West African Brachyuran Crabs (Crustacea: Decapoda)

RAYMOND B. MANNING
and
L. B. HOLTHUIS

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ABSTRACT

Manning, Raymond B., and L. B. Holthuis. West African Brachyuran Crabs (Crustacea: Decapoda). *Smithsonian Contributions to Zoology*, number 306, 379 pages, 88 figures, 1981.—The West African marine brachyuran crab fauna, comprising 218 named species in 120 genera and 26 familes, is surveyed. Sixteen new genera and 24 new species are recognized. Synonymies are updated for the tropical species, and all 300 + Eastern Atlantic species are listed. Original references and synonymies are provided for all 146 Eastern Atlantic genera. Synonymies have been compiled for all 36 currently recognized families of marine crabs. Twenty-nine families are represented in the Eastern Atlantic fauna. One family, Hexapodidae Miers, 1886, and one subfamily, Camptandriinae Stimpson, 1858 (Ocypodidae) are revised at the generic level. The genera *Liocarcinus* Stimpson, 1871 (Portunidae), *Machaerus* Leach, 1818 (Goneplacidae), and *Lambdophallus* Alcock, 1900, *Paeduma* Rathbun, 1897, *Parahexapus* Balss, 1922, *Pseudohexapus* Monod, 1956, and *Thaumastoplax* Miers, 1881 (all Hexapodidae), are defined and recognized. It is suggested that the family Geryonidae Colosi, 1923, shows closest affinities with the family Portunidae Rafinesque, 1815.

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West African Brachyuran Crabs (Crustacea: Decapoda)

Raymond B. Manning
and L. B. Holthuis

Introduction

This report is based primarily on collections made in the Gulf of Guinea in 1964 and 1965 during two cruises of the University of Miami Research Vessel *John Elliott Pillsbury*. Material from the *Pillsbury* collections has been supplemented by other brachyuran crabs from West Africa in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden, and the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Our original intent was to prepare a list of the Brachyura obtained during the two *Pillsbury* cruises, a job that we anticipated would be quite simple, as the West African Brachyuran fauna has been investigated in detail in the last 30 years. In 1951, A. Capart published a beautifully illustrated volume on the West African crabs collected by the Belgian Oceanographic Expedition, 1948–1949, aboard the *Noordende III*. Capart's study was overshadowed by the publication in 1956 by Th. Monod of a review of West African crabs. Monod's work, a monumental compilation of information on West African Brachyura, was illustrated with almost 900 figures. It remains the basic tool in the study of West African crabs.

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These reports were soon followed by others based on smaller collections, those by M. Rossignol (1957 and 1962) on decapods from the Congo region and by D. Guinot and A. Ribeiro (1962) on collections from the Cape Verde Islands and Angola, as well as several other smaller reports. Material collected by the *Calypso* in 1956 from West African localities between Spanish Sahara and Gabon on the mainland, as well as from the offshore islands of the Gulf of Guinea, Principe, São Tomé, and Annobon, formed the basis of an important report by J. Forest and D. Guinot in 1966.

Realizing that the West African tropical brachyuran fauna was one of the best known in the world, we anticipated few difficulties in preparing a report on the materials collected by the *Pillsbury*. As our study progressed, however, we continually encountered problems that demonstrated that our original optimism was largely unfounded.

Whenever comparative study material was available in our collections, we compared specimens from West African localities with those from other areas. Several of the common species in the Gulf of Guinea have in the past been identified with European-Mediterranean species. Thus *Ethusa mascarone*, *Inachus dorsettensis*, *Macropodia rostrata*, and *Parthenope macrochelos*, among others, all have been included in the tropical fauna by Monod (1956), as well as other authors. In the

case of these four species, direct comparison of material from northern and southern areas has demonstrated that the southern forms are distinct; southern counterparts of three of these are described as new, and a name is resurrected from synonymy for the fourth species.

Similarly, direct comparison of material from both sides of the Atlantic yielded surprising results. In one case, that of one species of *Ranilia*, such a comparison showed that populations on each side of the Atlantic were conspecific whereas they had previously been considered to be distinct. Other comparisons, based on species in *Eurypanopeus*, *Goniopsis*, *Callinectes*, and *Bathynectes*, resulted in our recognition of distinct species on each side of the Atlantic.

Two family-group taxa, the family Hexapodidae and the subfamily Camptandriinae of the family Ocypodidae, had to be surveyed at the generic level in order to determine the status of the West African species. These revisions are incorporated herein. In addition, a key to the subfamilies and genera of family Dorippidae is presented.

We also encountered unanticipated problems in various aspects of nomenclature: Citations of brachyuran family and subfamily names vary widely in the existing literature and often are incorrect; information on type-species and original citations of genera is widely scattered and has never been compiled for the Eastern Atlantic species; and numerous older names in the literature have never been properly identified.

Finally, there is no single reference work containing at least a list of all of the Eastern Atlantic Brachyura. The Scandinavian species have been dealt with by M. Christiansen (1969) in a well-prepared handbook; the British species have been studied by R. W. Ingle (1980) of the British Museum (Natural History); the Spanish and Portuguese species were the subject of the most up-to-date review of European-Mediterranean crabs by the late R. Zariquiey Alvarez (1968); the Black Sea species were studied by Bacescu (1967); the French species were studied by Bouvier (1940) in a work in which the nomenclature is now completely out of date; the Adriatic species were reported by O. Pesta in 1918, but, again, all the names are not current; and the eastern Mediterranean species were listed by L. B. Holthuis and E. Gottlieb in 1958. The latter fauna contains several species that have entered and colonized the region from the Red Sea via the Suez Canal. About 300 species of Brachyura are known from the Eastern Atlantic in literature that is widely scattered.

Thus our simple list of species taken off West Africa by the *Pillsbury* changed into a guide to the Eastern Atlantic crab fauna, with major emphasis on that of tropical West Africa. We have listed all Eastern Atlantic species of Brachyura known to us, and we have included all references to West African crabs published since 1956 that have come to our attention. This work, then, is basically an update of Monod's monumental work, based primarily on the collections made by the *Pillsbury*.

In our accounts, the term "West African" or "tropical" is used to indicate tropical West Africa: the Cape Verde Islands and the African mainland from Mauritania southward to Angola, including the offshore islands of the Gulf of Guinea. "Extralimital" is generally used to describe more northern forms, including those that live in the Mediterranean. We have not attempted to deal with the poorly known fauna of South-West Africa.

In the systematic account herein, we include original citations for all 36 families of marine Brachyura, as well as references to synonyms at the family-group level. Twenty-nine families are represented in the Eastern Atlantic fauna and 26 of these have representatives in the tropical fauna. The seven families of crabs not occurring in the Eastern Atlantic are the Belliidae, the Bythograeidae, the Mimilambridae, the Cyclodorippidae, the Mictyridae, the Platyranthidae, and the Retroplumidae. The three families of crabs occurring in the Eastern Atlantic but not represented in the tropical fauna are the Cancridae, the Cymonomidae, and the Homolodromiidae. Original citations are provided for all 146 genera

now known from the Eastern Atlantic, along with an indication of their type-species and gender; there are representatives of 120 genera in the tropical fauna. The Eastern Atlantic fauna comprises about 300 species, 218 of which have been recorded from localities between Mauritania and Angola.

Sixteen new genera, six of which are extralimital, and 24 new species from West Africa are recognized.

Most of the 300+ Eastern Atlantic species are indigenous to the Eastern Atlantic. Fifteen species have been introduced into the Eastern Mediterranean through the Suez Canal and apparently have become established there: *Atergatis roseus*, *Charybdis helleri*, *C. longicollis*, *Eucrate crenata*, *Heteropanope laevis*, *Hyastenus hilgendorfi*, *Ixa monodi*, *Leucosia signata*, *Myra fugax*, *Notopus dorsipes*, *Pilumnopeus vauquelini*, *Pilumnus hirsutus*, *Portunus pelagicus*, *Sphaerozius nitidus*, and *Thalamita poissonii*. Five other species have been introduced from other areas: *Callinectes sapidus*, *Eriocheir sinensis*, *Neopanope sayi*, *Pilumnoides perlatus*, and *Rhithropanopeus harrisii*.

Several other species have been introduced into the Eastern Atlantic but apparently have not become established there. Catta (1876) reported the following species taken from a vessel in Marseilles harbor: *Pachygrapsus advena*, new species (= *P. transversus*), *Nautilograpsus minutus* (= *Planes minutus*), *Plagusia squamosa* (= *P. depressa*), and *P. tomentosa* (= *P. chabrus* (Linnaeus, 1758)); the first three are included in the West African fauna. De Man (1913) found *Menippe convexa* Rathbun, 1893, *Leptodius voeltzkowi* Lenz, 1905, *Pilumnus longicornis* Hilgendorf, 1878, *Pilumnus malardi* De Man, 1913 (= *Parapilumnus malardi*), and *Pilumnus truncatospinosus* De Man, 1913 (= *Parapilumnus truncatospinosus*) in the harbor of St. Vaast-la-Hougue, Normandy, France, where they were obtained from barnacles attached to a ship coming from Madagascar.

The following species have been erroneously recorded from West Africa: *Chlorodiella longimana*, *Hepatus princeps*, *Libinia erinacea*, *Metopograpsus messor*, *Notolopas brasiliensis*, *Ocypode ceratophthalmus*, *O. quadrata*, *Pilumnoides hassleri*, *Platychirograpsus spectabilis*, *Pseudograpsus elongatus*, *Rochinia gracilipes*, *Sesarma roberti*, and *Uca burgersi*.

In addition, there are several species described or recorded from Eastern Atlantic localities based on incorrectly labeled material, such as *Portunus sanguinolentus* (Herbst, 1783), reported from the Adriatic by Pesta (1918:458). These species are not included in our lists of extralimital species under each family.

COLLECTIONS STUDIED.—Most of the specimens reported here were collected during two cruises of the research vessel *John Elliot Pillsbury* of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, in 1964 and 1965. A narrative of the cruise was given by Voss (1966) and Bayer (1966), who summarized dredging and trawling records. Cruise tracks of the *Pillsbury* off West Africa are shown in Figure 87. Species taken by the *Pillsbury* are marked with an asterisk (*) in the discussion sections under each family heading and in the headings of the species accounts. The *Pillsbury* collections have been deposited in the Rijksmuseum van Natuurlijke Historie, Leiden (L) and the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (W).

The *Pillsbury* collections are quite important. They are slightly smaller than those taken by the *Calypso*, containing the representatives of 98 rather than 108 species (Forest and Guinot, 1966: 27). Although this represents less than half of the known West African crab fauna, 16 of the 24 new species recognized here are based on specimens taken by the *Pillsbury*. A smaller collection from off Gabon, taken during an exploratory cruise of the U. S. Fish and Wildlife Service vessel *Geronimo* also is reported on here. All of the material from the *Geronimo* collections has been deposited at Washington. The bulk of the brachyuran collection made off southern Angola and northern South-West Africa by the U. S. Fish and Wildlife Service vessel *Undaunted* and reported upon by Crosnier (1970) has been deposited at Leiden and is reported here.

In the species accounts, station data for the

collections made by the *Pillsbury*, *Geronimo*, and *Undaunted* are abbreviated to station number, depth in meters, and observed bottom type. Complete station data and a list of brachyuran species taken at each station are given in Appendix I. Smaller collections from the northwestern coast of Africa by the Rijksmuseum van Natuurlijke Historie aboard the research vessel *Onversaagd* also are reported under "Material Examined" sections of the appropriate species discussion. Many of the species collected during the *Onversaagd* cruises do not occur in the tropical fauna and will be studied and possibly reported upon separately. In addition, the collections at Washington include series of decapods from Liberia donated by G. C. Miller, then with the U. S. Fish and Wildlife Service; material from Ghana donated by G. W. Bane, then with Cornell University; and several collections from Gulf of Guinea, donated by A. Crosnier, then with the Centre ORSTOM, Pointe-Noire.

In both Washington and Leiden are a few lots from the *Travailleur* and *Talisman* collections, acquired on exchange from the Muséum national d'Histoire naturelle, Paris. The Smithsonian received representatives of 80 species from those collections in 1899 through E.-L. Bouvier.

FORMAT CONSIDERATIONS.—We have adopted a fairly rigid format in order to ensure that our accounts are comparable at the family, genus, and species levels.

At the family level, we have first given the original citation for each family of marine brachyuran crabs; the freshwater families have been excluded. In addition to the original citation we have included original citations to all synonyms that we could find at the family-group level, without indicating necessarily which of these are now in current use as family-group categories. Thus in the Portunidae, for example, we have cited 20 different family-group taxa that have been recognized in the literature; only a few of these are now in current use. The list of synonyms for each family does not include erroneous spellings or subsequent uses of the family names; each of the family synonymies is a guide to original citations, not an exhaustive list of references. Where appropriate, we have indicated which family-group names are on the *Official List of Family Group Names in Zoology* established by the International Commission on Zoological Nomenclature (ICZN) by stating "name 00 on *Official List.*"

In each family account we have included a paragraph entitled "Eastern Atlantic Genera," in which we state how many genera of that family occur in the area. Extralimital or nontropical genera are then listed along with their original citations, an indication of their type-species and genders, and a statement that they are on the *Official List*, as appropriate. We have not tried to cite synonyms of extralimital genera.

That paragraph is followed by one entitled "Eastern Atlantic Species," in which the numbers of species occurring in that region are given. This is followed by a comparison of the names of tropical species, as cited by Monod (1956), compared to the current names; in several families, notably the Xanthidae and the Majidae, there have been numerous name changes since 1956. In those lists, the names used by Monod are given in the same order in which he cited them, to make it easier to work from our paper back to Monod's. Also in those lists, species taken by the *Pillsbury* are marked with an asterisk (*). Those lists are then followed by a list, in alphabetical order by genus and species, of extralimital species, along with a brief comment on their range and one or more pertinent references. These two introductory paragraphs may be followed by a third entitled "Remarks" or by a key to genera.

The families usually are arranged in the order in which they were treated in Monod. Within families, subfamilies, if recognized, are arranged alphabetically except in the Xanthidae where taxa are arranged alphabetically by genus and by species within each genus, genera are arranged alphabetically within subfamilies, and species are arranged alphabetically within genera.

For genera represented in the tropical fauna we have included not only the original citation but references to all synonyms known to us. In

the cases of some genera, such as *Dorippe* sensu lato, *Sesarma*, and *Uca*, all of which are in need of revision, we have given a complete list of original citations of genus-group names in these groups as a guide to their future revision. We do not mean to imply that the names so cited are to be considered as synonyms.

Tropical species are treated in two ways. If material from the tropical region was studied, we give an expanded account, with a synonymy, a list of synonyms, material examined (with a separate paragraph for *Pillsbury*, *Geronimo*, and *Undaunted* collections), citations to a description, to a good illustration, and to an illustration of the gonopod (used interchangeably with male pleopod and first male pleopod), an expanded section on biology, and an expanded section on distribution. If no tropical material is available, we have given an abbreviated account, with references to Capart (1951) and Monod (1956), and subsequent references, with parenthetic remarks on origin of the material reported in the literature, followed by a brief statement on distribution.

In our synonymies we have tried to include references to Capart (1951) and Monod (1956), all subsequent references based on West African specimens, and a few minor references overlooked by Monod. We have not duplicated the extensive synonymies given by Monod, except in the case of new species, where complete synonymies are given and in cases where the name has been changed since 1956. Original citations for all species then reported were given by Monod in his synonymies. The separate list of synonyms may seem redundant, but even though the nomenclature of the Eastern Atlantic brachyurans is relatively stable, current studies are demonstrating the existence of previously unrecognized species there, and many older names are available in the literature dealing with the European-Mediterranean fauna. In this region older names must be searched for carefully before new species are named.

In the sections on material based on the *Pillsbury*, *Geronimo*, and *Undaunted* collections, data are abbreviated; full data and a list of species taken at each station are in Appendix 1. Geographic localities in the sections on material and distribution are corrected to approved spellings by the U. S. Board on Geographic Names as published in their gazetteers. A list of localities, by country, with coordinates, is given in Appendix 2. Localities in the literature accompanied by coordinates are not repeated in Appendix 2. Alternate spellings often are given in the text. The names of most countries (e.g., Senegal, Guinea) have been anglicized. In the sections of ecology we have summarized available information on habitat, depth distribution, and occurrences of ovigerous females; much of this information has been taken from the recent literature, that is since 1956.

In the text, author and date citations accompanying a name (e.g., *Dehaanius* MacLeay, 1838) are considered to be part of the name, not a bibliographic citation. References to Monod without a date always refer to the monograph of West African crabs published by Monod in 1956.

Although we have tried to make our lists of family citations, generic names and synonyms, and species synonyms as complete as possible, we realize that these lists are by no means exhaustive. We would appreciate having any omissions or errors brought to our attention.

In some accounts in the literature based on expeditions sponsored by the French in the latter half of the 19th century (A. Milne Edwards and Bouvier, 1894, 1899, 1900), coordinates were based on the Paris observatory, not Greenwich, which is 2°20′ West of Paris. Later (Bouvier, 1922), these coordinates were based on Greenwich. In our text we have corrected the earlier observations from Paris to Greenwich; to avoid errors, we often have given both, so that a coordinate may be cited as: 05°10′N, 05°05′W of Paris (= 02°45′W of Greenwich).

Repositories and Abbreviations.—The bulk of the materials reported herein have been deposited in two institutions: The Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands, abbreviated to "L" in the material sections and often referred to as "Leiden" in the text. Registry

numbers (Crust. D. 000) are for the Decapod collection at Leiden. The National Museum of Natural History, Smithsonian Institution, Washington, D. C., abbreviated to "W" in the material and referred to as "Washington" or "USNM" in the text. Catalog numbers for material at Washington are given under the acronym USNM, referring to catalogs established under the former U. S. National Museum. For new species deposited in these collections, registry or catalog numbers are given only for holotypes.

A few specimens from other museums also have been studied. These are cited as follows:

BM	British Museum (Natural History), London
MP	Muséum national d'Histoire naturelle, Paris (Paris Museum)
ZMB	Zoologisches Museum, Berlin

A few abbreviations have been used throughout the text:

cb	carapace breadth
cl	carapace length
cm	centimeter
fm	fathom
juv	juvenile
m	meter
mm	millimeter
ov	ovigerous

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C. Froglia, Laboratorio di Tecnologia della Pesca, Ancona, brought an obscure paper by N. Prestandrea and the account of *Portunus Maravigna* to our attention. P. Le Loeuff, Antenne ORSTOM, Centre de Bretagne, Brest, provided us with a copy of a paper by C. A. Dias and J. F. Seita Machado that we were unable to obtain elsewhere. Angelo A. DiMauro, University of Connecticut, Torrington, provided information on the rediscovery of the type of *Amorphopus cylindraceus* in the Bell collection at Oxford University, England. C. F. Cowan, Cumbria, England, provided information on the dates of publication of Guérin's *Iconographie*. We thank M. Türkay, Natur-Museum Senckenberg, for bringing to our attention the account of *Lambrus spinosissimus* Osorio, 1923, which we otherwise would have overlooked, and R. W. Ingle, British Museum (Natural History), for pointing out that Verany (1846) had introduced a generic and specific name for *Brachynotus sexdentatus* (Risso) (see synonymy for *Brachynotus*, p. 247).

We thank two staff members of the Department of Invertebrate Zoology (Crustacea), National Museum of Natural History, Smithsonian Institution, for helping with various aspects of preparation of the manuscript: Anne Cohen for help in checking the bibliography and Cynthia J. Hemmings for proofreading parts of the manuscript. The manuscript was read by our colleague at the Smithsonian, Fenner A. Chace, Jr., with his usual and welcome attention to detail. Lilly King Manning executed most of the original illustrations and prepared all of the illustrations for publication. Much of her work was done as a volunteer. Carolyn S. Hahn and Jack F. Marquardt of the Smithsonian Library helped to locate many obscure references.

Family RANINIDAE de Haan, 1839

RANINOIDEA de Haan, 1839:102 [emended to Raninidae by White, 1847a:56].

NOTOPINAE Serène and Umali, 1972:22, 25, 29 [herein corrected to Notopodinae].

EASTERN ATLANTIC GENERA.—Four, of which three, *Cyrtorhina*, *Ranilia*, and *Raninoides*, are represented by tropical species. The fourth genus, which occurs in the eastern Mediterranean, is *Notopus* de Haan (1841:138). Type-species: *Cancer dorsipes* Linnaeus, 1758, by monotypy; gender: masculine; name 1570 on *Official List*.

EASTERN ATLANTIC SPECIES.—Four, three of which were recorded by Monod (1956) as follows:

Name in Monod	Current Name
Ranilia atlantica	*Ranilia constricta**
Cyrtorhina granulosa	*Cyrtorhina granulosa*
Raninoides bouvieri	*Raninoides bouvieri**

The fourth raninid occurring in the eastern Atlantic is *Notopus dorsipes* (Linnaeus, 1758): Eastern Mediterranean; an Indo-West Pacific species that has entered the Mediterranean via the Suez Canal, first recorded from the Mediterranean by Lewinsohn and Holthuis (1964).

Subfamily NOTOPODINAE Serène and Umali, 1972

Genus *Ranilia* H. Milne Edwards, 1837

Ranilia H. Milne Edwards, 1837:195 [type-species: *Ranilia muricata* H. Milne Edwards, 1837, by monotypy; gender: feminine].

Raninops A. Milne Edwards, 1880:34 [type-species: *Raninops constrictus* A. Milne Edwards, 1880, by subsequent designation by Rathbun, 1937:17; gender: masculine].

**Ranilia constricta* (A. Milne Edwards, 1880)

FIGURES 1, 2

Raninops constrictus A. Milne Edwards, 1880:35.

Notopus (Raninoides?) atlanticus Studer, 1883:17, pl. 1: figs. 5a, b.

Ranilia constricta.—A. Milne Edwards and Bouvier, 1923:302, pl. 1: figs. 11–13, pl. 3: figs. 2–5.—Rathbun, 1937:20, pl. 4: fig. 5, pl. 5: figs. 1, 2.—Gomes Corrêa, 1970:2, pls. 1, 2, 7: figs. 56–58.—Pequegnat, 1970:180.

Notopus atlanticus.—Gurney, 1939:103 [listed].

Ranilia atlantica.—Monod, 1956:47, 631, figs. 17, 18.—Longhurst, 1958:87.—Rossignol, 1962:113 [listed].—Gomes Corrêa, 1970:5 [discussion].

Raninids.—Voss, 1966:50.

Lyrideus.—Bayer, 1966:102.

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 3♂, 1♀ (L, W).

Other Material: Ascension Island: 60 fm (110 m), syntypes of *N. atlanticus* Studer, 1♂, 1♀ (ZMB 4560).

DESCRIPTION.—Carapace (Figure 2*a*,*c*) suboval, strongly convex from side to side, flattened, almost straight in midline, front slightly raised. Carapace length on midline about $1^1/_2$ times width between anterolateral spines. Lateral margins of carapace subparallel or slightly divergent anteriorly. Dorsal surface of carapace coarsely punctate, with narrow band of short, ciliated lines behind front (Figure 1*a*); lateral margins ciliate and punctate. Rostrum (Figure 1*a*) slender, with dorsal carina, extending to or beyond adjacent pair of frontal spines. Anterior border of carapace with 4 pairs of projections lateral to median spine, lateralmost strongest, arising behind anterior margin. Antennules short, reaching slightly beyond front when extended. Antennae slightly longer than eyes. Chelipeds (Figures 1*b*, 2*b*,*d*) stout, surface ornamented with tubercles and ciliated lines. Movable finger of chela unarmed, outer surface ornamented with setae. Palm of chela higher than long (measured dorsally), ventral margin terminating in strong spine, opposable margin obtusely crenulate, not armed with sharp teeth. Merus of cheliped with blunt dorsal spine, spine of carpus sharp or bluntly rounded. Dactyli of second and fifth pereiopods sublanceolate, anterior margins straight, posterior margins convex. Dactylus of fourth pereiopods (Figure 1*c*) crescent-shaped. Abdomen composed of 7 somites in both sexes. Telson of male very short, obtusely rounded distally. Male pleopod as figured (Figure 1*d*–*g*).

MEASUREMENTS.—Our measurable specimens have carapace lengths of 15.0 mm (♂) and 15.5 mm (♀); the anterior width of the carapace of the male is 10.2 mm. The syntypes of *N. atlanticus* Studer are 18.4 mm (♂) and 15.3 mm (♀) long.

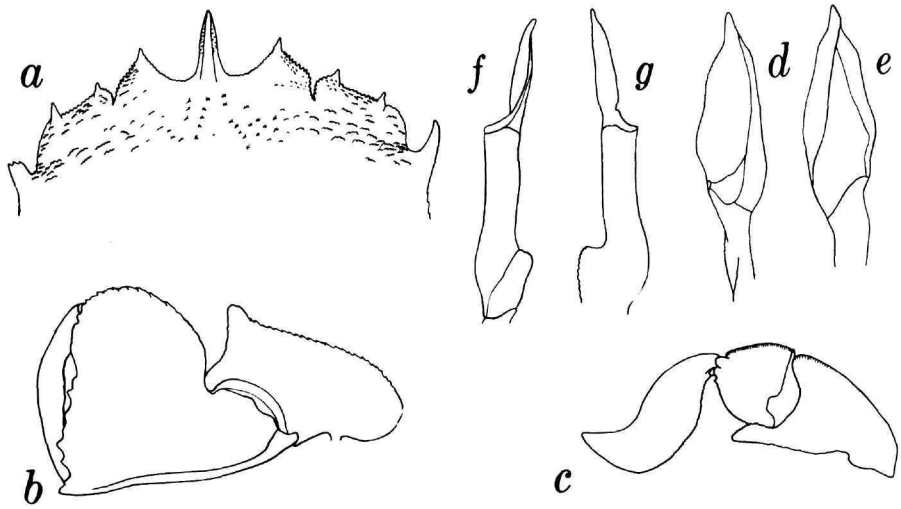

FIGURE 1.—*Ranilia constricta* (A. Milne Edwards), male cl ca. 15 mm, *Pillsbury* Sta 275: *a*, front; *b*, cheliped; *c*, fourth pereiopod; *d*, *e*, first pleopod of male; *f*, *g*, second pleopod of male.

The largest specimen recorded in the literature is a male 41 mm long (Gomes Corrêa, 1970).

REMARKS.—Both Monod (1956) and Gomes Corrêa (1970) have suggested that *Ranilia atlantica* (Studer, 1883) from Ascension Island and West Africa was conspecific with *R. constricta* (A. Milne Edwards, 1880) from the western Atlantic, but, so far as we can determine, specimens from both sides of the Atlantic have not been compared directly. We have been able to compare the four specimens taken by the *Pillsbury* off Annobon with a female (cl 22.2 mm) from Bahia Honda, Cuba (USNM 48642), a female (cl 19.2 mm) from Barbados, 92–366 m (USNM 110223), a male (cl 11.6 mm) and two females (cl 11.0–11.3 mm) from off Palm Beach, Florida, 55–73 m (USNM 169698), and a male (cl 17.2 mm) and a female (cl 18.0 mm) from off Sombrero Light, Florida, 92–110 m (USNM 169699), as well as with the syntypes of *R. atlantica* from Ascension Island. We can find no significant differences between these specimens.

The males from Annobon differ from the female in having slightly more divergent anterolateral spines on the carapace. Our female from Annobon resembles those from other localities in that the anterolateral spines do not diverge perceptibly from the lateral margins of the carapace.

The illustrations published by A. Milne Edwards and Bouvier (1923) and the figures given by Rathbun (1937) differ in several respects, as pointed out by Monod (1956), who questioned whether the two specimens previously identified with *R. constricta* were conspecific. Gomes Corrêa (1970:5) commented on the resemblance of the figures given by Studer (1883) and Rathbun (1937).

In all of our specimens, the rostral spine extends to or exceeds the adjacent frontal teeth by less than half its length; in no specimen is the rostrum so long as shown by A. Milne Edwards and Bouvier (1923, pl. 3: fig. 2) (Figure 2*a*). In addition, all of the specimens seen by us have a short but well-marked median carina on the rostrum. This carina is shown in the figures of A. Milne Edwards and Bouvier (1923, pl. 3: fig. 2), Rathbun (1937, pl. 5: fig. 1), and Studer (1883, pl. 1: fig 5a), but not by Monod (1956, figs. 17,18) or by Gomes Corrêa (1970, pl. 1: figs. 1,2).

We have reproduced here the illustrations published by Studer (1883) and A. Milne Edwards and Bouvier (1923) (Figure 2). These figures, especially those by Studer, may be inaccessible to most workers. In addition, we have added sketches from our specimens (Figure 1), including a figure of the male pleopods.

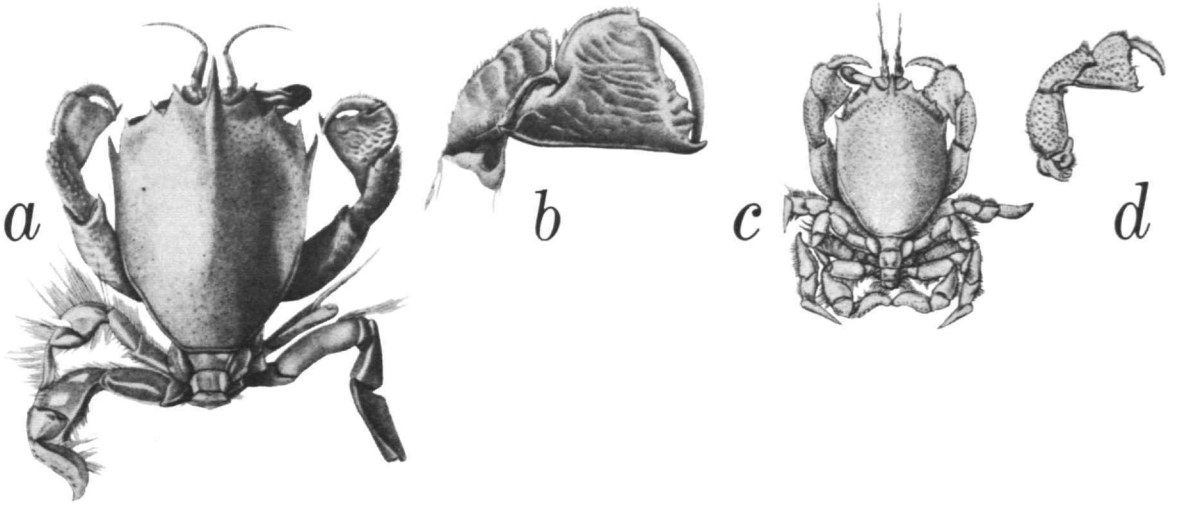

FIGURE 2.—*Ranilia constricta* (A. Milne Edwards): *a*, dorsal view (from A. Milne Edwards and Bouvier, 1923, pl. 3: fig. 2); *b*, cheliped (from A. Milne Edwards and Bouvier, 1923, pl. 1: fig. 11); *c*, dorsal view; *d*, cheliped (from Studer, 1883, pl. 1: fig. 5a,b).

BIOLOGY.—This species has been taken in West African waters in depths between 40 and 69 m; off Ascension Island it occurs in 110 m. In the western Atlantic it has been recorded from the littoral zone to 366 or 481 m, usually in less than 100 m. The record of 100–200 fm (183–366 m) in Pequegnat (1970) is somewhat puzzling. Pequegnat (1970:180) gave this depth in the species account, but in the station list (1970:6), published in the same volume, the station at which the species was collected, 65-A-9-15, is indicated as having a depth of 263 or 330 fm (481 or 604 m).

The *Pillsbury* specimens were taken on rubble of coralline algae, whereas those from Sierra Leone were taken on muddy sand (Longhurst, 1958). In the western Atlantic this species has been collected on a reef (Rathbun, 1937) and on a rocky reef off Palm Beach, Florida. Monod (1956) reported this species from the stomach contents of the fishes *Syacium micrurum* Ranzani and *Trygon marmorata* Steindachner. Nothing is known of the biology of this species. Ovigerous females have not been observed off West Africa.

DISTRIBUTION.—Tropical Atlantic Ocean. Monod (1956), who reported material from Senegal, SW of Gorée, 40 m, and between Joal and Sangomar, 42 m, as well as from Moyen Congo [Congo], was the first to record the species from West Africa. Other records in the literature include:

Eastern Atlantic. Sierra Leone: 07°43′N, 13°43′W, 40 m (Longhurst, 1958).

Annobon Island: 01°24′S, 05°37′E to 01°24′S, 05°38′E, 55–69 m (Bayer, 1966; Voss, 1966).

Central Atlantic. Ascension Island: 60 fm (110 m) (Studer, 1883).

Western Atlantic. Florida: Off Sombrero [reef], 47 fm (86 m) (A. Milne Edwards, 1880; A. Milne Edwards and Bouvier, 1923).

Cuba: Bahia Honda (Rathbun, 1937).

Gulf of Mexico: 23°00′N, 86°48′W, 100–200 fm (183–366 m) (or 481–604 m?) (Pequegnat, 1970).

Brazil: Cabo Frio Island, littoral; Pai Island, Rio de Janeiro State, 20–30 m; off Guaritiba, Guanabara State, 35–40 m (all Gomes Corrêa, 1970).

Subfamily RANININAE de Haan, 1839

Genus *Cyrtorhina* Monod, 1956

Cyrtorhina Monod, 1956:49 [type-species: *Cyrtorhina granulosa* Monod, 1956, by monotypy; gender: feminine].

Cyrtorhina granulosa Monod, 1956

Cyrtorhina granulosa Monod, 1956:49, figs. 19–31 [Ghana].—Gauld, 1960:68 [Ghana].—Monod, 1963, fig. 31 [no locality].—Forest and Guinot, 1966:42 [Principe].

Cyrthorina granulosa.—Forest, 1959:23 [Principe; erroneous spelling].

Cyrtorhyna granulosa.—Forest, 1959, pl. 2: fig. 1 [Principe; erroneous spelling].

DISTRIBUTION.—Gulf of Guinea, from off Ghana and Ilha do Principe, in 5–6 and 12 m.

Genus *Raninoides* H. Milne Edwards, 1837

Raninoides H. Milne Edwards, 1837:196 [type-species: *Ranina loevis* Latreille, 1825, by monotypy; gender: masculine].

* *Raninoides bouvieri* Capart, 1951

Raninoides bouvieri Capart, 1951:59, fig. 17.—Monod, 1956: 54, figs. 32–34.—Longhurst, 1958:87.—Forest, 1959:15.—Gauld, 1960:68.—Rossignol, 1962:113.—Crosnier, 1964: 35.—Forest and Guinot, 1966:42.—Le Loeuff and Intès, 1968, table 1.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 4♂, 2♀ (1 ov), 2 juv (L).

Ivory Coast: Sta 62, 46 m, brown, branched and foliate Foraminifera, 1♀ (L). Sta 64, 68 m, 1♂ (L).

Ghana: Sta 28, 49–53 m, 1♀ (L).

Nigeria: Sta 241, 59–63 m, mud and shell, 2 ♂, 1 ♀ (L).

Cameroon: Sta 259, 59 m, mud and broken shell, 13 ♂, 24 ♀ (W). Sta 260, 46 m, 1 ♂, 2 ♀ (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 3 ♂ 2 ♀ (L).

DESCRIPTION.—Capart, 1951:59.

Figures: Capart, 1951, fig. 17; Monod, 1956, figs. 32–34.

Male Pleopod: Monod, 1956, figs. 33, 34 (Ghana).

Color: Capart (1951:59) gave the following color account: "Coloration uniforme, rose saumon pâle, les pattes plus claires."

MEASUREMENTS.—Our specimens have carapace lengths of 8 to 29 mm; the single ovigerous female has a carapace length of 25 mm. The holotype, a female, has a carapace length of 32.5 mm (Capart, 1951).

REMARKS.—*Raninoides bouvieri* differs from all other Atlantic species of the genus in lacking a distal spine on the carpus of the chela; there is no trace of a spine in any of the specimens taken by the *Pillsbury*. The number of spines on the outer margin of the palm varies from three to five; all specimens have but one dorsal spine on the palm.

Monod (1965) described a raninid megalopa from the Gulf of Guinea, which may be identifiable with this species.

BIOLOGY.—This species occurs sublittorally on the continental shelf in depths varying from 5 to 70 m (two of the hauls were made in depths between 28 and 80 m and between 65 and 75 m, so that the species might occur in depths slightly greater than 70 m); more than 85% of the catches were from between 30 and 70 m. The *Pillsbury* specimens were taken from the following types of bottom: brown branching and foliate Foraminifera (Sta 62), broken shell (Sta 68), mud and shell (Sta 241), and mud and broken shell (Sta 259). The following bottom types have been noted in the literature: brown mud (Capart, 1951); fine sand and silty sand (Monod, 1956; Buchanan, 1958:44, 45, 54, 56 for descriptions of stations); shelly sand (Longhurst, 1958); muddy sand (Gauld, 1960); mud, sand, and compacted sand (sable construit), sand, mud and shells, and sand and Foraminifera (Forest and Guinot, 1966); and muddy quartz sand (Le Loeuff and Intès, 1968).

Crosnier (1964) characterized *R. bouvieri* as a eurythermic species occurring on most of the continental shelf off Cameroon. Ovigerous females have been collected in April, May, June, and December (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Known only from scattered localities off tropical West Africa, between Senegal and Zaire. It was originally described from WNW of Banana, Zaire, 05°52′S, 11°43.5′E, 70 m (Capart, 1951). Monod (1956) recorded several lots from off Accra, Ghana, in 28–44 m. Since 1956 *R. bouvieri* has been recorded from the following localities:

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Sierra Leone: 13°30′N, 17°17′W, 56 m, and 13°22′N, 17°16′W, 55 m (Longhurst, 1958).

Liberia: 04°34.5'N, 08°31'W, 64 m (Forest and Guinot, 1966).

Ivory Coast: Off Fresco, 40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 28–80 m (Gauld, 1960).

Cameroon: No specific locality (Crosnier, 1964).

Gabon: 00°38'25"S, 08°46'E, 5 m (Forest and Guinot, 1966).

Cabinda: W of Landana, 45 m (Rossignol, 1962).

It has not previously been recorded from Nigeria or Dahomey, although both of these localities are well within its known range.

Family HOMOLODROMIIDAE Alcock, 1899

HOMOLODROMIDAE Alcock, 1899b:127, 130 [corrected to Homolodromiidae by Stebbing, 1905:58; considered a subfamily of family Prosopidae von Meyer, 1860, by Glaessner, 1969:R486].

EASTERN ATLANTIC GENERA.—One, which has not been recorded from tropical waters, is *Dicranodromia* A. Milne Edwards (1880:31). Type-species: *Dicranodromia ovata* A. Milne Edwards, 1880, by monotypy; gender: feminine.

EASTERN ATLANTIC SPECIES.—One, *Dicranodromia mahieuxii* A. Milne Edwards, 1883. Bay of Biscay, Azores, and off the Sahara coast in depths between 454 and 1330 m (Zariquiey Alvarez, 1968).

Family DROMIIDAE de Haan, 1833

DROMIACEA de Haan, 1833:ix [corrected to Dromiidae by Ortmann, 1892:541, 543; name 356 on *Official List*].

EASTERN ATLANTIC GENERA.—Two, *Dromia* and *Sternodromia*, both represented by species occurring off tropical West Africa.

EASTERN ATLANTIC SPECIES.—Six, of which all but one are tropical. Three species were recorded by Monod (1956):

Name in Monod	Current Name
Dromia caputmortuum	*Dromia marmorea*
Dromia nodosa [part]	*Dromia nodosa*
Dromia nodosa [part]	*Dromia monodi**
Dromidiopsis spinirostris	*Sternodromia spinirostris**

The fifth tropical species, *D. bollorei*, was named in 1974.

The extralimital species is *Dromia personata* (Linnaeus, 1758). Southern North Sea southward to Spanish Sahara, Mediterranean; sublittoral (Christiansen, 1969; Forest, 1974).

Genus *Dromia* Weber, 1795

Dromia Weber, 1795:92 [type-species: *Cancer personatus* Linnaeus, 1758, by subsequent designation under the Plenary Powers of the International Commission on Zoological Nomenclature (Opinion 688 in *Bulletin of Zoological Nomenclature*, 21:16–19); gender: feminine; name 1568 on *Official List*].

Dromia bollorei Forest, 1974

Dromia bollorei Forest, 1974:91, figs. 1d, 2, 3d, 5, 6b, 7c,d, pl. 2: figs. 1, 2, pl. 3: fig. 4, pl. 6: fig 1 [Mauritania and Ivory Coast].

DISTRIBUTION.—Known only from off Mauritania and off the Ivory Coast in 100 m.

Dromia marmorea Forest, 1974

Dromia vulgaris.—Osorio, 1889:135, 139; 1898:193.—A. Milne Edwards and Bouvier, 1900:17, pl. 9: figs. 12–14 [not fig. 15].—Rathbun, 1900a:300.—Balss, 1921:47.—Gordon, 1950:246 [part], figs. 24, 25.—Longhurst, 1958: 87.—Buchanan, 1958:20. [Not *Dromia vulgaris* H. Milne Edwards, 1837 = *D. personata* (Linnaeus, 1758).]

Hairy Brown Sea Crab.—Irvine, 1932:13, fig. 16.

Dromia caput-mortuum.—Irvine, 1947:301, fig. 205.—Gauld, 1960:68. [Not *Cancer caputmortuum* Linnaeus, 1767 = *Dromia personata* (Linnaeus, 1758).]

Dromia caputmortuum.—Monod, 1956:59, figs. 35–51, 83a.—Rossignol, 1962:113. [Not *Cancer caputmortuum* Linnaeus, 1767 = *Dromia personata* (Linnaeus, 1758).]

Dromia nodosa.—Monod, 1956:65 [part]. [Not *Dromia nodosa* A. Milne Edwards and Bouvier, 1898.]

Dromia personata.—Crosnier, 1967:321 [not *Cancer personatus* Linnaeus, 1758].

Dromia marmorea Forest, 1974:79, 81, figs. 1c, 2, 3b, 4d–f, j,k, 5, pl. 1: figs. 2,4, pl. 3: fig. 2, pl. 4: fig. 7, pl. 5: figs. 3,4, pl. 8: figs. 3,4.—Türkay, 1976b:61 [listed], 62.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: Senegal: Dakar, 1949, R. Mauny, paratypes, 1♂, 1♀ (MP). Bel-Air, near Dakar, 5–10 m, lobster net, 1967, I. Marche-Marchad and J. Forest, paratypes, 1♂, 1♀ (W), 1♀ ov (W). S of Gorée, 40 m, E. Postel, paratype, 1♀ (MP).

Gambia: No specific locality, in crawfish nets, 2.5–3 fm (ca. 5 m), 6 Feb 1951, M. H. Routh, 2♂, 1♀ (BM).

Ghana: No specific locality, 1966, F. R. Irvine, 1♂ (BM). Accra, 1938, F. R. Irvine, paratypes, 2♀ (1 ov) (BM).

Gabon: Cap Lopez, 20 m, Dec 1956, A. Crosnier, paratype, 1♀ ov (MP).

Congo: Baie de Pointe-Noire, beach seine, Oct 1955, M. Rossignol, paratypes, 2♂ (MP). Baie de Pointe-Noire, wide-mouthed nets, Aug 1967, 1♂ (MP). Off Pointe-Noire, 50 m, mud, dredged, 3 Jan 1964, A. Crosnier, paratype, 1♂ (MP).

Cabinda: Landana, 1876–1890, L. Petit, 1♂ (L).

DESCRIPTION.—Forest, 1974:71, 81–85.

Figures: Monod, 1956, figs. 35–51, 81a; Forest, 1974, figs. 1c, 2, 3b, 4d–f,j,k, 5, pl. 1: figs. 2,4, pl. 3: fig. 2, pl. 4: fig. 7, pl. 5: figs. 3,4, pl. 8: figs. 3,4.

Male Pleopod: Monod, 1956, figs. 50, 51 (Senegal).

Color: The alcohol preserved male from Landana has a dark rufous brown hair cover. The fingers are pink with white tips. This coloration is shown by practically all specimens examined. Irvine (1932, 1947) described the species as a "brown . . . crab, covered with a dense mass of brown felt-like hair," the last two pereiopods being "fringed with brown hairs and have curious brown claw-like talons at the tips," the fingers of the chelipeds are "bright pink," the eggs are brown. Forest (1974:80) gave an extensive color description of the species.

MEASUREMENTS.—The carapace length of males varies from 12 to 72.8 mm, the carapace breadth between 14 and 98.4 mm. In non-ovigerous females these values are respectively 10 to 40 mm and 11 to 45 mm. Ovigerous females are known with carapace lengths between 34 and 53 mm, and carapace breadths between 42 and 65 mm. These data include those given in the literature. In juveniles (cl 10 to 12 mm, cb 11 to 14 mm) the carapace is only slightly wider than long, in the largest males it is up to 1.37 times as wide as long and in the largest females up to 1.31 times. As a whole the species thus has the carapace slightly wider than in *Dromia personata*, where in the juveniles the carapace is as wide as long, while in the old males examined by us (cl up to 72 mm, cb up to 92 mm) the width is never more than 1.30 times the length, and in large females (up to cl 53 mm, cb 63 mm) not more than 1.20 times. The diameter of the eggs is 0.50 to 0.55 mm (Monod, 1956).

REMARKS.—Forest's (1974) description and figures of the present species, and Monod's (1956) figures under the name *Dromia caputmortuum* characterize the species quite well. A large part of the above material consists of paratypes.

This species has been recorded in the literature numerous times; usually it has been identified with *Dromia personata* (or under one of its synonyms, *D. vulgaris* or *D. caputmortuum*). We found a good character for the distinction of *D. personata* and *D. marmorea* in the relative distance between the anterolateral teeth of the carapace. In *D. marmorea* the distance between the first and second, second and third, and third and fourth teeth is practically equal, while in *D. personata* the distance between the second and third tooth is slightly shorter than that between the first and second, and very much shorter than that between the third and fourth. We follow here Forest in numbering of the teeth; the actual third anterolateral tooth is considered by Forest to be an accessory tooth, so that the actual fourth and fifth teeth are indicated by him as third and fourth.

Dromia marmorea also is very similar to *D. erythropus* (Edwards, 1771) from the western Atlantic. In addition to the differences between these two species enumerated by Forest (1974), we found them different in the following characters:

1. In *D. erythropus* the distance between the suborbital and first anterolateral tooth of the carapace is distinctly longer than that between the first and the second anterolateral teeth. In *D. marmorea* these distances are about equal.

2. In *D. erythropus* the distance between the first and second anterolateral teeth is slightly shorter than that between the second and fourth and very much shorter than between the fourth and fifth. In *D. marmorea* these distances are about equal.

3. The carapace of *D. erythropus* is relatively narrower and more strongly vaulted.

4. The dactyli of the second and third walking legs are longer in *D. erythropus*.

Monod (1956) and Forest (1974) provided ex-

cellent figures of the present species, which show all the important details, and to which we have little to add. The only discrepancy that we can find is in the shape of the dactyli of the walking legs, which in Monod's figures 48 and 49 show minute ventral teeth, while in most of our specimens they bear very distinct spiniform teeth. The shape of these dactyli is very similar to that found in *D. erythropus* and *D. personata.*

Osorio (1889) reported "*Dromia vulgaris*" from São Tomé and Ilha do Principe without giving morphological details of his material. In the same paper he also reported material of "*Dromia spinirostris*" from the islands; this latter material, as shown below, in all probability belongs to *Dromia monodi.* Therefore, it seems most likely that Osorio's *Dromia vulgaris* belongs to the other common shallow-water *Dromia* of the area, *D. marmorea*, the moreso as the latter species has often been confused with *D. personata* (= *D. vulgaris* and *D. caputmortuum*).

Osorio (1898), Rathbun (1900a), and Balss (1921) just listed Osorio's 1889 records under *Dromia vulgaris*, and obviously did not see any new material. The references by Rathbun (1900a) and Balss (1921) to the occurrence of the species at St. Helena in all probability do not refer to the present species (see "Distribution," p. 14).

The first original record of this species subsequent to that by Osorio (1889) is that by A. Milne Edwards and Bouvier (1900:17, pl. 9: figs. 12–14), who reported "*Dromia vulgaris*" from Senegal (1♂) and from Porto da Praia (as La Praya), Cape Verde Islands (1 ♂ juv). Forest (1974), who examined both specimens, identified them with *D. marmorea.* A Milne-Edwards and Bouvier's description and illustrations of these West African specimens of "*Dromia vulgaris*" contain some mistakes that have caused considerable confusion. The two French authors, in their account of the *Talisman* and *Travailleur* Brachyura reported two species of *Dromia*: *Dromia vulgaris* (1900:17) and *D. nodosa* (1900:18). The latter species was said in the text (1900:18) and in the explanation of the figures (1900:369) to be illustrated on plate 9: figs. 12–14, whereas *Dromia vulgaris* was said to be figured on plate 9: fig. 15. Actually, however, the reverse is true: plate 9: figs. 12–14 shows one of the two specimens of *D. vulgaris*, probably the larger one from Senegal, and figure 15 is based on the syntype of *D. nodosa*, which was figured again by Forest and Guinot (1966, fig. 2a). This mixup was the primary reason that Monod (1956) incorrectly interpreted *D. nodosa.*

Irvine (1932) gave a short account and a recognizable figure of the present species, which he indicated as "Hairy Brown Sea Crab," based on material from the Gold Coast (Ghana), presumably from Accra. In a later publication, Irvine (1947) repeated this information and listed the species under the name *Dromia caput-mortuum.*

According to Irvine (1947), this species is not considered to be edible in Ghana. Irvine also noted that the vernacular name of this crab in the Ga language of Ghana is "Tsitsikuntu," a name derived from the word "kuntu" for blanket and obviously referring to the wooly hair cover of the body.

Gordon (1950:244–251), in her study of the morphology of the spermatheca in Dromiidae, figured and described the thoracic sternum of a female of "*Dromia vulgaris*" from Madeira. Forest (1974), who later examined the specimen, identified it with *D. marmorea.*

Capart (1951:21, figs. 1, 3a) also reported "*Dromia vulgaris*" from West Africa. He mentioned a young female from Pulpito Bay, Rio de Oro (Spanish Sahara). Forest (1974), who examined the specimen, identified it with *D. personata.* Capart's illustrations were based on a specimen of *D. personata* from the English Channel, so that both his text and illustrations pertain to *D. personata*, not to the present species.

The material reported upon by Sourie (1954a), Buchanan (1958), and Longhurst (1958) as *Dromia vulgaris* had been identified as such by Monod, and thus must be considered to be *D. marmorea.* As shown by the superb figures of "*Dromia caputmortuum*" in Monod's (1956) great work, the specimens that he considered to be that species (= *D. vulgaris* = *D. personata*) actually were *D. marmorea.*

It was Forest (1974) who first pointed out that the West African form is distinct from the Mediterranean and NE Atlantic *D. personata*, and Forest proposed the name *Dromia marmorea* for it, at the same time providing an excellent, well-illustrated description.

BIOLOGY.—This species has been reported from depths between 0 and 96 m, with one doubtful record from 100 m, but more than 90% of the records are from depths of less than 42 m, and about 60% are from 20 m or less. Irvine (1947: 302) remarked that the species "lives in deep water and is sometimes caught in bottom-nets a mile or more from land." It has been reported from the following types of bottom: mud (Crosnier, 1967); very fine sand (Buchanan, 1958); sand and shells (Forest, 1974); muddy sand (Longhurst, 1958); rocks (Sourie, 1954a; Monod, 1956; Forest, 1974). Monod (1956) reported a juvenile specimen from the hull of a ship. Sourie (1954a) classed this species as characteristic of the "hypobioses lapidicoles du sous-étage," while Buchanan considered it to belong to the active epifauna of the inshore fine sand community off Ghana.

Osorio (1889) is the only author to report that this species carries a sponge. Sourie (1954a:247) stated that it mostly bears didemnid or polycitorid ascidians. Two specimens from Bel-Air, Dakar, in the collection of the Smithsonian Institution (USNM 152646) have balanids all over the central and anterior part of the carapace; if these specimens carried a sponge or ascidian it must have covered a small area on the posterior part of the body.

Ovigerous females have been taken in September, November, and December (Monod, 1956; Forest, 1974).

DISTRIBUTION.—*Dromia marmorea* is a West African species, reported from the Azores, Madeira, and the Canary Islands south to Cabinda, and São Tomé and Principe islands in the Gulf of Guinea. Monod (1956:62) reported two males and a female from "Cap Blanc, M. H. Routh coll., 1951 (B.M.)"; an examination of this lot in the British Museum revealed that Monod's locality indication was erroneous, for the specimens actually originate from Gambia (see "Other Material" p. 11). The records of the species in the literature are as follows:

Azores: Ilha do Muda [?], off Ilha das Flores, 22–30 m; Caldeira Inferno, Ilha do Faial, 10 m; Ponta São Diego [?], Ilha Terceira, 0–30 m; Ponta Delgada, 15–20 m, Caloura, 3 m, and Ponta da Galera, 10–12 m, Ilha de São Miguel (all Forest, 1974).

Madeira: No specific locality (Gordon, 1950; Forest, 1974; Türkay, 1976b). Funchal harbor (Türkay, 1976b).

Canary Islands: Santa Cruz de La Palma, Isla de La Palma, 15 m; Playa de los Abrigos, Las Caletillas, 100 m (?), Puerto de la Cruz, intertidal, and Ensenada de Cristianos, intertidal, Isla de Tenerife; Playa Quemada, 2–3 m, and Arrecife, Isla de Lanzarote (all Forest, 1974).

Cape Verde Islands: Porto da Praia (as La Praya), São Tiago, 10–30 m (A. Milne Edwards and Bouvier, 1900; Forest, 1974); Porto da Praia, São Tiago (as Porto Praia (I. Santiago)), the type-locality (Forest, 1974).

Mauritania: No specific locality (Monod, 1956; Forest, 1974).

Senegal: No specific locality, in 80 m (A. Milne Edwards and Bouvier, 1900; Forest, 1974). Dakar (Monod, 1956; Forest, 1974). Gorée Island, near Dakar, beach, 2–3 m and 96 m; S of Gorée, 33–35 m and 40 m (Monod, 1956; Forest, 1974). Bel-Air, near Dakar, 5–10 m (Forest, 1974). Anse Bernard, Dakar; Gorée, 23 m; Mbour, 25 m; Joal (Monod, 1956).

Gambia: Erroneously cited as Cap Blanc, Mauritania (Monod, 1956).

Guinea-Bissau: 10°22′N, 16°22′W, 41 m (Forest, 1974).

Guinea: 09°22′N, 13°42′W, 20–35 m; Guinea, 15–20 m; 09°N, 13°50′W, 30 m (Monod, 1956). 09°20′N, 14°15′W, 32 m (Forest, 1974).

Sierra Leone: Off Freetown, 15 m (Forest, 1974).

Ghana: Gold Coast (Irvine, 1932); same, 23–45 m (Longhurst, 1958). Near Accra, in deep water (Irvine, 1947); same (Monod, 1956); same, in 5.5–14.6 m (Buchanan, 1958); same, in shallow water to 25 m (Gauld, 1960); same (Forest, 1974). Chorkor, near Accra, beach seine (Monod, 1956).

Principe: No specific locality (Osorio, 1889, 1898).

São Tomé: Praia Lagarto (Osorio, 1889, 1898).

Gabon: Cap Lopez, 20 m (Crosnier, 1967; Forest, 1974).

Congo: Baie de Pointe-Noire, beach seine (Rossignol, 1962; Crosnier, 1967; Forest, 1974). Off Pointe-Noire, 50 m (Crosnier, 1967; Forest, 1974).

According to Forest (1974) the present species also occurs in Saint Helena, and he assigned material from there identified as *Dromia vulgaris* by Melliss (1875) and Cunningham (1910), as well as that reported upon as *Dromia* species? by

Colman (1946) and as *Dromia erythropus* by Chace (1966), to the present species. The records by Rathbun (1900a) and Balss (1921) of *Dromia vulgaris* from St. Helena are not original, but based on Melliss' (1875) record. We have examined Chace's (1966) St. Helena material and found it impossible to confidently assign it to the present species, although it indeed is very similar, but so is it similar to *Dromia erythropus* and *D. personata*. Therefore, we have not included St. Helena in the range of *D. marmorea*. It seems possible that the St. Helena *Dromia* belongs to a species distinct from either *D. marmorea* and *D. erythropus*, but more material is needed to decide the status of that form; it also is possible, although less likely, that more than one species of *Dromia* occurs in St. Helena waters.

* *Dromia monodi* Forest and Guinot, 1966

FIGURE 3*a*, *b*

Dromia spinirostris Osorio, 1889:136, 139; 1898:193—Balss, 1921:47—Capart, 1951:23 [part, only specimens from A.S. 141 and *Mercator*]. [Not *Dromia spinirostris* Miers, 1881 = *Sternodromia spinirostris*.]

Dromia atlantica.—Rathbun, 1921:393, fig. 1, pl. 18: fig. 3 [not *Dromia atlantica* Doflein, 1904 = *Sternodromia spinirostris* (Miers, 1881).]

Dromia nodosa.—Monod, 1956:65 [part], figs, 52–71, 83b.—Longhurst, 1958:87.—Gauld, 1960:68. [Not *Dromia nodosa* A. Milne Edwards and Bouvier, 1898.]

Dromia monodi Forest and Guinot, 1966:43, fig. 1.—Crosnier, 1967:321 [part, only the male specimens].—Le Loeuff and Intès, 1968:38, tables 1,5,9.—Forest, 1974:96, figs. 1e, 2, 3f,g, 5, 7a,b, pl. 4: figs. 1–3, pl. 6: fig. 2.

Dromia sp.—Forest and Guinot, 1966:46.—Forest, 1974:99.

?Dromia.—Maurin, 1968b, fig. 4.

?Dromia nodosa.—Maurin, 1968b:484, 489.

Not *Dromia nodosa*.—Rossignol, 1962:113 [= *Sternodromia spinirostris* (Miers, 1881)].

MATERIAL EXAMINED.—*Pillsbury Material*: Ghana: Sta 26, 27 m, shell bottom (scallops), 1♀ ov (L).

Nigeria: Sta 248, 33 m, 5♂, 5♀ (2 ov) (L, W). Sta 250, 24 m, brackish water, 1♀ (L).

Other Material: Senegal: Dakar, 10 m, Dec 1951, E. Postel, 1♂ (MP). Bel-Air, near Dakar, 1.5–10 m, lobster net, I. Marche-Marchad, 1♂ (MP).

Ivory Coast: Off San-Pedro, 20 m, 23 May 1958, Mission Casamance, I. Marche-Marchad, 1♂ (MP).

Cameroon: Kribi, beach seine, 10 Aug 1964, B. de Wilde-Duyfjes, 2♂ (L).

Cabinda: Off Cabinda, 25 m, Dec 1962, A. Crosnier, 1♂, 1♀ (MP).

DESCRIPTION.—Forest and Guinot, 1966:43; Forest, 1974:96.

Figures: Monod, 1956, figs. 52–71, 83b; Forest and Guinot, 1966, fig. 1; Forest, 1974, figs. 1e, 2, 3f,g, 5, 7a,b, pl. 4: figs. 1–3, pl. 6: fig. 2.

Male Pleopod: Monod, 1956, figs. 70, 71 (Ghana).

MEASUREMENTS.—The males in our material have carapace lengths varying between 14 and 43 mm, the females between 14 and 47 mm. The three ovigerous females have carapace lengths of 14, 18, and 47 mm, respectively.

REMARKS.—As reported by most authors, the species strongly resembles *Sternodromia spinirostris*. It is distinctly more elongated than *Dromia marmorea*, *D. personata*, or *D. erythropus*. In juveniles the carapace is as long as wide or may even be slightly longer. In adults the carapace width exceeds the length only slightly: in specimens more than 40 mm long the carapace width/carapace length ratio is 1.05–1.13 in males and 1.06–1.16 in females. For the differences between the present species and *Sternodromia spinirostris* see p. 19.

Forest and Guinot (1966:46) and Forest (1974: 99) described under the name *Dromia* sp. two small specimens (one of which was sexually mature), which resemble greatly *Dromia monodi*, but differ in (1) the small size, (2) the sharper teeth on the carpus of the chelipeds, and (3) the presence, in the mature female cl 9.9 mm, of "une forte protubérance transverse faiblement excavée au milieu" (Forest, 1974:47) at the end of the sternal grooves. They considered these specimens as possibly representing a new species, because the smallest adult *D. monodi* known to them was so much larger than their small adult (ovigerous) female. Actually the smallest ovigerous female of *D. monodi* so far reported in the literature is one with cl 31 mm from Gorée (Monod, 1956). Our material from *Pillsbury* Sta 248, however, contains

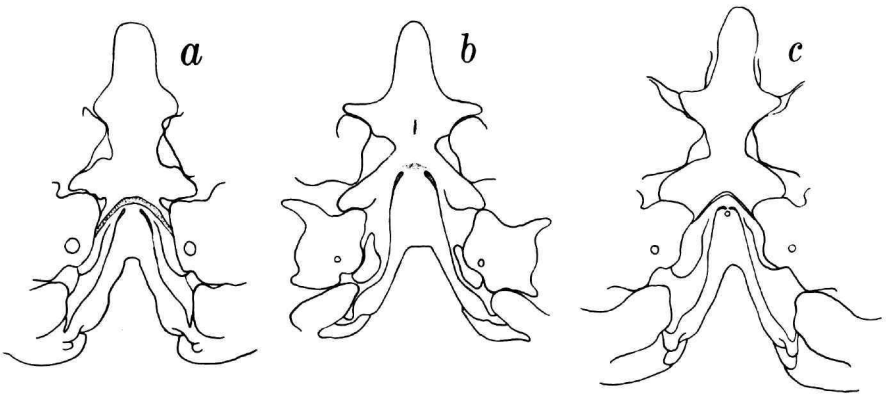

FIGURE 3—Sternal grooves of females of various sizes. *Dromia monodi* Forest and Guinot, *Pillsbury* Sta 248: *a*, cb 14 mm, *b*, cb 38 mm. *Sternodromia spinirostris* (Miers), *Pillsbury* Sta 47: *c*, cb 21 mm.

two ovigerous females, cl 14 and 18 mm, bridging nicely the existing gap. The smallest of these specimens has the sternal grooves rather straight and wide apart distally and each ends at the base of a tubercle; these tubercles are connected by a low wide ridge. The structure of the two tubercles and the ridge could very well be described as a strong transverse swelling, excavated in the middle. The specimen of 18 mm shows about the same situation, only the tubercles are less distinct and the ridge is absent, the surface between the tubercles being flush with the rest of the surface. In the ovigerous female of cl 47 mm the situation resembles that in the specimen of 18 mm, but here the tubercles are even less distinct as shown for a specimen 38 mm long in Figure 3*b*. We have not been able to find any consistent difference in the sharpness of the tubercles of the carpus of the cheliped in large and small, ovigerous and non-ovigerous specimens, and believe that this character, to which Forest and Guinot themselves attached very little importance, indeed is of no taxonomic value here. We have come to the conclusion therefore that the specimens indicated by Forest and Guinot as *Dromia* sp. can safely be considered to belong to *D. monodi*. Forest (1974: 100) considered it most likely that the specimens are precocious *D. monodi*, but did not exclude the possibility that they are a new species.

An interesting feature of this species is the arrangement of the sternal grooves in the female. As already stated above, in the ovigerous females, whether large or small, these grooves end wide apart, each at the base of a low rounded tubercle, which in the small specimens is somewhat more distinct than in the large. From the genital opening the groove extends straight backward, parallel and rather close to the lateral margins of the thoracic sternum; the anterior ends of these grooves are definitely not turned inward. In the non-ovigerous females, again whether small or large, the tips of the grooves are distinctly curved inward towards each other, and no tubercles are visible; in these specimens the tubercle is replaced by a depression (Figure 3*a*, ♀ cb 14 mm; 3*b*, ♀ cb 38 mm). An excellent figure of the latter situation also is given by Rathbun (1921:393, fig. 1e).

Forest and Guinot (1966) showed that the *Dromia* species from West Africa indicated by Monod (1956) as *Dromia nodosa* is specifically distinct from the type-specimen of the true *Dromia nodosa* A. Milne Edwards and Bouvier, 1898, and gave it the new name *Dromia monodi*. The source of the confusion was given by Forest and Guinot (1966:45) as "l'inexactitude du dessin ensemble (A. Milne Edwards et Bouvier, pl. IX; fig. 14)," evidently meaning figure 12, not 14; also Forest (1974:97) mentioned "le peu de fidélité du dessin publié par A. Milne Edwards et Bouvier (1900; pl. 9, fig. 12)." Examination of the text and

figures published by A. Milne Edwards and Bouvier shows, however, that figure 12 is not inexact, but has only been given the wrong name. Comparing Forest and Guinot's figure 2a of the type of *Dromia nodosa* with A. Milne Edwards and Bouvier's (1900, pl. 9: fig. 15) of "*Dromia vulgaris*," it is clear that these two are made after the same specimen. What has happened, therefore, obviously is that A. Milne Edwards and Bouvier (1900) on their plate 9 gave as figures 12 to 14 the entire animal and details of what in the text they called "*Dromia vulgaris*," and on figure 15 the type of *Dromia nodosa* in dorsal view, but that in the explanation of these figures (1900:369 and pl. 9) they switched the names, and also in the text referred to the wrong figures. This is confirmed in the explanation (1900:369) of plate 9: figure 15 ("*Dromia vulgaris*"), which is said to be of "un des petits exemplaires des îles du Cap-Vert," which evidently refers to *Dromia nodosa* of which the authors had 5 specimens from the Cape Verde Islands, while in their material "*Dromia vulgaris*" was represented by only a single Cape Verde Islands specimen. A Milne Edwards and Bouvier's (1900, pl. 9: figs. 12–14) illustrations are actually made after a specimen they named *Dromia vulgaris*, probably the large male from Senegal, which was shown by Forest (1974:79) to belong to *Dromia marmorea*. It is not surprising therefore that Monod (1956) arrived at the wrong conclusion about the identity of *Dromia nodosa*, especially since A. Milne Edwards and Bouvier's (1900) figure 12 shows the second and third anterolateral tooth of the carapace quite close together as in *Dromia monodi*.

As Forest and Guinot (1966:46) indicate, it is more likely that Osorio's (1889:136, 139) *Dromia spinirostris* from São Tomé and Principe islands belongs to *Dromia monodi* rather than to *Sternodromia spinirostris*, because the latter species usually is found at greater depths than the 4 or 5 m from which Osorio reported his male. Monod (1956) referred the specimens listed by Balss (1921) under *Dromia spinirostris* to the present species, evidently because Balss did not find a median tubercle between the ends of the sternal grooves of his female. As Balss' specimens were collected at depths of 10 and 20 m, it seems highly likely that Monod's surmise is correct, even though the character of the sternal tubercle does not always hold good. Monod (1956) also referred the material that Odhner (1923) identified as *Dromia spinirostris* to the present species, but there are reasons to believe that Odhner's identification was correct (see p. 19).

Rathbun's (1921) description and illustrations of what she thought to be *Dromia atlantica* Doflein leave no doubt that her material was actually *D. monodi*; already Monod (1956) pointed this out.

Monod (1956) very extensively figured the present species and identified it with *Dromia nodosa* A. Milne Edwards and Bouvier, being followed in this by Longhurst (1958), Gauld (1960), Rossignol (1962), and possibly Maurin (1968b). Forest and Guinot (1966) pointed out that the present species is different from the true *Dromia nodosa*, and proposed the new name *Dromia monodi* for it, which name has been adopted by subsequent authors.

Some of the specimens, mostly juveniles, that Monod (1956) identified as *Dromia nodosa* proved on examination to belong to neither that species nor to *D. monodi*. Forest (1974:79) found that the specimens indicated by Monod with the numbers 1–2 (Mauritania), 5, 7, 12(1), 15, 16(4) (all from Gorée), actually belong to *Dromia marmorea*. Examination of the specimen from Murray Town, Sierra Leone (Monod, 1956:69, no. 52), proved that it belongs to *Sternodromia spinirostris*.

Crosnier (1967:321) assigned two males and two females to the present species. The females are both juvenile, one is from Dahomey, the other from "Pte Ste Clara" (= Cap Santa Clara), Gabon. The Gabon female had been reported on before by Rossignol (1962) under the name *Dromia nodosa*. The two females are now in the collection of the Museum national d'Histoire naturelle, Paris, and were examined by us. Although juveniles of *Dromia monodi* and *Sternodromia spinirostris* are usually difficult to distinguish, we believe that both specimens should be assigned to *Sternodromia spinirostris* rather than to *Dromia mon-*

odi. Forest (1974:101) also assigned the Dahomey specimen to *Sternodromia spinirostris*, but did not mention the Cap Santa Clara specimen. The two male specimens listed by Crosnier (1967), from Cap Lopez (Gabon) and Cabinda, are true *Dromia monodi* (Forest, 1974:96, and p. 15).

Maurin (1968b:484, 489) reported *Dromia nodosa* from 200 m depth, dredged between Cabo Corbeiro and Cabo Blanco (= Cap Blanc), Spanish Sahara, and also from 60 and 70 m depth on the Banc d'Arguin, Mauritania. The species is not noted in Maurin's (1968a) more extensive treatise of the same area. As no morphological data are provided of the material, it is impossible to conclude whether the true *Dromia nodosa* or *D. monodi* is the species obtained by Maurin; the depth indications would indicate the former.

Pechüel-Loesche (1882) reported a specimen of *Dromia* from the "Banya" (= Crique Banjia, 00° 14'N, 09°40'E), Gabon. As insufficient morphological details are provided by Pechüel-Loesche, the identity of the species is uncertain, the description of its habits make it more likely that not *Dromia* but *Phyllodorippe* was meant (see p. 35).

BIOLOGY.—As Forest and Guinot (1966) pointed out, this species occurs mostly between 0 and 25 m depth. This is fully confirmed by the records below, all but one (60 m) of which are from less than 45 m and about 80% from 25 m or less.

As to the bottom on which the species lives, this is given variously as green and black mud (Capart, 1951; Forest, 1974), "sable" (Osorio, 1889), "sable vaseuse" (Le Loeuff and Intès, 1968), "between sponges that surrounded *Pinna*" (Rathbun, 1921), sand, shelly sand and shelly mud (Longhurst, 1958), "roche, coraux" and "vase, coquilles" (Forest and Guinot, 1966), "fonds à *Palythoa* et *Molgula*, sable," "sable dur" (Monod, 1956). Specimens have been reported as collected with beach seines on sandy beaches (Monod, 1956; and p. 15).

Like other species of *Dromia* the present species has been noted to carry sponges (Monod, 1956) and composite ascidians (Monod, 1956). Osorio (1889:136) reported on a specimen that carried a piece of decaying wood, by which it was entirely covered, but "il ne marchait pas tout à son aise"; it is possible that the collector mistook a sponge or ascidians for a piece of decaying wood.

Ovigerous females have been collected in February, March, May, July, and October (Monod, 1956; *Pillsbury*).

DISTRIBUTION.—*Dromia monodi* has been reported from the west coast of Africa between Mauritania and Angola. The records from between Cabo Corbeiro and Cabo Blanco, Spanish Sahara, 200 m and Banc d'Arguin, Mauritania, 60–70 m (both Maurin, 1968b) and Crique Banjia, Gabon, on the shore (Pechüel-Loesche, 1882), discussed above, are excluded. Other records include the following:

Mauritania: No specific locality (Forest, 1974).

