptandrium*, being hexagonal with distinct anterolateral teeth and being almost as long as wide. Also the male abdomen, which is so strongly constricted that the gonopods become partly exposed, resembles that of *Camptandrium*. However, the fact that the male gonopods in *Calabarium* end in a single slender point and do not show distal appendages immediately distinguishes the present genus from the Indo-West Pacific *Camptandrium*. Furthermore, the walking legs in *Camptandrium* do not possess dorsal teeth, and in most species the chelipeds show a distinct sexual dimorphism. The male gonopod of *Calabarium* somewhat resembles that of *Deiratonotus*, but has the apex narrowly drawn out. *Deiratonotus* furthermore differs from *Calabarium* by the wide and ridged carapace, which is more quadrangular than hexagonal, by the unarmed anterolateral margins of the carapace, and by the walking legs, which do not show any dorsal teeth on the merus; also in *Deiratonotus* there is a strong sexual dimorphism in the chelipeds.

*Calabarium crinodytes*, new species

FIGURE 46

**MATERIAL EXAMINED.**—*Pillsbury Material*: None.

*Other Material*: Nigeria: New Calabar River at Okpo waterside, Niger delta, 04°52'N, 06°54'E, 25 Jul 1978, C. B. Powell, 2♂, 3♀ ov (one male is holotype) (L, W). Same locality, 7 Aug 1978, C. B. Powell, 2♂, 1 ♀ ov (W). Same locality, 15 Nov 1978, C. B. Powell, 11♂, 5♀ (3 ov) (L, W).

**DESCRIPTION.**—Carapace (Figure 46a) subhexagonal, slightly broader than long if lateral teeth included in width, slightly longer than broad exclusive of lateral teeth. Surface flat but uneven. Median area of carapace with following elevations from front to back: 2 indistinct epigastric, 2 submedian mesogastric, 2 submedian cardiac, 1 intestinal, latter five much stronger than epigastric, almost developed into tubercles. Each branchial region with 2 elevations, outermost placed slightly more posteriorly than innermost. Regions indistinctly indicated, cervical groove discernible. Lateral margins of carapace with strong tooth in anterior half, about twice as close to outer orbital angle as to posterolateral angle of carapace. This tooth about as strong as outer orbital tooth; between them are 2 smaller teeth on anterolateral margin. Posterior margin of orbit slightly sinuous, merging with lower orbital angle under broadly rounded curve. Neither orbital margin with incision, but lower orbital margin with distinct blunt tooth slightly before middle. Front horizontal, wide, anterior margin formed into 2 broad triangular teeth, each terminating in blunt point, separated by wide, V-shaped incision. Dorsal surface of carapace bearing short, stiff, dark brown, curved hairs, placed closest together on elevations and on margins. Few long, soft, plumose, uncolored hairs also present, especially on front.

Eyes (Figure 46a,b) almost filling orbits, tapering distally, with distinct cornea. Some short, dark brown hairs placed on anterior surface of eyestalk. Lower margin of orbit with narrow denticulated process near base of antenna. Lateral to this process lower orbital margin with 1 or 2 small teeth on inner part, remainder of margin un-

armed. Suborbital ridge lying distinctly behind and below orbit, with 2 denticles.

Antennules covered by front, folding obliquely. Antennae short, entering orbit, latter widely open at its base.

Epistome wide, somewhat concave, with anterior and posterior margins elevated, ridge-like; surface with some irregular pits.

Third maxillipeds (Figure 46b) not completely filling oral cavity, space present between anterior margin of merus and posterior margin of epistome. Outer margin of merus much longer than inner, anterior margin oblique. Outer anterior angle of merus produced, but not conspicuously so. Ischium about as long as merus, with inner anterior angle produced forward. Merus partly covering exopod.

