

**West African pinnotherid crabs,
 subfamily Pinnotherinae
 (Crustacea, Decapoda, Brachyura)**

by Raymond B. MANNING

Abstract. — Fifteen species of Pinnotherinae, nine new, are recognized from localities in West Africa and are assigned to six new genera, based on features of the carapace, third maxilliped, walking legs, gonopods, and male abdomen. The genera and their included species are : *Afropinnotheres*, for *A. crosnieri* sp. nov., *A. guinotae* sp. nov., *Pinnotheres larissae* Machkevskiy, and the type-species *A. monodi* sp. nov. ; *Alainotheres*, for *Pinnotheres leloeuffi* Crosnier ; *Ernestotheres*, for *Pinnotheres conicola* Manning and Holthuis ; *Hospitotheres*, for *H. powelli* sp. nov. ; *Nepinnotheres*, for *N. africanus* sp. nov., *N. androgynus* sp. nov., *N. lillyae* sp. nov., the type-species *Cancer pinnotheres* Linnaeus, *N. sanqueri* sp. nov., *Pinnotheres tellinae* Manning and Holthuis, and *N. viridis* sp. nov. ; and *Waldotheres*, for *Pinnotheres mccainae* Schmitt. The genus *Pinnotheres* is not represented in the West African fauna.

Résumé. — Quinze espèces de Pinnotherinae, dont neuf nouvelles, provenant de localités ouest-africaines, sont assignées à six genres nouveaux, fondés sur les caractères de la carapace, du troisième maxillipède, des péreopodes, des gonopodes, et de l'abdomen du mâle. Les genres et les espèces considérées sont : *Afropinnotheres*, pour *A. crosnieri* sp. nov., *A. guinotae* sp. nov., *Pinnotheres larissae* Machkevskiy, et l'espèce-type *A. monodi* sp. nov. ; *Alainotheres*, pour *Pinnotheres leloeuffi* Crosnier ; *Ernestotheres*, pour *Pinnotheres conicola* Manning et Holthuis ; *Hospitotheres*, pour *H. powelli* sp. nov. ; *Nepinnotheres*, pour *N. africanus* sp. nov., *N. androgynus* sp. nov., *N. lillyae* sp. nov., l'espèce type *Cancer pinnotheres* Linnaeus, *N. sanqueri* sp. nov., *Pinnotheres tellinae* Manning et Holthuis, et *N. viridis* sp. nov. ; et *Waldotheres*, pour *Pinnotheres mccainae* Schmitt. Le genre *Pinnotheres* n'est pas représenté dans les eaux ouest-africaines.

Key Words. — Decapoda, Brachyura, Pinnotheridae, pea crabs, commensal crabs, *Afropinnotheres*, *Alainotheres*, *Ernestotheres*, *Hospitotheres*, *Nepinnotheres*, *Waldotheres*, West Africa.

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INTRODUCTION

MANNING and HOLTHUIS (1981) reported that West African crabs of the subfamily Pinnotherinae comprised six nominal species and five unnamed species of the widespread genus *Pinnotheres* Bosc, 1802, including two of the five nominal species reported from European waters, *P. pisum* (Linnaeus, 1767) and *P. pinnotheres* (Linnaeus, 1758) ; MACHKEVSKIY (1992) added a seventh nominal species, *P. larissae*. More than 100 species have been recognized in the genus *Pinnotheres* (see SCHMITT, MCCAIN and DAVIDSON, 1973), and TESCH (1918 : 247)

commented that "As all these species are small and greatly alike ... the discrimination within the genus is very difficult ..." GORDON (1936 : 163) commented on the difficulty of determining species with the key provided by TESCH and noted that "The genus *Pinnotheres* ... is urgently in need of thorough revision."

Almost a century ago, BÜRGER (1895) introduced a variety of characters that could be used to distinguish species and groups of species of *Pinnotheres*, e.g., the shape and relative lengths of the distal segments of the third maxilliped, the shape of the carapace, the relative lengths of the dactyli of the walking legs, and the relative lengths of the walking legs. Few workers have adopted the characters used by BÜRGER, yet his study laid the groundwork for a revision of the genus by providing a suite of very distinctive characters usable at the generic level.

Many of the changes in generic names proposed here are based on features of the third maxilliped, especially the shape and relative lengths of the three segments of the palp. In 1933 Th. MONOD, in his paper on the Moroccan pinnotherids, showed three basic types of palps on the third maxillipeds; these figures are reproduced here (fig. 1). One type of palp is found in *Afropinnotheres*, gen. nov., with a short, conical propodus and very long, spatulate dactylus, inserted basally (fig. 1a). A second type is typical of *Pinnotheres* s.s., in which the propodus is long and spatulate, and the styliform dactylus is inserted basally and does not extend to the end of the propodus (fig. 1b). Another type of palp occurs in *Nepinnotheres*, gen. nov., in which the propodus is spatulate, and the slender dactylus is inserted near the midlength of the ventral margin of the propodus with its apex extending well beyond the apex of the dactylus (fig. 1c).

Ernesto CAMPOS is one of the first modern authors to employ some of the characters used by BÜRGER as generic characters and to use them to recognize genera for some species traditionally placed in *Pinnotheres*. In recent papers CAMPOS (1989a) revised *Orthotheses*; (1989b) introduced *Tumidotheses*, a new genus for *Pinnotheres maculatus* Say; (1990) introduced *Calyptraeotheses* for *Fabia granti* Glassell; with GRIFFITH (1990), introduced *Clypeasterophilus* for small-palped species previously placed in *Dissodactylus*; and (1993)

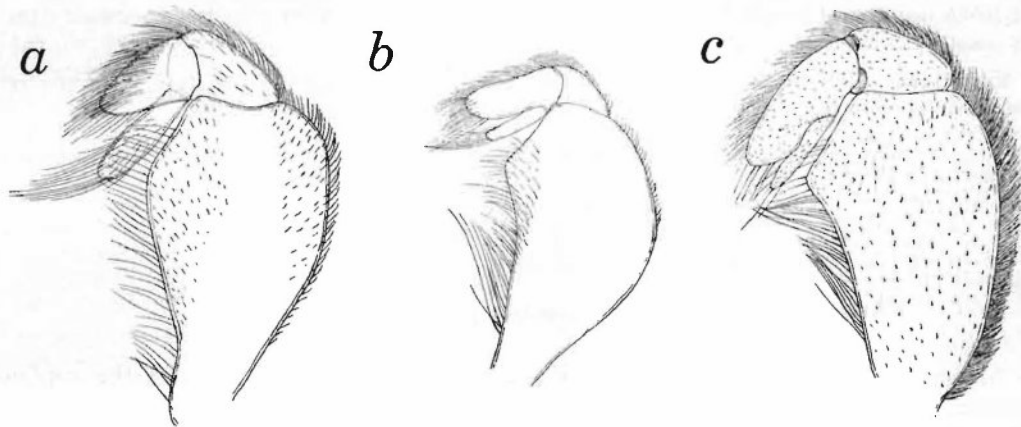


FIG. 1. — Third maxilliped : a, *Afropinnotheres monodi* sp. nov. ; b, *Pinnotheres pisum* (Linnaeus) ; c, *Nepinnotheres pinnotheres* (Linnaeus). (All from MONOD, 1933.)

named *Juxtafabia* for *Pinnotheres muliniarum* Rathbun. Many of the characters used by CAMPOS are summarized in his unpublished thesis (CAMPOS-GONZALEZ, 1988), which included a revision of *Fabia* Dana, 1851.

The present author (MANNING, 1993a) has removed three genera from the synonymy of *Pinnotheres* [type species *Cancer pisum* Linnaeus, 1767], namely *Arcotheres* Bürger, 1895 [type species *Pinnotheres palaensis* Bürger, 1895], *Holothuriophilus* Nauck, 1880 [type species *Holothuriophilus trapeziformis* Nauck, 1880], and *Zaops* Rathbun, 1900 [type species *Pinnotheres depressum* Say, 1817], and in a separate paper (MANNING, 1993b) has introduced a new genus and species with a two-segmented palp on the third maxilliped.

CHRISTENSEN and McDERMOTT (1958) have shown that members of *Zaops ostreum* (Say, 1817) (as *Pinnotheres ostreum*) go through several distinct stages between the invasive crab stage and the adult. Six stages were recognized for the female, pre-hard, hard (the masculine or copulatory stage), and four soft post-hard feminine stages, the last being the mature female; males die at the hard stage. At the invasive stage and the hard stage, the second (P3) and third (P4) walking legs are ornamented with long swimming setae on the carpus and propodus. PEARCE (1966, 1969) and CAMPOS (1989b) recognized a second type of reproductive cycle in which the crab infects an intermediate host, leaving it in the hard stage to copulate and infect the definitive host. Not enough information on the life cycle of West African species is available to determine if they follow either of these patterns, but in many species swimming setae are retained in adult females.

The revision at the generic level proposed here does not solve several problems posed by European species of *Pinnotheres*, including (1) whether material of *P. pisum* from the type locality, in North Africa, is conspecific with the Atlantic species that inhabits mussels; (2) the identity of *P. ascidicola* Hesse, 1872 and *P. marioni* Gourret, 1887, both reported to inhabit ascidians; and (3), the identity of material of *Nepinnotheres pinnotheres* from hosts other than bivalves of the genus *Pinna*. UDEKEM d'ACQZ (1989), working with material from Brittany, has shown that *P. petunculi* Hesse, 1872, from *Glycymeris* is distinct from *P. pisum* from mussels; both species appear to referable to *Pinnotheres sensu stricto*.

To simplify comparison of the six new genera for West African species recognized below (marked with an asterisk [*]), their characteristics and the characteristics of existing genera are summarized here in the form of a non-dichotomous key.

In members of all but one of the West African genera, the dactyli of the walking legs are of similar size and shape, although the dactylus of one or two legs may be of slightly different length than the remainder. In *Waldotheres* gen. nov, from West Africa, and the extra-limital genera *Arcotheres*, *Juxtafabia*, *Tumidotheres*, and *Zaops*, the dactylus of one or two legs can be as much as half again as long as some of the other dactyli and this is what is meant by the statement "dactyli dissimilar and unequal."

SYNOPSIS OF GENERA NOW RECOGNIZED IN THE PINNOTHERINAE

I. Dactyli of P2-P4 with bifurcate apex

Dissodactylus Smith, 1870

Clypeasterophilus Campos and Griffith, 1990

Dactyli of P2-P4 with simple apex 2

2. Carapace transversely rectangular or subrectangular, much wider than long
 - **Alainotheres* gen. nov.
 - Parapinnixa* Holmes, 1894
 - Sakaina* Serène, 1964
 - Scleroplax* Rathbun, 1893
 Carapace subcircular, subhexagonal or quadrangular 3
3. Mxp3 with 2-jointed palp
 - Calyptraeotheres* Campos, 1990
 - Epulotheres* Manning, 1993
 - Ostracotheres* Milne Edwards, 1853
 - Xanthasia* White, 1846
 Mxp3 with 3-jointed palp 4
4. Dactylus of Mxp3 inserted at tip of propodus
 - Orthotheres* Sakai, 1969 (see CAMPOS, 1989a)
 Dactylus of Mxp3 inserted subdistally on propodus 5
5. Carapace with median ridge
 - Durckheimia* De Man, 1889
 Carapace lacking median ridge 6
6. Carapace with 2 longitudinal depressions anteriorly
 - Fabia* Dana, 1851
 Carapace lacking 2 longitudinal depressions anteriorly 7
7. Carapace with distinct triangular rostrum and 3 longitudinal postfrontal grooves
 - Limotheres* Holthuis, 1975
 Carapace lacking distinct triangular rostrum and 3 longitudinal postfrontal grooves 8
8. Ischium and merus of Mxp3 separated by a distinct suture
 - Pinnaxodes* Heller, 1865
 Ischium and merus of Mxp3 indistinguishably fused 9
9. Male abdomen with 6 somites 10
 - Male abdomen with 7 somites 11
10. Male abdomen with somites 5 and 6 fused. Dactyli of walking legs subequal
 - **Ernestotheres* gen. nov.
 Male abdomen with somites 4 and 5 fused. Dactylus of P5 longest of dactyli of walking legs
 - Juxtafabia* Campos, 1993
11. Dactyli of walking legs unequal and dissimilar
 - a. Dactylus of P3 longest
 - **Waldotheres* gen. nov.
 - b. Dactyli of P4 and P5 longest
 - Arcotheres* Bürger, 1895
 - c. Dactylus of P5 longest
 - Tumidotheres* Campos, 1989
 - Zaops* Rathbun, 1900
 Dactyli of walking legs subequal and similar
 - a. Carapace quadrangular, Mxp3 dactylus broadly spatulate
 - Holothuriophilus* Nauck, 1880
 - b. Carapace subhexagonal or subcircular, Mxp3 dactylus slender
 - **Afropinnotheres* gen. nov.
 - **Hospitotheres* gen. nov.
 - **Nepinnotheres* gen. nov.
 - Pinnotheres* Bosc, 1802

In the accounts below, size is characterized as small when the carapace length is 5 mm or less, medium from 6-10 mm, large from 11-15 mm, and very large, more than 15 mm. Relative leg proportions are based on the proportions of the propodus of the longest leg : stout, length twice height or less (as in *A. leloeuffi*) ; slender, length 2.5 to 4.5 times height ; and very slender, length 5 times height or more (as in *W. mccainae*). Relative length of the walking legs often is reflected by the merus alone and is given in decreasing order in the diagnoses. Abbreviations used in the text include cb (carapace width), cl (carapace length), del. (drawn by), km (kilometers), leg. (collected by or collector), m (meters), mm (millimeters), Mxp3 (third maxilliped), and P1-5 (pereopods, P1 being the chela, P2-P5 the walking legs). Measurements are given as cl × cb, in mm. Coordinates that have been added to original data are from gazetteers of the U. S. Board on Geographic Names and are given in brackets.

This work is based in large part on material from the collections of the Muséum national d'Histoire naturelle, Paris, which now contains representatives of almost all of the species of Pinnotherinae known from West Africa. The revision proposed here could not have been carried out without access to this valuable collection.

The following abbreviations are used for institutions : IRSN, Institut Royal des Sciences Naturelles de Belgique, Brussels ; MNHN-B, brachyuran catalogue, Muséum national d'Histoire naturelle, Paris ; RMNH, Nationaal Natuurhistorisch Museum, Leiden (formerly Rijksmuseum van Natuurlijke Historie) ; USNM, National Museum of Natural History, Smithsonian Institution, Washington.

KEY TO EASTERN ATLANTIC PINNOTHERID GENERA

1. Mxp3 with ischium and merus separate, dactylus terminal (Asthenognathinae)..... [Asthenognathus Stimpson, 1858]
- Mxp3 with ischium and merus indistinguishably fused, dactylus subterminal (Pinnotherinae).... 2
2. Carapace subrectangular, distinctly broader than long [Mxp3 with dactylus inserted near midlength of propodus. Male telson acutely triangular] *Alainotheres* gen. nov., p. 141
- Carapace subcircular or subhexagonal, length and width subequal or width slightly greater.... 3
3. Dactylus of P3 longer than dactyli of other walking legs. [P3 longest of all walking legs. P3 in female 50% longer than P2 or P4. Mxp3 with dactylus inserted near midlength of propodus]..... *Waldotheres* gen. nov., p. 170
- Dactylus of P3 subequal to dactyli of other legs. [P3, if longest walking leg, not 50% longer than P2 or P4]. 4
4. Mxp3 with propodus shorter than carpus. [Mxp3 propodus conical, tapering distally] *Afropinnotheres* gen. nov., p. 130
- Mxp3 with propodus longer than carpus. [Mxp3 propodus oval or spatulate] 5
5. Walking legs of both sexes with dorsal and ventral fringes of long setae on merus, carpus and propodus. Male with 6 somites in abdomen, somites 5 and 6 fused. [Mxp3 suboperculiform] *Ernestotheres* gen. nov., p. 143
- Walking legs not fringed dorsally and ventrally with long setae. Male with 7 somites in abdomen . 6
6. Propodus of walking legs expanded distally in female. Male telson twice as broad as long. Mxp3 suboperculiform *Hospitotheres* gen. nov., p. 146
- Propodus of walking legs not expanded distally in female. Male telson almost as long as broad. Mxp3 elongate 7

7. Dactylus of Mxp3 styliform, inserted at base of ventral margin of propodus, apex not extending to end of propodus [*Pinnotheres*]
Dactylus of Mxp3 styliform or spatulate, inserted at or near midlength of ventral margin of propodus, apex extending to or overreaching end of propodus *Nepinnotheres* gen. nov., p. 150

AFROPINNOTHERES gen. nov.

DIAGNOSIS

Carapace subcircular, width greater than length, regions poorly defined. Mxp3 (fig. 1a) exopod with flagellum; ischium and merus indistinguishably fused, elongate; palp 3-segmented; propodus shorter than carpus, conical; dactylus spatulate, inserted near base of ventral margin of propodus, apex extending well beyond end of propodus. Walking legs subequal right and left; P3 or P4 longest of walking legs; dactyli of walking legs more than half as long as propodus, similar in shape and size. Abdomen of 7 somites in each sex; male abdomen slender, about twice as wide as telson at base, margins convergent. Male telson length and width subequal, apex rounded. Male gonopod simple.

ETYMOLOGY. — The generic name is modified from the Latin, *africa*, and combined with the generic name *Pinnotheres*. Gender masculine.

TYPE SPECIES. — *Afropinnotheres monodi* sp. nov., by present designation.

REMARKS

The relatively short, conical propodus on the third maxilliped, shorter than the carpus, and the spatulate dactylus, inserted basally on the ventral margin of the propodus and extending well beyond the end of the propodus, are characteristic of this genus. In members of *Pinnotheres* proper the third maxilliped has the spatulate propodus longer than the carpus and has a styliform dactylus, inserted at or near the base of the ventral margin of the propodus, and the tip of the dactylus does not extend to the tip of the propodus.

In this genus the carapace is rather high anterolaterally with a vertical slope at the hepatic regions. A poorly-defined edge extends posteriorly from the orbits and this disappears posterolaterally. At the lateral extremities of the carapace the true lateral margin can be seen below this ridge. At its highest level the carapace appears subcircular; at its lowest level it appears to be subhexagonal.

KEY TO MALES OF WEST AFRICAN *Afropinnotheres*

1. Carpus longer than propodus on all pereopods 2
Carpus subequal to propodus on all pereopods 3
2. Surface of carapace completely covered with coat of appressed setae. Gonopod with sharp point at apex. Size medium, cl to more than 6 mm *A. guinotae* sp. nov., p. 134

- Surface of carapace naked. Gonopod with blunt apex. Size small, cl less than 4 mm *A. larissae*, p. 136
3. P5 short, 0.7-0.75 times as long as P4, usually falling short of propodus of P4. Legs largely naked, tomentose ventrally..... *A. crosnieri* sp. nov., p. 131
- P5 long, 0.8-0.9 times as long as P4, extending almost to end of propodus of P4. Legs covered with low tomentum, especially ventrally..... *A. monodi* sp. nov., p. 141

KEY TO KNOWN FEMALES OF WEST AFRICAN *Afropinnotheres*

1. Dactylus of P5 longest of all dactyli of walking legs..... *A. larissae*, p. 136
Dactylus of P5 not longest of all dactyli of walking legs..... 2
2. P5 short, less than 0.8 times as long as P4, usually not extending to base of propodus of P4. Dactylus of longer walking legs subequal to or slightly shorter than respective propodus *A. crosnieri* sp. nov., p. 131
- P5 long, 0.9 times or more as long as P4, usually extending to midlength of propodus of P4. Dactylus of longer walking legs distinctly shorter than respective propodus... *A. monodi* sp. nov., p. 139

***Afropinnotheres crosnieri* sp. nov.**

(Figs. 2-4)

?*Pinnotheres pinnotheres*; BALSS, 1922 : 79 [Cameroon ; Gabon] [not *Pinnotheres pinnotheres* (Linnaeus, 1758) = *Nepinnotheres pinnotheres*].

MATERIAL EXAMINED. — Congo : Baie de Pointe-Noire [4°47'S, 11°51'E], dredging, 1955, leg. A. CROSNIER : 3♂ (2.8 × 3.1, 3.0 × 3.4, 3.2 × 3.6 mm), 2 post-hard non-ovigerous ♀ (1.9 × 2.1, 3.4 × 3.9 mm, both with narrow abdomen, smaller with ♂ abdomen and ♀ pleopods), 4 ovigerous ♀ (3.9 × 4.8, 4.3 × 5.0, 4.3 × 5.2, 4.7 × 5.6 mm) (largest ovigerous female is holotype, MNHN-B 10643 ; 1♂, 1 ovigerous ♀ with stalked growths on legs is paratype, USNM 264739 ; other specimens are paratypes, MNHN-B 22708). — Baie de Pointe-Noire, oyster grates, 18.XI.1968 ; leg. A. CROSNIER : 1 post-hard ♀ (4.4 × 5.3 mm, with narrow abdomen) (paratype, MNHN-B 10641).

ETYMOLOGY. — Named in honor of Alain CROSNIER, friend, colleague, and collector extraordinaire, who, while stationed at Pointe-Noire and elsewhere, occupied himself well in making valuable collections.