Senegal: Near Dakar, 15–20 m (type-locality) (Monod, 1956; Forest and Guinot, 1966; Forest, 1974). SE of Île de la Madeleine, near Dakar, 35 m; near Dakar, 10 m and 34 m; Joal; Lagoba [?], 10–11 m (Monod, 1956; Forest, 1974). Bel-Air, near Dakar, 5–10 m (Forest, 1974). Near Gorée, in 20 m (Balss, 1921); same, in 15–20 m (Monod, 1956). Anse Bernard, near Dakar, 13–15 m; between Gorée and Rufisque, 25 m; E of Bel-Air, 14 m; Ngazobil, 4 m; Joal, 4 m, 10–11 m and 15 m (Monod, 1956).

Guinea: 09°25'N, 13°55'W, 15 m; 09°16'N, 13°34'W, 10 m; between Tamara and Île de Corail, 10–12 m (all Monod, 1956). Near Conakry, 20 m (Monod, 1956). 09°51'N, 15°30'W (Capart, 1951; Forest, 1974).

Sierra Leone: No specific locality, 10–22 m (Longhurst, 1958). 08°38'–08°42'N, 8–12 m; Murray Town; Freetown (Monod, 1956). Off Freetown, 15 m (Forest, 1974).

Ivory Coast: Grand-Bassam, 30 m, 60 m (Le Loeuff and Intès, 1968). Off San-Pedro, 20 m (Forest, 1974).

Ghana: Near Accra, in 14, 35, 37, and 44 m (Monod, 1956); same, in 0–45 m (Gauld, 1960). Chorkor, near Accra; Christiansborg; Ningo [?] (all Monod, 1956).

Togo: No specific locality (Monod, 1956); Lomé (Monod, 1956).

Cameroon: Douala (Balss, 1921).

Principe: No specific locality (Osorio, 1889, 1898).

São Tomé: No specific locality (Balss, 1921). Praia de Santa Catarina, 00°16'N, 06°29'E, 3–10 m (Forest and Guinot, 1966). São João dos Angolares, 4–5 m (Osorio, 1889, 1898).

Gabon: No specific locality (Monod, 1956). Cap Lopez, 20 m (Crosnier, 1967; Forest, 1974). Near Cap Lopez, 00°53'S, 08°40'E, in 33–55 m (Capart, 1951; Forest, 1974).

Cabinda: No specific locality, in 25 m (Crosnier, 1967; Forest, 1974).

Angola: Ambrizete (as Ambrizette), 10 m; Quicembo (as Kinsembo) (Balss, 1921). Luanda (as São Paulo de Loanda), a few feet deep (Rathbun, 1921).

Dromia nodosa A. Milne Edwards and Bouvier, 1898

Dromia nodosa.—Monod, 1956:65 [part].—Forest, 1974:94, figs. 2, 3e, 5, 7e,f, pl. 2: figs. 3, 4, pl. 5: fig. 6 [references].

REMARKS.—There is a male syntype of this species (USNM 22937), carapace length 7.2 mm, taken by the *Talisman* in the Cape Verde Islands in 75 m, 29 July 1883, in the collection of the Smithsonian Institution. Forest (1974:95) noted that only three of the original five specimens could then be located.

DISTRIBUTION.—Cape Verde Islands, in 75 m, and off the Atlantic coast of Morocco.

Genus *Sternodromia* Forest, 1974

Sternodromia Forest, 1974:100 [type-species: *Dromia spinirostris* Miers, 1881, by original designation and monotypy; gender: feminine].

* *Sternodromia spinirostris* (Miers, 1881)

FIGURE 3*c*

Dromia spinirostris Miers, 1881a:271, pl. 16: fig. 2.—Rathbun, 1900a:300.—Odhner, 1923:15.—Capart, 1951:23 [part, not the specimens from A.S. 141 and *Mercator*], figs. 2, 3b.—Rossignol, 1957:75.

Dromia fulvo-hispida Miers, 1881a:270, pl. 16: fig. 1.

Dromia fulvohispida.—Rathbun, 1900a:300—Balss, 1921:47.

Dromia atlantica Doflein, 1904:10, 189, 252, 253, pl. 7: figs. 3, 4.

Dromidiopsis spinirostris.—Monod, 1956:72, figs. 72–82, 83c.—Longhurst, 1958:87.—Rossignol, 1962:113.—Forest and Guinot, 1966:47.—Crosnier, 1967:322.—Le Loeuff and Intès, 1968:38, 65, 67, 68, 71, fig. 62, tables 1, 6, 7, 8, 9; 1969:64, 65.—Maurin, 1968a:48.—Maurin, 1968b:484, 489, 491, fig. 7.—Türkay, 1975a:71[listed], 72.—Pastore, 1976:114, fig. 1 [Mediterranean].—Lewinsohn, 1977:7 [discussion].

Dromia nodosa.—Monod, 1956:69 [part, specimen from Murray Town].—Rossignol, 1962:113. [Not *Dromia nodosa* A. Milne Edwards and Bouvier, 1898.]

Dromia.—Voss, 1966:22.

Dromia monodi.—Crosnier, 1967:321 [part, the two female specimens].

Dromidiopsis.—Maurin, 1968b, figs. 4, 9.

Dromidopsis spinifrons.—Maurin, 1968b:486 [erroneous spelling].

Sternodromia spinostris.—Forest, 1974:100, figs, 1f, 2, 3h, 5, 6c,d, 7g–i, pl. 4: figs. 4,5, pl. 6: fig. 3, pl. 7: figs. 2, 4 [erroneous spelling].

Not *Dromia spinirostris.*—Osorio, 1889:136, 139; 1898:193.—Balss, 1921:47. [= *Dromia monodi* Forest and Cuinot, 1966.]

Not *Dromia atlantica.*—Rathbun, 1921:393, fig. 1, pl. 18: fig. 3 [= *Dromia monodi* Forest and Guinot, 1966].

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 2 juv (L).

Ivory Coast: Sta 46, 38–42 m, mud bottom with dense *Jullienella*, 6♂, 3♀, 5 juv (L). Sta 47, 37 m, bottom with *Jullienella*, 1♀, 9 juv (W). Sta 62, 46 m, brown, branching and foliate Foraminifera, 1 juv (W). Sta 63, 64 m, sandy mud with shells, 1♂, 1♀ (L).

Ghana: Sta 22, 51 m, rough bottom, 1♂, 1 juv (L). Sta 24, 35–37 m, dark red bryozoans, 2♂, 1♀ (W). Sta 28, 49–53 m, 1♀ (L).

Other Material: Senegal: Gorée Bay, 9–15 fm (16–27 m), H. von Maltzan, syntypes of *Dromia spinirostris* Miers, 1♂, 1♀ (BM); holotype of *Dromia fulvohispida* Miers, 1♀ (BM).

Sierra Leone: Murray Town, 1920, N. P. Lowe, 1♂ (BM).

Ivory Coast: 05°12′30″N, 04°04′W, 40 m, trawl, 9 Oct 1963, Guinean Trawling Survey, Sta 3, 1♂ (MP).

Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 1 juv (L). 06°04′N, 01°38′30″E, 48 m, mud, 17 Oct 1963, 1♂ (MP). 06°10′N, 02°02′E, 45 m, sandy mud with Foraminifera, A. Crosnier, 1♀ juv (MP).

Cameroon: 03°54′N, 08°50′E, 65–70 m, mud, 25 Aug 1963, A. Crosnier, 1♂, 1♀ (MP).

Gabon: Cap Santa Clara, 20–40 m, 2 Jul 1960, trawled, *Ombango* Expedition, M. Rossignol, 1♀ juv (MP).

Congo: 04°23′S, 11°07′E, 88 m, mud, trawled, 26 Jan 1968, A. Crosnier, 1♂ (MP). 05°S, 11°36′E, 50 m, trawled, 13 Dec 1966, A. Crosnier, 1♂, 4♀ (1 ov, 2 impregnated) (MP). Off Pointe-Noire, 100 m, mud, 13 Feb 1967, A. Crosnier, 1♂, 1♀ (MP).

Angola: Ambriz, 70 m, Jul 1961, A. Crosnier, 1♂ (MP).

DESCRIPTION.—Forest, 1974:101.

Figures: Capart, 1951, figs. 2, 3b; Monod, 1956, figs. 72–82, 83c; Forest, 1974, figs. 1f, 2, 3h, 5, 6c,d, 7g–i, pl. 4: figs. 4,5, pl. 6: fig. 3, pl. 7: figs. 2, 4.

MEASUREMENTS.—The examined specimens have carapace lengths ranging from 5 to 64 mm. The largest male has a carapace length of 64 mm

and a carapace width of 72 mm; in the largest female these values are 58 mm and 68 mm, respectively. Ovigerous (and impregnated) females have cl 48 to 58 mm and cb 55 to 58 mm. In juveniles the carapace width is slightly less (0.9 times) than the carapace length, and the larger specimens become relatively wider. Even in the largest specimen however, the ratio between carapace width and carapace length does not go beyond 1.19, the females as a rule being on the average somewhat wider than the males. Our finds agree with those by Crosnier (1967) who found that this species is slightly wider on the average than *Dromia monodi*, although the difference is slight.

REMARKS.—The present species greatly resembles *Dromia monodi*. Differences between adult specimens of the two species, some of which have already been pointed out by previous authors (Monod, 1956; Forest and Guinot, 1966; Crosnier, 1967; Forest, 1974) are the following:

1. The pubescence in *Sternodromia spinirostris* consists of a very dense cover of short hairs of equal length giving the animal a smooth and shiny, almost sealskin-like surface. In *Dromia monodi* the hairs are of two sizes, the shorter are less closely placed than in *S. spinirostris* and therefore do not produce the skin-like effect, while groups of longer hairs, especially in the anterior and lateral portions of the carapace give the pubescence a still more shaggy appearance.

2. The interantennular spine in *S. spinirostris* is hardly visible in dorsal view; in *Dromia monodi* it is distinct and reaches beyond the middle of the rostral teeth.

3. The anterolateral teeth of the carapace in *D. monodi* are far stronger and more conspicuous than in *Sternodromia spinirostris*; moreover, they are directed more outwards and are less appressed. In *S. spinirostris* the teeth are inconspicuous, especially the second and third, which are often hidden by the pubescence. Some of the teeth, especially the fourth and fifth are often continued backward as a marginal carina. The first anterolateral tooth is far more conspicuous than the second.

4. Between the first anterolateral tooth and the suprasutural tooth (Ihle, 1913:9, fig. 5) there is a marked groove in *Dromia monodi*; in *Sternodromia spinirostris* such a groove is hardly noticeable, while the teeth are less distinct.

5. The chelipeds in *Dromia monodi* have strong tubercles: one on the outer surface of the palm at the base of the dactylus, and two near the anterior margin of the carpus. These tubercles are hardly noticeable in *Sternodromia spinirostris* being quite obscured by the pubescence.

6. The outer surface of the carpus of the second and third pereiopods (= first and second walking legs) is evenly rounded in *Sternodromia spinirostris*, while in *Dromia monodi* it shows a distinct longitudinal ridge in the pubescence.

7. The dactyli of the second and third pereiopods in *D. monodi* are shorter than in *S. spinirostris* and have stronger spines on the lower margin.

8. The upper margin of the propodus of the fourth pereiopod is longer than the height of this segment in *S. spinirostris*, much shorter than the height in *D. monodi*. The dactylus is twisted in the latter species, lying in the same plane as the propodus in the former.

9. The fifth pereiopod is more slender in *D. monodi* than in *S. spinirostris*.

10. The female abdomen in non-ovigerous females is triangular with a rounded tip in *D. monodi*, more trapezoidal with a truncated tip in *S. spinirostris*.

11. In the same non-ovigerous females the sternal grooves in *S. spinirostris* end somewhat closer together than in *D. monodi*.

12. In our material of *S. spinirostris* the pubescence is grayish brown and the finger tips of the chelae are white; in *D. monodi* the pubescence is more yellowish brown and the finger tips are pink.

Young specimens of *Sternodromia spinirostris* differ from the adults in the following points:

1. The pubescence of the carapace shows some longer hairs in the anterior part, by which the smooth appearance is lost and becomes more shaggy like in *D. monodi*.

2. The interantennular spine is relatively longer and more distinct.

3. The anterolateral teeth of the carapace are even less conspicuous than in the adults.

These young specimens still can be distinguished from young of *Dromia monodi* by the character of the smaller anterolateral teeth and the more slender dactyli of the second and third pereiopods, in which the lower margin bears smaller spinules.

The sternal grooves in the females collected by the *Pillsbury* Expedition, all of which are non-ovigerous, very closely resemble those of non-ovigerous females of *Dromia monodi*, the only difference being that the anterior ends of the two grooves are placed somewhat closer together. In the Muséum national d'Histoire naturelle, Paris, we examined five large females (cl 48 to 58 mm) of the present species, some of which are impregnated or ovigerous. In these specimens the sternal grooves converge anteriorly and end at a distinct median tubercle, as shown in Monod's (1956) figures 78 and 79. In a juvenile female in the Paris Museum (cl 34 mm) no tubercle was seen, but the grooves resemble those found in the *Pillsbury* specimens (Figure 3*c*, ♀ cb 21 mm) in which the tubercle is visible. Evidently the arrangement of the sternal grooves changes drastically when sexual maturity is reached. It is debatable whether the sole character of the placement of the female sternal grooves is sufficient to distinguish genera. This seems the more doubtful when one considers the fact that *Dromia monodi* and *Sternodromia spinirostris* resemble each other so closely that they are difficult to separate, while both differ less from one another than from the other West African Dromiidae. Monod (1956:75) already commented that it does not seem logical that these two species should be placed in different genera. For the time being, however, we followed Forest (1974), who separated the present species from the other *Dromidiopsis* and *Dromia* species and erected a new genus, *Sternodromia*, for it. Lewinsohn (1977:7), when dealing with Dromiidae of the Red Sea, commented that in his view too much importance has been attached to the female sternal grooves as a generic character and that a revision of the family on a generic level is highly desirable.

There can be little doubt that the type material of Miers' *Dromia spinirostris* belongs to the present species, and in the modern literature the epithet *spinirostris* has practically always consistently and correctly been used for it. A quite different matter is the identity of *Dromia fulvo-hispida* Miers, 1881. This species was based on a single juvenile specimen (8 × 11 mm), taken together with the types of *Dromia spinirostris*. The specimen was reexamined by Monod (1956:59), who gave additional details of it but did not arrive at a conclusion concerning its identity. We have also examined the specimen, which is in a poor condition; it is a juvenile female, which is partly damaged; therefore, the measurements 8 × 11 mm cannot be relied upon. We decided after studying this specimen that it is a juvenile specimen of *Sternodromia spinirostris*. The fact that the anterolateral margins show hardly any teeth (Miers described these margins as entire, but as Monod correctly pointed out there is at least one visible tooth) points strongly in this direction. Furthermore that it was taken at a depth of 9 to 15 fathoms (16.5–27 m) together with the types of *Dromia spinirostris* make the identity of the two highly likely. As the type specimen of *Dromia fulvohispida* shows no characters that make it impossible to identify it with *D. spinirostris* and as there are several indications that the two species are synonymous, we confidently sink the epithet *fulvohispida* as a synonym of *spinirostris*.

Under *Dromia monodi* (p. 17) we have given the reasons why the specimens that Osoria (1889, 1898) and Balss (1921) considered to be *Dromia spinirostris* actually should be referred to *Dromia monodi*. Also we point out that the female specimens from Dahomey and Cap Santa Clara, identified by Rossignol (1962) and Crosnier (1967) as *Dromia monodi*, be better referred to the present species. All this again clearly shows the close resemblance of the two species.

The juvenile specimens from Angola that Odhner (1923) identified as *Dromia spinirostris*

were referred by Monod (1956:72) to *Dromia nodosa* (= *D. monodi*). Although Monod examined one of Odhner's specimens, we are not convinced that his conclusion is correct. Odhner himself was convinced that his specimens were conspecific with *Dromia atlantica* Doflein, after he compared them with Doflein's description and figures; moreover Odhner sent his material to W. T. Calman, who did not find any characters that would make them specifically different from Miers' types of *Dromia spinirostris*. Also the fact that Odhner's specimens came from depths of 72 and 108 m makes it more likely that they belong to *Sternodromia spinirostris* than to *Dromia monodi*.

As already suggested by Balss (1921), Odhner (1923), Monod (1956), and others, *Dromia atlantica* of Doflein (1904) is identical with the present species, as is clearly shown by Doflein's account.

The juvenile male from Sta A.S. 141 and the juvenile male collected by the *Mercator* expedition, both of which were identified by Capart (1951) with the present species, were examined by Forest (1974:96) and found to be *Dromia monodi*.

The specimen from Murray Town, Sierra Leone, assigned by Monod (1956:69) to *Dromia nodosa*, was examined by us and proved to belong to the present species.

The frequent misidentification, especially of juvenile specimens, clearly shows the difficulty of distinguishing the various species of West African Dromiidae.

BIOLOGY.—The species has been reported from depths between 7.5–9.5 and 108 m. As already pointed out by Forest and Guinot (1966) it has its optimum occurrence in water deeper than 25 m, this in contrast to *Dromia monodi*, which is hardly ever found in water deeper than 25 m. About 90% of the published records for *Sternodromia spinirostris* are from depths of 25 m or over and about 80% from depths between 25 and 75 m. Le Loeuff and Intès (1968) indicate that the species "vit de 35 à 60 m et surtout à 40 et 50 m." The bottom on which the species has been taken has variously been described as "partly shelly and partly muddy" (Miers, 1881a); sand and shell fragments, sand and muddy sand with broken shells and stones (Odhner, 1923); sand, mud, coral and rock, black mud, mud and brown sand, green mud and sand, brown mud, mud (Capart, 1951); mud (Rossignol, 1957); muddy sand (Longhurst, 1958); mud, rock, calcareous algae, sand and Foraminifera, mud and sand, mud and shells, muddy sand and Foraminifera, mud with *Arca* shells (Forest and Guinot, 1966); sandy mud and shells (Voss, 1966; and p. 19 herein); sandy mud with Foraminifera (Crosnier, 1967); "fonds détritiques envasés" (Maurin, 1968a, 1968b); sand or sand with shells and *Suberites*, liquid mud sometimes mixed with very fine sand (Maurin, 1968b); mud, Foraminifera, dark red bryozoans, mud with *Jullienella* (p. 19). Le Loeuff and Intès (1968), who obviously carefully studied the species, stated that in Ivory Coast waters they only found it on sandy mud bottoms, and they ranged it among the "vasicoles."

None of our specimens carried a sponge or ascidians, and we know of no record in the literature indicating such an association.

Ovigerous females have been collected in February, April, May, and December (Capart, 1951; Forest and Guinot, 1966; Forest, 1974; and p. 19).

DISTRIBUTION.—*Sternodromia spinirostris* is a West African species which occurs from the Spanish Sahara to Angola. Pastore (1976) recently recorded the species from the Gulf of Taranto in the Mediterranean. The West African records in the literature are as follows:

Spanish Sahara: Islote Virginia (as Ilot Virginie) (Forest, 1974). Between Cabo Barbas and Cabo Blanco, 50–90 m (Maurin, 1968b). Between Cabo Corbeiro and Cabo Blanco, 60–80 m (Maurin, 1968a). Cabo Blanco, 20°37.7′N, 17°24.4′W, 57 m (Türkay, 1975).

Mauritania: 20°55′N, 17°22′W, 60 m; and 20°19.5′N, 17°13.8′W, 20 m (Forest, 1974). Banc d'Arguin, 30–40 m (Maurin, 1968b).

Cape Verde Islands: 15°16′28″N, 23°27′24″W, 40–45 m (Forest, 1974).

Senegal: ?Senegal, 50–62 m (Forest, 1974). Saint-Louis, 35–40 m (Maurin, 1968b). Baie de Gorée, 18–28 m (Miers, 1881a). Between Gorée and Cap Manuel, 7.5–9.5 m; Ngaparou (Forest, 1974). 13°01′N, 17°24′W, 51–55 m; and 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966; Forest, 1974).

Gambia: 13°12′N, 17°03.5′W, 21 m (Forest, 1974).

Guinea-Bissau: 10°19′N, 16°24′W, 60–73 m (Forest and Guinot, 1966; Forest, 1974).

Guinea: 09°28′N, 14°58′W, 45 m (Forest, 1974). 09°15′N, 14°50′W, 45 m (Monod, 1956).

Sierra Leone: No specific locality, in 39 m (Longhurst, 1958). Murray Town (Monod, 1956).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). 04°35′N, 06°40′W to 04°35′N, 06°41′W, 64 m (Voss, 1966). 05°02.5′N, 05°25′W, 21–27 m (Forest and Guinot, 1966; Forest, 1974). 05°11.5′N, 04°09′W, 40 m; 05°12.5′N, 04°05′W, 40 m; and 05°04′N, 03°22.5′W, 50 m (Forest, 1974). Fresco; Grand-Lahou, 40 m; Jacqueville; Grand-Bassam, 35–60 m (overall depth range 15–60 m) (all Le Loeuff and Intès, 1968).

Ghana: 05°18′N, 00°24′W, 35–37 m (Forest, 1974).

Dahomey: 06°04′N, 01°38.5′E, 48 m (Forest, 1974). 06°10′N, 02°02′E, 45 m (Crosnier, 1967; Forest, 1974).

Nigeria: 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966; Forest, 1974).

Cameroon: 03°54′N, 08°50′E, 65–70 m (Forest, 1974).

Gabon: W of Cap Santa Clara, 20–40 m (Rossignol, 1962; Crosnier, 1967). Off Pointe Banda, 03°57.5′S, 10°36.5′E, 85 m (Capart, 1951).

Congo: Pointe-Noire, 100 m (Forest, 1974). Off Pointe-Noire, 50 m (Rossignol, 1957, 1962). Off Pointe-Noire, 04°23′S, 11°07′E, 88 m, and 05°S, 11°36′E, 50 m (Forest, 1974).

Zaire: Off Banana, 05°54′S, 11°58.5′E, 50 m; 05°55′S, 12°01′E, 25–30 m; and 05°56′S, 12°E, 50–60 m (Capart, 1951; Forest, 1974).

Angola: Off Moita Seca, 06°06′S, 12°14′E, 12–15 m (Capart, 1951; Forest, 1974), and 06°16′S, 12°07′E, 50 m (Capart, 1951). Off the mouth of the Congo River, 06°18′S, 12°02′E, 44 m (Doflein, 1904). Near Ambriz, 07°57′S, 13°05′E, 40–50 m (Capart, 1951; Forest, 1974). Ambriz, 70 m (Forest, 1974). Porto Alexandre, 72 and 108 m (Odhner, 1923).

Family DYNOMENIDAE Ortmann, 1892

DYNOMENIDAE Ortmann, 1892:538, 541, 543.

EASTERN ATLANTIC GENERA.—One, *Dynomene*, represented in the tropical fauna.

EASTERN ATLANTIC SPECIES.—One, *Dynomene filholi*, material of which was collected by the *Pillsbury*.

Genus *Dynomene* Desmarest, 1823

Dynomene Desmarest, 1823:422 [index] [a genus without included nominal species; type-species: *Dynomene hispida* Guérin-Méneville, 1832, by subsequent monotypy by Guérin-Méneville, 1832, in 1829–1844, pl. 14; gender: feminine].

Maxillothrix Stebbing, 1921:456 [type-species: *Maxillothrix actaeiformis* Stebbing, 1921, a subjective junior synonym of *Dynomene pilumnoides* Alcock, 1899, by monotypy; gender: feminine].

REMARKS.—So far as we can determine, the first latinized use of the generic name *Dynomene* was by Desmarest (1823:422) in the index to his article in the *Dictionnaire des Sciences Naturelles*. In the text of this article (1823:249, footnote) the name is used in the vernacular (DYNOMÈNE). Desmarest again used the vernacular form in his book *Considérations Générales sur la Classe des Crustacés* (1825:133, footnote), using DYNOMÈNE in the text (p. 133), DYNOMÈNE HISPIDE in the list of figures (p. 432), and Dynomène *hispide* on the plate itself (plate 18); in this work he gave the Latin name again in the index (p. 442). The specific epithet *hispida*, often attributed to Latreille or Desmarest, apparently was first used by Guérin-Méneville (14 July 1832: pl. 14). Guérin also used the Latin name in the text of his *Iconographie* which, however, was published as late as September 1844. We are much indebted to Col. C. F. Cowan (*in litt.*, 29 September 1971), who provided the information that livraison 22 of Guérin's *Iconographie*, which was published on 14 July 1832 (Cowan, 1971:29), contained Crustacea plates 12 and 14.

* *Dynomene filholi* Bouvier, 1894

Dynomene filholi.—Monod, 1956:76, figs. 84–88, 873.—Forest and Guinot, 1966:48.

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 2♂, 1♀ (L). Sta 282, 18–37 m, nodular coralline algae, 7♂, 5♀, 6 juv (L). Sta 283, 51–55 m, nodular coralline algae, 25♂, 14♀ ov, 5 juv (W).

Other Material: Cape Verde Islands: 75 m, 29 Jul 1883, *Talisman*, syntypes, 3♂ (L, W).

Annobon: 01°27′S, 05°35′50″E, 50–60 m, dredge, 11 Dec 1965, A. Crosnier, 3♂, 1♀ (W).

DESCRIPTION.—Carapace depressed, covered with dense coat of low setae, with some longer setae arranged in tufts. Carapace appearing sub-

circular, about 1¼ times broader than long, depressed, moderately convex. Fronto-orbital region forming on obtuse triangle, frontal margin thickened, fronto-orbital width about 2/3 carapace width. Regions well marked but obscured by coat of low setae. Several rounded prominences on surface, each with long tuft of setae: usually 1 epigastric, 2 or 3 protogastric, 1 metagastric, 1 intestinal, and 5 branchial. Anterolateral margins with 5 blunt teeth, each tufted.

Chelipeds stout, subequal, larger in males, covered with low setae, ornamented with rounded, tufted prominences. Merus with subdistal prominence on posterior margin, smaller, lower naked tubercles on inner margin. Carpus with 3 tufted prominences on posterior margin, 1 dorsally, 1 anteriorly; inner angle produced into slender, flattened lobe, almost spatulate. Propodus stout, high, slightly longer than movable finger, all with almost naked ventral surface ornamented with rounded prominences. Upper and outer surfaces of chela with longer setae, denser on inner face. Fingers gaping, movable finger with prominent tooth near midlength, naked apically, apices spatulate.

Walking legs decreasing in length posteriorly, surface densely tomentose, dorsal surfaces with rounded, tufted prominences and some scattered longer setae. Dactyli curved, apices corneous, ventral margins toothed. Fifth legs very short, not extending much beyond midlength of merus of fourth, dactylus very small, subterminal, leg appearing chelate.

Abdomen of 7 somites in both sexes, broadening posteriorly in males.

Figures: A. Milne Edwards and Bouvier, 1900, pl. 3: fig. 3 (color); Monod, 1956, fig. 873.

Male Pleopod: A. Milne Edwards and Bouvier, 1900, pl. 8: fig. 13; Monod, 1956, figs. 84–88 (both Cape Verde Islands).

Measurements.—Our specimens have carapace widths of 3 to 16 mm; the carapace widths of ovigerous females are 7 to 12 mm.

Remarks.—The male pleopods of our specimens have a large, triangular apical lobe, resembling that of the pleopod figured by A. Milne Edwards and Bouvier (1900, pl. 8: fig. 13) rather than that figured by Monod (1956, figs. 84–88).

Biology.—The depth range of the species is from 23 to 1477 m (with one record of 9–47 m), but 80% of the records are from between 23 and 75 m. As the *Talisman* and *Travailleur* records are notoriously unreliable, it is possible that the records from 110–180 and 150–275 m are incorrect. Also the depth of 1477 m (Monaco Expedition Sta 1209) needs confirmation.

The *Pillsbury* specimens all were taken from a bottom of nodular coralline algae (diameter of the nodules about 100–150 mm; see Voss, (1966: 50, fig. 14)). In the literature the species is reported from "fond dur" (Bouvier, 1922:90), "bancs de corail rouge" (A. Milne Edwards and Bouvier, 1900:9) and from bottoms with calcareous algae or sand, rock, corals and calcareous algae (Forest and Guinot, 1966). Off West Africa, ovigerous females have been collected in May (*Pillsbury*).

Distribution.—This is an insular West African species, known so far from the Cape Verde islands (the type-locality) and the Gulf of Guinea Islands, Principe, and Annobon; it has not been recorded from the mainland. Monod (1956) reported material from the Cape Verde Islands and Principe. Since 1956 *Dynomene filholi* has been recorded from the following localities:

Principe: 01°35′N, 07°28′E, 45 m; and 01°38′35″N, 07°21′35″E, 35 m (Forest and Guinot, 1966).

Annobon: 01°27.5′S, 05°36.5′E, 35 m; N of San Antonio, 23 m; 01°26′15″S, 05°35′40″E, 60 m (Forest and Guinot, 1966).

Family Latreilliidae Stimpson, 1858

Latreillidea Stimpson, 1858c:226 [corrected to Latreilliidae by Stebbing, 1902:23; name 373 on *Official List*].

Eastern Atlantic Genera.—One, *Latreillia*, represented in the tropical fauna.

Eastern Atlantic Species.—One, *Latreillia elegans*, not represented in the *Pillsbury* collections.

Genus *Latreillia* Roux, 1830

Latreillia P. Roux, 1830, pl. 22 [type-species: *Latreillia elegans*

Roux, 1830, by monotypy; gender: feminine; name 1630 on *Official List*].

Practor Gistel, 1848:ix [erroneously substituted for *Latreillia* (see Rathbun, 1937:73); type-species: *Latreillia elegans* Roux, 1830; gender: masculine].

Latreillia elegans Roux, 1830

Latreillia elegans.—Monod, 1956:78 [references].—Zariquiey Alvarez, 1968:307 [Spain; references].

Latreilla elegans.—Türkay, 1976a:25 [listed], 36, fig. 16 [Morocco; erroneous spelling].

DISTRIBUTION.—Mediterranean Sea and adjacent eastern Atlantic, from Portugal, the Azores, off the Sahara coast, and the Cape Verde Islands, in depths between 100 and 475 m. Ascension Island (Stebbing, 1914); western Atlantic (Rathbun, 1937).

Family HOMOLIDAE de Haan, 1839

HOMOLIDEA de Haan, 1839:102 [corrected to Homolidae by White, 1847a:55; name 243 on *Official List*, there attributed to White, 1847, in error].

THELXIOPEIDAE Rathbun, 1937:62 [name 278 on *Official Index*].

EASTERN ATLANTIC GENERA.—Three, two of which, *Homola* and *Paromola*, are represented by species occurring off tropical West Africa. The other genus is *Homologenus* A. Milne Edwards (in Henderson, 1888:20): A substitute name for *Homolopsis* A. Milne Edwards (1880:34), an invalid junior homonym of *Homolopsis* Bell, 1862 (type-species: *Homolopsis rostratus* A. Milne Edwards, 1880, by monotypy; gender: masculine).

EASTERN ATLANTIC SPECIES.—Three, two of which were recorded by Monod (1956), as follows:

Name in Monod	Current Name
Thelxiope barbata	*Homola barbata**
Paromola cuvieri	*Paromola cuvieri*

The extralimital species is *Homologenus rostratus* (A. Milne Edwards, 1880): Eastern Atlantic from the Azores, Madeira, and off Morocco, 1435 to 2195 m (Türkay, 1976a); western Atlantic (Rathbun, 1937).

Genus *Homola* Leach, 1815

Thelxiope Rafinesque, 1814:21 [suppressed by the International Commission on Zoological Nomenclature, Opinion 522 in *Bulletin of Zoological Nomenclature*, 19:211; type-species: *Thelxiope palpigera* Rafinesque, 1814, by monotypy; gender: feminine; name 1190 on *Official Index*].

Homola Leach, 1815a:324 [type-species: *Homola spinifrons* Leach 1815, a subjective junior synonym of *Cancer barbatus* Fabricius, 1793, by monotypy; gender: feminine; name 1301 on *Official List*].

Homolax Alcock, 1899b:124, 129, 156 [type-species: *Homola megalops* Alcock, 1894, by monotypy; gender: feminine].

Moloha Barnard, 1947:371 [type-species: *Latreillopsis alcocki* Stebbing, 1920, by monotypy; gender: feminine].

* *Homola barbata* (Fabricius, 1793)

Thelxiope barbata.—Gordon, 1950:221, 230, 232, 239, 250, figs. 19, 26b–d.—Monod, 1956:79.—Maurin, 1968b: 486.—Le Loeuff and Intès, 1968:31, table 1.

Homola barbata.—Figueira, 1960:7.—Guinot and Ribeiro, 1962:23.—Pérès, 1964:20.—Forest and Guinot, 1966: 48.—Crosnier, 1967:322.—Maurin, 1968a:19, 30, 43, 61, 107 [p. 107 Balearic Isles]; 1968b:480, 484.—Zariquiey Alvarez, 1968:304, figs. 12g, 106c [Spain; references].—Rice and Provenzano, 1970:446 ff., figs. 1–15 [larvae].—Türkay, 1976a:25 [listed], 36 [Portugal, in part]; 1976b: 61 [listed], 62.

SYNONYMS.—*Cancer cubicus* Forskål, 1775 (suppressed by ICZN); *Cancer novemdecos* Sulzer, 1776 (suppressed by ICZN); *Thelxiope palpigera* Rafinesque, 1814; *Homola spinifrons* Leach, 1815; *Dorippe spinosus* Risso, 1816.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 1♀ ov (L).

Nigeria: Sta 241, 59–63 m, mud and shell, 1♀ (W).

Annobon: Sta 283, 51–55 m, nodular coralline algae, 1♂ (W).

Other Material: Congo: Off Pointe-Noire, 04°56'S, 11° 31'E, 95–97 m, trawl, 21–22 Sep 1965, 2♂ (W).

DESCRIPTION.—Carapace subquadrate, widest anteriorly, frontorbital border with 2 pairs of spines in transverse row, outer longer. Gastric region with 9 large spines: 4 forming square on midline, 1 on midline posteriorly, and 2 pairs laterally, arranged in oblique line. Anterolateral area of carapace with 2 large spines, anterior larger, between branchial and cervical grooves.

Lateral margin of carapace with line of spinules decreasing in size posteriorly. Linea anomurica indistinct. Front, under orbit, with 3 spines forming triangle. Pterygostomian region with curved row of 6 spines dorsally, lower margin with curved row of 5–6 spines, and between these, 1–2 spines; below and posterior to these larger spines are numerous small spines. Raised anterior margin of epistome terminating before meeting in midline, leaving smooth median gap. Eyes elongate, stalk greatly enlarged proximal to cornea. Basal segment of antennal peduncle with outer spine.

Chelae slender, equal. Merus with 2 lines of spines below, 1 above, lower, outer spines largest. Carpus with 1 large and 1 small inner spines, outer surface with 6–8 spines arranged in 2 irregular rows and 2 distal spines. Palm with low, blunt spine on outer margin. Fingers shorter than palm, cutting edges corneous, tips of fingers crossing when closed, movable finger with low, obtuse prominence proximally on cutting edge.

Walking legs compressed, thin, elongate. Meri with row of fixed spines above. Propodi elongate, each shorter than respective merus, with row of 4 slender, movable spines below and 2 distal spines. Dactyli elongate, each equal to or slightly longer than respective carpus, more than half as long as respective propodus, with 11–13 spines below. Fifth leg with dorsal spine on coxa, 1 or 2 spines on ischium; merus with 4 large posterior spines and 1 terminal anterior spine; carpus with numerous small spines anteriorly; propodus with numerous spines on opposable margin; dactylus with 4 spines on opposable margin.

Abdomen of 7 somites in both sexes. Second segment of abdomen with prominent conical tooth.

Figures: Rathbun, 1937, fig. 16, pl. 15: figs. 1, 2; Rice and Provenzano, 1970, fig. 2.

Male Pleopod: Gordon, 1950, figs. 26b–d (Madeira).

MEASUREMENTS.—Our specimens have carapace lengths of 16 to 28 mm; the carapace length of the ovigerous female is 22 mm.

REMARKS.—In addition to the specimens collected by *Pillsbury*, we have been able to examine two larger males (cl 29 and 30 mm) reported off Pointe-Noire in 95–97 meters by Crosnier (1967: 322). The male pleopods of these specimens and that from a male (cl 32 mm, Leiden Crust. D.12989) from Naples, the type-locality, closely resemble that illustrated from a small male, cl 14 mm, from Madeira by Gordon (1950). The Mediterranean and eastern Atlantic populations of this species apparently are conspecific.

On the basis of their study of larvae identified with this species, Rice and Provenzano (1970) reinforced earlier suggestions by Rice (1964) and Rice and Von Levetzow (1967) that there might be several taxa, each with a distinctive larval form, currently placed in *H. barbata*. The recognized three groups of larvae are the western Atlantic, eastern Atlantic (including the Mediterranean and some specimens from South Africa), and a group found only off South Africa. Rice and Provenzano examined postlarval specimens from the western North Atlantic, Brazil, the Mediterranean, and South Africa but could find no consistent differences between specimens from these areas. However, they suggested that eastern Atlantic representatives of *H. barbata* matured faster and grew larger than specimens from other areas.

BIOLOGY.—*Homola barbata* inhabits moderate depths, having been taken in 55–679 m in the western Atlantic (Rathbun, 1937) and between 50 and 400 m in the eastern Atlantic (Monod, 1956); records since 1956 indicate that the species lives in depths between 10–30 and 470–500 m in the eastern Atlantic. The *Pillsbury* specimens were taken on broken shell in 70 m, on mud and shell in 59–63 m, and in nodular coralline algae in 51–55 m. This species also has been taken on mud in 215 m (Guinot and Ribeiro, 1962); reddish gravel with shell debris in 210 m (Pérès, 1964); calcareous algae in 73 m (Forest and Guinot, 1966); muddy sand in 95–98 m (Crosnier, 1967); muddy sand or sandy detritus in 10–30 m, slightly sandy mud with funiculines in 200–250 m, alcyonarians in mud in 90–150 m, and muddy sand in 470–500 m (all Maurin, 1968a); and on muddy shell in 50 m, mud in 40–60 m, muddy detritus in 200

m, and mud or sandy mud in 90–100 m (all Maurin, 1968b).

Off West Africa, ovigerous females have been collected in June and September (Crosnier, 1967; *Pillsbury*).

DISTRIBUTION.—Mediterranean, eastern and western Atlantic, and off South Africa, in depths between 10–30 m and 679 m. In the western Atlantic it has been recorded from localities between Massachusetts and Brazil (Rathbun, 1937; Rice and Provenzano, 1970). In the eastern Atlantic it is known from scattered localities in the Mediterranean and in the Atlantic from Portugal and Spain southward to South Africa, including the Azores, the Cape Verde Islands, and Madeira (Barnard, 1950; Gordon, 1950; Monod, 1956; Zariquiey Alvarez, 1968). Since 1956 it has been recorded from the following:

Spain: Off Guadiana, 470–500 m (Maurin, 1968a).

Azores: Off Horta, Ilha do Faial, in deep water (Figueira, 1960).

Madeira: Funchal, 100-ca. 250 m; Ilhas Desertas (Türkay, 1976b).

Morocco: Banc de Spartel, 35°54′N, 06°14′W, 210 m (Pérès, 1964). Between Cap Rhir and Cap Drâa, 10–30 m (Maurin, 1968a). Off Cap Juby, 50 m (Maurin, 1968b). 31°01′N, 10°16′W, 360–375 m (Türkay, 1976a).

Spanish Sahara: Off Médano de Aaiún and Cabo Bojador, 200–300 m; Morro Garnet, 300–350 m (Maurin, 1968a); between Cabo Corbeiro and Cabo Blanco, 200 m (Maurin, 1968b).

Mauritania: S Banc d'Arguin, 90–150 m (Maurin, 1968a). Banc d'Arguin, 40–60 and 90–100 m (Maurin, 1968b).

Ivory Coast: 05°06′N, 03°49′W, 50 m (Crosnier, 1967). In 40–50 m (Le Loeuff and Intès, 1968).

Principe: 01°43′10″N, 07°28′20″E, 73 m (Forest and Guinot, 1966).

Congo: Off Pointe-Noire, 05°00′S, 11°32′E, 98 m, and 04°56′S, 11°31′E, 95–97 m (Crosnier, 1967).

Angola: Baía dos Tigros, 215 m (Guinot and Ribeiro, 1962).

It has not been recorded previously from Liberia, Nigeria, or Annobon, although these localities are within the known range of the species.

Genus *Paromola* Wood-Mason and Alcock, 1891

Paromola Wood-Mason and Alcock, 1891:267 [type-species: *Dorippe cuvieri* Risso, 1816, by monotypy; gender: feminine; name 1641 on *Official List*].

Paromola cuvieri (Risso, 1816)

Paromola cuvieri.—Capart, 1951:25, fig. 4.—Monod, 1956:79, fig. 89.—Guinot and Ribeiro, 1962:23.—Rossignol, 1962: 113.—Forest, 1963:628.—Pérès, 1964:27, 29.—Figueira, 1964:69, pls. 1,2.—Zariquiey Alvarez, 1968:301, fig. 106b [Spain; references].—Maurin, 1968a:29, 33, 50, 64, 106, 114, 121 [p. 106, 114, 121 Mediterranean], fig. 22; 1968b: 479, 480, 482, 484, 489, 491, 492, figs. 3, 6.—Christiansen, 1969:24, fig. 8, map 2 [Scandinavia].—Crosnier, 1969: 529.—Türkay, 1976a:25 [listed], 36; 1976b:61 [listed], 62.—Intès and Le Loeuff, 1976:103.

Paromola.—Maurin, 1968a, fig. 23; 1968b, figs. 1, 9.

Parhomola.—Maurin, 1968a, fig. 29 [erroneous spelling].

Paramola.—Maurin, 1968b, fig. 4 [erroneous spelling].

SYNONYM.—*Maia dumerili* Risso, 1816.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: Morocco: Off Cap de Mazagan, 33°40′N, 08°45′W, 570 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 159, 1♀ (L).

DESCRIPTION.—Capart, 1951:27.

Figures: Capart, 1951, fig. 4; Monod, 1956, fig. 89; Christiansen, 1969, fig. 8.

Male Pleopod: Sankarankutty, 1968, fig. 1a,b (North Sea).

Color: "Couleur générale jaune orange, plus rouge à l'avant de la carapace et sur les épines antérieures; les pattes un peu plus foncées" (Capart, 1951:27).

BIOLOGY.—*Paromola cuvieri* is a deep water species, generally occurring on soft bottoms in depths between 150 and about 1000 m; there is one record from a depth of 952–1038 m (Türkay, 1976a), and another from a depth of 10 m (Doflein, 1904), but generally the species occurs beyond shelf depths. It has been recorded from mud or sandy mud.

Off West Africa, ovigerous females have been recorded in March and October (Capart, 1951; Monod, 1956).

DISTRIBUTION.—Eastern Atlantic, from the Hebrides and southern Scandinavia southward to Angola, including the Azores, the Cape Verde Islands, and the Mediterranean, in depths between 10 and more than 1000 m, usually deeper

than 150 m. Monod (1956) summarized earlier West African records and reported material from Senegal. Since 1956 the species has been recorded from:

Azores: Ilha Terceira (Figueira, 1964).

Madeira: No specific locality; fish market, Madeira (Türkay, 1976b).

Morocco: Foum Agouitir (as Puerto-Cansado), 350–450 m (Maurin, 1968a). 35°19′N, 06°32′W to 35°28.8′N, 06°39.2′W, 333–360 m, and 35°17.5′N, 06°10.3′W to 35°13.9′N, 06°36.2′W, 295–340 m (Pérès, 1964). 33°37.5′N, 09°02.2′W, 952–1038 m (Türkay, 1976a). Asilah (as Arzila) to Larache, 300–350 m (Maurin, 1968a).

Spanish Sahara: Off Médano de Aaiún and W of Cabo Bojador, 300–500 m; off Cabo Bojador and Morro Garnet, 530–720 m (Maurin, 1968b). Off Villa Cisneros, 300–500 m (Maurin, 1968a,b).

Mauritania: Off Nouakchott, 350–400 to 600 m (Maurin, 1968a). Banc d'Arguin, 200–300 m, and Tamzak (as Tamxat), 350–600 m (Maurin, 1968b).

Senegal: Fosse de Kayar, 300–350 to 600 m (Maurin, 1968b).

Ivory Coast: No specific locality (Intès and LeLoeuff, 1976). 04°32′30″N, 06°31′W, 300–455 m, and 04°54′N, 03°23′W, 380–400 m (Forest, 1963).

Ghana: 04°39′N, 02°46′W, 300–400 m (Forest, 1963).

Congo: W of Banga (as Banda), 250 m (Rossignol, 1962). Off Pointe-Noire, 04°54′S, 11°19′E, 300 m (Crosnier, 1969).

Angola: Baía dos Tigres, 453–478 m (Guinot and Ribeiro, 1962). 06°24′N, 11°34′E, 325 m (Crosnier, 1969).

Family CYCLODORIPPIDAE Ortmann, 1892

CYCLODORIPPIDAE Ortmann, 1892:552.
TYMOLINAE Alcock, 1896:273, 274.

REMARKS.—This family is not represented in the eastern Atlantic fauna. It was considered by Glaessner (1969:R492, as Tymolinae) to be a subfamily of the Dorippidae.

Family CYMONOMIDAE Bouvier, 1898

CYMONOMAE Bouvier, 1898:55, 59 [corrected to Cymonomidae by Glaessner, 1969:R627].

EASTERN ATLANTIC GENERA.—One, occurring to the north of the tropical region, *Cymonomus* A. Milne Edwards (1880:26). Type-species: *Cymonomus quadratus* A. Milne Edwards, 1880, by monotypy; gender: masculine; name 1618 on *Official List.*

EASTERN ATLANTIC SPECIES.—Two, both occurring north of the tropical region:

Cymonomus granulatus (Thomson, 1873). Ireland southward to Sahara coast, Mediterranean; sublittoral, 300–1350 m (Zariquiey Alvarez, 1968).

Cymonomus normani Lankester, 1903. Between Iceland and the Faroes, 875–1269 m, and off Portugal, 1370–1430 m (see Türkay, 1976a:36, for references).

Family DORIPPIDAE MacLeay, 1838

DORIPPINA MacLeay, 1838:69 [corrected to Dorippidae by White, 1847a:53; name 355 on *Official List*, there attributed to de Haan, 1841, in error.]
ETHUSINAE Guinot, 1977:1052.

EASTERN ATLANTIC GENERA.—Four, *Ethusa*, *Ethusina*, *Medorippe*, new genus, and *Phyllodorippe*, new genus, each represented by tropical species.

EASTERN ATLANTIC SPECIES.—Ten, six of which were recorded by Monod (1956), as follows:

Name in Monod	Current Name
[*Cymonomus granulatus* (Dorippidae)]	[*Cymonomus granulatus* (Cymonomidae)]
Ethusina abyssicola	*Ethusina alba*
Ethusa mascarone	*Ethusa vossi*, new species*
Ethusa rosacea	*Ethusa rosacea**
Ethusa rugulosa	*Ethusa rugulosa**
Dorippe lanata	*Medorippe lanata**
Dorippe armata	*Phyllodorippe armata**

A seventh West African species, *Ethusina beninia*, new species, is represented in the *Pillsbury* collections.

One species assigned to the Dorippidae by Monod (1956), *Cymonomus granulatus* (Thomson, 1873), is included under the Cymonomidae (above), following Garth and Haig (1971:6.7).

The extralimital species are as follows:

Ethusa mascarone (Herbst, 1785). Mediterranean and adjacent Atlantic, including Canary Islands (Miers, 1881a; A. Milne Edwards and Bouvier, 1900), Portugal (Nobre, 1936), and Bay of Biscay (Zariquiey Alvarez, 1968). For possible references

to *E. mascarone* from the NW African coast, see account of *E. vossi*, new species (p. 39).

Ethusa microphthalma Smith, 1881. Azores, in 1000 fm (1830 m) (Miers, 1886:329); western Atlantic (Rathbun, 1937).

Ethusina talismani A. Milne Edwards and Bouvier, 1897. Off the Azores and Cap Rhir, Morocco, in 2075 to 2235 m (Monod, 1956). A male syntype (USNM 22940) in the collections of the Smithsonian Institution was taken at *Talisman* sta 44 off Cap Rhir, Morocco, 29°52'N, 14°07'W of Paris (11°47'W of Greenwich), 2083 m, 25 June 1883.

REMARKS.—Usually the genera *Dorippe* sensu lato, *Ethusa*, and *Ethusina* are placed in the nominate subfamily of the Dorippidae. Recently Guinot (1977:1052) recognized a second subfamily, Ethusinae (p. 38), for *Ethusa* and *Ethusina*, an action with which we concur.

Key to Subfamilies and Genera of Dorippidae

1. Afferent branchial orifices narrow and placed somewhat before bases of chelipeds, being separated from chelipeds by narrow process of carapace reaching down to sternum. Last two pereiopods distinctly subchelate, dactylus closing against tubercle on propodus (Dorippinae) 2
   Afferent branchial orifices wide and placed immediately against bases of chelipeds. Last two pereiopods not subchelate; dactylus short and not closing against tubercle on propodus (Ethusinae) 8
2. Carapace with distinct epibranchial tooth 3
   Carapace without epibranchial tooth 5
3. Male gonopod short, broad, and straight. Gastric region of carapace with V-shaped ridge. Dactylus of second and third pereiopod with upper margin naked or with few hairs in extreme basal part (less than ¼ of length) 4
   Male gonopod slender, S-shapedly curved. Gastric region without V-shaped ridge. Dactylus of second and third pereiopod with fringe of short hairs over more than basal third of dorsal margin [Carapace broader than long.] ..... ***Phyllodorippe***, new genus
4. Meri of second and third pereiopods with dorsal row of spines or spinules; dactyli of these legs with few hairs and spinules in extreme basal part. Carapace broader than long with some low elevations. Abdomen of male and female without teeth ..... ***Medorippe***, new genus
   Meri of second and third pereiopods without dorsal spines or spinules; dactyli of these legs naked and smooth. Carapace longer than wide, with distinct tubercles. Abdomen of male and female with distinct teeth on third and fourth somites (also on second in male) ..... ***Dorippe***
5. Male gonopod short, stubby, with one or more narrow appendages, one or more of which are T-, hammer-, or cross-shaped. Carapace distinctly wider than long. Front reaching about as far forward as outer orbital teeth 6
   Male gonopod very slender and curved, ending in 3 or 4 rounded or subacute lobes. Carapace longer than wide or almost as long as wide. Front reaching beyond outer orbital teeth 7

6. Male gonopod straight, with single twisted L- or T-shaped appendage at apex, and lobe at base ..... ***Dorippoides***
   Male gonopod with sharp angular bend in middle, with several appendages at top, without lobe at base ..... ***Paradorippe***
7. Carapace distinctly longer than wide, flattened dorsally, without tubercles, but with grooves. Front reaching far beyond outer orbital teeth. Dactyli of second and third pereiopods with fringe of long hairs along both upper and lower margins ..... ***Neodorippe***
   Carapace slightly wider than long, convex, smooth or with tubercles. Front reaching only slightly beyond outer orbital teeth. Dactyli of second and third pereiopods with dorsal and ventral fringes of short hairs. ***Nobilum***
8. Eyes movable. Basal segment of antennules normal ..... ***Ethusa***
   Eyes immovable. Basal segment of antennules very large and swollen ..... ***Ethusina***

Subfamily DORIPPINAE MacLeay, 1838

REMARKS.—The two eastern Atlantic species belonging to this subfamily are present in the *Pillsbury* collections. Until recently both would have been placed in the genus *Dorippe*, but in 1969, Serène and Romimohtarto in a paper dealing with Indo-West Pacific species, recognized instead of the old genus *Dorippe* three genera (*Dorippe*, *Neodorippe*, and *Paradorippe*) and two new subgenera, *Dorippoides* (in *Dorippe*) and *Nobilum* (in *Neodorippe*).

We tried to accommodate the Atlantic species of *Dorippe* in the genera and subgenera recognized by Serène and Romimohtarto, but encountered several difficulties. Therefore a study first had to be made of the Indo-West Pacific species of Dorippinae. During this study we could only confirm the correctness of the taxonomic views of Serène and Romimohtarto, and even had to raise some of their subgenera to the rank of full genera. Furthermore, we found it necessary to establish two new genera, one each for the Atlantic species. It is our intention to discuss the Indo-West Pacific species of *Dorippe*, sensu lato, in a future paper, but our main conclusions can be found in the following list of the genera of Dorippinae that we at present recognize:

Dorippe Weber (1795:93). Type-species: *Cancer quadridens* Fabricius, 1793, a subjective junior synonym of *Cancer frascone* Herbst, 1785, by subsequent selection by Latreille, 1810:96, 422; gender: feminine. So far *Dorippe* contains only the type-species.

Dorippoides Serène and Romimohtarto (1969:3, 4, 8). Type-species: *Cancer facchino* Herbst, 1785, by original designation and monotypy; gender: masculine. So far only containing the type-species.

Medorippe, new genus. Type-species: *Cancer lanatus* Linnaeus, 1767, by present designation and monotypy; gender: feminine.

Neodorippe Serène and Romimohtarto (1969:3, 4, 11). Type-species: *Dorippe astuta* Fabricius, 1798, a subjective junior synonym of *Cancer facchino* Herbst, 1785, by original designation; gender: feminine. An examination of three syntypes of *Dorippe astuta* Fabricius, 1798, in the collection of the Leiden Museum, and photographs of two of the four syntypes in the Zoological Museum, Copenhagen, showed that *Dorippe astuta* Fabricius, 1798, is a subjective junior synonym of *Cancer facchino* Herbst, 1785, as defined by the lectotype selection for the latter species by Serène and Romimohtarto (1969:9). The specimens usually assigned by authors to *Dorippe astuta* and also described and figured under that name by Serène and Romimohtarto (1969:11, figs. 3, 7, 12, 17, pl. 1d, pl. 4a,b), prove to be *Dorippe callida* Fabricius, 1798. Photographs of the two type-specimens of *Dorippe callida* in the collection of the Copenhagen Museum, which could be examined by us, clearly

showed the identity of the species. Thus, *Neodorippe* is a genus based on a misidentified type-species, and in order to comply with Article 70(a) of the *International Code of Zoological Nomenclature*, we will submit this case to the International Commission on Zoological Nomenclature, requesting that under their plenary powers *Dorippe callida* Fabricius, 1798, be designated the type-species of the genus *Neodorippe*.

Although Serène and Romimohtarto assigned two species and a subspecies (the type-species, plus *Dorippe japonica* Von Siebold and *D. japonica taiwanensis* Serène and Romimohtarto) to the nominate subgenus of *Neodorippe*, we prefer to consider *Neodorippe* a genus with a single species, *Neodorippe callida* (Fabricius, 1798).

Nobilum Serène and Romimohtarto (1969:3, 5, 14). Type-species: *Dorippe histrio* Nobili, 1903, by original designation and monotypy; gender: neuter. We prefer to place *Dorippe japonica* in this genus rather than in *Neodorippe*. The gonopods of the two species, *Dorippe japonica* and *D. histrio*, in our opinion do not differ in essential details, while the general morphology of the body shows the species to be much closer to one another than to *Neodorippe callida*. Therefore we consider the genus *Nobilum* at present to consist of *Nobilum histrio* (Nobili, 1903), *N. japonicum japonicum* (Von Siebold, 1824) and *N. japonicum taiwanense* (Serène and Romimohtarto, 1969).

Paradorippe Serène and Romimohtarto (1969:3, 5, 15). Type-species: *Dorippe granulata* de Haan, 1841, by original designation; gender: feminine. This genus contains three species: *Paradorippe granulata* (de Haan, 1841), *P. australiensis* (Miers, 1884), and *P. polita* (Alcock and Anderson, 1894).

Phyllodorippe, new genus. Type-species: *Dorippe armata* Miers, 1881, by present designation and monotypy; gender: feminine.

The new genera, *Medorippe* and *Phyllodorippe*, are restricted to the eastern Atlantic. The other five genera inhabit the Indo-West Pacific region. The subfamily, so far, has not been found in American waters (neither in the western Atlantic nor in the eastern Pacific).

Genus *Medorippe*, new genus

TYPE-SPECIES.—*Cancer lanatus* Linnaeus, 1767.

ETYMOLOGY.—The name is formed from the Greek prefix *me-* (not) and the feminine generic name *Dorippe*.

DIAGNOSIS.—Carapace broader than long, pubescent, with distinct epibranchial spine on either side. Extra-orbital teeth slightly surpassing front. Tubercles on dorsal surface of carapace few and low, grooves conspicuous; V-shaped ridge present on cardiac region. Eyes not reaching beyond extra-orbital teeth. Lower margin of orbit, between extra- and infra-orbital teeth, smooth. Second and third pereiopods with dorsal margin of merus carrying row of spines. Dactylus of these pereiopods narrow and somewhat twisted, not fringed with hairs (at most with very short row of hairs in extreme basal part of dorsal margin). Abdomen of male with blunt and low elevations, but without teeth or spines. First pleopod of male short, stubby and straight, with lobe at outer margin of base; apex acute, turned inward abruptly (almost at right angle), without distal appendages.

REMARKS.—In the genus *Medorippe*, the shape of the male gonopod is closest to those of *Dorippe* and *Dorippoides*, but differs from that in both genera in the sharp straight apex which is turned inward. From the other genera, *Medorippe* can be distinguished by the short, straight gonopod without distal appendages. Like *Dorippe* and *Phyllodorippe*, *Medorippe* has a distinct epibranchial spine, which in *Dorippe*, however, is preceded by a row of granules. The presence of spines on the dorsal margin of the meri of pereiopods 2 and 3 distinguishes *Medorippe* from the others.

* *Medorippe lanata* (Linnaeus, 1767), new combination

FIGURE 4*a–h*

Dorippe lanata.—Capart, 1951:30, fig. 6.—Monod, 1956:90, fig. 103 [as *Dorippe armata*; not fig. 102 = *Phyllodorippe armata*].—Rossignol, 1957:75, pl. 3: fig. 3.—Forest and Gantès, 1960: 350.—Gauld, 1960:68.—Guinot and Ri-

beiro, 1962:25.—Rossignol, 1962:114.—Crosnier, 1964: 34.—Forest and Guinot, 1966:50.—Guinot, 1967a:244 [listed; Indian Ocean].—Zariquiey Alvarez, 1968:312, figs. 2f, 14b, 105a,b, 106b [Spain; references].—Maurin, 1968a:30, 41; 1968b:480, 486.—Le Loeuff and Intès, 1968: 38, table 1, figs. 47, 62; 1969:63, 65.—Serène and Romimohtarto, 1969:6 [discussion].—Bas, Arias, and Guerra, 1976, table 3.—Türkay, 1976a:25 [listed], 37.

Dorippe armata.—Monod, 1956, fig. 103.—Crosnier, 1964, fig. on pl. A.—Maurin, 1968b, figs. 5, 7. [Not *Phyllodorippe armata* (Miers, 1881).]

Dorripe lanata.—Rossignol, 1957:126 [key].—Crosnier, 1970: 1215. [Erroneous spelling.]

SYNONYM.—*Dorippe affinis* Desmarest, 1823.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 1♂, 1♀ ov, 6 juv (L).

Ivory Coast: Sta 42, 62-75 m, mud with brown, branched Foraminifera, 2 juv (W). Sta 46, 38-42 m, mud with dense *Jullienella*, 11♂, 11♀, 27 juv (L). Sta 47, 37 m, bottom with *Jullienella*, 4♂, 1♀ (W). Sta 60, 79-82 m, coral or rock, 1♂, 1 juv (L). Sta 62, 46 m, brown, branching and foliate Foraminifera, 19♂, 8♀ (W). Sta 64, 68 m, 1♀ (L). Sta 65, 46-49 m, 2♂, 4♀ (W).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 3♂, 2♀ (L). Sta 24, 35-37 m, dark red bryozoans, 1♂ (L). Sta 28, 49-53 m, 2♂, 1♀ (W). Sta 30, 61-64 m, coral, 1♂, 1♀ (L).

Nigeria: Sta 241, 59-63 m, mud and shell, 4♂, 1♀ (W). Sta 248, 33 m, 2♂ (L).

Cameroon: Sta 260, 46 m, 1♂, 1♀ (W).

Undaunted Material: Angola: Sta 102, 54 m, 1♀ (L). Sta 103, 90 m, 1♂ (L).

Other Material: Morocco: Off Cap Hadid, 31°55'N, 09°-52'W, 78 m, muddy sand, 5m beam trawl, 25 Mar 1976, *Onversaagd* Sta 127, 1♂ (L).

DESCRIPTION.—Monod, 1933b:490–494; Capart, 1951:30.

Figures: Capart, 1951, fig. 6; Monod, 1956, fig. 103.

Male Pleopod: Monod, 1933b, fig. 3f,g (Morocco, Syria) (Figure 4*g,h*).

Color: Capart (1951:31) noted that his material was "uniforme ocre rose, la carapace souvent encrassée de vase; les doigts de la pince roses." The *Pillsbury* specimens also were uniform pinkish in color, without obvious bands on the pereiopods.

MEASUREMENTS.—Carapace lengths of our specimens range from 4 to 28 mm; the single ovigerous female has a carapace length of 28 mm.

REMARKS.—The West African specimens of *Medorippe lanata* closely resemble those from localities in the Mediterranean as well as those from the Atlantic coasts of Spain and Portugal with which they have been compared. The male pleopods of our specimens apparently are identical with those of Mediterranean specimens, resembling those illustrated by Monod (1933b, fig. 3f, ♂ from Morocco) (Figure 4*g*); the pleopods of immature males are like that figured by Monod (1933b: fig. 3g) (Figure 4*h*) from a specimen from Syria; Monod questioned whether his specimens from the eastern Mediterranean actually were mature.

In spite of their close resemblance, some differences can be observed between our material from the Gulf of Guinea and specimens from more northern localities, but these observed differences overlap so broadly that we believe that the Gulf of Guinea and the Mediterranean populations of this species cannot be separated nomenclaturally at this time. Perhaps with additional material, distinct northern and southern subspecies can be recognized. In general, the Mediterranean specimens appear to be more pubescent, the spines on the merus of the walking legs are larger and give the impression of being less numerous, the teeth on the cutting edges of the chelae are sharper, and the walking legs appear to be longer and slenderer. The second and third pereiopods of a specimen from Tunisia (Figure 4*c,d*) and one from the Ivory Coast (Figure 4*e,f*) are shown here. Of these apparent differences, the first three vary widely and cannot be used to distinguish representatives of the two populations. Mediterranean specimens have 7–15 (usually 10–11) spines on the dorsal edge of the merus, whereas the Gulf of Guinea specimens have 7 to approximately 20 (usually 12) spines. The most striking difference is in the proportion of length to width of the merus of the walking legs (Table 1). The Mediterranean specimens appear to have much slenderer and longer legs, and this is in general supported by measurements, although for each size range the ratios overlap to some extent.

The Gulf of Guinea population may mature at

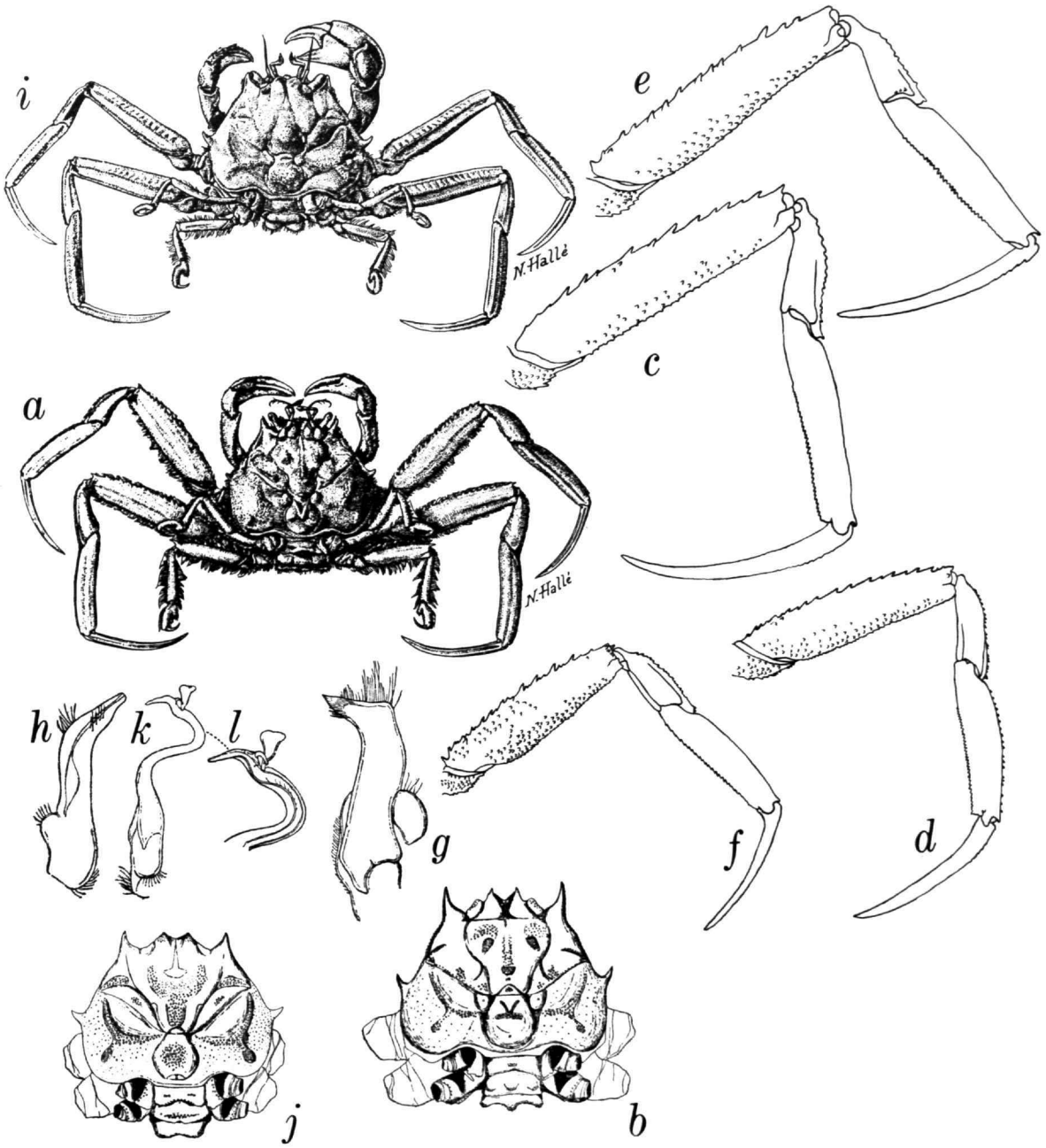

FIGURE 4.—*Medorippe lanata* (Linnaeus): *a*, dorsal view (from Monod, 1956, fig. 103); *b*, dorsal view of carapace (from Monod, 1933b, fig. 4c); *c*, second pereiopod, male, cl 23 mm, Tunis; *d*, third pereiopod, same specimen; *e*, second pereiopod, male, cl 19 mm, *Pillsbury* Sta 47; *f*, third pereiopod, same specimen; *g*, *h*, male, first pleopods (from Monod, 1933b, fig. 3f,g). *Phyllodorippe armata* (Miers): *i*, dorsal view (from Monod, 1956, fig. 102); *j*, dorsal view of carapace (from Monod, 1933b, fig. 4a); *k*, *l*, male first pleopods and apexes (from Monod, 1933b, fig. 3h).

TABLE 1.—Length-width ratios of the propodus of the third pereiopods for *M. lanata* from the Gulf of Guinea and the Mediterranean

Carapace length (mm)	Gulf of Guinea			Mediterranean		
	Number of specimens	Range (mm)	Mean (mm)	Number of specimens	Range (mm)	Mean (mm)
8–10	3	4.2–4.9	4.6	1	–	4.6
11–13	11	3.8–4.9	4.4	–	–	–
14–16	12	3.7–4.7	4.1	4	4.5–5.5	5.1
17–19	1	–	3.9	2	4.3–4.6	4.5
20–22	3	3.3–3.8	3.5	13	3.8–5.1	4.5
23–25	–	–	–	11	3.8–4.9	4.4
26–28	–	–	–	8	4.1–4.8	4.3

a smaller size. A 22 mm long male from Angola has the right cheliped greatly inflated, whereas in specimens from Spain males with carapace lengths of 23–26 mm show only slight inflation of the chela and smaller ones, 18–22 mm long, have chelae similar to those of females.

Monod (1933b:492) suggested that the eastern Mediterranean population of this species might be subspecifically distinct from those in the western Mediterranean and the Atlantic. One of the differences he noted was in the shape of the male pleopod, but, as already pointed out, his Syrian specimens were juveniles and the pleopods were not fully developed. He also noted that the Syrian specimens differed from others he examined in having a more spinulose sternal border; this feature varies widely in our material, too.

As indicated by Forest and Guinot (1966:50), figures 102 and 103 of Monod's (1956) monograph are interchanged, figure 102 showing *Phyllodorippe armata*, figure 103 *Medorippe lanata*. Crosnier's (1964) figure of "*Dorippe armata*" on his plate A, as well as Maurin's (1968b) figures 5D.a. and 7D.a., all are copies of Monod's (1956) figure 103, and thus do not represent *Phyllodorippe armata*, but *Medorippe lanata*.

BIOLOGY.—The depth at which this species occurs is usually indicated as sublittoral to about 100 m (Bouvier, 1940:200; Monod, 1956:92). The depth of 952–1038 m off Morocco given by Türkay (1976a) is far in excess of the depths at which the species normally is found and is probably erroneous. Zariquiey Alvarez (1968:313) indicated that this species is usually taken in Spanish waters in depths of 40 or 50 to 100 m; and Pesta (1918:287) gave these depths for the Adriatic population, with the reservation that the species may occur in depths of 10 m. So far as West Africa is concerned, evidently the same situation is found: Crosnier (1964) listed the species as occurring in cold water in depths greater than 50 m off Cameroon, whereas Le Loeuff and Intès (1968) stated that although *Medorippe lanata* is sometimes taken in Ivory Coast waters in depths between 25 and 30 m (in their table they give 15 m as least depth; this may be an error for 25), the majority of the specimens there were found in depths between 35 and 50 m and as deep as 100 m. Of the specimens examined by us only one was found at a depth less than 35 m (viz. 33 m), 10 specimens (55%) were found between 35 and 55 m, and the remainder were from deeper water, 55–90 m. Also, more than 80% of the material listed by Monod (1956) for which depth is indicated was from depths of 35 to 55 m, whereas only two specimens, the remainder, were taken at 96 and 100 m. Capart's West African material for the larger part (14 of the 17 lots for which depth was recorded) came from between 30 and 92 m, and only two lots were from less than 30 m (12–15 m and 20–24 m). Most other West African records also conform to this pattern: the far greater part is from deeper than 35 m. Only Maurin (1968a) reported the species from a depth of 10–30 m, and only Türkay (1976a) has reported it from much deeper water, as noted above.

Capart (1951) reported the occurrence of this species on coastal bottoms of mud or muddy sand generally in depths between 25 and 100 m, with one capture at 15 (12–15) m. It was taken only on one occasion with the shallower *Phyllodorippe armata*.