First pereopods of male (Figure 46e) small, equal, much shorter than second pereopods and not always larger than chelipeds of female. Fingers of male cheliped about as long as palm. Tips of chelipeds hoof-shaped and closing, proximal half of cutting edges gaping. Cutting edge of dactylus with blunt tooth in proximal third, proximal half of cutting edge of fixed finger with several small denticles. Palm about twice as long as broad when not swollen, slightly longer than broad when swollen. Carpus somewhat shorter than palm, unarmed. Merus slightly shorter than chela, with inner and outer lower anterior angles broadly rounded. Ischium short, with tooth on inner margin and several tubercles near distal margin. All segments of first pereopod, up to palm, bearing stiff, short and curved, dark hairs similar to those on dorsal surface of carapace; a few long, soft, plumose hairs also present. Cheliped of female (Figure 46c) slightly more slender than that of small male. Fingers about as long as palm, with tips widely hoof-shaped and closing. Cutting edges of both fingers unarmed, except for small tooth on basal third of dactylus. Other segments of female cheliped similar to those of male but more slender.

Second pereopod (Figure 46f) reaching with carpus beyond front of carapace. Dactylus slender with curved, sharp tip, lacking teeth; some hairs

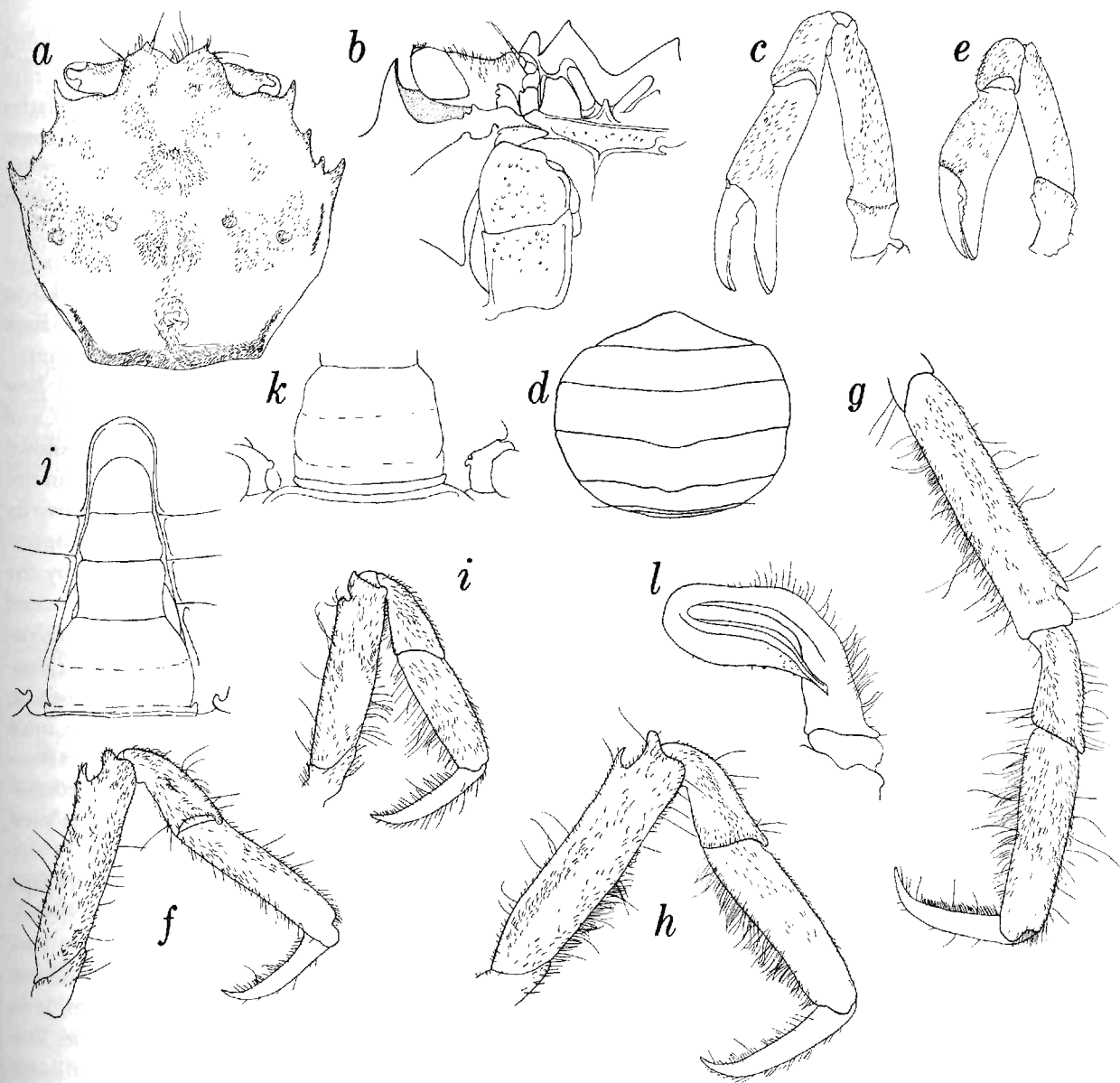


FIGURE 46.—*Calabarium crinodytes*, new genus, new species. Ovigerous female paratype: a, carapace; b, frontorbital region, ventral view; c, cheliped; d, abdomen. Male paratype: e, cheliped; f, second pereopod; g, third pereopod; h, fourth pereopod; i, fifth pereopod; j, abdomen in situ; k, basal part of abdomen. Holotype, male: l, gonopod.

implanted on both upper and lower margins. Propodus slightly less than 1.5 times as long as dactylus, slightly widening proximally, bearing usual dark, short, and curved setae and some longer plumose hairs. Carpus about as long as dactylus. Merus, slightly longer than propodus, conspicuous by having large, sharp, forwardly

curved, subdistal dorsal tooth. Pubescence of carpus and merus similar to that of propodus. Third leg (Figure 46g) longer and stronger than second, of about same structure and with same pubescence, except that lower margin of propodus and usually to lesser extent also that of merus, densely hairy, with numerous soft and long plumose hairs.