DIAGNOSIS

Post-hard female (figs. 2-3) : Size small to medium, cl less than 6 mm. Carapace naked dorsally, with low tomentum laterally. Front scarcely projecting beyond outline of carapace. Cheliped with movable finger longer than palm, height of palm slightly less than length ; opposable margin of each finger with tooth. Walking legs moderately stout, relative lengths $P3 \geq P4 > P2 > P5$; P5 short, usually not extending to base of propodus of P4 ; largest ovigerous female lacking swimming setae, setae present in other females ; walking legs tomentose ventrally. Dactyli of walking legs subequal in length, each subequal to or only slightly shorter than respective propodus. Abdomen of ovigerous females extending to bases of legs and to buccal area.

Male (fig. 4) : Size small, cl less than 3.5 mm. Carapace with low tomentum laterally. Front projecting, transverse. Chela with movable finger longer than palm, height and length

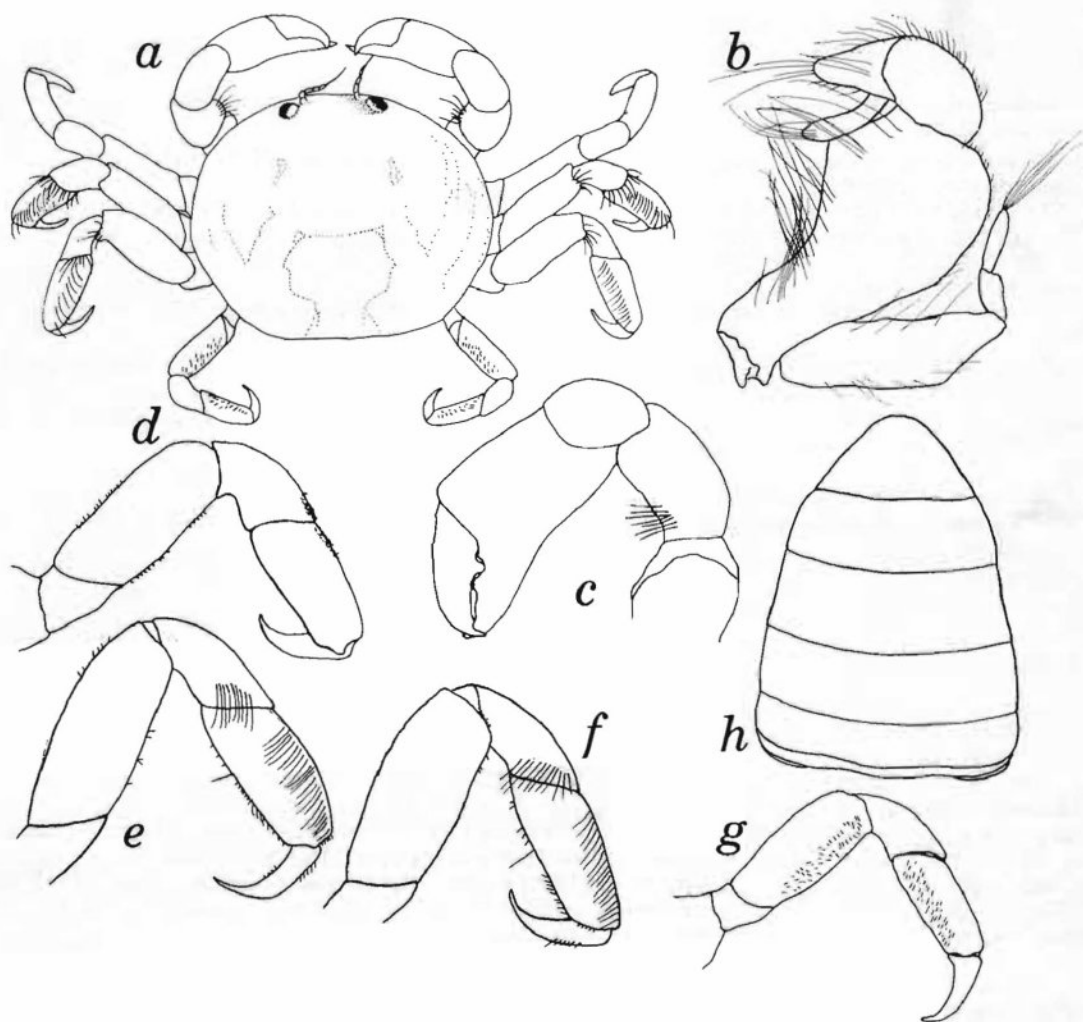


FIG. 2. — *Afropinnotheres crosnieri* sp. nov., post-hard female paratype, 4.4 × 5.3 mm, Congo : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen.

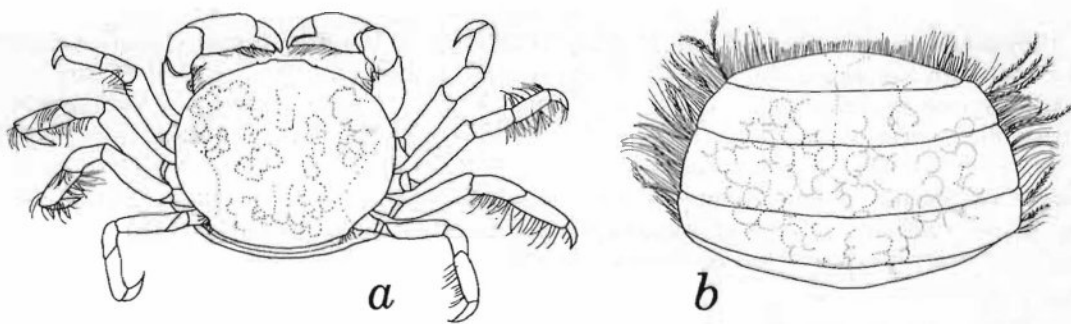


FIG. 3. — *Afropinnotheres crosnieri* sp. nov., post-hard ovigerous female paratype, 4.3 × 5.0 mm, Congo : a, dorsal view ; b, abdomen.

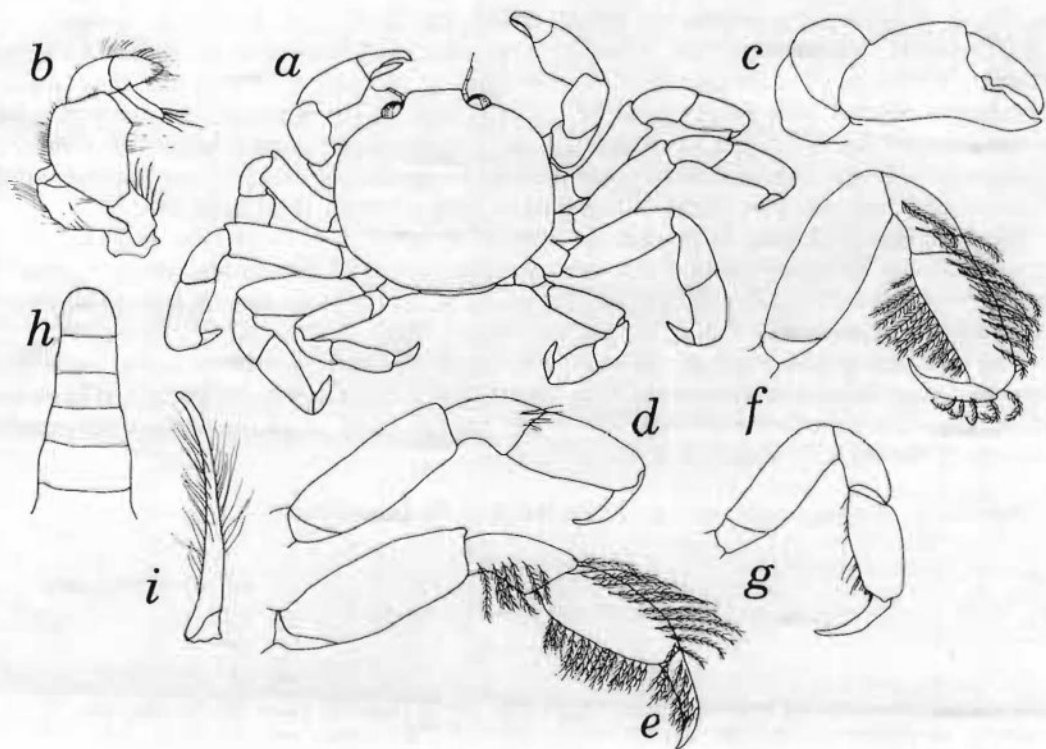


FIG. 4. — *Afropinnotheres crosnieri* sp. nov., male paratype, 3.2 x 3.6 mm, Congo : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen ; i, gonopod.

of palm subequal ; opposable margin of each finger with tooth. Walking legs relatively stout, relative lengths $P3 \geq P4 > P2 > P5$; P5 short, usually not extending to propodus of P4 ; swimming setae present on P3 and P4 ; legs tomentose ventrally. Dactyli of walking legs subequal, each subequal to its respective propodus ; carpus subequal to propodus on P2-P5. Abdomen widest at third somite, tapering to rounded telson. Gonopod tapering to rounded tip.

SIZE. — Males (3), 2.8 x 3.1 to 3.2 x 3.6 mm ; non-ovigerous females (3), 1.9 x 2.1 to 4.4 x 5.3 mm ; ovigerous females (4), 3.9 x 4.8 to 4.7 x 5.6 mm.

HOST. — One specimen was taken from oyster grates.

HABITAT. — Apparently in shallow water ; most specimens were taken by dredging.

REMARKS

This is the smallest species of the genus, with the carapace of adult females less than 5 mm long. As in *A. larissae* the carapace is largely naked, but males of *A. larissae* have the carpus of the pereopods longer than their respective propodus, and females of *A. larissae* have the dactylus of P5 longer than the dactyli of the other legs. In the male of *A. guinotae*, the carapace is completely covered with setae, the carpus of each walking leg is longer than the propodus, and the gonopod has a sharp tubercle apically. In contrast to *A. crosnieri*, adults of *A. monodi* are larger, have longer legs, and many more setae on the surface of the carapace and legs; adult females have a very elongate chela with a field of long setae on their inner face.

I believe that it is most likely that the species reported from Cameroon and Gabon by BALSS (1922) can be identified with this species rather than with any of the several species of *Nepinnotheres*, all sublittoral shelf species. According to L. TIEFENBACHER (*in litt.*, 10.VI.1991), BALSS's specimens were lost during the Second World War.

The carapace is firm in all of the examined specimens, and all specimens but the largest ovigerous female have swimming setae. One female, 4.3 × 5.2 mm, has stalked growths on the walking legs. The smallest specimen, which has several pairs of pleopods and the slender abdomen of the male, evidently is a young female.

RANGE. — Known with certainty from the Baie de Pointe-Noire, Congo.

Afropinnotheres guinotae sp. nov.

(Figs. 5-6)

Pinnotheres sp.; GUINOT and RIBEIRO, 1962 : 13, 64, figs. 30-33 [Baía de Santa Marta, Angola].

Pinnotheres sp.; SCHMITT, McCAIN and DAVIDSON, 1973 : 94; MANNING and HOLTHUIS, 1981 : 191.

MATERIAL EXAMINED. — Angola : Baía de Santa Marta (Doca Sem Fundo) [13°51'S, 12°28'E], among mussels on rocks, 4 IX 1951 : 1♂ (6.6 × 7.7 mm) (holotype, MNHN-B 10585).

ETYMOLOGY. — Named in honor of Dr. Danièle GUINOT whose pioneering studies on the systematics and classification of brachyuran crabs has added so much to our knowledge and understanding of these animals.

DIAGNOSIS

Male (figs. 5-6) : Size medium, cl less than 7 mm. Carapace and appendages completely covered with appressed setae. Front bilobed, projecting. Chela with movable finger slightly longer than palm; height of palm subequal to length; opposable margin of dactylus with 1 tooth, of fixed finger with 2 low teeth. Walking legs stout, relative lengths P3 > P4 > P2 > P5; P5 short, not extending to propodus of P4; swimming setae present on P3 and P4; legs completely covered with appressed setae. Dactylus of P5 shortest, 0.9 times as long as propodus; dactyli of P2-P4 3/4 as long as propodus; carpus longer than propodus on all legs. Abdomen widest at third somite, tapering to rounded telson. Gonopod with sharp apical projection.

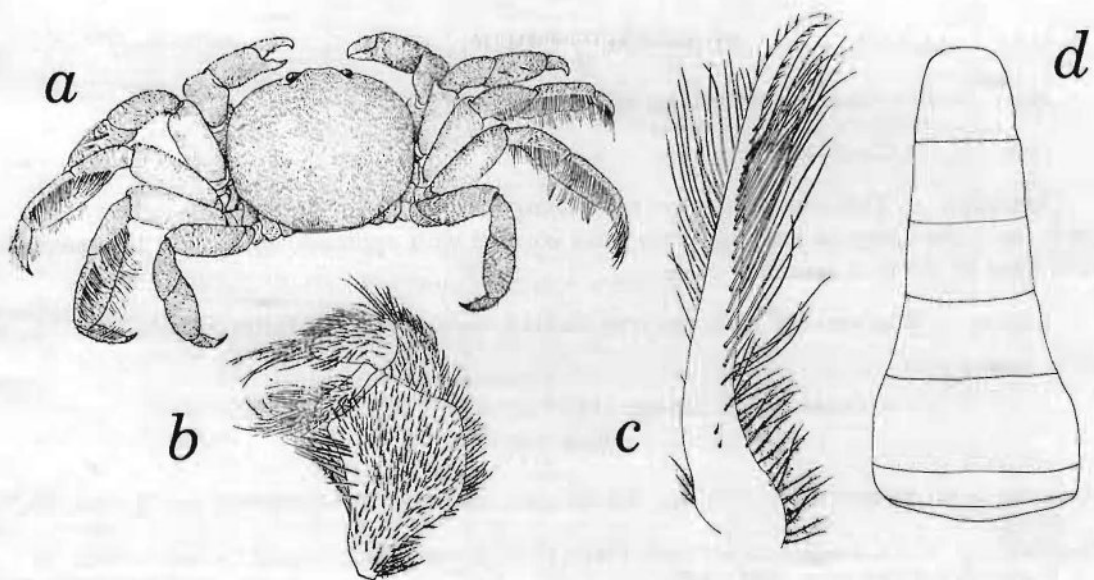


FIG. 5. — *Afropinnotheres guinotae* sp. nov., male holotype, 6.6 x 7.7 mm, Angola : a, dorsal view ; b, Mxp 3 ; c, gonopod ; d, abdomen. (a-c from GUNOT and RIBEIRO, 1962.)

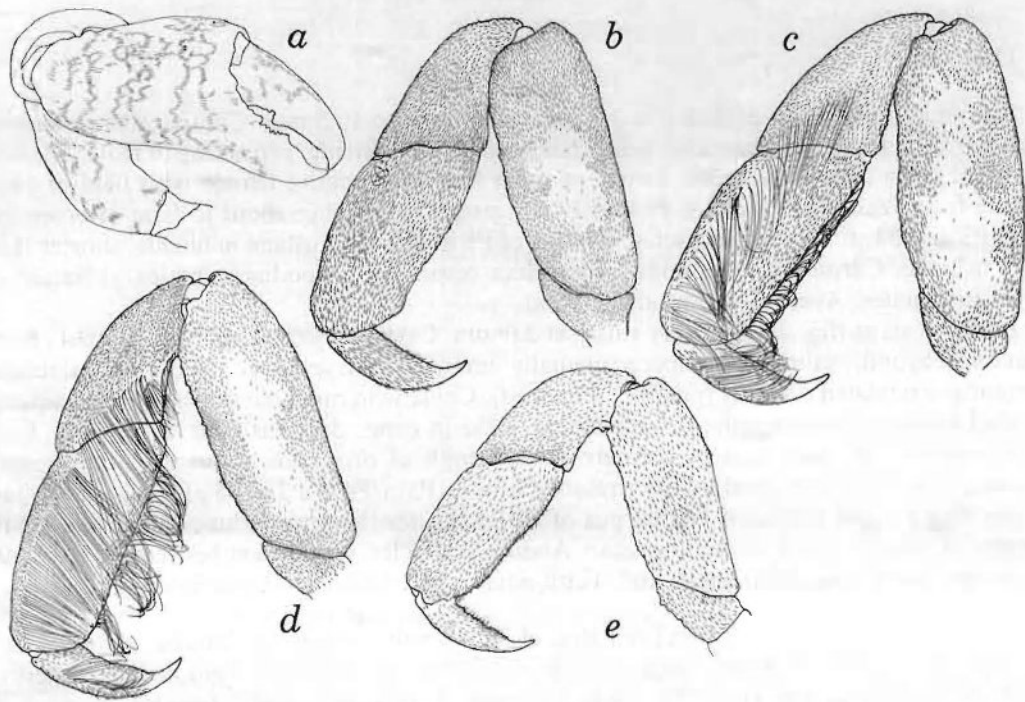


FIG. 6. — *Afropinnotheres guinotae* sp. nov., male holotype, 6.6 x 7.7 mm, Angola : a-e, P1-P5.

SIZE. — Male (1), 6.6 × 7.7 mm.

HOST. — In a bivalve mollusk, an unnamed mussel.

HABITAT. — Shore, on rocks.

REMARKS. — This species has the most conspicuous coat of setae of any species in the genus, with the carapace and legs completely covered with appressed setae. The carapace is quite hard in the only specimen examined.

RANGE. — Known only from the type locality, Baía de Santa Marta, Angola.

***Afropinnotheres larissae* (Machkevskiy, 1992) comb. nov.**

(Figs. 7-9)

Pinnotheres sp. A ; MONOD, 1956 : 376, figs. 502-507 [part, specimens from Sankouta, near Toubacouta, Senegal].

Pinnotheres sp. A ; SILAS and ALAGARSWAMI, 1967 : 1213 ; SCHMITT, McCAIN and DAVIDSON, 1973 : 91 ; MANNING and HOLTHUIS, 1981 : 190.

Pinnotheres larissae Machkevskiy, 1992 : 83, figs. 1-3 [Kaloum peninsula, Guinea].

MATERIAL EXAMINED. — Ivory Coast : Grand-Bassam [5°12'N, 3°44'W], depth 19 m, 13 VI 1973, leg. P. LE LOEUFF : 1 pre-hard stage, 2.0 × 2.0 mm (MNHN-B 22707).

DIAGNOSIS

Size small to large, cl of males to 3.3 mm, of females to 10.5 mm. Carapace hard, surface naked dorsally, tomentose laterally. Front not projecting in female, projecting in male, bilobed. Fingers of chela as long as palm, height of palm less than length ; female with field of setae on inner face. Walking legs stout, P3 and P4 longest, P5 extending about to base of propodus of P4 ; P3 and P4 with swimming setae. Dactyli of P5 longer than others in female, shorter than others in male. Carpus of pereopods longer than respective propodus in males, subequal or shorter in females. Apex of gonopod unarmed.

Pre-hard stage (fig. 9) : Size very small, cl 2.0 mm. Carapace length and width equal ; front projecting beyond outline of carapace, medially emarginate. Eyes large. Mxp3 with dactylus apparently articulated dorsally (possibly damaged). Chela with movable finger as long as palm, height of palm less than length ; fingers gaping, setae in gape ; dactylus with basal tooth, fixed finger unarmed. Walking legs moderately stout, length of propodus about 2.5 times height, flattened, arched dorsally, paddle-like ; relative lengths P3 > P4 > P2 > P5 ; P5 very short, just overreaching base of carpus of P4 ; carpus of P2-P5 shorter than propodus ; dactylus of P2-P5 subequal ; P3 and P4 with swimming setae. Abdomen slender, constricted between sixth somite and telson ; latter rounded, length and width equal. No pleopods or gonopores visible.

SIZE. — Males, cl 1.9-3.3 mm ; females, cl 3-10.5 mm ; ovigerous females, cl 7-10.5 mm (MACHKEVSKIY, 1992) ; pre-hard stage (1), 2.0 × 2.0 mm. MONOD (1933) studied an ovigerous female 10 × 12 mm and in (1956) studied a male, 2 × 2 mm, and 5 females, up to 9 × 10 mm.