The bottom types on which this species was collected by the *Pillsbury* include: mud with Foraminifera, 46 m; foliate brown to orange bryozoans in 42 m and dark red bryozoans in 35–37

m; coral in 61–64 m and coral and rock in 79–82 m; broken shell in 70 m; and mud and shell in 59–63 m. Most of the *Pillsbury* specimens were taken on mud bottom with foliate Foraminifera, probably *Jullienella*, in depths between 37 and 75 m.

Other bottom types on which the species has been collected include: mud and sand in 65–75 m, mud in 50–64 m, mud, stones, calcareous algae, sand, and Foraminifera in 51 to 55 m and gravel, shell, and Foraminifera in 50 m (all Forest and Guinot, 1966); sand and muddy sand in 10–30 m and muddy sand in 40–50 m (Maurin, 1968a); shelly mud, in 50 m (Maurin, 1968b); and mud and sandy mud in 15[25?]–100 m (Le Loeuff and Intès, 1968). Le Loeuff and Intès (1969:63) indicated that this species was a mud dweller off the Ivory Coast. It seems that this species, like *E. vossi*, prefers a soft bottom with hard particles in it.

Off West Africa, ovigerous females have been collected in March, April, May, June, August, and October (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; *Pillsbury*).

DISTRIBUTION.—Eastern Atlantic, from the Mediterranean Sea and Portugal to South Africa and Mozambique (Barnard, 1955). Monod (1956) enumerated earlier records from West Africa; since 1956 *M. lanata* has been recorded from the following localities:

Morocco: 33°37.5′N, 09°02.2′W, 952–1038 m (?) (Türkay, 1976a). Agadir, 60–130 m (Forest and Gantès, 1960); Agadir (Maurin, 1968a). Between Cap Rhir (as Cap Ghir) and Cap Drâa (as Cap Noun), 10–30 m (Maurin, 1968a). Off Essaouira, 32°08′N, 09°02′W, 33 m, and 31°37′N, 09°54′W, 70 m (Forest and Gantès, 1960). SW of Cap Juby, 40–50 m (Maurin, 1968a). Cap Juby, 50 m (Maurin, 1968b).

Spanish Sahara: 21°44′N, 17°03′W to 21°46.5′N, 17°04′W, 40 m, and 21°30′N, 17°24′W to 21°27′N, 17°24′W, 95–137 m (Bas, Arias, and Guerra, 1976).

Mauritania: Banc d'Arguin, 40–60 m and 90–100 m (Maurin, 1968b).

Senegal: 13°01′N, 17°24′W, 51–55 m, and 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Sierra Leone: 07°15.5′N, 12°51′W, 64 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, and off Grand-Bassam, 15[25?]–100 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 37–51 m (Gauld, 1960). 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m, and 04°36.5′N, 01°31′W, 50 m (Forest and Guinot, 1966).

Cameroon: No specific locality, more than 50 m (Crosnier, 1964).

Congo: Near Pointe-Noire (Rossignol, 1957, 1962).

Angola: 17°02′S, 11°40′E, 54 m, and 17°06′S, 11°35′E, 90 m (Crosnier, 1970).

Genus *Phyllodorippe*, new genus

TYPE-SPECIES.—*Dorippe armata* Miers, 1881.

ETYMOLOGY.—The name is formed by a combination of the Greek word *phyllon* (leaf) and the feminine name *Dorippe*.

DIAGNOSIS.—Carapace distinctly broader than long, with sparse pubescence dorsally and distinct epibranchial spine on either side. Extra-orbital teeth reaching slightly farther forwards than front. Tubercles on dorsal surface low, grooves distinct. Cardiac region without V-shaped ridge. Eyes not reaching beyond extra-orbital teeth. Lower margin of orbit between extra- and infra-orbital teeth smooth. Dorsal margin of pereiopods 2 and 3 without spines on dorsal margin of merus. Dactyli of these pereiopods narrow and slightly twisted; with fringe of short hairs present in basal half of upper margin. Abdomen of male with blunt low elevations, but without teeth or spines. First pleopod of male long, slender, S-shapedly curved, with 2 short appendages in distal part, lacking lobe in proximal part.

REMARKS.—In the shape of the male gonopod, *Phyllodorippe* is closest to the genera *Neodorippe* and *Nobilum*, in both of which the male gonopod is also slender and curved; the gonopod of *Phyllodorippe* differs from those of the other genera because it ends in a narrow acute point and carries two lobiform appendages. The presence of epibranchial spines distinguishes the present genus from all other dorippine genera except *Dorippe* and *Medorippe*. Furthermore, in *Neodorippe* and *Nobilum* the front reaches farther forward than the anterolateral teeth. So far the genus is represented by a single species.

* *Phyllodorippe armata* (Miers, 1881), new combination

FIGURE 4*i-l*

?*Dromia* Pechüel-Loesche, 1882:288.

Dorippe Senegalensis Monod, 1933b:548 [footnote; nomen nudum, published in synonymy].

Dorippe armato.—Monod, 1933b:548 [footnote; erroneous spelling].

Dorippe armata.—Capart, 1951:33, fig. 7.—Monod, 1956:92, figs. 102 [as *Dorippe lanata*], 104-107 [not fig. 103 = *Medorippe lanata*].—Rossignol, 1957:75.—Longhurst, 1958: 87.—Lebour, 1959:131, 132, 134-136, fig. 19 [larvae].—Gauld, 1960:68.—Rossignol, 1962:114.—Guinot and Ribeiro, 1962:24.—Crosnier, 1964:32, 38 [not fig. on pl. A = *Medorippe lanata*].—Forest and Guinot, 1966:50.—Le Loeuff and Intès, 1968:38, figs. 47, 61, tables 1, 3-6, 8; 1969:63-65.—Maurin, 1968a:48, 59, 62; 1968b:484, 486, 489, 491 [not figs. 5D.a. and 7D.a. = *Medorippe lanata*].—Serène and Romimohtarto, 1966:6—Monod, 1970:66.

Dorrippe armata.—Rossignol, 1957:126 [key; erroneous spelling.]

Doripe armate.—Lebour, 1959:136 [larvae; erroneous spelling.]

Dorippe.—Voss, 1966:19.—Maurin, 1968b, figs. 4, 9.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38-42 m, mud with dense *Jullienella*, 3♀ (L). Sta 47, 37 m, bottom with *Jullienella*, 9♂, 4♀ ov (L). Sta 48, 22 m, 12♂, 16♀ (13 ov) (W). Sta. 49, 73-77 m, 1♂ (L).

Nigeria: Sta 248, 33 m, 2♀ (1 ov) (L). Sta 250, 24 m, brackish water, mud, 4♀ (2 ov) (L). Sta 251, 27 m, mud, 2♂, 2♀ (1 ov) (L). Sta 252, 30 m, mud, 1♀ ov (L). Sta 253, 33-40 m, mud, 1♀ ov (W).

Other Material: Senegal: Joal, 4 m, 19 Feb 1953, 3♂, 5♀ (2 ov) (W).

Liberia: No specific locality, 23 Mar 1953, G. C. Miller, 1♀, 1 damaged specimen (W). Off St. Paul River mouth, Monrovia, 4-11 fm (7-20 m), trawl, G. C. Miller, 6 Jan 1953, 1♀ (W).

Ivory Coast: Off Sassandra, 11 m, 3 Apr 1964, Guinean Trawling Survey, Tr 27, Sta 1, 6♂, 1♀ ov (L).

Ghana: Shama Bay, 26 Jun 1961, Amegah, 2♀ (1 ov) (W).

Nigeria: Off Lagos, 18 m, 5-6 Sep 1963, Federal Fisheries Service, 1♀ ov (L).

DESCRIPTION.—Capart, 1951:33.

Figures: Capart, 1951, fig. 7; Monod, 1956, figs. 102, 104-107.

Male Pleopod: Monod, 1933b, fig. 3h (Guinea) (Figure 4*k*, *l*).

Color: Some color persisted in one of our specimens from Nigeria. The second and third pereiopods are ornamented with red tubercles and the propodi of these legs are banded red and white.

Capart (1951:34) reported the following color in his material: "ocre violacé, la base des pattes et les pinces presque blanche."

MEASUREMENTS.—Our specimens have carapace lengths of 5 to 25 mm; ovigerous females have carapace lengths of 7 to 25 mm.

REMARKS.—As noted in the synonymies of *Medorippe lanata* and *Phyllodorippe armata* given by Forest and Guinot (1966), the figures of these two species were reversed in Monod (1956); *Phyllodorippe armata* is shown in Monod's figure 102 (Figure 4*i*), *Medorippe lanata* in his figure 103 (Figure 4*a*). The figures of *P. armata* given by Crosnier (1964) and Maurin (1968b) are actually of *M. lanata*; they apparently were taken from Monod.

Phyllodorippe armata and *Medorippe lanata* were taken together at three stations by the *Pillsbury*: at stations 46 and 47 off the Ivory Coast in 38-42 m and at station 248 off Nigeria in 33 m.

Monod (1933b:548, footnote), in discussing an unpublished manuscript by C. P. de Fréminville in the library of the Muséum national d'Histoire naturelle, Paris, introduced the name *Dorippe senegalensis* which he identified with *Phyllodorippe armata* (as *Dorippe armato*).

BIOLOGY.—Almost all authors agree that this is a shallow water species compared to *Medorippe lanata*, the one occurring mostly above, the other below 35 m. Balss (1921:48) indicated the depth of 12 lots of *Phyllodorippe armata*, all of which were found between 7 and 33 m (all but one between 7 and 18 m). Monod (1956) mentioned the depth of 48 lots; these were taken between 4 and 43 m, but more than 90% of them were found at 25 m or less.

The material now examined comes from depths which on the average are greater (7-77 m), with only 50% less than 30 m, and most others between 30 and 38 m. The one record from 73-77 m (*Pillsbury* Sta 49) might be erroneous in so far that the single male of *Phyllodorippe* found with the material of that station may have been caught at the previous station (Sta 48, depth 22 m, at which

28 specimens of the species were obtained) and accidentally remained in the net.

Of the post-1956 records listed under "Distribution," those by Maurin (1968a, 1968b) are the deepest (1 record of 35–40 m, 6 records between 50 and 100 m, and 1 of about 200 m). Forest and Guinot (1966) reported the species from depths between 4 and 50 m (all but one of these 9 records from 34 m or less). Le Loeuff and Intès (1968:38) remarked that "*D. armata* est la plus côtière [of the two *Dorippe* species] et ne dépasse pas les 35 m," although in their table 1 they give the depth of the species as 15–50 m. Guinot and Ribeiro (1962) reported the species from very shallow localities (5 and 8 m), but also from 42 m. Other authors indicated depth ranges up to 43 m (Gauld, 1960) or even 60 m (Longhurst, 1958). It seems likely that the species has its greatest concentration below 35 m, but also occurs occasionally as deep as 60 m. The very deep records of the species need verification.

Inasmuch as Maurin (1968b) followed Monod (1956) and reversed the figures of *M. lanata* and *P. armata* and Maurin's records for the shallow water species, *P. armata*, are deeper than usual and his records for the deeper living species, *M. lanata*, are shallower than usual, it seems likely that the two species were reversed throughout his accounts (1968a,b).

Phyllodorippe armata is usually found on a sand or mud bottom, with shell, calcareous algae, or Foraminifera. It seems to be able to tolerate low salinities. Balss (1921:48) reported it from "Flusswasser" (in Nigeria), from the "Nyanga-Fluss, Salzwasser" (Gabon), and "Süsswasser des Kongoflusses" (near Boma [05°51'S, 13°03'E], Zaire). Voss (1966:37) remarked that *Pillsbury* Sta 250, at which *P. armata* was taken, had "a typically brackish water or estuarine fauna due to our proximity to the mouths of the Niger, or Kwara, which strongly influence this section of the coast." Sourie (1954b) found it on coarse shelly sand bottom with *Arca* and *Pyura*, in 10–12 m in the Baie de Dakar.

Crosnier (1964) found this species on mud or sandy mud off Cameroon and characterized it as a warm water species, living in 0–30 m. Longhurst (1958) reported if from muddy sand, shelly sand, and shelly mud in 10–60 m off Sierra Leone. Le Loeuff and Intès (1969:63) characterized this species as a coastal species indifferent to the nature of the substrate.

Ovigerous females have been collected in January, February, March, April, May, June, August, September, November, and December (Capart, 1951; Monod, 1956; Forest and Guinot, 1966; and p. 36).

Pechüel-Loesche (1882:288) described the behavior of a crab that he observed at the Crique Banjia, Gabon, as follows: "Um vieles komischer nimmt sich aber eine andere Krabbenart (Dromia?) aus, die ich am Banya beobachtete; beim Spazierengehen pflegt sie mittelst der hinteren, am Rücken entspringenden Beinpaare einen Sonnenschirm über sich zu halten, welcher gewöhnlich aus einem halben Mangrovenblatte besteht. Flüchtet sie eilig, oder geht sie ins Wasser, so lässt sie das wunderliche Schutzdach fallen." As no morphological details of this crab are provided by Pechüel-Loesche, it is impossible to state with certainty which species was observed by him. We know of no *Dromia* carrying leaves, but Serène and Romimohtarto (1969:12), when dealing with *Neodorippe callida*, remarked that "in Singapore the species is very common on the mangrove swamps and generally all specimens hook a leaf of a mangrove tree on their backs." If Pechüel-Loesche's specimen actually is a dorippid, it is more likely to be *Phyllodorippe armata* than *Medorippe lanata*, as the former is known to live in shallower depths than the latter. New field observations may solve the problem and could add much of interest to the knowledge of the biology of these little known animals.

DISTRIBUTION.—Off West Africa, where it has been recorded from many localities between Cabo Corbeiro, Spanish Sahara and Angola. Monod (1956) summarized earlier records and added many new ones. Since 1956, *P. armata* has been recorded from the following localities:

Spanish Sahara: Between Cabo Corbeiro and Cabo Blanco, 60–80 m (Maurin, 1968a), in about 200 m (Maurin,

1968b). Between Cabo Barbas and Cabo Blanco, 50–90 m (Maurin, 1968b).

Mauritania: N Banc d'Arguin, 20°20′N–20°40′N, 90–100 m (Maurin, 1968a); same, less than 45 m, 40–60 m, 60–70 m, and 90–100 m (Maurin, 1968b). Tamzak (as Tamxat), 70–75 m (Maurin, 1968a), in 70 m (Maurin, 1968b).

Senegal: Mboro, 35–40 m (Maurin, 1968b).

Sierra Leone: No specific locality, 10–60 m (Longhurst, 1958). 07°20′N, 12°39′W, 30–34 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). 05°00′N, 05°28.5′W, 27 m, and 05°03′N, 05°25′W, 20–25 m (Forest and Guinot, 1966). Off Sassandra, off Fresco, off Grand-Lahou, and off Grand-Bassam, 15–50 m (Le Loeuff and Intès, 1968).

Ghana: 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m (Forest and Guinot, 1966). Off Accra and Takoradi, 10–43 m (Gauld, 1960).

Cameroon: No specific locality, 0–30 m (Crosnier, 1964).

Principe: Between Ponta da Mina and Ilhéu Santana, 10–12 m; off (Cais de) Santana, 11 m; between Ponta da Mina and Ponta Novo Destino, 6 m (Forest and Guinot, 1966).

São Tomé: Off Ponta Diogo Nunes, 4 m (Forest and Guinot, 1966).

Gabon: ?Crique Banjia (as Banya) (Pechüel-Loesche, 1882).

Congo: Off Pointe-Noire (Rossignol, 1957, 1962).

Angola: Porto Amboim, 42 m; Baía de Benguela, 5 m; Baía da Caota, Benguela, 8 m (Guinot and Ribeiro, 1962).

Lebour (1959:136) recorded larvae of this species from several localities in the Gulf of Guinea: Ivory Coast, 04°29′N, 06°41′W; Ghana, 05°29′N, 00°20′E and 05°37′N, 00°38′E; and Nigeria, off Lagos, off Bonny River, and 05°58′N, 04°38′E.

Subfamily ETHUSINAE Guinot, 1977

Genus *Ethusa* Roux, 1830

Ethusa P. Roux, 1830, pl. 18 [type-species: *Cancer mascarone* Herbst, 1785, by subsequent designation by Fowler, 1912: 590; gender: feminine; name 1622 on *Official List*].

?*Pridope* Nardo, 1847a:2 [nomen nudum; without included species].

Pridope Nardo, 1869:307 [type-species: *Pridope typica* Nardo, 1869, a subjective junior synonym of *Cancer mascarone* Herbst, 1785, by original designation by use of *typica* and monotypy; gender: feminine].

* *Ethusa rosacea* A. Milne Edwards and Bouvier, 1897

Ethusa rosacea.—Capart, 1951:28, fig. 5.—Monod, 1956:88.—Rossignol, 1957:126 [key].—Crosnier, 1967:323; 1969:530, figs. 20–22.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 74, 641–733 m, 1♀ ov (L).

Ivory Coast: Sta 41, 641–842 m, 2♂ (W). Sta 44, 403–586 m, hard, dark gray mud, 1♂ (L).

DESCRIPTION.—Capart, 1951:28.

Figure: Capart, 1951, fig. 5.

Male Pleopod: Crosnier, 1969, figs. 20–22 (Angola).

Color: Capart (1951:28) gave the following account of color pattern: "Couleur brun clair, sauf la face ventrale et les pinces, qui sont blanc-rose."

MEASUREMENTS.—Our male specimens have carapace lengths of 8 to 11 mm; the ovigerous female has a carapace length of 12 mm.

REMARKS.—Crosnier (1969) figured the first male pleopod of this species and commented on its distinctness from that of *E. rugulosa*, figured in Monod (1956:140). Some of the apparent differences between the first pleopods of these two species may be the result of their having been illustrated from slightly different angles.

BIOLOGY.—*Ethusa rosacea* is a deep-water species, occurring generally in depths below 100 m. One of the *Pillsbury* samples was taken on hard, dark gray mud in 403–586 m. Material of this species reported by Crosnier (1969) was taken on mud in depths between 545 and 602 m. Capart (1951) reported the species from brown muddy sand in 125 m; brown, black mud in 100 m; sandy mud in 290–390 and 500 m; and green sandy mud in 280–420 m.

Ovigerous females have been recorded in March, April, and June (Capart, 1951; Crosnier, 1969; *Pillsbury*).

DISTRIBUTION.—Eastern Atlantic, where it has been recorded from localities between the Canary Islands and Luanda, Angola, in depths between 100 and 1113 m (Monod, 1956). Since 1956 it has been recorded from the following localities.

Congo: Off Pointe-Noire, 05°04'S, 11°20'E, 500 m (Crosnier, 1967).

Angola: 08°35'S, 12°51'E, 545–555 m; 09°27'S, 12°38'E, 545–555 m; 11°55'S, 13°20'E, 545–552 m; and 11°57'S, 13°29'E, 595–602 m (all Crosnier, 1969).

It has not been recorded previously from the Ivory Coast or Liberia.

* *Ethusa rugulosa* A. Milne Edwards and Bouvier, 1897

Ethusa rugulosa.—Monod, 1956:89, figs. 99–101.—Longhurst, 1958:87.—Rossignol, 1962:114.—Forest and Guinot, 1966:49.—Crosnier, 1970:1215.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 49, 73–77 m, 1♀ (L). Sta 50, 128–192 m, 2♀ (W). Sta 60, 79–82 m, coral or rock, 1 juv (L).

Other Material: Ivory Coast: Off Grand-Lahou, 20 m, dredge, 31 Mar 1964, Guinean Trawling Survey, Tr 24, Sta 1, 1♂ with sacculinid (L).

DESCRIPTION.—Female: Carapace slightly, 1.03 to 1.08 times, broader than long, narrowing anteriorly, surface granular, lightly pubescent. Regions of carapace well marked. Branchial regions inflated. Front about half fronto-orbital width, V-shaped median sinus deeper and broader than U-shaped antennular sinuses. Inner spines of front similar to and slightly overreaching outer spines. Anterolateral spines strong, extending to base of outer frontal spines in smaller female, to apex of outer frontal spines in larger female. Eyes stout, cornea black, broader than stalk. Merus of third maxillipeds less than half as long as and narrower than ischium.

Chelipeds slender, subequal. Fingers slightly longer than palm, cutting edges crenulate, with slight proximal gape, apices crossed when closed. Palm slender.

Anterior 2 pairs of walking legs elongate, second pair longest, dactyli long, slender, curved, compressed, ridged, those of second pair of walking legs as long as or longer than carapace. Third and fourth walking legs much shorter than first and second, dactyli very short, stout.

Abdomen of 7 somites in female.

Figures: Monod, 1956, figs. 99–101.

Male Pleopods: Monod, 1956, figs. 100, 101 (Senegal).

MEASUREMENTS.—Our specimens have carapace lengths of 4 to 8.5 mm.

BIOLOGY.—Little information is available on this species, which lives in moderate depths, between 20 and 275 m; 50% of the records are from depths greater than 100 m. Recorded bottom types on which it has been found include sand and shells, in 73–80 m (Forest and Guinot, 1966); and shelly mud in 180 m (Longhurst, 1958). One of the *Pillsbury* specimens was taken on bottom with coral or rock.

Ovigerous females have been collected in July (Monod, 1956).

DISTRIBUTION.—Eastern Atlantic, where until 1956 it had been recorded from the Cape Verde Islands (the type-locality) and off the coast of Senegal, in depths between 96 and 275 m (Monod, 1956). Since 1956 it has been recorded from the following localities.

Liberia: 05°21.5'N, 09°54.5'W, 73–80 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 180 m (Longhurst, 1958).

Cabinda: No specific locality, 55–60 m (Rossignol, 1962).

Angola: 16°41'S, 11°21'E, 162 m (Crosnier, 1970).

This species has not been recorded previously from the Ivory Coast although that is well within its known range.

* *Ethusa vossi*, new species

FIGURES 5, 6*a–c*, 7*a,b*

Ethusa mascarone.—Miers, 1881a:270 [part].—Rathbun, 1900a:299 [listed].—Doflein, 1904:29.—Balss, 1921:48.—Monod, 1956:85, 632, figs. 90–98.—Longhurst, 1958:87.—Gauld, 1960:68.—Guinot and Ribeiro, 1962:24.—Forest and Guinot, 1966:49. [Not *Ethusa mascarone* (Herbst, 1785).]

?*Ethusa mascarone.*—A. Milne Edwards and Bouvier, 1900:22 [part; not Canary Islands.].—Monod, 1933b:488.—Türkay, 1975a:71 [listed], 72. [Not *Ethusa mascarone* (Herbst, 1785).]

Ethusa.—Voss, 1966:19.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 4♂ (L). Sta 70, 33 m, branched Foraminifera, 1♀ (W).

Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*,

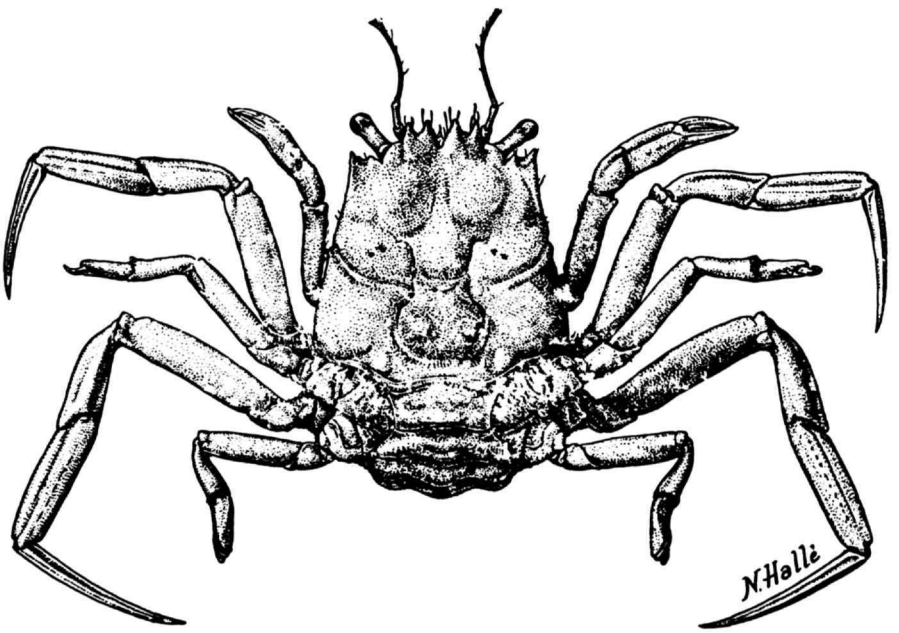

FIGURE 5.—*Ethusa vossi*, new species, dorsal view (from Monod, 1956, fig. 90).

5♂, 17♀ (L). Sta 47, 37 m, bottom with *Jullienella*, 1♂, 1♀ ov (W).

Ghana: Sta 22, 51 m, rough bottom, 1♀ ov (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂, 4♀ (1 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 10♂ 7♀ (1 ov) (W). Sta 26, 27 m, shell bottom (scallops), 1♀ (L.)

Nigeria: Sta 248, 33 m, 4♂, 1♀ (L) (1♂ is holotype).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 3♂, 1♀ (L).

DESCRIPTION.—Carapace (Figure 5) longer than broad, narrowing anteriorly, surface granular, lightly pubescent. Regions of carapace well marked but surface moderately even. Branchial region slightly inflated. Front less than half fronto-orbital width, median sinus deeper and broader than antennular sinuses. Inner spines of front slightly slenderer than outer, all 4 frontal spines extending about to same level. Orbital sinuses deep, margins tuberculate, posterior margin of orbit a convex lobe. Anterolateral spines not extending to base of frontal spines. Eye long, cornea broader than stalk, darkly pigmented. Merus of third maxilliped slightly more than half as long as and narrower than ischium, with angular antero-internal projection; both segments with 2 shallow, longitudinal grooves.

Chelipeds of female subequal, small, slender, chela not stouter than carpus, with 2 shallow grooves on outer margin; fingers slightly longer than palm, with narrow proximal gape, tips of fingers crossed. Chelipeds of male (Figure 6*c*) very unequal, left similar to that of female, right much larger, with stout, swollen chela; propodus about 2½ times as high as that of left cheliped; finger shorter than palm, movable finger with large basal tooth; fingers of chela with slight gape, tips of fingers crossing when closed.

First 2 pairs of walking legs more than twice as long as minor cheliped in both sexes; propodus shorter than merus, faintly grooved longitudinally; dactylus longer than propodus, curved, strongly carinate. Third and fourth pair of walking legs short, not half as long as first and second legs, fourth longer than third, dactyl short, strongly curved. Pereiopods finely granulate, mostly naked, light pubescence present on carpus

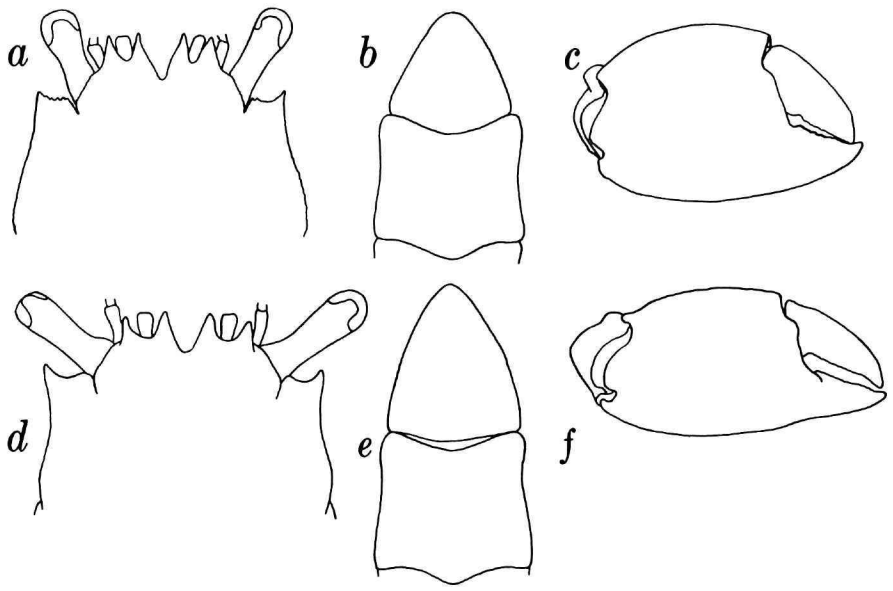

FIGURE 6.—*Ethusa vossi*, new species, male paratype, cl 9 mm, *Pillsbury* Sta 248: *a*, dorsal view; *b*, terminal two somites of abdomen; *c*, palm of chela. *Ethusa mascarone* (Herbst), male, cl 10 mm, Naples: *d*, dorsal view; *e*, terminal two somites of abdomen; *f*, palm of chela.

and merus of third and fourth legs. Terminal somite of male abdomen shorter than penultimate (Figure 6*b*).

Male Pleopod: Illustrated in Figure 7*a,b*.

Color: Our specimens had the legs banded with red or orange and white. In males the enlarged right cheliped is white, with the tips of the fingers brown. Monod (1956) recorded one specimen with irregular white spots on the branchial regions.

MEASUREMENTS.—Our specimens have carapace lengths of 4 to 11 mm. The ovigerous females have carapace lengths of 10 mm.

REMARKS.—*Ethusa vossi* closely resembles *E. mascarone* (Herbst) from the Mediterranean and adjacent Atlantic; this new species had been identified with *E. mascarone* in the past, but it differs in several important respects. In *E. vossi* the terminal somite of the male abdomen is shorter than the penultimate somite (Figure 6*b*), whereas in *E. mascarone* the terminal somite is the longer (Figure 6*e*). The male first pleopod of *E. vossi* (Figure 7*a,b*) has an enlarged apex with a subapical patch of spinules; in *E. mascarone* the male pleopod tapers evenly to its apex (Figure 7*c,d*). The right chela of the male is inflated in both species, but in *E. vossi* the longitudinal grooves on the outer face of the chela become more prominent with increasing size; in *E. mascarone* the upper groove is shallower and the lower groove almost disappears in larger specimens. In both sexes the posterior margin of

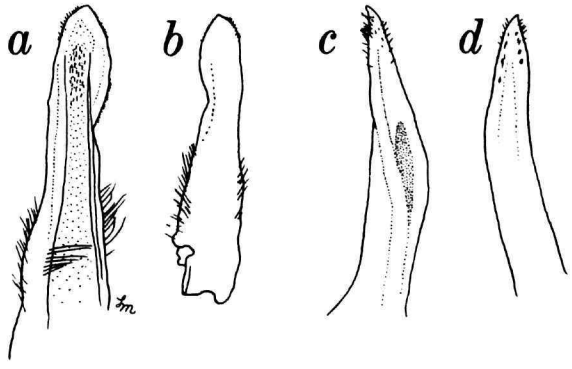

FIGURE 7.—First pleopods: *a,b*, *Ethusa vossi*, new species, holotype, male, cl 8 mm, *Pillsbury* Sta 248; *c,d*, *Ethusa mascarone* (Herbst), male, cl 10 mm, Naples.

the orbit is smoother in *E. mascarone* (Figure 6*d*) than in *E. vossi* (Figure 6*a*), and females of the two species can be distinguished by this feature.

Miers (1881a:270), in identifying material of this new species from Gorée, Senegal, with *E. mascarone*, noted that "the larger chelipede in the male has the palm deeper and externally somewhat more convex than the male from the Mediterranean in the [British] Museum collection."

In addition to the tropical West African records cited below (and assigned to *E. vossi*), *E. mascarone* has been recorded from the following localities outside of the Mediterranean: Canary Islands (A. Milne Edwards and Bouvier, 1900; Miers, 1881a); Cape Verde Islands (A. Milne Edwards and Bouvier, 1900); and Cabo Blanco, Spanish Sahara (Cap Blanc, Mauritania) (Monod, 1933b; Türkay, 1975a). These materials will have to be reexamined to determine whether *E. mascarone* or *E. vossi* is involved.

TYPE-LOCALITY.—Gulf of Guinea, off Nigeria, 04°03′N, 05°41′E to 04°07′N, 05°40′E, *Pillsbury* Sta 248.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31538), a male, cl 8 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. The other specimens are paratypes; they have been divided between the Rijksmuseum van Natuurlijke Historie in Leiden and the National Museum of Natural History, Smithsonian Institution, Washington.

ETYMOLOGY.—It is a pleasure to name this species for Gilbert L. Voss of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, Florida, who organized and led the *Pillsbury* expeditions to West Africa in 1964 and 1965.

BIOLOGY.—This species has been recorded from depths between 6 and 96 m, but 80% of the records are from depths of less than 45 m, and somewhat more than half from between 30 and 45 m. The bottoms on which the species has been found have been described as mud with shells (Miers, 1881a); coarse shelly sand, bottom with *Arca* and *Pyura* (Sourie, 1954b); partly shelly and partly muddy and shelly sand (Longhurst, 1958); mud and shells, mud, calcareous algae and shells, algae and calcareous algae, gravel, shells and Foraminifera, and mud, calcareous algae and shells (all Forest and Guinot, 1966). The *Pillsbury* specimens were taken on bottoms with *Jullienella* (Sta 46, 47) (Voss, 1966), broken shell (Sta 68), and branched Foraminifera (Sta 70). It seems, therefore, that the species prefers a muddy bottom on which solid particles (shells, Foraminifera, etc.) occur.

Ovigerous females have been recorded in January, February, April, May, August, and September (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Off tropical West Africa, where it has been recorded from localities between Senegal and Angola; there is one record from Mauritania, which requires corroboration. Records in the literature include:

Mauritania: Cap Blanc (?) (Monod, 1933b).

Senegal: S of Mbao (Monod, 1956). Near Dakar, 14°38.5′-14°41′N, 17°20.5′-17°23.5′W, 22–34 m (Monod, 1956). Anse de Hann (as Baie de Hann) (Monod, 1956). Between Gorée and Thiaroye-sur-Mer, ca. 15 m (Monod, 1956). Near Gorée, 25 m (Balss, 1921); same, 17–96 m (Monod, 1956). Baie de Gorée, 18–28 m (Miers, 1881a). Near Banc du Séminole, Baie de Gorée, 38 m (Monod, 1956). Near Île de la Madeleine, 35 and 40 m (Monod, 1956).

Guinea: 09°40′N, 14°05′W, 18 m (Forest and Guinot, 1966). Near Conakry, 09°N, 13°50′W, 30 m; 09°22′N, 13°-37′W, 10 m; 3 mi NW of Tamara, 12 m; between Tamara and Île de Corail, 10 m (all Monod, 1956).

Sierra Leone: No specific locality, 44 m (Monod, 1956); 6–44 m (Longhurst, 1958).

Ivory Coast: 05°07′N, 04°32′W to 05°07′N, 04°36′W, 43–38 m (Voss, 1966).

Ghana: Off Accra, 16–44 m (Monod, 1956; Gauld, 1960). 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m, and 04°36.5′N, 01°31′W, 50 m (Forest and Guinot, 1966).

Principe: 01°37′N, 07°22′E, 30 m; 01°38′25″N, 07°-22′05″E, 31 m; and 01°43′10″N, 07°28′20″E, 73 m (Forest and Guinot, 1966).

São Tomé: 00°25′40″N, 06°40′10″E, 50 m (Forest and Guinot, 1966).

Cabinda: No specific locality, 38–39 m (Guinot and Ribeiro, 1962).

Angola: Off the mouth of the Congo River, 06°18′S, 12°02′E, 44 m (Doflein, 1904).

Genus *Ethusina* Smith, 1884

Ethusina Smith, 1884:349 [type-species: *Ethusina abyssicola* Smith, 1884, by monotypy; gender: feminine].

Key to Eastern Atlantic Species of *Ethusina*

1. Outer orbital spine very small, directed laterally, not overreaching eye ..... ***E. alba***
   Outer orbital spine large, directed anteriorly, overreaching eye 2
2. Outer orbital spine extending to base of inner orbital spine . ***E. talismani***
   Outer orbital spine extending to or beyond apex of inner orbital spine ... . ***E. beninia***, new species

Ethusina alba (Filhol, 1884)

FIGURES 8, 9*d*, 10

Ethusa alba Filhol, 1884:199 [23 February; nomen nudum], 230 [8 March; nomen nudum], 232 [8 March; available name].—Anonymous, 1884:7 [20 April].—Filhol, 1885b: 129 [1 December].

Ethusina abyssicola.—Bouvier, 1898:66 [listed].—A. Milne Edwards and Bouvier, 1899:18;·1900:29, pl. 1: fig. 6 [color; outline based on *E. abyssicola* Smith from Smith, 1884: pl. 2: fig. 1].—Bouvier, 1922:53, pl. 2: fig. 1 [color].—Monod, 1956:85[references only]. [Not *Ethusina abyssicola* Smith, 1884.]

Ethusa abyssicola.—Bouvier, 1922:91 [not *Ethusina abyssicola* Smith, 1884].

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: North Atlantic: Azores to France, 42°15′N, 23°37′W (of Paris, = 21°17′W of Greenwich), 3975 m, to 42°19′N, 23°36′W (of Paris, = 21°16′W of Greenwich), 4060 m, soft white mud, *Talisman* Sta 133, 134, 24 Aug 1883, 1♂, (holotype) 1♀ (L,W).

DESCRIPTION.—Carapace (Figures 8*a*,10) longer than broad in male (width = 0.95 × length), broader than long in female (width = 1.03 × length), noticeably narrowing anteriorly. Carapace coarsely granular, at most lightly pubescent dorsally, few longer hairs present laterally. Cervical and cardiobranchial grooves distinct. Branchial regions moderately inflated. Front with 4 upturned spines, submedians broad, blunt, laterals narrower, sharper, falling short of submedians in male (Figure 8*a*), overreaching submedians in female (Figure 8*e*). Front less than half greatest width of carapace. Outer orbital spine small, triangular, scarcely overreaching eye, not extending to front. Eyes short, stout, fixed, with terminal black cornea, narrower than stalk, visible in dorsal view. Basal segment of antennule inflated, surface irregular, not tuberculate. Basal article of antenna short, not extending to front. Antennal flagellum elongate, extending to posterior third of carapace. Ventral surface of body less granular but more pubescent than dorsal.

Outer maxillipeds slender, merus narrower than, but more than half as long as, ischium.

Chelipeds similar, equal, small, extending with merus to cornea in both sexes; propodus slightly larger in male than in female but not markedly inflated. Fingers (Figure 8*b*) longer than palm, slender, flattened, with shallow longitudinal groove, cutting edges crenulate.

Second and third pereiopods similar, third longer, more than twice as long as chela, about 2½ times as long as carapace. On each leg dactylus longer than propodus but shorter than car-

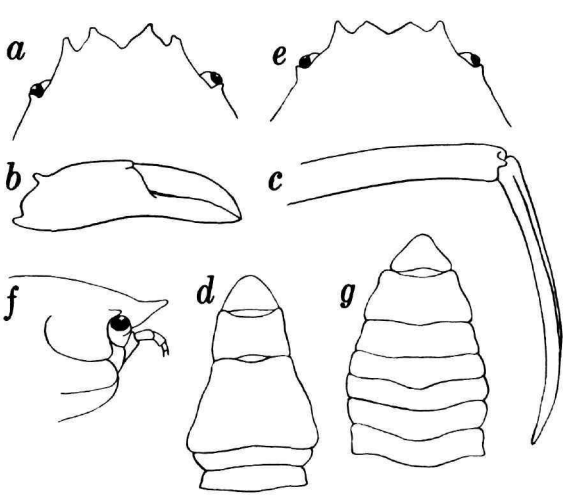

FIGURE 8.—*Ethusina alba* (Filhol). Male, cl 10.4 mm, North Atlantic: *a*, front, dorsal view; *b*, chela; *c*, propodus and dactylus of third pereiopod, posterior view; *d*, abdomen. Female, cl 9.3 mm, North Atlantic: *e*, front, dorsal view; *f*, front, lateral view; *g*, abdomen.

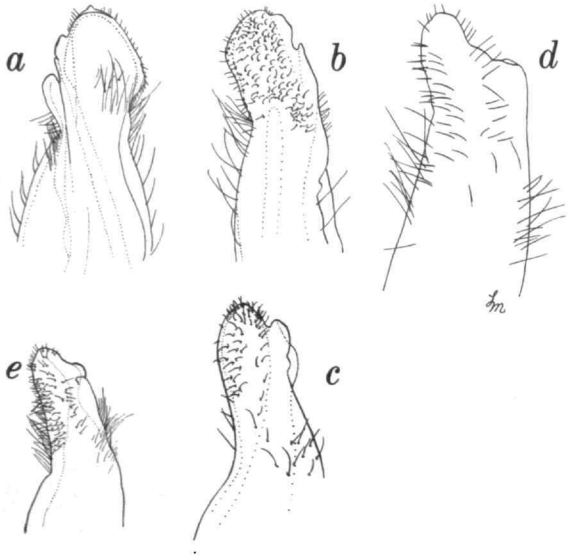

FIGURE 9.—Male pleopods: *a*, *Ethusina beninia*, new species, holotype, cl 14.0 mm, *Pillsbury* Sta 18; *b*, *Ethusina robusta* (Miers), cl 13.9 mm, Galapagos Islands; *c*, *Ethusina talismani* A. Milne Edwards and Bouvier, syntype, carapace broken, Morocco; *d*, *Ethusina alba* (Filhol), cl 10.4 mm, North Atlantic; *e*, *Ethusina abyssicola* Smith, cl 11.9 mm, Massachusetts.

apace, subequal to or slightly shorter than merus, flattened dorsoventrally, grooved longitudinally, spatulate, slightly twisted, apex corneous; dactyli of both legs shorter than carapace in our material. Fourth and fifth pereiopods dissimilar, much shorter than second and third, both overreaching merus of third by length of dactylus; dactyli of last 2 legs very short, curved, apices corneous, with row of spinules on ventral margin; ischium of fifth pereiopod longer than that of fourth. Pereiopods with light surface pubescence, especially on fourth and fifth, latter also with some longer hairs.

Male abdomen with 5 somites, that of female with 7 (Figure 8*d*,*g*).

Male Pleopod: Illustrated in Figure 9*d*.

Color: "Céphalothorax bleuâtre sur le vivant, avec une légère teinte violacée; pattes et abdomen d'un blanc jaunâtre, avec les doigts de couleur rose" (A. Milne Edwards and Bouvier, 1900:30). Bouvier (1922:53) noted that material from the Cape Verde Islands was "jaune d'ocre pâle avec les doigts et les antennules roses" and that in material collected earlier by the *Talisman* the carapace was "uniformément bleuâtre." The color of this species has been illustrated by A. Milne Edwards and Bouvier (1900, pl. 1: fig. 6) and Bouvier (1922, pl. 2: fig. 1).

MEASUREMENTS.—The single male examined has a carapace length of 10.4 mm, a carapace width of 9.9 mm; the only female examined measures 9.3 × 9.6 mm.

REMARKS.—The present species was identified by A. Milne Edwards and Bouvier (1900:29) with *Ethusina abyssicola* Smith. Originally, however, A. Milne Edwards must have thought that the species was new and gave it provisionally the manuscript name *Ethusa alba*. Filhol (1884:199, 230, 232), in a popular article on the *Travailleur* and *Talisman* expeditions, introduced, obviously unintentionally, the name *Ethusa alba* into the literature; A. Milne Edwards was cited as the author. In that paper, Filhol used the name on three occasions; in two of these (pp. 199, 230) the name was not accompanied by sufficient data to make it an available name. On page 232, however, Filhol remarked that *Ethusa alba* differed from other species of the genus by the presence of eyes ("dans un même genre l'on trouve des espèces aveugles et d'autres qui ne le sont pas, ainsi l'*Ethusa granulata* [= *Cymonomus granulatus*] qui vit dans les mers du Nord entre 200 et 1300 mètres



FIGURE 10.—*Ethusina alba* (Filhol) (from Bouvier, 1922, pl. 1: fig. 1).

est aveugle, alors que l'*Ethusa alba* que nous avons pris dans l'Océan par 5000 mètres ne l'est pas"). Hereby the name *Ethusa alba* becomes available as from 8 March 1884 and Filhol has to be cited as the author. Since the publication of Filhol's paper, the name *Ethusa alba* has only been mentioned a few times in the literature. First in an anonymous guide to the "exposition sous-marine du Travailleur et du Talisman" issued for the "visiteurs de l'Exposition organisée sous la direction de M. Alph. Milne-Edwards, président de la Commission des dragages". This guide was a "publication du journal *La Nature*" and consists of an abstract of Filhol's 1884 paper, probably made by Gaston Tissandier, chief editor of the journal. The dates of the exposition are given on page 16 of the guide as follows:

> Cette exposition des collections du *Travailleur* et du *Talisman* a été ouverte le 26 janvier 1884 et fermée le 16 mars. On l'a ouverte de nouveau le 7 avril, à l'occasion de la réunion des sociétés savantes à la Sorbonne, et elle sera fermée le 20 du même mois.

The fact that the last verb is written in the future tense shows that the catalog was written and probably published before 20 April 1884. The remark on *Ethusa alba* in the guide is verbally the same as the one made by Filhol (1884:199), viz., "les Éthuses dont une espèce nouvelle, l'*Ethusa alba*, a été prise à 5000 mètres de profondeur." Filhol (1885b:129) in his book *La vie au fonds des mers*, does not add anything new to the knowledge of the species. We have been unable to find any later reference to *Ethusa alba* in the literature, probably because A. Milne Edwards and Bouvier (1899) identified their specimens with *Ethusina abyssicola* S. I. Smith and used that name ever since.

Apart from the fact that the species has eyes, the only information on it provided by Filhol is that it was taken by the *Talisman* at 5000 m (Filhol, 1884:199, 232; 1885b:129) or "entre quatre et cinq mille mètres" (Filhol, 1884:230). A. Milne Edwards and Bouvier (1900) in their account of the *Talisman* and *Travailleur* Brachyura, listed the following Ethusinae collected by the *Talisman*: *Ethusa mascarone* (Herbst) in 38 and 60 m (Sta 56); *E. rugulosa* A. Milne Edwards and Bouvier in 150–275 m (Sta 103); *E. rosacea* A. Milne Edwards and Bouvier in 930 and 1013–1113 m (Stas 85, 87); *Ethusina abyssicola* S. I. Smith in 2995, 3655, 3975, and 4060 m (Stas 102, 131, 133, 134); and *E. talismani* A. Milne Edwards and Bouvier in 2075, 2083, 2115, 2212, and 2235 m (Stas 40, 41, 43, 44, 130). Of *Ethusina abyssicola* they remarked (1900:30): "C'est, de tous les Crabes, le plus abyssal." Although none of the crabs of the *Talisman* expedition was collected at 5000 m, as stated for *Ethusa alba*, *Ethusina abyssicola* is the only species then taken in a depth of more than 4000 m and would fit Filhol's statement that *Ethusa alba* was taken "entre quatre et cinq mille mètres." The only *Talisman* station of 5000 m depth is no. 137 of 27 August 1883 (4975–5005 m), but no crabs are recorded from it. Filhol's statement that *Ethusa alba* was taken at 5000 m either is an exaggeration or an error (he may have confused stations 134 and 137), or a careless abbreviation of 4000–5000 m. Confusion in the station numbers of the *Talisman* expedition occurred very frequently (the expedition is rather notorious because of it). So de Folin (1887:332) when dealing with station 136 (26 August 1883, depth 4255 m) mentioned from it "des *Ethuses* différentes de celles déjà connues," although A. Milne Edwards and Bouvier (1900) do not mention any Ethusinae from that station. However this may be, there can be little doubt that the present species at first was thought by A. Milne Edwards to be a new species, *Ethusa alba*, and that he later changed his views and considered it identical with S. I. Smith's *Ethusina abyssicola*. Filhol's use of the name *Ethusa alba* in print made that name available and it has to be used, now that the specific distinctness of the *Talisman* specimens from S. I. Smith's *Ethusina abyssicola* has been demonstrated.

In identifying material of this species collected by the *Talisman* at several different localities, A. Milne Edwards and Bouvier (1900:29) noted: "Nos spécimens ressemblent complètement à ceux qu'a décrits ou figurés S.-I. Smith. Nous ferons remarquer, toutefois, que les doigts de leurs

grandes pattes ambulatoires sont manifestement tordus, que leurs saillies rostrales sont tantôt obtuses, tantôt acuminées, enfin que leurs épines susorbitaires ont une longueur extrêmement variable. L'aire cardiaque est toujours assez distincte et les dents latérales du 3° segment abdominal sont peu saillantes."

Our material of *E. alba* differs from *E. abyssicola* in having much shorter frontal spines with their apices only slightly reflected dorsally. In *E. abyssicola* the frontal spines are much more prominent and their apices, especially of the outer pair, are strongly reflected dorsally, being situated at an angle of almost 45° from the longitudinal axis of the carapace. The most important difference between the two species is in the structure of the male pleopod, which in *E. alba* (Figure 9*d*) is slenderer, not sharply bent basally, with a distinct, corneous angled prominence apically; the apex of the pleopod in *E. abyssicola* is rounded or flattened distally (Figure 9*e*).

As in *E. abyssicola*, the female of *E. alba* is comparatively broader and has much shorter frontal spines than the male.

The figure of this species given by A. Milne Edwards and Bouvier (1900, pl. 1: fig. 6) is based on an outline of *E. abyssicola* published by Smith (1884).

Coordinates for *Talisman* station 133 given by A. Milne Edwards and Bouvier (1900:30), 42°-45'N, 23°37'W of Paris (= 21°17'W of Greenwich), may be in error, for that station was made on the same day as station 134 and the latitude for station 133 is given as 42°15'N in a list of *Talisman* stations prepared by the Paris Museum. These stations were so close to each other that the material from them may have been combined. The male specimen from Leiden has the following label data: 42°19'N, 23°37'W [Paris], 4060 m, *Talisman* Sta. 134 [(it should read longitude 23°36'W (Paris)], whereas that from Washington bears the coordinates 42°15'N, 23°37'W (Paris), 3975–4060 m; both sets of data were originally based on longitude of Paris and are corrected to Greenwich (see "Distribution").

BIOLOGY.—*Ethusina alba*, like *E. abyssicola*, is a true abyssal species, living in depths exceeding 1000 m. It has been collected on white mud with Foraminifera in 4261 m (A. Milne Edwards and Bouvier, 1899); soft white mud in 2995, 3975 and 4060 m, and gray mud in 3655 m (A. Milne Edwards and Bouvier, 1900); and on muddy volcanic sand with Foraminifera in 3890 m (Bouvier, 1922).

Ovigerous females have not been recorded.

DISTRIBUTION.—Eastern Atlantic, from the North Atlantic N of the Azores to the Cape Verde Islands, in depths between 2995 and 4261 m. Records in the literature include:

North Atlantic between the Azores and France: 42°15'N, 23°37'W of Paris (= 21°17'W of Greenwich), 3975 m, and 42°19'N, 23°37'W of Paris (= 21°17'W of Greenwich), 4060 m (A. Milne Edwards and Bouvier, 1900).

Azores: 38°38'N, 27°26'W of Paris (= 25°06'W of Greenwich), 2995 m (A. Milne Edwards and Bouvier, 1900). 36°55'N, 24°43'W of Paris (= 22°23'W of Greenwich), 4261 m (A. Milne Edwards and Bouvier, 1899).

Cape Verde Islands: 16°12'N, 24°43'45''W, 3890 m (Bouvier, 1922). 15°48'N, 22°43'W of Paris (= 20°23'W of Greenwich), 3655 m (A. Milne Edwards and Bouvier, 1900).

* *Ethusina beninia*, new species

FIGURES 9*a*, 11

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 18, 3047–3129 m, soft, dark gray clay, 1♂ (holotype), 1♀ (L). Sta 34, 1948–1984 m, mud, 1♀ (W).

DESCRIPTION.—Carapace (Figure 11*a*) slightly broader than long (1.05 times broader in male, 1.01 to 1.05 times in females), noticeably narrowing anteriorly. Surface finely granular, lightly pubescent. Cervical and cardiobranchial grooves distinct, latter deeper, better defined. Branchial regions inflated. Intestinal region with pair of rounded prominences. Front (Figure 11*a–d*) with 4 upturned spines, inner pair broader and shorter than outer, with sinus between inner spines broader and deeper than that between inner and outer spines. Inner frontal spines shorter, blunter in female than in male. Front less than half greatest width of carapace. Outer orbital spine strongly developed, extending to or beyond base of frontal sinus, apex curved upward, directed

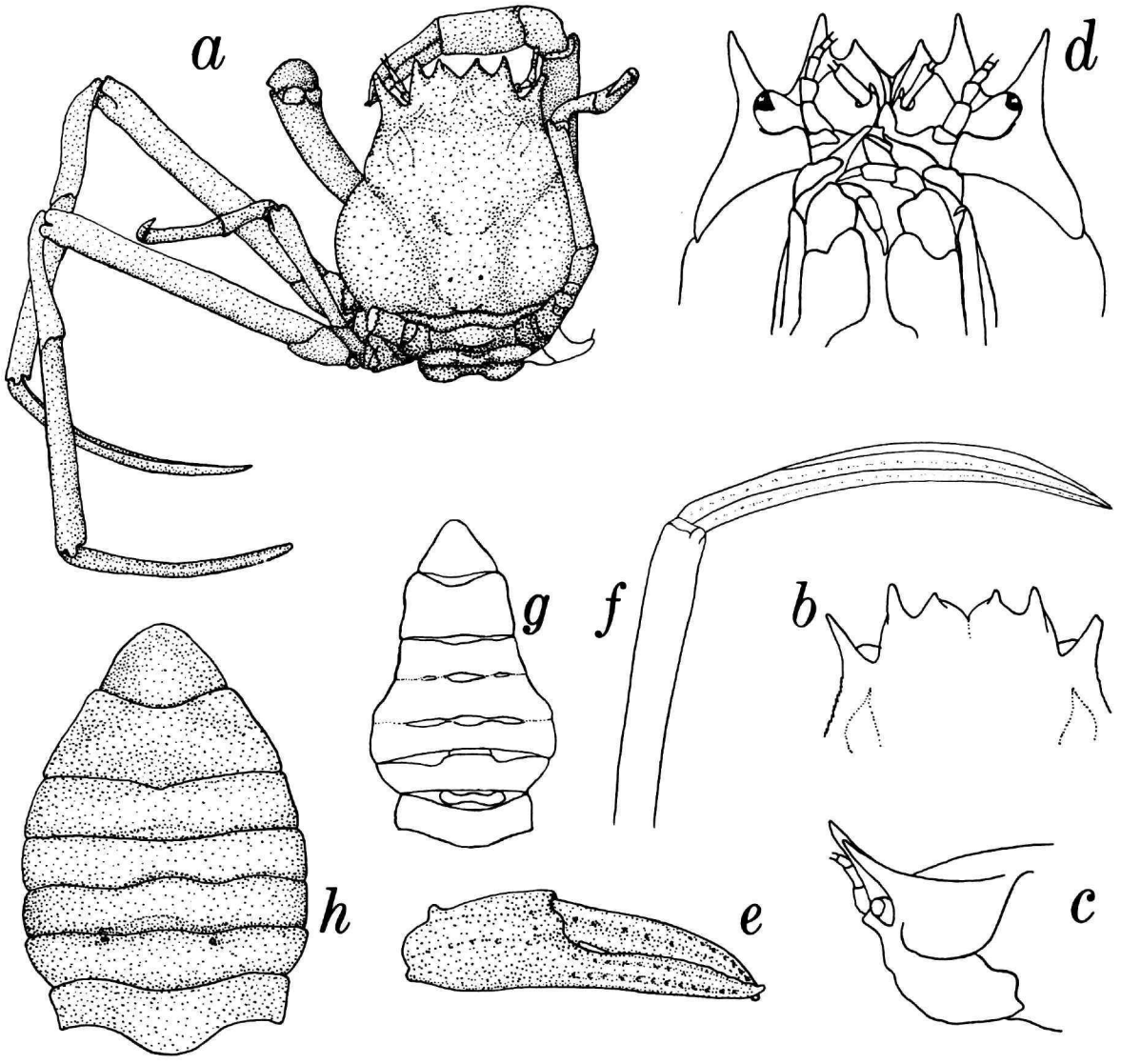

FIGURE 11.—*Ethusina beninia*, new species. Holotype, male, cl 14.0 mm, *Pillsbury* Sta 18: *a*, dorsal view; *b*, front, dorsal view; *c*, front, lateral view; *g*, abdomen. Paratype, female, cl 16.1 mm, *Pillsbury* Sta 18: *d*, front, ventral view; *e*, chela; *f*, dactylus of third pereiopod; *h*, abdomen.

anterolaterally, broader and shorter in female than in male. Eyes (Figure 11*c,d*) short, stout, fixed, with terminal black cornea; eyes tapering distally, scarcely or not at all visible in dorsal view. Basal segment of antennule inflated, with 1 or 2 anterior tubercles. Basal article of antenna short, not extending to front. Antennal flagellum elongate, extending to posterior fourth of carapace. Ventral surface of body more granular than dorsal.

Outer maxillipeds slender, merus narrower than, but more than half as long as, ischium.

Chelipeds similar, equal, small, slender, with propodus slightly stouter than carpus. Palm 1.44

times longer than high in male, 1.33–1.34 times in female. Left chela broken on only intact male, meri of chelipeds on that male subsimilar in size and shape, intact cheliped slightly larger than those of female (Figure 11*e*). Fingers slender, flattened, with shallow, longitudinal groove, cutting edges crenulate, not toothed. Carpus finely tuberculate, unarmed. Merus slender, longer than palm.

Second and third pereiopods similar, third slightly larger, more than twice as long as chela, more than three times as long as carapace. On each leg dactylus longer than propodus, subequal to or slightly shorter than merus, flattened dorsoventrally, grooved longitudinally; dactyli with anterior margin concave, posterior (flexor) convex, converging distally on sharp, corneous point. Dactylus of second leg as long as carapace. Fourth and fifth pereiopods dissimilar, both short, not extending beyond merus of third pereiopod; dactyli very short, curved, apices corneous, flexor margin with row of spinules. Ischium of fifth pereiopod almost twice as long as that of fourth. Pereiopods covered with light pubescence, especially fourth and fifth, latter also with some longer hairs.

Abdomen with 7 somites in female, 5 in male.

Male Pleopod: Illustrated in Figure 9*a*.

MEASUREMENTS.—The single male specimen examined has a carapace length of 14.0 mm, a carapace width of 14.8 mm. The two females measure 16.1 × 16.9 mm and 15.9 × 16.1 mm.

REMARKS.—*Ethusina beninia* most closely resembles *E. robusta* Miers, 1886, originally described from material collected in the Arafura Sea in 800 fm (1464 m) and from the Banda Sea in 1425 fm (2608 m) and subsequently recorded from the eastern Pacific by Garth and Haig (1971) and possibly by Faxon (1895) and Rathbun (1937) as *Ethusina gracilipes*. The eastern Pacific population of *E. robusta* differs from that from the Indo-Malayan area in having much better developed frontal spines on the carapace, which are inclined on a different plane; these and other differences were noted by Garth and Haig (1971:6.9). The eastern Pacific population may well prove to be a distinct species.

Ethusina beninia differs from *E. robusta* sensu stricto, as figured by Miers (1886, pl. 19: fig. 2) in having shorter submedian spines on the carapace which do not overreach the outer frontal (or inner orbital spines), in having slenderer outer orbital spines which are directed more anteriorly than in *E. robusta*, in having two distinct submedian prominences on the cardiac region of the carapace, and in having the basal antennular segment distinctly tuberculate. This new species differs from the eastern Pacific population of *E. robusta* in having shorter, blunter, frontal spines and heavier outer orbital spines which are directed more anteriorly; also, in the American population of *E. robusta*, the basal antennular article has been described as being armed with a small distal spine or tubercle (Rathbun, 1937:94).

Male pleopods are illustrated here for *E. beninia* (Figure 9*a*), *E. robusta* from the Galapagos Islands (Figure 9*b*), and a syntype of *E. talismani* from off Morocco (Figure 9*c*). The ornamentation of the terminal part of the male pleopod of *E. beninia* is less complex than those of *E. robusta* or *E. talismani*, as illustrated.

In the new species the outer orbital spines in both sexes are larger than any of the frontal spines, and, in both sexes, they originate closer to the front and extend almost to the level of the frontal spines. The regions of the carapace also are better defined in *E. beninia* than in *E. talismani*.

Ethusina beninia differs from *E. talismani* (as shown in A. Milne Edwards and Bouvier, 1900, pl. 3: fig. 6 (labeled as a female but same specimen figured as male on pl. 10, in color, and pl. 10: fig. 9 (male)) in having much larger frontal spines.

A. Milne Edwards and Bouvier (1900:31) may have included two species in their account of *E. talismani*, because it is difficult to believe that the illustrated male and female actually represent the same species. A female from the *Talisman* collection taken at 30°01′N, 14°06′W of Paris (= 11° 46′W of Greenwich) in 2115 m was illustrated by them on plate 10: figure 10, and a male from

30°03′N, 14°02′W of Paris (= 11°42′W of Greenwich), in 2212 m, was shown on plate 10: figure 9. Apparently the same male was figured in color on plate 3: figure 6, although according to the text a female was figured there (only one female was reported in the collection). According to the figure and to the account given in the text (A. Milne Edwards and Bouvier, 1900:31), "les femelles se distinguent des mâles par leur carapace plus large, par leurs pointes frontales plus courtes et plus obtuses . . . ," the female differed from the males in having the frontal spines shorter and broader, the lateral spines originating more anteriorly and extending further forward, and the eyes were not visible in dorsal view. In these features the female more closely resembles *E. beninia*, differing mainly in having shorter exorbital spines which are directed anteriorly. The female reported by A. Milne Edwards and Bouvier and *E. beninia* both differ from males of *E. talismani* in having eyes that are hidden in dorsal view and in having the exorbital spines originating nearer the anterior margin of the carapace. There is no indication of dimorphism to such an extent in our material of *E. beninia*, so it seems likely that the female from the *Talisman* collection may represent a distinct species.

TYPE-LOCALITY.—Bight of Benin, off Ghana, 05°01′N, 00°12′E, in 3047–3129 m.

DISPOSITION OF TYPES.—The male holotype (Crust. D. 31781) and female paratype from *Pillsbury* Sta 18 are in the Rijksmuseum van Natuurlijke Historie, Leiden. A female paratype from *Pillsbury* Sta 34 is in the National Museum of Natural History, Smithsonian Institution, Washington.

ETYMOLOGY.—The specific name, *beninia*, alludes to its occurrence in the Bight of Benin.

BIOLOGY.—This is a deep water species occurring between 1984 and 3047 m (the two stations at which it was collected being from 1948–1984 m and 3047–3129 m). The bottom where the species was obtained in 3047–3129 m was soft, dark gray clay.

DISTRIBUTION.—This species is known only from the Bight of Benin, off Ghana, at 05°01′N, 00°12′E and 03°53′N, 02°33′W.

Family CALAPPIDAE de Haan, 1833

CALAPPIDEA de Haan, 1833:ix [corrected to Calappidae by White, 1847a:44; name 371 on *Official List*].
MATUTOIDEA de Haan, 1835:36.
ORITHYINAE Dana, 1852b:391.

EASTERN ATLANTIC GENERA.—Four, *Acanthocarpus*, *Calappa*, *Cycloes*, and *Matuta*, all of which have representatives in tropical waters.

EASTERN ATLANTIC SPECIES.—Seven, all of which were recorded by Monod (1956), as follows:

Name in Monod	Current Name
Matuta michaelseni	*Matuta michaelseni*
[*Osachila stimpsoni* (Calappidae)]	[*Sakaila africana*, *new genus, new species** (Parthenopidae)]
Calappa gallus	*Calappa gallus*
Calappa peli	*Calappa pelii**
Calappa granulata	*Calappa granulata*
Calappa rubroguttata	*Calappa rubroguttata**
Acanthocarpus brevispinis	*Acanthocarpus brevispinis**
Cryptosoma cristatum	*Cycloes cristata*

As noted above, we have placed West African material identified with *Osachila stimpsonii* in *Sakaila africana*, new genus, new species, which has been assigned to the Subfamily Aethrinae, Family Parthenopidae (p. 322).

We believe that one other species reported in the West African fauna by Monod (1956:151) is based on an erroneously labeled specimen. It is *Hepatus princeps* (Herbst, 1794): a western Atlantic species reported from "Guinea" by Rathbun (1937:237) based upon a single specimen in the Zoological Museum, Copenhagen.

Subfamily CALAPPINAE de Haan, 1833

Genus *Acanthocarpus* Stimpson, 1871

Acanthocarpus Stimpson, 1871a:152 [type-species: *Acanthocarpus alexandri* Stimpson, 1871, by monotypy; gender: masculine].

**Acanthocarpus brevispinis* Monod, 1946

Acanthocarpus africanus Capart, 1951:35, fig. 8.—Rossignol, 1957:127 [key].

Acanthocarpus brevispinis Monod, 1956:109, figs. 125–132.—Guinot-Dumortier and Dumortier, 1960:129 [stridulation].—Guinot and Ribeiro, 1962:27.—Forest, 1963: 628.—Monod, 1963, fig. 32.—Maurin, 1968b:484, 492, fig. 6.—Le Loeuff and Intès, 1968, table 1; 1969:66.

Acanthocarpus bispinosus.—Longhurst, 1958:87 [not *Acanthocarpus bispinosus* A. Milne Edwards, 1880].

Acanthocarpus brevispinnis.—Maurin, 1968b:489 [erroneous spelling].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 51, 329–494 m, 1♂, 1♀, 1 carapace (L).

Nigeria: Sta 255, 264–269 m, 1♂, 6 juv (L). Sta 256, 409–485 m, 2♀ (L).

Geronimo Material: Gabon: Sta 179, 293 m, 1♂, 1♀, 2 juv (W). Sta 198, 300 m, 1♂, 1♀ (W). Sta 202, 100 m, 1♀ (W). Sta 203, 200 m, 1♂, 1♀ (W).

Other Material: Sierra Leone: 06°31.5′N, 11°28.5′W, 150–250 m, 12 Nov 1963, Guinean Trawling Survey, *La Rafale* Sta 13/7, 1♂, 1♀ (W).

Ghana: 05°06′N, 00°16′-18′E, 220–265 m, Sep 1963, Guinean Trawling Survey, *La Rafale* Sta 31/7, 1♂ (W).

Togo: 06°05′N, 02°15′E, 180–340 m, 4 Oct 1963, Guinean Trawling Survey, *Thierry* Sta 35/7, 1♂ (W).

DESCRIPTION.—Capart, 1951:36.

Figures: Monod, 1956, figs. 125–132.

Male Pleopod: Monod, 1956, figs. 129, 130 (Senegal).

Color: Capart (1951:37) reported the following color in this species: "carapace de blanc à rose, passant au mauve sur la partie antérieure des pinces; les épines orange; les pattes en partie orange, en partie blanches."

MEASUREMENTS.—Our specimens have carapace lengths of 14 to 73 mm.

REMARKS.—This species was described as a variety of *A. bispinosus* A. Milne Edwards, 1880 (see Rathbun, 1937:224) by Monod (1946:7); the holotype was a male taken off Cap Juby, Morocco, at an unknown depth. Monod compared his specimen with a male of *A. bispinosus* from the Antilles (Tortugas) and pointed out that the main difference between the two was the relative shortness of the spines on the carapace and the merus of the cheliped in the eastern Atlantic form.

In 1951, Capart described *A. africanus* from a series of specimens taken off the West African coast between 10°North and 11°South latitudes in depths between 142 and 420 meters. Capart also pointed out several differences between his species and the American *A. bispinosus*, again emphasizing the differences in spine lengths in the two species. Monod (1956) synonymized *A. africanus* with *A. brevispinis* without commenting on the latter's resemblance to the American species.

We have compared our material with *A. bispinosus* from Florida. The two species can be differentiated easily. The major differences that we found are as follows:

The carapace of *A. bispinosus* is more coarsely granulated, and the tubercles on the posterolateral margins tend to decrease in size posteriorly in the American species; they are more irregular in *A. brevispinis* than in *A. bispinosus*. The length and width of the terminal segment of the male abdomen are subequal in *A. bispinosus*, whereas the width is much greater than the length in *A. brevispinis*. The walking legs are slenderer in *A. brevispinis*; on the fifth leg in that species the carpus is more than three times as long as its greatest width, whereas in *A. bispinosus* the carpus of the fifth leg is about twice as long as broad. Finally, there are about 40 striae on the stridulating ridge on the claw in *A. brevispinis*, 60 in *A. bispinosus*.

BIOLOGY.—The type of bottom on which this species was found was not recorded for any of our specimens. Capart (1951) recorded it on sandy mud, brown sandy mud, sandy green mud, muddy sand, and green muddy sand in depths between 140 and 420 m. Monod (1956) recorded one collection from fine sandy mud in 275–366 m. Longhurst (1958) found it on shelly mud and sandy mud in 180 to 400 m, and Maurin (1968b) found it on green muddy sand in 300 m and 250 to 300–350 m, on sandy mud in 200–300 and 300–500 m, and on fine muddy detritic sand in 200–400 m. It lives on soft bottoms on the continental slope; it has not been found in water shallower than 100 m.

Ovigerous females have been recorded in

March and October (Capart, 1951; Monod, 1956).

DISTRIBUTION.—West Africa, where it has been recorded from a few localities between Cap Juby, Morocco [the type-locality] and Angola, in depths between 100 and 500 m. Monod (1956) studied material from Senegal, Gambia, and Guinea. Since 1956 it has been recorded from the following:

Spanish Sahara: Off Villa Cisneros, 300–500 m; off Tamzak (as Tamxat), 200–400 m (both Maurin, 1968b).

Mauritania: Banc d'Arguin, 200–300 m (Maurin, ‡968b).

Senegal: Off Saint-Louis, 300 m; Fosse de Kayar, 250 to 300–350 m (both Maurin, 1968b).

Sierra Leone: No specific locality, 180–400 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969); Off Grand-Bassam, 200 m (Le Loeuff and Intès, 1968). 04°32′30″N, 06°31′W, 300–455 m (Forest, 1963).

Ghana: 04°39′N, 02°46′W, 300–400 m (Forest, 1963).

Angola: Ponta de São José, Baía Farta, Benguela, 235–310 m (Guinot and Ribeiro, 1962).

Genus *Calappa* Weber, 1795

Calappa Weber, 1795:92 [type-species: *Cancer granulatus* Linnaeus, 1758, by subsequent designation by Latreille, 1810: 422; gender: feminine; name 1611 on *Official List*].

Camara de Haan, 1837:67 [type-species: *Calappa fornicata* Fabricius, 1798, a subjective junior synonym of *Calappa calappa* Linnaeus, 1758, by monotypy; gender: feminine].

Lophos de Haan, 1837:67 [type-species: *Cancer lophos* Herbst, 1785, by tautonymy; gender: masculine].

Gallus de Haan, 1837:67 [type-species: *Cancer gallus* Herbst, 1803, by tautonymy and monotypy; gender: masculine].

Pistor Gistel, 1848:ix [substitute name for *Gallus* de Haan, 1837; type-species: *Cancer gallus* Herbst, 1803; gender: masculine].