Fourth leg (Figure 46*h*) very similar in size, shape, and pubescence to third. Fifth leg (Figure 46*i*) distinctly shortest of all walking legs. Dactylus almost as long as propodus and longer than carpus. Subdistal short tooth of merus reduced to blunt lobe. In females legs longer and more slender than those of males, with short dark hairs more distinct and fewer long soft hairs.

Female abdomen (Figure 46*d*) wide, reaching to coxae of pereopods, broadly oval to almost circular, with all somites free. Seventh somite with apex somewhat broadly triangularly produced.

Male abdomen (Figure 46*j,k*) elongate triangular. First somite very short, about as wide as second, failing to reach base of fifth pereopod, separated from coxa of that leg by considerable distance. Second, third, and fourth abdominal somites fused, but lines between them rather distinct. Second somite shortest of the three, but longer than first. Deep incision in lateral margin of abdomen indicating separation of second and third somites. Third and fourth somites of about equal length, fourth narrowing distinctly in distal part. Fifth and sixth somites free, fifth much narrower than third or basal part of fourth, narrowest at base, widening distally. Sixth somite about as wide as fifth but somewhat shorter, narrowing slightly distally. Seventh somite about as long as fifth but somewhat shorter, distinctly narrower, ending in almost semicircular distal margin. Outer margin of depression in thoracic sternum, which receives abdomen when latter completely folded against body, regularly triangular in shape; apex of depression rounded like seventh abdominal somite, lateral margins not showing any constriction; space present between margin of depression and outer margin of abdomen at level of constriction between fourth and fifth somites filled by part of ventral surface of gonopods, latter partly exposed even when abdomen completely pressed against thorax.

Male gonopod (Figure 46*l*) with characteristic recurved shape of Camptandriinae. Anterior limit of curve just failing to reach separation between sternites of first and second pereopods. Gonopod

tapering regularly from base to top, widening somewhat in distal fourth, then narrowing rapidly to slender, sharp, drawn out point; latter simple, lacking appendages. Distal part of gonopod ornamented with few, scattered, minute tubercles, with some tubercles arranged in short row on inner margin proximal to tip.

MEASUREMENTS.—Carapace lengths of males 3.8 to 7.8 mm, of nonovigerous females 3.0 to 5.0 mm, of ovigerous females 5.5 to 9 mm. Eggs numerous and small, diameter 0.3 to 0.35 mm.