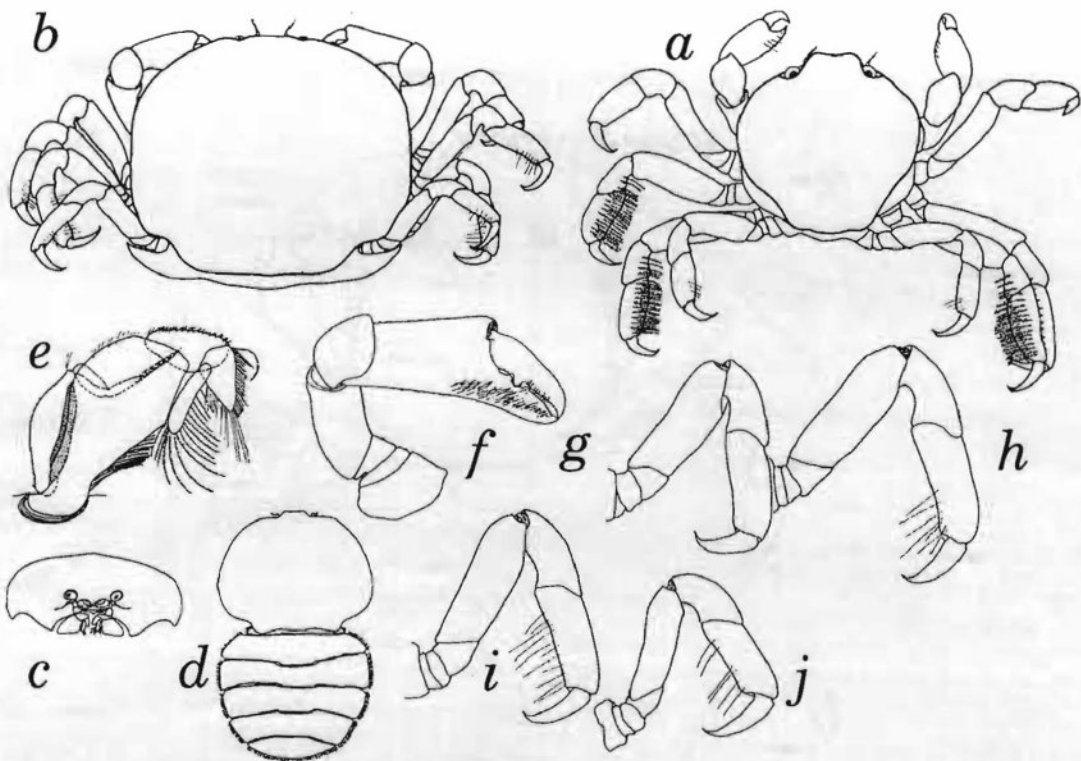


FIG. 7. — *Afropinnotheres larissae* (Machkevskiy), Guinea : a, male, dorsal view ; b, female, dorsal view ; c, female, anterior view of carapace ; d, female, carapace and abdomen ; e, MXP3 ; f-j, P1-P5. (All from MACHKEVSKIY, 1992.)

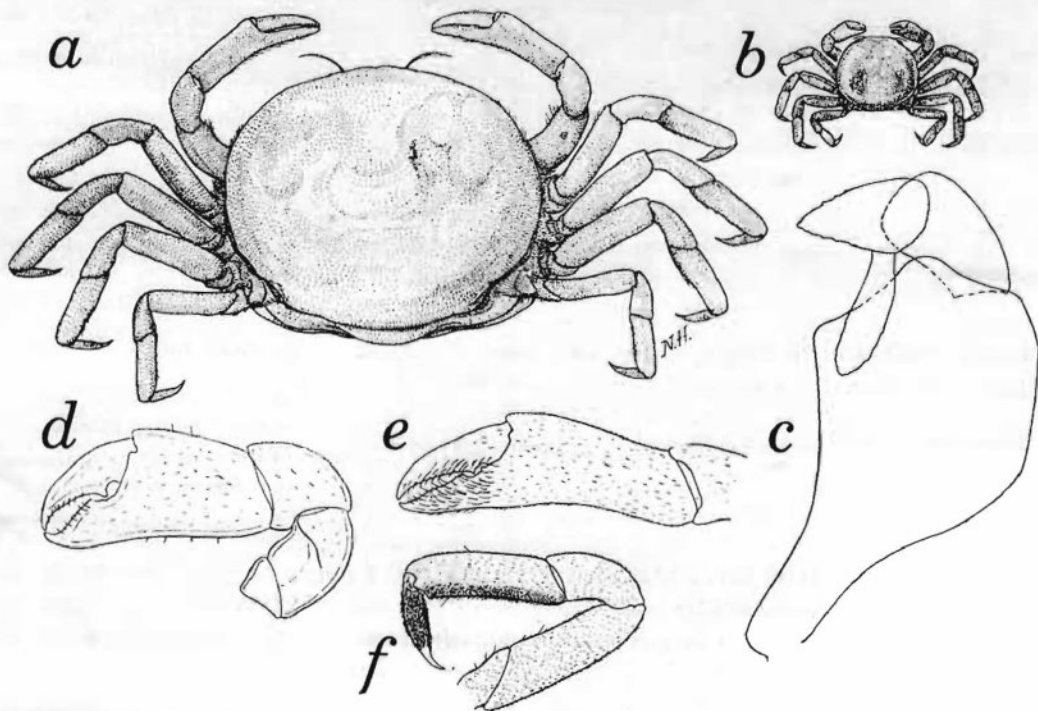


FIG. 8. — *Afropinnotheres larissae* (Machkevskiy), Senegal : a, female ; b, male ; c, Mxp3 ; d, chela of male ; e, chela of female ; f, P5 of female. (All from MONOD, 1956.)

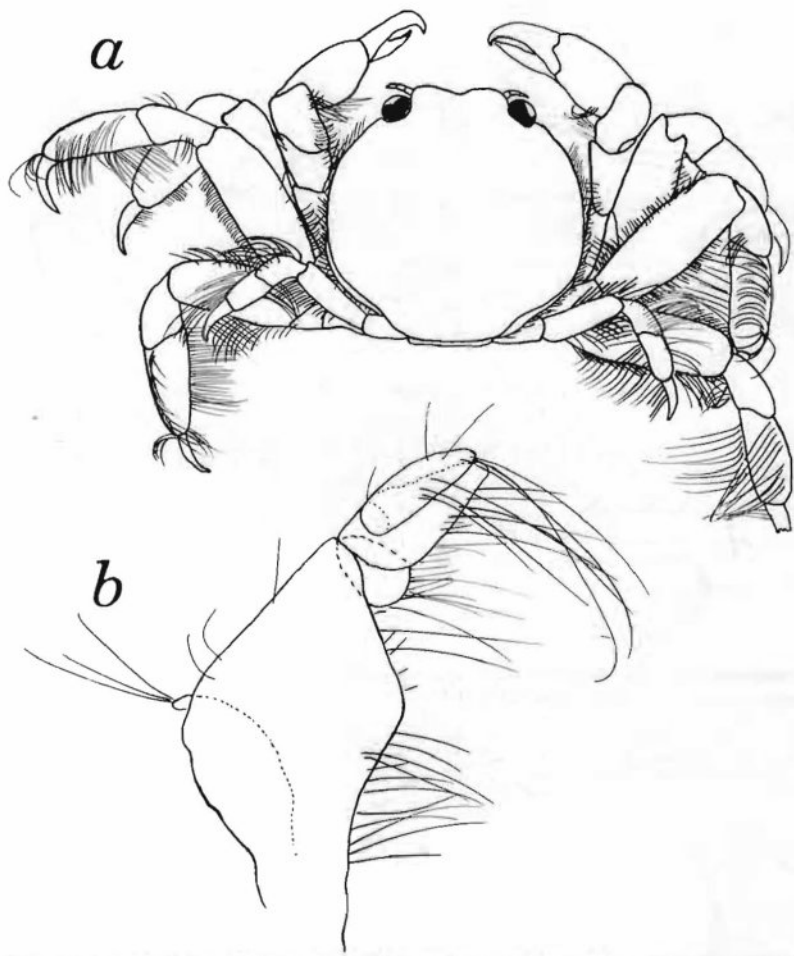


FIG. 9. — *Afropinnotheres larissae* (Machkevskiy), pre-hard stage, 2.0 × 2.0 mm, Ivory Coast : a, dorsal view ; b, Mxp3 (damaged).

HOST. — Bivalve mollusks, family Ostreidae, the oyster *Crassostrea tulipa* (Lamarck) (MONOD, 1956, as *Ostraea gasar* (Adanson); MACHKEVSKIY, 1992).

HABITAT. — Shore, on rocks and in mangrove estuaries.

REMARKS

My first reaction upon seeing MACHKEVSKIY's account of *Pinnotheres larissae* was that all of the other species recognized here in *Afropinnotheres* were identifiable with it. The differences in leg proportions, size, and in surface setation convinced me that all of the taxa recognized here are distinct.

Females of *A. larissae* differ from those of the other species in having the dactylus of P5 longer than the dactyli of P2-P4, and males, which are very small, agree with the much larger male of *A. guinotae* in having the carpus of the pereopods longer than the propodus, but differ from that species in their smaller size, naked carapace, and gonopod with a rounded apex.

Both *A. larissae* and the more northern *A. monodi* live in oysters, and it may be that all members of this genus share that host.

The emarginate front of the pre-hard stage shown in fig. 9 suggests that it belongs to this species, as MACHKEVSKIY showed the bilobed front in males that he examined. The conical propodus on the damaged MXP3 confirms that the pre-hard stage is a member of *Afropinnotheres*, but the specimen cannot be identified unequivocally.

RANGE. — Known with certainty from Sankouta, near Toubacouta [? = Toubakouta, 13°14'N, 15°47'W], Senegal (MONOD, 1956); the Kaloum peninsula [= Presqu'île de Camayenne, 9°33'N, 13°40'W], Guinea (MACHKEVSKIY, 1992); and possibly from the Ivory Coast.

***Afropinnotheres monodi* sp. nov.**

(Figs. 1a, 10-11)

Pinnotheres pisum; MONOD, 1933 : 143, figs. 2D, 3B,D [not fig. 2A = *Nepinnotheres pinnotheres*] [Moulay bou Selham, Atlantic coast of Morocco]; CAPART, 1951 : 175 [Port-Étienne, Mauritania]; MONOD, 1956 : 375 [part]; FOREST and GANTES, 1960 : 353 [Sous, Oued Massa, Atlantic coast of Morocco]; MANNING and HOLTHUIS, 1981 : 187 [part]. [Not *P. pisum* (Linnaeus, 1767).]
Pinnotheres spec.; FRANSEN, 1991 : 57, 166 [Baie de Cansado, Mauritania].

MATERIAL EXAMINED. — **Morocco, Atlantic coast** : Sous, a little north of mouth of Oued Massa [30°05'N, 9°40'W], XI.1953, leg. RUNGS : 1♂ (4.5 × 4.5 mm [gonopods and abdomen missing]), 7 post-hard ♀ (3.1 × 3.4, with narrow abdomen of ♂, 6.4 × 7.6, 6.5 × 7.8, 6.8 × 8.5, 7.6 × 9.4, 7.8 × 9.0, 8.0 × 9.0 mm) (largest ♀ is holotype, MNHN-B 10646; 1♀ is paratype, USNM 264740; other specimens are paratypes, MNHN-B 22706). — **Mauritania** : Baie de Cansado, 20°54'N, 17°02'W, depth 0-6 m, on shipwreck (partly above water), scuba diving, snorkeling, 6 VI 1988, CANCAP Sta. MAU.003 : 1 ovigerous ♀ (12.1 × 13.6 mm) (paratype, RMNH D.41151). Port-Étienne [20°54'N, 17°04'W], depth 0-5 m, 5.XI.1935, *Mercator* Expedition : 1 post-hard ♀ (10.0 × 11.5 mm) (paratype, IRSN 10910).

ETYMOLOGY. — This species is dedicated to Th. MONOD, whose monumental work on the West African crabs laid the foundation for all subsequent work on that fauna.

DIAGNOSIS

Post-hard female (fig. 10) : Size medium to large, cl to 12 mm. Carapace and appendages with scattered setae, surface of carapace firm. Front scarcely projecting beyond outline of carapace. Chela with movable finger as long as palm, height of palm less than length; opposable margins of fingers each with tooth; inner face of palm with field of setae at base of movable finger. Walking legs moderately slender, relative lengths P3 > P4 > P2 > P5; P5 relatively long, usually extending to midlength of propodus of P4; swimming setae absent; legs

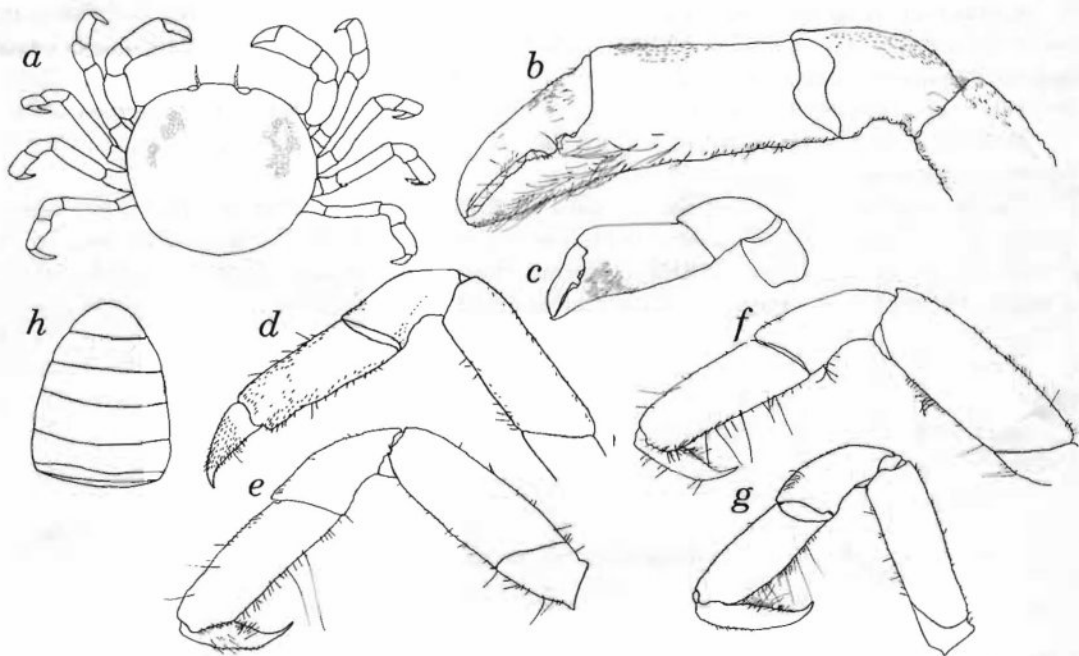


FIG. 10. — *Afropinnotheres monodi* sp. nov., female paratype, 3.1 x 3.4 mm (a, c-h), Morocco : a, dorsal view ; c-g, P1-P5 ; h, abdomen. Female paratype, 10.0 x 11.5 mm, Mauritania : b, cheliped.

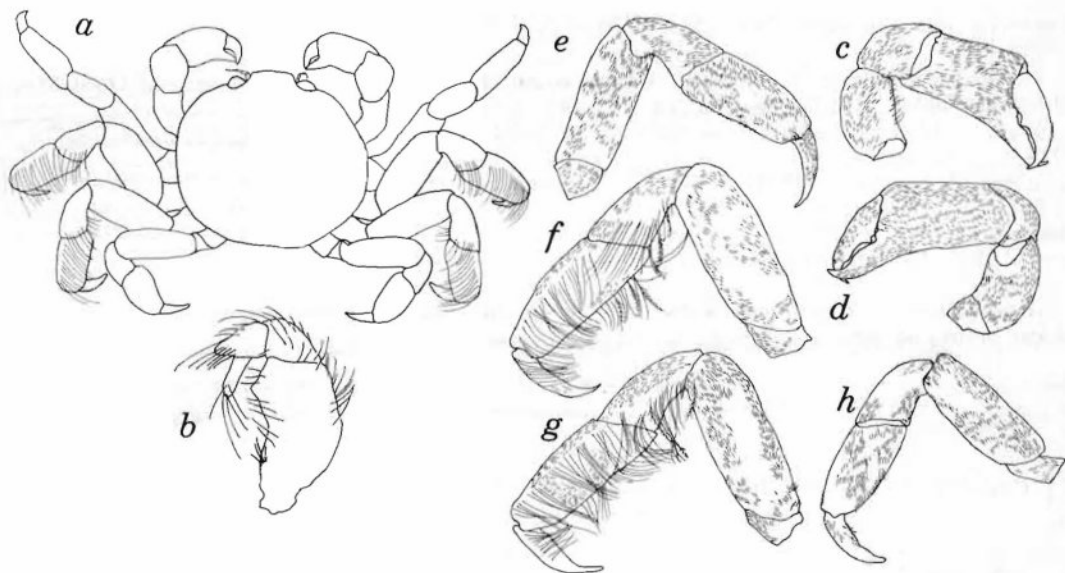


FIG. 11. — *Afropinnotheres monodi* sp. nov., male paratype, 4.5 x 4.5 mm, Morocco : a, dorsal view ; b, Mxp3 ; c-h, P1-P5.

with low setae, tomentose ventrally. Dactyli of walking legs subequal in length, each (especially on longer legs) distinctly shorter than respective propodus. Abdomen of ovigerous females extending to bases of legs and to buccal area.

Male (fig. 11) : Size small, cl less than 5 mm. Carapace lightly setose dorsally. Front projecting, transverse. Chela with movable finger as long as palm, height of palm less than length ; opposable margin of each finger with tooth. Walking legs relatively slender, relative lengths $P3 > P4 > P2 > P5$; P5 long, extending beyond base of propodus of P4 ; swimming setae present on P3 and P4 ; legs tomentose ventrally. Dactyli of walking legs subequal, each shorter than its respective propodus ; carpus subequal to propodus on P2 to P5. Abdomen widest at third somite, tapering to rounded telson. Gonopod unknown.

SIZE. — Male (1), 4.5 × 4.5 mm ; non-ovigerous females (8), 3.1 × 3.4 to 10.0 × 11.5 mm ; ovigerous female (1), 12.1 × 13.6 mm.

HOST. — Unknown.

HABITAT. — Shore.

REMARKS. — This species differs from *A. larissae* in several features. In the male the carpus is shorter than the propodus on all legs and in the female the dactyli of the walking legs are subequal.

RANGE. — Atlantic coast of Africa from the lagoon of Moulay bou Selham [Moulay Bouselham, 35°00'N, 6°22'W] (MONOD, 1933) and the mouth of Oued Massa, at Sous (FOREST and GANTÈS, 1960), Morocco ; and Baie de Cansado (FRANSEN, 1991) and Port-Étienne (CAPART, 1951), Mauritania.

ALAINOTHERES gen. nov.

DIAGNOSIS

Carapace subrectangular, distinctly broader than long, regions poorly defined. Mxp3 exopod with flagellum ; ischium and merus indistinguishably fused ; palp 3-segmented ; propodus longer than carpus, spatulate ; dactylus slender, inserted near midlength of ventral margin of propodus, apex falling short of end of propodus. Walking legs subequal right and left, legs stout in male ; P3 longest of walking legs ; dactyli of walking legs subequal and similar, 0.8-1.0 times as long as propodus. Male abdomen with 7 free somites, broad, about 3 times as wide as telson at base, margins converging towards telson ; latter broader than long, with triangular apex. Male gonopod simple. Male only known.

ETYMOLOGY. — Named in honor of Alain CROSNIER, colleague, friend, and author of the type species, and the Latin ending *-theres*. Gender masculine.

TYPE SPECIES. — *Pinnotheres leloeffi* Crosnier, 1969, by present designation and monotypy.

REMARKS

The wide carapace and the broad, triangular abdomen of the male will distinguish the member of this genus from members of other genera known from West Africa.

Although CAMPOS (1989b : 673) suggested that this species might belong in the genus *Tumidotheres* Campos, 1989, I believe that it cannot be accommodated there. *Alainotheres* differs from *Tumidotheres* in lacking distinct regions on the carapace, and it differs from that genus and all of the other genera recognized here in having a broad, subrectangular carapace, a triangular abdomen, with the margins convergent posteriorly rather than subparallel, and a triangular rather than rounded telson in the male. The Mxp3 of *Alainotheres* does resemble that of *Tumidotheres* (see CAMPOS, 1989b : fig. 2b).

CROSNIER (1969 : 531) mentioned that the ischiomeral suture on the third maxilliped was visible but it is not shown in his figure ; it is very faint and is evident only on the mesial part of the appendage. It may be an artifact.

Alainotheres leloeffi (Crosnier, 1969) comb. nov.

(Fig. 12)

Pinnotheres leloeffi Crosnier, 1969 : 531, figs. 1-10, 17 [Vridi, Ivory Coast]; SCHMITT, McCAIN and DAVIDSON, 1973 : 52; MANNING and HOLTHUIS, 1981 : 185 [no records].
Pinnotheres leleouffi; CAMPOS, 1989b : 673 [erroneous spelling].

MATERIAL EXAMINED. — Ivory Coast : Vridi, 5°14'N, 4°02'W, depth 20 m, dredging, reddish-brown sand, 30.IX.1966, leg. P. LE LOEUFF : 1♂ (2.8 × 3.7 mm) (holotype, MNHN-B 10654).

DIAGNOSIS

Male : Size small, cl less than 3 mm. Carapace 1.3 times wider than long. Front bilobed, produced anteriorly. Eyes large, orbits half frontal width. Chela with movable finger longer than palm, height and length of palm subequal ; opposable margin of each finger with low, obtuse tooth. Walking legs stout, length of propodus of P3 twice height ; relative lengths, P3 > P4 > P2 > P5 ; P5 extending to base of dactylus of P4 ; carpus of P2-P5 subequal to propodus ; dactyli of walking legs subequal.

SIZE. — Male (1), 2.8 × 3.7 mm.

HOST. — Unknown.

HABITAT. — Sublittoral, at a depth of 20 meters on sand.

RANGE. — Known from the type locality, Vridi, Ivory Coast.