Calappa gallus (Herbst, 1803)

Calappa gallus.—Monod, 1956:100, figs. 115, 116 [Cape Verde Islands, Senegal, Sierra Leone, Ghana].—Rossignol, 1957:76, 127 [key], fig. 1 [Congo].—Longhurst, 1958: 87 [Sierra Leone]—Gauld, 1960:68 [Ghana].—Guinot and Ribeiro, 1962:26 [Cape Verde Islands].—Rossignol, 1962: 114 [Congo].—Ribeiro, 1964:4 [Cape Verde Islands].—Forest and Guinot, 1966:51 [Principe, São Tomé, Annobon].—Guinot, 1967a:245 [Indian Ocean, listed].—Monod, 1967:178 [no locality].—Ribeiro, 1973:5 [Cape Verde Islands].

SYNONYMS.—*Calappa galloides* Stimpson, 1859; *Calappa squamosa* Desbonne and Schramm, 1867; *Calappa gallus* var. *capellonis* Laurie, 1906.

DISTRIBUTION.—Tropical Atlantic and Indo-West Pacific. In the eastern Atlantic it has been recorded from scattered localities between the Cape Verde Islands and Senegal to Angola, including the offshore islands of the Gulf of Guinea; from shore to a depth of about 50 m.

Calappa granulata (Linnaeus, 1758)

Calappa granulata.—Gruvel, 1913:168 [listed].—Chapman and Santler, 1955:374.—Monod, 1956:105 [references only].—Figueira, 1960:8.—Pérès, 1964:28.—Zariquiey Alvarez, 1968:315, figs. 105c, 107a [Spain; references].—Maurin, 1968a:18 [Portugal], 43, 107 [Mediterranean], fig. 4; 1968b:479, 480, 482, 484, fig. 2.—Ribeiro, 1973:4, fig. 1.—Türkay, 1976a:25 [listed], 36, fig. 17 [Portugal in part]; 1976b:61 [listed], 62.—Bas, Arias, and Guerra, 1976, table 3.

Calappa.—Maurin, 1968b, fig. 1.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Morocco: Off Cap Hadid, 31°54′N, 09° 55′W, 85 m, muddy sand, 5 m beam trawl, 25 Mar 1976, *Onversaagd* Sta 126, 1♀ (L). Casablanca fishmarket, 31 Mar 1976, 1♂, 3♀ (L).

DESCRIPTION.—Zariquiey Alvarez, 1968:315.

Figures: Bouvier, 1940, fig. 142, pl. 7: fig. 1; Zariquiey Alvarez, 1968, fig. 107a.

Male Pleopod: Ribeiro, 1973, fig. 1 (Cape Verde Islands).

REMARKS.—Although Linnaeus' (1758:627) description of *Cancer granulatus* is more extensive than most of his descriptions, not enough details are provided in it to make certain to which of several species of *Calappa* the species belongs. A further clue to the identity of the species is given in Linnaeus' statement "*Catesb. car.* 2. *p.* 36. *t.* 36. C. chelis crassissimis. *Habitat in* America. *Mus. De Geer.*" Catesby's (1743: 36, pl. 36) specimens, which originated from either the southeastern United States (North or South Carolina, or Florida) or the Bahama Islands, belong to *Calappa flammea* (Herbst), an East American species. The material from the De Geer collection was later referred to by Linnaeus (1767:1043) as "Mus. De

Geer ex Algiria mihi," showing that De Geer's specimen(s), originating from Algeria, were examined by Linnaeus himself. Linnaeus' (1758) description evidently is entirely or partly based on this Algerian material. In this description, namely, Linnaeus described "*Rostrum bilobum, obtusum,*" while Catesby's figure shows a narrowly rounded truncate rostrum, which certainly cannot be called bilobed. As *Cancer granulatus* is a composite species, its identity can only be fixed by a lectotype selection. As this, so far as is known to us, has so far not been done, we now select as the lectotype of *Cancer granulatus* Linnaeus, 1758, the specimen (or if more than one specimen is represented in the material, the largest specimen) from Algeria in the De Geer collection.

Monod (1956:105) noted that "la seule mention possible de l'espèce dans notre dition est celle d'A. MILNE-EDWARDS et BOUVIER [1900:59–60]. Mais comme ces auteurs considèrent *rubroguttata* comme probablement synonyme de *granulata*, rien ne prouve qu'ils aient bien eu cette dernière espèce sous les yeux."

The confirmation of the early record of this species from the Cape Verde Islands (A. Milne Edwards and Bouvier, 1900) by Ribeiro (1973), the records of Maurin (1968a,b) from Morocco, Spanish Sahara, and Mauritania, and the present records from Morocco suggest that this species is more widely distributed in the Atlantic than previously believed.

BIOLOGY—*Calappa granulata* is a sublittoral species which, according to Bouvier (1940) and Zariquiey Alvarez (1968), lives in depths between 30 and 150 m. If the recent records in the literature are accurate, the species occurs in much deeper water off the northwestern coast of Africa. Türkay (1976a) recorded it from depths of 160–250 m off Morocco and (1976b) in 13 m and 20–30 m off Madeira. Pérès (1964) found it off Morocco in 260–500 m on compact bathyal mud. Maurin (1968a,b) recorded it from the following depths and bottom types off Spanish Sahara: 200–300 m and 200–350 m, slightly sandy mud with Pennatulacea; 400–700 m, sandy mud; 50–90 m, on muddy detritus; and 60 m, shelly, muddy sand, as well as on bathyal mud with funiculines and *Isidella* in 350–450 m off Morocco.

DISTRIBUTION.—Eastern Atlantic, from the Mediterranean, the Atlantic coasts of Portugal and Spain, southward to Cap Blanc, Mauritania, including the Azores, Madeira, and the Cape Verde Islands, in depths between 13 and 400–700 m (Zariquiey Alvarez, 1968). Monod (1956) summarized the literature but reported no material. In addition, the following species localities have been recorded.

North Atlantic: Conception Bank, 200 and 237 m (Maurin, 1968b).

Azores: Faial (Figueira, 1960). Horta Harbor, Faial (Chapman and Santler, 1955).

Madeira: No specific locality; Funchal harbor, 13 m; Ponta dos Reis Magos, 20–30 m (Türkay, 1976b).

Morocco: Foum Agoüitir (as Puerto-Cansado), 350–450 m (Maurin, 1968b). 35°05.5'N, 09°18'W, 160–250 m (Turkay, 1976a). 34°39.6'N, 06°54.5'W to 34°33.5'N, 06°56'W, 260–500 m (Pérès, 1964).

Spanish Sahara: 23°30'N, 16°06'W to 23°28.5'N, 16°09.5'W, 24–29 m (Bas, Arias and Guerra, 1976). Off Médano de Aaiún and Cabo Bojador, 200–300 m (Maurin, 1968a,b). Between Cabo Bojador and Morro Garnet, 200–350 m; off Morro Garnet, 400–700 m; between Cabo Corbeiro and Cabo Blanco, 50–90 m; and off peninsula of Cabo Blanco, 60 m (all Maurin, 1968b).

Cape Verde Islands: Boavista, 15°58'N, 22°43'W, 80 m (Ribeiro, 1973).

**Calappa pelii* Herklots, 1851

FIGURE 12*a*

Calappa peli.—Capart, 1951:39, figs. 9, 10.—Monod, 1956: 102, figs. 117–121.—Rossignol, 1957:75, 127 [key].—Longhurst, 1958:87.—Gauld, 1960:69.—Guinot and Ribeiro, 1962:26.—Rossignol, 1962:114.—Crosnier, 1964:34, 35, fig. on pl. B.—Forest and Guinot, 1966:52.—Monod, 1967:178 [no material].—Maurin, 1968a:48, 59, 64, fig. 23; 1968b:484, 486, 489, 491, figs. 5, 9.—Le Loeuff and Intès, 1968:40, table 1, figs. 48, 61, 63; 1969:63, 64.—Crosnier, 1970:1215 [listed], 1216.

Calappa.—Voss, 1966:19.—Maurin, 1968b, figs. 1, 4[?].

Calappa Pelii.—Holthuis, 1968:29 [listed].

SYNONYM.—*Calappa piscatorum* Calman, 1914.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 3♀, 16 juv (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched

Foraminifera, 2 juv (L). Sta 46, 38–42 m, mud with dense *Jullienella*, 3 juv (W). Sta 47, 37 m, bottom with *Jullienella*, 1 juv (L). Sta 49, 73–77 m, 2 juv (W). Sta 62, 46 m, brown, branching and foliate Foraminifera, 7 juv (L). Sta. 64, 68 m, 1♀, 1 juv (W).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♀ (L). Sta 22, 51 m, rough bottom, 1♂ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 3 juv (L).

Nigeria: Sta 237, 101 m, 1♂ (W). Sta 241, 59–63 m, mud and shell, 8 juv (L). Sta 253, 33–40 m, mud, 1 juv (L).

Cameroon: Sta 259, 59 m, mud and broken shell, 2 juv (W). Sta 260, 46 m, 7 juv (L).

Geronimo Material: Gabon: Sta 212, 200 m, 1♂ (W). Sta 235, 100 m, 1♂, 1♀ (W).

Undaunted Material: Angola: Sta 95, 126 m, 2♂, 1♀ (L). Sta 96, 162 m, 1♀ (L). Sta 102, 54 m, 1♂ (L). Sta 103, 190 m, 1♀ (L).

Other Material: Ghana: Butre (04°49′N, 01°55′W), 1841–1851, H. S. Pel, lectotype, 1♀ (L); paralectotypes, 2♂ (L). 05°07′N, 00°19′W, 100 m, 5 Mar 1964, Guinean Trawling Survey, *Thierry* Sta 31/6, 1♀ (W). 05°12.5′N, 04°05′W, 40–42 m, 9 Oct 1963, Guinean Trawling Survey, *La Rafale* Sta 25/3, 1♂, 1♀ (W).

Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 1 juv (L).

Congo: 05°20′S, 11°40′E, 100 m, 20 May 1964, Guinean Trawling Survey, *Thierry* Sta 62/6, 3♂ (W).

DESCRIPTION.—Capart, 1951:40.

Figures: Monod, 1956, figs. 117–121.

Male Pleopod: Monod, 1956, figs. 119–121 (Senegal).

Color: According to Capart (1951:41) this species has the following color pattern: "La carapace unicolore bistre-jaune, plus foncée sur la moitié antérieure. Les pinces et les pattes plus claires."

MEASUREMENTS.—Our specimens have carapace widths of 5 to 96 mm; none was ovigerous.

REMARKS.—The type-material of *Calappa pelii* is preserved in the Rijksmuseum van Natuurlijke Historie in Leiden. It consists of the lectotype, selected here, a female with a carapace width of 69 mm (Crust. D. 764), and two male paralectotypes with carapace widths of 88 and 89 mm (Crust. D. 765). These specimens were collected near Butre (= Boutry), just east of Dixcove, Ghana, by H. S. Pel between 1841 and 1851.

Inasmuch as young specimens of *Calappa* may be difficult to identify, we include here sketches of the carapace of juveniles of *C. pelii* (Figure 12*a*) and *C. rubroguttata* (Figure 12*b*). The characteristic posterior spines on the carapace of *C. pelii* are well developed even in the smallest specimens we examined.

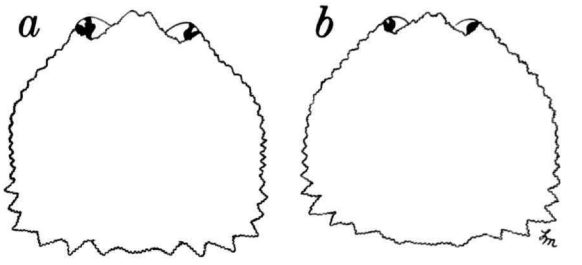

FIGURE 12.—Outlines of carapace of juveniles: *a*, *Calappa pelii* Herklots, cb 10 mm, *Pillsbury* Sta 46; *b*, *Calappa rubroguttata* Herklots, cb 14 mm, *Pillsbury* Sta 248.

Some of the material from Angola reported on by Crosnier (1970) was examined. The specimen of *Calappa pelii* reported upon by Crosnier as from *Undaunted* Station 94 proved, according to the label, to be from Station 96.

BIOLOGY.—This species apparently prefers various types of mud bottoms in depths generally in excess of 50 m; it replaces the shallower *C. rubroguttata* in deeper water. As Capart (1951:43) stated, "Nos récoltes montrent que l'espèce est abondante sur tous les fonds vaseux profonds du plateau continental dans la région explorée [06°16′S to 14°S] jusqu'au 14° latitude Sud." Of the 30 records for this species given by Capart, only 7 (23%) were from shallower than 50 m whereas 23 (77%) were from depths between 50 and 150 m.

Crosnier (1964) noted that off Cameroon *C. pelii* was a cold water species, living in depths greater than 50 m, where it replaced *C. rubroguttata* in colder, deeper water.

Le Loeuff and Intès (1968:40) reported that off the Ivory Coast *C. pelii* was found in depths between 30 and 200 m, with most individuals taken 35 and 50 m, where it occurred together with *C. rubroguttata*. They further noted that *C. pelii* apparently did not like sandy substrates; off Fresco, where the sand bottom extends to a depth of 45 m, only a single specimen of *C. pelii* was found.

The deepest records for this species that we have found are those of Maurin (1968a,b), who reported material from depths of 200 m off Spanish Sahara and 200–350 and 200–400 m off Mauritania. The species generally is taken in depths of 50 to 150 m.

Ovigerous females have been collected in March, May, August, October, and December (Capart, 1951; Guinot and Ribeiro, 1962).

DISTRIBUTION.—Off West Africa, from localities between Spanish Sahara and Angola, in depths between 8–20 and 400 m, usually between 50 and 150 m. Monod (1956) recorded material from localities between Port-Etienne, Mauritania, and Luanda, Angola. Since 1956 this species has been recorded from the following localities.

West Africa: No specific locality (Monod, 1967).

Spanish Sahara: Between Cabo Corbeiro and Cabo Blanco, 60–80 m (Maurin, 1968a); in 200 m (Maurin, 1968b). Between Cabo Barbas and Cabo Blanco, 50–90 m (Maurin, 1968b).

Mauritania: N of Banc d'Arguin, 20°20′N to 20°40′N, 90–100 m (Maurin, 1968a). Banc d'Arguin, 40–60 m, 60–70 m, 90–100 m (Maurin, 1968b). Between Cap Timiris and Tamzak (as Tamxat), 200–350 m (Maurin, 1968a). Off Tamzak (as Tamxat), 200–400 m (Maurin, 1968b).

Senegal: Saint-Louis, 35–40 m (Maurin, 1968b). Off Mboro, 35–40 m (Maurin, 1968b). 13°01′N, 17°24′W, 51–55 m, and 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, in 12–120 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, and off Grand-Bassam, 22–200 m (Le Loeuff and Intès, 1968). 05°07′N, 04°32′W to 05°07′N, 04°36′W, 38–42 m (Voss, 1966).

Ghana: Off Accra, 37 m (Gauld, 1960). 04°36.5′N, 01°31′W, 50 m (Forest and Guinot, 1966).

Cameroon: No specific locality, in more than 50 m (Crosnier, 1964).

Principe: 01°38′25″N, 07°22′05″E, 31 m (Forest and Guinot, 1966).

Gabon: 00°25′N, 09°00′E, 73 m (Forest and Guinot, 1966).

Congo: Pointe-Noire, 40–75 m (Rossignol, 1957). W of Pointe-Noire, 80–100 m (Rossignol, 1962).

Angola: 16°41′S, 11°21′E, 162 m (see "Remarks"); 16°37′S, 11°22′E, 122 m; 17°02′S, 11°40′E, 54 m; and 17°06′S, 11°35′E, 90 m (all Crosnier, 1970). Luanda, 110–113 m; Mussulo Grande, Luanda, 86–90 m; Porto Amboim, 85 m; Baía da Caota, Benguela, 8–20 m, 13 m, 17 m, 30 m; Sombreiro, 13 m; between Ponta da Caruíta and Sombreiro, 29 m; Baía Farta, 22 m, 100–144 m; Baía de Moçâmedes; Baía dos Tigres, 107 m (all Guinot and Ribeiro, 1962).

**Calappa rubroguttata* Herklots, 1851

FIGURES 12*b*, 13

Calappa rubroguttata.—Büttikofer, 1890:466, 487.—Johnston, 1906: 862.—Postel, 1950:25, 26.—Monod, 1956:106, figs. 122–124.—Rossignol, 1957:76.—Longhurst, 1958:87.—Buchanan, 1958:23.—Gauld, 1960:69.—Rossignol, 1962: 144.—Guinot and Ribeiro, 1962:27.—Crosnier, 1964:32, 35, fig. on pl. B.—Monod, 1967:178, pl. 16: fig. 1 [no material].—Forest and Guinot, 1966:53.—Maurin, 1968b: 491, fig. 9.—Le Loeuff and Intès, 1968:40, table 1, figs. 48, 61, 63; 1969:63, 64, 65.—Uschakov, 1970:439, 455 [listed].

?*Calappa granulata.*—Bouvier, 1911:226 [not *C. granulata* (Linnaeus, 1767)].

Calappa rubroguttatus.—Capart, 1951:43, figs. 10, 11.—Rossignol, 1957:127 [key]. [Erroneous spelling.]

Calappa.—Bassindale, 1961:499.

Callappa rubroguttata.—Bott, 1968:170 [erroneous spelling].

SYNONYM.—*Calappa bocagei* De Brito Capello, 1871.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 47, 37 m, bottom with *Jullienella*, 1♀ ov (L).

Ghana: Sta 24, 35–37 m, dark red bryozoans, 2 juv (W).

Nigeria: Sta 248, 33 m, 2 juv (W).

Other Material: Liberia: No specific locality, 1879–1882, J. Büttikofer, 3♂, 1♀ (L) (smallest male with huge *Chelonibia patula* (Ranzani) on posterior margin of carapace).

Ghana: Butre (04°49′N, 01°55′W), 1841–1851, H. S. Pel, lectotype, 1♂ (L); paralectotypes, 8♂, 1♀ (L). ESE of Sekondi, 04°40′N, 00°50′W, 78–80 m, 6 Sep 1963, Guinean Trawling Survey, *La Rafale* Sta 30/5a, 1♂ (W).

Cameroon: Kribi, caught with beach seine by fishermen, 10 Aug 1964, B. de Wilde-Duyfjes, 2♂ (L).

Angola: Luanda, tip of peninsula opposite town, 15 Jun 1967, G. Hartmann, 1 specimen (L).

DESCRIPTION.—Capart, 1951:44.

Figures: Monod, 1956, figs. 122–124.

Male Pleopod: Monod, 1956, figs. 123–124 (Senegal).

Color: Capart (1951:44) observed the following

pattern in this species: "Coloration typique: la carapace beige clair, marquée des bandes et taches rondes carminées. La partie antérieure à fond carmin clair. La pince marquée de trois taches rondes disposées en triangle; le carpe de deux taches. Les pattes de couleur claire."

MEASUREMENTS.—Our specimens have carapace widths of 14 to 104 mm; the carapace width of the single ovigerous female examined is 95 mm.

REMARKS.—The lectotype of this species, selected here, is a male, cb 104 mm, from Butre (= Boutry), east of Dixcove, Ghana, collected between 1841 and 1851 by H. S. Pel (Crust. D. 772). There are nine paralectotypes, a female, cb 51 mm, and eight males, cb 82 to 99 mm, two of which are preserved dry (Crust. D. 771).

A sketch of the carapace of a juvenile is shown in Figure 12*b* along with that of a young *C. pelii* (Figure 12*a*). We also reproduce here an original illustration of this species prepared by Herklots (Figure 13).

BIOLOGY.—This species lives in shallower water than does *C. pelii*, from shore to a maximum depth of about 90 m. It apparently can live on all level substrates, but may prefer sand. Gauld (1960:69) reported that off Ghana this species was "very common on sand from shallow water to 30 m. Catches of up to 250 have been taken in a single net; large catches have been taken only beyond 10 m." Crosnier (1964) characterized this species as a warm water crustacean, living in 0–30 m off Cameroon; there it replaces *C. pelii* in shallow water. Off the Ivory Coast, Le Loeuff and Intès (1968:40) found this species to be very abundant all year on all sediments in depths less than 40 m, usually between 20 and 35 m. In depths between 30 and 40 m it occurred together with *C. pelii*. In 1969 they noted that it appeared to be indifferent to the nature of the substrate and that it was eurythermic.

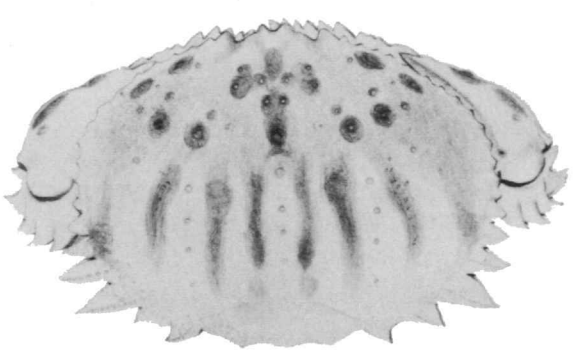

FIGURE 13.—*Calappa ruboguttata* Herklots (sketch by J. A. Herklots).

More than 85% of the occurrences reported in the literature for which depth information is available are from depths of 40 m or less. There are about equal numbers of records of the species in depths below 20 m and between 20 and 40 m.

Ovigerous females have been collected in May, September, and October (Capart, 1951; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Off West Africa, between Senegal and Angola, usually in depths of less than 50 m. Monod (1956) summarized the literature prior to 1956 and reported numerous specimens from localities between Senegal and Luanda, Angola. In addition this species has been recorded from the following localities.

West Africa: No specific locality (Monod, 1967).

Senegal: No specific locality, 30–80 m (Postel, 1950). Off Saint-Louis, 35–40 m; off Mboro, 35–40 m (Maurin, 1968b). 13°01′N, 17°24′W, 51–55 m (Forest and Guinot, 1966). Baie de Rufisque (Bouvier, 1911).

Guinea: No specific locality, depths greater than 20 m (Uschakov, 1970).

Sierra Leone: No specific locality, 10–41 m (Longhurst, 1958).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). 05°00′N, 05°28.5′W, 27 m; 05°03.5′N, 05°25′W, 20–25 m; 05°02.5′N, 05°25′W, 21–27 m (Forest and Guinot, 1966). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, and off Grand-Bassam, 8–40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra (Bassindale, 1961). In 3–8 fm (5–15 m) (Buchanan, 1958). In shallow water to 30 m (Gauld, 1960).

Cameroon: No specific locality, 0–30 m (Crosnier, 1964).

Principe: Between Ponta da Mina and Ponta Novo Destino, 6 m (Forest and Guinot, 1966).

Gabon: 00°38′25″N, 08°46′E, 5 m (Forest and Guinot, 1966).

Congo: Baie de Pointe-Noire, beach (Rossignol, 1957). Pointe-Noire, beach (Rossignol, 1962).

Angola: Luanda (Bott, 1968). Baía de Benguela, shore (Guinot and Ribeiro, 1962).

Genus *Cycloes* de Haan, 1837

Cycloes de Haan, 1837:67, 68, 69 [type-species: *Cycloes granulosa* de Haan, 1837, by monotypy; gender: feminine].

Cryptosoma Brullé, 1837:16 [an invalid junior homonym of *Cryptosoma* Berthold, 1827 (Coleoptera); type-species: *Cryptosoma cristatum* Brullé, 1837, by monotypy; gender: neuter].

REMARKS.—Chace (1968:610) discussed the use of the two names previously applied to this genus and gave convincing reasons for using *Cycloes* rather than *Cryptosoma*. He also provided a key to the species of *Cycloes*.

Cycloes cristata (Brullé, 1837)

Cryptosoma cristatum.—Monod, 1956:114, fig. 133 [Cape Verde Islands; references].—Türkay, 1976b:61 [listed].

Cycloës cristata.—Guinot-Dumortier and Dumortier, 1961: 561, figs. 1-4 [Cape Verde Islands].—Guinot and Ribeiro, 1962:27, figs. 3, 4 [Cape Verde Islands].

Cycloes cristata.—Chace, 1968:610 [key].—Guinot, 1968b, fig. 13 [morphology].

Cyclöes cristata.—Ribeiro, 1964:4 [Cape Verde Islands].

Crytosoma cristatum.—Türkay, 1976b:62 [Madeira, Porto Santo, Ilhas Desertas; erroneous spelling].

SYNONYM.—*Cryptosoma dentatum* Brullé, 1839.

DISTRIBUTION.—Eastern Atlantic, from Madeira, the Canary Islands, and the Cape Verde Islands; sublittoral (Monod, 1956).

Subfamily MATUTINAE de Haan, 1835

Genus *Matuta* Weber, 1795

Matuta Weber, 1795:92 [type-species: *Cancer victor* Fabricius, 1786, a subjective junior synonym of *Cancer lunaris* Forskål, 1775, by subsequent designation by Latreille, 1810:422; gender: feminine].

Matutinus MacLeay, 1838:70 [type-species: *Cancer victor* Fabricius, 1786, a subjective junior synonym of *Cancer lunaris* Forskål, 1775, by monotypy; gender: masculine].

Matuta michaelseni Balss, 1921

Matuta michaelseni.—Capart, 1951:45, fig. 12.—Monod, 1956: 98, figs. 108-114.—Rossignol, 1957:77, 127 [key].—Buchanan, 1958:20.—Longhurst, 1958:87.—Gauld, 1960: 68.—Guinot and Ribeiro, 1962:25.—Rossignol, 1962: 114.—Forest and Guinot, 1966:51.—Le Loeuff and Intès, 1968, table 1.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Liberia: Off St. Paul River, Monrovia, trawl, 6 Jan 1953, G. C. Miller, 1♂ (W).

Ivory Coast: Off Sassandra, 11 m, 3 Apr 1969, Guinean Trawling Survey, Tr 22, Sta 1, 1♀ (L).

Ghana: Takoradi, 14 Aug 1961, Amegah, 1♂ (W).

Congo: Beach at Pointe-Noire, beach seine, Jul 1963, A. Crosnier, 2♂, 7♀ (W).

DESCRIPTION.—Capart, 1951:46.

Figures: Monod, 1956, figs. 108-114.

Male Pleopod: Monod, 1956, figs. 110-114 (Senegal, Togo).

Color: "Blanc-rosé uniforme" (Rossignol, 1957: 77).

MEASUREMENTS.—Our specimens have carapace lengths of 9 to 14 mm.

BIOLOGY.—This species inhabits primarily sandy bottoms in shallow water, from the shore to a depth of about 30 m. Buchanan (1958) found it in the inshore fine sand community, in 3-8 fm (5-15 m) off Accra, Ghana, and Longhurst (1958) found it on sand and muddy sand, but noted that it occurred mostly on shelly sand in 5-30 m off Sierra Leone. Guinot and Ribeiro (1962) reported material collected on a beach at low tide.

Ovigerous females have been collected in January, March, April, and September (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962).

DISTRIBUTION.—West Africa, from Senegal to Angola, in shallow water, shore to about 30 m. Monod (1956) summarized earlier records and reported material from localities between Senegal and Togo. Since 1956 the species has been recorded from:

Sierra Leone: No specific locality, 5-30 m (Longhurst, 1958).

Ivory Coast: Off Sassandra, 15 m (Le Loeuff and Intès, 1968). 05°03'N, 05°25'W, 20-25 m (Forest and Guinot, 1966).

Ghana: No specific locality, shore to 15 m (Gauld, 1960). Accra, 3–8 fm (5–15 m) (Buchanan, 1958).

Congo: Pointe-Noire, beach (Rossignol, 1957). Baie de Pointe-Noire, beach (Rossignol, 1962).

Angola: Baía de Benguela, beach at low tide (Guinot and Ribeiro, 1962).

Family LEUCOSIIDAE Samouelle, 1819

LEUCOSIADAE Samouelle, 1819:91 [corrected to Leucosiidae by Miers, 1879a:671; name 374 on *Official List*].
ILIINAE Stimpson, 1871a:155 [name 372 on *Official List*].
EBALIINAE Stimpson, 1871a:159.
MYRODINAE Miers, 1886:297.
OREOPHORINAE Miers, 1886:297.
MYROIDA Alcock, 1896:167.
IPHICULOIDA Alcock, 1896:167.
NURSILIOIDA Alcock, 1896:167.
NURSIOIDA Alcock, 1896:166.
NUCIOIDA Alcock, 1896:167.
CRYPTOCNEMIDAE Stimpson, 1907:161.
PHILYRINAE Rathbun, 1937:151.

EASTERN ATLANTIC GENERA.—Nine, of which six, *Atlantotlos*, *Ebalia*, *Ilia*, *Merocryptus*, *Philyra*, and *Pseudomyra*, are represented by tropical species occurring off West Africa. Indo-West Pacific species belonging to three genera have become established in the eastern Mediterranean, having colonized that area via the Suez Canal. These genera are as follows:

Ixa Leach (1815a:334). Type-species: *Cancer cylindricus* Fabricius, 1777, by monotypy; gender: feminine; name 161 on *Official List*.

Leucosia Weber (1795:92). Type-species: *Cancer craniolaris* Linnaeus, 1758, by subsequent designation by Holthuis, 1959a:106; gender: feminine; name 1631 on *Official List*.

Myra Leach (1817:19, 23). Type-species: *Leucosia fugax* Fabricius, 1798, by monotypy; gender: feminine; name 1635 on *Official List*.

EASTERN ATLANTIC SPECIES.—Twenty, of which 12 occur in tropical waters. The extralimital species are as follows.

Ebalia deshayesi Lucas, 1846. Canary Islands, Madeira (Türkay, 1976b), and Mediterranean; sublittoral, to 100 m (Zariquiey Alvarez, 1968).

Ebalia edwardsii Costa, 1838. Mediterranean; littoral and sublittoral, to about 200 m (Zariquiey Alvarez, 1968).

Ebalia granulosa H. Milne Edwards, 1837. Eastern Atlantic, from England to the Mediterranean; littoral and sublittoral, to 445 m (Zariquiey Alvarez, 1968).

Ebalia tumefacta (Montagu, 1808). Norway and Shetland Islands to Spanish Sahara; sublittoral, to 130 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Ixa monodi Holthuis and Gottlieb, 1956. An Indo-West Pacific immigrant into the eastern Mediterranean, Turkey; Red Sea (Holthuis and Gottlieb, 1956, 1958).

Leucosia signata Paulson, 1875. An Indo-West Pacific immigrant into the eastern Mediterranean; Israel and Egypt (Holthuis and Gottlieb, 1958; Lewinsohn and Holthuis, 1964; Ramadan and Dowidar, 1976).

Merocryptus boletifer A. Milne Edwards and Bouvier, 1894. Azores, Seine Seamount, Mediterranean; sublittoral, 100–600 m (Zariquiey Alvarez, 1968).

Myra fugax (Fabricius, 1798). An Indo-West Pacific immigrant into the eastern Mediterranean; Egypt, Israel, and possibly Turkey (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

The status of *Ebalia fragifera* Miers (1881a:268) from the Canary Islands, which Monod (1956: 131) considered to be distinct from *E. tuberculata*, remains to be determined.

The names used by Monod (1956) have not been changed, so the species therein are not listed here.

REMARKS.—Glaessner's (1969:R496) observation that "this family is commonly divided into subfamilies which are constituted and defined differently by different authors (Miers, Alcock, Ihle, Rathbun, Balss) and are not considered helpful to paleontologists at the present stage of our knowledge of the family" is still quite pertinent. Of the four subfamilies currently recognized within the Leucosiidae, two, Ebaliinae and Cryptocneminae, do not offer too many difficulties and most authors agree in the limits of the two. The confusion that exists concerning the size and

composition of the two other subfamilies, however, is very great.

The root of all the difficulties in the subfamily classification of the Leucosiidae is to be found in a nomenclatural mix-up concerning the type genus of the family, *Leucosia*. Until 1897 the name *Leucosia* Fabricius, 1798, was used for a genus of Indo-West Pacific crabs, the type of which is *Cancer craniolaris* Linnaeus, 1758. In 1897(b), however, Rathbun showed this usage to be incorrect as the first type selection for *Leucosia* Fabricius, 1798, is that by Latreille (1810:97, 422), who selected *Cancer nucleus* Linnaeus, 1758, as the type of the genus. As *Cancer nucleus* Linnaeus is also the type-species of the genus *Ilia* Leach, 1817, the name *Leucosia* Fabricius, 1798, had to be substituted for *Ilia* Leach, a name until then generally accepted by carcinologists. For the genus *Leucosia* auctt. (non Fabricius, 1798), Rathbun (1897b: 160) proposed the new name *Leucosides*. There was considerable opposition to Rathbun's action, although this action was nomenclaturally entirely justified; most non-American authors ignored the changes proposed. In 1959 Holthuis (1959a:106) showed that *Leucosia* Fabricius, 1798, is a junior homonym of *Leucosia* Weber, 1795, and thus is invalid. For *Leucosia* Weber, 1795, Holthuis selected as type-species *Cancer craniolaris* Linnaeus, 1758, thereby making this name a senior synonym of *Leucosides* Rathbun, 1897, and *Leucosia* auctt. (non Fabricius, 1798). In this way the former, pre-1897, usage of *Leucosia* was restored, albeit with a different author's name. In 1964 the situation was further consolidated by the International Commission on Zoological Nomenclature (1964, in Opinion 712, *Bulletin of Zoological Nomenclature*, 21(4): 336–351), who placed both names *Leucosia* Weber, 1795, and *Ilia* Leach, 1817, on the Official List of Generic Names in Zoology.

At the generic level Rathbun's action had caused hardly any disturbance because (1) non-American authors had, incorrectly, ignored her changes, and (2) the genera *Ilia* Leach, 1817, and *Leucosia* Weber, 1795, do not occur in American waters, the former being restricted to the eastern Atlantic, the latter to the Indo-West Pacific (except for *L. signata* which has entered the Mediterranean via the Suez Canal).

Rathbun's (1937:194) record of "*Leucosia planata* (Fabricius)" from Tierra del Fuego rests upon an uncharacteristic mistake on her part. Fabricius' species is not a leucosiid but is *Halicarcinus planatus* (Fabricius), a species of Hymenosomatidae, already dealt with by Rathbun (1925:563) in an earlier work.

At the subfamily level Rathbun's (1897b) transfer of the name *Leucosia* from one genus (*Leucosia* Weber, 1795) to another (*Ilia* Leach, 1817) caused much confusion as these two genera were generally considered to form part of two different subfamilies. These subfamilies were indicated by Rathbun (1937:122, 151, and 123, 183) with the names Philyrinae and Leucosiinae, respectively, while most other authors used the names Leucosiinae and Iliinae, respectively, for them. The fact that the name Leucosiinae could stand for two entirely different groups was not realized by several authors.

A year before Rathbun (1897b) published her controversial paper, Alcock (1896) gave an important classification of the Leucosiidae, which he divided into two subfamilies: Leucosiinae (containing 5 subdivisions, named by him Alliances I–V) and Iliinae (with Alliances I–IV).

Ihle (1918) recognized three subfamilies within the Leucosiidae: Ebaliinae (with 12 genera, most of which were placed in Alcock's Alliances I–III of his Leucosiinae), Iliinae (with 19 genera including all of those placed by Alcock in his Iliinae, those of his Alliance IV of Leucosiinae and part of those of Alliances II and III of the latter subfamily), and Leucosiinae (with 7 genera including all those of Alcock's Alliance V of the Leucosiinae and the genera *Cryptocnemus* and *Carcinaspis* which Alcock had placed (the latter with some doubt) in Alliance I).

Rathbun (1937) followed Ihle in recognizing three subfamilies of Leucosiidae, and in his delimitation of the subfamily Ebaliinae. Rathbun's Philyrinae contained all the genera that Ihle assigned to the Leucosiinae plus several that he considered to belong to the Iliinae (viz., all those

of Alcock's Leucosiinae Alliance IV, plus *Randallia* of Alliance III). Rathbun's Leucosiinae consisted of the other Iliinae sensu Ihle. As Rathbun dealt only with the American representatives, it is difficult to know the exact limits of her subfamilies.

Balss (1957:1612–1615), in his authoritative treatment of the Decapoda in Bronn's *Klassen und Ordnungen des Tierreichs*, which of necessity is mostly based on study of the literature, evidently became severely confused. He recognized, like Rathbun, the two subfamilies Philyrinae and Leucosiinae, but unlike Rathbun used the generic names *Leucosia* and *Ilia* for the genera that she named *Leucosides* and *Leucosia*, respectively. In the subfamily Philyrinae Balss placed all the genera that Ihle had assigned to the Iliinae with the exception of two, viz., *Callidactylus* and *Iliacantha*, the only two that Rathbun (1937) mentioned by name and which she placed in the Leucosiinae. Balss' Leucosiinae contained all genera placed by Ihle in that subfamily with the exception of *Philyra* (which Rathbun, 1937, had placed in the Philyrinae) and *Pseudophilyra*. Balss' definition of the Philyrinae is based almost exclusively on that by Rathbun (1937), but his definition of the Leucosiinae has the first five sentences adapted from Ihle's (1918:207) account of the Leucosiinae (sometimes in the identical wording), while the last sentence (dealing with the third maxilliped) is taken from Rathbun's (1937:183) definition of her Leucosiinae. Balss' action was taken in spite of the fact that Rathbun (1937:151, 183) made clear that her subfamily Philyrinae corresponds with all of Ihle's Leucosiinae plus part of his Iliinae, while her Leucosiinae are formed by the rest of Ihle's Iliinae. Unfortunately Balss's (1957: 1612–1615) garbled version of the classification of the Leucosiinae provides the most recent complete list of all the genera of the family and has been accepted as the basis for the work of several subsequent authors (Guinot, 1967a:246–251; Serène, 1968:41–48; Sakai, 1976:76–126). Serène (1965:11–17) separated the subfamily Cryptocneminae from the Leucosiinae, placing the genera *Cryptocnemus*, *Leucisca* (= *Carcinaspis*), *Onychomorpha* and *Lissomorpha* in the former subfamily, leaving only *Leucosia* in the latter (probably *Callidactylus* and *Iliacantha* are also left in the Leucosiinae by Serène, but as these genera do not occur in the Indo-West Pacific region they are not mentioned by him). For the time being we follow the system of Ihle (1918), which seems to be more logical than the one by Rathbun (1937) or than the garbled version of the latter produced by Balss (1957). A closer comparative study of the various genera of Leucosiidae is, however, badly needed.

Subfamily EBALIINAE Stimpson, 1871

Genus *Atlantotlos* Doflein, 1904

Atlantotlos Doflein, 1904:49 [type-species: *Atlantotlos rhombifer* Doflein, 1904, by monotypy; gender: masculine].

**Atlantotlos rhombifer* Doflein, 1904

Atlantotlos rhombifer.—Capart, 1951:57, fig. 16, pl. 2: fig. 1.—Monod, 1956:134, figs. 162, 163.—Longhurst, 1958:87.—Gauld, 1960:69.

Atlantotlus rhombifer.—Rossignol, 1962:114 [erroneous spelling].

Atlantotlos.—Voss, 1966:35.

Merocryptus rhombifer.—Forest and Guinot, 1966:54.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 5♂, 4♀ (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂ (L). Sta 63, 64 m, sandy mud with shells, 1♀ (L).

Nigeria: Sta 239, 73 m, 1♀ (L). Sta 241, 59–63 m, mud and shell, 1♂, 1♀ ov (L). Sta 248, 33 m, 2♀ (W).

Cameroon: Sta 260, 46 m, 3♂, 1♀, 1 juv (L).

Other Material: Ghana: 05°13′42″N, 03°59′48″W, 50–55 m, dredge, Guinean Trawling Survey, *La Rafale*, Tr 12, 1♂ (W).

DESCRIPTION.—Capart, 1951:57.

Figures: Capart, 1951, fig. 16, pl. 2: fig. 1.

Male Pleopod: Capart, 1951, pl. 2: fig. 1 (Gabon); Monod, 1956, fig. 163 (Senegal).

Color: According to Capart (1951:58), in this species "Les mâles et les femelles sont orangé rose, mais les sillons entre les saillies sont bruns avec des tubercules presque blancs."

MEASUREMENTS.—Our specimens have cara-

pace widths of 7 to 16 mm. The carapace width of the ovigerous female is 15 mm.

REMARKS.—Forest and Guinot (1966) synonymized *Atlantotlos* Doflein, 1904 with *Merocryptus* A. Milne Edwards, 1873, noting Monod's (1956: 136) comment: "Je ne suis pas certain du tout que le genre *Atlantotlos* soit distinct de *Merocryptus*." However, the male pleopod of *A. rhombifer*, figured in Monod, differs from that of two species of *Merocryptus* figured in Guinot and Ribeiro (1962, fig. 5a, b (*M. obsoletus*), and fig. 6 (*M. boletifer*)), in having a subterminal bulbous enlargement rather than tapering evenly to the apex. Until all the representatives of these genera can be studied in more detail, we prefer to retain *Atlantotlos* for Doflein's species.

BIOLOGY.—This species occurs in depths between 44 and 115 m, but most specimens were taken in depths between 70 and 100 m. The *Pillsbury* specimens were collected on mud with brown, branched Foraminifera in 62–75 m, sandy mud with shells in 64 m, and on mud and shell in 59–63 m. The material reported by Capart (1951) was taken on brown muddy sand and coral, brown sandy mud and sandy brown mud, and on muddy sand or muddy sand and rock in 85 to 100 m. Longhurst (1958) found it on shelly mud in 106 m, and Rossignol (1962:114) found it in 115 m, "en bordure des affleurements rocheux." Forest and Guinot (1966) found the species on mud, rocks, calcareous algae, sand and Foraminifera in 51–55 m and on mud and shell in 73–80 m.

Ovigerous females have been recorded in February, May, September, and December (Capart, 1951; *Pillsbury*).

DISTRIBUTION.—West Africa, where it has been recorded from a few localities between Senegal and Angola, in depths between 44 and 115 m. Monod (1956) summarized earlier records and recorded the species from Senegal. Since 1956 it has been recorded from the following localities.

Senegal: 13°01′N, 17°24′W, 51–55 m (Forest and Guinot, 1966).

Liberia: 05°21.5′N, 09°54.5′W, 73–80 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 106 m (Longhurst, 1958).

Ghana: Off Accra, 80 m (Gauld, 1960).

Nigeria: 04°56′N, 05°00′E, to 04°54′N, 05°05′E, 73 m (Voss, 1966).

Congo: W of Pointe-Noire, 115 m (Rossignol, 1962).

Genus *Ebalia* Leach, 1817

Ebalia Leach, 1817, in 1815–1875, pl. 25 [type-species: *Ebalia bryerii* Leach, 1817, a subjective junior synonym of *Cancer tumefactus* Montagu, 1808, by subsequent designation by H. Milne Edwards, 1837, in 1836–1844, pl. 24: fig. 3 (as *Ebalia brayerii*); gender: feminine; name 145 on *Official List*, type-species there given as *Cancer tuberosus* Pennant, 1777, in error].

Phlyxia Bell, 1855:303 [type-species: *Phlyxia crassipes* Bell, 1855, by selection by Bell, 1855:304; gender: feminine].

Bellidilia Kinahan, 1856:115, 117, 128 [type-species: *Bellidilia undecimspinosa* Kinahan, 1856, by present designation; gender: feminine].

* *Ebalia affinis* Miers, 1881

Ebalia atlantica.—Capart, 1951:54.

Ebalia affinis.—Monod, 1956:117, figs. 134–144.—Longhurst, 1958:87.—Gauld, 1960:69.—Forest and Guinot, 1966:53.

SYNONYM.—*Ebalia atlantica* A. Milne Edwards and Bouvier, 1898.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 3♂ (W).

Ivory Coast: Sta 47, 37 m, bottom with *Jullienella*, 3♂, 1♀ (L).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♂ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂, 1♀ (L). Sta 24, 35–37 m, dark red bryozoans, 1♂, 3♀ (W).

Nigeria: Sta 248, 33 m, 1♂ (W).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 4♂, 3♀ (L).

DESCRIPTION.—Capart, 1951:54.

Figures: Monod, 1956, figs. 134–144.

Male Pleopod: Monod, 1956, figs. 141–144 (Guinea; Senegal).

Color: Capart (1951:54) reported that in this species the color is "orange avec quatre taches blanches en avant de l'aire cardiaque."

MEASUREMENTS.—Our specimens have carapace lengths ranging from 4 to 9 mm.

BIOLOGY.—This species has been recorded from depths between 4 and 140 m, but more than 85% of the records are between 4 and 45 m. Capart (1951) reported it on brown muddy sand in 100 m. Longhurst (1958) found it on muddy sand, shelly sand, and shelly mud in depths between 8 and 140 m. Forest and Guinot (1966) reported it from mud or shelly mud in 18–30 m, mud, calcareous algae, and shell in 31 m, rocks and coral in 3–10 m, sand, algae, and calcareous algae in 8–30 m, and mud and calcareous algae in 4–5 m. The *Pillsbury* specimens were taken on fine sand and green mud in 48 m, on bottom with bryozoans in 35–37 and 42 m, on bottom with *Jullienella* in 37 m, and on broken shell in 70 m. Apparently the species prefers soft bottom mixed with shell or other hard substances.

Ovigerous females have been collected in January, February, March, April, May, and June (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—Off West Africa, from localities between Senegal and Angola; it also has been reported from the Seine Seamount north of Madeira. Monod (1956) summarized earlier records and reported material from Senegal, Guinea, Sierra Leone, and Ghana. Since 1956 the species has been reported from the following localities.

Guinea: 09°40′N, 14°05′W, 18 m, and 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 8–140 m (Longhurst, 1958).

Ghana: Accra, 32 m (Gauld, 1960).

Principe: 01°37′N, 07°22′E, 30 m, and 01°38′25″N, 07°22′05″E, 31 m (Forest and Guinot, 1966).

São Tomé: Praia de Santa Catarina, W coast, 3–10 m; 00°25′15″N, 06°43′05″E, 8–30 m; Baía de Ana de Chaves, 5 m; and in front of Ponta Diogo Nunes, 4 m (Forest and Guinot, 1966).

Ebalia cranchii Leach, 1817

Ebalia cranchi.—Monod, 1956:122, figs. 145, 146 [Senegal; references].—Zariquiey Alvarez, 1968:329, figs. 108a,b, 111b,d, 111Aa, 111Cb [Spain; references].—Türkay, 1976a:25 [listed], 37, fig. 19 [Morocco].

Ebalia cranchii.—Christiansen, 1969:31, fig. 11, map 5 [Scandinavia].

DISTRIBUTION.—Eastern Atlantic, from Norway to Senegal, Mediterranean, in depths between 20 and 550 m (Zariquiey Alvarez, 1968).

Ebalia nux A. Milne Edwards, 1883

Ebalia nux A. Milne Edwards, 1883, pl. 5.—Monod, 1956: 121 [references].—Zariquiey Alvarez, 1968:328, figs. 108c, 111Ab [Spain; references].—Türkay, 1976a:25 [listed], 37, fig. 18 [Morocco].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Morocco: Off Cap de Mazagan, 33°38′N, 08°45′W, 420 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 150, 1♂ (L). Same area, 33°40′N, 08°45′W, 570 m, Agassiz trawl, 2 Mar 1976, *Onversaagd* Sta 154, 1♀ ov (L). Same area, 33°39′N, 08°46′W, 500 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 151, 2♀ (L).

DESCRIPTION.—Zariquiey Alvarez, 1968:329.

Figures: Zariquiey Alvarez, 1968, figs. 108c, 111Ab.

Male Pleopod: Zariquiey Alvarez, 1968, fig. 111Ab (locality not stated); Türkay, 1976a, fig. 18 (Morocco).

MEASUREMENTS.—Our specimens have carapace widths of 7 to 10 mm; the carapace width of the single ovigerous female is 10 mm.

BIOLOGY.—*Ebalia nux* is a deep water species which has been taken in depths between 80 and 2400–2500 m. In the southern part of its range it has been taken in depths between 161–168 and 875 m (A. Milne Edwards and Bouvier, 1900; Bouvier, 1922; Türkay, 1976a).

The only ovigerous female reported from African localities is that listed above; it was collected in March.

DISTRIBUTION.—Eastern Atlantic, from the British Isles to the Cape Verde Islands, Mediterranean, in depths between 80 and 2400–2500 m. Monod (1956) summarized the literature but reported no material. Since 1956 the species has been recorded from the following localities.

Morocco: 33°27.7′N, 08°50.8′W, 161–168 m, and 31°-01′N, 10°16′W, 360–375 m (Türkay, 1976a).

**Ebalia tuberculata* Miers, 1881

FIGURE 14

Ebalia tuberculata.—Capart, 1951:56, pl 2: fig. 2.—Monod, 1956:127, figs. 152–158.—Gauld, 1960:69.—Forest and Guinot, 1966:54.

SYNONYM.—*Lithadia barnardi* Stebbing, 1920.

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 22, 51 m, rough bottom, 2♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂ (L). Sta 24, 35–37 m, dark red bryozoans, 7♂, 3♀ (W). Sta 27, 33 m, 1 gynandromorph (L).

Nigeria: Sta 248, 33 m, 2♂, 2♀ ov (L).

Annobon: Sta 283, 51–55 m, nodular coralline algae, 1♀ (L).

DESCRIPTION.—Capart, 1951:56.

Figures: Monod, 1956, figs. 152–158.

Male Pleopod: Capart, 1951, pl. 2: fig. 2 (Spanish Sahara); Monod, 1956, figs. 154–158 (Morocco; Ghana).

MEASUREMENTS.—Our specimens have carapace lengths of 6 to 10 mm; the gynandromorph measures 7.6 × 8.5 mm.

REMARKS.—The specimen from *Pillsbury* Sta 27 is remarkable in that it is a bilateral gynandromorph. In dorsal view the specimen shows nothing extraordinary, but in ventral view the abdomen is most peculiar (Figure 14). The right half of the abdomen is wide and almost semicircular as in the adult female, while the left half is very narrow as in the adult male. The margin of the female half of the abdomen touches the thoracic sternum close to the bases of the pereiopods so that very little is exposed of the thoracic sternites of the first to fifth pereiopods. In the male half of the body a much larger part of the thoracic sternum is exposed and tuberculate. The right half of the thoracic sternum that is covered by the abdomen is therefore far deeper and wider than the left half. In both halves a distinct female opening is visible on the sternite of the third pereiopod (= second walking leg). The first abdominal sternite shows no pleopod on the right (= female) side, but a large male gonopod is present on the left side. This gonopod is well developed and reaches to the base of the cheliped. Its distal half is curved outward, much more strongly so than in normal specimens as shown in Capart's (1951, pl. 2: fig. 2) and Monod's (1956, figs. 154–158) figures of this organ in normal males. This difference may be caused by the abnormal condition of the present specimen. The second abdominal sternite of the gynandromorph shows a normal female pleopod on the right side and a male gonopod on the left. The second male gonopod is less than half as long as the first, but is well developed and broad. The third, fourth, and fifth abdominal somites each have a well-developed pair of female type pleopods, those on the male half of the abdomen having the same shape and practically the same size as the ones on the female half. Evidently the female characters in this specimen dominate: in the male half several female characters (female sexual opening, pleopods on the third to fifth abdominal somites) can be seen, but no male characters are noticeable in the female half. Apart from the abdomen and thoracic sternum, the specimen is perfectly symmetrical exteriorly. The internal anatomy has not been studied in our specimen. The phenomenon of gynandromorphism seems to be rather rare in Decapod Crustacea. Chace and Moore (1959: 226–231, figs. 1–4) described a case of gynandromorphism in the American lobster, and cited several previous records of similar abnormalities in that species and in the European lobster.

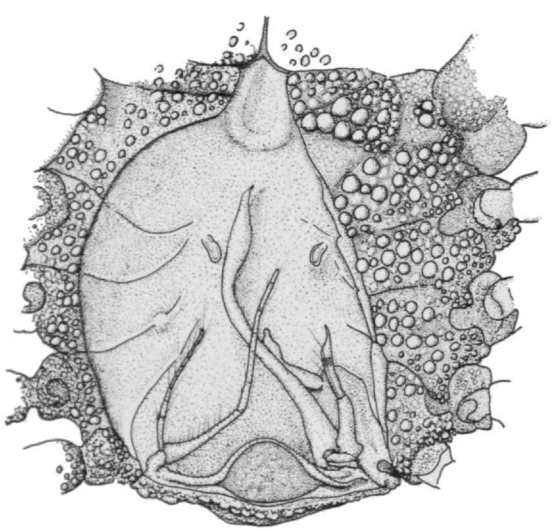

FIGURE 14.—*Ebalia tuberculata* Miers, sternal view of gynandromorph, cl 7.6 mm, *Pillsbury* Sta 27.

Bürger (1902, 1904) described a gynandromorph specimen of *Jasus frontalis* (H. Milne Edwards), and Hay (1905) mentioned the case of such a specimen in the freshwater crayfish *Orconectes propinquus* (Girard). According to Balss (1944:634, 635), apart from a case in *Lucifer*, no gynandromorphs have been reported in Decapoda other than the Macrura Reptantia. However, a gynandromorph of the Mediterranean crab, *Brachynotus gemmellari* (Rizza), was reported by Froglia and Manning (1978:700, fig. 5). In *Homarus* and *Jasus* the body of the gynandromorph usually is skewed because of the different longitudinal proportions of males and females.

Nothing irregular was found in the shape of the carapace or the thoracic appendages of this specimen of *E. tuberculata*, which in this case may be an indication that in this species the sexes are not different in size.

Both Capart (1951:56) and Guinot (1967a:247, footnote) suggest that material from South Africa referred to this species by Barnard (1950) probably belongs to a distinct species. Barnard (1955: 4) proposed *Ebalia pondoensis* for South African specimens previously identified with *E. tuberculata.*

COMMENSALS AND PARASITES.—The carapace of the gynandromorph is covered dorsally and ventrally by Bryozoa, but the appendages, sternum, and abdomen are entirely free from this growth. In the space enclosed by the abdomen and the thoracic sternum a number of sausage-shaped organisms, resembling Rhizocephala of the genus *Thompsonia,* can be seen. One such organism is fastened to the male half of the thoracic sternite of the fifth pereiopod, whereas on the female half of the abdomen seven similar organisms are present, two attached to a pleopod, the other five to the abdominal sternites.

BIOLOGY.—The depths at which this species has been taken range from 10–12 m to 135–250 m. Of the known depth records, more than 85% are from depths of less than 75 m, the optimal depth apparently being between 30 and 50 m.

Little is known of the habitat preferences of the species. The *Pillsbury* specimens were taken on rough bottom in 51 m, on bottom with bryozoans in 35–37 and 42 m, and on bottom with nodular coralline algae in 51–55 m. The species was reported from mud, sand, and compacted sand [sable construit] in 65–75 m and on mud with *Arca* in 32 m by Forest and Guinot (1966).

Apparently the species spawns all year. Ovigerous females have been recorded in January, March, April, May, and September through December (Monod, 1956; *Pillsbury*).

DISTRIBUTION.—Off West Africa, where it occurs from localities between Morocco and Angola and possibly South Africa. Monod (1956), who recorded material from Morocco, the Cape Verde Islands, Senegal, Ghana, and Angola, summarized the earlier literature. Since 1956 this species has been recorded from the following localities.

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Ghana: Accra, 37–51 m (Gauld, 1960).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

This species has not been recorded previously from Annobon.

Ebalia tuberosa (Pennant, 1777)

Ebalia tuberosa.—Lebour, 1954:236.—Monod, 1956:124, figs. 150, 151 [England, Algeria, Bonifacio, Ilhas Desertas, Canary Islands, Mauritania; references].—Zariquiey Alvarez, 1968:326, figs. 109d, 110a–c, 111a [Spain; references].—Christiansen, 1969:27, fig. 9, map 3 [Scandinavia].—Türkay, 1976a:25 [listed], 37, fig. 20 [Morocco]; 1976b:61 [listed], 63 [Madeira, Ilhas Desertas].

SYNONYMS.—*Ebalia pennantii* Leach, 1817; *Ebalia insignis* Lucas, 1849; *?Ebalia madeirensis* Stimpson, 1858.

REMARKS.—This species is included in this list of tropical species on the basis of the single juvenile female reported by Monod (1956:126) from the Banc d'Arguin, Mauritania, 21°51′N, 19° 48′W. Other specimens from the same station off the Banc d'Arguin were referred to *E. tuberculata* by A. Milne Edwards and Bouvier (1900:50). Its occurrence northward, off Spanish Sahara and Morocco, is not questioned. Christiansen (1969) did not accept Monod's record, noting

that the species occurred southward to Spanish Sahara. Lebour (1954:236) reported on some larval and postlarval specimens of *Ebalia* from the Benguela Current that she believed might be identified with this species.

DISTRIBUTION.—Eastern Atlantic, from Norway and the Hebrides southward to Mauritania (?), including the Azores and the Canary Islands, Mediterranean; sublittoral to about 138 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Genus *Merocryptus* A. Milne Edwards, 1873

Merocryptus A. Milne Edwards, 1873a:78 [type-species: *Merocryptus lambriformis* A. Milne Edwards, 1873, by monotypy; gender: masculine; name 166 on *Official List*].

Merocryptus obsoletus A. Milne Edwards and Bouvier, 1898

Merocryptus obsoletus.—Monod, 1956:132, figs. 161, 161 *bis* [Morocco; Senegal].—Guinot and Ribeiro, 1962:28, figs. 5a, b, pl. 1: figs. 1, 2, 4 [Cape Verde Islands, Senegal, Angola].

DISTRIBUTION.—Eastern Atlantic, from Morocco, the Cape Verde Islands, Senegal, and Angola, in depths between 75 and 132 m.

Subfamily ILIINAE Stimpson, 1871

Genus *Ilia* Leach, 1817

Leucosia Fabricius, 1798:313, 349 [an invalid junior homonym of *Leucosia* Weber, 1795 (Decapoda); type-species: *Cancer nucleus* Linnaeus, 1758, by subsequent designation by Latreille, 1810:97, 422; gender: feminine; name 1732 on *Official Index*].

Ilia Leach, 1817:19, 24 [type-species: *Cancer nucleus* Linnaeus, 1758, by monotypy; gender: feminine; name 1628 on *Official List*].

Thaumasta Gistel, 1848:ix [substitute name for *Leucosia* Fabricius, 1798; type-species: *Cancer nucleus* Linnaeus, 1758; gender: feminine].

Ilia nucleus (Linnaeus, 1758)

Ilia nucleus.—Monod, 1956:139 [references].—Guinot and Ribeiro, 1962:30 [Cape Verde Islands].—Zariquiey Alvarez, 1968:322, figs. 11c, 94f [Spain; references].

?Ilia nucleus spinosa.—Türkay, 1975a:71 [listed], 72 [Spanish Sahara]. [Not *Ilia spinosa* Miers, 1881.]

SYNONYMS.—*Cancer orbicularis* Olivi, 1792; *Leucosia leachii* Risso, 1822; *Ilia laevigata* Risso, 1827; *Ilia rugulosa* Risso, 1827; *Ilia parvicauda* Costa, 1853.

REMARKS.—Türkay's (1975a) record of *Ilia* from off Cabo Blanco, Spanish Sahara, may be referable to this species rather than to *I. spinosa*. Monod (1933b) recorded *I. nucleus* from the same locality, and this apparently is the southernmost limit of the species along the African mainland. *Ilia spinosa* is not known with certainty to occur north of Mauritania.

DISTRIBUTION.—Eastern Atlantic, from the Cape Verde Islands (where it occurs together with *I. spinosa*), Spanish Sahara, and from the Mediterranean, in depths between 4 and 162 m (Zariquiey Alvarez, 1968).

**Ilia spinosa* Miers, 1881

?Ilia nucleus.—Bouvier, 1911:226 [not *Ilia nucleus* (Linnaeus, 1758)].

Leucosia spinosa.—Capart, 1951:52, fig. 15.

Ilia spinosa.—Monod, 1956:136, 632, figs. 164–166.—Buchanan, 1958:28, 54.—Longhurst, 1958:87.—Lebour, 1959:133, 135, 136, 137, fig. 21 [larvae].—Gauld, 1960: 69.—Rossignol, 1962:114.—Guinot and Ribeiro, 1962:30, pl. 4: fig. 1.—Crosnier, 1964:38.—Ribeiro, 1964:4.—Forest and Guinot, 1966:55.—Crosnier, 1967:323.—Le Loeuff and Intès, 1968:31, table 1.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 1 juv (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂, 1 juv (W). Sta 46, 38–42 m, mud bottom with dense *Jullienella*, 2♂, 1♀ (W). Sta 48, 22 m, 1♂ (W). Sta 62, 46 m, brown, branching and foliate Foraminifera, 3♂, 1♀ (L). Sta 63, 64 m, sandy mud with shells, 5♂ (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂, 4♀ (L). Sta 22, 51 m, rough bottom, 4♂, 1♀ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 7♂, 1♀, 1 juv (W). Sta 24, 35–37 m, dark red bryozoans, 10♂, 10♀ (L). Sta 26, 27 m, shell bottom (scallops), 2♀ (L).

Nigeria: Sta 246, 37 m, 1♂ (W). Sta 248, 33 m, 12♂, 14♀ (11 ov) (W). Sta 252, 30 m, mud: 1♀ ov (L).

Cameroon: Sta 260, 46 m, 2♀, 1 juv (L).

Other Material: Senegal: 13°01′N, 17°24′W, 51–55 m,

mud, stones, calcareous algae, sand, Foraminifera, 15 May 1956, *Calypso* Sta 3, 1♀ ov (W).

Cameroon: 02°39′N, 09°40′E, 50–65 m, mud, 22 Aug 1963, A. Crosnier, 2♀ (1 ov) (W).

DESCRIPTION.—Capart, 1951:52.

Figures: Monod, 1956, figs. 164–166.

Male Pleopod: Monod, 1956, figs. 165, 166 (Senegal).

Color: Capart (1951:53) noted that in this species "Le carapace est orangé clair, les épines et appendices presque blancs."

MEASUREMENTS.—Our specimens have carapace lengths of 5 to 17 mm; the carapace lengths of ovigerous females are 10 to 16 mm.

REMARKS.—In none of our specimens are the posterolateral spines of the carapace so well developed as shown for a specimen from Angola by Guinot and Ribeiro (1962, pl. 4: fig. 1).

It seems likely that Türkay's (1975a) record of *Ilia nucleus spinosa* from Spanish Sahara is based on material of *I. nucleus* (Linnaeus) rather than *I. spinosa.* For that reason we have placed it in the synonymy of the latter species.

Guinot and Ribeiro (1962) noted that one of their specimens from the Cape Verde Islands was similar to *I. nucleus* in having relatively short posterolateral spines on the carapace. Apparently both species occur in the Cape Verde Islands. Bouvier (1911:226) reported *I. nucleus* from Baie de l'Ouest, Mauritania, and noted "avec passage à la *spinosa*, Miers."

BIOLOGY.—This species lives in relatively shallow water, in depths between 6 and 132 m. Of 49 depth records in Monod (1956), 1 was at 132 m, 1 at 96 m, 1 at 75 m, and 46 were at 50 m or less. Apparently, like many of the leucosiids, it prefers soft bottoms with harder (larger?) substances in it. Sourie (1954b) found it on coarse shelly sand, bottom with *Arca* and *Pyura*, in 10–12 m in the Baie de Dakar, and Buchanan (1958) took it in the silty sand community with *Jullienella* off Ghana. Crosnier (1964) reported that it was found on mud or sandy mud in cold water off Cameroon. Forest and Guinot (1966) reported it from a variety of substrates in depths between 18 and 90–100 m. Most of the *Pillsbury* specimens were taken on bottom with shell, bryozoans, or Foraminifera.

Ovigerous females have been collected in May, June, July, August, October, November, and December (Capart, 1951; Monod, 1956; Forest and Guinot, 1966; Crosnier, 1967; *Pillsbury*).

DISTRIBUTION.—Off West Africa, from the Canary Islands, the Cape Verde Islands, and Mauritania southward to Angola, in depths between 4 and 132 m, generally in less than 50 m. Monod (1956) reported material from Mauritania, Senegal, Guinea, Sierra Leone, Ghana, and Principe. In addition, the species has been recorded from the following localities.

Cape Verde Islands: Baía de Porto Grande, São Vicente, 8 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Mauritania: Baie de l'Ouest (Bouvier, 1911).

Senegal: 13°01′N, 17°24′W, 51–55 m, and 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 18 m (Forest and Guinot, 1966).

Guinea: 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, in 8–32 m (Longhurst, 1958).

Ivory Coast: Off Jacqueville and Grand-Bassam, 40–100 m (Le Loeuff and Intès, 1968).

Ghana: 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m; 04°36.5′N, 01°31′W, 50 m; 04°37′N, 00°50′W, 90–100 m (all Forest and Guinot, 1966). Off Accra (Buchanan, 1958); in 20–55 m (Gauld, 1960).

Cameroon: No specific locality (Crosnier, 1964).

Principe: 01°38′25″N, 07°22′05″E, 31 m (Forest and Guinot, 1966).

Annobon: 01°25′30″S, 05°39′E, 52 m (Crosnier, 1967).

Gabon: 00°40′S, 08°46′25″E, 18 m, and 00°38′20″S, 08°48′30″E, 35 m (Forest and Guinot, 1966).—W of Mayumba, 20 m (Rossignol, 1962).

Congo: W of Pointe-Noire, 20–30 m (Rossignol, 1962).

Angola: Baía Farta, Benguela, 40 m (Guinot and Ribeiro, 1962).

Lebour (1959) recorded larvae of this species from the following localities: Guinea, 10°22′N, 16°34′W; Sierra Leone, 08°22′N, 14°08′W; Ghana, 05°44′N, 01°02′E; Cameroon, 04°01′N, 07°23′E; and Angola, 07°35′S, 12°46′E.

Subfamily LEUCOSIINAE Samouelle, 1819

Genus *Philyra* Leach, 1817

Philyra Leach, 1817:18, 22 [type-species: *Leucosia globulosus*

Bosc, 1802, a subjective junior synonym of *Cancer globus* Fabricius, 1775, by subsequent designation by H. Milne Edwards, 1837, in 1836–1844, pl. 24: fig. 4 (as *Philyra globulosa*); gender: feminine; name 1642 on *Official List.*]

Philyra cristata Miers, 1881

Philyra cristata.—Monod, 1956:144, figs. 177–183 [Senegal, Guinea, Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].—Rossignol, 1962:115 [Congo].—Forest and Guinot, 1966:56 [Guinea; São Tomé].

DISTRIBUTION.—West Africa, from Senegal to the Congo, in depths between 4 and 25 m.

* *Philyra laevidorsalis* Miers, 1881

Philyra laevidorsalis.—Capart, 1951:47, fig. 13.—Monod, 1956:141, figs. 169–176.—Rossignol, 1957:77.—Longhurst, 1958:87.—Buchanan, 1958:20.—Gauld, 1960: 69.—Rossignol, 1962:115.—Forest and Guinot, 1966:56.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 47, 37 m, bottom with *Jullienella*, 1♂ (W).

Other Material: Liberia: Off St. Paul River, Monrovia, 22–29 m, trawl, 4 Nov 1953, G. C. Miller, 1♂ (W).

Ivory Coast: Off Sassandra, 11 m, 3 Apr 1964, Guinean Trawling Survey, Tr 22, Sta 1, 4♂, 6♀ (L).

DESCRIPTION.—Capart, 1951:47.

Figures. Monod, 1956, figs. 169–176.

Male Pleopod: Monod, 1956, figs. 173–176 (Senegal).

Color: Rossignol (1957) noted that this species is a uniform gray beige, with the ventral surface lighter. Capart (1951:47) reported that this species has "couleur uniforme gris brunâtre, plus claire sur la face inférieure; telson blanc ivoire."

MEASUREMENTS.—Our specimens have carapace lengths of 6 to 11 mm.

BIOLOGY.—*Philyra laevidorsalis* is a coastal species, generally found in shallow water, in depths between 4 and 18–30 m. Longhurst (1958) found it in 9–86 m off Sierra Leone, but all other depth records in the literature are from 20–25 m or less. Sourie (1954b) found it on coarse shelly sand, bottom with *Arca* and *Pyura*, in the Baie de Dakar, and Buchanan (1958) characterized it as a member of the active epifauna, inshore fine sand community, in 3–8 fm (5–15 m) off Ghana. Off Sierra Leone, Longhurst (1958) found it on shelly sand. Forest and Guinot (1966) reported it from mud in 18–30 m, shells in 20–25 m, calcareous algae in 10–12 m, and calcareous algae, sand and mud or shells in 6 to 11 m.

Ovigerous females have been collected in April and May (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—West coast of Africa, from Cap Blanc, Mauritania, southward to Angola, including the Cape Verde Islands and Principe, in shallow water, from a depth of 4 m to about 30 m. Monod (1956), who summarized the earlier literature, reported material from Senegal and Ghana. Since 1956 it has been recorded from the following localities.

Guinea: 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 9–86 m (Longhurst, 1958).

Ivory Coast: 05°03′N, 05°25′W, 20–25 m (Forest and Guinot, 1966).

Ghana: Accra, 3–8 fm (5–15 m) (Buchanan, 1958). Off Accra and Takoradi, 15–20 m (Gauld, 1960).

Principe: Between Ponta da Mina and Ilhéu Santana, 10–12 m; in front of (Cais de) Santana, 11 m; and between Ponta da Mina and Ponta Novo Destino, 6 m (all Forest and Guinot, 1966).

Congo: Pointe-Noire, beach (Rossignol, 1957). Baie de Pointe-Noire, 7–15 m (Rossignol, 1962).

Genus *Pseudomyra* Capart, 1951

Pseudomyra Capart, 1951:48 [type-species: *Pseudomyra mbizi* Capart, 1951, by original designation and monotypy; gender: feminine].

* *Pseudomyra mbizi* Capart, 1951

Pseudomyra mbizi Capart, 1951:49, fig. 14, pl. 2: fig. 24.—Monod, 1956:140, figs. 167, 168.—Rossignol, 1962:115.—Guinot and Ribeiro, 1962:30.—Crosnier, 1964:35.—Forest and Guinot, 1966:56.—Voss, 1966:35.—Le Loeuff and Intès, 1968:40.—Maurin, 1968b:491, 492.—Crosnier, 1970:1215, 1216.

Pseudomyra.—Voss, 1966:33, 36.

Pseudomyra m'bizi.—Le Loeuff and Intès, 1968, table 1 [erroneous spelling]; 1969:66.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia:

Sta 68, 70 m, broken shell, 19♂, 32♀ (23 ov), 7 juv (W). Sta 69, 29 m, coral or rock, 1♂ (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 174♂, ♀, juv (L,W). Sta 45, 73–97 m, 9♂, 3♀ (W). Sta 49, 73–77 m, 11♂, 3♀, 7 juv (L). Sta 50, 128–192 m, 1♂, 2♀ (W). Sta 59, 55–64 m, mud with dense, branched Foraminifera, 5♂, 4♀ (W). Sta 60, 79–82 m, coral or rock, 3♂ (L). Sta 62, 46 m, brown, branching and foliate Foraminifera, 45♂, 26♀ (L). Sta 63, 64 m, sandy mud with shells, 11♂, 6♀ (1 ov), 2 juv (L).

Ghana: Sta 28, 49–53 m, 1♂, 1♀ (W). Sta 29, 58–60 m, 1♂ (L). Sta 32, 110 m, 2♂, 1♀ (L).