REMARKS.—The three new genera and new species, *Calabrium crinodytes*, *Ephantor modestus*, and *Telmatothrix powelli*, are so far the only known West African Camptandriinae. *Ephantor* can immediately be distinguished from the other two by the absence of anterolateral teeth on the carapace. The present new species is characterized by the shape of the front, which is more deeply incised anteriorly; furthermore, the chelipeds in *Telmatothrix* show a strong sexual dimorphism. *Telmatothrix* lacks the strong subdistal dorsal tooth on the merus of the walking legs. Also, the male abdomens and gonopods of the three species show significant differences, which necessitate recognition of a separate genus for each of the three West African species.

TYPE-LOCALITY.—New Calabar River at Okpo waterside, Niger Delta, Nigeria, 04°52'N, 06°54'E.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31950), a male, cl 5.7 mm, cb 6.3 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes have been deposited in that institution as well as in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

ETYMOLOGY.—The specific epithet is derived from the generic name of the aquatic lily, *crinum*, on which the species was found.

BIOLOGY.—Mr. C. B. Powell (in litt., 26 July 1978) informed us as follows:

Specimens were collected from submerged leaves of the aquatic lily *Crinum natans* Baker in the zone of mixed *Rhizophora* and *Pandanus* in the New Calabar River. The water at the site is nearly fresh, but the tidal range is about 2 meters

and there is considerable disturbance to the littoral zone caused by the wash from motorboats and barges moving at top speed—when they pass by, one has to scramble to shore to avoid the large waves. The other Malacostraca present are *Parorchestia* n. sp., *Cirolana*, n. sp., *Metastenasellus* n. sp., *Caridina africana* Kingsley, *Palaemonetes africanus* Balss, *Macrobrachium vollenhovenii* (Herklots), *M. felicinum* Holthuis, *Potamalpheops monodi* (Sollaud), *P. pylorus* Powell (a single specimen), a new *Potamalpheops*, *Telmatothrix powelli*, *Metagrapsus curvatus* (H. Milne Edwards), *Sesarma alberti* Rathbun, *S. angolense* De Brito Capello, *S. elegans* Herklots, and *S. buettikoferi* De Man.

Ovigerous females were collected in July, August, and November.

DISTRIBUTION.—Known only from the type-locality.

### Genus *Camptandrium* Stimpson, 1858

FIGURE 47

*Camptandrium* Stimpson, 1858b:106 [type-species: *Camptandrium sexdentatum* Stimpson, 1858, by monotypy; gender: neuter; name 289 on *Official List*].

DIAGNOSIS.—Carapace hexagonal rather than transversely quadrangular, with 2 or 3 anterolateral teeth, posteriormost reaching sideways. Surface of carapace flat, uneven, with elevations that may form longitudinal or transverse ridges. Epigastric lobes rather conspicuous, placed in basal part of front. Chelipeds equal, with conspicuous sexual dimorphism (except in the aberrant *C. elongatum*); dactylus in male with single tooth on cutting edge, tooth being absent from fixed finger; in female neither finger with tooth. Meri of pereopods without spines, but lower distal angle may be produced. First somite of male abdomen only slightly wider than second and not extending to coxae of fifth pereopods. Second to fifth somites of male abdomen fused, but lines between somites more or less distinctly visible. Abdomen gradually narrowing distally, but constricted at level of fifth somite so that gonopods partly visible, even when abdomen folded fully back against thorax. Male gonopods strongly recurved, each with apex somewhat swollen, ending in 2 long slender appendices, one practically straight, the