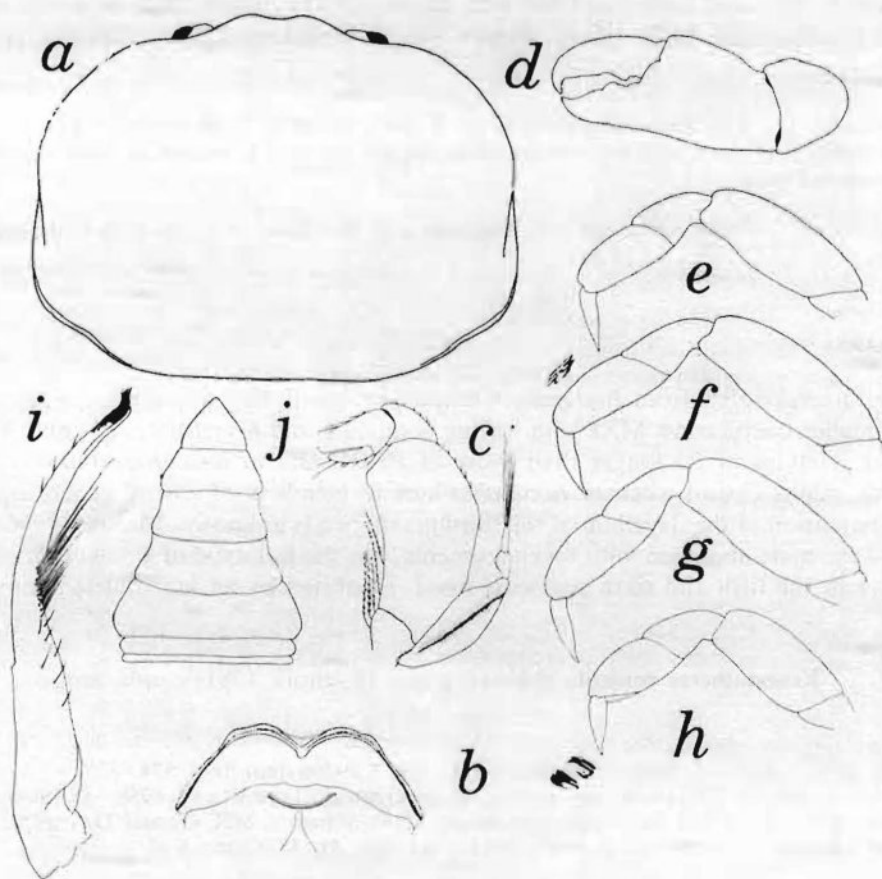


FIG. 12. — *Alainotheres leloeufti* (Crosnier), male holotype, 2.8 x 3.7 mm, Ivory Coast : a, carapace ; b, buccal frame ; c, Mxp3 ; d-h, P1-P5 ; i, gonopod ; j, abdomen.

ERNESTOTHERES gen. nov.

DIAGNOSIS

Carapace subcircular, width slightly greater than length. Mxp3 with status of exopod unknown ; ischium and merus indistinguishably fused, suboperculiform ; palp 3-segmented ; propodus longer than carpus, spatulate ; dactylus very slender, inserted near midlength of ventral margin of propodus, apex not extending to end of propodus. Walking legs subequal right and left, stout in male ; P3 barely longest of walking legs ; dactyli of walking legs similar

and subequal ; dactylus of longest walking leg almost as long as propodus. Male abdomen of 6 free somites, fifth and sixth fused but with suture, slender, about twice as wide as telson at base, sides subparallel. Male telson slightly longer than broad, with rounded apex. Male gonopod simple.

ETYMOLOGY. — The name is dedicated to Ernesto CAMPOS, Universidad Autónoma de Baja California, Mexico, whose studies on American pinnotherids provided a framework and a stimulus for the revision proposed here.

TYPE SPECIES. — *Pinnotheres conicola* Manning and Holthuis, 1981, by present designation and monotypy.

REMARKS

Ernestotheres differs from *Juxtafabia* Campos, 1993 in having a much larger propodus and a much smaller dactylus on MXP3, in having somites 5 and 6 rather than 4 and 5 fused, in having the dactylus of P5 longer than those of P2-P4, and in host. *Ernestotheres* occurs in gastropods, genus *Conus*, whereas *Juxtafabia* lives in members of several genera of bivalves.

The condition of the flagellum of the third maxilliped is unknown. MONOD (1956 : fig. 508) illustrated the male abdomen with seven segments, but the holotype of *C. conicola* clearly had only six, with the fifth and sixth segments fused, separated by an incomplete suture.

Ernestotheres conicola (Manning and Holthuis, 1981) comb. nov.

(Figs. 13-15)

Pinnotheres sp. C ; MONOD, 1956 : 380, figs. 508, 509, 526-538 [not figs. 524, 525 = *Nepinnotheres androgynus* nov. sp.] [Sierra Leone and Conakry, Guinea] ; LONGHURST, 1958 : 88 [Sierra Leone].
Pinnotheres sp. C ; SILAS and ALAGARSWAMI, 1967 : 1214 ; SCHMITT, McCAIN and DAVIDSON, 1973 : 92.
Pinnotheres conicola Manning and Holthuis, 1981 : 182, figs. 41, 42 [Cameroon].

MATERIAL EXAMINED. — None.

DIAGNOSIS

Size medium to large, cl of males to 10 mm, of females to 15 mm. Carapace subcircular, slightly wider than long in both sexes, lateral margins with fringe of long soft setae. Chelipeds with fingers almost as long as palm, latter longer than high ; upper surface of chela pilose, lower half of palm naked, much of remainder of palm ornamented with long setae. Walking legs stout, length of propodus less than twice height on P2-P5 ; relative lengths, P3 > P2 = P4 > P5 ; dactyli appearing very short but each almost as long as respective propodus, length of propodus less than twice height on all legs ; carpus longer than propodus on all legs (from MANNING and HOLTHUIS, 1981).

SIZE. — Males, 9 × 11, 9.5 × 10, and 10 × 11.5 mm ; ovigerous female, 15 × 18 mm ; non-ovigerous female, 8 × 9 mm (MONOD, 1956 ; MANNING and HOLTHUIS, 1981).

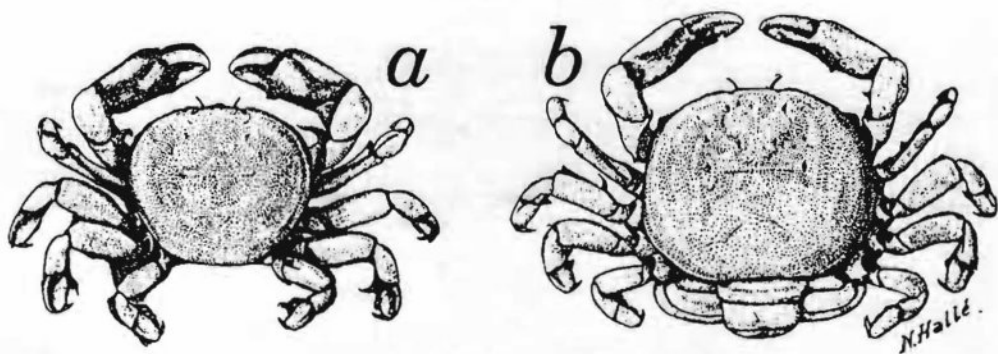


FIG. 13. — *Ernestotheres conicola* (Manning and Holthuis), Guinea : a, male ; b, female. (From MONOD, 1956.)

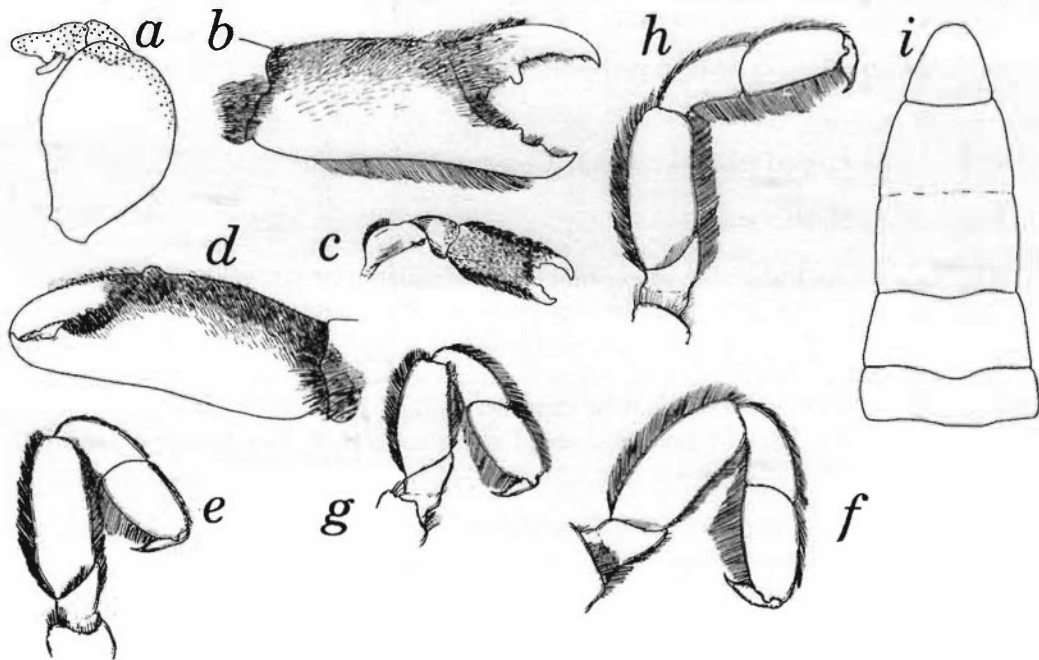


FIG. 14. — *Ernestotheres conicola* (Manning and Holthuis), Guinea : a, Mxp3 ; b-d, chelipeds of female ; e-h, P2-P5 ; Cameroon : i, abdomen of holotype. (a-h from MONOD, 1956 ; i from MANNING and HOLTHUIS, 1981.)



FIG. 15. — *Ernestotheres conicola* (Manning and Holthuis), male holotype, 10 × 11.5 mm, Cameroon : Mxp3 (del. C. FRANSEN).

HOST. — Gastropod mollusks, family Conidae, genus *Conus*.

HABITAT. — Shore.

REMARKS. — As I was able to examine no new material of this species, I have restricted the diagnosis to a summary of the description in MANNING and HOLTHUIS (1981).

MANNING and HOLTHUIS (1981 : 183) suggested that *Pinnotheres* sp. D sensu MONOD, 1956 might be conspecific with *E. conicola*. MONOD's material was not available for this study, but I believe that MONOD's sp. D cannot be identified with *E. conicola*, as its Mxp3 is much too slender ; it resembles that of representatives of *Nepinnotheres* ; I have tentatively identified it with *N. africanus* sp. nov., below.

RANGE. — West Africa, from Conakry, Guinea ; Sierra Leone ; Kribi, Cameroon [2°57'N, 9°55'E] ; and Pointe-Noire, Congo.

HOSPITOTHERES gen. nov.

DIAGNOSIS

Carapace subcircular, width greater than length, regions poorly defined. Mxp3 exopod with flagellum ; ischium and merus indistinguishably fused, suboperculiform ; palp 3-segmented ; propodus much longer than carpus, spatulate ; dactylus slender, inserted near

midlength of ventral margin of propodus, apex falling short of end of propodus. Walking legs subequal right and left, legs slender in female, stouter in male; propodi distally club-shaped in female; P3 longest of walking legs; dactyli of walking legs similar in shape, slightly different in size; dactylus of longest legs about half as long as propodus. Abdomen of 7 somites in each sex; male abdomen slender, almost as wide as telson at base, margins subparallel; male telson much broader than long. Male gonopod with strong subapical bend, curving outward, then anteriorly.

ETYMOLOGY. — From the Latin, *hospita*, guest or host, in combination with the Latin ending *-theres*. The name reflects the occurrence of this species together with a callianassid and a shrimp. Gender masculine.

TYPE SPECIES. — *Hospitotheres powelli* sp. nov., by present designation and monotypy.

REMARKS. — The broad, suboperculiform shape of the third maxilliped, with the long propodus and very short dactylus, the broad telson in the male, and the curved apex of the gonopod are diagnostic for this genus. All other West African pinnotherids treated here have a gonopod that forms a straight, tapering tube.

***Hospitotheres powelli* sp. nov.**

(Figs. 16-17)

MATERIAL EXAMINED. — Nigeria: Opuadakiri, right bank of Bonny River, about 25 km SW of Port Harcourt, 4°35.7'N, 7°10.4'E, 15/16 X 1985, leg. C. B. POWELL: 6♂ (3.2 × 3.5, 3.3 × 3.5, 3.5 × 3.8, 3.5 × 3.9, 3.6 × 3.9, 3.9 × 4.0 mm), 4 post-hard non-ovigerous ♀ (3.5 × 3.9, 5.3 × 6.0, 5.9 × 6.6, 6.5 × 6.8 mm), 2 ovigerous ♀ (5.0 × 5.2, 5.3 × 5.8 mm) (non-ovigerous ♀, 5.3 × 6.0 mm, is holotype, USNM 264741; 1♂, 3.2 × 3.5 mm, and 1♀, 6.5 × 6.8 mm, are paratypes, MNHN-B 22712; remaining specimens are paratypes, USNM 264742).

ETYMOLOGY. — Named for C. B. POWELL, University of Port Harcourt, who collected the material and whose observations on the freshwater fauna of the region have revealed the presence of many previously unrecognized species.

DIAGNOSIS

Post-hard female (fig. 16): Size medium, cl to 6.5 mm. Carapace smooth, widest posteriorly. Front projecting slightly. Chela with movable finger slightly longer than palm, height and length of palm subequal; opposable margin of movable finger with large rounded tooth, of fixed finger with rectangular tooth. Walking legs slender, length of propodus of P3 more than 3.5 times height; relative lengths, P3 > P4 > P2 > P5; P5 extending about to midlength of propodus of P4; carpus shorter than propodus on P2-P5; dactyli of P3 and P4 slightly longer than remainder; propodi of P2-P4 distinctly club-shaped, widest distally; legs ornamented with numerous scattered setae, denser on carpus, propodus, and dactylus, those segments appearing furry, setation not obscuring surface of segments; P3 and P4 lacking swimming setae. Abdomen of ovigerous females extending beyond bases of legs.

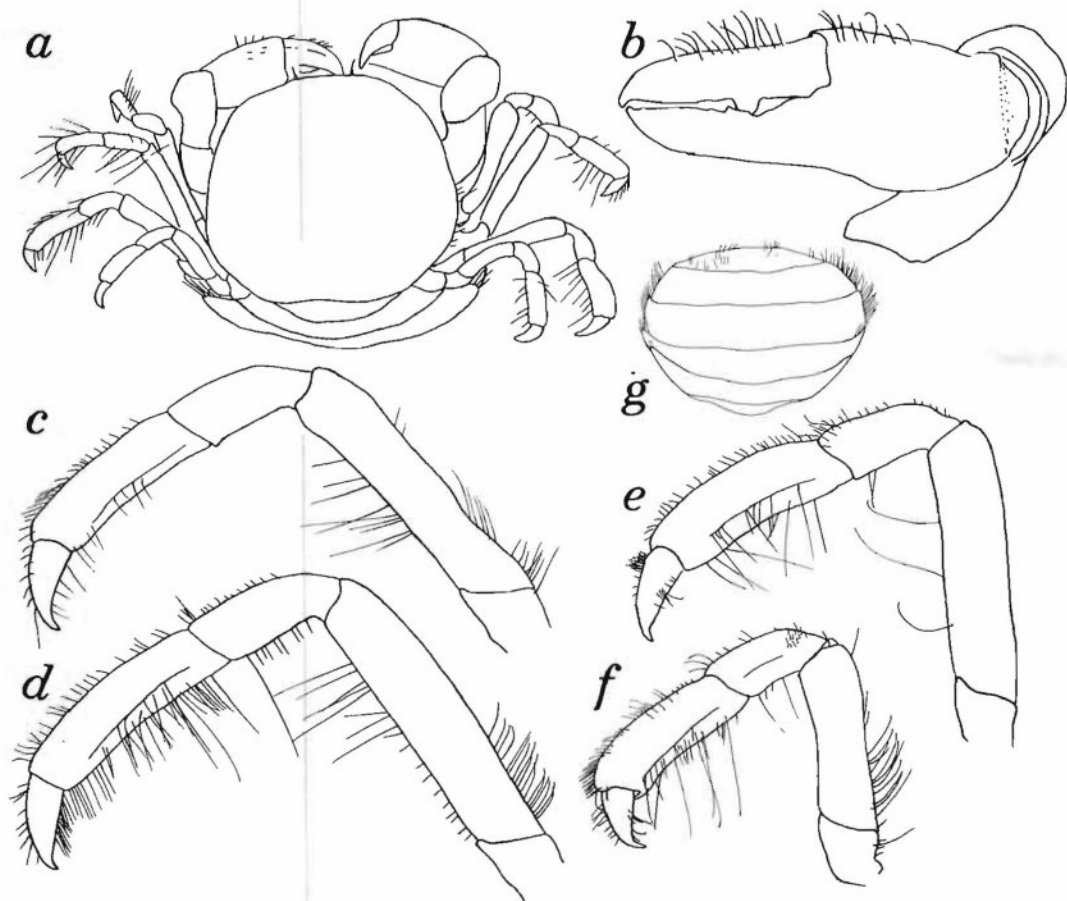


FIG. 16. — *Hospitotheres powelli* sp. nov., female holotype, 5.3 x 6.0 mm, Nigeria : a, dorsal view ; b-f, P1-P5 ; g, abdomen.

Male (fig. 17) : Size small, cl less than 4 mm. Carapace with lateral margin setose. Front evenly curved, produced anteriorly. Eyes large, orbits more than half frontal width. Chela with movable finger slightly shorter than palm ; palm inflated, height subequal to length ; movable finger with large, triangular tooth on cutting edge ; fixed finger with rectangular tooth basally ; chela with coat of short setae dorsally and ventrally and tuft of longer setae distally on inner surface of merus. Walking legs stout, much stouter than on female, propodus of P3 about 2.5 times longer than high, relative lengths $P3 > P4 > P2 > P5$; dactylus of P3 slightly longer than other dactyli ; all walking legs tomentose dorsally and ventrally, setae obscuring surface ; propodus of P5 with longer fringe ventrally ; P3 and P4 with swimming setae. Abdomen broadest at third somite, narrowing evenly through sixth somite, widening slightly at telson ; latter broadly rounded, much broader than long.

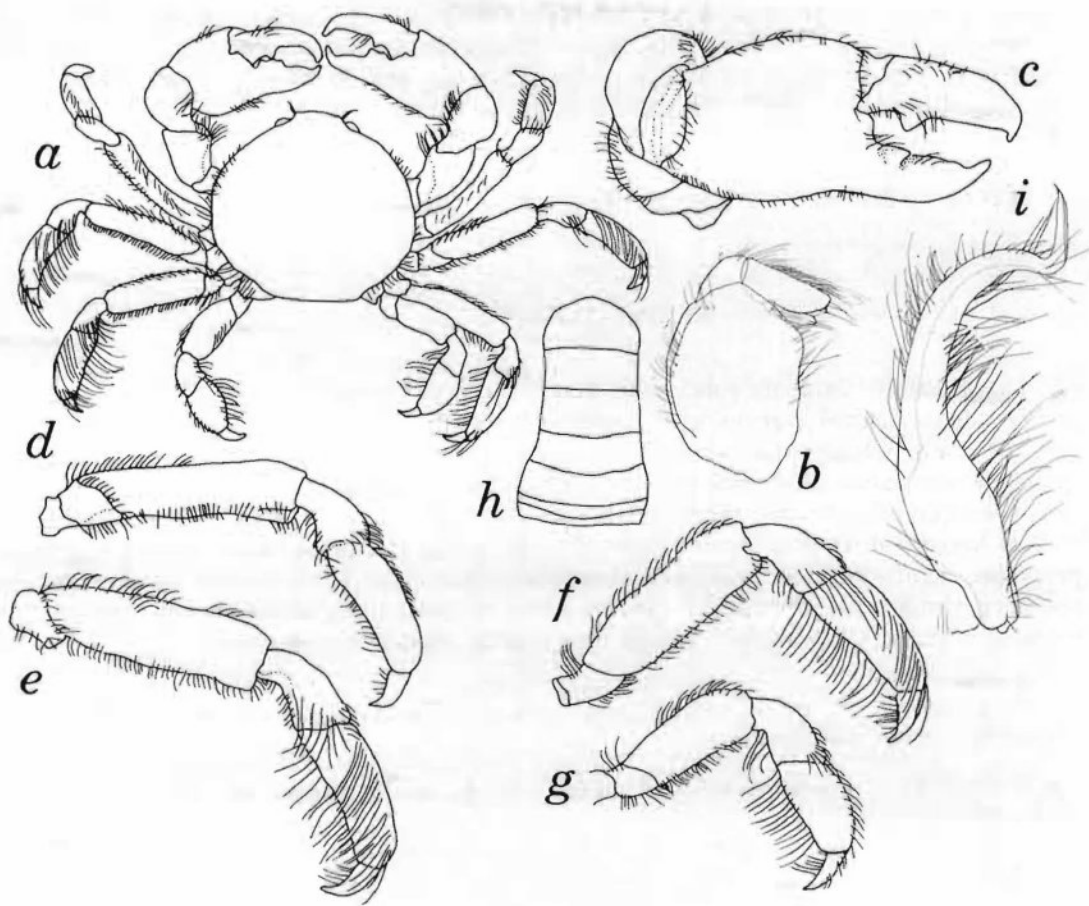


FIG. 17. — *Hospitotheres powelli* sp. nov., male paratype, 3.5 × 3.9 mm, Nigeria : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen ; i, gonopod.

SIZE. — Males (6), 3.2 × 3.5 to 3.9 × 4.0 mm ; non-ovigerous females (4), 3.5 × 3.9 to 6.5 × 6.8 mm ; ovigerous females (2), 5.0 × 5.2 and 5.3 × 5.8 mm.