Nigeria: Sta 232, 100–132 m, green mud, 2♂ (W). Sta 236, 101–128 m, coral ground, rough, 3♂ (L). Sta 237, 101 m, 13♂, 7♀ (4 ov), 7 juv (W). Sta 239, 73 m; 20♂, 7♀ (5 ov), 4 juv (L,W). Sta 241, 59–63 m, mud and shell: 9♂, 6♀ (5 ov) (L). Sta 245, 64–119 m, mud, 4♂, 2♀ (1 ov) (W). Sta 246, 37 m, 3♂ (L). Sta 254, 148–174 m, 3♂, 3♀ (2 ov), 2 juv (L).

Cameroon: Sta 259, 59 m, mud and broken shell, 4♂ (L).

Geronimo Material: Gabon: Sta 185, 200 m, 3♂, 5♀ (W). Sta 187, 300 m, 8♂, 6♀ (W).

Undaunted Material: Angola: Sta 103, 90 m, 1♀ (L).

Other Material: Ivory Coast: Off Grand-Lahou, 20 m, dredge, 31 Mar 1964, Guinean Trawling Survey, Tr 24, Sta 1, 1♀ ov (L).

DESCRIPTION.—Capart, 1951:50.

Figures: Monod, 1956, figs. 167, 168.

Male Pleopod: Capart, 1951, pl. 2: fig 24 (Congo); Monod, 1956, fig. 167 (Senegal).

Color: Capart (1951:51) noted that the color was "rose orangé avec extrémités des pinces et pattes plus claires."

MEASUREMENTS.—Our specimens have carapace lengths of 4 to 19 mm; carapace lengths of ovigerous females range from 10 to 17 mm.

BIOLOGY.—This species inhabits moderate depths, between 12–15 and 300 m, occurring most frequently between 50 and 100 m; 57% of the material reported by Capart (1951) and 54% of our material occurred in depths between 50 and 100 m. Crosnier (1964) noted that the species was eurythermic, occurring over most of the continental shelf off Cameroon. It apparently prefers mud or muddy sand. Maurin (1968b) found it on mud or very muddy fine sand in 40–50 m, and Forest and Guinot (1966) took it on sand, mud and shell in 64 m and on rocks and mud in 90–105 m. Our specimens were taken on a variety of bottoms, including mud with Foraminifera, sandy mud with shells, broken shell, coral or rock, or on plain mud or green mud.

Le Loeuff and Intès (1968:40) noted: "Rarement pêché au-dessus de 50 mètres, *P. mbizi* fréquente les fonds de toute la partie profonde du plateau continental [of the Ivory Coast], c'est-à-dire des eaux froides et salées—température inférieure à 20°C, salinité supérieure à 35,4 o/oo—et des sédiments sablo-vaseux."

Ovigerous females have been recorded in March, April, May, June, July, August, October, and December (Capart, 1951; Guinot and Ribeiro, 1962).

DISTRIBUTION.—Off West Africa, from scattered localities between northern Senegal and Angola, in depths between 12–15 and 300 m, usually between 50 and 100 m. Judging from records in the literature, it is most abundant in the central part of its range, from the Ivory Coast to the Congo. Monod (1956) recorded material from Senegal. Since 1956 it has been recorded from the following localities.

Senegal: Off Saint-Louis, 75–85 m, and off Mboro, 40–50 m (Maurin, 1968b).

Liberia: 04°34.5′N, 08°31′W, 64 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Grand-Lahou, off Grand-Bassam, 50–200 m (Le Loeuff and Intès, 1968).

Nigeria: Off the mouths of the Niger River, 04°05′N, 05°28′E, 90–105 m (Forest and Guinot, 1966). 05°56′N, 04°27′E to 05°54′N, 04°27′E, 101–132 m; 04°56′N, 05°00′E to 04°54′N, 05°05′E, 73 m; 04°32′N, 05°07′E to 04°31′N, 05°13′E, 64–119 m (Voss, 1966).

Cameroon: No specific locality (Crosnier, 1964).

Gabon: W of Mayumba, 20 m (Rossignol, 1962).

Congo: W of Pointe-Noire, 100 m (Rossignol, 1962).

Angola: 2 miles [3.2 km] S of Luanda lighthouse, Luanda, 50 m; Luanda, 80 m; and Baía Farta, Benguela (Guinot and Ribeiro, 1962). 17°06′S, 11°35′E, 90 m (Crosnier, 1970).

Family BELLIIDAE Dana, 1852

CYCLINEA Dana, 1851b:122, 131.

BELLIDEA Dana, 1852a:119 [corrected to Belliidae by Guinot, 1976:15.]

ACANTHOCYCLIDAE Dana, 1852b:145.

REMARKS.—This family is not represented in

the eastern Atlantic. Guinot (1976) provided a recent review of the family.

Family ATELECYCLIDAE Ortmann, 1893

ATELECYCLIDAE Ortmann, 1893a:27 [name 369 on *Official List*].
CHEIRAGONIDAE Ortmann, 1893b:413, 419.

EASTERN ATLANTIC GENERA.—One, *Atelecyclus*, represented in the tropical fauna of West Africa.

EASTERN ATLANTIC SPECIES.—Two, both occurring in Europe as well as off tropical West Africa. Monod (1956) included accounts of both species, as follows, but had material of only one:

Name in Monod	Current Name
Atelecyclus septemdentatus	*Atelecyclus rotundatus*
Atelecyclus undecimdentatus	*Atelecyclus undecimdentatus*

REMARKS.—Neither species was taken by the *Pillsbury*.

Genus *Atelecyclus* Leach, 1814

Atelecyclus Leach, 1814:430 [type-species: *Cancer (Hippa) septemdentatus* Montagu, 1813, a subjective junior synonym of *Cancer rotundatus* Olivi, 1792, by monotypy; gender: masculine; name 1608 on *Official List*].

Atelecyclus rotundatus (Olivi, 1792)

Cancer rotundatus Olivi, 1792, pl. 2: fig. 2.
Atelecyclus rotundatus.—Sourie, 1954b:150.—Forest, 1958:472, fig. 2 [references].—Pérès, 1964:20.—Forest and Guinot, 1966:57.—Maurin, 1968a:30.—Zariquiey Alvarez, 1968: 342, figs. 1d, 112b [Spain; references].—Christiansen, 1969:37, fig. 13, map 7 [Scandinavia].—Türkay, 1976a:25 [listed], 37, fig. 21 [Portugal].
Atelecyclus septemdentatus.—Bouvier, 1911:236.—Monod, 1956:148.—Longhurst, 1958:87.
Atelecyclus.—Maurin, 1968a, fig. 13.

SYNONYMS.—*Cancer septemdentatus* Montagu, 1813; *Atelecyclus heterodon* Leach, 1815.

MATERIAL EXAMINED.—*Pillsbury Material:* None. *Geronimo Material:* Gabon: Sta 211, 100 m, 1♀ (W).

DESCRIPTION.—Christiansen, 1969:37.
Figure: Christiansen, 1969, fig. 13.
MEASUREMENTS.—Our specimen, a non-ovigerous female, has a carapace length and a carapace width of 15 mm.

REMARKS.—Our specimen agrees well with the accounts of this species given by Christiansen (1969) and Forest (1958). The latter author established the identity of *A. rotundatus* (Olivi, 1792) with *A. septemdentatus* (Montagu, 1813).

A comparison of our young specimen with material of this species from the Mediterranean shows that the West African specimen has a considerably rougher carapace; no other differences were observed.

BIOLOGY.—Little is known about the habitat requirements of this species, which, as Forest (1958) noted, lives from shallow water to a depth of 200–300 m; Forest questioned the validity of some early records from very deep water. Off Scandinavia, Christiansen (1969) found it on sand and soft bottom, often with gravel and small stones, in depths between 15–40 and 190–324 m. Longhurst (1958) collected it on shelly sand in 121–160 m. Pérès (1964) recorded it from reddish gravel with shell debris in 210 m off the Banc de Spartel, and Maurin (1968a) reported it from muddy sand and sandy detritus in 10–30 m. It was collected on mud, rocks, calcareous algae, sand, and Foraminifera by the *Calypso* (Forest and Guinot, 1966).

DISTRIBUTION.—Eastern Atlantic, from Scandinavia and the Hebrides southward to South Africa, including the Mediterranean, and, off the African Coast, a few localities between Morocco and Gabon, as well as the Cape Verde Islands; littoral to about 300 m. Monod (1956) summarized the literature but recorded no material of this species. In addition, the species has been recorded from the following localities.

Morocco: Banc de Spartel, 35°54′N, 06°14′W, 210 m (Pérès, 1964). Between Cap Rhir (as Cap Ghir) and Cap Drâa (as Cap Noun), 10–30 m (Maurin, 1968a).

Mauritania: Baie de l'Ouest (Bouvier, 1911).

Senegal: Baie de Dakar, 0–17 m (Sourie, 1954b). 13°01′N, 17°24′W, 51–55 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 121–160 m (Longhurst, 1958).

Although Gabon is well within the known

range of the species, it is the southernmost locality on the tropical mainland.

Atelecyclus undecimdentatus (Herbst, 1783)

Atelecyclus cruentatus.—Capart, 1951:136, pl. 2: fig. 7 [Spanish Sahara].

Atelecyclus undecimdentatus.—Monod, 1956:148, figs. 184–186 [Mauritania, Senegal, Gambia, Gabon; references].—Forest, 1958:472, fig. 1 [references].—Longhurst, 1958:87 [Sierra Leone].—Forest and Gantès, 1960:350 [Morocco].—Zariquiey Alvarez, 1968:342, fig. 112d [Spain; references].—Maurin, 1968b:486, 489, fig. 4 [Mauritania].—Bas, Arias, and Guerra, 1976, table 3 [Spanish Sahara].

SYNONYMS.—*Atelecyclus cruentatus* Desmarest, 1825; *Atelecyclus omiodon* Risso, 1827.

DISTRIBUTION.—Eastern Atlantic, from France to Gabon, Mediterranean, from shore to about 30 m.

Family THIIDAE Dana, 1852

THIIDAE Dana, 1852a:120 [name 361 on *Official List*, dated 1862 in error].

EASTERN ATLANTIC GENERA.—One, *Thia*, represented in the fauna of tropical West Africa.

EASTERN ATLANTIC SPECIES.—One (possibly two), occurring off tropical West Africa. The species reported as *Thia residua* by Monod (1956) is now known as *Thia scutellata*.

REMARKS.—This family was not represented in the *Pillsbury* collections.

Genus *Thia* Leach, 1815

Thia Leach, 1815a:312 [type-species: *Thia polita* Leach, 1815, a subjective junior synonym of *Hippa scutellatus* Fabricius, 1793, by monotypy; gender: feminine; name 1577 on *Official List*].

Thia scutellata (Fabricius, 1793)

Hippa scutellata Fabricius, 1793:474.

Thia residua.—Monod, 1956:153, figs. 186 *bis*, 186 *ter* [Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].

Thia scutellata.—Zariquiey Alvarez, 1968:343, fig. 111f [Spain; references].—Christiansen, 1969:40, fig. 14, map 8 [Scandinavia].

Thia sp. aff. *residua.*—Forest and Guinot, 1966:57, fig. 3 [São Tomé].

SYNONYMS.—*Cancer residuus* Herbst, 1799; *Thia polita* Leach, 1815; *Thia blainvillii* Risso, 1822.

REMARKS.—Forest and Guinot (1966) pointed out several differences between Monod's and their specimens from West Africa and European specimens and suggested that a direct comparison of material from the two areas might result in the recognition of a small, distinct West African species.

DISTRIBUTION.—Eastern Atlantic, from the British Isles and Sweden southward to Portugal, Mediterranean, and off Sierra Leone and São Tomé in the Gulf of Guinea; usually in depths between 10 and 25 m.

Family CANCRIDAE Latreille, 1803

Cancerides Latreille, 1803b:350 [corrected to Cancridae by MacLeay, 1838:59].

TRICHOCERIDAE Dana, 1852a:120.

EASTERN ATLANTIC GENERA.—One, not represented in the tropical fauna, is *Cancer* Linnaeus, 1758:625. Type-species: *Cancer pagurus* Linnaeus, 1758, by subsequent designation by Latreille, 1810:422; gender: masculine; name 491 on *Official List*.

EASTERN ATLANTIC SPECIES.—Two, both extralimital:

Cancer bellianus Johnson, 1861. Shetland Islands and Iceland southward to Canary Islands, Madeira (Türkay, 1976b), and Spanish Sahara (Maurin, 1968b); sublittoral, to 620 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Cancer pagurus Linnaeus, 1758. Northern Norway to the Mediterranean; sublittoral, between 6 and 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Family PIRIMELIDAE Alcock, 1899

Pirimélides A. Milne Edwards, 1862a:41; 1865:181, 204.

PIRIMELINAE Alcock, 1899a:5, 95. [Elevated to Pirimelidae by Bouvier, 1940:217.]

PERIMELIDAE Monod, 1956:147, 157. [Unjustified emendation.]

EASTERN ATLANTIC GENERA.—Two, *Pirimela* and *Sirpus*, both represented in the fauna of tropical West Africa.

EASTERN ATLANTIC SPECIES.—Four, three of which occur in tropical waters. The extralimital species, *Sirpus zariquieyi* Gordon, 1953, occurs in the Mediterranean (Lewinsohn and Holthuis, 1964; Zariquiey Alvarez, 1968).

REMARKS.—Monod (1956) recorded two species from West Africa, as listed below, and we add a previously undescribed species of *Sirpus* (*S. gordonae*), the only representative of the family collected by the *Pillsbury*:

Name in Monod	Current Name
Perimela denticulata	*Pirimela denticulata*
Sirpus monodi	*Sirpus monodi*

Genus *Pirimela* Leach, 1816

Pirimela Leach, 1816, in 1815–1875, pl. 3 [type-species: *Cancer denticulatus* Montagu, 1808, by monotypy; gender: feminine; name 181 on *Official List*].

Perimela Agassiz, 1846:280, 293 [unjustified emendation of *Pirimela* Leach, 1816; type-species: *Cancer denticulatus* Montagu, 1808; gender: feminine].

Pirimela denticulata (Montagu, 1808)

Pirimela denticulata.—Bouvier, 1911:226 [?Mauritania; listed].—Zariquiey Alvarez, 1968:350, figs. 7a, 11d, 112a, 113a [Spain; references].—Christiansen, 1969:46, fig. 17, map 11 [Scandinavia].—Türkay, 1976b:61 [listed], 64 [Madeira].

Perimela denticulata.—Capart, 1951:137 [Spanish Sahara].—Monod, 1956:157, figs. 187–190 [Mauritania, Senegal, Gabon(?)].

SYNONYM.—*Pirimela princeps* Hope, 1851.

DISTRIBUTION.—Eastern Atlantic, from Norway to Senegal, Mediterranean, usually in shallow water, intertidal to 40–50 m. There is one questionable record from Gabon (Monod, 1956); Bouvier (1940) recorded material to a depth of 200 m.

Genus *Sirpus* Gordon, 1953

Sirpus Gordon, 1953a:304 [type-species: *Sirpus zariquieyi* Gordon, 1953, by original designation and monotypy; gender: masculine].

Sirpus monodi Gordon, 1953

Sirpus monodi.—Monod, 1956:159, figs. 191–193 [Mauritania, Senegal; references].—Rossignol, 1962:115 [Congo].—Monod, 1963, fig. 33 [no locality].

Zirpus Monodi.—Monod, 1963:124 [erroneous spelling].

DISTRIBUTION.—Off West Africa, from Mauritania, Senegal, and the Congo, intertidal to a depth of 12 m.

* *Sirpus gordonae*, new species

FIGURE 15

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 271, shore, 3♂ (includes holotype), 3♀ (L,W).

DESCRIPTION.—Carapace (Figure 15*a*,*b*) about as long as wide, greatest width behind postorbital tooth, at level of first anterolateral tooth. Front (Figure 15*a*,*b*) 3-lobed rather than 3-toothed as in *Sirpus monodi* Gordon and *S. zariquieyi* Gordon, median lobe bluntly triangular, extending farthest anteriorly, submedian lobes shorter, rounded triangular in shape, pointed or with small, sharp, almost granuliform apex. Anterior supraorbital angle triangularly pointed or rounded, with small granuliform apex. Dorsal orbital margin straight, sloping posteriorly, terminating in distinct incision. Posterior orbital margin, between incision and postorbital tooth, rounded or angular. Postorbital tooth large, sharply pointed, curved anteriorly. Lateral margin (Figure 15*a*,*b*), posterior to postorbital tooth, with 3 spiniform teeth, anteriormost larger than postorbital, with margins, particularly anterior, crenulate. Posterior 2 lateral teeth short, small, contrasting greatly with anterior tooth, terminating in sharp apices, often dorsally directed or twisted. Surface of carapace strongly areolated, in this resembling other *Sirpus* species, with elevations as follows: 2 protogastric, 1 mesogastric,

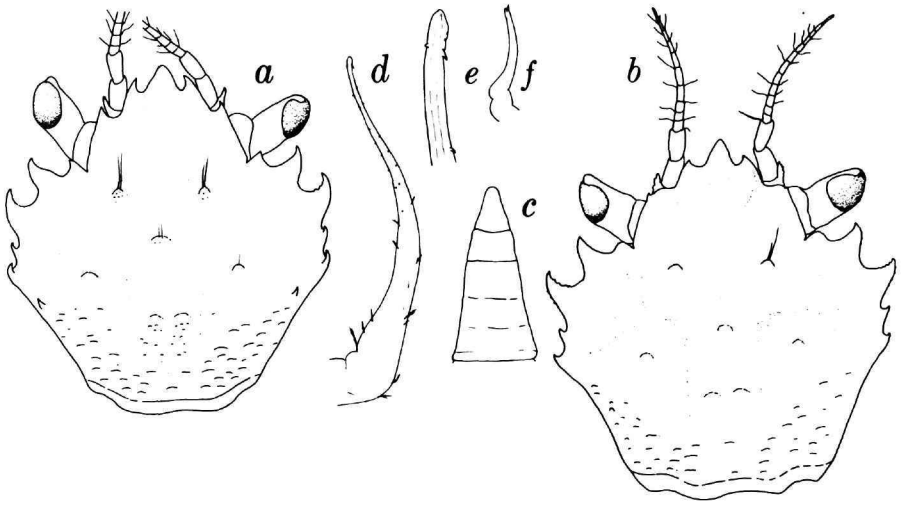

FIGURE 15.—*Sirpus gordonae*, new species, paratypes. Female, cl 2.8 mm, *Pillsbury* Sta 271: *a*, carapace. Male, cl 2.8 mm, *Pillsbury* Sta 271: *b*, carapace; *c*, abdomen; *d*, first pleopod; *e*, apex of first pleopod; *f*, second pleood.

1 on each branchial region, and 2 submedian on cardiac region. No elevation present at base of posterior lateral tooth, but small spinule or tooth there on dorsal surface of carapace in some specimens. Posterior part of carapace rugose, with short transverse striae, as in other species of genus.

Lower border of orbit terminating in blunt tooth. Antepenultimate segment of antennular peduncle, forming part of orbital floor, terminating in distinct anterior spine and spinules. Antennal peduncle extending beyond front.

Male abdomen (Figure 15*c*) broader than that of *S. zariquieyi*, with third to fifth somites fused, longer than sixth somite and telson combined. Sixth somite distinctly wider than long. Female abdomen with 6 free somites.

First pleopod of male (Figure 15*d,e*) strongly resembling that of *S. zariquieyi*, apex blunter. Second pleopod of male (Figure 15*f*) with apex divided into blunt and sharply triangular lobes.

MEASUREMENTS.—Carapace lengths of males 2.5 to 2.8 mm, of females 2.8 to 3.1 mm. Adult specimens of *S. zariquieyi* have carapace lengths of 3.4 to 5.1 mm, and whereas in *S. monodi* ovigerous females with carapace lengths of 4.5 to 7.0 mm are known, the smallest representative of that species, with a carapace length of 3.9 mm, probably is immature. Sexually mature specimens of *S. gordonae* are smaller than any of the known specimens of the other two species.

REMARKS.—*Sirpus gordonae* can immediately be distinguished from the two other species of the genus by the shape of the front. In *Sirpus zariquieyi* (Gordon, 1953a, 1953b) the front consists of three sharp teeth, which are fused only in their extreme basal portion and of which the central one is distinctly shorter than the two lateral. In *S. monodi* Gordon (1953b) the three teeth are likewise separated for almost their entire length, and also are sharp, but here the median tooth is of about the same length as the others. In *S. gordonae* the front is a broad plate-like projection which only at the top bears three short broad teeth, the median of which is blunt and reaches distinctly beyond the lateral. The last of the anterolateral teeth of the carapace in *S. zariquieyi* and *S. monodi* is large, being about as large or larger than the postorbital tooth. In *S. gordonae* this posterior anterolateral tooth is much smaller than the postorbital tooth. The large blunt tubercle that is present on the dorsal surface of the carapace at the base of the last anterolateral tooth in *S. zariquieyi* and *S. monodi* is absent in *S. gordonae*.

TYPE-LOCALITY.—Annobon Island, 01°25′S, 05°38′E, Gulf of Guinea.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31543), a male specimen with carapace length and width 2.6 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Two paratypes, a male and a female, also are in that collection and a male and two female paratypes (USNM 169534) are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C.

ETYMOLOGY.—It is a great pleasure to dedicate this new species to Dr. Isabella Gordon, British Museum (Natural History), who was the first to make the existence of the genus *Sirpus* known to the world and who exhaustively treated the first two species assigned to it.

DISTRIBUTION.—Our material of *Sirpus gordonae* was obtained at Annobon during a fish poison station at a sandy beach in a rocky cove. *Sirpus zariquieyi* is a Mediterranean species, known from scattered localities between Spain and Israel; it has been found in depths between 1 to about 40 m. *Sirpus monodi* is known from NW Africa, from Mauritania and Senegal, and has been taken in depths between 0 and 12 m. This represents the first find of the genus in the southern hemisphere.

Family CORYSTIDAE Samouelle, 1819

CORYSTIDAE Samouelle, 1819:82 [name 357 on *Official List*].
NAUTILOCORYSTIDAE Ortmann, 1893a:26, 28.
EURYALIDAE Rathbun, 1930:10.

EASTERN ATLANTIC GENERA.—Two, only one of which, *Nautilocorystes*, is represented in the tropical fauna. The other genus is *Corystes* Bosc (1802:65). Type-species: *Hippa dentata* Fabricius, 1793, by monotypy; gender: masculine; name 1571 on *Official List*.

EASTERN ATLANTIC SPECIES.—Two, the first of which is the only species of the family occurring in tropical waters:

Nautilocorystes ocellatus, was first discovered there after Monod's account of the tropical species; Monod remarked (1956:155) that it occurred as far north as 17°S. No representatives of the family were taken by the *Pillsbury*.

Corystes cassivelaunus (Pennant, 1777). Southern Norway and Sweden southward to Gibraltar and the Mediterranean, in depths between 7 and 90 m; both Zariquiey Alvarez (1968) and Christiansen (1969) gave accounts of this species.

Genus *Nautilocorystes* H. Milne Edwards, 1837

Dicera de Haan, 1833:14 [invalid junior homonym of *Dicera* Germar, 1817 (Hymenoptera); type-species: *Corystes* (*Dicera*) *octodentata* de Haan, 1833, a subjective junior synonym of *Corystes ocellatus* Gray, 1831, by monotypy; gender: feminine].
Nautilocorystes H. Milne Edwards, 1837:149 [type-species: *Nautilocorystes ocellatus* H. Milne Edwards, 1837, an invalid junior homonym of *Corystes ocellatus* Gray, 1831, by monotypy; gender: masculine].
Alyptes Gistel, 1848:ix [substitute name for *Dicera* de Haan, 1833; type-species: *Corystes* (*Dicera*) *octodentata* de Haan, 1833, a subjective junior synonym of *Corystes ocellatus* Gray, 1831; gender: masculine].

Nautilocorystes ocellatus (Gray, 1831)

Corystes ocellata Gray, 1831:39.
Nautilocorystes ocellata.—Barnard, 1950:303, figs. 57a–c [South Africa].—Monod, 1956:155 [Great Fish Bay (= Baía dos Tigres), Angola].—Rossignol, 1962:115 [listed].—Crosnier, 1967:324 [Congo].
Nautilocorystes ocellatus.—Capart, 1951:110, fig. 38 [Walvis Bay, Southwest Africa].

SYNONYMS.—*Corystes* (*Dicera*) *octodentata* de Haan, 1833; *Nautilocorystes ocellatus* H. Milne Edwards, 1837.

DISTRIBUTION.—South Africa and South-West Africa northward to Angola and off the Congo, in depths between 18 and 82 m.

Family BYTHOGRAEIDAE Williams, 1980

BYTHOGRAEIDAE Williams, 1980:444.

This family, comprising a single genus and species from the Galapagos Rift in the eastern Pacific, is not represented in the study area.

Family PORTUNIDAE Rafinesque, 1815

PORTUNIDIA Rafinesque, 1815:97 [corrected to Portunidae by Samouelle, 1819:83; name 69 on *Official List*].
MEGALOPIDAE Haworth, 1825:184.

CARCINIDAE MacLeay, 1838:59.
LUPINAE Dana, 1851b:129.
ARENAEINAE Dana, 1851b:129.
PLATYONYCHIDAE Dana, 1851b:130.
PODOPHTHALMIDAE Dana, 1851b:130.
Neptuniden Nauck, 1880:65.
THALAMITINAE Miers, 1886:170, 193.
CAPHYRINAE Miers, 1886:170.
POLYBIIDAE Ortmann, 1893a:66, 68.
CARUPIDAE Ortmann, 1893a:66, 68.
LISSOCARCINIDAE Ortmann, 1893a:67, 87.
LUPOCYCLOIDA Alcock, 1899a:22.
PORTUMNINAE Ortmann, 1899:1170.
GONIOCAPHYRINAE Borradaile, 1900:577.
XAIVIDAE Berg, 1900:224.
CATOPTRINAE Borradaile, 1902a:200.
LIOCARCININAE Rathbun, 1930:18.
MACROPIPINAE Stephenson and Campbell, 1960:75, 76, 88.

EASTERN ATLANTIC GENERA.—Twelve, of which nine, *Bathynectes*, *Callinectes*, *Carcinus*, *Cronius*, *Liocarcinus*, *Macropipus*, *Portunus*, *Thalamita*, and *Xaiva*, are represented by tropical species. Three genera do not occur in the tropical region:

Charybdis de Haan (1833:3, 10). Type-species: *Cancer sexdentatus* Herbst, 1783, a subjective junior synonym of *Cancer feriatus* Linnaeus, 1758, by subsequent designation by Glaessner (1929:113); gender: feminine; name 1616 on *Official List.*

Polybius Leach (1820, in 1815–1875, pl. 9b: figs. 1–4). Type-species: *Polybius henslowii* Leach, 1820, by monotypy; gender: masculine; name 184 on *Official List.*

Portumnus Leach (1814:391, 429–430). Type-species: *Cancer latipes* Pennant, 1777, by monotypy; gender: masculine; name 185 on *Official List.*

EASTERN ATLANTIC SPECIES.—36, of which 16 occur in tropical waters. The following species were recorded by Monod (1956):

Name in Monod	Current Name
Carcinus maenas	*Carcinus maenas*
Xaiva biguttata	*Xaiva biguttata*
Xaiva mcleayi	*Xaiva mcleayi*
Portunus arcuatus	*Liocarcinus arcuatus*
Portunus corrugatus	*Liocarcinus corrugatus*
Portunus tuberculatus	*Macropipus rugosus**
Bathynectes superbus	*Bathynectes piperitus*, new species*
Thalamita africana	*Thalamita poissonii*
Cronius ruber	*Cronius ruber**
Neptunus vocans	*Portunus vocans*
Neptunus validus	*Portunus validus**
Neptunus inaequalis	*Portunus inaequalis**
Callinectes gladiator	*Callinectes pallidus**
Callinectes marginatus	*Callinectes marginatus**
Callinectes latimanus	*Callinectes amnicola**

The extralimital species are as follows:

Bathynectes longipes (Risso, 1816). England to Portugal, Madeira, Mediterranean; sublittoral, 20–90 m (Zariquiey Alvarez, 1968; Türkay, 1976b).

Bathynectes maravigna (Prestandrea, 1839). See page 76.

Callinectes sapidus Rathbun, 1896. A. Milne Edwards and Bouvier (1900:71, pl. 4: fig. 5) reported three specimens (2 ♂, 1 ♀) of "*Callinectes diacanthus*, Latr., var. *africanus*, A. M.-Edw." from Porto da Praia (as Praya), Cape Verde Islands. The colored figure that they published shows definitely *Callinectes sapidus*, having only two frontal teeth. As Monod (1956:204) pointed out, the figure is nothing but a colored copy of the figure that A. Milne Edwards (1861:425, pl. 30: fig. 1) published of "Neptunus diacanthus. Individu mâle de grandeur naturelle, rapporté des côtes de l'Amérique septentrionale. (Variété à front quadrilobé)." As to the identity of the three specimens taken by the *Talisman*, Monod (1956:204) stated: "J'ai vu un des ♂ d'*africanus* (M.P.): c'est un *C. marginatus.*" This identification is confirmed by Williams (1974:729), who likewise examined the male specimen in the collection of the Paris museum. The female specimen of the *Talisman* set now forms part of the collection of the Museum of Comparative Zoology, Harvard University (no. 6530) and was likewise examined by Williams (1974:729); it also is *C. marginatus*. The third specimen of the lot, a male (USNM 23950), is now in the collection of the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; it was examined by us, and like the two other specimens belongs to *C. marginatus*. A. Milne Edwards and Bouvier (1900:71) thus did not correctly report *C. sapidus* from West Africa.

A second dubious record of *C. sapidus* from

West Africa is the one by Gruvel (1912, pl. 2: fig. 1), who in an account of the edible Crustacea of West Africa figured as *Callinectes africanus* a specimen that clearly represents *C. sapidus*. The explanation of Gruvel's figure does not give any information about the locality or origin of the specimen figured. As *Callinectes sapidus* otherwise has not been reported from West Africa, notwithstanding intensive collecting, we agree with Monod (1956:204) who thinks that "on est bien obligé de penser qu'ici encore le spécimen représenté est un *sapidus* (américain)."

Although so far there has not been a single reliable record of *Callinectes sapidus* from West Africa, and the species certainly is not native there, the possibility exists that it will be accidentally introduced in West African waters as it was in Europe, the Mediterranean, and Japan; for an enumeration of the European and eastern Mediterranean localities of the species see Holthuis (1969a:34, fig. 1) and Christiansen (1969:72, fig. 29, map 23). Since 1969, introduced specimens have been reported from the North Sea off the English coast (Dr. R. W. Ingle, in litt.), Normandy, France (Maury, 1975:25), possibly from Nice (Türkay, 1971:129), the central Adriatic Sea coast of Italy (Froglia, 1972:48), Strait of Messina (Cavaliere and Berdar, 1977), and Japan (Dr. T. Sakai, in litt.). In view of what is said in the previous paragraphs, it is unlikely that Rathbun's (1921:384) suggestion that the European species came from a West African population is correct.

Carcinus aestuarii Nardo, 1847. Mediterranean, also in Canary Islands, possibly in Atlantic adjacent to Mediterranean and possibly in portions of the Suez Canal; intertidal (Zariquiey Alvarez, 1968). Until now this species was known as *Carcinus mediterraneus* Czerniavsky, 1884. Nardo's (1847b) account, however, based on material from the lagoon at Venice, clearly provides the oldest available name for the Mediterranean species of *Carcinus*.

Charybdis helleri (A. Milne Edwards, 1867). Eastern Mediterranean, Egypt and Israel (from the Red Sea); sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Charybdis longicollis Leene, 1938. Eastern Mediterranean, Egypt to Turkey (from the Red Sea); sublittoral (Holthuis, 1961; Lewinsohn and Holthuis, 1964; Ramadan and Dowidar, 1976).

Liocarcinus bolivari (Zariquiey Alvarez, 1948). Mediterranean, 8–60 m (Zariquiey Alvarez, 1968).

Liocarcinus depurator (Linnaeus, 1758). Norway to Spanish Sahara, Mediterranean; in depths to 450 m, usually shallower than 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus holsatus (Fabricius, 1798). Hebrides southward to Portugal, Canary Islands, possibly also Cap Blanc, Mauritania (Monod, 1956, recorded a juvenile 8 × 10 mm from there); in depths to 350 m, generally in less than 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus maculatus (Risso, 1827). Mediterranean records of *L. pusillus* are referable to this species, according to a study by Manning and C. Froglia, Laboratorio di Tecnologia della Pesca, Ancona, to be published in the proceedings of II Colloquium Crustacea Decapoda Mediterranea held in Ancona, Italy, in May 1979.

Liocarcinus marmoreus (Leach, 1814). Southern North Sea and British Isles southward to Spain, Azores, and Madeira; in shallow water to about 85 m (Zariquiey Alvarez, 1968; Christiansen, 1969; Türkay, 1976b).

Liocarcinus puber (Linnaeus, 1767). Norway to Spanish Sahara, Mediterranean; littoral to 70 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus pusillus (Leach, 1815). Norway to Portugal, possibly on northwest African coast (see Christiansen, 1969, for comments); in depths from 6 to 200 m, usually less than 50 m (Zariquiey Alvarez, 1968).

Liocarcinus vernalis (Risso, 1816). Mediterranean, and possibly (doubtfully) off Cabo Blanco, Spanish Sahara (Monod, 1956); shallow water (Zariquiey Alvarez, 1968).

Liocarcinus zariquieyi Gordon, 1968. England to Canary Islands, Mediterranean; 5 to 30 m (Zariquiey Alvarez, 1968).

Macropipus tuberculatus (Roux, 1830). Norway to the Azores, Morocco, Mediterranean; 20–30 to

834 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Polybius henslowii Leach, 1820. North Sea and British Isles southward to Morocco, Mediterranean; pelagic (Zariquiey Alvarez, 1968; Christiansen, 1969).

Portumnus latipes (Pennant, 1777). North Sea and British Isles to northern Morocco (there is one doubtful record from Mauritania), Mediterranean; intertidal and subtidal to a depth of 28 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Portumnus pestai Forest, 1967. Mediterranean; shallow water (Forest, 1967).

Portunus pelagicus (Linnaeus, 1758). Mediterranean (from the Red Sea, Egypt to Turkey, Italy); sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Portunus sayi (Gibbes, 1850). Canary Islands (see *P. hastatus*, p. 101); Cap Spartel, Morocco and Balearic Islands, from drifting *Sargassum* (Bouvier, 1922; Zariquiey Alvarez, 1968). Bouvier (1940) does not refer to his earlier record of this species from the Balearic Islands, so there is some question as to its authenticity. There are no other records of this species from the Mediterranean.

Subfamily CARCININAE MacLeay, 1838

Genus *Carcinus* Leach, 1814

Ligia Weber, 1795:92 [type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by monotypy; gender: feminine; name suppressed by the International Commission on Zoological Nomenclature in Opinion 330, 1955, and placed on the *Official Index* as name 207].

Carcinus Leach, 1814:390 [type-species: *Cancer maenas* Linnaeus, 1758, by monotypy; gender: masculine; name 798 on *Official List*].

Megalopa Leach, 1814:431 [type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by present selection; gender: feminine].

Macropa Latreille, 1822:9 [type-species: *Megalopa montagui* Leach, 1817, an objective synonym of *Cancer rhomboidalis* Montagu, 1804, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by monotypy; gender: feminine].

Megalops H. Milne Edwards, 1837:260 [erroneous spelling of *Megalopa* Leach, 1814].

Sympractor Gistel, 1848:ix [replacement name for *Megalopa* Leach, 1814 (as *Megalopus*); type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758; gender: masculine].

Carcinides Rathbun, 1897b:164 [replacement name for *Carcinus* Leach, 1814; type-species: *Cancer maenas* Linnaeus, 1758; gender: masculine; name 209 on *Official Index*].

Carcinus maenas (Linnaeus, 1758)

Carcinus maenas.—Monod, 1956:165, fig. 194 [Mauritania; references].—Forest and Gantès, 1960:351 [Morocco].—Guinot, 1967a:253 [Indian Ocean localities; listed].—Monod, 1967:178 [no locality].—Zariquiey Alvarez, 1968: 354, figs. 115a, c [Spain; references].—Christiansen, 1969: 49, fig. 18, map 12 [Scandinavia].

SYNONYMS.—*Cancer viridis* Herbst, 1783; *Cancer granarius* Herbst, 1783; *Cancer pygmaeus* Fabricius, 1787; *Cancer rhomboidalis* Montagu, 1804; *Megalopa montagui* Leach, 1817; *Portunus menoides* Rafinesque, 1817; *Cancer granulatus* Say, 1817.

DISTRIBUTION.—Eastern Atlantic, from Norway, N of 70° N latitude, S to Mauritania, about 20° S latitude; western Atlantic; eastern Pacific; Australia. In the Mediterranean it is replaced by the allied *C. aestuarii* Nardo, 1847 (= *C. mediterraneus* Czerniavsky, 1884) (see Bacescu, 1967, and Zariquiey Alvarez, 1968, for differences between the two species).

Genus *Xaiva* MacLeay, 1838

Xaiva MacLeay, 1838:62 [type-species: *Xaiva pulchella* MacLeay, 1838 (? = *Portunus biguttatus* Risso, 1816), by monotypy; gender: feminine; name 1649 on *Official List*].

Portumnoides Bohn, 1901:270, 271 [type-species: *Portumnoides garstangi* Bohn, 1901, a subjective junior synonym of *Portunus biguttatus* Risso, 1816, by monotypy; gender: masculine].

Xaiva biguttata (Risso, 1816)

Xaiva biguttata.—Monod, 1956:168, fig. 195 [Cape Verde Islands].—Guinot, 1967a:253 [Indian Ocean; listed].—Zariquiey Alvarez, 1968:359, figs. 8d, 116c, 122b [Spain; references].—Kensley, 1970:182 [South-West Africa].—Penrith and Kensley, 1970b:248, 261 [South-West Africa].

SYNONYMS.—*Platyonichus nasutus* Latreille, 1828; *Portumnoides garstangi* Bohn, 1901.

REMARKS.—Material of this species from the northern and southern parts of its reported range (England to Cape Verde Islands versus South-West Africa and South Africa) should be studied to determine whether or not two species might be recognized. If the southern form proves to be distinct, the name *Xaiva pulchella* MacLeay, 1838, is available.

DISTRIBUTION.—Eastern Atlantic, from England southward to the Cape Verde Islands, South-West Africa, South Africa, and the Mediterranean, in shallow water.

Xaiva mcleayi (Barnard, 1947)

Portumnus mcleayi.—Capart, 1951:114, fig. 40, pl. 2: fig. 9 [Angola].—Rossignol, 1957:123 [key].

Xaiva mcleayi.—Monod, 1956:169, 632, figs. 196–201 [Mauritania, Senegal, Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].—Guinot and Ribeiro, 1962:31 [Angola].—Forest and Guinot, 1966:59 [Principe, São Tomé].—Guinot, 1967a:253 [Indian Ocean; listed].—Crosnier, 1967:324 [Dahomey, Annobon].

?*Xaiva biguttata*.—Gauld, 1960:69 [Ghana] [not *Xaiva biguttata* (Risso, 1816)].

REMARKS.—We suspect that Gauld's record from Ghana of *X. biguttata*, a species not known to occur south of the Cape Verde Islands on the tropical West African Coast, may have been based on this species, now known to occur at least as far north as Mauritania on the West African coast (Monod, 1956).

DISTRIBUTION.—Eastern Atlantic, from scattered localities between Mauritania and Angola, South Africa, in depths between 8–30 and 73 m.

Subfamily POLYBIINAE Ortmann, 1893

Genus *Bathynectes* Stimpson, 1871

Bathynectes Stimpson, 1871a:145 [type-species: *Bathynectes longispina* Stimpson, 1871, by subsequent designation by Rathbun, 1930:27; gender: masculine; name 127 on *Official List*].

Thranites Bovallius, 1876:60, 61 [type-species: *Thranites velox* Bovallius, 1876, a subjective junior synonym of *Portunus maravigna* Prestandrea, 1839, by monotypy; gender: masculine].

Bathynectes maravigna (Prestandrea, 1839), new combination

Portunus Maravigna Prestandrea, 1839:132.

Portunus superbus Costa, in Costa and Costa, 1838–1871: 19, pl. 5 [color].

Bathynectes.—Filhol, 1885a:56.—Maurin, 1968a, fig. 29; 1968b, figs. 1, 4.

Bathynectes superba.—Forest and Gantès, 1960:351 [Morocco].—Pérès, 1964:20, 26, 29 [Morocco].

Bathynectes superbus.—Maurin, 1968a:19, 45, 50, 64 [Spain, Spanish Sahara, Mauritania]; 1968b:482, 484, 489, 491, fig. 6 [Spanish Sahara, Mauritania].—Zariquiey Alvarez, 1968:382, fig. 127g [Spain; references].—Christiansen, 1969:70, fig. 28, map 22 [Scandinavia].—Türkay, 1976b: 61 [listed], 64 [Madeira].—Lewis and Haefner, 1978:164 [part; Spain].

SYNONYM.—*Thranites velox* Bovallius, 1876.

MATERIAL EXAMINED.—France: Banc de la Chapelle, off Brittany, 47°58′N, 08°00′W, 9 Sep 1921, L. Fage, 1♂, 1♀ (MP).

Spain: NE of Santander, (43°28′N, 03°48′W), 564 m, sand and shells, 6 Jul 1882, *Travailleur*, 6 juv (MP, W). Off western Galicia, 43°41.2′N, 08°57.6′W, 995 m, rocky bottom, 8 Aug 1967, *Thalassa* Sta T.491, 1 juv (MP).

Madeira: SE of Madeira, 32°43′N, 16°43′W, 420 m, 1♂ (L).

Morocco: Fosse de Rabat (approx. 34°N, 07°W), 300–400 m, N. Pigeault, 1♂ (MP).

REMARKS.—Dr. Carlo Froglia of the Laboratorio di Tecnologia della Pesca, Ancona, Italy, brought to our attention the description of this species by Prestandrea in 1839. Prestandrea described it as new under the name *Portunus Maravigna*, the name having been given in honor of his friend Prof. Maravigna.

This species usually is indicated with the name *Bathynectes superbus* (Costa), sometimes dated 1838, sometimes 1853. The latter date is correct (Sherborn, 1937:39; Erasmo, 1949:10); Costa's name was published on 11 April 1853. The name *maravigna* Prestandrea, 1839, thus has clear priority over *superbus* Costa, 1853, and should be used.

Prestandrea (1839:132, 133) gave the following color notes:

> Rosso-corallo chiaro, con alquante macchie bianche raramente sparse sul torace, è il colorito di questo elegantissimo crustaceo. E macchiate parimente di bianco sono l'estremità

delle articolazioni dei piedi camminatori. . . . Gli occhi sono sferici nerastri. [The anterolateral teeth] sono tutti del colore del torace con l'estremità color caffè cotto. . . . Tutte le spine dei piedi-mani [= chelipeds] sono bianche colla estremità color caffè cotto; pero quella del lato interno del carpo à una banda bianca; quindi una rosso-corallo chiara è la estremità come le altre. [The fingers are] verso l'estremità brunastre.

In listing material of this species that does not occur off tropical West Africa, we have departed from our format. However, the material listed above was used to compare this species with the new species from West Africa described below.

Material from Spanish Sahara and Mauritania identified with this species by Maurin (1968a,b) might well be referable to *B. piperitus*, new species. This cannot be determined without examining his material.

DISTRIBUTION.—Eastern Atlantic, from Norway and the Faroes southward to NW Morocco, possibly to Spanish Sahara and Mauritania, Mediterranean; in moderately deep water, from 100 to 1455 m.

* *Bathynectes piperitus*, new species

FIGURES 16, 17

Bathynectes superba.—A. Milne Edwards and Bouvier, 1899, pl. 2: figs. 16–18 [part, not p. 25, pl. 2: figs. 1–15, 19–24]; 1900:65 [part].—Bouvier, 1922:59 [part, Cape Verde Islands only].—Monod, 1933b:510 [listed].—Capart, 1951:121, fig. 42. [Not *Portunus superbus* Costa, 1853.]

Bathynectes superbus.—Monod, 1956:183, figs. 210–212.—Longhurst, 1958:87.—Guinot and Ribeiro, 1962:45.—Forest, 1963:628.—Monod, 1967, pl. 15: fig. 4 [no records].—Maurin, 1968b:492.—Intès and Le Loeuff, 1976: 103.—Lewis and Haefner, 1978:164, pl. 1a [part]. [Not *Portunus superbus* Costa, 1853.].

Bathynectes suberbus.—Gauld, 1960:69 [erroneous spelling].

Bathynectes.—Voss, 1966:19, 25.—Maurin, 1968a, fig. 29; 1968b, fig. 9 [part, Senegal only].

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 73, 311–366 m, 13 ♂, 4 ♀ ov (L, W).

Ivory Coast: Sta 44, 403–586 m, hard dark gray mud, 5 juv (L). Sta 51, 329–494 m, 31 ♂, 16 ♀ (1 ov), 13 juv (L, W).

Geronimo Material: Gabon: Sta 179, 293 m, 1 ♀ (W). Sta 191, 300 m, 2 ♂ (W). Sta 198, 300 m, 3 ♂ (W). Sta 199, 400 m, 1 ♂, 1 ♀ (W). Sta 203, 200 m, 3 ♂, 2 ♀ (W). Sta 206, 455–610 m, 1 ♀, 1 juv (W). Sta 213, 300 m, 1 ♀ (W). Sta 214, 546 m, 3 juv (W). Sta 220, 300 m, 1 carapace (W). Sta 247, 400 m, 1 ♀ (W).

Undaunted Material: Angola: Sta 111, ca. 366 m, 2 ♂ (includes holotype), 3♀ (1 ov) (L).

Other Material: Cape Verde Islands: 16°53′N, 27°30′W to 16°54′N, 27°30′W of Paris [= 25°10′W of Greenwich], 410–460 m, sand and gravel, 29 Jul 1883, *Talisman* Sta 110, 1♂ (MP). 15°14′N, 23°03′45″W, 628 m, muddy sand, fish trap, 14–15 Aug 1901, *Princesse Alice* Sta 1189, 1♀ (MP).

Senegal: NW of Pointe des Almadies (14°45′N, 17°32′W), 250–300 m, 21 Oct 1952, *Gérard Tréca*, 2♂, 1♀ (MP). Off Pointe des Almadies, ca. 300 m, 16 Oct 1952, Cremoux, leg., *Gérard Tréca*, 1♀ (MP).

DESCRIPTION—Front (Figures 16, 17*a*) with 4 rounded teeth, inner 2 about half as wide as outer, extending about as far forward as outer. Latter broadly rounded, more semicircular than triangular. Inner orbital teeth low, rectangular, wide, with blunt apex and short dorsal carina. Upper orbital margin with 2 distinct narrow, open fissures. Exorbital tooth triangular, blunt, especially in larger specimens. Lower orbital margin with small, triangular, often blunt, narrow tooth next to exorbital tooth. Third tooth present medially, wider, blunter than second, separated from second by U-shaped incision. Inner, lower orbital tooth triangular, with narrowly rounded apex, latter occasionally curved inward. First 3 anterolateral teeth of carapace, excluding exorbital tooth, sharply triangular, curved anteriorly, third smallest. Fourth (= last) tooth large, spine-like, curved anteriorly, especially apically. Dorsal surface of carapace with 4 transverse ridges: (1) indistinct postfrontal ridge, widely interrupted in midline; (2) mesogastric ridge, divided by median

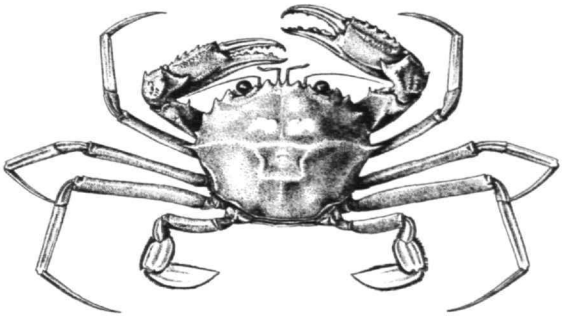

FIGURE 16.—*Bathynectes piperitus*, new species (from Capart, 1951, fig. 42).

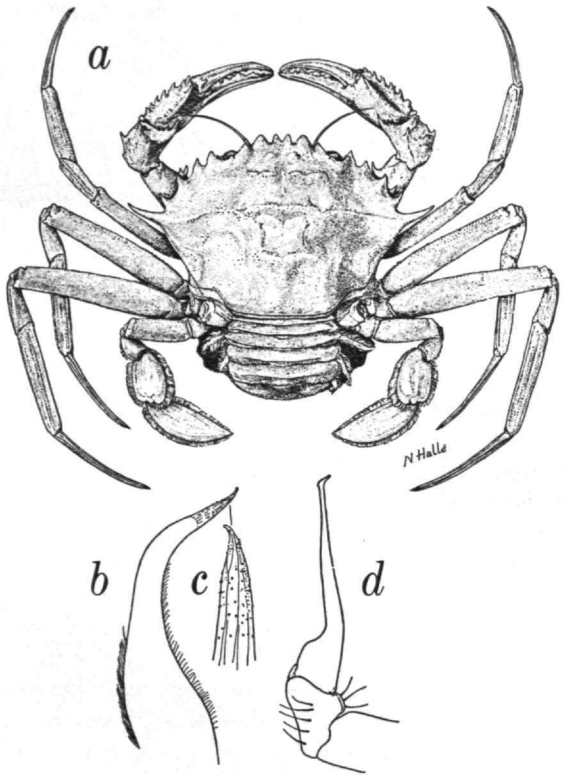

FIGURE 17.—*Bathynectes piperitus*, new species: *a*, dorsal view; *b*, *c*, first pleopod of male and apex; *d*, second pleopod of male. (All from Monod, 1956, figs. 210–212.)

interruption, each half again divided into 2 short, slightly convex ridges; (3) long lateral spines connected by third transverse ridge, sinuous and tuberculate; third ridge convex anteriorly, with posteriorly directed indentations (incurvations) at branchiocardiac grooves; and (4) short transverse carina placed between ends of branchiocardiac grooves on posterior half of carapace. Carapace finely and closely pubescent.

Mouthparts not significantly different from those of *Bathynectes longispina* Stimpson.

First pereiopods unequal, larger chela higher and heavier than smaller, with teeth on cutting edges of fingers larger, blunter. Otherwise chelipeds very similar. Fingers about as long as palm. Dactylus with usual 5 ridges, dorsalmost tuberculated basally. Upper ridge on inner surface of dactylus divided into 2 branches proximally, branches united distally; upper branch with blunt tubercle. In larger chela, basal tooth of cutting edge of dactylus large, swollen, directed somewhat posteriorly. Opposite tooth of fixed finger molar-like, with 2 small teeth proximally at base. Fixed finger, like dactylus, with laterally compressed teeth, usually alternately large and small. In smaller chela all teeth on cutting edges of compressed type. Fixed finger also with 5 ridges. Upper carina of palm with large, subdistal sharp tooth, lacking spinule adjacent to tooth; carina tuberculate posterior to tooth. Upper outer carina of palm with 6 large, triangular, blunt teeth, several smaller tuberculiform denticles present between larger teeth. Carina below upper, outer carina low, often partly absent, with row of small granules, latter often inconspicuous or absent, especially in middle of carina. Next lower carina strong, high and sharp, granular, terminating before reaching base of fingers; row of granules below distal end of this carina extending to first tooth of fixed finger. Lower part of palm with carina extending onto fixed fingers, more distinct proximally than distally, ornamented with numerous granules. All of lower surface of palm covered by transverse rows of granules; anteriorly this area terminates on ventral carina of fixed finger. Inner surface of palm with high, distinct longitudinal carina terminating somewhat above base of upper carina of inner surface of fixed finger. Carpus with very large, sharply pointed tooth on inner margin, anterior margin of tooth with 1 to 3, rarely 4, spinules, remainder of margin smooth or granular. Upper surface of carpus with 2 spines placed in line with upper articulation of palm, inconspicuous row of tubercles extending from posterior spine towards inner tooth, with more distinct row of tubercles extending obliquely proximally. Some tubercles scattered over remainder of upper surface of carpus. Outer anterior angle of carpus with sharp tooth. Anterior margin of carpus, between sharp tooth and upper articulation with propodus, smooth or evenly granular. Merus slender, more than twice as long as high, with strong spiniform tooth on anterior third of upper margin, second tooth

somewhat before middle of inner, lower margin. Remainder of merus smooth or slightly tuberculate.

Walking legs (pereiopods 2 to 4) very slender. Dactylus narrow, evenly curved, upper and lower surfaces with narrow, longitudinal groove over entire length; lateral surfaces with broad groove, distally divided in two by longitudinal carina. Propodus as long as dactylus, measured dorsally, and more than 5 to more than 6 times as long as high. Upper and lower margins with deep longitudinal groove, flanked by 2 sharp carinae. Outer surfaces with 2 longitudinal carinae separating 3 grooves, middle groove particularly wide; upper carina placed close to outer carina of upper margin. On inner surface of propodus upper carina absent or very reduced, almost entirely covered by pubescence, thus only lower carina visible on surface. Carpus 2/3 to 4/7 length of propodus, with blunt longitudinal dorsal ridge, flanked on either side by distinct pubescent groove. Merus 2 to 3⅓ times as long as carpus and 4-5 times as long as wide, upper part with transverse subdistal groove, occasionally flanked posteriorly by blunt tubercle. Upper surface of merus sometimes slightly tuberculate. Dactylus of last pereiopod 3 times as long as high, oval, with lower margin straight for most of length, merging with distal tooth in straight line. Upper margin regularly curved, merging with distal tooth in concave line. Propodus about 2/3 as long as dactylus. Carpus less than half as long as dactylus. Merus about as long as propodus and 2½ times as long as high.

Male abdomen triangular, third to fifth somites fused, sixth and seventh somites free, latter triangular, apex broadly rounded, appearing broader than that of *B. longispina.*

Male gonopods similar to those of *B. longispina*, with apex less slender, less strongly curved laterally, as illustrated by Monod (1956, fig. 211) (Figure 17*b-d*).

Color: The first color note published of this species is the one by Capart (1951:122): "Couleur rouge orangé, les épines généralement plus rouges; les pattes marquées de zones rouges et orange alternées." Monod (1956:185) described the color as follows: "gris à rouge-brique, parfois rose vif; chélipèdes en partie rouges, un anneau rouge sur les mérus, carpe, propode et base du dactyle des pattes." The following color description is made after notes and photographs taken of specimens of *Pillsbury* Station 73, immediately after they came aboard: The carapace is orange-red with a white spot at the front, one such spot just behind either of the large lateral teeth, one in each posterolateral angle, and one in the middle of the posterior margin. The apex of the lateral spine is very dark, almost black. The chelipeds are orange with the main spines and teeth white. Also the distal part of the palm and the fingers are white, except for an orange spot at the base of the dactylus. The tips of the fingers and a large part of the cutting edges are of a dark, almost black color. The walking legs have a broad orange band over the distal part of the merus, one over the carpus and one over the proximal half of the propodus, sometimes the proximal part of the dactylus also is orange. All the rest of the leg is white, viz., the base of the merus, all the articulations, the distal part of the propodus and the entire dactylus or the larger part of it. In the fifth leg the orange color is somewhat more extensive than in the other legs, here the basal part of the merus is white, from there on the leg is orange up to the middle of the propodus or slightly beyond (with the exception of small white articulations), and also the basal part of the dactylus is orange, the distal part white. The lower surfaces of body and chelipeds are white, that of the second to fifth pereiopods is of the same color as the dorsal surface. The eggs are carmine.

MEASUREMENTS.—The specimens examined had the carapace width from 15 to 86 mm (inclusive of the lateral spine); the largest specimen is a male. The ovigerous females have carapace widths between 55 and 72 mm; the largest of the females is ovigerous. In the literature, male specimens with carapace lengths from 17 to 57 mm and carapace widths 32 to 80 mm (including the lateral spines) are recorded; for the non-ovigerous females these values are 22 to 49 mm and 38 to 68 mm, respectively, and for the ovigerous fe-

males 40 to 54 mm and 62 to 78 mm. The diameter of the eggs is 0.42 mm (Monod, 1956).

REMARKS.—Most authors have considered all Atlantic *Bathynectes*, other than *Bathynectes longipes* (Risso, 1816), to belong to a single species, *B. superbus* (Costa, 1853), the type-locality for which is Naples, Italy. As stated (p. 76), that species should be known as *Bathynectes maravigna* (Prestandrea, 1839), type-locality "Mare di Messina," Sicily, Italy. However, a comparison of the present West African material with West Atlantic specimens and with material from the Mediterranean, European, and NW African waters, showed constant differences between the three groups, which leads to the conclusion that three species are involved. For the West Atlantic species the name *Bathynectes longispina* Stimpson, 1871, is available (*B. brevispina* Stimpson, 1871, is a synonym). The name *Bathynectes maravigna* (Prestandrea, 1839) has to be used for the species from the Mediterranean and NE Atlantic. A new name, *Bathynectes piperitus*, is proposed here for the West African species. *Bathynectes piperitus* differs from *B. maravigna* in the following respects:

1. The frontal teeth of the carapace in *B. piperitus* are always blunt, even in the large specimens, and the median teeth are always distinctly narrower than the outer. In *B. maravigna* the large specimens have the frontal teeth sharply pointed and triangular, while the median teeth are hardly narrower than the outer. In juveniles of *B. maravigna* the situation is much like in the large *B. piperitus*.

2. The lateral spine of the carapace in *B. maravigna* is long and straight, in *B. piperitus* it is much shorter than in *B. maravigna* and is curved forward in the adults. Although in juveniles of *B. piperitus* the lateral spines are straighter and relatively longer than in the adults, they are still shorter than in the corresponding stages of *B. maravigna*.

3. The postfrontal ridges in *B. maravigna* as a rule are more distinct than in *B. piperitus*, and each of the two mesogastric carinae is mostly entire and not divided in two short ridges.

4. The last somite of the male abdomen is wider and flatter in *B. piperitus*, being relatively longer and narrower, with a convex upper surface, in *B. maravigna*. The fourth and fifth abdominal somites in males of *B. piperitus* each show a distinct transverse carina, which are absent or very vague in *B. maravigna*.

5. The outer half of the anterior margin of the carpus of the cheliped (between the outer spine and the upper articulation with the palm) in *B. piperitus* usually is straight or finely granular; in *B. maravigna* it carries some spinules.

6. The inner surface of the propodus of the second pereiopod in *B. maravigna* shows two distinct longitudinal carinae separating three longitudinal pubescent grooves. In *B. piperitus* the upper of these carinae is absent or hardly indicated, so that the lower carina is separated from the upper margin of the propodus by a pubescent area that is much wider than the area separating it from the lower margin.

7. The merus of the fifth pereiopod is longer and more slender in *B. maravigna* than in *B. piperitus*. The dactylus of this leg in *B. maravigna* is slightly more slender than in *B. piperitus* and has the lower margin somewhat convex and joining the distal tooth under a concave curve.

8. The coloration of living *B. maravigna* is quite different from that of *B. piperitus*. The colored plate of *B. maravigna* published by A. Milne Edwards and Bouvier (1899, pl. 2: fig. 19) shows a uniformly orange red crab. Costa's figure (in Costa and Costa, 1838–1871, pl. 7) of the species has the carapace irregularly mottled with reddish brown and yellowish, the pereiopods 1 to 4 are uniformly reddish brown, only the dactyli of the walking legs and a few spines being yellowish; the fifth pereiopods are shown entirely yellowish. A male specimen of *B. maravigna* (cl 61 mm, cb 73 mm without lateral spines, 96 mm with lateral spines) from east of Madeira (11–12 Mar 1976, L) was examined rather soon after capture, when the colors were still visible and a color photograph of the living specimen was made. This specimen showed the following color pattern: The animal is dark brownish orange dorsally. The margins of the frontal teeth are white. A very short median

line extends from between the bases of the median frontal teeth backward. The tips of the three short anterolateral spines of the carapace (not the outer orbital angle) have the tips white. One to three small white dots are seen on the middle of the large lateral spine. A few very small white spots are placed in the cervical groove. A large lateral white spot stands at each side of the carapace about halfway between the lateral spine and the posterior margin of the carapace. A narrow white line extends along the posterior carina and a small median spot is placed somewhat before this line. The chelipeds have dorsally the same color as the carapace, with a small white spot near the tips of many of the spines. The tips of the fingers and the teeth on their cutting edges are black. Also the tips of various of the spines are black. The lower surface of the chelipeds is lighter than the upper. The following legs are of the same brownish orange color as the carapace. The second and third legs have the basal part slightly lighter than the rest. There may be some small white spots at the articulations and at the tips of the second to fourth pereiopods, but otherwise the legs are of a uniform brownish orange color. The dactyli of the fifth leg show two very small spots: one just before the tip, the other near the middle of the lower margin, otherwise the leg is of a uniform dark brownish orange color. At first view *B. maravigna* seems to be uniformly brownish orange, and the white spots are rather small and inconspicuous. They evidently have been overlooked by the artist of A. Milne Edwards and Bouvier's colored plate. Costa's specimen may have been made after a specimen that was preserved or dead for a considerable time. The most important color difference between *B. maravigna* and *B. piperitus* seems to be the less striking color pattern of the carapace and the absence of white and orange bands on the pereiopods in the former species.

9. The range of *B. maravigna* is in the N Atlantic Ocean between Iceland and Norway south to the Mediterranean (as far as Greece), Madeira, the Azores, and NW Morocco. We have examined specimens of this species from several localities between France and Morocco, as noted above. *Bathynectes piperitus* is a West African species, known from the Cape Verde Islands and Senegal to Angola.

The differences between *B. piperitus* and *B. longispina* are as follows:

1. In *B. longispina* the outer frontal teeth are more acute and are more triangular in shape; the inner teeth are narrowly triangular.

2. The anterolateral teeth of *B. longispina* are longer, more robust, and relatively narrower than in *B. piperitus*. The length of the second tooth after the exorbital angle is greater than half the distance between it and the first tooth; in *B. piperitus* it is narrower than half that distance.

3. The lateral spine of the carapace is straight in *B. longispina* and is longer than in *B. piperitus*.

4. The transverse ridge that connects the lateral spines of the carapace in *B. longispina* is practically straight and does not show the posterior incurvations at the level of the branchiocardiac grooves.

5. The two mesogastric ridges are each divided in two smaller ridges like in *B. piperitus*, but they are usually shorter, less distinct (sometimes hardly visible), and lie in one line.

6. The last somite of the male abdomen in *B. longispina* is more triangular than in *B. piperitus*, and has the distal margin less broadly rounded.

7. The fourth and fifth abdominal somites in *B. longispina* do not show a sharp transverse carina.

8. The first male gonopod of *B. longispina* is more slender distally and more strongly curved than in *B. piperitus*.

9. In *B. longispina* the chelae are relatively shorter and higher: the height of the palm (inclusive of the dorsal spine) is more than its dorsal length. In *B. piperitus* the dorsal length of the palm is definitely greater than the height.

10. In *B. longispina* the subdistal tooth on the upper margin of the palm is much higher, being large, compressed, almost wing-like, reaching practically to the base of the dactylus. Before this large tooth a small but distinct spine is present on the dorsal margin. In *B. piperitus* the dorsal

tooth is much shorter and less wide and does not reach the base of the dactylus; the dorsal margin bears no distal spine.

11. The inner surface of the propodus of the second pereiopod in *B. longispina* shows a single deep longitudinal groove in the middle, and the two other grooves are inconspicuous. The legs have hardly any pubescence. Also the upper groove on the inner surface of the carpus is very obscure.

12. The fifth legs in *B. longispina* have the merus more slender and the propodus less slender than in *B. piperitus*.

13. Also in the color there are marked differences between the two species. In *B. longispina* the carapace is reddish because all or practically all the tubercles are of that color; the lateral spine is dark red in the larger distal part, the anterolateral teeth are whitish with a red tip or with a red ring. The front is pale and the orbital margin is often darker red than the surroundings. A median white line extends from the transverse ridge of the carapace forwards reaching to the postfrontal ridges. The mesogastric ridges, at least the inner two, are white and form a more or less distinct cross with the median white line. The chelipeds are pink; the large teeth on the inner margin of the carpus and the upper margin of the palm are white at the base and dark red distally. The dactylus is red with a white base and a light spot in the middle of the dorsal margin; the tip of the finger and practically the entire cutting edge (in the large chela) or the distal part of it (in the smaller) are black. The fixed finger has the distal part and the lower surface red, the tip black. The legs are pink because of the presence of scattered red spots; the articulations are pale or white. Very striking is the presence of a solid deep red color on the propodus and dactylus of the second to fourth leg; this color, which persists long in alcohol-preserved specimens, occupies practically the entire segments with the exception of a very narrow area near the articulation. The carpus sometimes shows a narrow red band over its middle. In the fifth leg the dactylus, but not the propodus, has this same strikingly deep red, almost lacquer-like, color. The presence of these deep red bands on the legs distinguishes this species immediately from the others belonging to this genus. The lower surface of the body is white.

TYPE-LOCALITY.—Angola, 10°36′S, 13°12′E, ca 366 m (*Undaunted* Sta 111).

DISPOSITION OF TYPES.—The holotype (Crust. D.31505) is a male, carapace width 79 mm, in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden. The remainder of the specimens examined are paratypes, which have been deposited in the Rijksmuseum and in the Division of Crustacea, National Museum of Natural History, Smithsonian Institution.

ETYMOLOGY.—The Latin name *piperitus* is given in allusion to the bright red and white color, resembling that of a peppermint cane.

BIOLOGY.—The species has been reported from depths between 200 and 628 m, and has been taken most often between 300 and 450 m. The bottom on which it was found was described as mud (Guinot and Ribeiro, 1962; Forest, 1963), hard, dark gray mud (Voss, 1966), muddy sand (Bouvier, 1922), mud and sand, brown mud and sand, green mud and sand (Capart, 1951), sand and gravel (A. Milne Edwards and Bouvier, 1899, 1900), corals (Guinot and Ribeiro, 1962), green muddy sand (Maurin, 1968b). A. Milne Edwards and Bouvier (1900) mentioned the bottom at *Talisman* Sta 113 as "Sable, roche," but in the official list of stations of the expedition it is indicated as "Sable. Gravier," exactly as in Sta 110 of the same expedition.

Ovigerous females of this species have been collected in February (Monod, 1956), March, April, and May (Capart, 1951), May and June (p. 77). Several specimens carry Lepadidae on the dorsal surface of the carapace and on the legs. A male from *Geronimo* Sta 198 carries a number of hydroid colonies on the merus of the last pereiopod.

DISTRIBUTION.—*Bathynectes piperitus* is a West African species, known from the Cape Verde Islands and the coast of Africa from Senegal to Angola. Records of *B. superbus* (= *B. maravigna*) from Spanish Sahara and Mauritania given by

Maurin (1968a,b) and of *Bathynectes* given by Filhol (1885a) may be referable to this species. Records in the literature include the following:

Cape Verde Islands: No specific locality (Filhol, 1885a). 16°53′N, 27°30′W of Paris [= 25°10′W of Greenwich] to 16°54′N, 27°30′W of Paris [= 25°10′W of Greenwich], 410–460 m (A. Milne Edwards and Bouvier, 1899, 1900). 16°-52′N, 27°30′W of Paris [= 25°10′W of Greenwich] to 16°-52′N, 27°32′W of Paris [= 25°12′W of Greenwich], 550–760 m (A. Milne Edwards and Bouvier, 1900). 15°14′N, 23°-03′45″W, 628 m (Bouvier, 1922).

Senegal: Off Saint-Louis, 300 m (Maurin, 1968b). Fosse de Kayar, 85–660 m (Monod, 1956), 300–350 to 600 m (Maurin, 1968b). Off Pointe des Almadies, 150–245 m, 250–300 m, ±300 m, and 270–500 m (Monod, 1956).

Guinea-Bissau: 10°05′N, 17°00′W, 320–360 m (Capart, 1951).

Guinea: 09°05′N, 15°10′W, 310–380 m (Monod, 1956).

Liberia: 04°40′N, 09°20′W, 311–366 m (Voss, 1966; Lewis and Haefner, 1978).

Ivory Coast: No specific locality (Intès and Le Loeuff, 1976). 05°05′N, 04°00′W to 05°04′N, 04°02′W, 403–586 m (Voss, 1966). 04°32.5′N, 06°31′W, 300–455 m, and 04°54′N, 03°23′W, 380–400 m (Forest, 1963).

Ghana: 04°39′N, 02°46′W, 300–400 m (Forest, 1963). Off Accra, 200 m (Longhurst, 1958; Gauld, 1960).

Gabon: Off Port-Gentil, 00°15′S, 08°47′E, 290–390 m (Capart, 1951). 00°02.2′S, 08°50.2′E, 293 m (cited as Liberia); 01°26.4′S, 08°24′E, 400 m (cited as 01°6.4′S, 08°-44′E, 396 m); 01°28′S, 08°24.5′E, 300 m (as 297 m); 02°01′S, 08°50.5′E, 200 m; 02°31′S, 08°51′E, 300 m (as 288 m); 04°38.4′S, 11°01.2′E, 400 m (all Lewis and Haefner, 1978).

Cabinda: 05°23′S, 11°32′E, 290–350 m, and 05°39′S, 11°25′E, 470 m (Capart, 1951).

Angola: Off Ponta da Moita Seca, 06°08′S, 11°24′E, 350–380 m, and 06°23′S, 11°29′E, 400–430 m; off Ambrizete, 07°16′S, 12°02′E, 380–420 m; off Ponta do Morro (as Cap Morro), 10°45′S, 13°07′E, 400–500 m; off Egito [Praia], 11°53′S, 13°28′E, 300 m, 11°53′S, 13°20′E, 480–510 m, and 11°53′S, 12°23′E, 400–500 m (all Capart, 1951). Off Benguela, 405–505 m; off Baía dos Tigres, 320–400 m (Guinot and Ribeiro, 1962).

Genus *Liocarcinus* Stimpson, 1871

Liocarcinus Stimpson, 1871a:145 [type-species: *Portunus holsatus* Fabricius, 1798, by original designation; gender: masculine].

DEFINITION.—Carapace broader than long, with 5 anterolateral teeth, lacking iridescent patches on surface. Front with 3 lobes, 7-10 irregular teeth or tubercles, or entire. Dorsal margin of orbit with 2 closed incisions, ventral margin (Figure 18*a*) with narrow, V-shaped, incision. Basal antennal article touching front, scarcely or not at all movable. Chelipeds unequal, generally shorter than pereiopods; merus without distal ventral tooth; carpus with strong inner tooth, generally lacking outer tooth; dactylus (Figure 18*c*) usually with 3 dorsal ridges. Propodus of second to fourth pereiopods each with 1 ventral ridge (Figure 18*e,g*). Third to fifth abdominal somites fused in male.

REMARKS.—It is with some hesitation that we separate *Liocarcinus*, including most of the European species assigned to *Macropipus* for the last 20 years or so, from *Macropipus*; but as Guinot (1961: 7) pointed out, the species of *Macropipus* sensu stricto, restricted to three species, share certain features that serve to distinguish them readily from those species here assigned to *Liocarcinus*. Indeed, 50 years ago Palmer (1927, fig. 1) came to the conclusion that "*Portunus*" *tuberculatus* [the type-species of *Macropipus*] occupied an isolated position from the remainder of the British species of "*Portunus*" [here assigned to *Liocarcinus*]. *Liocarcinus* has not been used by European zoologists but was used by Bennett (1964:65) for *L. corrugatus* from New Zealand.