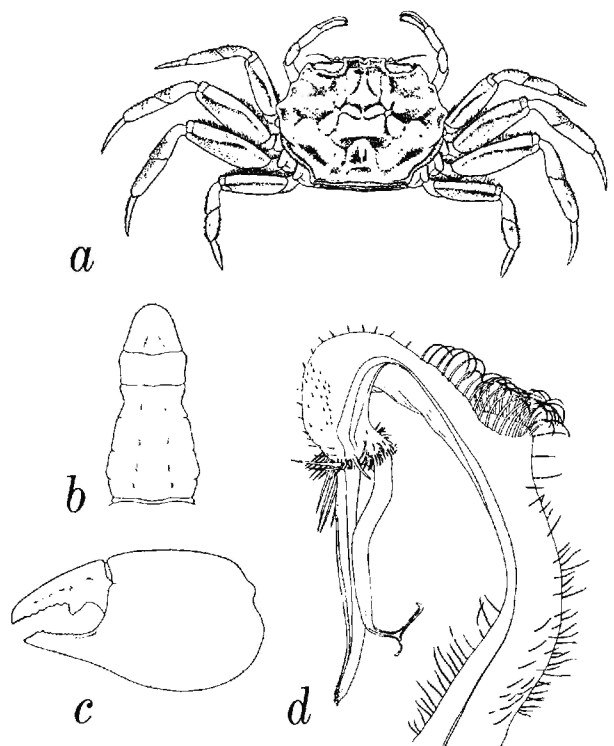


FIGURE 47.—*Camptandrium sexdentatum* Stimpson: *a*, female, dorsal view; *b*, male abdomen; *c*, male chela; *d*, gonopod. (All from Shen, 1932, figs. 138, 140a,c,e.)

other sinuous and longer of the two; appendages longer than recurved part of gonopod.

REMARKS.—Shen (1935:30) assigned the following four species to the genus *Camptandrium*: *C. sexdentatum* Stimpson, 1858 (Figure 47); *C. elongatum* Rathbun, 1929; *C. anomalum* Shen, 1935; and *C. paludicola* Rathbun, 1909. Since 1935 the following three new species have been described in *Camptandrium*: *C. starmuehlneri* Pretzmann, 1968; *C. ambonensis* Serène and Moosa, 1971; and *C. rathbunae* Takeda, 1972. In our opinion four of these species are true *Camptandrium*, viz., *C. sexdentatum*, *C. elongatum*, *C. ambonensis*, and *C. rathbunae*. *Camptandrium starmuehlneri* Pretzmann (1968:16; see also Pretzmann, 1969:5, figs 1–4), which is known only from the female holotype, probably is a good *Camptandrium* near *C. elongatum*; but since the shape of the abdomen and the gonopods of the male are not known, we are not quite certain of its generic status. Serène and Moosa (1971:6)

suggested that the species might belong either to the genera *Shenius* Serène or *Ilyograpsus* Barnard, which, however, seems unlikely. *Camptandrium paludicola* Rathbun belongs to the grapsid genus *Ilyograpsus* Barnard, 1955, being synonymous with the type and only known species of the genus, *Ilyograpsus rhizophorae* Barnard, 1955, the correct name of which thus is *Ilyograpsus paludicola* (Rathbun, 1909) (see Crosnier, 1965:31). *Camptandrium anomalum* Shen was removed from *Camptandrium* by Serène (1971:916, 917) and made the type of the new genus *Shenius* Serène. *Shenius* should be removed from the Camptandriinae because the male gonopods of *Shenius anomalus* (Shen) are not recurved. Serène (1974:60) placed the genus *Shenius* in the subfamily Scopimerinae. *Shenius* also was left out of his (1974:62–66) lists of the genera and species of Camptandriinae. However, it was included in Serène's (1974:66) key to the genera of Camptandriinae.

The range of the genus extends from India to Japan, Korea, the Malay Archipelago, and perhaps New Caledonia.

### Genus *Cleistostoma* de Haan, 1833

FIGURE 48

*Cleistostoma* de Haan, 1833:5, pl. B, pl. 7: fig. 3 [misspelled *Cleistotoma* on pl. 7] [type-species: *Ocyopode* (*Cleistostoma*) *dilatata* de Haan, 1833, by monotypy; gender: neuter].