HOST. — Taken in burrows with decapods, the alpheid *Leptalpheus* sp. nov. and the callianassid *Callianassa balssi* Monod.

HABITAT. — Estuarine, in Bonny River.

REMARKS. — Males and females of this species are markedly dimorphic, as shown in the figures. The legs of females are much slenderer than those of males, and the propodi of the female walking legs are distinctly club-shaped, expanded distally. The distal expansion of the

propodi is not so pronounced as in *Pinnotheres clavapedatus* Glassell, 1935, from Mexico (? = *Pinnotheres lithodomi* Smith, 1870). In that species the dactylus of P4 in the female is much longer and slender than the dactyli of the other legs and the Mxp3 is very slender. The club-shaped propodus also is more pronounced in the type species of *Zaops* (see fig. 5c in MANNING, 1993a).

RANGE. — Known only from the Bonny River, Nigeria.

NEPINNOTHERES gen. nov.

DIAGNOSIS. — Carapace subcircular, length and width subequal or width greater, regions poorly defined. Mxp3 exopod with flagellum; ischium and merus indistinguishably fused, elongate; palp 3-segmented; propodus longer than carpus, spatulate; dactylus styliform or spatulate, inserted on at or near midlength of ventral margin of propodus, apex extending to or beyond end of propodus. Walking legs subequal right and left, slender or stout; P3 or P3 and P4 longest of walking legs; dactyli of walking legs similar in shape, almost as long as propodus, slightly different in size in each species; abdomen of 7 free somites in each sex; male abdomen slender, about twice as wide as telson at base, margins subparallel; male telson rounded apically, width slightly greater than length. Male gonopod simple.

ETYMOLOGY. — The generic name is formed with the Latin prefix, *ne-*, not, and the generic name *Pinnotheres*. Gender masculine.

TYPE SPECIES. — *Cancer pinnotheres* Linnaeus, 1758, by present designation.

REMARKS

Members of this genus can be distinguished from those of *Pinnotheres* proper by the shape of the distal two segments of the third maxilliped. In *Nepinnotheres* the dactylus of the third maxilliped is articulated at or near the midlength of the ventral margin of the propodus and it extends to or beyond the end of the propodus, whereas in *Pinnotheres* the dactylus is articulated at or near the base of the ventral margin and it does not extend to the apex. The shape of the third maxilliped of *Afropinnotheres* (fig. 1a), *Nepinnotheres* (fig. 1c), and *Pinnotheres* (fig. 1b) is shown in figure 1.

The dactyli of the walking legs usually are longer and less falcate in members of this genus than in *Pinnotheres*.

LEBOUR (1928 : 114) commented that "The larvae of the two British species [of *Pinnotheres*, i.e., *P. pisum* and *P. pinnotheres*] are so unlike that it seems improbable that they should belong to the same genus."

KEY TO WEST AFRICAN SPECIES OF *Nepinnotheres*

1. Fixed finger of chela lacking tooth on cutting edge, margin smooth or serrated, evenly curved. 2
Fixed finger of chela with obtuse or erect tooth on cutting edge 4
2. Propodus of Mxp3 slender, length almost 3 times height *N. africanus* sp. nov., p. 151
Propodus of Mxp3 stout, length 2 times height 3
3. Movable finger of chela 3/4 as long as palm. Male with transverse front, not projecting beyond outline of carapace, and with tuberculate cutting edge on fixed finger *N. lillyae* sp. nov., p. 157
Movable finger of chela as long as palm. Male with bilobed front, projecting well beyond outline of carapace, and with smooth cutting edge on fixed finger *N. sanqueri* sp. nov., p. 163
4. Fixed finger of chela with erect, conical tooth on cutting edge 5
Fixed finger of chela with low, obtuse tooth 6
5. Walking legs stout, length of propodus about twice height *N. tellinae*, p. 166
Walking legs slender, length of propodus at least three times height .. *N. viridis* sp. nov., p. 168
6. Walking legs stout, length of propodus two times height or less . *N. androgynus* sp. nov., p. 154
Walking legs slender, length of propodus about three times height *N. pinnotheres*, p. 159

Nepinnotheres africanus sp. nov.

(Figs. 18-19)

?*Pinnotheres* sp. D ; MONOD, 1956 : 382, figs. 539, 540 [Pointe-Noire, Congo] ; ROSSIGNOL, 1962 : 118 [Baie de Pointe-Noire, Congo].

?*Pinnotheres* sp. D ; SILAS and ALAGARSWAMI, 1967 : 1214 ; SCHMITT, McCAIN and DAVIDSON, 1973 : 92 ; MANNING and HOLTHUIS, 1981 : 191.

MATERIAL EXAMINED. — Ivory Coast : Grand-Lahou [5°08'N, 5°01'W], depth 40 m, trawl, 28.VI.1966 : 1♂, 5.8 × 6.5 mm (paratype, MNHN), 1 ovigerous ♀, 6.0 × 6.6 mm (holotype, MNHN-B 10645).

DIAGNOSIS

Post-hard female (fig. 18) : Size medium, cl to 6.0 mm. Front not projecting beyond outline of carapace. Eyes small. Mxp3 with spatulate propodus, length almost 3 times height. Chela with movable finger more than half as long as palm, height of palm slightly more than half length ; fingers narrowly gaping, some setae in gape ; opposable margin of dactylus with large basal tooth ; opposable margin of fixed finger unarmed. Walking legs moderately slender, propodus of P4 about 3 times longer than high ; relative lengths P3 > P2 = P4 > P5 ; P5 extending almost to base of dactylus of P4 ; carpus of P2-P5 shorter than propodus ; dactyli of P2-P5 subequal, much more than half propodus length ; P3 and P4 with swimming setae, some long setae and some tomentum also present dorsally and ventrally on all segments but dactylus. Abdomen extending to bases of walking legs and buccal area.

Male (fig. 19) : Size small to medium, cl to 5.8 mm. Front projecting, faintly emarginate. Eyes small. Chela with movable finger about half as long as palm, height of palm about half length ; fingers gaping, some setae in gape ; opposable margin of dactylus with rectangular basal tooth ; opposable margin of fixed finger unarmed. Walking legs slender, propodus of P4

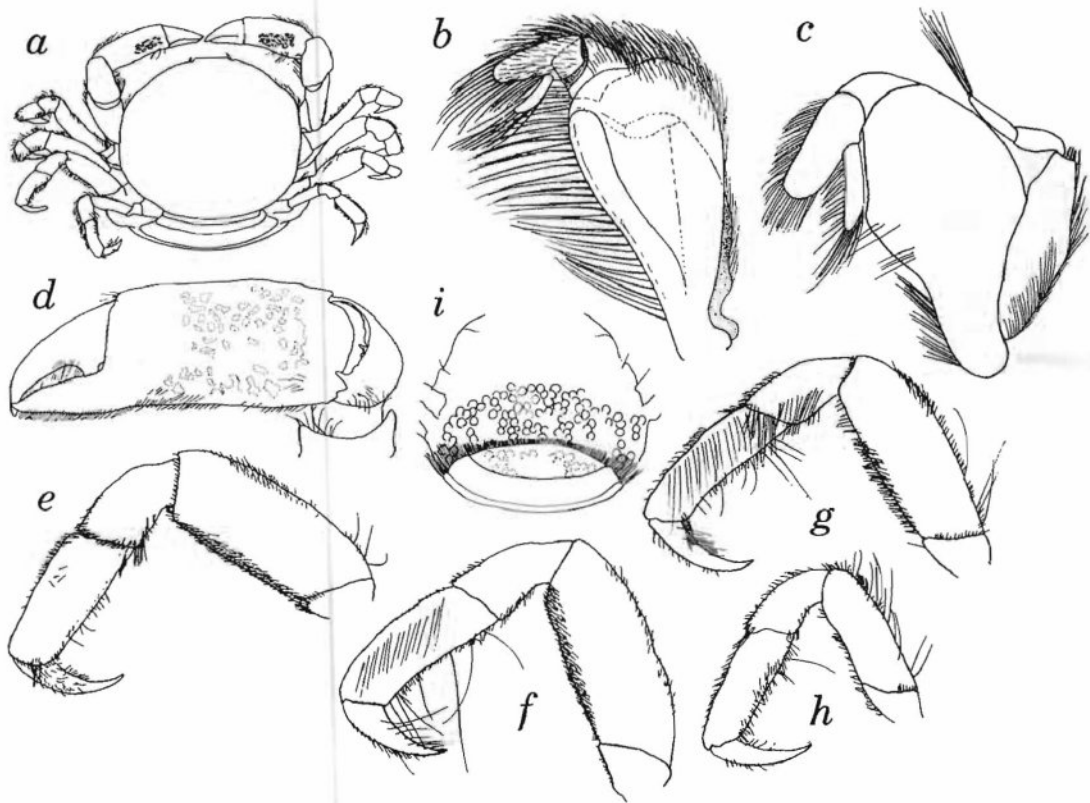


FIG. 18. — *Nepinnotheres africanus* sp. nov., ovigerous female holotype, 6.0 × 6.6 mm (a, c-i), Ivory Coast : a, dorsal view ; c, Mxp3 ; d-h, P1-P5 ; i, abdomen. Female : b, Mxp3 (from MONOD, 1956).

almost 4 times longer than high, relative lengths $P3 > P4 > P2 > P5$; $P5$ extending beyond base of dactylus of $P4$; carpus of each walking leg much shorter than respective propodus ; dactyli of walking legs $P3$ and $P4$ longest, dactyli of all legs more than half as long as propodus ; swimming setae absent, but some long setae present dorsally and ventrally on all segments but dactylus and some tomentum present dorsally and ventrally. Abdomen widest basally, tapering evenly to rounded telson, latter slightly wider than long. Gonopod simple, tapering distally.

SIZE. — Male (1), 5.8 × 6.5 mm ; ovigerous female (1), 6.0 × 6.6 mm.

HOST. — Unknown.

HABITAT. — Sublittoral, in 40 meters. ROSSIGNOL (1962) characterized the species as sublittoral.

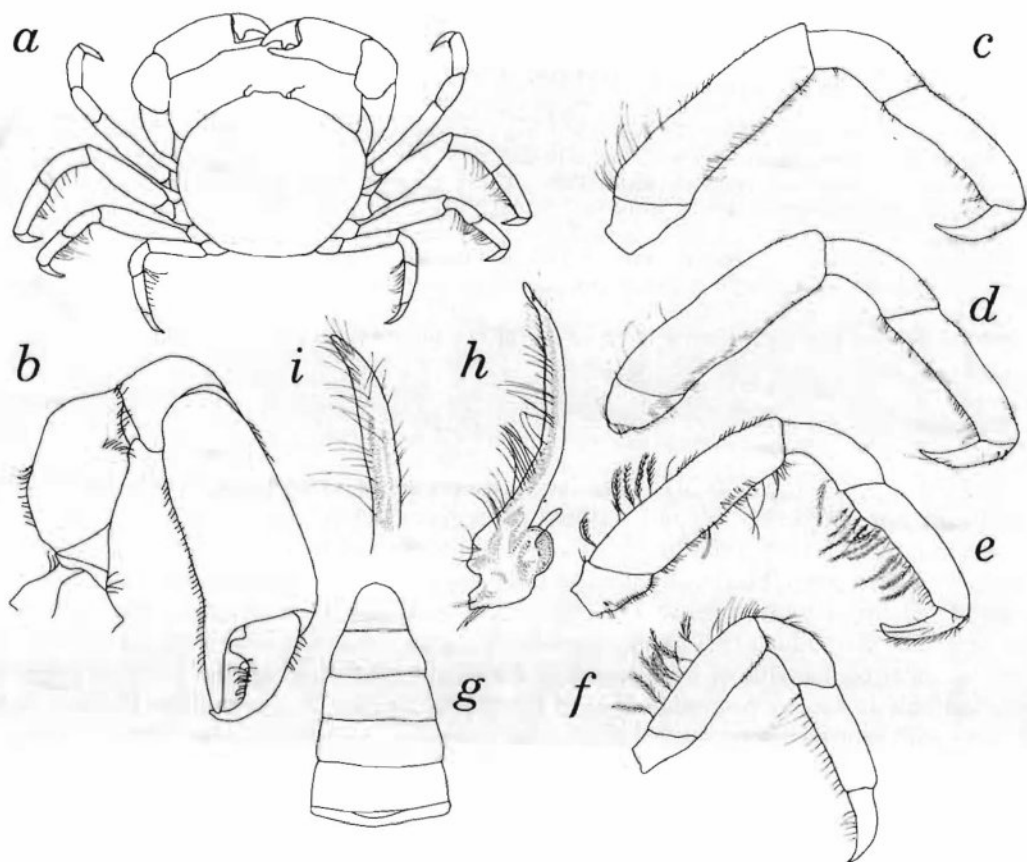


FIG. 19. — *Nepinnotheres africanus* sp. nov., male paratype, 5.8 x 6.5 mm, Ivory Coast : a, dorsal view ; b-f, P1-P5 ; g, abdomen ; h, i, gonopod.

REMARKS. — *Pinnotheres* sp. D sensu MONOD perhaps can be identified with *N. africanus*, as it shares the characteristic Mxp3 of the species (fig. 18b, c), but MONOD's figure of the whole animal seems to show a tooth on the pollex of the claw.

The long propodus on Mxp3 will distinguish this species from *N. sanqueri*, the only other species of the genus known from West Africa in which the fixed finger of the chela is unarmed.

ETYMOLOGY. — The name alludes to the geographic distribution of the species, off West Africa.

RANGE. — Known from off Grand-Lahou, Ivory Coast, and possibly Pointe-Noire, Congo (MONOD, 1956 ; ROSSIGNOL, 1962).

***Nepinnotheres androgynus* sp. nov.**

(Figs. 20-21)

Pinnotheres sp. B; MONOD, 1956 : 378, fig. 524 [?part; specimen no. 1 from Port of Dakar, Senegal; specimens 2-5 from Gorée, Senegal, figs. 510-523, 525 may represent a different species].

Pinnotheres sp. B; SILAS and ALAGARSWAMI, 1967 : 1213; SCHMITT, McCAIN and DAVIDSON, 1973 : 91; MANNING and HOLTHUIS, 1981 : 190.

MATERIAL EXAMINED. — Senegal : Port of Dakar [14°40'N, 17°26'W], dredging, 25 IV 1951, leg. F. PARAISSO : 1 gynandromorph with ♂ and ♀ pleopods, 14.9 × 16.6 mm (holotype, MNHN-B 10628).

ETYMOLOGY. — The species name is based on the condition of the holotype and is from the Latin.

DIAGNOSIS

Gynandromorph (figs. 20-21) : Size large to very large, cl to 16 mm. Carapace surface hard. Front not projecting beyond outline of carapace. Eyes very small. Mxp3 propodus elongate, length about 2.5 times height at articulation of dactylus. Chela with movable finger much shorter than palm, height of palm less than length; movable finger with triangular tooth basally; fixed finger with at most an obtuse tooth in distal third. Walking legs moderately stout, length of propodus of P3 more than twice height; relative lengths P3 > P2 > P4 > P5; P5 falling short of dactylus of P4; carpus of P2-P5 subequal to propodus; dactyli subequal, more than half as long as propodus, that of P5 slightly shorter than remainder (broken in fig. 21f); legs with scattered long setae dorsally and ventrally; swimming setae absent. Abdomen broadly triangular, with male and female pleopods. Gonopod simple, tapering distally.

SIZE. — Gynandromorph (1), 14.9 × 16.6 mm. MONOD (1956) reported two males, 15 × 16 and 16 × 20 mm, and two females, 19 × 20 and 20 × 21 mm.

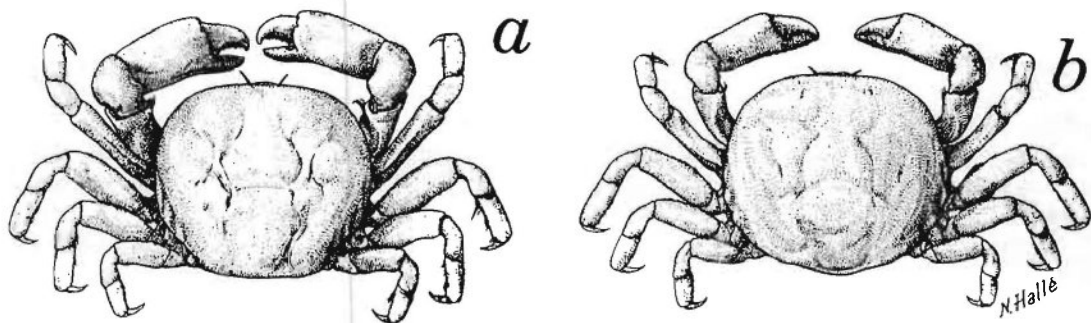


FIG. 20. — *Nepinnotheres androgynus* sp. nov., Senegal : a, male ; b, female. (From MONOD, 1956.)

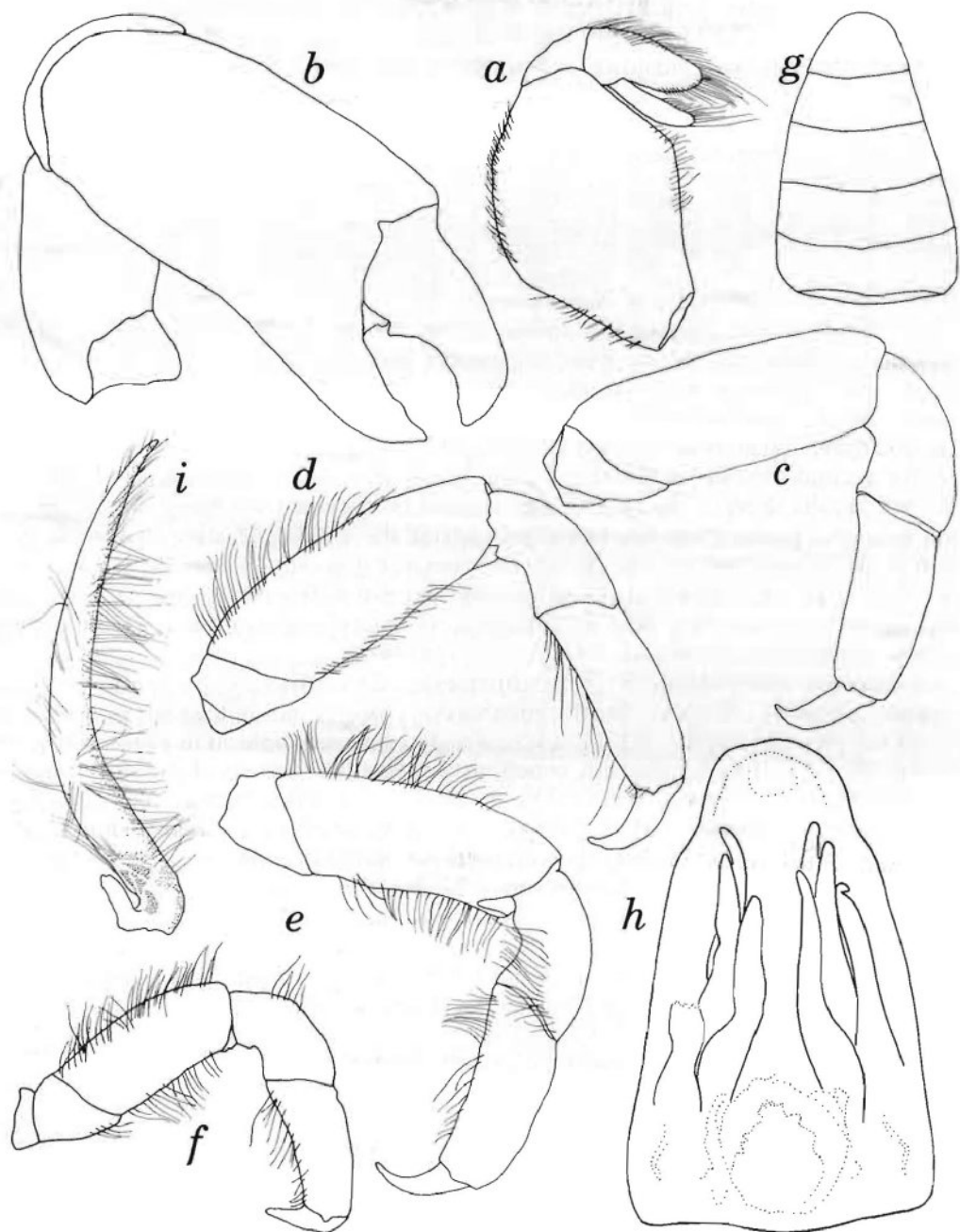


FIG. 21. — *Nepinnotheres androgynus* sp. nov., holotype, 14.9 × 16.6 mm, Senegal : a, Mxp3 ; b-f, P1-P5 ; g, abdomen, h, pleopods in situ ; i, gonopod.

HOST. — A bivalve mollusk, family Hiatellidae, *Panopea aldrovandi* Menard (= *P. glycymeris* (van Born) (see MONOD, 1956)), if all of MONOD's material was conspecific. If not, the host of *N. androgynus* is unknown, as host data is available only for specimens not studied here.

HABITAT. — Sublittoral (depth not given).

REMARKS

This is a very large species of *Nepinnotheres*.