Liocarcinus differs from *Macropipus* as follows: (1) The ventral margin of the orbit has one narrow, ⋁-shaped incision (Figure 18*a*); in *Macropipus* (Figure 18*b*) the ventral margin is open and deeply U-shaped (see also Guinot and Ribeiro, 1962, fig. 8). (2) *Liocarcinus* lacks iridescent patches on the carapace and pereiopods. (3) The ornamentation of the cheliped is different: *Liocarcinus* lacks a distal ventral spine on the merus, generally lacks a well-developed outer tooth on the carpus (such as in *L. marmoreus* and *L. corrugatus*), and usually has three rather than two longitudinal ridges on the dactylus (there may be only two in the highly ornamented *L. corrugatus*). (4) The propodi of the second to fourth pereiopods are ornamented with a single ventral ridge in *Liocarcinus* (Figure 18*g*), two distinct ridges in *Macropipus* (Figure 18*h*). (5) The walking legs are distinctly

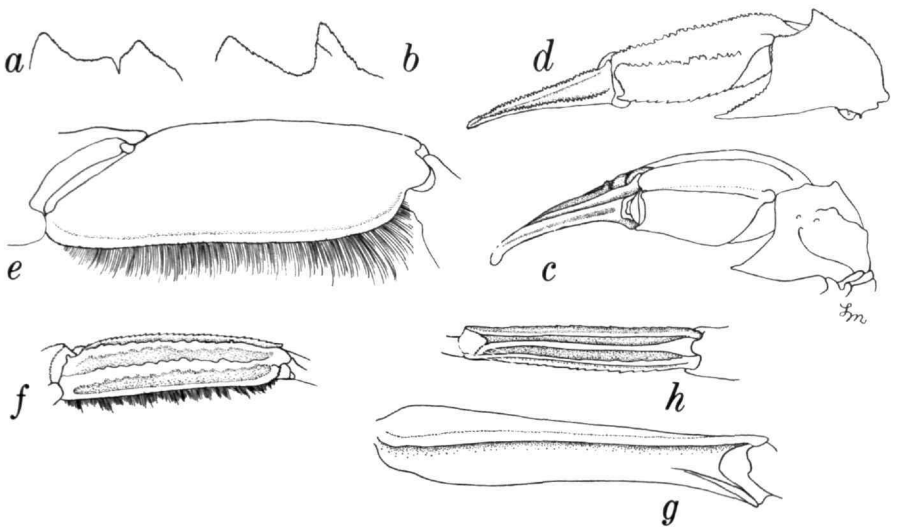

FIGURE 18.—Comparison of morphological features. *Liocarcinus holsatus* (Fabricius), male, cb 36.5 mm, England: *a*, orbit, ventral view; *c*, chela; *e*, propodus of second pereiopod, lateral view; *g*, propodus of second pereiopod, ventral view. *Macropipus rugosus* (Doflein), male, cb 36.7 mm, Guinea-Bissau: *b*, orbit, ventral view; *d*, chela; *f*, propodus of second pereiopod, lateral view; *h*, propodus of second pereiopod, ventral view.

longer in *Macropipus* (compare figure 26 (*Macropipus tuberculatus*) with figures 20–25 (*Liocarcinus* spp.) in Christiansen, 1969).

Liocarcinus, *Macropipus*, and *Bathynectes* form a progression from generally shallow-water, short-legged species to deep-water, long-legged species.

One species of *Liocarcinus*, *L. bolivari* (Zariquiey Alvarez, 1968) apparently is endemic in the Mediterranean. Two species, *L. holsatus* (Fabricius, 1798) and *L. marmoreus* (Leach, 1814), are not known to occur in the Mediterranean; records of these species in the latter area probably are referable to *L. vernalis* (Risso, 1816).

As Christiansen (1969:60) pointed out, there has been some confusion regarding identity of *Liocarcinus* spp. off the northwest African coast, due to similarities between *Xaiva mcleayi* and *L. pusillus*.

Eleven species of *Liocarcinus* occur in European-Mediterranean waters; Zariquiey Alvarez (1968: 367) provided a key to the species then known.

Liocarcinus arcuatus (Leach, 1814), new combination

Portunus arcuatus.—Capart, 1951:115 [Mauritania].—Monod, 1956:173 [references].

Macropipus arcuatus.—Zariquiey Alvarez, 1968:369, figs. 116d–h, 120a, 122c, 123a [Spain; references].—Christiansen, 1969:57, fig. 21, map 15 [Scandinavia].

SYNONYMS.—*Portunus emarginatus* Leach, 1814; *Portunus guttatus* Risso, 1816; *Portunus rondeleti* Risso, 1816; *Portunus infractus* Otto, 1828.

DISTRIBUTION.—Eastern Atlantic from the North Sea and the British Isles to Mauritania, Mediterranean, in depths to 108 m, usually between 10 and 50 m.

Liocarcinus corrugatus (Pennant, 1777), new combination

Portunus corrugatus.—Bouvier, 1911:226 [Mauritania].—Capart, 1951:120 [Spanish Sahara].—Monod, 1956:174, fig. 202 [Senegal, Guinea, Gabon, Angola; references].—Maurin, 1968b:484 [Spanish Sahara].

Macropipus corrugatus.—Guinot and Ribeiro, 1962:31 [Cape Verde Islands, Angola].—Ribeiro, 1964:5 [Cape Verde Islands].—Forest and Guinot, 1966:59 [Senegal].—Maurin, 1968b:484 [Spanish Sahara].—Zariquiey Alvarez, 1968:372, figs. 13e, 118c–e, 120c, 122d, 123e, 124c [Spain; references].—Bas, Arias, and Guerra, 1976, table 3 [Spanish Sahara].—Türkay, 1976b:61 [listed], 66 [Madeira].

SYNONYM.—*Portunus leachi* Risso, 1827.

DISTRIBUTION.—Eastern Atlantic, from England to Senegal, Angola, including the Azores, Canary Islands and Cape Verde Islands, Mediterranean; also Indo-West Pacific (Stephenson, 1972:23); littoral to 60 m.

Genus *Macropipus* Prestandrea, 1833

Macropipus Prestandrea, 1833:5 [type-species: *Portunus macropipus* Prestandrea, 1833, a subjective junior synonym of *Portunus tuberculatus* Roux, 1830, by tautonymy; gender: masculine; name 987 on *Official List*].

Elliptodactylus Doflein, 1904:93 [type-species: *Elliptodactylus rugosus* Doflein, 1904, by monotypy; gender: masculine].

DEFINITION.—Carapace broader than long, with 5 anterolateral teeth, iridescent patches present on surface and on pereiopods. Front with 3 lobes. Dorsal margin of orbit with 2 closed incisions, ventral margin (Figure 18*b*) deeply U-shaped. Basal antennal article touching front, usually freely movable. Chelipeds unequal, shorter than pereiopods 2 to 5; merus with distal ventral tooth; carpus with strong inner tooth and smaller outer tooth; dactylus (Figure 18*d*) with 2 dorsal ridges. Propodus of second to fourth pereiopods each with 2 ventral ridges (Figure 18*f,h*). Third to fifth abdominal somites fused in male.

REMARKS.—As noted above (p. 83), we are extremely reluctant to separate the genus *Liocarcinus*, from *Macropipus* sensu stricto. However, as Guinot (1961:7) pointed out in her account of the three species of *Macropipus*, "Ce trois espèces ont en commun [in contrast with other species then assigned to *Macropipus*] certains caractères, en particulier l'ornementation de la face dorsale de la carapace et des appendices, la disposition des épines sur le chélipède, la forme du maxillipède externe, la présence de zones iridescentes nacrées sur la carapace et les appendices." These features, and those discussed under *Liocarcinus*, warrant the recognition of two genera: *Liocarcinus*, including 11 relatively short-legged, shallow water species, and *Macropipus*, including 3 relatively long-legged, deep-water species from the Mediterranean and West Africa.

Macropipus australis Guinot, 1961

Elliptodactylus rugosus.—Barnard, 1950:817 [not *Elliptodactylus rugosus* Doflein, 1904 = *Macropipus rugosus*].

Portunus tuberculatus.—Capart, 1951:117, fig. 41 [part, specimens from Angola (Sta A.S. 110) and South-West Africa (Sta A.S. 108) only].—Barnard, 1954:123 [listed]; 1955:3 [listed]. [Not *Portunus tuberculatus* Roux, 1830 = *Macropipus tuberculatus*.]

Macropipus australis Guinot, 1961:5, figs. 1, 2, 5, pl. 1, pl. 2: fig. 1.—Crosnier, 1970:1216.

Macropipus sp.—Guinot and Ribeiro, 1962:44, 45, figs. 13–15, 24a,b, pl. 2: fig. 3, pl. 3: fig. 3.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Undaunted Material: Angola: Sta 94, 90 m, 1♂ (L). Sta 95, 126 m, 5♂, 6♀ (W). Sta 96, 162 m, 1♀ (L). Sta 103, 90 m, 20♂, 6♀ (L). Sta 104, 126 m, 1♂, 1♀ (L). Sta 105, 155 m, 3♂ (L).

South-West Africa: Sta 106, 225 m, 1♀ (L).

DESCRIPTION.—Capart, 1951:117; Guinot, 1961:5.

Figures: Capart, 1951, fig. 41; Guinot, 1961, figs. 2, 5, pl. 1, pl. 2: fig. 1; Guinot and Ribeiro, 1962, figs. 13–15, 24a,b, pl. 2: fig. 3, pl. 3: fig. 3.

Male Pleopod: Guinot and Ribeiro, 1962, fig. 24a,b (South-West Africa).

Color: "Brick-red, under surface greyish; bright iridescent patches as follows: on antero-lateral margin between each pair of teeth, and a larger crescentic patch behind the last lateral tooth, in the smooth grooves between the regions of the carapace, anterior surface of the palp of mxp. 3, on the smooth distal portion of upper surface of arm of cheliped, the spine and other smooth areas on wrist, the smooth areas on upper surface of hand, and in the groove on upper margin of finger" (Barnard, 1950:818).

BIOLOGY.—*Macropipus australis* is a sublittoral species living on the outer shelf and upper slope in depths between 90 and 238 m. Of ten depth records available, two are from less than 100 m (both 90 m), five are from between 100 and 200 m (110, 126, 126, 155, and 162 m), and three are from depths greater than 200 m (220, 225, and 238 m). The only information on the nature of bottom on which the species has been found is given by Capart (1951); both of the lots he re-

ported were taken on muddy sand in 110 and 220 m. Ovigerous females have not been collected.

DISTRIBUTION.—Off West Africa, from the coasts of Angola and South-West Africa, in depths between 90 and 238 m. Records in the literature include:

Angola: 16°27′S, 11°35′E, 90 m (Crosnier, 1970). 18 mi [29 km] WSW of Baía dos Tigres, 16°36′S, 11°27′E, 110 m (Capart, 1951; Guinot, 1961). 16°37′S, 11°22′E, 126 m; 16°41′S, 11°21′E, 162 m; 17°06′S, 11°35′E, 90 m; 17°09′S, 11°30′E, 126 m; 17°13′S, 11°27′E, 155 m (all Crosnier, 1970).

South-West Africa: 17°18′S, 11°24′E, 225 m (Crosnier, 1970). 52 mi [84 km] SxW Fort Rock Point, 19°52′S, 12°-20′E, 220 m (Capart, 1951; Guinot, 1961). 26°36′S, 14°37′E, 130 fm (238 m) (Barnard, 1950; Guinot, 1961; Guinot and Ribeiro, 1962).

* *Macropipus rugosus* (Doflein, 1904)

Portunus sp.—Leach, 1818, in 1817-1818:413.—Monod, 1970:66.

Elliptodactylus rugosus Doflein, 1904:94, figs. 7, 8, pl. 30: figs. 1-3, pl. 32: fig. 7.

Portunus tuberculatus.—Capart, 1951:117 [part, not fig. 41, not specimens from A.S. 108, 110].—Monod, 1956:180, 632, figs. 207-209.—Rossignol, 1957:80, 123 [key].—Longhurst, 1958:87.—Rossignol, 1962:115.—Maurin, 1968b: 484, fig. 5.—Le Loeuff and Intès, 1968:44, table 1, figs. 49, 63. [Not *Portunus tuberculatus* Roux, 1830.]

Macropipus rugosus.—Guinot, 1961:2, 9, figs. 1, 4, 7, pl. 2: fig. 3 [synonymy].—Guinot and Ribeiro, 1962:32-34, 35, figs. 7-9, 17, 19, 20, 22a,b, pl. 2: fig. 1, pl. 3: fig. 1.—Crosnier, 1964:34.—Forest and Guinot, 1966:60.—Le Loeuff and Intès, 1969:63, 65.—Türkay, 1976a:25 [listed], 37.

Macropipus.—Voss, 1966:27.

Portunus.—Maurin, 1968b, fig. 4.

Portunus (*Macropipus*) *tuberculatus.*—Maurin, 1968b:486, 489, 491 [not *Portunus tuberculatus* Roux, 1830].

Macropipus tuberculatus.—Maurin, 1968b:491.—Bas, Arias and Guerra, 1976, table 3. [Not *Portunus tuberculatus* Roux, 1830.]

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 3 juv (W). Sta 83, 156-220 m, 2♀ ov (L).

Ivory Coast: Sta 42, 62-75 m, mud with brown, branched Foraminifera, 1 juv (W). Sta 64, 68 m, 1 carapace (L). Sta 65, 46-49 m, 1♀ ov (dry) (L).

Ghana: Sta 23, 42 m, foliate brown to orange bryozoans, 2♀ (L). Sta 24, 35-37 m, dark red bryozoans, 1♀ (W).

Nigeria: Sta 241, 59-63 m, mud and shell, 5♂, 6♀, 9 juv (W).

Cameroon: Sta 259, 59 m, mud and broken shell, 9♂, 9♀ (L). Sta 260, 46 m, 1♂, 1♀ (L).

Geronimo Material: Gabon: Sta 202, 100 m, 36♂, 30♀ (W). Sta 211, 100 m, 3♂, 7♀ (W). Sta 213, 300 m, 1♂, 2♀ (W). Sta 228, 300 m, 1♂, 2♀ (W).

Other Material: Guinea-Bissau: 10°19′N, 16°34′W, 174 m, mud, sand, 16 May 1956, *Calypso* Sta 5, 1♂ (W).

Liberia: Off Monrovia, 400 m, 27 Apr 1964, Guinean Trawling Survey 14/8, 1 specimen (L).

Gulf of Guinea: Between Ghana and Sierra Leone, Feb and Apr 1964, Guinean Trawling Survey, 1♂ (L).

DESCRIPTION.—Guinot, 1961, table 1 (comparison with *M. tuberculatus* (Roux, 1830) and *M. australis* Guinot, 1961; Guinot and Ribeiro, 1962: 37-42 (comparison with *M. tuberculatus*).

Figures: Monod, 1956, figs. 207-209.

Male Pleopod: Monod, 1956, fig. 209 (Senegal); Guinot and Ribeiro, 1962, fig. 22a,b (Guinea-Bissau).

Color: According to Capart (1951:118), this species is "gris-jaune avec taches roses, prenant un aspect nacré après fixation." His color notes may have been based on *M. australis*, for part of his material is referable to that species (see p. 85).

MEASUREMENTS.—Our specimens have carapace widths of 8 to 39 mm; ovigerous females have carapace widths of 32 to 39 mm.

BIOLOGY.—*Macropipus rugosus* inhabits moderate depths and seems to prefer depths of less than 100 m; the shallowest record is of 5 m and the deepest is 400 m. 78% of the records for which depth is given are from depths of less than 100 m, and, in those depths, records are equally divided between those in 50 m or less and those in 51-100 m. All but two of the *Pillsbury* specimens came from depths of less than 100 m and the species was found on bottoms with bryozoans, Foraminifera, broken shell, and mud and shell or mud and broken shell. Guinot (1961:10) noted that "Son habitat le plus commun semble être le sable ou la vase." Forest and Guinot (1966) reported it from mud, rocks and calcareous algae, mud, mud and sand or broken shell, mud and calcareous algae and shells, sand, and algae and calcareous algae. Maurin (1968b) found it on mud in 40-

60 m, on detrital mud in 50–90 and 200 m, on fine detrital muddy sand in 200–400 m, and on fluid mud with fine sand or mud and very muddy fine sand in 35–40 m.

Le Loeuff and Intès (1968:44) studied this species (as *Portunus tuberculatus*) off the Ivory Coast and commented:

> La zone des 50 m constitue l'habitat privilégié de l'espèce qui accompagne cependant les eaux froides jusqu'à 35 m quand elles remontent le long du plateau continental en Mai, puis Août-Septembre-Octobre et même Janvier-Février. En fait *P. tuberculatus* vit dans des eaux bien déterminées (22°C–16°5C de température, 35,55‰ à 35,75‰ de salinité) qui, en Côte d'Ivoire correspondent à l'eau subtropicale. C'est sans doute, parmi tous les organismes benthiques littoraux de cette étude, l'espèce la plus sténotherme et la plus inféodée à une masse d'eau.

Türkay's (1976a) record of this species from off Morocco seems questionable to us, not only because it is from so far north (33°37.5'N) but also because of the relatively great depth, 952–1038 m, at which his material is supposed to have been collected. That depth is more than twice as great as the deepest record otherwise observed for this species.

Ovigerous females have been collected in June and September (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Off West Africa, from Mauritania to Angola, in moderate depths, from 5 to 400 m. Monod (1956) identified this species with the Mediterranean *M. tuberculatus* (Roux) and reported material from Mauritania, Senegal, Sierra Leone, and Guinea. Guinot (1961) differentiated earlier records and provided synonymies for each of the three nominal species: *M. australis*, *M. rugosus*, and *M. tuberculatus*. Subsequent records include:

West Africa: Gulf of Guinea (Leach, 1818, in 1817–1818; Monod, 1970).

Morocco: 33°37.5'N, 09°02.2'W, 952–1038 m (?) (Türkay, 1976a).

Spanish Sahara: No specific locality (Guinot and Ribeiro, 1962). Between Cabo Barbas and Cabo Blanco, 59–90 m; between Cabo Corbeiro and Cabo Blanco, 200 m (Maurin, 1968b). 25°37.5'N, 14°52'W to 25°39.2'N, 14°51.5'W, 72–78 m, and 24°06.3'N, 16°20.2'W to 24°06'N, 16°24.8'W, 61–68 m (Bas, Arias, and Guerra, 1976).

Mauritania: Banc d'Arguin, 40–60 and 90–100 m; off Tamzak (as Tamxat), 200–400 m (Maurin, 1968b).

Senegal: Off Saint-Louis, 35–40 m; off Mboro, 35–40 m (Maurin, 1968b). 13°01'N, 17°24'W, 51–55 m, and 12°55.5'N, 17°33'W, 65–75 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966). SE of Île de la Madeleine, 48 m; S border, Fosse de Kayar, 300 m; off Cambérène, 50 m (all Guinot and Ribeiro, 1962).

Guinea-Bissau: 10°32'N, 16°53.5'W, 174 m, and 10°19'N, 16°34'W, 60–73 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

Sierra Leone: No specific locality, 15–236 m (Longhurst, 1958).

Liberia: 04°59'N, 09°37'W, to 04°57.5'N, 09°33'W, 156–220 m (Voss, 1966).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Grand-Lahou, off Grand-Bassam, 35–100 m (Le Loeuff and Intès, 1968).

Cameroon: No specific locality, in more than 50 m (Crosnier, 1964).

Principe: 01°38'25"N, 07°22'05"E, 31 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

São Tomé: 00°25'40"N, 06°40'10"E, 50 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

Gabon: 00°38'25"S, 08°46'E, 5 m; 00°38'20"S, 08°48'-30"E, 35 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966). W of Pointe Panga, 70 m (Rossignol, 1962).

Congo: Off Pointe-Noire (Rossignol, 1957).

Zaire: 06°16'S, 12°07'E, 50 m; 06°28'S, 12°05'03"E (Guinot, 1961).

Angola: 10°S, 13°30'E, 60–70 m (Guinot, 1961). Baía Farta, Benguela, 90 m; Baía da Caota, Benguela, 13 m (both Guinot and Ribeiro, 1962).

Subfamily PORTUNINAE Rafinesque, 1815

REMARKS.—This subfamily is characterized by the presence of a strong tooth on the upper, outer surface of the palm of the cheliped near the upper articulation of the carpus.

Genus *Callinectes* Stimpson, 1860

Callinectes Stimpson, 1860:220 [type-species: *Callinectes sapidus* Rathbun, 1896, by designation under the plenary powers of the International Commission on Zoological Nomenclature, Opinion 712 in *Bulletin of Zoological Nomenclature*, 21(5):337, 1964; gender: masculine; name 1613 on *Official List*].

REMARKS.—The genus *Callinectes* has been reviewed recently in detail by Williams (1974); not all of his distribution records are duplicated here.

Key to West African Species of *Callinectes**

(modified from Williams, 1974)

1. Granules of carapace (Figure 19*a*) anterior to epibranchial ridges larger and placed wider apart than those posterior to ridges. Epibranchial ridges without distinct inflection in middle, almost straight. Submedian pair of frontal teeth well developed, usually half or more than half as long as lateral pair (measuring from base of lateral notch between teeth). First abdominal somite laterally ending in triangular, rather blunt point, not sharply pointed nor curved upward. Tips of male gonopods reaching beyond suture between thoracic sternite VI and mesially expanded sternite VII ..... ***C. amnicola***, new combination

   Granulation of carapace not different anterior and posterior to epibranchial ridges. Frontal teeth decidedly unequal in size, submedian pair no more than half as long as the lateral pair. Tips of male gonopods falling well short of suture between thoracic sternite VI and mesially expanded sternite VII 2

2. Carapace (Figure 19*b*) coarsely granulated. Epibranchial ridges with a distinct deflection in the middle. First abdominal somite ending laterally in a triangular point, which is neither sharply drawn out nor curved up. Male gonopods well separated from each other, not touching or crossed ..... ***C. marginatus***

   Carapace (Figure 19*c*) finely granulated. Epibranchial ridges not deflected in the middle, at most slightly sinuous. First abdominal segment ending laterally in narrow upturned points. Male gonopods overlapping each other, often crossed ..... ***C. pallidus***, new combination

* Excluding juveniles.

**Callinectes amnicola* (De Rochebrune, 1883), new combination

FIGURE 19*a*

Amphitrite diacantha.—Herklots, 1851:5 [not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896].

Neptunus amnicola De Rochebrune, 1883:168.—Miers, 1886: 175.—Monod, 1956:215.

Neptunus Edwardsi De Rochebrune, 1883:169.—Monod, 1956:215.

Neptunus diacanthus.—De Man, 1883:150 [part].—Büttikofer, 1890:466, 487 [part].—Johnston, 1906:862. [Not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896.]

Neptunus edwardsii.—Miers, 1886:175.

Portunus edwardsi.—Rathbun, 1900a:290.

Callinectes diacanthus africanus.—Gruvel, 1912:5, 6, 11 [not pl. 2: fig. 1 = *Callinectes sapidus* Rathbun, 1896].

Neptunus Edwardsii.—Balss, 1921:58 [listed].

Callinectes latimanus.—Capart, 1951:132, fig. 47.—Bruce-Chwatt and Fitz-John, 1951:117.—Sourie, 1954a:24, 84, 112 [listed].—Monod, 1956:211, figs. 240–243.—Rossignol 1957:82.—Longhurst, 1957:375, 380.—Sourie, 1957:13, 51.—Longhurst, 1958:87.—Gauld, 1960:69.—Guinot and Ribeiro, 1962:50.—Rossignol, 1962:116.—Crosnier, 1964: 32.—Ribeiro, 1964:7.—Forest and Guinot, 1966:65.—Monod, 1967:180, pl. 15: fig. 2 [no material].—Le Loeuff and Intès, 1968:44; 1969:63.—Williams, 1974:775, figs. 15, 19c, 20p, 23a, 27 [review of genus].—Pauly, 1975:57.—Powell, 1979:127.

Not *Callinectes latimanus.*—Irvine, 1947:297, fig. 203 [= *Portunus validus* Herklots, 1851], fig. 202 [= *Callinectes pallidus* (De Rochebrune, 1883)].

SYNONYMS.—*Neptunus edwardsi* De Rochebrune, 1883; *Callinectes latimanus* Rathbun, 1897; *Neptunus marginatus* var. *truncata* Aurivillius, 1898.

MATERIAL EXAMINED.—*Pillsbury Material*: Nigeria: Sta 2, Lagos harbor, surface, 1♀ ov (L). Sta 229, Lagos harbor, surface, 1♀ (W).

Other Material: Senegal: No specific data, 1 juv ♂ (W).

Liberia: Robertsport, Grand Cape Mount County, 28 Dec 1947, J. T. Baldwin, Jr., 1♀ (W). Junk River, Habel, T. C. Rutherford, 20 Jul 1968, 1♂ (W). Fisherman's Lake [Lake Piso], 1881, J. Büttikofer and J. A. Sala, 2♂, 2♀ (L). Grand Cape Mount, 1881, J. Büttikofer and J. A. Sala, 1♂ (L).

Ghana: Elmina (as St. George d'Elmina), 1840–1855, H. S. Pel, 1♂ (L). Takoradi Airport stream, 28 Aug 1961, Banes and Amegah, 1♂, 2♀, 2 juvs (W). Data same, Amegah, 1♂, 1♀ (W). Takoradi swimming pool, 10 Aug 1961, Amegah, 2♂ (W),

Togo: No specific locality, 1♀ (W).

Nigeria: Lagos, A. Molony, syntype of *Callinectes latimanus* Rathbun, 1♂ (52 × 114 mm) (W). South bank of mouth of Escravos River near Ajudaibo, Niger delta, 18 Jul 1975, C. B. Powell, 1♀ (L). Between Brass and Port Harcourt, Niger delta, May-Aug 1960, H. J. G. Beets, 6 spec (L).

Zaire: Banana, mouth of Congo River, American Museum Congo Expedition 1909–1915, July-Aug 1915, H. Lang, 5♂, 2♀ (W).

Angola: "Congo," 1880, P. Kamerman, 6 specimens (L).

DESCRIPTION.—Carapace (Figure 19*a*) moderately convex, twice or slightly more than twice (2.0–2.3 times) as wide as long (spines included), dorsal surface rather roughly granular. Posterior to epibranchial ridges granules generally smaller and placed closer together than anteriorly, where coarser, more widely spaced. Epibranchial ridge forming an almost straight line from cervical groove to lateral marginal spine of carapace, showing no inflection as in *C. marginatus*. Length of metagastric area of carapace equal to or slightly greater than posterior width, latter half anterior width. Submedian teeth of front triangular, usually half or slightly more than half as long as outer frontal teeth; latter triangularly rounded, distinctly narrower than inner orbital angles, extending beyond them for some distance. Epistomial spine, in dorsal view, rarely extending beyond frontal teeth. Anterolateral margins of carapace not strongly arched, less so than in *C. marginatus*. Anterolateral teeth rather wide, anterior teeth blunt to acute, directed outward, posterior teeth more acute, curved more anteriorly. Lateral spine stout, varying from twice to somewhat more than twice as long as preceding tooth.

Carpus and chela with usual distinct, granular ridges. Adults with larger chela often high and swollen in basal part of fingers, with lower margin of fixed finger convex basally, fingers gaping, dactylus with enlarged molariform tooth basally on cutting edge.

First somite of abdomen in both sexes bluntly triangular laterally, not ending in sharp, upcurved point as in *C. pallidus*.

Male first gonopods very long, reaching almost to end of abdomen, distally curved inward, tips crossing. Length of gonopods characteristic of this

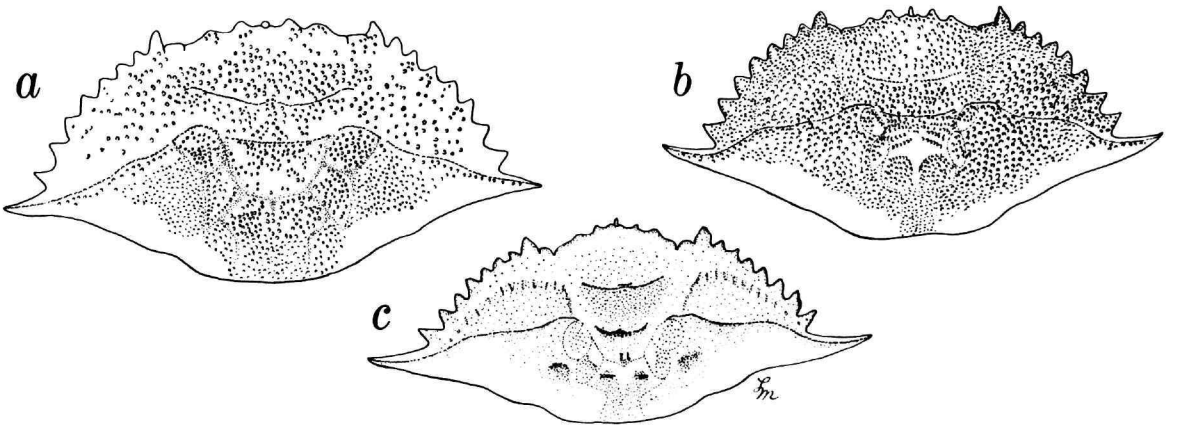

FIGURE 19.—Carapace ornamentation in West African species of *Callinectes*: *a*, *C. amnicola* (De Rochebrune), male, cb 119.5 mm, Liberia; *b*, *C. marginatus* (A. Milne Edwards), male, cb 90 mm, Congo; *c*, *C. pallidus* (De Rochebrune), male, cb 95 mm, Liberia.

species, distinguishing it from other African species of the genus.

An excellent account of the species has been given by Williams (1974:775).

Figures: Rathbun, 1921, fig. 4, pl. 15: fig. 2, pl. 21, pl. 22: fig. 1; Capart, 1951, fig. 47; Monod, 1956, figs. 240–243; Williams, 1974, figs. 15, 19c, 20p, 23a, 27.

Male Pleopod: Rathbun, 1921, fig. 4e (Zaire); Williams, 1974, figs. 19c, 20p (Congo).

Color: Williams (1974:776) summarized some earlier observations on color and noted that "a mottled olive coloration persists at least as long as 20 yr in some preserved specimens." Capart (1951:133) noted that in his material the color was "uniforme bleuâtre (exemplaires fixés, orangé clair)." Gauld (1960:69) observed that off Accra material of this species is "olive-brown with pale legs." De Rochebrune's (1883) color descriptions of the adult and juvenile are cited on p. 91.

MEASUREMENTS.—Our specimens have carapace widths of 15 to 126.5 mm; the ovigerous female has a carapace width of 120 mm.

REMARKS.—In the recent literature this species has usually been given the name *Callinectes latimanus* Rathbun, 1897, but there is an older name (or actually two older names) available for it. De Rochebrune (1883:168–171) described three new species of swimming crabs from Senegal: *Neptunus amnicola* (p. 168), *N. edwardsi* (p. 169), and *N. pallidus* (p. 170). The identity of these species has puzzled many authors. Miers (1886:175) listed them in the subgenus *Amphitrite* de Haan, 1833 [= *Monomia* Gistel, 1848] of the genus *Neptunus* de Haan, 1833 [= *Portunus* Weber, 1795], without any comment other than that *amnicola* perhaps should be placed in the subgenus *Neptunus*. Rathbun (1900a:290) placed *amnicola* with some doubt in the synonymy of *Callinectes bocourti* A. Milne Edwards, and treated *edwardsi* (p. 289) and *pallidus* (p. 290) as good species of *Portunus*. Later Rathbun (1921:398) reassigned the West African specimens that she at first had thought to be *C. bocourti* to *C. latimanus*, but at that occasion she did not deal with *amnicola*. Monod (1956:215) listed all three species of De Rochebrune as "species inquirendae" under *Callinectes* and stated that he had not been able to locate De Rochebrune's type material in the Paris Museum. So far as we know all later authors ignored De Rochebrune's species.

A study of De Rochebrune's descriptions makes clear that Monod was right in considering all to belong to the genus *Callinectes*. The species *N. amnicola* was described from a fullgrown specimen (cb 141 mm, cl 76 mm), the other two species after juveniles, which makes their identification especially difficult. *Neptunus amnicola* was described by De Rochebrune (1883:168–169) as follows (only the French description is cited and the abbreviated Latin diagnosis is omitted).

> Carapace beaucoup plus large que haute, faiblement bombée, fortement granuleuse, à granulations plus grosses et plus espacées dans la région antérieure; lignes épigastriques et hypogastriques bien marquées, les épibranchiales peu indiquées; bords latéro-antérieurs plus courts que les latéro-postérieurs; première dent de forme trapézoidale, obtuse au sommet; les suivantes épaisses, brusquement terminées en pointe courte et aiguë; la neuvième très longue, étroite, acérée, faiblement incurvée en dehors; front découpé en six dents, les deux médianes petites et obtuses, les mitoyennes plus longues, subaiguës, les externes très larges courtes arrondies au sommet; apophyse épistomienne grosse, atteignant le niveau du front; pattes antérieures très robustes, celles de droite plus volumineuses que celles de gauche; bras armé à la partie antérieure de trois dents en forme d'épine de Rosier, la première faible, les deux suivantes très fortes; partie postérieure du bras aplatie, carénée, à carène obtusement denticulée et terminée en haut par une épine courte; avant-bras tricaréné en dessous et en côté, chaque carène terminée par une dent obtuse; mains quadrangulaires, à angles fortement granuleux, armées en dessous d'une épine courte, en côté de deux tubercules et à l'articulation de l'avant-bras, d'une dent triangulaire robuste et aiguë.
>
> Teinte générale d'un beau bleu d'outre-mer nuancé de rose, deux taches arrondies, rouges, de chaque côté et à la base de la carapace.

This description agrees quite well with the present species, especially the very characteristic granulation of the carapace shows that *Neptunus amnicola* is a synonym of *Callinectes latimanus*. De Rochebrune's remark that the chelae are "armées en dessous d'une épine courte" evidently is a misprint for "armées en dessus. . . . " The fact that *Callinectes latimanus* is a common species in

fresh and brackish waters of Senegal makes the identification even more likely. Rathbun's (1900a) tentative identification of De Rochebrune's *Neptunus amnicola* with what she at that time considered *C. bocourti* A. Milne Edwards thus proves to have been correct. The epithet *amnicola* De Rochebrune, 1883, being older than *latimanus* Rathbun, 1897, has priority and thus must be used for the species.

De Rochebrune's second species, *Neptunus edwardsi*, is based on a very small specimen (cb 26 mm, cl 14 mm), much smaller than *N. amnicola* which measured 141 mm in carapace width and 76 mm in carapace length. De Rochebrune's (1883:169–170) description of *N. edwardsi* runs as follows.

> Carapace plus large que haute, aplatie, subhexagonale, très faiblement granuleuse à la partie antérieure; lignes épigastriques et hypogastriques à peine indiquées, lignes épibranchiales fortement accusées; bords latéro-antérieurs plus longs que les latéro-postérieurs; première dent droite épaisse, les suivantes tres obtuses à bords libres très finement crénélés; la neuvième aiguë un peu incurvée en haut, relativement courte; front découpé en six dents, les deux médianes très petites, les mitoyennes et les externes égales et obtuses; apophyse épistomienne courte, ne dépassant pas le front; pattes antérieures faibles; bras armé sur le bord antérieur de trois épines, et de deux autres épines plus faibles à l'extrémité articulaire; avant-bras portant sur la face externe une crête saillante limitée en dehors par une épine courte et accompagnée en dedans d'un tubercule obtus; mains anguleuses, à crêtes longitudinales assez saillantes faiblement rugueuses, et armées de deux petites épines en dessus de l'articulation du pouce.
>
> Teinte générale d'un roux canelle marbré de bleuâtre et de blanc.

The description of *Neptunus edwardsi* fits juvenile specimens of *Callinectes latimanus* very well. In specimens of the size of that of Rochebrune's the carapace is smooth with a few granules in the area before the epibranchial ridge. The lateral spine is short, being only somewhat longer than the last anterolateral tooth, which gives the carapace indeed a "subhexagonal" shape. The lateral frontal and inner orbital teeth are rounded and similar, while the epistomial spine does not show in dorsal view. In juvenile *Callinectes gladiator* the lateral spines are well developed and long. It seems quite safe to consider *Neptunus edwardsi* De Rochebrune a synonym of *N. amnicola* De Rochebrune, being based only on a juvenile specimen of that species.

De Rochebrune's third species, *Neptunus pallidus*, proves to belong to the species that is generally known as *Callinectes gladiator*, and as De Rochebrune's name is older it has to be known as *Callinectes pallidus* (De Rochebrune) (p. 95).

The material that Irvine (1947:297) referred to *Callinectes latimanus* proves to belong to *Portunus validus* (p. 103); his figure 202, however, represents *Callinectes pallidus* (p. 95).

The specimens recorded by Herklots (1851), De Man (1883), and Büttikofer (1890) are in the collections of the Rijksmuseum van Natuurlijke Historie in Leiden. Herklots' specimen, from Elmina (as St. George del Mina), Gold Coast (Ghana), is a male *C. amnicola* (Crust. D. 376). De Man's material included a specimen of *C. amnicola* from the Congo (Crust. D. 1863), and Büttikofer's material included a *C. amnicola* from Grand Cape Mount (Crust. D. 1873), as well as from Lake Piso (as Fisherman's Lake), Liberia (Crust. D. 1864). Monod (1956:214) had listed the records by Herklots and De Man as unidentifiable.

There is a syntype of *C. latimanus* Rathbun (USNM 19877), a female 52 × 114 mm, from Lagos, in the collection of the National Museum of Natural History, Smithsonian Institution.

Pauly (1957:75) noted that in the Sakumo lagoon, Ghana, this species was common enough to support a subsistence trap fishery.

BIOLOGY.—As pointed out by Williams (1974) and earlier authors, this species is primarily estuarine, although it is not restricted to estuaries. De Rochebrune (1883:171) commented on the "habitat exclusivement fluviatile" of this species, and said that it is common in the Senegal River and disappears when the water becomes salt, to reappear when it turns again completely fresh. Actually the species can stand brackish water and Monod (1956:214) classified it as occurring in marine, brackish, and freshwater habitats. Generally it is considered to be more characteristic of estuaries than *C. pallidus*, but in the *Pillsbury*

collections from Lagos harbor, a brackish to fluviatile habitat, the latter species (55 specimens) far outnumbers *C. amnicola* (2 specimens).

Le Loeuff and Intès (1968:44) made the following observations on this species:

> C'est un élément important de la faune des milieux lagunaires de l'ouest Africain. Nous l'avons cependant récolté à 9 reprises en mer dans la zone littorale au-dessus de 30 mètres. Les individus étaient tous des femelles de grande taille, ovigères à une exception près. Ces collectes ont eu lieu de juillet à août, puis de décembre à février. Les deux sorties de décembre 1967 à Grand-Bassam ont permis encore de ramener onze femelles ovigères. *C. latimanus* migre donc en mer pour pondre; et il y aurait deux saisons de ponte, l'une en saison froide, après la période des fortes précipitations de Mai et Juin, l'autre au moment des petits upwellings, après les crues des fleuves de Septembre et Octobre.

In a subsequent paper these same authors commented (1969:63):

> Le Crabe de lagune *Callinectes latimanus* Rathbun vient également pondre en mer; des femelles de grande taille, en grande majorité ovigères ont été récoltées à plusieurs reprises sans qu'il soit possible encore d'affirmer que la sortie en mer et la ponte ont lieu à certaines périodes définies ou tout au long de l'année.

Ovigerous females have been collected in January, February, March, May, June, July, August, October, and December (Monod, 1956; Ribeiro, 1964; Le Loeuff and Intès, 1968; Williams, 1974; *Pillsbury*).

DISTRIBUTION.—*Callinectes amnicola* is an inshore, estuarine species, occurring off West Africa from Baie de Saint-Jean (19°27′N, 16°22′W), Mauritania to at least as far south as a lagoon N of Luanda (08°47′S, 13°16′E), Angola. Williams (1974) summarized earlier records; distributional records from the literature not in Williams include the following:

West Africa: No specific locality (Monod, 1967).

Cape Verde Islands: Baía [Porto] de Sal Rei, Boavista (Guinot and Ribeiro, 1962; Ribeiro, 1964). Porto da Praia, São Tiago (Ribeiro, 1964).

Senegal: Sénégal River, Falémé River [?], Bakoy [?] [= ? Bako, 14°00′N, 15°16′W, or Bakor River 12°55′N, 14°-44′W], Bafing [?] [= Baling ?] "et tous les Marigots tributaires," Casamance River (all De Rochebrune, 1883). Presqu'île du Cap Vert; Rosso; Dakar (Sourie, 1954a). Dakar; Saloum (Sourie, 1957).

Gambia: Gambia River (13°28′N, 16°34′W) (De Rochebrune, 1883).

Sierra Leone: Sierra Leone River (Longhurst, 1957).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ivory Coast: Off Sassandra, off Grand-Lahou, off Grand-Bassam, 15-30 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, in shallow water (Gauld, 1960). Sakumo lagoon (Pauly, 1975).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951). Elechi Creek, Port Harcourt, 04°47′15″N, 06°58′45″E (Powell, 1979).

Cameroon: No specific locality, 0-30 m (Crosnier, 1964).

**Callinectes marginatus* (A. Milne Edwards, 1861)

FIGURES 19*b*, 20*a*,*b*

Neptunus diacanthus.—Pechüel-Loesche, 1882:287.—Osorio, 1892:199. [Not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896].

?Callinectes diacanthus.—Gruvel, 1913:78, 106 [this species or *C. amnicola?*].

?Callinectes diacanthus var. *africanus.*—Gruvel, 1913:168 [listed] [this species or *C. amnicola* ?].

Callinectes marginatus.—Gruvel, 1913:168 [listed].—Capart, 1951:134, fig. 48.—Monod, 1956:208, figs. 238, 239.—Rossignol, 1957:82.—Buchanan, 1958:20, 23.—Gauld, 1960:69.—Guinot and Ribeiro, 1962:48.—Rossignol, 1962:116.—Ribeiro, 1964:6.—Forest and Guinot, 1966: 65.—Monod, 1967:180, pl. 15: fig. 6 [no material].—Bott, 1968:169.—Williams, 1974:722 [part, not figs. 3, 18a,b, 20a, 22b, 27] [review of genus].—Hartmann-Schröder and Hartmann, 1974:19.

Callinectes.—Bayer, 1966:102.

SYNONYM.—*Callinectes diacanthus* var. *africanus* A. Milne Edwards, 1879.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, washed ashore, 1 carapace (L).

Fernando Poo: Sta 257, shore, 2♂, 1 juv (L).

Annobon: Sta 281, shore, 2♂, 2 juv (W).

Other Material: Cape Verde Islands, Porto Grande, São Vicente, U.S. Eclipse Expedition, 1 juv (W). Porto da Praia, São Tiago (as La Praya, Santiago), Jul 1883, *Talisman*, 1♂ (W).

Ghana: Mouth of Hwini River, Takoradi, 27 Jul 1961, Bane and Richards, 1♂ (W). Virgins Pool, Takoradi, 27 Jul 1961, Bane and Richards, 1♂ (W).

Zaire: Banana, mouth of Congo River, American Museum Congo Expedition 1909-1915, Aug 1915, H. Lang, 5♂, 4♀ (W). Data same, Jul-Aug 1915, 1♀ (W).

Angola: Luanda (as St. Paul de Loanda), U.S. Eclipse Expedition, 2♂ (W).

DESCRIPTION.—Carapace (Figure 19*b*) somewhat elevated, generally flatter than in *C. amnicola*, width slightly more (2.1 to 2.3 times) than twice as great as length (lateral spines included). Granulation dense, uniform, granules anterior to epibranchial ridge as dense and large as those posterior to ridge; granules finer than in *C. amnicola* but distinct. Epibranchial ridge between cervical groove and lateral spine of carapace not straight, with strong inflection near midlength. Length of metagastric area equal to or shorter than posterior width, latter half anterior width. Front with submedian teeth very narrow, short, much shorter than half length outer teeth; latter bluntly triangular, extending somewhat beyond more widely triangular inner orbital angles. Epistomial spine distinct in dorsal view, extending about as far forward as outer frontal teeth. Anterolateral margins of carapace more strongly convex than in *C. amnicola.* Anterior teeth triangular, curved somewhat forward, blunt; posterior teeth also triangular, more sharply pointed. Lateral spine stout, about twice as long as preceding tooth.

Carinae on cheliped of adults distinct, granular. Chelae of adults slender, occasionally somewhat swollen in basal part of fingers, less strongly so than in *C. amnicola.* Basal tooth of dactylus of large chela slightly enlarged.

First somite of abdomen in both sexes terminating laterally in triangular or blunt point, neither prolonged nor turned upward.

First gonopods of male short, failing by far to reach end of sternite of third pereiopod. Distal part of gonopods somewhat curved externally, curve gradual, gonopods generally not touching (Figure 20*a,b*).

Figures: Rathbun, 1921, fig. 2, pl. 19: fig. 1, pl. 20: fig. 1; Capart, 1951, fig. 48; Monod, 1956, figs. 238, 239.

Male Pleopod: Rathbun, 1921, fig. 2d (Zaire).

Color: Capart (1951:135) noted that "coloration après fixation non uniforme, des marbrures plus foncées sur la carapace et sur P.l." Rossignol (1957:82) remarked that the species can best be distinguished from *C. amnicola* by its color, namely "carapace marbrée."

MEASUREMENTS.—Our specimens have carapace widths of 15 to 97 mm.

REMARKS.—Since Rathbun (1896:358, 359) referred African specimens of this species to the East American *Callinectes larvatus*, the specific identity of African and American specimens of the two forms have not been questioned. After having examined the types of *Callinectes marginatus* (A. Milne Edwards, 1861) from Gabon, *Callinectes larvatus* Ordway, 1863, from Key West, the Tortugas, the Bahamas and Haiti, and *Callinectes diacanthus africanus* A. Milne Edwards, 1879, from the Cape Verde Islands, Rathbun (1897a:149) synonymized the three species and used the oldest available name, *marginatus*, for it. Rathbun's views on the taxonomy and nomenclature of the species have since been followed by most authors, including Williams (1974) in his fundamental revision of the genus *Callinectes.*

However, a comparison of our African material with American specimens identified with *C. marginatus* showed a number of seemingly constant differences, which in our opinion necessitates the recognition of two distinct species. The American species should be given the name *Callinectes larvatus* Ordway, 1863; the well-known name *Callinectes marginatus* (A. Milne Edwards, 1861) is retained for the African species. The differences between these species are the following:

1. In *C. marginatus* (Figure 19*b*) the granulation of the carapace before the epibranchial ridges is as dense as that behind these ridges, the granules there are of the same size as those in the posterior part of the carapace. In *C. larvatus* the granules before the epibranchial ridges are larger and placed much wider apart than those behind the ridges.

2. The cervical groove behind the orbits is much deeper in *C. larvatus* than in *C. marginatus.*

3. The ventral inner orbital angle in *C. marginatus* is narrower than in *C. larvatus.*

4. The male gonopods are short in both species, but in *C. marginatus* (Figure 20*a,b*) they are more

slender and the distal part that is curved outward is relatively longer and less abruptly bent; the two gonopods as a rule do not touch. In *C. larvatus* (Figure 20*c,d*) the distal outward curved part of the gonopod is shorter and more abruptly bent; the two gonopods touch each other in the midline of the body.

BIOLOGY.—Monod (1956:210) indicated that this species is a shallow water form that prefers a sandy or sandy mud bottom, and is found in marine habitats. The latter in contrast to *C. amnicola*, which is known from fresh, brackish, and salt water, and *C. pallidus*, which Monod reported from salt and brackish waters. Buchanan (1958: 20, 23) indicated *C. marginatus* as a characteristic epifaunistic species of the inshore fine sand community. Rossignol (1962:116) described the species as a "forme littorale (eaux saumâtres, lagunes)," but possibly based this on the literature in which more than one species is confused under the name *C. marginatus*. Gauld (1960) mentioned the species to be caught intertidally. Guinot and Ribeiro (1962:48, 49) listed an abundant material, mostly from sandy beaches, either taken by hand or by beach seines; the species was mentioned once by them from the hull of a ship, and once from under rocks near the shore; there is no indication that any of this material is estuarine. Ribeiro (1964:6) reported the species from "zona intercotidal." Forest and Guinot (1966:65) mentioned the species from a sand beach (0–9 m) and from intertidal rocks. West African material of *Callinectes marginatus* was listed by Williams (1974) from "rock pool" and "beach." The *Pillsbury* specimens were collected from sandy beaches (Sta 1 and 281) and from the seashore (Sta 257). All these data confirm Monod's statement that the species is marine rather than estuarine. The data are too few, however, to definitely fix the habitat of the species; specimens have been reported from the mouth of the Congo River (Rathbun, 1921; and p. 92), and from the mouth of the Hwini River (p. 92), localities that might be estuarine.

Off West Africa ovigerous females have been collected in February, May, June, September, October, and December (Guinot and Ribeiro, 1962; Ribeiro, 1964; Forest and Guinot, 1966; Williams, 1974).

DISTRIBUTION.—The species is known from the Cape Verde Islands and Port Etienne, Mauritania to central Angola. Monod (1956) summarized earlier records; distribution records from the literature not in Monod include the following.

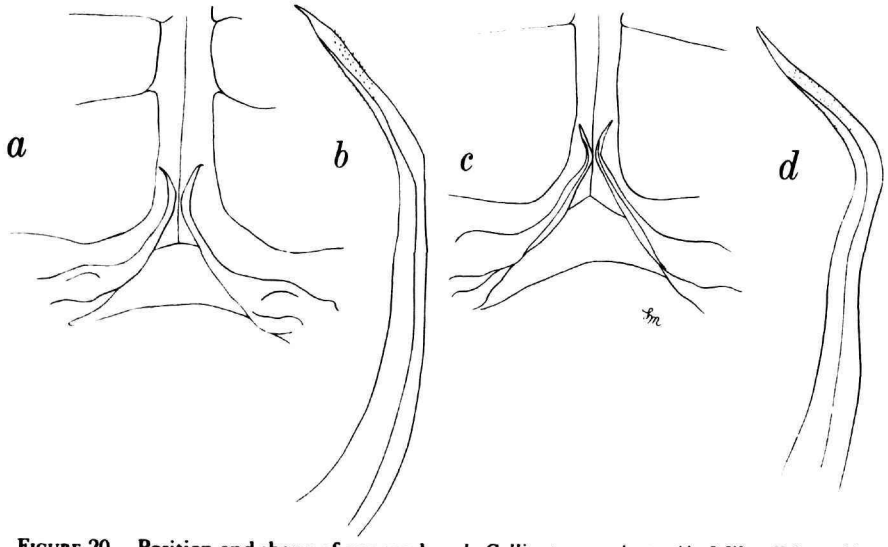

FIGURE 20.—Position and shape of gonopods: *a,b, Callinectes marginatus* (A. Milne Edwards), male, cb 90 mm, Congo; *c,d, Callinectes larvatus* Ordway, male, cb 116 mm, Jamaica.

West Africa: No specific locality (Monod, 1967).

Cape Verde Islands: Baía das Gatas, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964). Porto da Praia, São Tiago (Guinot and Ribeiro, 1962; Ribeiro, 1964; Williams, 1974).

Senegal: Dakar (Williams, 1974).

Gambia: Near Gunjur (Williams, 1974).

Guinea: Fotoba, 6 miles [10 km] W of Conakry (Williams, 1974).

Sierra Leone: Murray Town (Williams, 1974).

Ghana: Off Accra (Buchanan, 1958). Apam (Gauld, 1960).

Togo: No specific locality (Gruvel, 1913).

Dahomey: No specific locality (Gruvel, 1913).

Nigeria: Lagos harbor (Williams, 1974).

Fernando Poo: No specific locality (Williams, 1974).

Principe: No specific locality (Forest and Guinot, 1966).

São Tome: No specific locality (Forest and Guinot, 1966; Williams, 1974). Iógoiógo (Osorio, 1892; Forest and Guinot, 1966). Morro Peixe (Forest and Guinot, 1966; Williams, 1974).

Annobon: 01°24'S, 05°37'E, shore (Bayer, 1966).

Gabon: No specific locality (Williams, 1974; syntypes).

Congo: No specific locality (Williams, 1974). Loango (Pechüel-Loesche, 1882). Djeno, lagoon (Rossignol, 1957). Near Pointe-Noire (Rossignol, 1962; Williams, 1974).

Zaire: Mouth of Congo River near Banana (Williams, 1974).

Angola: No specific locality (Forest and Guinot, 1966). Luanda (Forest and Guinot, 1966; Bott, 1968; Williams, 1974). Baía do Lobito (Guinot and Ribeiro, 1962; Williams, 1974). Praia da Rocha, Benguela (Guinot and Ribeiro, 1962). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

**Callinectes pallidus* (De Rochebrune, 1883), new combination

FIGURE 19*c*

Neptunus pallidus De Rochebrune, 1883:170.—Miers, 1886: 175.—Balss, 1921:59 [listed].—Monod, 1956:215.

Neptunus diacanthus.—De Man, 1883:150 [part].—Büttikofer, 1890:466, 487 [part]. [Not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896].

Portunus pallidus.—Rathbun, 1900a:290.

Callanectes Sp.?.—Irvine, 1932, fig. 13.

Callinectes Gladiator.—Irvine, 1932:15.

Callinectes latimanus.—Irvine, 1947, fig. 202 [not *C. latimanus* Rathbun, 1897 = *C. amnicola* (De Rochebrune, 1883)].

Callinectes gladiator.—Irvine, 1947:298.—Frade, 1950:11, 26.—Bruce-Chwatt and Fitz-John, 1951:117.—Capart, 1951:130, fig. 46.—Monod, 1956:205, figs. 236, 237.—Rossignol, 1957:82.—Sourie, 1957:13, 51.—Longhurst, 1958:87.—Gauld, 1960:69.—Guinot and Ribeiro, 1962: 48.—Rossignol, 1962:116.—Crosnier, 1964:32.—Forest and Guinot, 1966:64.—Monod, 1967:180, pl. 15: fig. 3 [no material].—Bayer, 1966:98.—Le Loeuff and Intès, 1968: 40, p. 2 of table 1, figs. 50, 61; 1969:64, 65.—Monod, 1970:66.—Uschakov, 1970:439, 455 [listed].—Ejike, 1973: 253.—Williams, 1974:735, figs. 5, 18c, 20b, 22c, 24 [review of genus].

Callinectes.—Bayer, 1966:98.

Lupa Smythiana.—Monod, 1970:66.

SYNONYM.—*Callinectes tumidus* var. *gladiator* Benedict, 1893.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 43, surface, 2♀ (W).

Nigeria: Sta 2, Lagos harbor, surface, 41 specimens (L,W). Sta 226: Lagos harbor, surface, 1♂ (W). Sta 228, Lagos harbor, surface, 1♂, 2♀ (W). Sta 229, Lagos harbor, surface, 4♂, 6♀ (W). Sta 250, 24 m, brackish water, mud, 9♂, 11♀, 1 juv (W). Sta 251, 27 m, mud, 3♂, 5♀ (1 ov), 3 juv (L). Sta 252, 30 m, mud, 1♀, 1 juv (W).

Fernando Poo: Sta 257, shore, 1♂ (L). Sta 258, shore, 1 juv (W).

Other Material: Senegal: Dakar, 3 May 1892, O. F. Cook, 1♂ (W). Dakar Harbor, 25–26 Jul 1964, *Geronimo*, 2♂, 2♀ (W).

Liberia: Mouth of Mesurado River, Monrovia, O. F. Cook, 1♀ (W). Farmington River at Snafu Docks, Nov 1946, H. A. Beatty, 3♂, 1♀ (W). Off Saint Paul River mouth, Monrovia, 4–11 fm (7–20 m), 6 Jan 1953, G. C. Miller, 2♀ ov (W). Data same; 3–6 fm (5–11 m), 4 Mar 1953, 1♂ (W). Grand Cape Mount, near Robertsport, 1881, J. Büttikofer and J. A. Sala, 1♂, 2♀ (L).

Ghana: Chorkor, near Accra, Dec 1950, R. Bassindale, 3♀ (L). Baya River, Elmina, Ashantee [Ghana], 1889, W. H. Brown, Jr., holotype of *Callinectes tumidus* var. *gladiator* Benedict, 1♂ (29 × 63 mm) (W). Komenda, 11 Apr 1962, Amegah, 1♀ (W). Volta River mouth [Volta delta], 23 Jul 1961, Bane and Richards, 1 juv (W). Takoradi Fisheries Bay, 14 Aug 1961, Bane and Amegah, 11 juv (W). Takoradi, Hwini River mouth, Hwini drainage, 27 Jul 1961, Bane and Richards, 2♂, 5 juv (W).

Nigeria: Between Brass and Port Harcourt, Niger delta, May–Aug 1960, H.J.G. Beets, 3♂, 1 juv (L). S bank of mouth of Escravos River, Ajudaibo, Niger delta, 30 Jul 1975, C. B. Powell, 1♂, 1♀ (L).

Cameroon: Batanga, 1♂ (W). Batanga, caught on hooks by native fishermen, 12 Aug 1930, A. J. Good, 1♀ (W). Douala, from fish market at Yaounde, 10 Feb 1964, B. de Wilde-Duyfjes, 1♂ (L). Kribi, 9 Mar 1964, B. de Wilde-Duyfjes, about 15 specimens (L); same, 9 Aug 1964, about 15 juv (L).

Gabon: 01°10'S, 08°15'E, 21 Aug 1961, G. W. Bane, 1♂ (W). Port-Gentil, 1956, J. H. Logemann, 1♂ (L).

Zaire: Banana, mouth of Congo River, American Mu-

seum Congo Expedition, 1909-1915, Aug 1915, H. Lang, 1♂, 1♀ (W). Locality same, no date, 1♂ (W).

Angola: No specific locality ("Congo"), 1880, P. Kamerman, 1♂, 2♀ (L). Musserra, 1882, P. Kamerman, 1♂, 1♀ (L).

DESCRIPTION.—Carapace (Figure 19*c*) flatter and wider (2.3–2.5 times wider than long, lateral spines included) than those of other West African species of *Callinectes*. Surface granulation fine, uniform. Epibranchial ridge, between cervical groove and lateral spine, almost straight, lacking inflection found in *C. marginatus*. Length of metagastric area shorter than posterior width, 2/3 to 3/4 times posterior width, much shorter than half anterior width. Front with submedian teeth distinct, short, narrow, slightly less than half as long as outer frontal teeth, latter narrowly triangularly rounded, extending distinctly beyond broadly rounded inner orbital angles. Epistomial spine distinctly visible in dorsal view, extending to or slightly beyond outer frontal teeth. Anterolateral margins somewhat more strongly arched than in *C. amnicola*. Anterolateral teeth triangular, anteriormost acute or blunt, directed outward or slightly forward; posterior teeth sharply pointed, curved forward. Lateral spine almost 3 times as long as preceding tooth.

Ridges on carpus and chela usually distinct, granular, inconspicuous in some specimens. Palm in adults never swollen as in *C. amnicola*; basal tooth of dactylus occasionally enlarged in larger chela.

First abdominal somite in both sexes terminating laterally in sharp, upcurved points, characteristic for the species.

First gonopods of male short, extending almost to end of sternite of third pair of legs. Gonopods regularly curved outward, tips recurved inward. Williams (1974) provided a good account of the species.

Figures: Rathbun, 1921, fig. 3, pl. 19: fig. 2; Capart, 1951, fig. 46; Monod, 1956, figs. 236, 237; Williams, 1974; figs. 5, 18c, 20b, 22c, 24.

Male Pleopod: Rathbun, 1921, fig. 3d (Zaire); Williams, 1974, figs. 18c, 20b (Dahomey).

Color: Irvine (1947:298) described the color of the species as follows: "A crab with a beautiful mottled carapace and bright blue legs." Capart (1951:131) noted the color to be "brun-vert foncé." Monod (1956:208) reported that in some of his material the dactyli of the fifth legs were "noirs," "plus ou moins noirs," "foncés." Rossignol (1957:82) described the color of the species as follows: "gris-vert ou gris-bleu uniforme avec une tache bleue sur la paume et la partie proximale interne du doigt et du pouce des pinces." Gauld (1960:69) commented that this species is "sandy grey, dorsally, with bright blue legs and a dark, almost black, patch on the distal part of the fifth dactyl." Williams (1974:735) summarized other information on color and noted that "preserved specimens often have an oval dark mahogany colored spot, variable in size, on the gastric and metagastric areas." De Rochebrune's (1883:171) remark that the color of the species is "d'un gris rose" would fit the color description of Gauld, but since De Rochebrune's type is juvenile, it is difficult to compare this color with that of adult specimens.

MEASUREMENTS.—Our specimens have carapace widths of 24 to 105 mm; the carapace width of the ovigerous female is 74 mm.

REMARKS.—De Rochebrune's (1883:170–171) original description of *Neptunus pallidus* runs as follows:

> Carapace plus large que haute, presque aplatie, lisse; lignes épigastriques et hypogastriques à peine visibles; bords latéro-antérieurs beaucoup plus courtes que les latéro-postérieurs; première dent obtuse, les autres très courtes, arrondies au sommet; la neuvième droite aiguë très étroite; front découpé en six dents, les deux médianes très faibles, les mitoyennes arrondies, les externes courtes sub-aiguës; apophyse épistomienne dépassant légèrement le front; bras comprimés, armés à la partie antérieure de deux épines faibles, à la partie postérieure et au milieu d'une épine courte; avant-bras lisse, portant un petit tubercule en dehors; mains faibles, lisses, anguleuses, ayant une petite dent à l'articulation de l'avant-bras. Couleur générale d'un gris rosé."

The measurements given of this specimen are carapace width 15 mm, carapace length 9 mm. The specimen thus obviously is a juvenile. The description best fits juveniles of the species usually named *C. gladiator*. As shown under *C. amnicola*, the young of that species have the lateral spine of

the carapace very short, but in juveniles of the present species that spine is very elongate and straight, being much longer than the anterolateral teeth. The rest of the description also fits the present species, except for the measurements, for even *C. amnicola* specimens with cl 9 mm are much broader than 15 mm; one wonders whether 15 mm for the width is not a typographical error for 25 or 19 mm. Because both *C. amnicola* and *C. gladiator* are estuarine species, and both are common in Senegal, it seems most likely that *Neptunus pallidus* belongs to one of these two species; the shape of the lateral spines and the granulation of the carapace makes clear that it can only be identified with *C. gladiator* Benedict, 1893. As Benedict's name *gladiator* was proposed 10 years after De Rochebrune's publication of *pallidus* the latter name has priority and has to be used for the species.

As the type specimen of *N. pallidus* is no longer extant, we propose to fix the identity of *Neptunus pallidus* De Rochebrune, 1883, by selecting as its neotype the holotype of *Callinectes tumidus gladiator* Benedict, 1893 (USNM 14879), a male measuring 29 × 63 mm (one lateral spine broken). In this way *N. pallidus* and *C. gladiator* become objective synonyms. The name *pallidus* is quite appropriate for the species, as preserved material usually is of a very pale color.

The specimens reported as *Neptunus diacanthus* by De Man (1883) and Büttikofer (1890) are in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden. Both author's accounts were based on material of *C. amnicola* as well as *C. pallidus*. De Man's material included two specimens of *C. pallidus* from the Congo (Crust. D. 374, 1876), and Büttikofer's collection included one specimen of *C. pallidus* from Liberia (Crust. D. 1871).

As pointed out by Capart (1951:130, 132) the figures that Irvine (1932, 1947) published with his "*Callinectes gladiator*" and "*Callinectes latimanus*" have been interchanged: the figures indicated by Irvine in 1932 (fig. 13) as "*Callanectes* Sp.(?)" and in 1947 (fig. 202) as *Callinectes latimanus* actually represent *C. pallidus*. Irvine's text of "*Callanectes* Sp.(?)" and *C. latimanus* refers to *Portunus validus* (p. 103).

Biology—Williams (1974:736) has summarized most of the available ecological information on this species, an inshore form usually found on mud, sand, or sand and shell in depths of less than about 30 m. It is less often encountered in estuaries than *C. amnicola*, although the majority of the *Pillsbury* specimens were taken in brackish water in Lagos harbor during outgoing tides. Monod (1956:208) indicated this species as being found in the sea and in brackish water.

Sourie (1954b) found the species on bottoms of fine shelly sand with mud and *Molgula hannensis* Pérès in 2–7 m in the Baie de Dakar; Uschakov (1970) found it in turbid water in depths of less than 20 m on unstable mud off Guinea. Gauld (1960) noted that off Ghana it was very common from low water mark to 18 m, usually on sand. Bruce-Chwatt and Fitz-John (1951) noted that in Nigeria it lives on muddy bottoms of creeks.

Le Loeuff and Intès (1968:40) made the following observations on this species from their studies off the Ivory Coast:

> Extrêmement abondant et fréquent au-dessus de 30 mètres, ce Callinectes est très littoral car il ne descend pas au-delà de 35 m; son aire de répartition est très stable: *C. gladiator* ne se déplace pas quelle que soit la saison et est donc extrêmement tolérant aux variations de température, salinité, teneur en oxygène des eaux. Capart (1951) a signalé *C. gladiator* comme vivant sur des fonds vaseux. En fait l'espèce est indifférente à la nature du substrat. Tous les sédiments lui conviennent, sables ou vases. Sur les petits fonds *C. gladiator* domine nettement en nombre d'individus les autres Portunidae côtiers: *Portunus inaequalis*, *Cronius ruber*, *Neptunus validus* et contribue sans doute à repousser le maximum d'abondance des deux premiers au-delà de 25 mètres et à limiter la densité de *N. validus*.

Williams (1974) noted that earlier authors had commented on the aggressiveness of this species, a characteristic of most Portunidae.

Ovigerous females have been recorded in January, February, March, April, May, June, October, and December (Capart, 1951; Forest and Guinot, 1966; Monod, 1956; Williams, 1974; *Pillsbury*).

Distribution.—West Africa, from numerous

localities between Baie de Saint-Jean (19°27′N, 16°22′W), Mauritania, to Baía do Lobito (12°-20′S, 13°34′E), Angola, generally in depths of 35 m or less. Williams (1974) reported material from numerous localities and summarized earlier records. Records not in Williams include the following.

West Africa: No specific locality (Monod, 1970).

Senegal: Lac de Nguèr (as N'Guer), marigots de MBao [= Grand Mbao], Thionk [Pointe], Leybar (all De Rochebrune, 1883). Anse de Hann, Baie de Dakar, 2–7 m (Sourie, 1954b), Saloum (Sourie, 1957).

Guinea: No specific locality, less than 20 m (Uschakov, 1970).

Sierra Leone: No specific locality, 14–19 m (Longhurst, 1958).

Liberia: No specific locality (Frade, 1950).

Ghana: No specific locality, low water mark to 18 m (Gauld, 1960).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, off Grand-Bassam, 15–35 m (Le Loeuff and Intès, 1968).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951). Lagos harbor, 06°28′N, 03°23′E, surface (Bayer, 1966). 7 miles [11 km] off Lagos harbor (Ejike, 1973).

Genus *Cronius* Stimpson, 1860

Cronius Stimpson, 1860:225 [type-species: *Portunus ruber* Lamarck, 1818, by monotypy; gender: masculine].

Charybdella Rathbun, 1897b:166 [substitute name for *Cronius* Stimpson, 1860, erroneously considered to be preoccupied; type-species: *Portunus ruber* Lamarck, 1818; gender: feminine].

**Cronius ruber* (Lamarck, 1818)

FIGURE 21*a,b*

Cronius ruber.—Capart, 1951:128, fig. 45.—Monod, 1956: 189, figs. 218–221.—Rossignol, 1957:81, 124 [key].—Longhurst, 1958:87.—Buchanan, 1958:20.—Gauld, 1960: 69.—Rossignol, 1962:115.—Guinot and Ribeiro, 1962: 46.—Ribeiro, 1964:5.—Forest and Guinot, 1966:61.—Monod, 1967:180, pl. 15: fig. 5 [no locality].—Le Loeuff and Intès, 1968:40, 44, table 1, figs. 51, 61; 1969:63, 64, 65.—Uschakov, 1970:445, 455 [listed].

Charybdis.—Voss, 1966:19.

SYNONYM.—*Goniosoma Millerii* A. Milne Edwards, 1867.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38-42 m, mud with dense *Jullienella*, 1 juv (W). Sta 48, 22 m, 4♂, 3♀ (L, W).

Annobon: Sta 275, 9–69 m, rubble of coralline algae, 2 juv (L).

Other Material: Ghana: Accra, 1868–1869, M. Sintenis, 1♂ (L).

DESCRIPTION.—Capart, 1951:128.

Figures: Monod, 1956, figs. 218–221.

Male Pleopod: Guinot-Dumortier, 1960, fig. 15a,b (French Guiana); Garth and Stephenson, 1966, pl. 12c (Galapagos Islands).

Color: Rossignol (1957:81) provided the following detailed color account of this species.

Face dorsale:

a. Carapace: brun verdâtre teinté de jaune dans la région postérieure. Dents antérolatérales et frontales bleu azur avec apex marron.

b. Pinces: Côté interne: paume orange avec des taches blanches. Pouce et doigt brun-rouge à apex jaune. De plus, une tache orange au milieu du doigt. Côté externe: jaune sale avec bord inférieur blanc et épines bleues.

c. Pattes: brun verdâtre; épines bleues à apex marron. Partie distale du dactyle rose violacé, apex jaune. Dactyle de P_5 bordé d'une frange de poils oranges.

Face ventrale: blanc sale.

Capart (1951:128) gave the following notes on color: "Coloration rouge orange vif tacheté de blanc crème; le bout des épines et des doigts de la pince noir."

MEASUREMENTS.—Our specimens have carapace widths of 10 to 72 mm.

REMARKS.—So far as we can determine, the male pleopod of this species has not been figured from West African specimens; the pleopod of one of our specimens is shown here (Figure 21*a,b*).

Garth and Stephenson (1966) gave a detailed account of this species from the eastern Pacific region.

There is a possibility that the West African population of *C. ruber* should be recognized as different from the American population. If the study of further material supports this, the name *Cronius millerii* (A. Milne Edwards, 1867), based on a young specimen from the Cape Verde Islands, is available. Adults of the West African population appear to differ from American spec-

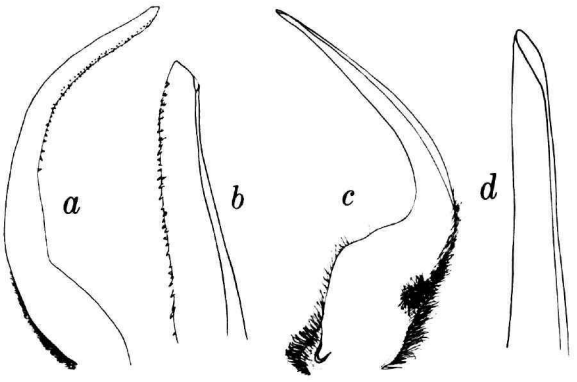

FIGURE 21.—Gonopods of two West African portunids. *Cronius ruber* (Lamarck), male, cb 72 mm, *Pillsbury* Sta 48: *a*, sternal view; *b*, apex, enlarged. *Portunus validus* Herklots, male, cb 151 mm, *Pillsbury* Sta 252: *c*, sternal view; *d*, apex, enlarged.

imens in the color pattern and ornamentation of the chelae. In adults from West Africa the dark color of the movable finger extends proximally on the cutting edge, but is not expanded dorsally on the outer margin at the base of the finger. In specimens from Brazil, the dark color extends proximally as in the West African population, but at the base of the finger it expands dorsally so the finger appears to have a large, dark spot basally on the outer margin. This enlarged proximal spot is present in juveniles from both areas. The enlarged proximal spot is present in some eastern Pacific specimens, absent in others.