DIAGNOSIS.—Carapace convex both in longitudinal and transverse directions, not showing any appreciable ridges dorsally, but evenly hairy with short, dark pubescence. Carapace quadrangular in outline, being wider than long. Epigastric ridges not very distinct, extending forward far beyond base of front. Latter shallowly concave in middle, with anterior margin rounded, lacking anterolateral lobes. Suborbital ridge reaching far forward, protruding beyond distinct lower orbital margin. Upper orbital margin showing no incisions. Anterolateral margin of carapace lacking teeth apart from outer orbital angle, continuing posteriorly into posterolateral margin. No additional carina present on posterolateral part of

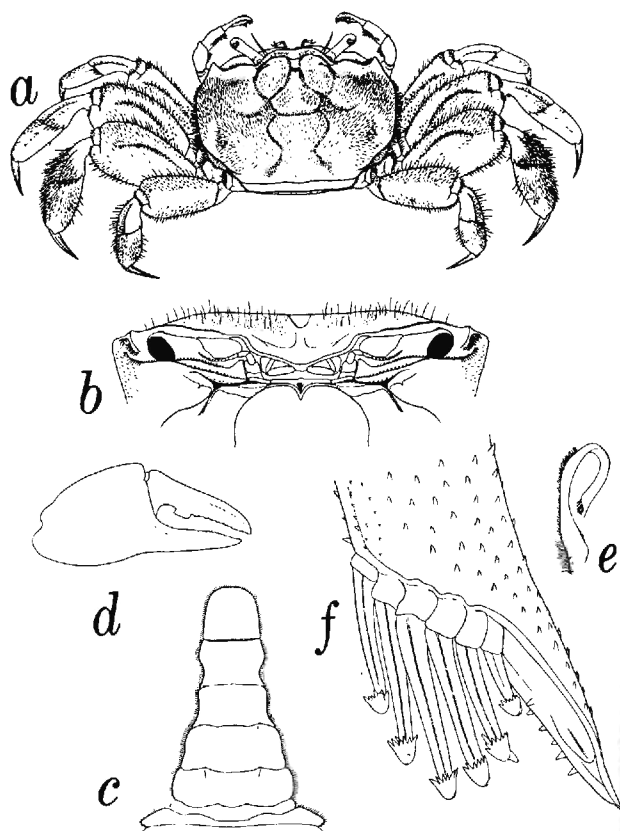


FIGURE 48.—*Cleistostoma dilatatum* (de Haan): a, female, dorsal view; b, male, frontal view; c, male abdomen; d, male chela; e, gonopod; f, tip of gonopod, enlarged. (From Shen, 1932, figs. 145, 146, 147b,c, 148.)

carapace. Chelipeds equal, left and right, but showing strong sexual dimorphism: much larger and stronger in male than in female and with different shape. Dactylus of male cheliped with distinct molariform tooth on cutting edge; such tooth absent on fixed finger of male cheliped or on either finger of that of female. Pereiopods lacking spines on merus. First somite of male abdomen very wide, reaching to coxae of fifth pereiopods; second somite much narrower. Second to fourth somites of male abdomen fused; fifth and sixth free. Lateral margins of abdomen somewhat sinuous, fitting snugly against thoracic sternum, covering gonopods completely. Strongly recurved male gonopods gradually narrowing toward apex, lacking distal appendages. Detailed figures of the type-species, *C. dilatatum*, are pro-

vided by Shen (1932:236, figs. 145-148, pl. 10; fig. 4).

REMARKS.—Guinot and Crosnier (1963) listed the following species as belonging to the genus *Cleistostoma*: *C. dilatatum* (de Haan, 1833) (Figure 48), *C. wardi* Rathbun, 1926, *C. dotilliforme* Alcock, 1900, *C. macneilli* Ward, 1933, *C. edwardsii* MacLeay, 1838, and *C. algoense* Barnard, 1954. We have examined material of all these species except *C. macneilli*. In our opinion, only *C. dilatatum*, the type-species of the genus, which is known from Japan, North China, and Korea, is a true *Cleistostoma*; all the other species should be transferred to other genera. *Cleistostoma wardi* and *C. dotilliforme*, perhaps also *C. macneilli*, are placed in the genus *Paracleistostoma* (p. 208), and *C. edwardsii* and *C. algoense* are referred below to the genus *Paratyloidiplax* (p. 209), as they differ in so many respects from *Cleistostoma* that it is impossible to assign them to that genus.