Five specimens were assigned to "species B" by MONOD (1956 : 378). Only one of them is available for study, his specimen no. 1 from the port of Dakar, a gynandromorph here designated as the holotype of *Nepinnotheres androgynus*. It is possible that the other specimens represent a distinct species, for their legs, as figured by MONOD (female, figs. 512-515 ; male, figs. 517-520) are much slenderer and of different lengths and proportions. The P5 of the female, for example, shown in MONOD's figure 515, is very short, overreaching the carpus of P3, whereas it falls short of the base of the dactylus in the examined specimen. In MONOD's figured male and female from Gorée the propodi of the walking legs are slender, with the height 3 times the length ; in the examined specimen, the propodi are only 2.2 to 2.4 times as long as high. However, I believe that it is unlikely that two different large species might occur together. There is a possibility that the leg proportions of the gynandromorph are different from those of the other specimens.

The only specimen examined is a gynandromorph, with a broad abdomen, male gonopods, and female pleopods ; it lacks female gonopores. There is no indication of parasitism. MANNING and HOLTHUIS (1981 : 62, fig. 14) reported gynandromorphism in a leucosiid, *Ebalia tuberculata* Miers, and noted that this condition was relatively rare in decapod crustaceans. Earlier, FROGLIA and MANNING (1978 : 700, fig. 5) reported gynandromorphism in a grapsid crab, *Brachynotus gemmellarii* (Rizza). BISHOP (1974) reported on a gynandromorph of the Upper Cretaceous fossil crab *Dakoticancer overanus* Rathbun, and included references to several other instances of intersexes in decapods. *Nepinnotheres androgynus* appears to provide the first occurrence of gynandromorphism in pinnotherids.

UDEKEM d'ACUZ (1989 : 196) noted that a species of *Pinnotheres* from the same host (*Panopaea*) was recorded from Spain by ZARIQUETEY ALVAREZ (1968) and UDEKEM suggested the present species (as *Pinnotheres* sp. B Monod) might occur in Spain.

RANGE. — Known only from the type locality, Dakar, Senegal.

Nepinnotheres lillyae sp. nov.

(Figs. 22-23)

MATERIAL EXAMINED. — Ivory Coast : Sassandra [4°57'N, 6°05'W], 50 m, 11 III 1966 : 1♂, 4.8 × 4.8 mm (paratype, MNHN-B 22709), 1 ovigerous ♀, 6.0 × 6.9 mm (holotype, MNHN-B 10642).

ETYMOLOGY. — Named for my wife Lilly, whose support and artistic talent have contributed to all of my studies of systematics of crustaceans.

DIAGNOSIS

Post-hard female (fig. 22) : Size medium, cl to 6 mm. Front not projecting beyond outline of carapace. Eyes small. Mxp3 with short, spatulate propodus, length about twice height. Chela with movable finger about 3/4 as long as palm, height of palm much less than length ; fingers

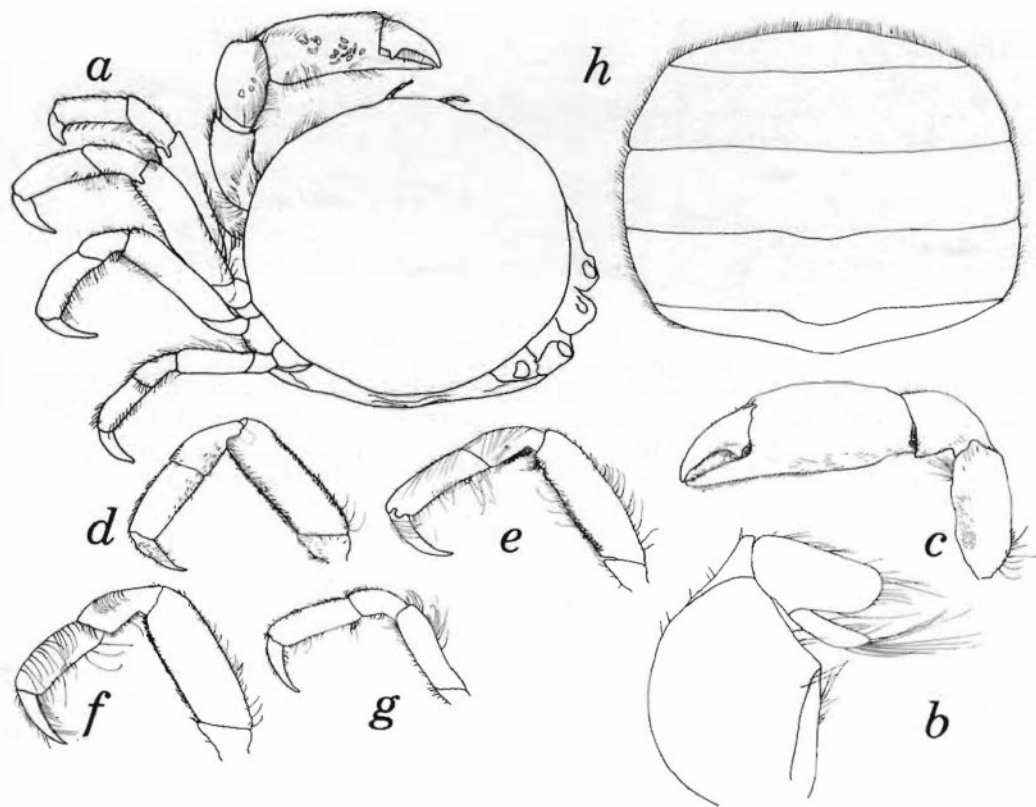


FIG. 22. — *Nepinnotheres lillyae* sp. nov., female holotype, 6.0 x 6.9 mm, Ivory Coast : a, dorsal view ; b, Mxp3 ; c, chela ; d-g, P2-P5 ; h, abdomen.

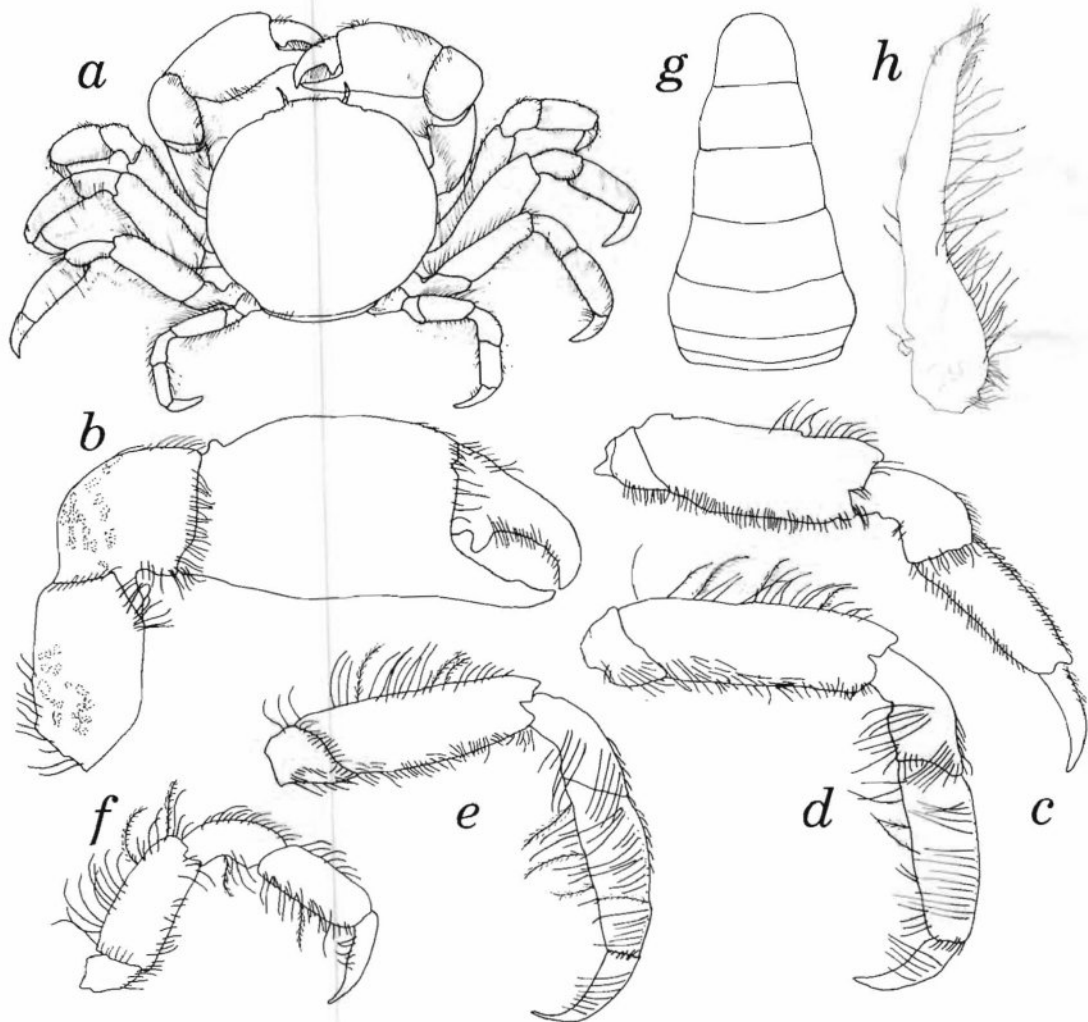


FIG. 23. — *Nepinnotheres lilyae* sp. nov., male paratype, 4.8 × 4.8 mm, Ivory Coast : a, dorsal view ; b, chela ; c-f, P2-P5 ; g, abdomen ; h, gonopod.

gaping, some setae in gape ; opposable margin of dactylus with large basal tooth, opposable margin of fixed finger unarmed, smooth ; chela and walking legs ornamented with fine, long setae. Walking legs slender, propodus of P3 about 3 times longer than high, relative lengths $P3 > P4 > P2 > P5$; P5 not extending to propodus of P4. Carpus of P2-P5 shorter than propodus ; dactyli of P2-P5 subequal, more than half propodus length ; P3 and P4 with swimming setae. Abdomen extending beyond bases of legs and well into buccal area.

Male (fig. 23) : Size small, cl less than 5 mm. Front scarcely projecting, transverse. Eyes small. Chela with movable finger about 3/4 length of palm, height of palm also more than half length ; fingers gaping, some setae in gape ; opposable margin of dactylus with large, rounded tooth basally ; opposable margin of propodus unarmed, smooth ; chela and walking legs ornamented with fine, long setae. Walking legs relatively stout, length of propodus about 3 times height, relative lengths $P3 > P2 > P4 > P5$; P5 falling short of base of propodus of P4 ; carpus of walking legs P2-P4 shorter than respective propodus, that of P5 subequal to propodus ; dactyli of walking legs subequal, each much more than half as long as propodus ; swimming setae present. Abdomen widest basally, sixth somite not markedly dilated, telson rounded. Gonopod slender, simple.

SIZE. — Male (1), 4.8 × 4.8 mm ; ovigerous female (1), 6.0 × 6.9 mm.

HOST. — Unknown.

HABITAT. — Sublittoral, in a depth of 50 meters.

REMARKS. — At first I thought that these specimens could be identified with *N. sanqueri*, but the males are so different that I believe they must be assigned to a separate species. This species agrees with *N. sanqueri* in having a short, stout propodus on the Mxp3, but differs in having the fingers of the chela much shorter than the palm and a transverse rather than projecting and bilobed front in the male. Both species differ from *N. africanus*, the only other West African species with an unarmed pollex on the chela, in having a much shorter propodus on the Mxp3.

RANGE. — Known only from off Sassandra, Ivory Coast.

***Nepinnotheres pinnotheres* (Linnaeus, 1758), comb. nov.**

(Figs. 1c, 24-25)

Cancer Pinnotheres Linnaeus, 1758 : 628.

Pinnotheres pinnotheres ; MONOD, 1933 : 142, figs. 1B,C, 2C [Atlantic coast of Morocco] ; MONOD, 1956 : 376 [part].

?*Pinnotheres pisum* ; MONOD, 1933 : 143, fig. 2A [juvenile from Atlantic coast of Morocco only] [not *Pinnotheres pisum* (Linnaeus, 1767)].

Pinnotheres spec. ; FRANSEN, 1991 : 57, 166 [off Mauritania].

MATERIAL EXAMINED. — **Morocco, Atlantic coast** : 35°7'N, 6°15'W, depth 50 m, 19.VII.1969, leg. J. STIRN on *Al Mounir*, MO-MMSC (Morocco-Mediterranean Marine Sorting Center) Sta. B11 TR 5 : 1 post-hard ♀, 12.1 × 14.7 mm (USNM 264743). 35°28'N, 6°5'30"W, depth 55 m, leg. *Espador*, MO-MMSC Sta. 1 : 1 post-hard ♀, 8.0 × 9.2 mm (USNM 264744). — **Mauritania** : Off Mauritania, 20°21'N, 17°17'W, depth 34 m, sand with shell gravel, triangular dredge, 1 XI 1978, CANCAP Sta. 3.172 : 1 pre-hard stage, 1.8 × 1.7 (RMNH D 41149).

DIAGNOSIS

Post-hard female (fig. 24) : Size medium to large, cl to 12.1 mm. Carapace subcircular. Front not projecting beyond outline of carapace, transverse. Eyes small. Mxp3 with spatulate propodus, length about 2.5 times height at articulation of dactylus. Chela with movable finger shorter than palm, height of palm less than length, similar to dactylus length ; gape slight ; movable finger with low, obtuse tooth basally ; fixed finger with broad, obtuse, triangular, tooth at about midlength, proximal margin of tooth irregular. Walking legs relatively slender, propodus of P4 about 3 times longer than high ; relative lengths, $P3 > P4 > P5 > P2$; P5 extending about to midlength of dactylus of P4 ; carpus of P2-P5 shorter than propodus ; dactyli of P2-P4 subequal, of P5 the longest, all dactyli more than half propodus length ; legs moderately setose, covered with stalked growths ; vestiges of swimming setae present. Abdomen densely tomentose, extending to bases of merus of walking legs and to middle of buccal area.

Pre-hard stage (fig. 25) : Size very small, cl 1.8 mm. Carapace slightly longer than wide, front arcuate, projecting well beyond outline of carapace. Eyes large. Mxp3 with spatulate propodus, length about 2.5 times height at articulation of dactylus ; dactylus styliform, tip not extending to tip of propodus. Chela with movable finger subequal to palm, height of palm subequal to length ; fingers gaping ; movable finger with low swelling proximally, lacking distinct tooth ; fixed finger with triangular tooth at midlength and with low, obtuse tooth or swelling distally ; cheliped with setae as illustrated. Walking legs stout, propodus about twice as long as high, flattened, paddle-like, arched dorsally ; relative lengths $P3 = P4 > P2 > P5$; P5 extending to midlength of propodus of P4 ; carpus of P2-P5 shorter than propodus ; dactylus of P5 shortest of dactyli of walking legs ; P3 without and P4 with vestiges of swimming setae as well as other setae as illustrated. Abdomen slender, widening posteriorly, constricted at 4th somite, telson wider than long but much narrower than sixth somite. No pleopods or gonopores visible.

SIZE. — Post-hard females (2), 8.0×9.2 and 12.1×14.7 mm ; pre-hard stage (1), 1.8×1.7 mm. The specimens studied by MONOD (1933), included an ovigerous female, 12×14 mm, and a young male, 4×4 mm.

HOST. — The female specimen studied by MONOD (1933) was taken in a bivalve mollusk, an unnamed species of *Pinna*, family Pinnidae. No host was recorded for the specimens reported here or for the male recorded by MONOD.

HABITAT. — The two adult specimens reported here were taken at depths of 50 and 55 meters ; the pre-hard specimen was taken in 34 meters. MONOD's (1933) specimens were taken in a depth of 40 and 75 meters.

REMARKS. — At first I thought that these specimens might represent an undescribed species, but I cannot distinguish them from specimens of *N. pinnotheres* from Tunisia and Spain. The leg proportions are virtually identical with those of specimens from other localities.

The third maxilliped figured by MONOD (1933 : fig. 2A) may belong to a juvenile of this

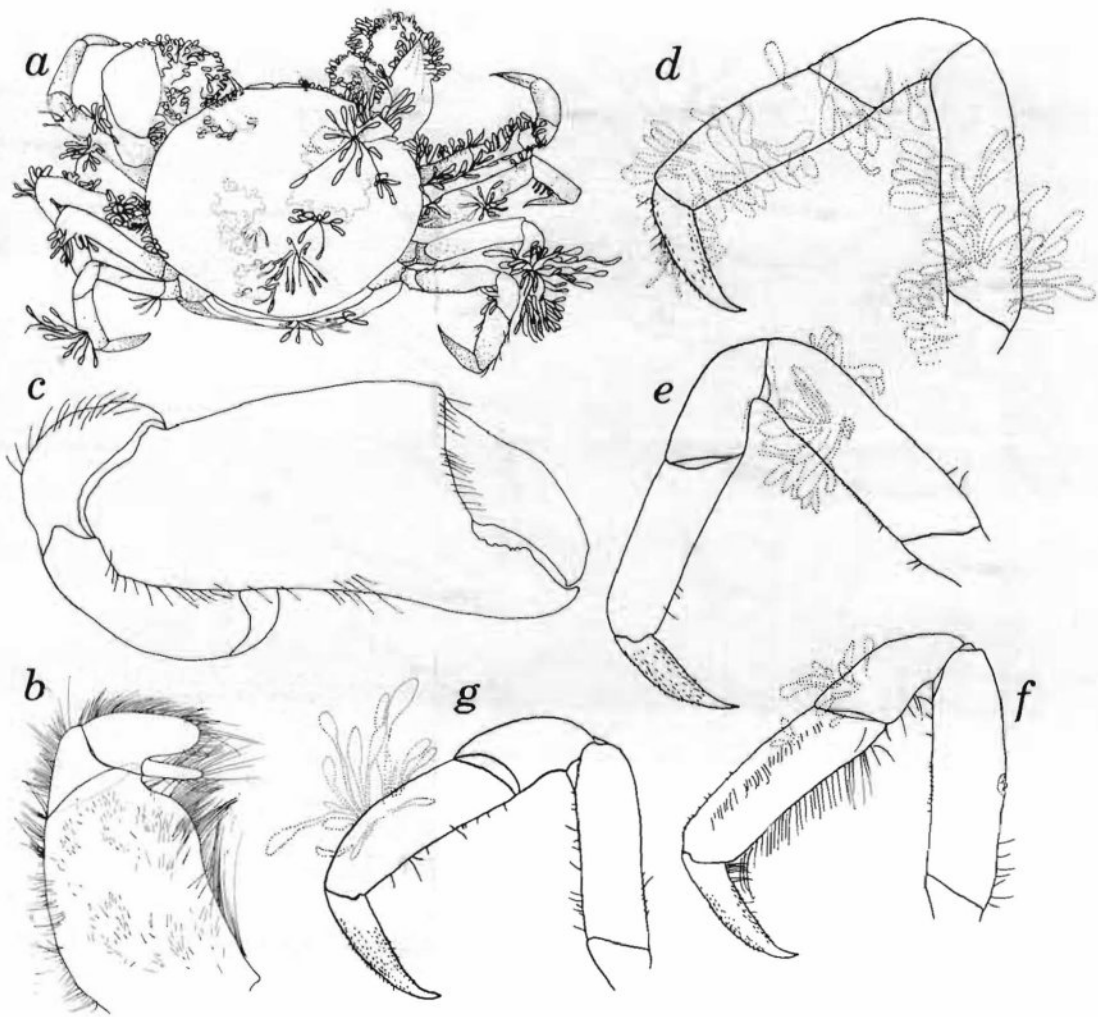


FIG. 24. — *Nepinnotheres pinnotheres* (Linnaeus), female, 12.1 × 14.7 mm, Morocco : a, dorsal view ; b, Mxp3 ; c-g, P1-P5.