The ornamentation of the propodus of the claw, which appears to be similar in American specimens from both coasts, differs significantly in the one large specimen from the Gulf of Guinea available to us (male, cb 72 mm, *Pillsbury* Sta 48). In American specimens the prominent longitudinal ridges on the propodus of the claw, especially the lower one on the outer face and the two ventral ones, are composed of short, transverse lines of tubercles or ridges which are inflated along the main axis of the longitudinal ridges so that the latter appear to be broad ridges with tuberculate edges. In our large specimen from West Africa the transverse lines of tubercules forming the main ridges are not inflated in the larger chela but are distinct throughout the length of the longitudinal ridge, as illustrated by Monod (1956, fig. 220), whereas in the smaller chela the ventral longitudinal ridges are ornamented with tubercles scattered in no apparent pattern, and there is no trace of the transverse lines of granules present on the major chela.

In American specimens of *C. ruber*, the tubercles forming the lower, outer ridge on the chela also are inflated, so that the ridge appears smooth along its midline, with numerous marginal tubercles dorsally, fewer ventrally. In our West African specimen, that ridge is made up of 2 distinct rows of tubercles with a space between them.

Although the male pleopods of specimens from both sides of the Atlantic appear to be similar in shape and ornamentation, that of our largest specimen from West Africa is more curved laterally and has the apex directed anterolaterally rather than anteriorly. In available specimens from Brazil the pleopod is less strongly curved and the apex is directed anteriorly.

BIOLOGY.—This is a shallow water species occurring on a variety of bottom types off West Africa; it has been recorded from the intertidal zone to a depth of 69 (9–69) m, but the majority of depth records are from depths of 30 m or less. Sourie (1954a) characterized it as a sand dwelling species associated with the understone fauna of rocky shores; he also found it in the Dakar region (1954b) on coarse shelly sand, bottom with *Arca* and *Pyura*, and noted that juveniles were found on fine shelly sand, with mud, bottom with *Molgula hannensis* Pérès in 2–7 m. Off Guinea, Uschakov (1970) found it on the inferior mesolittoral part of rocky shores, associated with red algae and *Padina*. Buchanan (1958) characterized it as a member of the active epifauna, inshore fine sandy community, in 3–8 fm (5–15 m) off Ghana. Longhurst (1958) found it on shelly sand in 14–25 m off Sierra Leone. Le Loeuff and Intès (1968) reported that off the Ivory Coast it reached its maximum abundance at a depth of 35 m, but that on one transect in May, 465 individuals were taken at a depth of 50 m. They characterized the species as eurythermic and euryhaline and noted

that it occurred on all types of bottom. Forest and Guinot (1966) reported several lots from the offshore islands of the Gulf of Guinea from the following habitats and depths: calcareous algae in 4–5 to 10–12 m (7 stations), calcareous algae and shells in 5–6 m, sand, algae, and calcareous algae in 8–30 m, mud, calcareous algae and shells in 31 m, and mud and sand in 35 m. The *Pillsbury* specimens were taken on mud bottom with *Jullienella* in 38–42 m and in the coralline algae habitat off Annobon in 9–69 m.

Off West Africa ovigerous females have been recorded in January, March, and September (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Ribeiro, 1964). Off West Africa, juveniles are more often found than adults; of more than 80 lots recorded by Monod (1956) more than 50 were made up of juveniles.

DISTRIBUTION.—Atlantic–East Pacific. It is widely distributed in the eastern Pacific (Garth and Stephenson, 1966), as well as in the western Atlantic (Rathbun, 1930). Off West Africa it has been recorded from localities between Mauritania and Angola; shallow water to a depth of 69 m, usually between 10 and 30 m. Monod (1956) summarized earlier West African records and reported material from Mauritania (questionable data), Senegal, Guinea, Sierra Leone, Ivory Coast, Ghana, Gabon, and Angola; since 1956 it has been recorded from the following.

West Africa: No specific locality (Monod, 1967).

Cape Verde Islands: Porto da Furna, Brava, 6–20 m and Baía de Porto Grande, São Vicente, 4–6 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Guinea: Conakry (Uschakov, 1970).

Sierra Leone: No specific locality, 14–25 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). 05°05′N, 04°59.5′W, 22 m (Voss, 1966). Off Sassandra, off Fresco, off Grand-Lahou, and off Grand-Bassam, 15–60 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 3–8 fm (5–15 m) (Buchanan, 1958). Off Accra, Winneba, and Tenkpobo (as Tenpobo), low water mark to 12 m (Gauld, 1960).

Principe: 01°37′20″N, 07°21′45″E, 35 m; 01°38′25″N, 07°22′05″E, 31 m; between Ponta da Mina and Ilhéu Santana, 8–10 and 10–12 m; and in front of Praia Pequena, 5–6 m (Forest and Guinot, 1966).

São Tomé: 00°20′N, 06°46′E, 10 m; 00°25′15″N, 06°43′05″E, 8–30 m; in front of Ponta Oquedelrei, 6 m; off Ponta Diogo Nunes, 4–5 m; off São Tomé, 5 m (Forest and Guinot, 1966).

Annobon: N of San Antonio, 9 m (Forest and Guinot, 1966).

Congo: Pointe-Indienne and Baie de Pointe-Noire (Rossignol, 1957, 1962).

Angola: Baía Farta, Benguela, 22–28 m, and Baía do Lobito, intertidal (Guinot and Ribeiro, 1962).

Genus *Portunus* Weber, 1795

Portunus Weber, 1795:93 [type-species: *Cancer pelagicus* Linnaeus, 1758, by selection by Rathbun, 1926:75; see Opinion 394, International Commission on Zoological Nomenclature, 1956; gender: masculine; name 986 on *Official List*].

Portunus Fabricius, 1798:325, 363 [type-species: *Cancer pelagicus* Linnaeus, 1758, by selection by Latreille, 1810:94, 422; gender: masculine; name 410 on *Official Index*].

Lupa Leach, 1814:390 [type-species: *Cancer pelagicus* Linnaeus, 1758, by monotypy; gender: feminine; name 411 on *Official Index*].

Lima Leach, 1814:429 [possibly an erroneous spelling of *Lupa*; type-species: *Cancer pelagicus* Linnaeus, 1758, by present selection; gender: feminine; name 413 on *Official Index*].

Lupania Rafinesque, 1818:272 [substitute name for *Lupa* Leach, 1814; type-species: *Cancer pelagicus* Linnaeus, 1758; gender: feminine].

Neptunus de Haan, 1833:3, 7 [type-species: *Cancer pelagicus* Linnaeus, 1758, by selection by Miers, 1886:172; gender: masculine; name 414 on *Official Index*].

Achelous de Haan, 1833:3, 8 [type-species: *Portunus spinimanus* Latreille, 1819, by monotypy; gender: masculine].

Amphitrite de Haan, 1833:3, 8 [invalid junior homonym of *Amphitrite* O. F. Müller, 1771 (Polychaeta); type-species: *Portunus gladiator* Fabricius, 1798, by selection by Miers, 1886:172; gender: feminine].

Pontus de Haan, 1833:3, 9 [type-species: *Portunus* (*Pontus*) *convexus* de Haan, 1833, by monotypy; gender: masculine].

Lupea H. Milne Edwards, 1834:445 [erroneous spelling of *Lupa* Leach, 1814].

Monomia Gistel, 1848:viii [substitute name for *Amphitrite* de Haan, 1833; type-species: *Portunus gladiator* Fabricius, 1798; gender: feminine].

Posidon Herklots, 1851:3 [invalid junior homonym of *Posidon* Illiger, 1801 (Crustacea); type-species: *Portunus* (*Posidon*) *validus* Herklots, 1851, by monotypy; gender: masculine].

Xiphonectes A. Milne Edwards, 1873b:157 [type-species: *Amphitrite vigilans* Dana, 1852, by selection by Rathbun, 1930:33; gender: masculine].

Hellenus A. Milne Edwards, 1874, in 1873–1881:210, 221 [type-species: *Achelous spinicarpus* Stimpson, 1871, by selection by Rathbun, 1930:33; gender: masculine].

Lupocycloporus Alcock, 1899a:31, 32, 44 [type-species: *Achelous whitei* A. Milne Edwards, 1861, by monotypy; gender: masculine].

Cycloachelous Ward, 1942:79 [type-species: *Lupea granulata* H. Milne Edwards, 1834, by monotypy; gender: masculine].

Portunus hastatus (Linnaeus, 1767)

Lupa hastata.—Barrois, 1888:14.

Neptunus (Amphitrite) hastatus.—Lenz and Strunck, 1914:278.

Neptunus hastatus.—Capart, 1951:125, fig. 44 [part, not specimen from Guinea].—Chapman and Santler, 1955:374.—Monod, 1956:203, figs. 232–235 [no material].

Portunus hastatus.—Figueira, 1960:8.—Zariquiey Alvarez, 1968:384, figs. 125d,e, 126c, 128a,b [Spain; references].—Türkay, 1976b:61 [listed], 64, pl. 1: figs. 1, 2.

SYNONYMS.—*Cancer ponticus* Herbst, 1790; *Portunus Dufourii* Latreille, 1819; *Eriphia prismaticus* Risso, 1827; *Neptunus hastatus rubromaculatus* Steinitz, 1932.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Madeira: Canical, 30 fm (55 m), seine, 18 Apr 1916, A. C. de Noronha, 1♂ (W). Machico Bay, seine, 16 Apr 1916, A. C. de Noronha, 1♂ (W). Same data, 30 Jun 1916, 2♀ (W). Same data, 5 Nov 1921, 12♂, 11♀ (6 ov) (W).

Angola: 8 mi [13 km] W of Rio Cuanza, 09°20′S, 13°04′E, 20–22 m, muddy sand, 31 Jan 1949, Expédition Océanographique Belge, Sta A. S. 116, 1♂, 1♀ ov (Brussels).

DESCRIPTION.—Capart, 1951:126.

Figure: Capart, 1951, fig. 44.

Male Pleopod: Monod, 1956, figs. 232–235 (Lebanon).

MEASUREMENTS.—Our specimens have carapace widths of 18 to 45 mm; the carapace widths of the ovigerous females from Madeira range from 18 to 26.5 mm, that from Angola is 42 mm.

REMARKS.—In large males, the abdomen is narrower than in *P. inaequalis*; the last somite is triangular in *P. hastatus*, ovate in *P. inaequalis*. In *P. hastatus* the width of the terminal somite of the male abdomen is half or more than half the width of the preceding somite; in *P. inaequalis* it is less than half the width of the preceding somite. Finally, the ventral incision of the orbit is a closed ⋁ in *P. hastatus*, an open ⋁ or U in *P. inaequalis*, as noted by Monod (1956:203).

The two specimens from Angola are those reported by Capart (1951), who correctly identified them with *Portunus hastatus*. We have compared these specimens with material of this species from several Mediterranean localities, as well as with the material from Madeira reported above, and we could find no constant differences in specimens from different areas. The specimens from Angola at first sight appear to be different from those from the Mediterranean, for, as figured by Capart (1951, fig. 44), the dorsal sculpturing of the carapace is much less pronounced on them. In addition, the lateral spine of the carapace is shorter than in most specimens of *P. hastatus* from the Mediterranean we have examined, and the chelae appear stouter with a slightly shorter movable finger.

There are relatively few records for this species outside of the Mediterranean and we have tried to compile all of them here. One record, that of Miers (1886:175), as *Neptunus (Amphitrite) hastatus*, from Tenerife or Isla de la Gomera, Canary Islands, appears to be based on specimens of *Portunus sayi*. Miers noted that his specimens were "very prettily mottled with purple on a yellowish ground" (this is the color of *P. sayi* as described by Rathbun, 1930:42) and that the same jar contained specimens of *Planes minutus*. Miers' was the only record for this species from the Canary Islands that we could find.

BIOLOGY.—*Portunus hastatus* is a sublittoral species, occurring on sandy bottoms subtidally to a depth of at least 55 m. The two specimens from Angola were taken on muddy sand in 20–22 m.

Off West Africa ovigerous females have been recorded in January (Angola) and November (Madeira).

DISTRIBUTION.—Eastern Atlantic, where it occurs primarily in the Mediterranean. Outside of that sea it has been recorded from the following:

Azores: Ponta Delgada, Ilha de São Miguel (Barrois, 1888; Lenz and Strunck, 1914). Ilha do Faial (as Fayal) (Chapman and Santler, 1955). Ilha do Pico (Figueira, 1960).

Madeira: Funchal, from fish market, Prainha[?], and Ponta de São Lourenço, 15–20 m (all Türkay, 1976b).

Angola: 8 mi [13 km] W of Rio Cuanza, 09°20'S, 13°04'E, 20–22 m (Capart, 1951).

* *Portunus inaequalis* (Miers, 1881)

Neptunus hastatus.—Capart, 1951:125 [part, not fig. 44].—Rossignol, 1957:123 [key]. [Not *Portunus hastatus* (Linnaeus, 1767).]

Neptunus inaequalis.—Monod, 1956:198, figs. 225–231.—Buchanan, 1958:24.—Longhurst, 1958:87.—Gauld, 1960: 69.—Rossignol, 1962:116.—Le Loeuff and Intès, 1968:40, 44, table 1, figs. 49, 61; 1969:63, 65.—Türkay, 1976b:61 [listed] 64, pl. 1: figs. 3, 4.

Portunus inaequalis.—Guinot and Ribeiro, 1962:47.—Ribeiro, 1964:6.—Forest and Guinot, 1966:63.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 47, 37 m, bottom with *Jullienella*, 12♂, 7♀, 3 juv (W).

Ghana: Sta 24, 35–37 m, dark red bryozoans, 1 juv (L). Sta 26, 27 m, shell bottom (scallops), 3♂, 1♀ ov (L). Sta 27, 33 m, 1♀ (L).

Nigeria: Sta 246, 37 m, 1♂ (L). Sta 248, 33 m, 1♂, 1♀ ov (L). Sta 250, 24 m, brackish water, mud, 1♂, 1♀ (L). Sta 252, 30 m, mud, 1♂, 1♀ (L).

Other Material: Ghana: Chorkor, near Accra, Dec 1950, R. Bassindale, 1♂ (L).

DESCRIPTION.—Carapace more than twice as broad as long, regions distinct, surface roughened. Gastric region with long patch of raised granules, with curved branches extending onto protogastric region. Metagastric region with 2 raised submedian lobes ornamented with enlarged tubercles. Cardiac region with 2 raised submedian lobes, often united posteriorly in form of ⋁. Epibranchial ridges raised, granular, sinuous. Mesobranchial region with raised prominence mesially, flanked laterally by 1 or more oblique granular ridges. Hepatic region with curved, granular ridges. Frontal teeth triangular, submedians smallest, sharpest, second pair larger and more triangular than blunt inner orbital spines. Interantennular spine small, visible in dorsal view. Anterolateral margin with 9 sharp, separate spines, outer orbital (first anterolateral) blunter than next spine; lateral spine long, at least as long as space occupied by preceding 4 or 5 spines, slender, curved upward and forward. Small patch of iridescence present between bases of spines. Posterolateral margins unarmed. Chelae long, slender, merus longer than carapace, subequal. Dorsal surface of merus irregular, anterior margin with 4 or 5 spines, occasionally 1 smaller spine distally, posterior and ventral margin each with 1 distal spine. Carpus with inner and outer spine. Propodus with 1 spine proximally and 2 spines distally on upper margin. Fingers slender, shorter than palm. Pereiopods 2–5 with iridescent lines. Merus of fifth leg unarmed. Sternum and abdomen smooth.

Figures: Monod, 1956, figs. 225–231.

Male Pleopod: Monod, 1956, figs. 227–231 (Senegal, Sierra Leone).

Color: The following observations on color were provided by Monod in his list of material of this species:

> Très marbrés; en alcool une tache rouge plus ou moins marquée sur le dactyle p5 [1956:200, Senegal] . . . ; rouge brique; tache carminée sur la partie postérieure du dactyle p5; ligne carmin sur la crête inf. du propode p1, se prolongeant sur le doigt fixe; face interne du dactyle également carmin [1956:202, Guinea] . . . ; traces de tache rouge au dactyle p5 [1956:202, Ghana].

The dark red color on the dactylus of the last leg also is characteristic of *P. hastatus* (Linnaeus).

MEASUREMENTS.—Our specimens have carapace widths of 16 to 53 mm; the measurable ovigerous female has a carapace width of 25 mm.

BIOLOGY.—*Portunus inaequalis* is a shallow water species, living near shore to a depth of 60–73 m, generally in depths of less than 40 m. It can tolerate waters of reduced salinity. The *Pillsbury* took it in brackish water on mud in 24 m off Nigeria, and Longhurst (1958), who reported it from Sierra Leone, characterized it as an estuarine-shelf species; he found it on stones, sand, and shelly sand in 10–25 m. Sourie (1954b) reported it from fine shelly sand with mud, bottom with *Molgula hannensis* Pérès, in 2–7 m in the Baie de Dakar. Buchanan (1958) found it in the sandy silt community in 8–20 fm (15–37 m) off Ghana. Guinot and Ribeiro (1962) reported it from algae and rocks and on sand in 10 m. It was reported from a variety of bottom types by Forest and

Guinot (1966): shell in 20–25 and 27 m; mud, shells and *Cidaris* in 60–73 m; sand or muddy sand and Foraminifera in 5 and 21–27 m; calcareous algae in 5, 6, and 12 m; rocks and coral in 3–10 m; sand and calcareous algae in 4–5 m; and from a sand beach, 0–4 m.

Le Loeuff and Intès (1968:44) found that off the Ivory Coast the species lived on sand or muddy sand and was rarely observed on mud. There it generally lives at depths between 30 and 35 m, not going below 40 m, although during periods of upwelling or cooling part of the population was found at 15–20 m; in warm periods it generally was found below 25 m.

Only two of the *Pillsbury* samples were taken at stations on mud; the species was found on shell bottom with scallops, on bottom with dark red bryozoans, and bottom with *Jullienella.*

Ovigerous females have been collected in March, April, May, June, July, September, and November (Monod, 1956; Guinot and Ribeiro, 1962; Ribeiro, 1964; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Off West Africa, from Madeira and from Senegal to Angola, in shallow water, from shore to a depth of 60–73 m, generally in less than 40 m. Monod (1956) recorded material from the Cape Verde Islands, Senegal, Guinea, Sierra Leone, Ghana, Gabon, and Principe. Since 1956 it has been recorded from the following localities.

Madeira: No specific locality (Türkay, 1976b).

Cape Verde Islands: Baía de Porto Grande and Baía de Calheta, 8–16 m, São Vicente; Baía da Fajã di Agua (? = Porto da Fajã) and Porto da Furna, 4 m, Brava; Tarrafal and Porto da Praia, São Tiago; and Tarrafal, São Nicolau (all Guinot and Ribeiro, 1962; Ribeiro, 1964).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 10–25 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). 05°00′N, 05°28.5′W, 27 m; 05°03′N, 05°25′W, 20–25 m; and 05°02.5′N, 05°25′W, 21–27 m (all Forest and Guinot, 1966). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, and off Grand-Bassam, 8–40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 8–20 fm (15–37 m) (Buchanan, 1958); 10–32 m (Gauld, 1960).

Principe: Between Ilheú Santana and Ponta Capitão, 12 m (Forest and Guinot, 1966).

São Tomé: Baía de Ana de Chaves; Praia de Santa Catarina, W coast, 3–10 m; in front of Ponta Oquedelrei, 6 m; Morro Peixe, 0–4 m; Ilhéu das Cabras, 4–5 m; off São Tomé, 5 m (all Forest and Guinot, 1966).

Annobon: 01°26′20″S, 05°36′25″E, 22–25 m (Forest and Guinot, 1966).

Congo: W of Pointe-Noire (Rossignol, 1962).

Gabon: 00°38′25″S, 08°46′E, 5 m (Forest and Guinot, 1966).

Angola: Baía de Caota, Benguela, 10 m (Guinot and Ribeiro, 1962).

**Portunus validus* Herklots, 1851

FIGURES 21*c,d*, 22, 23*a,c,e,g*

Lupa Cranchiana White, 1847a:27 [nomen nudum; under *Neptunus sanguinolentus*].—Monod, 1970:66, 72.

Neptunus validus.—Pechüel-Loesche, 1882:287.—Büttikofer, 1890:466, 487, fig. on p. 465.—Johnston, 1906:862.—Frade, 1950:11, 26.—Capart, 1951:123, fig. 43.—Monod, 1956:196, fig. 224.—Rossignol, 1957:80, 123 [key], pl. 2: fig. 6.—Buchanan, 1958:20.—Longhurst, 1958:87.—Gauld, 1960:69.—Rossignol, 1962:115.—Crosnier, 1964: 32, 87, 90, 92, 98, 105, 106, 110, 112, 120, 121.—Crosnier and Berritt, 1966:68, 100, 101, 102, 109, 123, 127, 131, 132, 136.—Le Loeuff and Intès, 1968:40, 46, table 1, figs. 49, 61; 1969:64, 65.

Callanectes sp.?.—Irvine, 1932:14.

Callinectes Gladiator.—Irvine, 1932: fig. 9 [not *C. gladiator* Benedict, 1893 = *C. pallidus* (De Rochebrune, 1883)].

Callinectes gladiator.—Irvine, 1947: fig. 203 [not *C. gladiator* Benedict, 1893 = *C. pallidus* (De Rochebrune, 1883)].

Callinectes latimanus.—Irvine, 1947:297 [not *Callinectus latimanus* Rathbun = *C. amnicola* (De Rochebrune, 1883)].

Portunus validus.—Monod, 1967:180, pl. 15: fig. 1 [no locality]; 1970:66, 72.—Uschakov, 1970:439, 455 [listed].—Baron, 1975a:3–13 [physiology]; 1975b:103, figs. 1–4.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 241, 59–63 m, mud and shell, 1♀ (L). Sta 252, 30 m, 2♂, 2♀ (W).

Other Material: Liberia: Off St. Paul River, Monrovia, 3–6 fm (5–11 m), 4 Mar 1953, G. C. Miller, 1♂ (W). Liberia, 1881, J. Büttikofer, 2♀ (L).

Ghana: Elmina (as St. George-del-Mina), 1840–1855, H. S. Pel, lectotype, 1♂ (L). Same data, paralectotypes, 2♀ (L). Accra, 1868–1869, M. Sintenis, 1♀ (L).

Cameroon: Batanga, 17 Sep 1930, A. J. Good, 1♀ (W). Between Kribi and Douala, at Yaounde fish market, 14 May

1964, B. de Wilde-Duyfjes, 1♂, 2♀ (L). Kribi, beach seine, 9 Mar 1964, B. de Wilde-Duyfjes, 1♀ (L). Same, 10 Aug 1964, B. de Wilde-Duyfjes, 1♀ (L).

Angola: No specific locality, 1879, P. Kamerman, 2♀ (L).

DESCRIPTION.—A. Milne Edwards, 1861:321; Capart, 1951, fig. 124.

Figures: A. Milne Edwards, 1861, pl. 29: fig. 1; Capart, 1951, fig. 43; Monod, 1956, fig. 224.

Color: The carapace is rather uniformly greenish gray with some brown tinges. A large conspicuous, white triangular spot is present on each side just before the middle of the posterolateral margin. This white spot is surrounded by a ring of darker gray than is on the rest of the carapace. The posterior margin also is white. The uniform color of the carapace contrasts strongly with the brightly marbled upper surface of the chelipeds (Figure 22). The upper half of each cheliped is very dark purple with numerous rather large white spots, which at some places are confluent. The lower half of the cheliped is white. The same marbled purple color is present on the upper half of the merus and carpus of the next 3 legs, the purple color and size of the white spots being very variable. The propodus and dactylus are greenish gray as is the carapace. The fifth leg has the upper surface of all segments except the dactylus purplish to greenish with white spots. The dactylus is gray dorsally with a white streak along the basal half of the outer margin. The lower surface of the body and legs is uniformly pale.

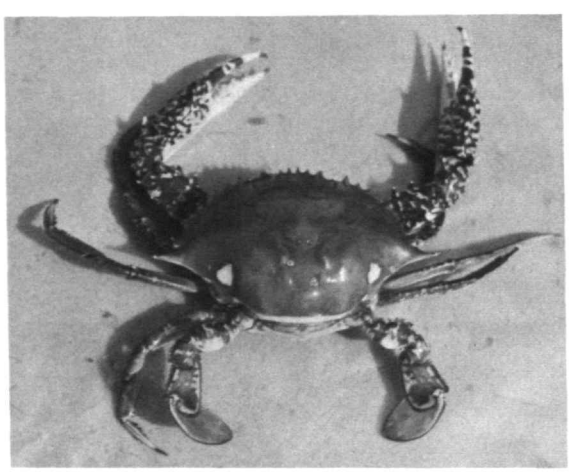

FIGURE 22.—*Portunus validus* Herklots, female, *Pillsbury* Sta 241.

Irvine (1947:297, under *Callinectes latimanus*) described the color of this species as follows: The carapace "is khaki in colour, with a bluish tinge. The claws are blue.... The legs are also blue...."

Capart (1951:124) gave the following color account of this species: "Carapace bleu-vert, avec deux taches blanches sur les aires branchiales."

Rossignol (1957:81) gave the following color description:

> Le ♂ et la ♀ sont identiques. Face dorsale:
>
> *a.* Carapace: marron ou brun violacé plus ou moins irrisé, avec deux taches arrondies d'un blanc crème sur chaque aire branchiale en arrière des dents postérieures. Souvent, une autre petite tache blanche de forme imprécise juste au-dessus de la précédente. Extrémité de la dent postérieure blanche.
>
> *b.* Chélipèdes: brun-violacé marbré de blanc (mérus, carpe, propode, dactyle). Face interne de la pince: moitié inférieure de la paume blanche: pouce bleu turquoise.
>
> *c.* Pattes: bleu turquoise avec des taches blanches sur le mérus (P_2, P_3). P_4 et P_5: mérus et carpe brun-violacé marbré de bleu et de blanc. Dactyle de P_5 beige légèrement rosé.
>
> Face ventrale de la carapace et face externe des pinces: blanc crème.

MEASUREMENTS.—The carapace width of our specimens varies between 62 and 180 mm. In the literature males with carapace lengths of 46 to 114 mm, carapace widths of 85 to 205 mm, females with carapace lengths of 41.5 to 93 mm, widths 82 to 190 mm, and ovigerous females with carapace lengths of 83 to 97 mm, widths of 150 to 170 mm, have been reported.

REMARKS.—*Portunus validus* is remarkable in having the carapace finely and evenly granular, almost evenly convex, lacking sharp ridges or grooves. It falls within the genus *Portunus* sensu lato, as currently defined, but a careful revision of this heterogeneous genus may necessitate the recognition of a new genus for the preoccupied genus *Posidon* Herklots, 1851, originally established for *Portunus validus*. Judging from the accounts of Stephenson and Campbell (1959) and Stephenson (1972), *Portunus validus* shows little similarity to any of the many Indo-West Pacific species of the genus, and it shows little affinity

with any of the American species of the genus (Rathbun, 1925; Garth and Stephenson, 1966).

Indeed, a comparison of *P. validus* with *P. pelagicus*, the type-species of *Portunus*, reveals some interesting differences in addition to the ornamentation of the carapace and the structure of the male pleopod. In *P. validus* the interantennular spine is very short and does not extend to the front; it is not at all visible in dorsal view (Figure 23*a*), whereas in *P. pelagicus* the entire spine, including its base, is visible in dorsal view, and the apex of the spine extends well beyond the level of the frontal spines (Figure 23*b*). In *P. validus* there are two strong spines on the posterior margin of the merus of the claw, one subdistal (Figure 23*c*), whereas in *P. pelagicus* (and in *Callinectes* as well) the subdistal spine is absent (Figure 23*d*).

In *P. validus* (Figure 23*e*,*g*) the epistome is distinct and has its margins with antennular fossae and that with the oral cavity elevated and separated from each other by a distinct distance; in *P. pelagicus* (Figure 23*f*,*h*) there is no epistome, the oral cavity reaches to the antennular fossae and its anterior margin forms the posterior margin of the fossae. In *P. validus* the oral cavity is not completely filled by the third maxillipeds, there is a distinct gap between the anterior margin of the maxillipeds and that of the oral cavity; in *P. pelagicus*, however, the third maxillipeds fill the entire oral cavity: their anterior margins lie against the anterior margin of the oral cavity, leaving only two small sharply defined afferent branchial apertures.

The male pleopod of *P. validus* (Figure 21*c*,*d*) is stout, curved laterally, and unarmed, not slender and elongate as in *P. pelagicus* (see Stephenson and Campbell, 1959, fig. 2*a*). The second male pleopod is thin and slender, rather straight, and

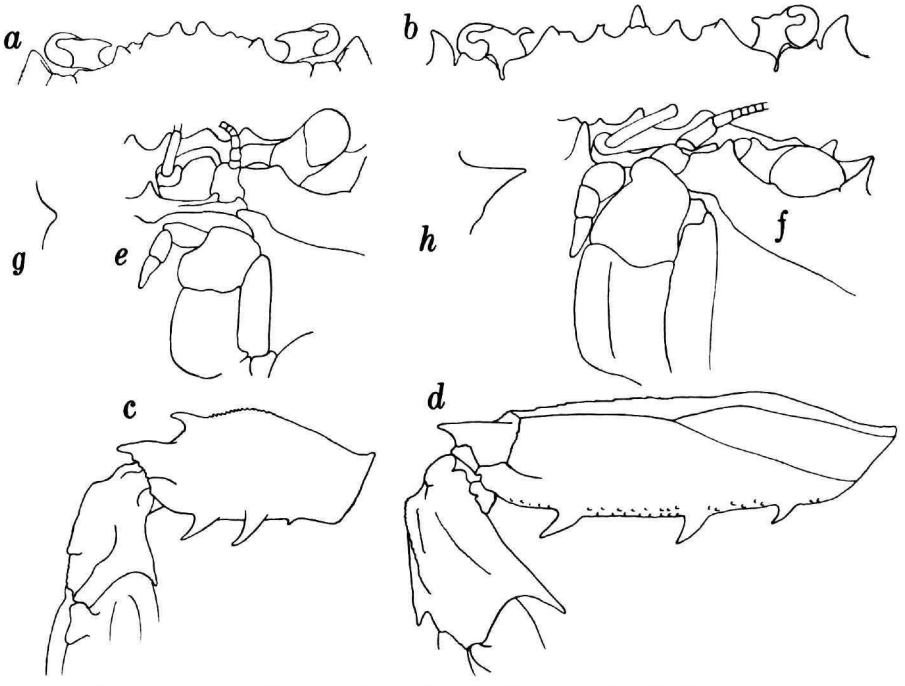

FIGURE 23.—Comparison of two species of *Portunus*. *Portunus validus* Herklots, male, cb 61 mm, Liberia: *a*, front, dorsal view; *c*, merus and carpus of chela; *e*, buccal region; *g*, interorbital spine, lateral view. *Portunus pelagicus* (Linnaeus), male, cb 90 mm, Philippines: *b*, front, dorsal view; *d*, merus and carpus of chela; *f*, buccal region; *h*, interorbital spine, lateral view.

terminates in a bifid tip. The male abdomen has been well figured by A. Milne Edwards (1861).

This species has some limited commercial importance and great commercial potential. Baron (1975b) has summarized observations on catch, size distribution, sex ratio, and growth of claw in specimens taken commercially off Senegal and Gambia.

A male collected off Elmina (St. George-del-Mina), Ghana, by H. S. Pel, between 1840 and 1855, is here selected as the lectotype of the species (Crust. D.395). It is in the collection of the Rijksmuseum van Natuurlijke Historie.

Irvine (1932) mentioned two species of *Callinectes* from Ghana; one he indicated correctly as *C. gladiator* Benedict (= *C. pallidus* (De Rochebrune)), the other was referred to as "*Callanectes* Sp.(?)" In 1947 Irvine again described and figured the two species and identified the latter as *Callinectes latimanus* Rathbun. The true identity of the two forms puzzled many subsequent authors, because Irvine had interchanged the figures illustrating these two species, as was first pointed out by Capart (1951:130, 132). The figures said to represent *Callinectes* sp. (Irvine, 1932, fig. 13) and *Callinectes latimanus* Rathbun (Irvine, 1947, fig. 202) actually are those of *C. gladiator* (= *C. pallidus*). Irvine's text of "*Callanectes* Sp.(?)" (1932:14) and his figure 9, as well as his later text of *C. latimanus* (1947:297) do not represent *Callinectes latimanus* as was thought by Capart (1951), but *Portunus validus*. The great size of the species, the shape of the front, the fact that the merus of the chelipeds bears two distal teeth on the posterior margin, all this proves the identity of Irvine's material with *P. validus*. Even the peculiar white spots on the carapace are correctly indicated in the drawing, which, however, shows the carapace grooves somewhat overaccentuated. Monod (1956:196) already recognized Irvine's figures of "*Callinectes gladiator*" as representing *Portunus validus*, but evidently did not realize that they did not belong to the text of *C. gladiator*, but to that of the other species of "*Callinectes*." Williams (1974:737) recognized that something was wrong and referred to Capart and Monod, but concluded that "since the features [of Irvine's figures] are sketchy, it is best to accept the author's designation with allowance for error."

BIOLOGY.—This species inhabits shallow water in depths mostly between 0 and 40 m. Among the almost 50 depth records for this species known to us there are only two records of the capture of specimens that originate from hauls made entirely in water deeper than 40 m, viz. 50 m (Crosnier, 1964:91, 92) and 50–55 m (Crosnier and Berritt, 1966:135, 136); more than two-thirds of the records are from depths between 10 and 30 m. Rossignol (1957:81) therefore is mistaken in giving the range as 0–70 m and sublittoral (from 50 to 99 m).

The species is frequently taken with beach seines. Buchanan (1958) found it in the inshore fine sandy community in 5 to 15 m off Accra. Crosnier (1964) characterized it as a warm water species, living in depths between 0 and 30 m off Cameroon. Le Loeuff and Intès (1968:46) made the following observations on the species off the Ivory Coast:

> Il est assez fréquent dans les traits mais jamais en grandes quantités: 10 individus constituent un maximum. Espèce côtière qui ne descend pas au-dessous de 35 m, *N. validus* tolère de gros écarts des facteurs physico-chimiques des eaux, ainsi que tous les types de sédiments puisqu'on le pêche aussi bien sur les sables de Fresco que sur les vases de Grand-Lahou.

Off Guinea, Uschakov (1970) found the species in depths of less than 20 m on unstable mud in turbid water. It has been reported from bottoms consisting of shells and sand, sand and Gorgonaria, sand, muddy sand, fine sand and mud, sandy mud, mud, mud and Foraminifera, or on shells and mud.

Ovigerous females have been collected in March, September, and December (Capart, 1951; Monod, 1956; Baron, 1975a).

Irvine (1947:297) commented on the "ferocious disposition" of this species and the harm it can do to fishes caught in fish pots. In Ghana the crabs are caught and sold as food. According to Irvine (1947:297) "there is reason to believe that they migrate to the sea at times and it is very

probable that they do so during the breeding season."

DISTRIBUTION.—Off tropical West Africa, from Mauritania to Angola, sublittoral to about 55 m. Monod (1956), who summarized earlier records, reported material from Mauritania, Senegal, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, and the Congo. In addition, the species has been recorded from the following localities.

West Africa: No specific locality (White, 1847a; Balss, 1921; Monod, 1967, 1970).

Senegal: 13°25'N, 16°55'W, 15 m; 12°25'N, 17°15'W, 26 m; 12°20'N, 17°50'W (all Baron, 1975a). Saint-Louis; off the Casamance River (Baron, 1975b).

Gambia: Off the Gambia River (Baron, 1975b).

Guinea: No specific locality, less than 20 m (Uschakov, 1970).

Sierra Leone: No specific locality, 18–39 m (Longhurst, 1958).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, off Grand-Bassam, 8–35 m (Le Loeuff and Intès, 1968).

Ghana: Elmina [as S. Jorge da Mina] (Frade, 1950). Off Accra, 3–8 fm (5–15 m) (Buchanan, 1958); from shallow water to 25 m (Gauld, 1960).

Togo: 06°15'N, 01°53'E, 15–17 m; 06°07'N, 01°53'E, 50–55 m (Crosnier and Berritt, 1966).

Dahomey: 06°10'40"N, 02°02'E, 35 m; 06°10'30"N, 02°02'E, 35–40 m; 06°17'N, 02°22'E, 20 m; 06°18'30"N, 02°24'E, 16 m; 06°21'N, 02°37'E, 12–14 m; 06°16'N, 02°37'E, 22 m; 06°12'30"N, 02°37'E, 35–36 m (Crosnier and Berritt, 1966).

Cameroon: 03°55'N, 09°00'E, 50 m; 03°47'N, 09°12'30"E, 20 m; 03°39'30"N, 09°14'E, 30 m; 03°32'N, 09°34'E, 13–15 m; 03°27'N, 09°38'30"E, 12 m; 03°15'N, 09°51'30"E, 9 m; 03°09'N, 09°44'30"E, 30 m; 02°41'30"N, 09°49'30"E, 20 m; 02°28'N, 09°45'30"E, 7–10 m (Crosnier, 1964).

Congo: Loango (Pechüel-Loesche, 1882). Off Pointe-Noire (Rossignol, 1957, 1962).

Portunus vocans (A. Milne Edwards, 1878)

Neptunus vocans.—Monod, 1956:194, figs, 222, 223 [Cape Verde Islands].—Forest, 1959:19 [Annobon, São Tomé].

Portunus vocans [*Neptunus vocans*].—Guinot-Dumortier and Dumortier, 1960:120, 144 [table 2] [islands of Gulf of Guinea; discussion of stridulation].

Portunus [*Neptunus*] *vocans.*—Guinot-Dumortier and Dumortier, 1960:142 [listed].

Portunus vocans.—Forest and Guinot, 1966:62, fig. 4 [Annobon, São Tomé].—Türkay, 1976b:61 [listed], 66, pl. 2: figs. 1, 2 [Madeira].

DISTRIBUTION.—An insular species in the Atlantic. In the eastern Atlantic it is known from Madeira, the Cape Verde Islands, and Annobon and São Tomé Islands in the Gulf of Guinea. It also has been recorded from Ascension Island in the central Atlantic and from several western Atlantic localities; in moderate depths, 7–10 m to about 309 m (Rathbun, 1925).

Genus *Thalamita* Latreille, 1829

Thalamita Latreille, 1829:33 [type-species: *Cancer admete* Herbst, 1803, by monotypy; gender: feminine; name 195 on *Official List*].

Thalamita poissonii (Audouin, 1826)

Portunus Poissonii Audouin, 1826:84 [Egypt].

Thalamita integra var. *africana* Miers, 1881a:218.

Thalamita africana.—Sourie, 1954b:151.—Monod, 1956:186, figs. 213–217.—Rossignol, 1957:124 [key].—Guinot and Ribeiro, 1962:46.—Crosnier, 1962:116 [discussion].—Ribeiro, 1964:5.—Forest and Guinot, 1966:61.—Uschakov, 1970:455 [listed].—Stephenson, 1972:19 [key], 44 [listed].

Thalamita integra africana.—Stephenson and Hudson, 1957: 319 [key].

Thalamita poissonii.—Holthuis and Gottlieb, 1958:89, 118, pl. 2: fig. 10a,b [Eastern Mediterranean references].—Stephenson, 1976:23.

Thalmita africana.—Hartmann-Schröder and Hartmann, 1974:19 [erroneous spelling].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Gulf of Guinea, no specific locality, 1956, *Calypso*, 1♂ (L).

Angola: Luanda (as St. Paul de Loanda), American Museum Congo Expedition 1909–1915, 23 Sep 1915, H. Lang, 3♂, 3♀ ov (W).

DESCRIPTION.—Rathbun, 1921:402.

Figures: Rathbun, 1921, fig. 5; Monod, 1956, figs. 213–217.

Male Pleopod: Monod, 1956, figs. 215–217 (Senegal).

Color: Little information is available on color in

life of this species. Monod (1956) gave the following notes in his list of material: "rougeâtre" (p. 187); "doigts des chelipèdes (en alcool) rouges avec les apex noirs, la couleur se poursuivant, en liseré, le long des bords internes, dentigères" (p. 188).

MEASUREMENTS.—Our specimens have carapace widths of 28 to 41 mm; the carapace widths of ovigerous females are 28 to 31 mm.

REMARKS.—Crosnier (1962:117) noted the similarity between the male pleopods of *T. poissonii* and *T. africana*. Stephenson (1976:23) synonymized *T. africana* with *T. poissonii* and noted that "these [specimens from Angola] are identical in all respects with *T. poissonii*." We have compared our material from Angola with specimens from other areas and can find no differences.

This is one of a few Indo-West Pacific species of brachyurans to occur off West Africa; it has also colonized the eastern Mediterranean via the Suez Canal (Holthuis and Gottlieb, 1958).

BIOLOGY.—*Thalamita poissonii* is a shallow water species, occurring off West Africa from the littoral zone to a depth of about 30 m. Rathbun (1921: 404) noted that it was "the most common species in the quiet stretches of the bay near town of St. Paul de Loanda, and easily caught at low tide on the many submerged sand flats. Their behavior is much the same as that of *Callinectes* . . . but their habitat there is typically marine." Sourie (1954b) found this species on fine shelly sand, bottom with *Molgula hannensis* Pérès, in the Baie de Dakar. The specimens collected by the *Calypso* were taken on the following types of bottom (Forest and Guinot, 1966): mud, 18 m; calcareous algae, 11 m; sand, 0–4 m; sand, algae, and calcareous algae, 8–30 m; mud and calcareous algae, 4 and 5 m.

Off West Africa, ovigerous females have been collected in January, February, March, April, June, August, September, and October, suggesting that there the species breeds all year (Rathbun, 1921; Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—Eastern Atlantic and Indo-West Pacific. In eastern Atlantic, from eastern Mediterranean and off West Africa at scattered localities between the Canary Islands and Angola, in depths between the littoral zone and about 30 m; Indo-West Pacific from localities between Japan and Madagascar and the Red Sea (Crosnier, 1962). Monod (1956) summarized the West African literature and reported material from localities off Mauritania, Senegal, Guinea, and Angola. Records since then include the following.

Cape Verde Islands: Baía de Porto Grande, São Vicente, 4–6 and 8 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: Baie de Dakar (Sourie, 1954b).

Guinea: No specific locality (Uschakov, 1970).

Principe: In front of [Cais de] Santana, 11 m (Forest and Guinot, 1966).

São Tomé: 00°25′15″N, 06°43′05″E, 8–30 m; Baía de Ana de Chaves, 5 m; in front of Ponta Diogo Nunes, 4 m; Morro Peixe, 0–4 m (all Forest and Guinot, 1966).

Gabon: 00°40′S, 08°46′25″E, 18 m (Forest and Guinot, 1966).

Angola: Baía de Luanda (Guinot and Ribeiro, 1962). Luanda (as St. Paul de Loanda) (Stephenson, 1976). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Family GERYONIDAE Colosi, 1923

GERYONIDAE Colosi, 1923:249.

EASTERN ATLANTIC GENERA.—Due to the uncertainty of the taxonomic status of this family and of the genera sometimes assigned to it, we are unable to give here a reliable list of the eastern Atlantic geryonid genera. Guinot (1971:1077) included in the Geryonidae the following three genera that are represented in the eastern Atlantic: *Geryon*, *Paragalene*, and *Progeryon*; of these only *Geryon* is known from tropical West Africa.

Paragalene Kossmann (1878:253). Type-species: *Paragalene neapolitana* Kossmann, 1878, a junior subjective synonym of *Eriphia longicrura* Nardo, 1869, by monotypy; gender: feminine; name 341 on *Official List*.

Progeryon Bouvier (1922:71). Type-species: *Progeryon paucidens* Bouvier, 1922, by monotypy; gender: masculine.

We are not convinced that these two genera are correctly assigned to the Geryonidae, but as

we have not had the opportunity to study this question in detail, we follow Guinot, at least for the time being. The genus *Platychelonion* (p. 155), placed by Guinot (1971:1078) with some doubt in the Geryonidae, in our opinion finds a better place in the Xanthidae.

EASTERN ATLANTIC SPECIES.—The above-mentioned three genera are represented in the eastern Atlantic area by 6 species; only two of these have been found in tropical West African waters. The other four are as follows:

Geryon tridens Krøyer, 1837. North Atlantic from N Norway and Iceland to the British Isles and the North Sea; records from the Bay of Biscay, the Mediterranean and Morocco need to be verified and at least partially pertain to *G. longipes*; 32–690 m, usually deeper than 100 m (Christiansen, 1969).

Geryon longipes A. Milne Edwards, 1881. Bay of Biscay, Morocco, Mediterranean; 600–1370 m (Zariquiey Alvarez, 1968).

Paragalene longicrura (Nardo, 1869). Mediterranean (Algeria, Malta, Naples, Adriatic and Aegean Seas) and Madeira; 20-ca. 120 m (Türkay, 1976b).

Progeryon paucidens Bouvier, 1922. Off Morocco, 2165 m (Bouvier, 1922).

Monod (1956:337) recognized a single West African species: *Geryon quinquedens* Smith, synonymizing *G. affinis* with it. In the present publication two tropical West African species are distinguished: *G. affinis* and *G. maritae*, new species; *G. quinquedens* is thought to be restricted to East American waters.

Only one species of *Geryon*, *G. maritae*, was taken by the *Pillsbury* in West African waters.

Genus *Geryon* Krøyer, 1837

Geryon Krøyer, 1837:10, 20, 21 [type-species: *Geryon tridens* Krøyer, 1837, by original designation and monotypy; gender: masculine; name 309 on *Official List*].

Chalaepus Gerstaecker, 1856:118 [type-species: *Cancer trispinosus* Herbst; 1803, by monotypy; gender: masculine].

REMARKS.—The place of the genus *Geryon* in the system of the Brachyura has been subject to many different interpretations by zoologists. Krøyer (1837:19, 20), when describing his new genus remarked that it should be placed in the "famille des Cyclométopes" of H. Milne Edwards (1834:363) although in some respects it showed some resemblance to the Catometopes, and because of the shape of the dactyli of the last pair of pereiopods ("ifølge de bageste Tarsers Beskaffenhed") thought it should be placed in the former of the two tribes (Cancériens and Portuniens) in which H. Milne Edwards had subdivided his Cyclométopes. Miers (1886:223) placed *Geryon* in the subfamily Carcinoplacinae of the family Ocypodidae. Ortmann (1894:685; 1899:1176) left it in that subfamily, which he made the nominal subfamily of a new family Carcinoplacidae; he is followed in this by Stebbing (1905:35). A Milne Edwards and Bouvier (1894:41) first placed the genus in the family Cancériens sensu lato (= Cancridae + Xanthidae), but later (1899:34) assigned it to the family Galenidae. Alcock (1899c: 84) accepted this disposition, but made the Galeninae a subfamily of the Xanthidae. Doflein (1904:105), without comment, ranged *Geryon* in the Potamidae. Colosi (1923:249) partly agreed with Doflein and erected a new (monotypic) family Geryonidae, which he placed near the Potamidae. Several authors, like Balss (1927:1020, 1933a:298), Bouvier (1940:261), Stephensen (1945:222), Monod (1956:337), Guinot and Ribeiro (1962:62), Zariquiey Alvarez (1968:388), and Crosnier (1970:1216) placed the genus in the family Xanthidae; others, e.g., Rathbun (1937: 265), Barnard (1950:290) and Capart (1951:173) kept it in the Goneplacidae. In recent years the family Geryonidae Colosi, 1923 (often attributed to Beurlen, 1930) is recognized by many authors. It then is usually placed between the Xanthidae and Goneplacidae (Balss, 1957:1654; Christiansen, 1969:83; Glaessner, 1969:R524) or closer to the Goneplacidae than to the Xanthidae (Kaestner, 1970:349). Serological investigations by Leone (1949:284, 1951:44–48) suggested that the Geryonidae are more closely related to the Xanthidae and Portunidae on the one hand, than to the Cancridae, Ocypodidae, Grapsidae, and Majidae on the other. All in all, Stebbing's (1893:

93) remark, made 80 years ago, still holds good: "The genus *Geryon*, Krøyer, 1837, may claim a passing notice as one of those instances in which systematic arrangement finds itself at fault. It is sometimes placed among the Cyclometopa and sometimes among the Catometopa. . . . That, on the theory of the evolution of different groups from a common stem, such inosculant forms are almost sure to occur, has long been recognized. Darwin himself humorously admits that while as a theorist he delighted in coming across them, as a naturalist engaged in classification he found them an unmitigated nuisance."

In studying the present material, we were struck by the great resemblance in general and in detail of *Geryon* with the Portunidae. In practically every point our specimens resemble Portunidae, except in the shape of the last pereiopods which lack the paddle-shape of the distal segments. Were the distal segment of these pereiopods broadened, no one would have hesitated to assign the genus to the Portunidae. The resemblance with species of *Benthochascon* is especially striking. The resemblance of the Geryonidae to the Portunidae is much closer, we think, than to either Xanthidae or Goneplacidae. In our opinion the family Geryonidae is close to the Portunidae, perhaps between Portunidae and Xanthidae, which incidentally would also agree with the serological findings by Leone (1949, 1951) and a study of the larvae of *Geryon tridens* by Ingle (1979: 230), who noted that "the larvae of *G. tridens* possess many portunid features. . . . " The taxonomy of the Brachyrhynchous crabs, especially at the family level, is still highly unsatisfactory and a thorough revision is badly needed.

The strong resemblance of the chelae of *Geryon* to those of Portunidae is shown in Figure 24. As in Portunidae the basal tooth of the dactylus of the large chelipeds in *Geryon* is blunt, enlarged and often directed somewhat backward. The other teeth are often flanked by small teeth; in *Geryon* the larger teeth usually have a single smaller tooth separating them, while in portunids the larger teeth often are flanked each with two teeth.

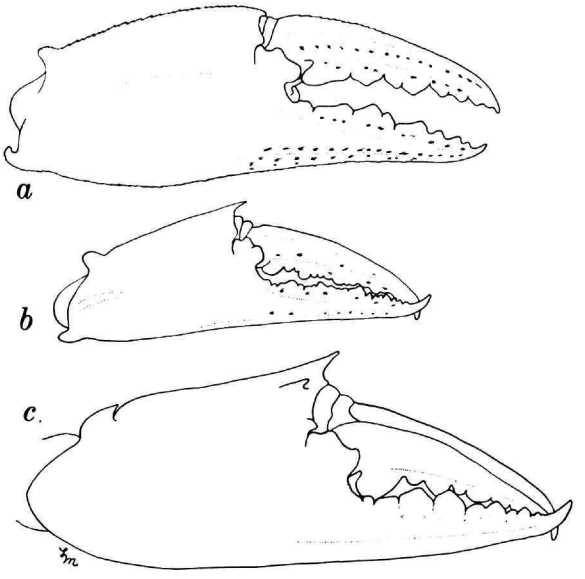

FIGURE 24.—Chelae: *a*, *Geryon maritae*, new species, paratype, female, cb 59.5 mm, *Pillsbury* Sta 51; *b*, *Benthochascon schmitti* Rathbun, female, cb 50.3 mm, Florida; *c*, *Scylla serrata* (Forskål), male, cb 55.1 mm, China.

Guinot (1969c:692) mentioned the fact that between the first two abdominal segments of *Geryon* and the coxa of the fifth pereiopod a very small section of the 8th thoracic sternite is visible, and considered this as a goneplacid character. However, in portunid genera like *Ovalipes* and *Benthochascon* a similar situation exists, and as pointed out by Guinot (1971:1066) also in Xanthidae, like *Panopeus* and *Rhithropanopeus*, part of the 8th thoracic sternite is visible, in the last mentioned genus even "une assez importante partie latérale." In *Geryon* the third abdominal somite of the male covers the basal part of the coxa of the fifth pereiopod and the 8th thoracic sternite is only visible lateral to the first and second abdominal somites. All this demonstrates that the taxonomy of these crabs is still far from clear.

Geryon affinis A. Milne Edwards and Bouvier, 1894

Geryon affinis A. Milne Edwards and Bouvier, 1894:41, figs. A, C, pl. 1; 1899:35.—Hansen, 1908:18, pl. 1: fig. 1.—

Bouvier, 1922:70.—Rae and Lamont, 1963:24.—Kjennerud, 1967:193, fig. 1.—Sankarankutty, 1968:50.—Christiansen, 1969:87, fig. 35, map 29.—Mason and Davidson, 1969:208.—Türkay, 1976b:61 [listed], 70.

Geryon quinquedens.—Bouvier, 1922:70, pl. 6: fig. 7.—Monod, 1956:337 [part, not fig. 441]. [Not *Geryon quinquedens* Smith, 1879.]

Geryon tridens.—Saemundsson, 1937:21 [not *Geryon tridens* Krøyer, 1837].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Azores: E of Corvo, 39°41′35″N, 31°04′-07″W of Paris (= 28°44′07″W of Greenwich), 844 m, sand and gravel, 7 Aug 1888, *Princesse Alice* Sta 222, syntypes, 1♂, 1♀ (MP).

SE of Madeira: 32°42′N, 16°43′W, 670 m, tent trap, 13 Mar 1976, *Onversaagd* Sta 63, 1♂, 1♀ ov (L).

Cape Verde Islands: 16°44′N, 24°48′05″W, 692 m, hard bottom, 21–22 Jul 1901, *Princesse Alice* Sta 1138, 1♂ (MP).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1894:41–45; Christiansen, 1969:87.

Figures: A. Milne Edwards and Bouvier, 1894, figs. A, C, pl. 1 (color); Christiansen, 1969, fig. 35.

Male Pleopod: We have found no illustrations of the male pleopod of this species. Sankarankutty (1968:51) remarked that it was similar to that of *G. maritae* as figured by Doflein (1904).

Color: A colored figure of one of the type-specimens was published by A. Milne Edwards and Bouvier (1894, pl. 1). It shows a pale brown crab with the cervical groove and posterolateral margins, as well as the spine on the carpus, with a pink hue; the central part of the carapace is somewhat greenish. Kjennerud (1967:194) remarked of her specimen: "The colour of the specimen before it was preserved in alcohol was dull yellow with patches of red and red brown, the tips and the margins of the dactyls in the walking legs were dark brown. In general it may be said that the colour was very like the colour of one of the type-specimens illustrated by Milne-Edwards and Bouvier." Christiansen (1969:85) on the other hand described the color as "red to brick-red." A. Milne Edwards and Bouvier (1899: 35) mentioned a probably abnormal specimen "à pattes blanches."

MEASUREMENTS.—The male and female syntypes examined have the carapace lengths 109 and 112 mm, the carapace widths 134 and 135 mm, respectively. In the male and female from Madeira the carapace widths are 140 and 145 mm, respectively. In the male from the Cape Verde Islands the carapace length is 133 mm, the carapace width 158 mm. A. Milne Edwards and Bouvier (1894) gave the following measurements of some of the types: males, carapace lengths 15, 97, and 133 mm, carapace widths 17, 112, and 153 mm, respectively; females, carapace length 128 mm, carapace width 14–(?) mm. (Due to a printer's error the last digit of this number was not printed so that the width may be anywhere between 140 and 149 mm). One of Saemundsson's (1937) specimens was 160 mm long by 180 mm wide; Kjennerud's (1967) male had a length of 150 mm and a width of 180 mm. The 5 males reported upon by Mason and Davidson (1969) had carapace widths ranging from 192 to 210 mm. In contrast to these large specimens are the specimens reported upon by Hansen (1908), the male of which was 40 mm long, the ovigerous female 42 mm. The only other ovigerous female of which the measurements are known is the one (cb 145 mm) from Madeira (above). A. Milne Edwards and Bouvier, (1894:43) mentioned the eggs as very small. Hansen (1908:19) gave the egg size in his specimen as 0.5–0.6 mm.

REMARKS.—The differences between the present species and *G. maritae* are enumerated under the latter species. Most records of *Geryon affinis* or *Geryon quinquedens* from West Africa pertain to *G. maritae.* It was a surprise to find that the male from the Cape Verde Islands listed above, and already reported upon by Bouvier (1922), belongs to *G. affinis* rather than to *G. maritae*; this shows that both species do inhabit the tropical West African region. The *Princesse Alice* specimens were examined by Holthuis in Paris on 4 October 1971.

The specimen from the Azores assigned by Bouvier (1922) to *Geryon quinquedens* is, as shown by Bouvier's illustration, a good *Geryon affinis.*

BIOLOGY.—In the eastern Atlantic the species is known from depths between 130 and 2047 m; almost 50% of the records is from 1165 to 2047

m, the other half is from 130 to 844 m. The bottom on which the species was found was described as sand and gravel (A. Milne Edwards and Bouvier, 1894); muddy sand, black sand, sand and rock (A. Milne Edwards and Bouvier, 1899); hard bottom (Bouvier, 1922).

Ovigerous females have been collected in August (A. Milne Edwards and Bouvier, 1894); our ovigerous female from Madeira was taken in March.

DISTRIBUTION.—In the eastern Atlantic the species has been reported from the following localities:

Near Iceland: SW edge of Hvalsbaksbanki (approximately 64°N, 13°W), 140 m (Saemundsson, 1937). SW of Geirfuglasker, Vestmanneyjar (approximately 63°N, 21°W), 130 m (Saemundsson, 1937). SW of Vestmanneyjar (approximately 63°N, 21°W), 240 fm (440 m) (Rae and Lamont, 1963). S of Iceland, 61°30′N, 22°30′W, 975 fm (1785 m), and 61°33′N, 19°0′W, 1089 fm (2000 m) (Hansen, 1908).

Off SW Norway: Nyegga Bank (approximately 63°38′N, 05°52′E), 410 m (Kjennerud, 1967; Sankarankutty, 1968).

Färöe Islands: ? Off Enniberg (approximately 62°24′N, 06°33′W) (Mason and Davidson, 1969).

Atlantic Ocean, NW of Scotland: Lousy Bank (approximately 60°N, 13°30′W), 440 m (Mason and Davidson, 1969). Rosemary Bank (approximately 59°15′N, 10°W), 480 m (Mason and Davidson, 1969). George Bligh Bank (approximately 59°N, 13°30′W), 240 fm (440 m) (Rae and Lamont, 1963; Mason and Davidson, 1969). 30 miles [48 km] SW of Rockall, 57°18′N, 14°25′W (Mason and Davidson, 1969).

Azores: 39°39′10″N, 31°03′40″W, 1300 m; 39°21′20″N, 31°06′08″W, 1360 m; 38°27′N, 26°31′W, 1165 m; 38°25′-50″N, 28°34′30″W, 785 m; 38°01′N, 29°22′30″W, 1260 m; 37°43′N, 25°06′W, 1385 m (all A. Milne Edwards and Bouvier, 1899). Near Ilha de São Miguel, 37°37′N, 25°20′-45″W, 1187 m (Bouvier, 1922). E of Ilha do Corvo, 39°41′-35″N, 28°44′07″W, 844 m; SE of Ilha do Corvo, 1386 m; between Ilha do Pico and Ilha de São Jorge, 38°38′N, 28°08′15″W, 620 m (A. Milne Edwards and Bouvier, 1894).

Madeira: No specific locality, ca. 1000 m (Türkay, 1976b).

Cape Verde Islands: W of the Cape Verde Islands, 16°-44′N, 24°48′05″W, 692 m; near Ilha de Maio, 15°17′40″N, 23°02′45″W, 1300 m (Bouvier, 1922).

Christiansen (1969, map 29) provided distribution charts of the species. Outside the eastern Atlantic region *Geryon affinis* has been reported from the east coast of America, from South Africa, the Indian Ocean, and Australia. A comparison of material from those areas with specimens from the eastern Atlantic is highly desirable in order to ascertain whether or not a single species is involved in all these records. The taxonomic confusion within the genus *Geryon* is notorious. Many authors (including Rathbun, 1937:271; Barnard, 1950:291; Monod, 1956:337) considered *Geryon affinis* and *G. quinquedens* synonymous, notwithstanding the fact that A. Milne Edwards and Bouvier (1894:41-45, figs. A-D) and Chace (1940:38-40) had convincingly shown the differences between the two species. A revision of the genus is highly desirable.

**Geryon maritae*, new species

FIGURES 24*a*, 25, 26

Geryon chuni Doflein, 1903:21 [nomen nudum].

Geryon affinis.—Doflein, 1903:23; 1904:106, 110, 111, 175, 177, 180, 186, 190, 204, 206, 208, 210, 211, 213, 214, 219, 220, 251, 253, 255, 257, 258, text figs. 9, 14, 32, 62, unnumbered pl.: figs. 1, 2, pls. 3, 33, 34, 38: figs. 1-5, 9, pl. 41: figs. 3-7, pl. 43: figs. 2, 8, pl. 49/50: fig. 1, pl. 52: fig. 7, pl. 55: fig. 6, pl. 58: figs. 2, 4 [part]. [Not *Geryon affinis* A. Milne Edwards and Bouvier, 1894.]

Geryon quinquedens.—Capart, 1951:173, fig. 66.—Monod, 1956:337, fig. 441 [part].—Guinot and Ribeiro, 1962: 62.—Forest, 1963:628.—Monod, 1967:180, pl. 17: fig. 2 [no material].—Le Loeuff and Intès, 1969:66.—Crosnier, 1970:1216.—Le Loeuff, Intès, and Le Guen, 1974:73, figs. 1-4.—Intès and Le Loeuff, 1976:101. [Not *Geryon quinquedens* Smith, 1879.]

Geryon.—Voss, 1966:19.—Maurin, 1968b, figs. 1, 4.

Geryon quinquidens.—Maurin, 1968a:50; 1968b:484, 487, 491, 492, fig. 6 [erroneous spelling.]

"Third form of *Geryon*".—Christiansen, 1969:87.

Geryon sp.—Dias and Seita Machado, 1973:1.—Bas, Arias, and Guerra, 1976, table 3.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 74, 641-733 m, 1♂ (holotype, L), 1♀ (W).

Ivory Coast: Sta 41, 641-842 m, 1♂, 1♀, 10 juv (L). Sta 44, 403-586 m, hard, dark gray mud, 4♂, 2♀ (L, W). Sta 51, 329-494 m, 1♂, 4♀ (L, W).

Geronimo Material: Gabon: Sta 191, 300 m, 2♀ (W). Sta 198, 300 m, 2♀ (W). Sta 203, 200 m, 2♀ (W).

Undaunted Material: South-West Africa: Sta 107, 359 m, 2♀ (L).

DESCRIPTION.—Carapace (Figure 25) about 1.1

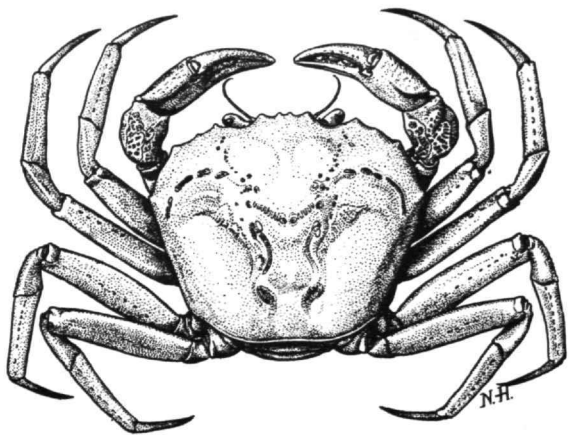

FIGURE 25.—*Geryon maritae*, new species (from Monod, 1956, fig. 441).

times wider than long, greatest width at posterior pair of anterolateral teeth. Median pair of frontal teeth about as long as but narrower than lateral pair, overreaching lateral teeth by half their length. Median sinus U-shaped. Orbital margin L-shaped, short leg of L forming lateral margin of front, longer leg curving distally to join exorbital tooth. Orbital margin, apart from 2 fissures, smooth, lacking tubercles. Exorbital tooth and second and last (= fourth) anterolateral teeth of carapace distinct but low and triangular. First anterolateral tooth vaguely visible as low angle, third tooth absent or visible as low, indistinct elevation. Distances between anterolateral teeth subequal, only slightly greater than distance between exorbital tooth and first anterolateral tooth. Grooves of carapace very faint, much less distinct than in *G. quinquedens*. Blunt ridge extending anteriorly from near base of fifth leg, running more or less parallel to lateral margin of carapace. Anterior half of dorsal surface of carapace relatively smooth, with some groups of low, eroded tubercles on elevated parts. Posterior part of carapace with many distinct, coarse tubercles, becoming finer laterally.

Suborbital margin terminating in strong inner tooth, directed anteriorly, extending to or just beyond second segment of antennular peduncle. Lower orbital margin distinctly tuberculate, ending before reaching exorbital tooth.

Abdomen triangular, closely resembling that of *G. quinquedens*, differing in lacking transverse carina on fourth somite. Telson almost an equilateral triangle.

Epistome shorter than in *G. quinquedens*, with deep pit in middle of basal part.

Mouth parts of this species have been well figured by Doflein (1904, pl. 38: figs. 1–5, 9). Mandible with heavy molar part and rather slender 3-segmented palp, with last segment somewhat sickle-shaped. Maxillule (Figure 26) with very slender lower lacinia, upper widening distally, twice as wide at distal margin as at base; palp 2-segmented, basal segment about as wide as long or slightly wider, distal segment about half as wide as basal segment, slender in comparison. In Doflein's (1904, pl. 38: fig. 5) illustration an evidently mutilated maxillule is shown, which lacks part of the upper lacinia; therefore a new figure of the maxillule is provided here (Figure 26). Maxilla with 2 inner laciniae deeply incised, forming together 4 unequal slender lobes; basal part of palp almost circular, distal part very narrow, ending in slender sharp point, somewhat curved; scaphognathite broad, truncated posteriorly. First maxilliped with 2 laciniae, upper about twice as high as lower; endopod 2-segmented, distal segment inversely triangular with

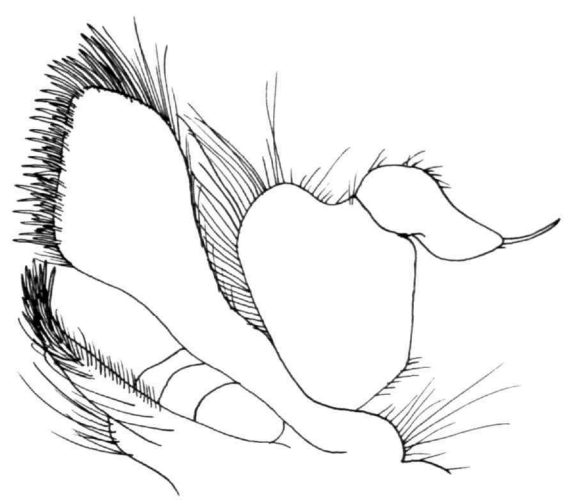

FIGURE 26.—Maxillule of *Geryon maritae*, new species, paratype, female, cb 59.5 mm, *Pillsbury* Sta 51.

distal margin wide; faint lobe visible on inner margin; exopod with well-developed flagellum; epipod large, ending in elongate narrow distal part. Second maxilliped pediform; peduncle of exopod reaching beyond endopod; well-developed flagellum present. Merus of third maxilliped with outer angle rounded, not produced.

Larger of 2 chelipeds with dactylus 5/4 to 4/3 as long as palm (measured along upper margin). As in *Carcinus* proximal teeth of fingers wide, molar-like, distal fingers flattened, tooth-like. Distal teeth alternatingly large and small. Upper surface of dactylus minutely granular, with some coarse tubercles basally; normal ridges and rows of pits present on fingers. Palm lacking anterodorsal spine, outer surface with transverse rows of tubercles and with broad longitudinal groove on upper part and 1 or 2 low, inconspicuous ridges over middle. Smaller chela resembling larger, but with fingers proportionately slightly longer and lacking molar-like teeth. Dorsal surface of carpus (of both chelipeds) with very strong, rather sharp tubercles, inner margin with large, sharp tooth, anterior and outer margins unarmed. Merus of usual shape, triangular in transverse section, with strong subdistal dorsal spine, distal spine absent. Merus less slender than in *G. quinquedens*.

Walking legs slender, merus of last leg 4 times as long as high. Dorsal part of anterior margins of walking legs angular, unarmed. Subdistal tubercle present just behind transverse dorsal groove on distal part of merus, with smaller tubercles present on dorsal surface, restricted to distal part, more numerous and more distinct on anterior legs than on posterior ones. Distinct tubercles present on upper margin of carpus and propodus. Propodus of fifth leg about 4 times as long as high, 5/4 as long as dactylus (length measured on dorsal margin). Dactylus dorsoventrally flattened, resembling that of *G. quinquedens*. Posterior margin of dactylus with distal groove, most distinct on second pereiopod (first walking leg). Lower posterior margin of dactylus of second pereiopod with row of closely placed short hairs over proximal two-thirds. Third pereiopod with few scattered tufts of hairs on dactylus, tufts completely absent on fourth and fifth pereiopods.

Female, carapace length 89 mm, width 95 mm: First and third anterolateral teeth of carapace more distinct than in male, but far less conspicuous than second and fourth teeth. First tooth a low triangle, third a slight elevation. Otherwise carapace similar to that of male but slightly smoother.

Young male (*Pillsbury* Sta 41), carapace length 27 mm, width 34 mm: Carapace relatively wider than in adult male, still widest at level of last pair of anterolateral teeth. Median pair of frontal teeth short, bluntly rounded, placed close together, extending about as far as slightly broader lateral frontal teeth. Exorbital tooth and second and fourth anterolateral teeth slender, spiniform, far more distinct than in adult. First and third anterolateral teeth scarcely visible, presence indicated by slight blunt hump; anterior end of hump of third tooth often abrupt, more clearly marked than that of first. Grooves of carapace more distinct than in adult, branchiocardiac grooves particularly well developed. Entire surface of carapace finely tuberculated, but elevated portions of anterior half and most of posterior part with coarse tubercles. Abdomen similar to that of adult, but with faint low transverse carina on fourth and less distinct carina on fifth somite. Orbit and epistome as in adult. Merus of third maxilliped with anterolateral angle slightly more auricularly produced.

Chelipeds slenderer than in adult, with fingers somewhat longer. First tooth of dactylus large, rounded, directed proximally, exactly as in many Portunidae; other teeth also quite portunid-like. Tuberculation and pitting of chela as in adult male. No trace of spine present at broadly rounded distal end of upper margin of palm. Carpus as in large male, but spine at inner margin longer, more slender; carpus lacking any trace of spine on anterior margin. Merus only with subdistal dorsal spine, distal dorsal spine absent.

Pereiopods as slender as in adult. Sharp tubercles present on upper margin of merus, carpus, and propodus, merus lacking distal dorsal spine.

Dactylus scoop-shaped, as in adults. On second pereiopod row of hairs visible along either margin of flattened area, rows interrupted on third and fourth pereiopods, scarcely discernible on fifth pereiopod.

Very small specimens, carapace length 11–17 mm: carapace slightly wider, 4/3 as wide as long. Legs slightly slenderer, merus of fifth leg about 4.3 times as long as wide. First and third anterolateral teeth of carapace visible as small lobes, first more distinct than third.