*Ocypode* (*Cleistostoma*) *dilatata* de Haan, 1833, is a senior homonym of *Ocypode* (*Macrophthalmus*) *dilatata* de Haan (1835:55, pl. 15: fig. 2). We propose the replacement name, *Macrophthalmus abbreviatus*, new name, for the invalid *Ocypode* (*Macrophthalmus*) *dilatata* de Haan, 1835, for which, so far as we can ascertain, no other name has ever been proposed. The epithet *abbreviatus* is chosen because de Haan (1835:26) himself used it for the species, be it as a nomen nudum.

In the original publication of the genus, de Haan (1833) used two different spellings: *Cleistostoma* in the text (p. 5) and on plate B, and *Cleistotoma* on plate 7: figure 3. In later parts of the *Fauna Japonica* de Haan was not consistent either; he mostly used *Cleistostoma* (part 2(1835): 26, 27, 55, 56; part 3(1837), pl. 16: fig. 1), but at the end used again *Cleistotoma* (part 7(1849):233, 234), namely in the index to the work. This 1849 use of *Cleistotoma* was perhaps because H. Milne Edwards (1837:67, 68) had adopted that spelling; de Haan in his index (1849:233) referred to "*Cleistotoma*, n. *Edw.*" From de Haan's original publication it is not clear which spelling is the correct one; neither de Haan's (1835, 1837, 1849) later uses of the two spellings, nor H. Milne Edwards'

(1837) use of *Cleistotoma*, indicates why a certain spelling is used. Thus none of these actions can be construed as first reviser actions. The actual first reviser is Dana (1852b:312, 313) who used the spelling *Cleistostoma*, and said in a footnote on p. 312 "not *Cleistotoma*." By Dana's action *Cleistostoma* is the correct spelling of the generic name; *Cleistotoma*, being an incorrect original spelling, has no nomenclatural standing.

Agassiz (1846:89, 90) emended *Cleistostoma* to *Clistotoma*. *Clistotoma* Agassiz, 1846, thus is an unjustified emendation of the incorrect original spelling, but this notwithstanding is an available name, even though it is invalid as a junior objective synonym of *Cleistostoma* de Haan, 1833.

### Genus *Deiratonotus*, new genus

FIGURE 49

TYPE-SPECIES.—*Paracleistostoma cristatum* De Man, 1895.

ETYMOLOGY.—From the Greek, *deirado* (ridge) and *noton* (back); gender of name is masculine.

DIAGNOSIS.—Carapace about quadrangular in outline, distinctly broader than long with lateral

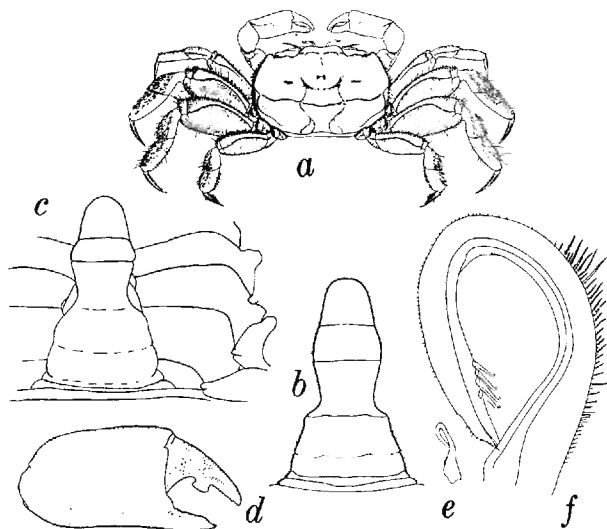


FIGURE 49.—*Deiratonotus cristatus* (De Man): a, male, dorsal view; b, male abdomen; c, abdomen in situ, male, cl. 7.5 mm, Japan; d, male chela; e, gonopod; f, tip of gonopod, enlarged (a,b,d-f from Shen, 1932, figs. 141, 143b,c, 144).