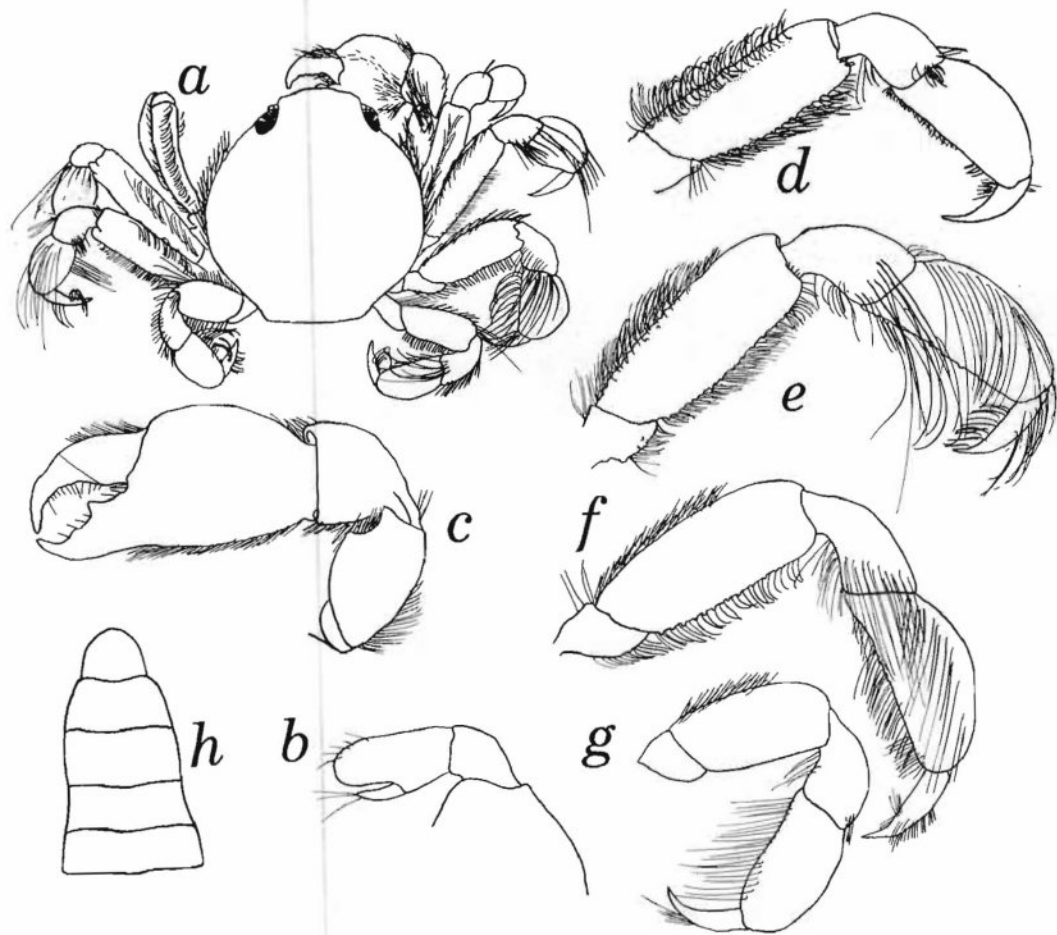


FIG. 25. — *Nepinnotheres pinnotheres* (Linnaeus), pre-hard stage, 1.8 × 1.7 mm, Mauritania : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen.

species rather than *P. pisum* proper, as indicated by MONOD. The dactylus, though much shorter than in the adults reported here, is similar to that of the pre-hard stage identified here with *N. pinnotheres*. In that juvenile, the insertion of the dactylus is near midlength of the propodus, as in *N. pinnotheres*, rather than basally on the propodus, as in *P. pisum*, and I initially believed the pre-hard specimen to be *P. pisum* sensu stricto. However, I don't think it can be identified with *P. pisum*, as tooth on the fixed finger of the chela is far too large (compare the chela shown here in figure 25c with that shown for *P. pisum* by ATKINS, 1926 : pl. 1, fig. 2). The difference in size of the dactylus of the third maxilliped in young and mature specimens of *N. pinnotheres* is similar to that shown by RATHBUN (1918) for young (*Pinnotheres*

depressum, fig. 37) versus adult (*Pinnotheres ostreum*, fig. 30) specimens of *Zaops ostreum* (Say, 1817).

The abundant growths on the carapace and legs of the Moroccan specimens reported here suggest that they were free-living, either living in a dead host or cast out by the host; within a living host the carapace and legs would be free from growths.

RANGE. — West Africa, from 34°03'N, 6°56'W and 30°30'25 "N, 9°43'30 "W (MONOD, 1933) and 35°7'N, 6°15'W and 35°28'N, 6°5'30 "W, Atlantic coast of Morocco; and at 20°21'N, 17°17'W, off Mauritania; and the Atlantic coast of Europe and the Mediterranean.

***Nepinnotheres sanqueri* sp. nov.**

(Figs. 26-27)

MATERIAL EXAMINED. — **Sierra Leone**: 7°29'N, 13°25'30 "W, depth 55 m, Guinean Trawling Survey I, Transect 10, Sta 24, 18 XI 1963: 1♂, 4.7 × 5.1 mm (paratype, USNM 264746), 1 ovigerous ♀, 5.2 × 5.4 mm (holotype, USNM 264745).

ETYMOLOGY. — Named for Robert SANQUER of Vouhé, Surgères, France, trawling master for the Guinean Trawling Survey.

DIAGNOSIS

Post-hard female (fig. 26): Size medium, cl to 6 mm. Front not projecting beyond outline of carapace. Eyes small. Mxp3 with short, spatulate propodus, length about twice height. Chela with movable finger about as long as palm, height of palm less than length; fingers gaping, some setae in gape; opposable margin of dactylus with large basal tooth, opposable margin of fixed finger unarmed; chela and walking legs ornamented with fine, long setae. Walking legs slender, propodus of P3 about 3 times longer than high, relative lengths P3 > P4 > P2 > P5; P5 not extending to propodus of P4. Carpus of P2-P5 subequal to or slightly shorter than propodus; dactyli of P2-P5 subequal, more than half propodus length; P3 and P4 with swimming setae. Abdomen extending beyond bases of legs and well into buccal area.

Male (fig. 27): Size small, cl less than 5 mm. Front projecting, medially emarginate. Eyes large. Chela with movable finger little more than half length of palm, height of palm also more than half length; fingers gaping, some setae in gape; opposable margin of dactylus with triangular tooth; opposable margin of propodus unarmed; chela and walking legs ornamented with fine, long setae. Walking legs relatively stout, length of propodus about twice height, relative lengths P3 > P4 > P2 > P5; P5 not extending to base of propodus of P4; each carpus of walking legs shorter than respective propodus; dactyli of walking legs subequal, each much more than half as long as propodus; swimming setae present. Abdomen widest basally, sixth somite somewhat dilated, telson rounded. Gonopod slender, simple.

SIZE. — Male (1), 4.7 × 5.1 mm; ovigerous female (1), 5.2 × 5.4 mm.

HOST. — Unknown.

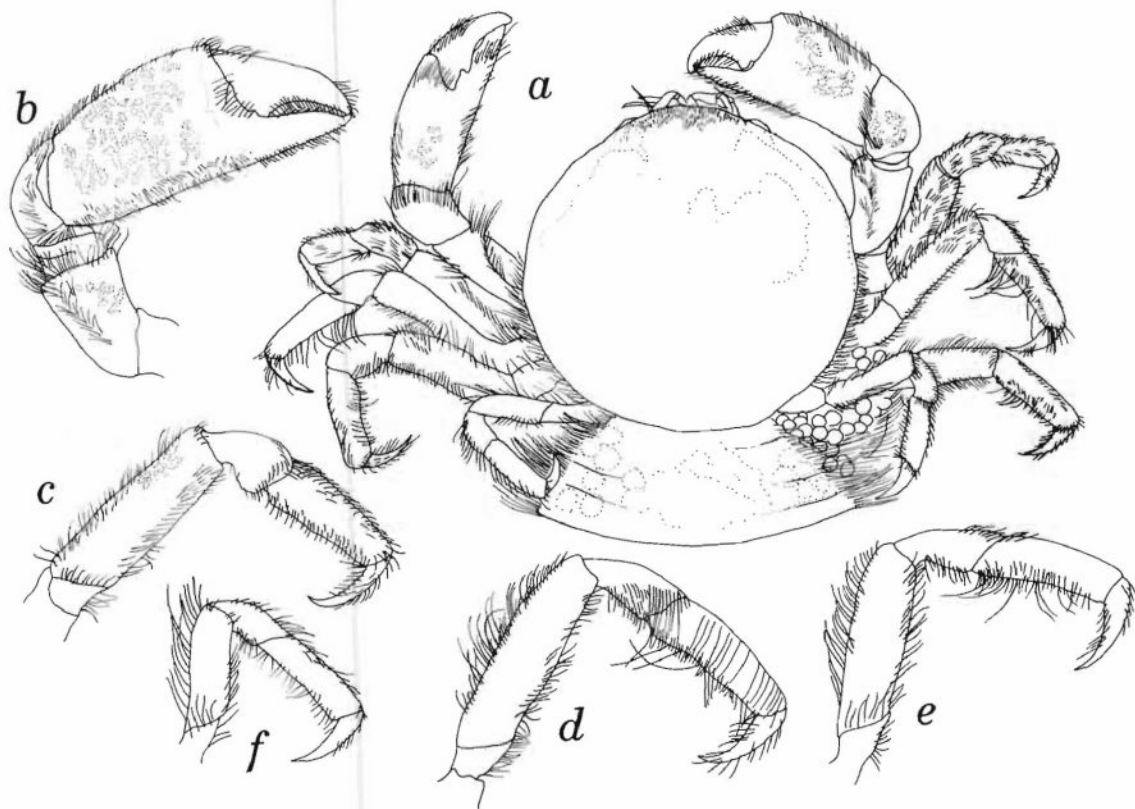


FIG. 26. — *Nepinnotheres sanqueri* sp. nov., ovigerous female holotype, 5.2 × 5.4 mm, Sierra Leone : a, dorsal view ; b-f, P1-P5.

HABITAT. — Sublittoral, in a depth of 50 meters.

REMARKS. — The stout, short propodus on Mxp3 will serve to distinguish this species and *N. lillyae* from *N. africanus*, the only other West African species of the genus with an unarmed fixed finger on the chela. The fingers of the chela are much longer in this species than in *N. lillyae*, and the front of the male is strongly projecting and bilobed, instead of transverse. The cutting edge of the fixed finger of the chela is smooth in *N. africanus* and *N. lillyae*, but in *N. sanqueri* it is tuberculate, especially in the male. The chela of the female shows a low, serrated tooth proximally on the fixed finger under high magnification ; it is not shown in figure 26b.

RANGE. — Known only from off Sierra Leone.

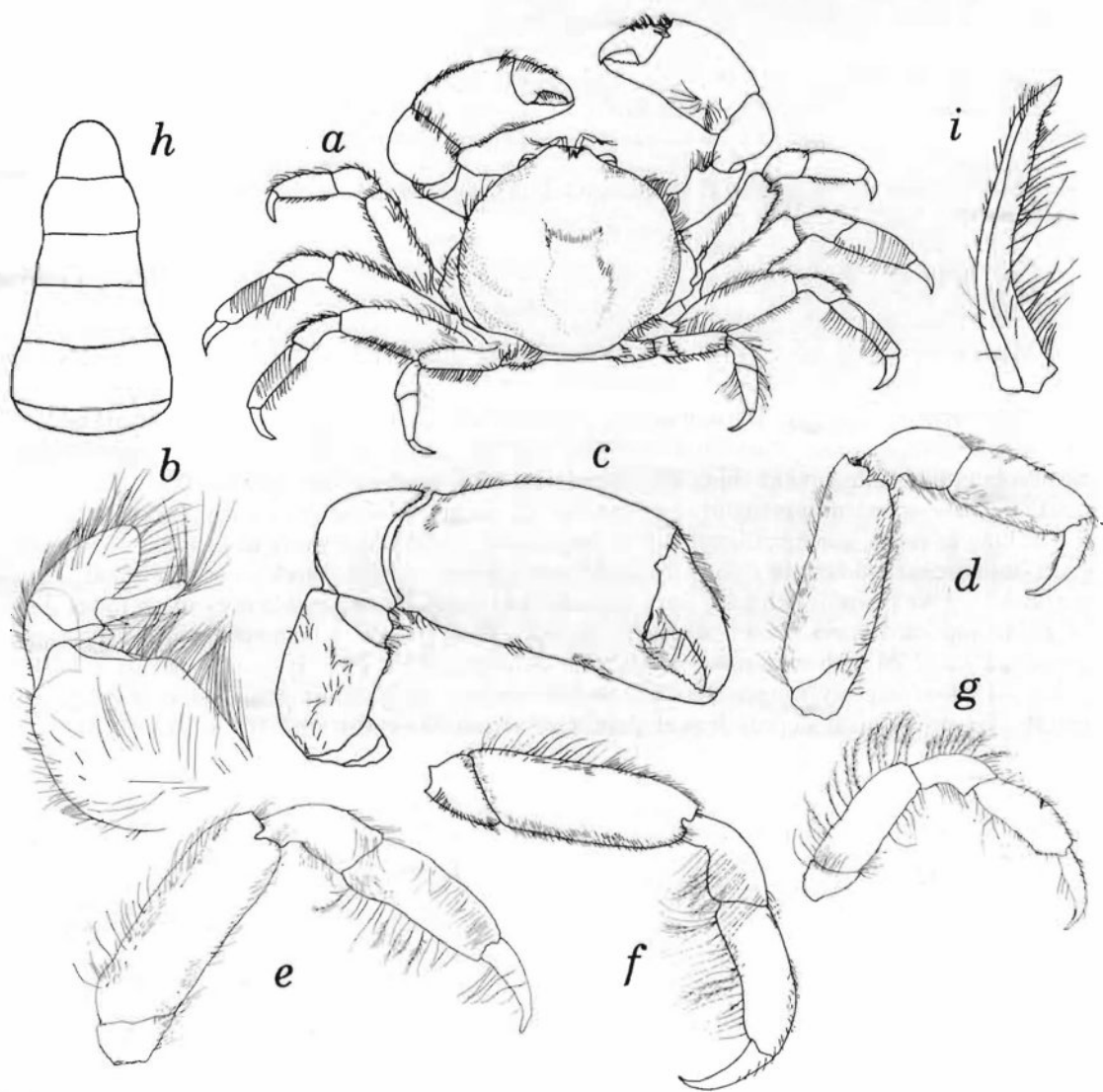


FIG. 27. — *Nepinnotheres sanqueri* sp. nov., male paratype, 4.7 × 5.1 mm, Sierra Leone : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen ; i, gonopod.

Nepinnotheres tellinae (Manning and Holthuis, 1981), comb. nov.
(Figs. 28-29)

Pinnotheres sp. A; MONOD, 1956 : 376 [Sierra Leone] [part, not figs. 502-507 = *Afropinnotheres larissae*]; LONGHURST, 1958 : 88 [Sierra Leone River].

Pinnotheres sp. A; SILAS and ALAGARSWAMI, 1967 : 1213 [part]; SCHMITT, McCAIN and DAVIDSON, 1973 : 91 [part].

Pinnotheres tellinae Manning and Holthuis, 1981 : 187, figs. 44, 45 [Bullom Shore and Kissy, near Freetown, Sierra Leone].

MATERIAL EXAMINED. — None.

DIAGNOSIS

Size small to medium, cl of males to 3.5 mm, of females to 6.0 mm. Carapace almost circular in females, wider, more oval in males; surface naked, some setae present laterally and posterolaterally; integument thin. Mxp3 with dactylus inserted near midlength of propodus, apex of dactylus extending slightly beyond end of propodus. Chelipeds strong; fingers about 4/5 as long as palm, gaping; dactylus with large tooth basally on cutting edge, fixed finger with erect tooth near midlength; palm in male ornamented with tubercles on inner and outer surfaces; chelae fringed with long setae dorsally and ventrally, setae also present on lower part of palm and on fingers. P2-P5 slenderer in male than female, ornamented with long setae distally, P3 and P4 with swimming setae; relative lengths $P3 > P2 > P4 > P5$; carpus of P2-P5 subequal to or slightly longer than propodus; dactyli subequal, more than half propodus length. Telson of male slightly longer than wide (from MANNING and HOLTHUIS, 1981).

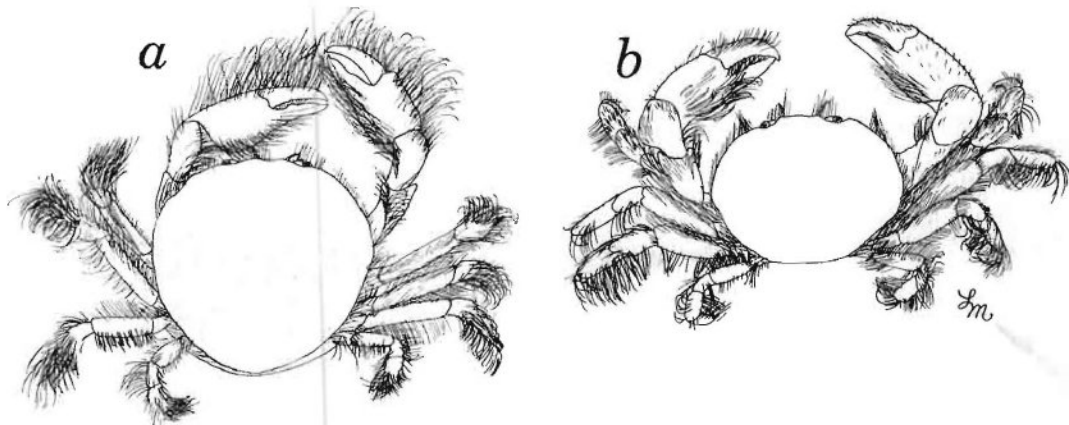


FIG. 28. — *Nepinnotheres tellinae* (Manning and Holthuis), Sierra Leone : a, female ; b, male. (From MANNING and HOLTHUIS, 1981.)

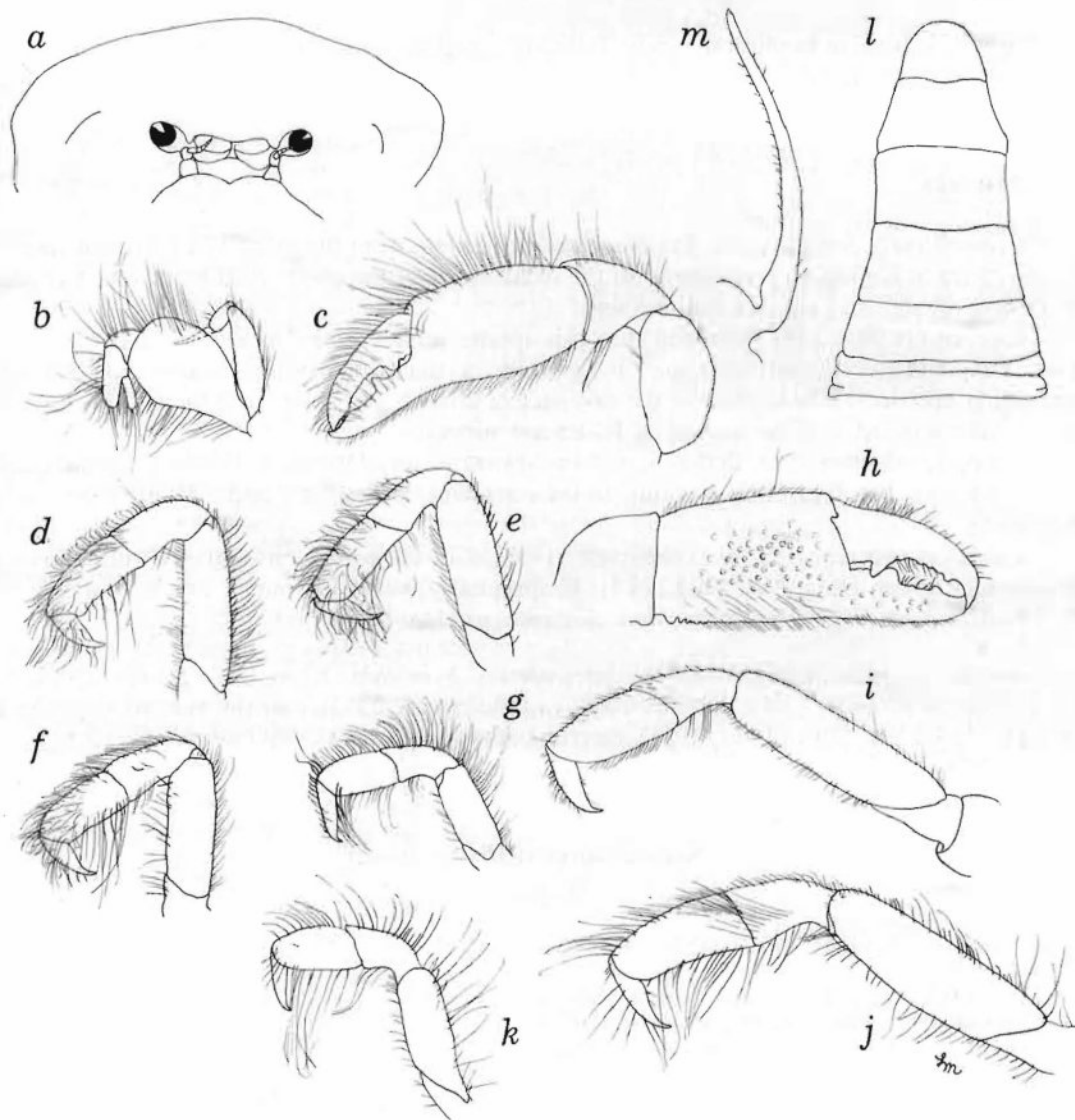


FIG. 29. — *Nepinnotheres tellinae* (Manning and Holthuis), Sierra Leone : a, carapace in frontal view ; b, Mxp3 ; c-g, P1-P5 of female ; h-k, P1-P3, P5 of male ; l, abdomen ; m, gonopod. (From MANNING and HOLTHUIS, 1981.)

SIZE. — Males, 2.0 × 2.5 to 3.5 × 4.0 mm; females, 2.0 × 2.2 to 6.0 × 6.5 mm; ovigerous females, 4.5 × 5.0 to 6.0 × 6.5 mm (MONOD, 1956; MANNING and HOLTHUIS, 1981).

HOST. — Bivalve mollusks, family Tellinidae, *Tellina nymphalis* Lamarck.

HABITAT. — Shore.

REMARKS

Nepinnotheres tellinae resembles *N. viridis* and differs from the other West African species of the genus in having an erect tooth on the fixed finger of the chela. It differs from *N. viridis* in having stouter and shorter walking legs.

CAMPOS (1989b : 673) suggested that this species might belong in a genus recognized by him, *Tumidotheres*. It differs from *Tumidotheres* in that the front is neither notched nor projecting anteriorly, the surface of the carapace is smooth and shiny, and the regions are not at all differentiated and the dactyli of P2-P5 are subequal.

No material other than that reported by MANNING and HOLTHUIS (1981) is available, so the diagnosis is based on their account. In their account, letters "e" and "l" are reversed in Fig. 45.

The specimen reported by LONGHURST (1958) is in the collection of the Natural History Museum, London (Reg. No. 1992.224.1). It apparently had dried out at one time and is so flattened that its diagnostic features are not recognizable.

RANGE. — West Africa, from localities around Freetown, Kissy [8°28'N, 13°12'W] and Bullom Shore [8°34'N, 13°12'W] (MANNING and HOLTHUIS, 1981), and the Sierra Leone River [8°30'N, 13°15'W] (LONGHURST, 1958), Sierra Leone. MONOD's (1956) material also was from Sierra Leone.

Nepinnotheres viridis sp. nov.

(Fig. 30)

Pinnotheres sp.; FRANSEN, 1991 : 54, 166 [Cape Verde Islands].

MATERIAL EXAMINED. — Cape Verde Islands : Branco, south coast near Ponta da Parede, 16°39'N, 24°41'W, sandy bottom, rock ledges, depth 12-15 m, scuba diving, 4-5 IX 1986, Cancap Sta. 7.D14 : 1 ovigerous ♀, 6.0 × 6.8 mm (holotype, RMNH D.41150).

ETYMOLOGY. — The name is from the Latin, *viridis*, green, alluding to the occurrence of the species in the Cape Verde Islands.

DIAGNOSIS

Post-hard female (fig. 30) : Size medium, cl 6.0 mm. Carapace firm, greatest width posterior to midlength. Front not projecting beyond outline of carapace. Mxp3 propodus stout, length about twice height. Chela with movable finger shorter than palm, height of palm

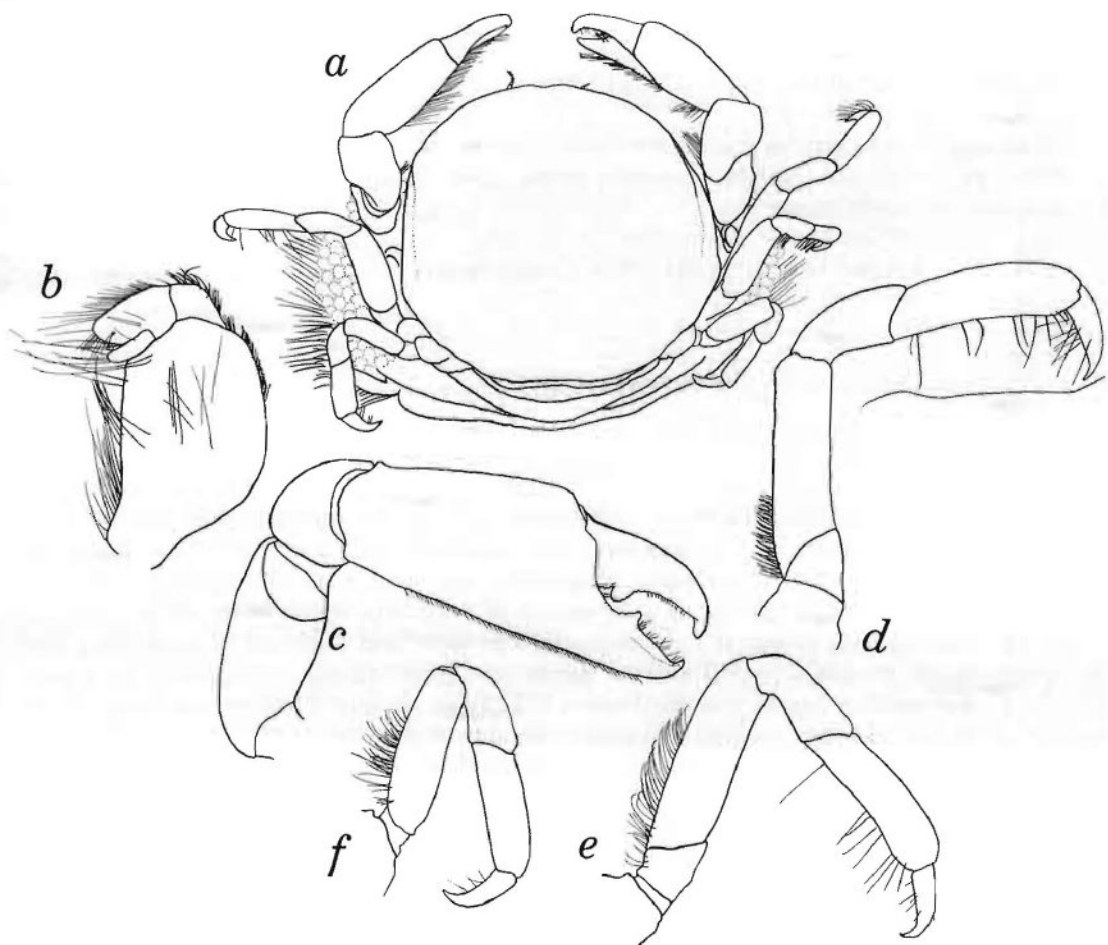


FIG. 30. — *Nepinnotheres viridis* sp. nov., ovigerous female holotype, 6.0 × 6.8 mm, Cape Verde Islands : a, dorsal view ; b, Mxp3 ; c-f, P1, P3-P5.

much less than length ; movable finger with large rounded tooth proximally, fixed finger with more triangular tooth proximally ; chela with fringe of short setae ventrally. Walking legs slender, propodus of P4 more than 3 times longer than high ; relative lengths $P3 > P4 > P5$ (P2 absent) ; P5 falling short of dactylus of P4 ; carpus shorter than propodus on P3-P5 ; dactyli of P3-P5 short, about half as long as propodus ; P3 and P4 lacking swimming setae. Merus of each walking legs with dorsal setae basally, scattered longer setae ventrally on propodus and dactylus. Abdomen of seven somites, wider than long, extending beyond bases of walking legs.

SIZE. — Ovigerous female (1), 6.0 × 6.8 mm.

HOST. — Unknown.

HABITAT. — Sublittoral, depth 12 to 15 meters.

REMARKS. — The large tooth on the fixed finger of the chela will distinguish this species at once from the eastern Atlantic members of the genus except for *N. tellinae* in which the walking legs are much stouter.

RANGE. — Known only from the Cape Verde Islands.

WALDOTHERES gen. nov.

DIAGNOSIS

Carapace quadrangular anteriorly, subcircular posteriorly, width slightly greater than length, regions poorly defined. Mxp3 exopod with flagellum; palp 3-segmented; ischium and merus indistinguishably fused, elongate; propodus longer than carpus, triangular; dactylus slender, inserted near midlength of ventral surface of propodus, apex falling short of end of propodus. Walking legs subequal right and left, legs stout and flattened in male, long and slender in female; P3 longest of all walking legs in post-hard female; P3 dactylus longer than dactyli of other walking legs in post-hard female; dactylus of longest walking leg about 1/3 as long as propodus, of other walking legs almost as long as propodus. Abdomen of 7 somites in each sex. Male telson broader than long, rounded. Male gonopod simple.

ETYMOLOGY. — Dedicated to the late Waldo L. SCHMITT who studied the pinnotherids during the latter part of his long career. Gender masculine.

TYPE SPECIES. — *Pinnotheres mccainae* Schmitt, 1973, in SCHMITT, McCAIN and DAVIDSON, 1973, by present designation and monotypy.

REMARKS. — This monotypic genus is the only one recognized to date in which the dactylus of P3 is distinctly longer than the dactyli of the other walking legs. This is a distinguishing feature for this genus in the eastern Atlantic, as the elongated dactylus is not found in any other pinnotherid in that region. In *Arcotheres* from the Indo-West Pacific the dactyli of P4 and P5 are longest, and in the American genera *Juxtafabia*, *Tumidotheres* and *Zaops* the dactylus of P5 is the longest.

Waldotheres mccainae (Schmitt, 1973) comb. nov.

(Figs. 31-33)

Pinnotheres rouxi Rossignol, 1957 : 84, fig. 4 [Pointe-Noire, Congo]; SILAS and ALAGARSWAMI, 1967 : 1208; SCHMITT, McCAIN and DAVIDSON, 1973 : 2, 57. [Preoccupied by *Pinnotheres rouxi* H. Milne Edwards, 1837.]

Pinnotheres rouxi; ROSSIGNOL, 1962 : 118 [Pointe-Noire, Congo].

Pinnotheres mccainae Schmitt, in SCHMITT, McCAIN and DAVIDSON, 1973 : 2, 5, 11, 57; MANNING and HOLTHUIS, 1981 : 185, fig. 43 [Pointe-Noire, Congo].

MATERIAL EXAMINED. — Congo : Plage de Pointe-Noire, in *Donax*, 22.XI.1953, leg. M. ROSSIGNOL : 1 ovigerous ♀ (5.2 × 6.1 mm) (holotype of *P. rouxi* Rossignol; MNHN-B 10632). Baie de Pointe-Noire, in *Donax*, V-VI.1956, leg. M. ROSSIGNOL : 7♀ (6 post-hard), 2 spent (3.4 × 4.1, 4.2 × 4.8 mm), 4 ovigerous (3.9 × 4.9, 4.3 × 5.1, 5.3 × 6.3, 5.9 × 6.8 mm), 1 damaged ♀ (ca. 2.8 × 3.6 mm), 6 pre-hard stages (1.5 × 1.7, 1.6 × 1.8, 1.7 × 1.9, 1.7 × 1.9, 1.8 × 2.0, 1.9 × 2.0 mm) (5♀, 4 pre-hard stages, MNHN-B 22710; 2♀, 2 pre-hard stages, USNM 264747).

DIAGNOSIS

Post-hard female (figs. 31-32) : Size small to medium, cl to almost 6 mm. Carapace naked, integument thin; front deflexed, not projecting beyond outline of carapace, orbits not visible in dorsal view. Chela with movable finger about 3/4 as long as palm, height of palm about twice length; cutting edges of both fingers with distinct tooth. Walking legs very slender, length of propodus of P3 more than 6 times height; relative lengths P3 > P4 > P2 > P5; dactylus of P3 longest, about 1.5 times as long as shortest dactylus; carpus subequal to or longer than propodus on P2, shorter on P3 and P4, equal on P5; P3 and P4 lacking swimming setae. Abdomen of ovigerous females extending beyond bases of walking legs and to buccal area.

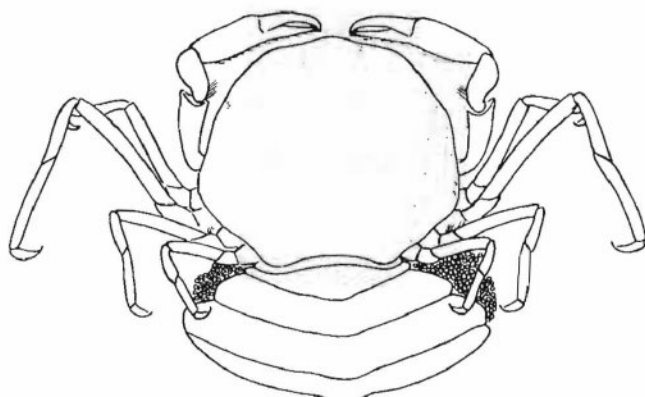


FIG. 31. — *Waldotheres mccainae* (Schmitt), ovigerous female holotype, 5.2 × 6.1 mm, Congo : dorsal view (from ROSSIGNOL, 1957.)

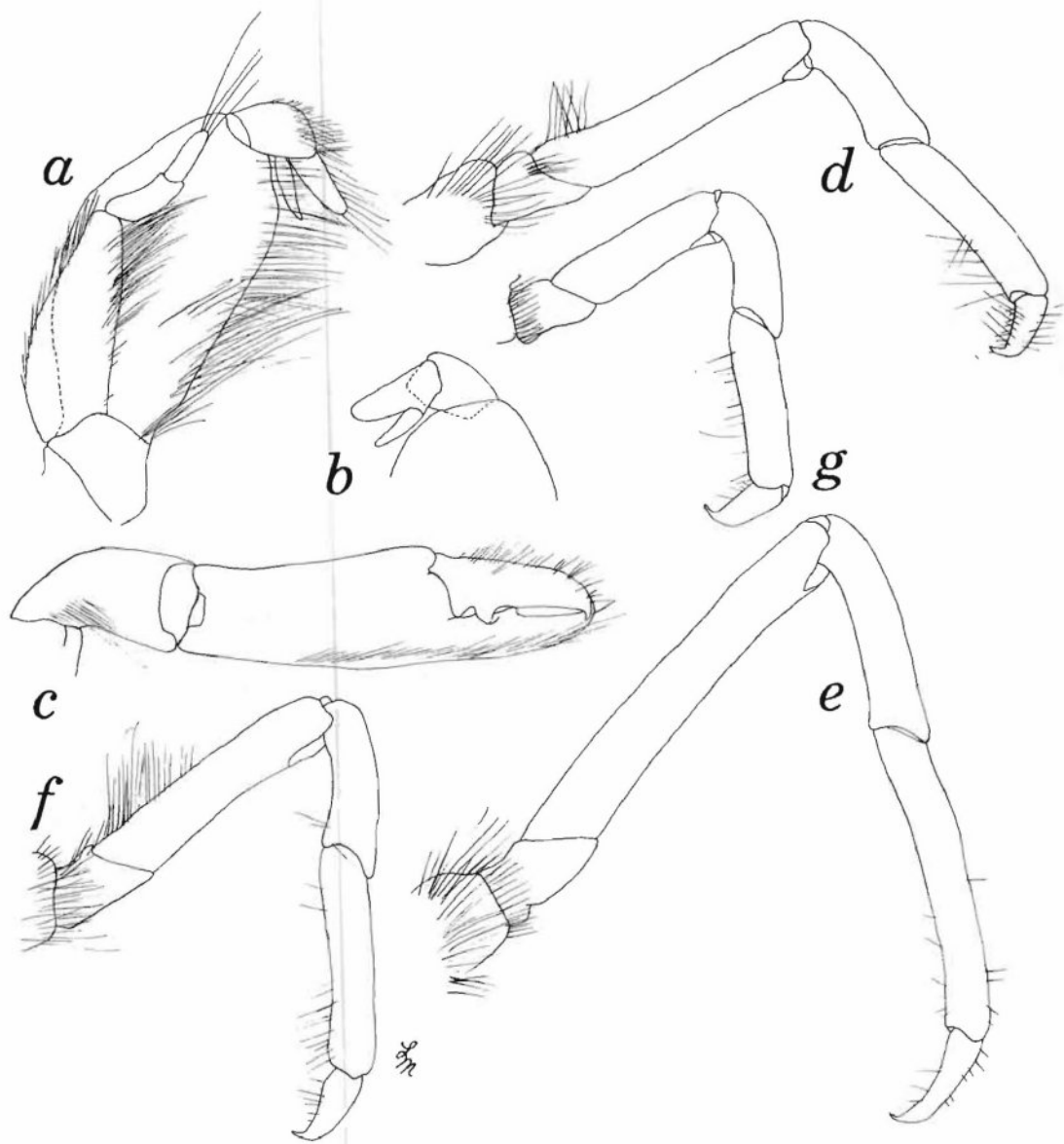


FIG. 32. — *Waldotheres mccainae* (Schmitt), Congo : a-b, Mxp3 ; c-g, P1-P5. (From MANNING and HOLTHUIS, 1981.)

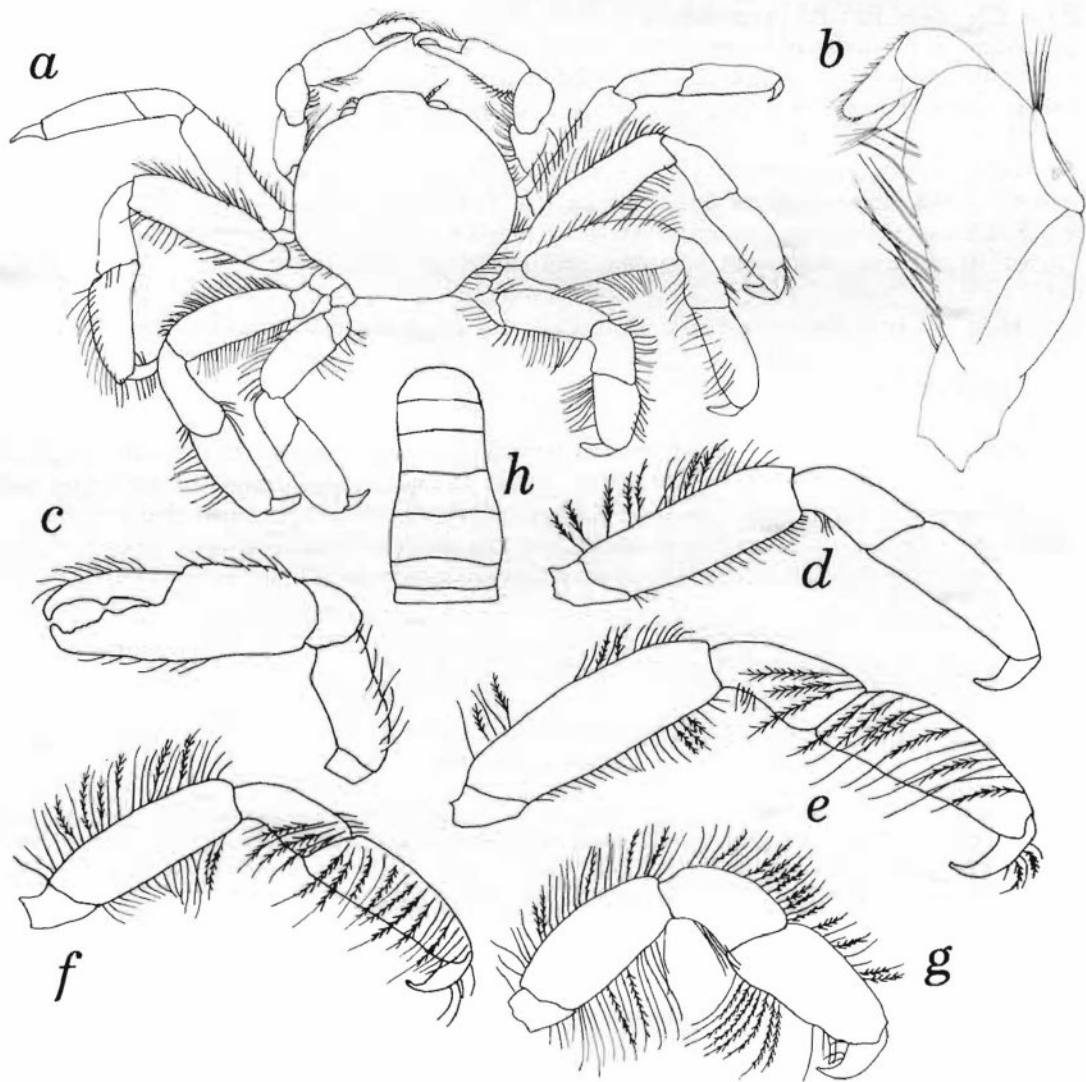


FIG. 33. — *Waldotheres mccainae* (Schmitt), pre-hard stage, 1.9 × 2.0 mm, Congo : a, dorsal view ; b, Mxp3 ; c-g, P1-P5 ; h, abdomen.

Pre-hard stage (fig. 33) : Size very small, cl 2 mm or less. Carapace width greater than length. Front rounded, projecting slightly beyond outline of carapace. Orbits large, about half as wide as front. Mxp3 similar to that of adults, conical propodus longer than carpus, palp articulated basally. Chela with movable finger shorter than palm, height of palm about 3/4

length; fingers gaping, each with low, inconspicuous tooth. Walking legs stout, length of propodus of P3 about 2.5 times height, flattened, arched dorsally, paddle-like; relative lengths $P3 > P2 = P4 > P5$; P5 overreaching base of dactylus of P4; carpus of P2-P4 shorter than propodus, of P5 subequal to propodus; dactylus of P3 1.5 times longer than dactyli of P2, P4, or P5; P3 and P4 with swimming setae. Abdomen widest at third somite, tapering to rounded telson, latter broader than long. No pleopods or gonopores visible.

SIZE. — Ovigerous females (5), 3.9×4.9 to 5.9×6.8 mm; spent females (2), 3.4×4.1 and 4.2×4.8 mm; damaged female (1), ca. 2.8×3.6 mm; pre-hard stages (6), 1.5×1.7 to 1.9×2.0 mm. Ovigerous females, cl 4.0 to 6.5 mm, cb 5.5 to 7.0 mm were reported by MONOD (1956), ROSSIGNOL (1957), and MANNING and HOLTHUIS (1981).

HOST. — In a bivalve mollusk, *Donax rugosus* Linnaeus, Family Donacidae.

HABITAT. — Shore.

REMARKS. — The specimens from the Baie de Pointe-Noire were in the same lot as the holotype. Although collected by ROSSIGNOL before the species was named in 1957, they were not mentioned in the original account. ROSSIGNOL (1962 : 118) commented that many of the *Donax* he collected at Pointe-Noire were "habituée par une couple de cette espèce" but he gave no other information on the presumed males which may have been the pre-hard specimens reported here.

RANGE. — Known only from Pointe-Noire, Congo.

Acknowledgements

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