Male Pleopod: Doflein, 1904, pl. 41: fig. 6 (locality not stated).

Color: Color photographs were taken of the large male holotype of *Pillsbury* Sta 74, immediately after it came aboard. The ground color of the body is pale cream. The carapace is grayish brown in the anterior part, with a pale median longitudinal zone. Black spots of irregular size, which are irregularly arranged, are found in the middle and in the anterolateral parts of the carapace; they probably are caused by external agencies and do not form part of the actual color pattern. The chelipeds are cream with a black color along the cutting edges of the fingers. The propodi and dactyli of the walking legs are reddish brown, contrasting with the cream color of the merus; the carpus is somewhat intermediate in color. In alcohol the male specimens and the juveniles are pale cream colored, the females in several instances are more of a reddish brown. Doflein (1904, pl. 3) published a color plate of a male, showing it entirely reddish brown. Capart (1951:174) gave the following color description of his material: "Couleur générale bistre; zone rouge brique à rose sur l'arrière de la carapace et sur les pattes; dents latérales plus foncées. Les grands spécimens généralement à coloration plus intense."

MEASUREMENTS.—The males examined have the carapaces up to 140 mm long and 160 mm wide. The largest female has a carapace length of 89 mm, a width of 95 mm. The smallest specimen has a carapace length of 11 mm, a width of 15 mm. The records in the literature mostly deal with animals smaller than our largest. Doflein (1904) indicated that his largest specimen was about 90 mm long, about 110 mm wide; as Doflein's material included ovigerous females they must have been smaller than this. Le Loeuff, Intès and Le Guen (1974) gave the carapace width of their largest female as 110 mm, and that of their largest male as 164 mm. Dias and Seita Machado (1973) reported upon a male with carapace width of 165 mm. The species can attain a weight of up to 1650 g (Le Loeuff, Intès and Le Guen, 1974).

REMARKS.—*Geryon maritae* closely resembles *Geryon affinis* A. Milne Edwards and Bouvier, but differs in the following points.

1. The front between the orbits is narrower, because the inner margins of the orbits are less strongly divergent. In *G. maritae* this margin is short, straight, and runs only slightly obliquely backwards. It then abruptly turns into the posterior margin of the orbit, which from there goes in an almost straight line to the exorbital tooth. In *G. affinis* the inner orbital margin is much longer, diverges widely, and has a little hump in the middle. It gradually merges with the posterior margin of the orbit, which at first is directed obliquely laterally and then turns more anteriorly to the apex of the exorbital tooth. Capart's (1951, fig. 66) drawing very clearly shows the situation as it is in *G. maritae*.

2. The first anterolateral tooth usually is more distinct in *G. affinis* than in *G. maritae*.

3. The inner infraorbital tooth in *G. maritae* is shorter and reaches hardly past the second segment of the antennula; in *G. affinis* it is much larger and stronger and reaches far beyond that segment.

4. In *G. affinis* the lower orbital angle is finely and closely tuberculate, in *G. maritae* these tubercles as a rule are placed wider apart.

5. The main character distinguishing the two species, however, is shown by the dactyli of the walking legs, which in *G. affinis* are laterally compressed, while in *G. maritae* they are dorsoventrally flattened.

In the fifth character the new species resembles *G. quinquedens*, a species with which *G. affinis* has

often been confused; however, *G. quinquedens* differs from *G. maritae* in the following points:

1. The submedian frontal teeth reach with their entire length beyond the lateral frontal teeth and are placed on a prolongation of the front.
2. The upper margin of the palm of the chelipeds ends in a distinct tooth.
3. The outer anterior margin of the carpus of the cheliped has a distinct sharp tooth.
4. The dorsal margin of the merus of the cheliped has a distinct distal and subdistal tooth.
5. The pereiopods are longer: the merus of the fifth leg is more than five times as long as high.
6. The meri of the walking legs each end in an anterodorsal tooth.
7. The male abdomen is broader and the lateral margin shows incisions at the lines of separation of the segments.

The species was first described and figured by Doflein (1904), who had about 40 specimens from the Valdivia Bank in the South Atlantic Ocean, which he incorrectly assigned to *Geryon affinis*. A specimen from E Africa also identified by him as this species evidently is specifically distinct. Doflein's extensive description and illustrations of his Atlantic specimens leave little doubt that they belong to the present new species. Doflein described many of the important characters of the species, but attached little importance to the systematic value of features as the shape of the dactylus of the walking legs; he was inclined to unite all the species of *Geryon* into a single variable one. His figures (1904, pl. 41: figs. 5, 7) of the dactylus of the pereiopod distinctly show that his specimens belong in the present species and not to *G. affinis*.

A year before the publication of his large paper on the *Valdivia* crabs, Doflein (1903) published a short note on the eyes of deep sea crabs, using the *Valdivia* material as a basis. In this preliminary paper he remarked (Doflein, 1903:21) "Bei *Geryon chuni* konnte ich in den Eihüllen wohlentwickelte Zoëen konstatieren." Two pages beyond this he (1903:23) made the observation: "Zudem fand ich später bei *Geryon affinis* aus mehr als 1000 m Tiefe, dass die noch in den Eischalen eingeschlossenen Larven deutlich pigmentierte Augen besassen." As Doflein's (1903:4) observations are evidently based on *Valdivia* material, and as the only ovigerous specimens of *Geryon* collected by the *Valdivia* were those of the present species obtained from the Valdivia Bank, the specimens referred to by Doflein (1903) under both the names *Geryon chuni* and *G. affinis* evidently belong to *G. maritae*. This is confirmed by Doflein's (1904:258) remark in his *Valdivia* report: "Dagegen konnte ich z.B. bei *Geryon affinis* M.-E.u.Bouv., dessen Eier klein sind, die im Ausschlüpfen begriffenen Zoëen auffinden." This sentence being practically identical with the one from his 1903 (p. 21) paper cited above. It seems likely that Doflein at first intended to describe the South Atlantic form as a new species *Geryon chuni*, but that he later changed his mind and considered it conspecific with *G. affinis*. Everywhere he changed the epithet *chuni* to *affinis*, but evidently forgot to do so in the entry on p. 21 of his 1903 paper; otherwise it is difficult to understand why he indicated one species in that paper with two different names. The name *G. chuni* was published without any description and must be considered a nomen nudum. Its identity can only be ascertained by inference.

Bouvier (1922) reported a small specimen of *Geryon* from the Azores as *G. quinquedens*; the figure given by Bouvier, however, shows that it is *G. affinis* (p. 110). A large male and female from the Cape Verde Islands were referred by the same author (Bouvier, 1922:70) to *G. affinis*. Of these two specimens the male is in the collection of the Paris Museum and could there be examined by us. Contrary to our expectations, it proves to be a true *Geryon affinis*.

Capart (1951), under the name *Geryon quinquedens*, gave a good description and figure of the present species. Monod (1956:337, 338) incorrectly united *Geryon affinis* and *G. quinquedens* to a single species. His specimens clearly belong to *G. maritae* as shown by his figure. Crosnier (1970) dealt with our above-mentioned specimens from Angola, which are now in the collection at Leiden. It also seems most likely that the material listed by Guinot and Ribeiro (1962), and Forest

(1963) belong to the present species. All these authors thought the synonymy of *Geryon quinquedens* and *G. affinis* very likely, but they had reservations. This is the more peculiar as both A. Milne Edwards and Bouvier (1894:41–45, figs. A–D) and Chace (1940:38–40) had enumerated very clearly the differences between these two species. The cause of the confusion evidently is that the present new species is somewhat intermediate between *G. affinis* and *G. quinquedens*: it shows the dactyli of the walking legs as in *G. quinquedens*, but in most of the other characters it more closely resembles *G. affinis*.

The anatomy of this species, especially that of the eye, the statocyst, etc., has been extensively dealt with by Doflein (1904).

Economic Importance.—An active trawling fishery for this species has been developed in Angola since about 1970 (Dias and Seita Machado, 1973; Le Loeuff, Intès and Le Guen, 1974), the annual catch amounting to 2000 tons. Spanish trawlers, which operate off the West coast of Africa to fish for shrimps, often catch *Geryon*, but only sell the chelipeds; in recent years the Japanese have also developed an interest in the species and have done some exploratory fishing for it off South-West Africa (Le Loeuff, Intès and Le Guen, 1974). Le Loeuff, Intès, and Le Guen (1974) and Intès and Le Loeuff (1976) described exploratory fishing for this species off the Ivory Coast, in 400 to 650 m and 300 to 700 m depth. As the rough bottom configuration there made trawling impractical, lobster pots were used with reasonable success (from 1.6 to 53 kg crabs were caught per pot; the best catches being in depths between 400 and 500 m, where 30 to 50 kg crabs were obtained per pot).

Type-Locality.—Off Liberia, 04°20′N, 09°26′W to 04°30′N, 09°22′W, 641–733 m.

Disposition of Types.—The holotype (Crust. D. 21052), a male, carapace length 134 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. The remaining specimens are paratypes; they have been divided between the Rijksmuseum van Natuurlijke Historie, Leiden, and the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Etymology.—Dr. Marit E. Christiansen, who saw our *Pillsbury* material, was the first to publish that the present species is distinct from *G. affinis* and pointed this out in her excellent book on the Scandinavian Brachyura (1969:87). For this reason we take great pleasure in naming this interesting species for her.

Biology.—This species has been reported from depths between 100 and 936 m. Only three records are definitely from less than 250 m (150–245 m, Monod, 1956; no deeper than 200 m on talus, Le Loeuff and Intès, 1969; 200 m, p. 112 herein), and only four are definitely from more than 600 m (936 m, Doflein, 1904; 800 m, Dias and Seita Machado, 1973; 650 m, Le Loeuff, Intès and Le Guen, 1974; and 641–842 m, p. 112 herein). The majority, 24 of 31, of the records are partly or entirely from between 250 and 600 m. The bottom on which the species has been taken has been given as mud (Guinot and Ribeiro, 1962; Forest, 1963); mud, sandy mud, slightly muddy sand, greenish muddy sand (Maurin, 1968b); green mud and sand (three records), brown mud and sand, green mud (Capart, 1951); hard, dark gray mud (Voss, 1966; p. 112 herein); corals (Guinot and Ribeiro, 1962).

Dias and Seita Machado (1973) found that at 300 m depth the catch consisted of 96.8% females, but that this percentage dropped considerably in deeper waters being 38% in 500 m, 2.2% in 600 m, and 1.6% m in 800 m. Le Loeuff, Intès, and Le Guen (1974) found in their catches (400–650 m) that the females were very scarce. The males were more numerous and probably represented two age classes. In 1976 Intès and Le Loeuff observed that the percentage of males increased with increasing depth.

Distribution.—*Geryon maritae* is a West African species, known from localities between Spanish Sahara and Valdivia Bank, South-West Africa. A fishing survey reported by Dias and Seita Machado (1973) encountered the species in depths between 300 and 800 m from 29 transects made between just N of Point-Noire, Congo, and off

the Rio Cunene, southern Angola; their individual records are not repeated below. Other records in the literature include the following.

West Africa: No specific locality (Monod, 1967).

Spanish Sahara: Off Villa Cisneros, 300–500 m (Maurin, 1968a, 1968b). 23°35.5′N, 16°58′W to 23°32′N, 16°57′W, 362–463 m (Bas, Arias, and Guerra, 1976).

Mauritania: Between Cap Timiris and Tamzak (as Tamxat), 350–600 m (Maurin, 1968b).

Senegal: Off Saint-Louis, 300 m (Maurin, 1968b); S of Saint-Louis, 100–300 m (Monod, 1956). Fosse de Kayar, 300–350 to 600 m (Maurin, 1968b). Off Senegal, 14°46′-51″N, 150–245 m (Monod, 1956). 11 mi [18 km] NW of Pointe des Almadies, ca. 300 m (Monod, 1956).

Liberia: No specific locality (Christiansen, 1969).

Ivory Coast: No specific locality (Christiansen, 1969; Le Loeuff and Intès, 1969). Numerous localities at transects across the Ivory Coast, 03° to 07.5°W, 300–700 m (Intès and Le Loeuff, 1976). Off Grand-Bassam, 03°49′W, 400–650 m (Le Loeuff, Intès and Le Guen, 1974). 05°05′N, 04°00′W to 05°04′N, 04°02′W, 403–586 m (Voss, 1966). 04°32.5′N, 06°31′W, 300–455 m and 04°54′N, 03°23′W, 380–400 m (Forest, 1963).

Ghana: 04°39′N, 02°46′W, 300–400 m (Forest, 1963).

Angola: SW of Moita Seca, 06°08′S, 11°24′E, 250–380 m; W of Ambrizete, 07°16′S, 12°02′E, 380–420 m; W of Ponta do Morro, 10°45.5′S, 13°07′E, 400–500 m; NW of Egito, 11°53′S, 12°23′E, 400–500 m, and 11°53′S, 13°20′E, 480–510 m (all Capart, 1951). Baía dos Tigres, 320–400 m, 453–478 m (Guinot and Ribeiro, 1962).

South-West Africa: 17°23′S, 11°20′E, 359 m (Crosnier, 1970). Valdivia Bank, 25°27′S, 06°08.2′E, 936 m (Doflein, 1904).

Family PLATYXANTHIDAE Guinot, 1977

PLATYXANTHIDAE Guinot, 1977:1052.

This family, comprising three genera, is not represented in the eastern Atlantic.

Family XANTHIDAE MacLeay, 1838

PILUMNIDAE Samouella, 1819:86 [by direction, under the Plenary Powers of the International Commission on Zoological Nomenclature, not to be used in preference to Xanthidae MacLeay, 1838, but available for use by those who consider that *Pilumnus* Leach and *Xantho* Leach belong to different family-group taxa; Opinion 423 in *Opinions and Declarations of the International Commission on Zoological Nomenclature*, volume 14, 1956; name 74 on *Official List*].

XANTHIDAE MacLeay, 1838:59 [name 73 on *Official List*; there dated from Dana, 1851, in error].

ERIPHIDAE MacLeay, 1838:59, 60.

TRICHIDEA de Haan, 1839, pl. H.

CHLORODINAE Dana, 1851b:125.

POLYDECTINAE Dana, 1851b:127.

OZINAE Dana, 1851b:127.

ACTUMNINAE Dana, 1851b:128.

Carpilides A. Milne Edwards, 1862a:40.

Trapézides A. Milne Edwards, 1862a:40.

Liagorides A. Milne Edwards, 1862a:41.

Trapeziden Nauck, 1880:64.

TRAPEZIINAE Miers, 1886:163.

MENIPPIDAE Ortmann, 1893b:428, 431.

MYOMENIPPINAE Ortmann, 1893b:429, 432.

CARPILINAE Ortmann, 1893b:429, 463.

ETISINAE Ortmann, 1893b:429, 470.

PANOPAEINAE Ortmann, 1893b:429, 473.

DOMOECIINAE Ortmann, 1893b:429, 478.

ZOZYMOIDA Alcock, 1898:77, 94.

EUXANTHOIDA Alcock, 1898:77, 109.

HALIMEDOIDA Alcock, 1898:77, 134.

ACTAEINAE Alcock, 1898:78, 137.

XANTHODIOIDA Alcock, 1898:78, 156.

CYMOIDA Alcock, 1898:78, 172.

PSEUDOZIOIDA Alcock, 1898:176, 180.

RUPPELLIOIDA Alcock, 1898:176, 186.

HETEROPANOPIOIDA Alcock, 1898:177, 207.

MELIOIDA Alcock, 1898:177, 230.

LYBIOIDA Serène, 1965:9, 12, 26, 37.

ZALASIINAE Serène, 1968:62.

LIOMEROIDA T. Sakai, 1976:xvii, 385, 390.

EASTERN ATLANTIC GENERA.—Thirty-two, of which all but five are represented by species occurring off tropical West Africa. The extralimital genera are the following:

Atergatis de Haan (1833:4, 17). Type-species: *Cancer integerrimus* Lamarck, 1818, by subsequent designation by the International Commission on Zoological Nomenclature in Opinion 73 in *Smithsonian Miscellaneous Collections*, 73(1):26, 1922; gender: masculine; name 124 on *Official List*.

Neopanope A. Milne Edwards (1880, in 1873–1881:329). Type-species: *Neopanope pourtalesii* A. Milne Edwards, 1880, a subjective junior synonym of *Panopeus packardii* Kingsley, 1879, by subsequent designation by Fowler (1912:400); gender: feminine.

Pilumnoides H. Milne Edwards and Lucas (1843:21). Type-species: *Hepatus perlatus* Poeppig,

1836, by monotypy; gender: masculine; name 347 on *Official List.*

Rhithropanopeus Rathbun (1898:273). Type-species: *Pilumnus harrisii* Gould, 1841, by original designation and monotypy; gender: masculine; name 365 on *Official List.*

Sphaerozius Stimpson (1858a:32). Type-species: *Sphaerozius nitidus* Stimpson, 1858, by subsequent designation by the International Commission on Zoological Nomenclature in Opinion 85 in *Smithsonian Miscellaneous Collections*, 73(3):17, 1925; gender: masculine; name 372 on *Official List.*

EASTERN ATLANTIC SPECIES—Fifty-seven, of which 44 occur off tropical West Africa. Monod (1956) recorded the following species:

Name in Monod	Current Name
Menippe nodifrons	*Menippe nodifrons*
Globopilumnus africanus	*Globopilumnus africanus*
Globopilumnus stridulans	*Globopilumnus stridulans**
Epixanthus helleri	*Epixanthus hellerii**
Pseudozius bowieri	*Euryozius bowieri*
	Euryozius pagalu, new species*
Pilumnus stebbingi	*Pilumnus stebbingi**
Pilumnus perrieri	*Pilumnus perrieri**
Pilumnus inermis	*Pilumnus inermis*
Pilumnus spinifer	*Pilumnus spinifer*
Parapilumnus pisifer	*Leopoldius pisifer**
Parapilumnus boletifer	*Nanopilumnus boletifer**
Heteropanope (Heteropanope) tuberculidens	*Heteropanope tuberculidens*
Heteropanope (Pilumnopeus) caparti	*Pilumnopeus caparti*
Heteropanope (Pilumnopeus) africana	*Pilumnopeus africanus**
Domecia hispida	*Domecia acanthophora africana**
Xantho (Xantho) incisa	*Xantho incisus*
Xantho (Xantho) pilipes	*Xantho pilipes*
Xantho (Xantho) sexdentata	*Xantho sexdentatus*
Xantho (Xantho) denticulata	*Xanthodius denticulatus**
Xantho (Leptodius) inaequalis punctata	*Xanthodius inaequalis inaequalis**
Xantho (Leptodius) inaequalis convexa	*Xanthodius inaequalis faba*
Xantho (Leptodius) floridana	*Cataleptodius floridanus**
Actaea (Actaea) rufopunctata	*Paractaea rufopunctata africana**
	Paractaea monodi
Actaea (Actaea) margaritaria	*Paractaea margaritaria**
Actaea (Glyptoxanthus) angolensis	*Glyptoxanthus angolensis**
Actaea (Glyptoxanthus) cavernosa	*Glyptoxanthus cavernosus*
Actaea (Glyptoxanthus) corrosa	*Glyptoxanthus corrosus*
Platypodia picta	*Platypodiella picta*
Cycloxanthops occidentalis	*Cycloxanthops occidentalis*
Paraxanthias eriphioides	*Paraxanthias eriphioides*
Medaeus africanus	*Pseudomedaeus africanus**
Medaeus couchi	*Monodaeus couchii*
Medaeus (?) rouxi	*Monodaeus rouxi**
Micropanope rufopunctata	*Microcassiope minor**
Micropanope parvula	*Coralliope parvula*
Micropanope melanodactyla	*Nanocassiope melanodactyla**
Panopeus africanus	*Panopeus africanus**
Panopeus parvulus	*Eurypanopeus blanchardi**
Panopeus sp.	*Panopeus africanus**

The extralimital species include the following:

Atergatis roseus (Rüppell, 1830). Eastern Mediterranean, Israel; an immigrant from the Red Sea; littoral (Lewinsohn and Holthuis, 1964).

Heteropanope laevis (Dana, 1852). Eastern Mediterranean, Egypt, an immigrant from the Red Sea; sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Monodaeus guinotae Forest, 1976. Mediterranean, from the Balearic Isles, the Gulf of Taranto, and off Israel, shore (?) to 800 m (Forest, 1976).

Neopanope sayi (Smith, 1869). An East American species introduced into England; littoral (Naylor, 1960).

Pilumnoides perlatus (Poeppig, 1836). An eastern Pacific species (Rathbun, 1930:537) introduced to England, South-West Africa (L), and South Africa (Barnard, 1950:257).

Pilumnopeus vauquelini (Audouin, 1826). Eastern Mediterranean, from Egypt and Israel, an immigrant from the Red Sea; sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Pilumnus aestuarii Nardo, 1869. Mediterranean, from Cadaqués, Spain and Venice, Italy; shallow water (Zariquiey Alvarez, 1968).

Pilumnus hirsutus Stimpson, 1858. Eastern Mediterranean, Egypt, an immigrant from the Red Sea; sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Pilumnus villosissimus (Rafinesque, 1814). Med-

iterranean; shallow water (Zariquiey Alvarez, 1968).

Rhithropanopeus harrisii (Gould, 1841). Scattered localities between the Baltic, the southern North Sea, NW and SW France, Black Sea, Sea of Azov, and Caspian Sea; introduced from North America; estuarine (Christiansen, 1969).

Sphaerozius nitidus Stimpson, 1858. Eastern Mediterranean, Egypt, an immigrant from the Red Sea; shallow water (Ramadan and Dowidar, 1976).

Xantho granulicarpus Forest, 1953. Mediterranean; sublittoral (Zariquiey Alvarez, 1968).

Xantho poressa (Olivi, 1792). Canary Islands, Portugal, and Mediterranean; shallow water (Zariquiey Alvarez, 1968).

We believe that two species included in the West African fauna by Monod (1956) are based either on misidentifications or erroneously labeled specimens:

Chlorodiella longimana (H. Milne Edwards, 1834). A western Atlantic species reported from São Tomé by Osorio (1887:221) (see Monod, 1956:303), and not subsequently recollected there.

Pilumnoides hassleri A. Milne Edwards, 1880. A western Atlantic species reported by Monod (1956:262) on the basis of a specimen supposedly from Gabon collected by Heurtel. The origin of most or all of the Heurtel collection from Gabon is doubtful.

REMARKS.—The status of subfamilies and genera within the family Xanthidae is currently being studied by Mme. D. Guinot of the Muséum national d'Histoire naturelle, Paris. Preliminary observations of Mme. Guinot have appeared in a series of shorter papers published between 1967 to 1971 and the first of more comprehensive papers, detailing observations on three subfamilies of xanthids, Actaeinae, Polydectinae, and Trichiinae, was published in 1976. Rather than try to accomodate the West African genera within the partial framework established by Mme. Guinot to date or one of the unsatisfactory older classifications, we have arranged accounts of all of the West African genera alphabetically.

Genus *Cataleptodius* Guinot, 1968

Cataleptodius Guinot, 1968a:704 [type-species: *Chlorodius floridanus* Gibbes, 1850, by original designation; gender: masculine].—Guinot, 1971:1068 [list of species].

**Cataleptodius floridanus* (Gibbes, 1850)

Xantho (Leptodius) floridana.—Monod, 1956:291, figs. 353–355.

Xantho (Leptodius) floridanus.—Forest and Guinot, 1966:75.—Guinot, 1968a:706 [discussion].

Cataleptodius aff. *floridanus.*—Guinot, 1968a:706, 708 [discussion], fig. 23; 1971:1068 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 275, 9–69 m, rubble of coralline algae, 1♂, 2♀ (1 ov) (L, W).

DESCRIPTION.—We have found no full description of this species based on West African specimens, but we anticipate that Mme. Guinot, in future studies, will provide a description. A description based upon western Atlantic specimens may be found in Rathbun (1930:297).

Figure: Monod, 1956, figs. 353–356.

Male Pleopod: Monod, 1956, figs. 354–355 (Annobon), fig. 356 (Florida); Guinot, 1968a, fig. 23 (Annobon).

MEASUREMENTS.—Our specimens have carapace widths of 6 to 7 mm; that of the ovigerous female is 6.5 mm. Monod (1956) mentioned specimens from West Africa 8 to 20 mm wide, and Rathbun (1930) reported a carapace width of 33 mm in an American specimen.

REMARKS.—In her generic revision, Guinot (1968a:706) designated the West African population of this species as *Cataleptodius* aff. *floridanus* and noted:

> Sous ce nom, nous séparons les représentants ouest-africains rapportés à *Xantho* (*Leptodius*) *floridanus* par Monod (1956, p. 291, fig. 353–356) et par nous-même (Forest et Guinot, 1966, p. 75), car nous relevons de petites différences, tout au plus d'ordre sous-spécifique, entre les échantillons américains et ouest-africains: aff. *floridanus* serait de plus petit taille et en particulier présenterait des fosses orbitaires moins arrondies et moins profondes, plus inclinées latéralement et munies à l'angle externe d'une dent moins saillante; de plus, les pattes ambulatoires semblent un peu plus grêles. Il y aura

lieu de revenir sur cette question à l'aide d'un matériel plus important que celui dont nous disposons aujourd'hui.

Unfortunately, the *Pillsbury* collections are so small that we cannot add anything to the solution of this problem at this time. The question can only be settled when much more material becomes available.

BIOLOGY.—The West African population of this species lives sublittorally, in depths between 4 and 12 or more meters; the *Pillsbury* specimens were taken in the beds of coralline algae off Annobon in 9 to 69 m. All of the specimens taken by the *Calypso* also were taken from bottoms with coralline algae (Forest and Guinot, 1966).

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

DISTRIBUTION.—Atlantic Ocean: western Atlantic from Bermuda and Florida to Brazil; eastern Atlantic from off Gabon and the offshore islands of the Gulf of Guinea: Annobon, Principe and São Tomé; sublittoral in the eastern Atlantic, in depths between 4 m and more than 12 m (9–69 m). Monod (1956) was the first to report the species from the eastern Atlantic, based on material from Gabon and Annobon. The only other records that we have found in the literature are:

Principe: Between Ponta da Mina and Ilhéu Santana, 10–12 m (Forest and Guinot, 1966).

São Tomé: 00°20'N, 06°46'E, 10 m; in front of Ponta Diogo Nunes, 4 m; off Ponta Diogo Nunes, 4–5 m; in front of Ponta Oquedelrei, 6 m; in front of Praia Lagarto, 5–6 m; Iógoiógo (all Forest and Guinot, 1966).

Genus *Coralliope* Guinot, 1967

Coralliope Guinot, 1967c:353 [type-species: *Actumnus parvulus* A. Milne Edwards, 1869, by original designation; gender: feminine].—Guinot, 1971:1076 [list of species].

Coralliope parvula (A. Milne Edwards, 1869)

Micropanope parvula.—Monod, 1956:317, figs. 393–400.—Guinot and Ribeiro, 1962:59.—Ribeiro, 1964:11.—Forest and Guinot, 1966:82.—Guinot, 1967c:348 [discussion].

Actumnus parvulus.—Guinot, 1967c:355 [listed].—Garth, 1968:314 [discussion].

Coralliope parvula.—Guinot, 1967c, figs. 3, 11; 1971:1076 [listed].

SYNONYM.—*Xanthodes talismani* A. Milne Edwards and Bouvier, 1898.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Cape Verde Islands: São Vicente, 20 m, 26 Jul 1883, *Talisman*, syntypes of *Xanthodes talismani* A. Milne Edwards and Bouvier, 1898, 3♂, 7♀ (2 ov) (L, Crust. D.1567; W, USNM 22957).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:91 (as *Xanthodes talismani*).

Figures: Monod, 1956, figs. 393–400.

Male Pleopod: Monod, 1956, figs. 397–400 (Cape Verde Islands, Senegal); Guinot, 1967c, fig. 11a,b (Senegal).

MEASUREMENTS.—Our specimens have carapace widths of 2.4 to 6.0 mm; the carapace widths of the ovigerous females are 6.0 mm.

BIOLOGY.—*Coralliope parvula* is a sublittoral species, inhabiting relatively shallow water, 4–5 m, to a depth of 355 m. More than 90% of the records in the recent literature are from depths of less than 50 m. The deepest record is that from Cabo Bojador from 355 m on shelly sand and coral (Monod, 1956). The *Calypso* collected the species on calcareous algae in 4–5 m, calcareous algae, sand and coral in 7–10 m, and rocks and coral in 25–40 m.

Ovigerous females have been collected in May, July, September, November, and December (Monod, 1956; Guinot and Ribeiro, 1962; Ribeiro, 1964; Forest and Guinot, 1966).

DISTRIBUTION.—West Africa, from the Cape Verde Islands and Cabo Bojador, Spanish Sahara southward to Angola, including the offshore islands Principe, São Tomé, and Annobon in the Gulf of Guinea. On the mainland it is known only from off Cabo Bojador, several localities off Senegal, and one locality off Angola. Monod (1956) summarized the literature and reported material from the Cape Verde Islands, Spanish Sahara, and Senegal. Subsequent records include the following:

Cape Verde Islands: São Vicente (Guinot, 1967c). Baía da Matiota, São Vicente; Baía do Porto Grande, São Vicente, (3)3.5–11 m, 4–6 m, 8–10 m; Baía do Monte Trigo,

Santo Antão; Porto dos Carvoeiros (as Baía do Porto Novo), Santo Antão, 12 m; Baía do Tarrafal, São Nicolau, 16 m; channel between Santa Luzia and Branco, 18 and 30 m; Porto Inglês, Maio, 14 m; S of Ilhéu Luís Carneiro, 22 m; Baixo João Leitão, 25 m; Porto da Furna, Brava, 6–20 m (all Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: Dakar (Guinot, 1967c).

Principe: Tinhosa Grande (as Hermano Grande) island, 12 mi [19 km] SSW of Principe, 01°20′45″N, 07°17′37″E, 25–40 m (Forest and Guinot, 1966).

São Tomé: Off Ponta Diogo Nunes, 4–5 m (Forest and Guinot, 1966).

Annobon: 01°24′04″S, 05°36′45″E, 7–10 m (Forest and Guinot, 1966).

Angola: Praia Azul, Ponta da Caruíta (Guinot and Ribeiro, 1962).

Genus *Cycloxanthops* Rathbun, 1897

Cycloxanthus A. Milne Edwards, 1863:278 [invalid junior homonym of *Cycloxanthus* H. Milne Edwards, 1850 (Crustacea); type-species: *Xantho sexdecimdentatus* H. Milne Edwards and Lucas, 1843, by original designation and monotypy; gender: masculine].

Cycloxanthops Rathbun, 1897b:164 [substitute name for *Cycloxanthus* A. Milne Edwards, 1863; type-species: *Xantho sexdecimdentatus* H. Milne Edwards and Lucas, 1843; gender: feminine].—Guinot, 1968a:699; 1971:1067 [list of species, *C. occidentalis* not included].

Cycloxanthops occidentalis (A. Milne Edwards, 1867)

Cycloxanthops occidentalis.—Monod, 1956:301, figs. 368–370 [Senegal; references].—Gauld, 1960:70 [Ghana].—Guinot and Ribeiro, 1962:57 [Angola].—Guinot, 1968a:700 [discussion].—Crosnier, 1969:530 [Congo].—Guinot, 1971: 1068 [listed].

DISTRIBUTION.—West Africa, from the Cape Verde Islands and Senegal to Angola; intertidal to 23 m.

Genus *Domecia* Eydoux and Souleyet, 1842

Domecia Eydoux and Souleyet, 1842:234 [type-species: *Domecia hispida* Eydoux and Souleyet, 1842, by monotypy; gender: feminine; name 144 on *Official List*].

Neleus Desbonne and Schramm, 1867:35 [type-species: *Neleus acanthophorus* Desbonne and Schramm, 1867, by monotypy; gender: masculine].

**Domecia acanthophora africana* Guinot, 1964

Domecia hispida.—Monod, 1956:273.—Forest, 1959:22.—Guinot and Ribeiro, 1962:52. [Not *Domecia hispida* Eydoux and Souleyet, 1842.]

Domecia sp.—Ribeiro, 1964:8.

Domecia acanthophora.—Forest and Guinot, 1966:73 [not *Domecia acanthophora* Desbonne and Schramm, 1867].

Domecia acanthophora forma *africana* Guinot, 1964:272, figs. 6, 10–12, 16, 17.—Forest and Guinot, 1966:73 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 273, shore, 1♂ (L). Sta 282, 18–37 m, nodular coralline algae, 1♀ (W).

Other Material: Annobon: S coast, 01°28.5′S, 05°37.5′E, 35–55 m, 16 Jun 1967, F. Poinsard, 1♀ (W).

DESCRIPTION.—Guinot, 1964:273–278 (comparison with the Indo-West Pacific *D. hispida* Eydoux and Souleyet, 1842 and *D. glabra* Alcock, 1899).

Figures: Guinot, 1964, figs. 6, 10–12, 16.

Male Pleopod: Guinot, 1964, figs. 11, 12 (Cape Verde Islands; Annobon).

MEASUREMENTS.—Our specimens have carapace widths of 4 mm.

REMARKS—In 1964 Guinot clarified the status of the species of *Domecia* and recognized three species, two of which, *D. hispida* Eydoux and Souleyet, 1842 and *D. glabra* Alcock, 1899, are restricted to Indo-West Pacific localities. She pointed out that the oldest available name for the Atlantic species, previously thought to be *D. hispida*, actually was *D. acanthophora* (Desbonne and Schramm, 1867), a species originally described from Guadeloupe in the Antilles. She further recognized *Domecia acanthophora* forma *africana*, an infrasubspecific name without standing in nomenclature, for the smaller West African population of *D. acanthophora*, and noted (Guinot, 1964: 281) that "les petites différences (pilosité, spinulation [and size]) séparant nos exemplaires ouest-africains des spécimens est-américains sont sans doute liées à des conditions écologiques différentes."

Our material is too limited to add any new information but we believe that east and west Atlantic subspecies should be recognized in this case.

BIOLOGY.—This species usually is associated with coral; it appears to be quite abundant in rocks and coral as well as in the beds of coralline algae off São Tomé and Annobon islands in the Gulf of Guinea (Forest and Guinot, 1966), based on collections made by the *Calypso*. Off West Africa it occurs from the intertidal zone to a depth of 35–55 m; of 14 stations at which this species was taken by the *Calypso*, 10 were in depths of 10 m or less.

Off West Africa, ovigerous females have been collected in June and August (Guinot and Ribeiro, 1962; Ribeiro, 1964; Guinot, 1964; Forest and Guinot, 1966).

DISTRIBUTION.—Atlantic; an insular form off West Africa, occurring in the Cape Verde Islands and the offshore islands of the Gulf of Guinea, Annobon, Principe, and São Tomé, in depths from shore to about 35 m (15–40 m and 35–55 m). Records in the literature include the following:

Cape Verde Islands: No specific locality (Monod, 1956; Guinot, 1964). Channel between Santa Luzia and Ilhéu Branco, 18 m (Guinot and Ribeiro, 1962; Ribeiro, 1964). Baía de Santa Clara, São Tiago, 15–35 m; Porto da Praia, São Tiago, 10 m; Ponta da Areia, Fogo, 2.5 m; Ponta Garbeiro [?], Brava; Ilhéu de Sal Rei, Boavista, 7 m (all Guinot, 1964).

Gulf of Guinea: No specific locality (Forest, 1959).

Principe: Ilhéu Caroço, 2–8 m; 01°38′25″N, 07°21′35″E, 35 m (Forest and Guinot, 1966).

São Tomé: Between Ponta Oquedelrei and Ponta de São Sebastião, 5 m (Forest and Guinot, 1966). Ponta Diogo Vaz, W coast, 0–6 and 30 m; Praia de Santa Catarina, W coast, 3–10 m; Baía de São Miguel, 6–10 m; Ilhéu Macaco [as îlot dos Cocos], 3–8 m; Morro Peixe, 2–6 m; Ilhéu das Cabras, 0–2 m; and Ponta Furada, 3–8 m (all Guinot, 1964; Forest and Guinot, 1966).

Annobon: Off Annobon, 12 m (Monod, 1956; Guinot, 1964). Santa Cruz bay, 8–12 m (Guinot, 1964). 01°24′04″S, 05°36′45″E, 7–10 m; Isla Tortuga, NW side, 15–40 m; 01°25′10″S, 05°36′10″E, 20–25 m (Guinot, 1964; Forest and Guinot, 1966).

Genus *Epixanthus* Heller, 1861

Epixanthus Heller, 1861:323 [type-species: *Epixanthus kotschii* Heller, 1861, a subjective junior synonym of *Ozius frontalis* H. Milne Edwards, 1834, by monotypy; gender: masculine; name 299 on *Official List*].

**Epixanthus hellerii* A. Milne Edwards, 1867

Epixanthus helleri.—Monod, 1956:236, figs. 270–272.—Longhurst, 1958:88.—Gauld, 1960:70.—Guinot and Ribeiro, 1962:51.—Ribeiro, 1964:8.—Forest and Guinot, 1966: 68.—Garth, 1968:314 [discussion].—Uschakov, 1970:445, 447, 455 [listed].

SYNONYM.—*Ozius corrugatus* Osorio, 1887.

MATERIAL EXAMINED.—*Pillsbury Material:* Fernando Poo: Sta 258, shore, 3♂, 4♀, 4 juv (L,W).

Other Material: Sierra Leone: Aberdeen, J. Cadenat, Mar 1948, 1♀ (W).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:83.

Figures: Monod, 1956, figs. 270–272.

Male Pleopod: Monod, 1956, figs. 271, 272 (Sierra Leone).

MEASUREMENTS.—Our specimens have carapace widths of 5 to 25 mm.

BIOLOGY.—*Epixanthus hellerii* is a primarily intertidal species which may also occur subtidally in shallow water; Forest and Guinot (1966) reported one specimen from a depth of 3–10 m off Principe. Sourie (1954a) noted that this species was a characteristic component of the understone fauna of rocky shores of Senegal, and Uschakov (1970) found it in the inferior mesolittoral zone of rocky shores off Guinea, a zone with red algae and *Padina*.

Ovigerous females have been recorded in March and November (Monod, 1956).

DISTRIBUTION.—West Africa, from the Cape Verde Islands and Senegal to Angola, including Fernando Poo, Principe, São Tomé, and Annobon. Monod (1956), who reported material from the Cape Verde Islands, Senegal, Guinea, Sierra Leone, and Ghana, summarized earlier records. Records in the literature since 1956 include the following:

Cape Verde Islands: Baía das Gatas, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Guinea: Île Tamara, Îles de Los; Conakry (Uschakov, 1970).

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

Ghana: Tenkpobo (as Tenpobo), Dixcove (Gauld, 1960).

Principe: Ponta da Mina, beach; Ilhéus dos Mosteiros, 3–10 m (Forest and Guinot, 1966).

São Tomé: Off São Tomé; Iógoiógo; W of Ponta Diogo Nunes; Ilhéu das Cabras, 0–2 m; and Santana (Forest and Guinot, 1966).

Annobon: No specific locality (Forest and Guinot, 1966).

Genus *Eriphia* Latreille, 1817

Eriphia Latreille, 1817a:404 [type-species: *Cancer spinifrons* Herbst, 1785, a subjective junior synonym of *Cancer verrucosus* Forskål, 1775, by selection by H. Milne Edwards, 1842, in 1836–1844, pl. 14: fig. 1; gender: feminine; name 1621 on *Official List*].

Eriphia verrucosa (Forskål, 1775)

Cancer verrucosa Forskål, 1775:93.

Eriphia spinifrons.—Stimpson, 1907:72 [Madeira].—Bouvier, 1911:226 [Mauritania].—Chapman and Santler, 1955:374 [Azores].

Eriphia verrucosa.—Figueira, 1960:9 [Azores].—Forest and Gantès, 1960:352 [Morocco].—Zariquiey Alvarez, 1968: 393, figs. 1i, 135b [Spain; references].—Türkay, 1976b:61 [listed], 67 [Madeira, Ilhas Desertas].

SYNONYMS.—*Cancer spinifrons* Herbst, 1782; *Eriphia spinifrons angusta* Czerniavsky, 1884; *Eriphia spinifrons mediterranea* Czerniavsky, 1884; *Eriphia spinifrons orientalis* Czerniavsky, 1884.

DISTRIBUTION.—Eastern Atlantic from the Bay of Biscay to Mauritania, including Madeira, the Azores, and the Mediterranean; intertidal.

Genus *Euryozius* Miers, 1886

Euryozius Miers, 1886:142 [type-species: *Xantho bouvieri* A. Milne Edwards, 1869, by monotypy; gender: masculine].—Guinot, 1968c:320 [listed], 325 [discussion][genus restricted to type-species]; 1971:1077 [included species].

Gardineria Rathbun, 1911:236 [type-species: *Gardineria canora* Rathbun, 1911, by monotypy; gender: feminine].—Guinot, 1967a:264; 1968b:156; 1968c:325; 1971:1077.

DISCUSSION.—Guinot (1967a:264, footnote) noted that "*Gardineria canora* appartient au même genre que l'espèce ouest-africaine *Pseudozius bouvieri* (A. MILNE EDWARDS). Ces deux espèces appartiennent, selon nous, au genre *Euryozius* établi par MIERS en 1886 et dont le plus proche parent serait *Carpilius*." In that same paper *Gardineria* was assigned to the Xanthinae whereas *Pseudozius* sensu stricto, was assigned to the Menippinae. In another paper, part of an overall review of some of the more difficult xanthid genera, Guinot (1968b:156) resurrected *Euryozius* from the synonymy of *Pseudozius* and placed both *Euryozius* and *Gardineria* in the Menippinae. In a subsequent paper in that same series, Guinot (1968c:320, 325) recognized the subfamily Carpilinae Ortmann, 1893, for the Recent genera *Carpilius*, *Euryozius*, and *Gardineria*, and for two other genera based on fossils.

In her account of *Gardineria* and *Euryozius*, Guinot (1968c:325–330) pointed out the numerous similarities and some differences between the species of these two monotypic genera, concluding (p. 328): "la plupart des ces différences ne semblent que d'ordre spécifique." Earlier (p. 326) she noted,

> En fait, *canora* est tellement proche de *bouvieri* que notre premier mouvement fut d'unir les deux genres *Gardineria* et *Euryozius*. Pratiquement, tous les caractères concordent. Nous avons maintenu séparé *Gardineria* surtout pour la raison que le mâle de l'espèce de RATHBUN n'est pas connu.

Finally, Guinot (1971:1077), in her summary of her xanthid revision, noted that *Gardineria* is "très proche, sinon synonyme, d'*Euryozius*."

We have examined the unique female holotype of *Gardineria canora* (USNM 41535) from Providence Island, western Indian Ocean, and conclude that it should be known as *Euryozius canorus* (Rathbun, 1911). As Guinot pointed out, *E. canorus* shares all essential features with *E. bouvieri*, including the stridulating ridge under the carapace, as well as the short branchial ridges. Miers (1886:142) and Rathbun (1911:236) both commented on the well-developed but incomplete branchial ridges, a unique feature of this genus. The Indian Ocean species differs from its Atlantic counterparts in having two faint notches in the orbit; at most one such notch is visible in our material of the Atlantic species.

Three species of *Euryozius* can be recognized in the Atlantic, *E. sanguineus* (Linnaeus, 1767) from Ascension and Saint Helena islands in the central Atlantic; *E. bouvieri* (A. Milne Edwards, 1869) from Madeira, the Azores, and the Cape Verde

Islands; and a new species, *E. pagalu*, from the Gulf of Guinea. *Euryozius canorus*, an insular species like those in the Atlantic, is the only representative of the genus from the Indo-West Pacific region.

Euryozius bouvieri (A. Milne Edwards, 1869)

FIGURE 27*a*

Xantho Bouvieri A. Milne Edwards, 1869:377.—Stebbing, 1893:63 [discussion].

Pseudozius bouvieri.—Miers, 1886:142 [listed].—Monod, 1956: 239, figs. 275–278 [part].—Figueira, 1960:9.—Guinot-Dumortier and Dumortier, 1960:121, 144 [table 2], fig. 4 [stridulation].—Guinot, 1967a:264 [footnote], 272 [discussion]; 1968b:156 [discussion]; 1968c:325 [discussion].

Ozius Edwardsi Barrois, 1888:10, pl. 1 [fig. 1 in color].—Stebbing, 1893:63 [discussion].

Pseudorius Bouvieri.—A. Milne Edwards and Bouvier, 1898: 185 [discussion; error for *Pseudozius*].

Pseudozius Bouvieri.—A. Milne Edwards and Bouvier, 1900: 82, pl. 15: figs. 11–14.—Bohn, 1901:297, 298, 302, 308, 309, 315, 316, 318 [morphology].—Monod, 1933b:529 [part of synonymy only; listed].

Euryozius bouvieri.—Guinot, 1968b:156 [discussion], fig. 8 [no locality]; 1968c:325, 326, 327, 329, 330 [all discussion], fig. 8 [no locality], pl. 2: fig. 2; 1971:1077 [listed].—Türkay, 1976b:61 [listed], 67.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Madeira: No specific locality, 1♂ (BM). Cape Verde Islands: No specific locality, syntypes, 2 dry specimens (MP).

DESCRIPTION.—A. Milne Edwards, 1869:377; Barrois, 1888:10 [as *Ozius Edwardsi*].

Figures: Barrois, 1888, pl. 1; Monod, 1956, figs. 275–278; Guinot, 1968c, pl. 2: fig. 2.

Male Pleopod: Monod, 1956, figs. 276–278 (Azores).

Color: Barrois (1888:12, pl. 1: fig. 1) described the color in the type of *Ozius edwardsi* as follows:

> Un beau rouge orangé, légèrement teinté de jaune en arrière; les pattes ravisseuses sont de même teinte que la carapace, sauf les doigts qui sont d'une noir intense, tandis que les pattes ambulatoires sont d'un nuance plus claire et plus rosée.

The pereiopods are shown to be of uniform color in his figure.

MEASUREMENTS.—The two syntypes, juveniles, have carapace lengths of 7.4 and 8.0 mm. The male from Madeira has a carapace length of 28.8 mm, carapace width of 46.5 mm. Barrois' (1888) specimen was 25.8 mm long, 38.5 mm wide. Guinot (1968c) figured a female 30 mm long, 47 mm wide. This species, like *E. sanguineus*, is a large species.

REMARKS.—See comments under account of *E. pagalu*, new species.

BIOLOGY.—Almost nothing is known of the ecology of this species. Barrois's (1888) specimen from the Azores was taken on a jetty among rocks. The specimen reported by Figueira (1960) from the Azores was found dead on a beach. One of the specimens collected by the *Talisman* in the Cape Verde Islands was taken at a depth of 20 m, and one of the specimens identified with this species by Türkay (1976b:67) was taken on an "aus 5–6 m Tiefe gegreiferten Steinblock."

DISTRIBUTION.—*Euryozius bouvieri* is an insular species occurring in the central eastern Atlantic, from the littoral zone to a depth of about 20 m. Records in the literature include the following:

Azores: No specific locality (A. Milne Edwards and Bouvier, 1900). Ponta Delgada, Ilha de São Miguel, jetty (Barrois, 1888). Volcano Capelhinos [= Rochas dos Capelhinos], on beach (Figueira, 1960).

Madeira: No specific locality (Monod, 1956). Funchal, fish market (from stomachs of littoral fishes and *Phycis phycis* (Linnaeus)); between Ponta da Oliveira and Ponta da Garajau, 5–6 m (Türkay, 1976b).

Cape Verde Islands: No specific locality (A. Milne Edwards, 1869; A. Milne Edwards and Bouvier, 1900; Bohn, 1901; Monod, 1956; Guinot, 1968c). Baía das Gatas (as Baie de la Gatta), São Vicente [indicated as type-locality] (Monod, 1956). Between Ilhéu Branco and Ilhéu Raso (as îlot Razzo), São Vicente (A. Milne Edwards and Bouvier, 1900; Monod, 1956).

According to Barrois (1888:12), A. Milne Edwards informed him that Barrois's specimen was conspecific with a species collected by the *Talisman* in the Canary Islands in 1883. Monod (1956: 240, footnote) correctly pointed out that the Canary Islands were not among the localities listed for the species by A. Milne Edwards and Bouvier (1900) in their report on the *Talisman* collections.

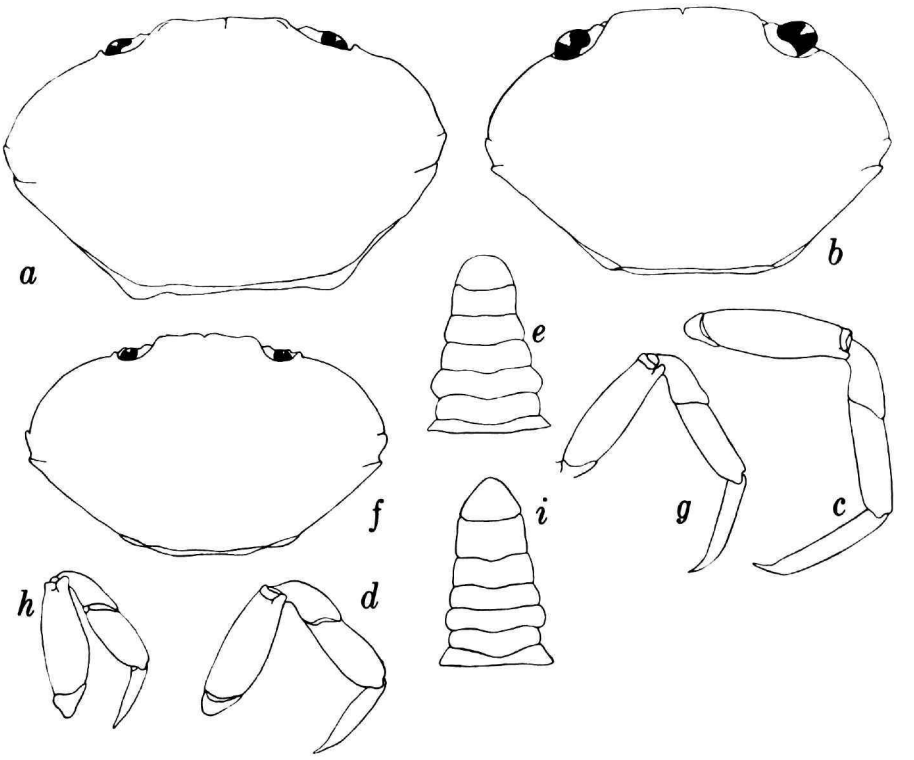

FIGURE 27.—Atlantic species of *Euryozius*. *Euryozius bouvieri* (A. Milne Edwards), dry syntype, cl 7.4 mm: *a*, carapace. *Euryozius pagalu*, new species, paratype, male, cl 9.0 mm, *Pillsbury* Sta 275: *b*, carapace; *c*, second pereiopod; *d*, fifth pereiopod; *e*, abdomen. *Euryozius sanguineus* (Linnaeus), male, cl 11.7 mm, Ascension Island: *f*, carapace; *g*, second pereiopod; *h*, fifth pereiopod; *i*, abdomen.

**Euryozius pagalu*, new species

FIGURES 27*b–e*, 28

Pseudozius Bouvieri.—Balss, 1921:63 [not *Xantho bouvieri* A. Milne Edwards, 1869].

Pseudozius caystrus.—Capart, 1951:19 [error for *bouvieri*] [not *Panopeus caystrus* Adams and White, 1848].

Pseudozius bouvieri.—Capart, 1951:164, fig. 62.—Monod, 1956:239 [part, not figs. 275–278].—Rossignol, 1962: 116.—Forest and Guinot, 1966:68.

young crab.—Cousteau, 1958:393 [color photograph].

Euryozius bouvieri.—Guinot, 1968c, figs. 15, 16, pl. 1: fig. 3.

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 275, 9–69 m, rubble of coralline algae, 6♂, 4♀, 16 juv (L, W) (largest male is holotype). Sta 282, 18–37 m, nodular coralline algae, 3♂, 10♀ (1 ov) (L, W). Sta 283, 51–55 m, nodular coralline algae, 3♂, 1♀, 9 juv (L).

Other Material: Annobon: 01°28′S, 05°38′30″E, 80 m, 11 Dec 1965, A. Crosnier, *Ombango*, 1♂ (W). 01°28′40″S, 05° 35′50″E, 11 Dec 1965, A. Crosnier, 3♀ (W).

DESCRIPTION.—Size small, maximum carapace width about 18 mm. Carapace (Figure 27*b*, 28*a*) oval, length 0.6 to 0.7 times width. Front broad, fronto-orbital margin 0.54 to 0.7 times carapace width. Front composed of 2 sinuate lobes, almost straight in dorsal view, sinuate in oblique anterior view in adults (convex mesially, concave laterally), less sinuate in smaller specimens; lobes separated by a distinct median notch. Front flanked dorsally by shallow groove and low, irregular ridge above groove. Orbits smooth, with indications of 1 incision in dorsal margin of smaller specimens, upraised margins continuing laterally and ventrally into suborbital margin,

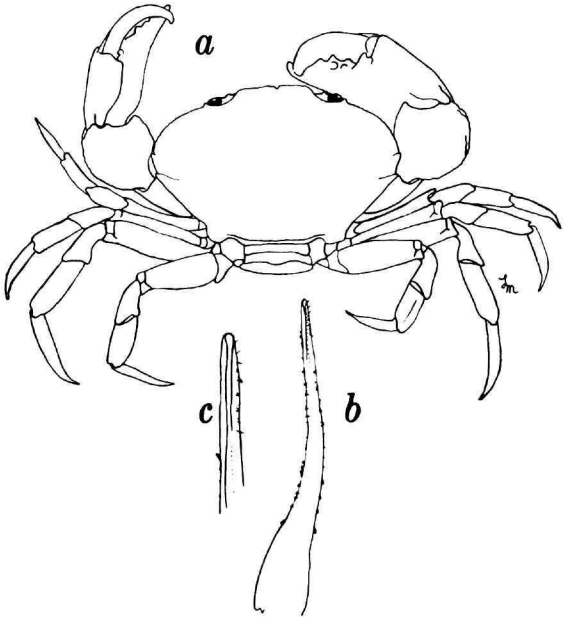

FIGURE 28.—*Euryozius pagalu*, new species, paratypes. Female, cb 13.5 mm, *Pillsbury* Sta 282: *a*, dorsal view. Male, cb 14.4 mm, *Pillsbury* Sta 275: *b*, gonopod; *c*, apex of gonopod.

lateral part of ridge appearing as tubercle in dorsal view. Anterolateral margin cristate, unarmed anterior to lateralmost point of carapace, there produced into 2 low anterolateral teeth, anteriormost, anterior to midlength of carapace, occasionally not developed, posteriormost distinct behind midlength, each with short ridge on carapace, posteriormost the longer. Low irregular swelling extending laterally from orbit above lateral margin. Carapace regularly convex from front to back, regions indistinct, dorsal surface punctate, anterior surface, in arc behind front, rougher than posterior surface. Stridulating ridge under anterolateral border of carapace arising under first anterolateral tooth, extending about to midlength of lower margin of orbit, composed of about 60 striae.

Chelipeds stout, unequal. Carpus with dorsal and outer surface irregular, deeply punctate; inner margin produced into rectangular lobe (the stridulating lobe) terminating anteriorly in blunt inner tooth. Surface of palm deeply punctate and longitudinally sulcate dorsally, outer surface smooth. Fingers dark, evenly toothed, with bilobed enlarged basal tooth.

Walking legs slender, third (Figure 27*c*) much the longest, overreaching second by about 1/2 to 1/3 of dactylus. First walking leg with at most a low tubercle distally on inner margin of carpus. Dactylus of each walking leg longer than respective propodus, grooved laterally and dorsally, ornamented with a few slender, simple setae. Propodi of third and fourth walking legs grooved laterally, length of propodus of third about 3 times depth, length of that of fourth 2 times depth (measured dorsally).

Abdomen (Figure 27*e*) of 7 distinct somites in both sexes, terminal somite of male abdomen longer than penultimate. Male pleopods as figured by Guinot (1968c, figs. 15, 16).

Color: Like the other Atlantic species of *Euryozius*, *E. pagalu* is reddish. Capart (1951:165) noted that in his material the general color was "rose orangé, les doigts bruns." Cousteau (1958) illustrated a juvenile from São Tomé; it is red with the pereiopods banded red and white, the latter at the articulations. The color pattern of our material has completely faded.

MEASUREMENTS.—Our specimens have carapace widths ranging from 8.0 to 16.2 mm; the carapace width of the ovigerous female is 11.2 mm. The largest specimens examined by Capart (1951) were a male, 10.5 × 17 mm, and a female, 11.5 × 18 mm; the latter is the largest known representative of the species. Guinot (1968c) figured a male, 9.7 × 14.5 mm, from the *Calypso* collection.

REMARKS.—Specimens from different geographic areas identified with *Euryozius bouvieri* in the past have exhibited an order of magnitude difference in size. For example, a syntype of *Xantho bouvieri* from the Cape Verde Islands measured 8 × 12 mm (A. Milne Edwards, 1869), whereas another specimen from the same area measured 30 × 47 mm (Guinot, 1968c). The type of *Ozius edwardsi*, from the Azores, measured 25.8 × 38.5

mm (Barrois, 1888), and syntypes of *Pseudozius mellissi*, from Ascension and Saint Helena Islands in the central Atlantic, measured 25 × 38 mm and 35.5 × 59 mm (Miers, 1881b). Our specimens from Annobon, more than 33 in all, comprising an ovigerous female as well as adult males, do not exceed 10 × 16 mm, and are obviously adult at a size of 7 × 11 mm.

This size disparity, considered together with two features reported in the literature, pereiopod length and color, suggested to us that the species now known as *E. bouvieri* actually might consist of a complex of species. *Euryozius bouvieri* is considered to be a widely distributed insular species in the central and eastern Atlantic (Monod, 1956: 240), and, as noted by Monod "Cette distribution presque uniquement insulaire est singulière." Such an insular distribution pattern for a single species is difficult to understand or explain. We decided to investigate the possibility that different species occurred in each of the three geographic areas from which *E. bouvieri* was reported: the mid-Atlantic, on Ascension and Saint Helena islands; the central eastern Atlantic, from Madeira, the Azores, and the Cape Verde Islands; and the Gulf of Guinea.

The problem is further complicated by the fact that large specimens from both the mid-Atlantic (*Pseudozius mellissi*), as well as the central eastern Atlantic (*Ozius edwardsi* and a female from the Cape Verde Islands taken by the *Talisman*, see Guinot, 1968c, pl. 2: fig. 2), have a very narrow front, which in the specimens from the mid-Atlantic, at least, is distinctly four-lobed. In our specimens from Annobon, as well as in the syntypes of *Xantho bouvieri*, the front is comparatively quite broad and is produced into two transverse or sinuous lobes.

In his original account of *Xantho bouvieri* from the Cape Verde Islands, A. Milne Edwards (1869: 378) remarked that in his specimens the fourth pereiopods were quite long, exceeding all of the other legs by the length of the dactylus. This is not the case in our series from Annobon or in the young male (6.6 × 9.8 mm) from Ascension that we have examined; in our specimens the fourth legs exceed the third by no more than half the dactylus. The small specimens from the Cape Verde Islands reported by Bouvier appear to represent a species distinct from that occurring on Annobon or that occurring in the mid-Atlantic. Those small specimens from the Cape Verde Islands represent either a distinct small species or the juveniles of the large species also known from the Cape Verde Islands. We believe that it is unlikely that two species of *Euryozius* occur in the Cape Verde Islands and that the types of *Xantho bouvieri* are based on the young of a species, which in that area attains a size of at least 30 × 47 mm.

The second feature mentioned in the literature that attracted our attention is color. *Euryozius bouvieri,* sensu lato, is known to be a bright red crab. Melliss (1875:275) referred to an orange-red crab. A. Milne Edwards (1869), Miers (1886), Barrois (1888), and Capart (1951) all referred to the red color of this species. Barrois (1888, pl. 1: fig. 1) illustrated his *Ozius edwardsi* in color and showed the pereiopods to be uniform in color, not banded. Cousteau (1958: 393 photograph) illustrated a juvenile specimen from São Tomé in color, showing walking legs distinctly banded red and white. The walking legs in all of our specimens from Ascension are distinctly banded red and white.

The available material suggests to us that there are three species of *Euryozius* in the Atlantic: a large species with banded legs which lives on Ascension and Saint Helena; a large species with uniform coloration which is found at Madeira, the Azores, and the Cape Verde Islands; and a small species with banded legs which lives in the Gulf of Guinea.

Four names are available for two of these taxa. The large central Atlantic species from Ascension and Saint Helena was named *Pseudozius mellissi* by Miers (1881b:432); until now it was considered a synonym of *Xantho bouvieri* A. Milne Edwards from the Cape Verde Islands. However, Miers' name is not the oldest available name for this species. Linnaeus (1767:2970) described an oceanic crab, *Cancer sanguineus*, a species with an obsoletely bidentate carapace and a four-lobed

front that, judging from the name, is red. Herbst (1785, in 1782–1804) noted that this species occurred at Ascension. The central atlantic form is identifiable as *Euryozius sanguineus*, which, as noted by Linnaeus, has two low anterolateral teeth on the carapace and a distinctly four lobed front.

Two names also are available for the species occurring in the central part of the eastern Atlantic, *Xantho bouvieri* A. Milne Edwards, 1869 and *Ozius edwardsi* Barrois, 1888, the former, based on juveniles, having priority.

The third species, from the Gulf of Guinea, is named herein.

The possibility exists that Barrois was incorrect in showing his species to have a uniform color pattern or that A. Milne Edwards was incorrect in his account of the walking legs of his species. Moreover, all of the Atlantic species of *Euryozius* might prove to be conspecific in which case the name *E. sanguineus* would have to be used. Alternatively, the same large species might occur in the central as well as in the eastern Atlantic and *E. bouvieri* also might occur in the Cape Verde Islands and the Gulf of Guinea. Additional fresh material will have to be studied before this problem can be settled.

A detailed account of *E. sanguineus* is in preparation by Manning in collaboration with Fenner A. Chace, Jr., in a review of the marine decapods of Ascension Island.

We have been able to compare our material of *E. pagalu* with three male specimens of *E. sanguineus* (Figure 27*f-i*) from Ascension Island (6.6 × 9.8 mm, 17.6 × 27.8 mm, and 28.6 × 45.8 mm) and one female of *E. sanguineus* from Saint Helena (42.5 × 71.1 mm) in the collections of the Smithsonian Institution. The specimens from Ascension, newly collected, all have the walking legs banded red and white. The fronto-orbital width of the three larger specimens of *E. sanguineus* ranges from 0.45 times the carapace width in the smaller male (17.6 × 27.8 mm) to 0.37 times the carapace width in the large female. In the smallest male from Ascension, of comparable size with our specimens of *E. pagalu* from Annobon, it is 0.67 times the carapace width; it ranges from 0.54 to 0.7 times the carapace width in *E. pagalu*.

A comparison of our material with the smallest specimen of *E. sanguineus* from Ascension shows the following differences: the frontal lobes are less sinuous; the carapace and dorsal surfaces of the carpus and propodus of the claw are rougher; the third pereiopod overreaches the second by less of its length, 1/3 to 1/2 its length in *E. pagalu*, 2/3 of its length in *E. sanguineus*; the pereiopods appear to be slenderer in *E. pagalu*; there is a distinct tubercle (almost a spine in larger specimens) on the inner, distal surface of the carpus of the second and third periopods in *E. sanguineus*; this tubercle is scarcely or not at all detectable in even the largest specimens of *E. pagalu*.

Guinot (1968c:330) commented on differences in pilosity, possibly related to sex or size, in material available to her. Our material exhibits no obvious differences.

Type-Locality.—Off Annobon Island, Gulf of Guinea, 01°24′S, 05°37′E to 01°24′S, 05°38′E, in 9 to 69 m.

Disposition of Types.—The holotype (Crust D. 31539), the largest male from *Pillsbury* Sta 275, measuring 10.3 × 16.2 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes are in the collections of that museum and in the Smithsonian Institution.

Etymology.—The specific name is derived from the modern name for Annobon Island, Pagalu.

Biology.—*Euryozius pagalu* is generally a sublittoral species, living from shore to a depth of 80 m. Of 16 depth records available, only one is from shore (shore to 2 m); that and two others, 2–6 m and 7–10 m, are in 10 m or less. Five records (9–69 m, 51–55 m, 60 m, 60 m, and 80 m) are from depths generally greater than 50 m. Fifty percent of the records are from depths between 15 and 40 m, suggesting a preference for that depth range.

Only two records are from localities other than São Tomé and Annobon islands: one specimen was found dead on a beach off the Congo (Rossignol, 1962), and Capart (1951) reported 4 males

and 3 females from sandy mud in 20–22 m off Angola.

Apparently the preferred habitat for this species is the nodular coralline algae found off Annobon and São Tomé; all of the *Pillsbury* specimens and eight of the ten lots (25 specimens) collected by the *Calypso* were taken in coralline algae. Other kinds of bottom noted for the *Calypso* collections (Forest and Guinot, 1966) include: rocks and coral; one specimen from a sponge on rocky bottom with calcareous algae; sand, with calcareous algae; sand, algae, rocks, or coral.

The only ovigerous female known was taken by the *Pillsbury* in May.

DISTRIBUTION.—*Euryozius pagalu* is primarily an insular species occurring in the Gulf of Guinea; it lives from the shore to a depth of 80 m. Records in the literature include the following:

São Tomé: No specific locality (Cousteau, 1958). Ilhéu Gago Coutinho (as Ilha das Rolas) (Balss, 1921). 00°25-15″N, 06°43′E, 8–30 m; Morro Peixe, 2–6 m (Forest and Guinot, 1966). W of Ponta Diogo Nunes, shore to 2 m (Forest and Guinot, 1966; Guinot, 1968c).

Annobon: Off Annobon, 60 m (Monod, 1956). 01°24′-04″S, 05°36′45″E, 7–10 m; 01°25′10″S, 05°36′10″E, 20–25 m; 01°25′12″S, 05°36′05″E, 20 m; 01°26′15″S, 05°35′40″E, 60 m; 01°27.5′S, 05°36.5′E, 35 m; N of San Antonio, 23 m; Isla Tortuga, NW coast, 15–40 m (all Forest and Guinot, 1966).

Congo: Pointe Indienne, beach (Rossignol, 1962).

Angola: 8 mi [12.8 km] W of Rio Cuanza, 09°20′S, 13°04′E, 20–22 m (Capart, 1951).

Genus *Eurypanopeus* A. Milne Edwards, 1878

Eurypanopeus A. Milne Edwards, 1878, in 1873–1881:318 [type-species: *Panopeus crenatus* H. Milne Edwards and Lucas, 1843, by subsequent designation by Fowler, 1912: 394; gender: masculine].

**Eurypanopeus blanchardi* (A. Milne Edwards, 1881)

FIGURE 29*b*

Xantho parvulus.—Dana, 1852b:170.—Miers, 1881a:214 [discussion]. [Not *Cancer parvulus* Fabricius, 1793 = *Xanthodius parvulus*; not *Xantho parvulus* sensu H. Milne Edwards, 1834 = *Eurypanopeus abbreviatus* (Stimpson, 1860); not *Actumnus parvulus* A. Milne Edwards, 1869 = *Coralliope parvula*.]

Xantho parvula.—Stimpson, 1858a:31; 1907:47 [= *Xantho parvulus* sensu Dana, 1852, not *parvulus* auctorum].

Panopeus Blanchardi A. Milne Edwards, 1880, in 1873–1881: 308, footnote [nomen nudum]; 1881, in 1873–1881:323.

Panopeus blanchardi.—Miers, 1886:129 [discussion].

Eurypanopeus parvulus.—A. Milne Edwards and Bouvier, 1900: 99, pl. 17: fig. 7 [not *Cancer parvulus* Fabricius, as in first entry above].

Eurypanopeus blanchardi(?).—Rathbun, 1921:440, fig. 20, pl. 36: figs. 2, 3.

Panopeus parvulus.—Monod, 1956:329, figs. 416–434.—Gauld and Buchanan, 1959:127.—Gauld, 1960:70.—Guinot and Ribeiro, 1962:62—Rossignol, 1962:118.—Monod, 1963, fig. 35 [no material].—Ribeiro, 1964:13.—Forest and Guinot, 1966:85.—Uschakov, 1970:447, 455 [listed].

MATERIAL EXAMINED.—*Pillsbury Material*: Fernando Poo: Sta 257, shore, 5♂ (W). Sta 258, shore, 5♂, 1 juv (L).

Other Material: Congo: Ponte-Noire, intertidal rocky platform, Aug 1963, A. Crosnier, 3♂ (W). Pointe Kounda, intertidal, 2 May 1965, A. Crosnier, 1♂, 2♀ (1 ov)(W).

DESCRIPTION.—Rathbun, 1921:440.

Figures: Monod, 1956, figs. 416–434.

Male Pleopod: Monod, 1956, figs. 422–434 (Senegal, Ghana).

Color: In this species, as in *Panopeus africanus*, there may be a dark red spot on the inner surface of the ischium of the third maxilliped. A similar spot has been observed in the western Atlantic *E. depressus* (Smith) (Williams, 1965:195).

MEASUREMENTS.—Our specimens have carapace widths of 6 to 19 mm; the single ovigerous female has a carapace width of 6.5 mm. Western Atlantic specimens of *E. abbreviatus* (Stimpson) are of similar size; Rathbun (1930) and Williams (1965) recorded a male 22 mm wide.

REMARKS.—Although the specific name *Panopeus parvulus* has been in general use for this species, we believe that Rathbun (1921:440) was correct in using *Eurypanopeus blanchardi* rather than identifying the species with its closely related western Atlantic ally, *Eurypanopeus abbreviatus* (Stimpson, 1860). Monod (1956) considered the populations on both sides of the Atlantic to be conspecific.

A. Milne Edwards (1881, in 1873–1881:323), in discussing *Eurypanopeus abbreviatus* from Brazil and the Antilles (as *Eurypanopeus parvulus*) commented:

Elle [*E. abbreviatus*] ressemble beaucoup à un Panopé de la côte occidentale d'Afrique que j'ai désigné dans les catalogues du Muséum sous le nom de *Panopeus Blanchardi*, dont les pinces sont dépourvues de dent basilaire et dont les bords latéro-antérieurs sont un peu plus courts.

Rathbun (1921:440, 441) who used the name *Eurypanopeus blanchardi*(?) for the species and who gave the only description of the species, commented in her account based on a specimen from Angola:

I think, however, that this is with little doubt the species named *blanchardi*. Bouvier makes it a synonym of the American *parvulus* or *abbreviatus* [in A. Milne Edwards and Bouvier, 1900:99]. Our African specimen, however, differs from *abbreviatus* of equal size as follows. The carapace is slightly narrower in proportion to its length, but is wider in its posterior half, the posterolateral margins less convergent, so that the carapace appears less regularly oval than in *abbreviatus*. The anterolateral teeth are more pronounced and more elevated; the chelipeds more rugose, fingers more deeply grooved. A small piece of the sternum shows at each end of the second abdominal segment, between it and the coxa of the last leg; this is not the case in *abbreviatus*.

Rathbun (1930) did not synonymize *E. blanchardi* with *E. abbreviatus* in her account of the latter species.

With one exception, the characters pointed out by Rathbun to differentiate *E. blanchardi* from *E. abbreviatus* are well marked in the materal available to us. In addition to the difference in proportion of the body, in our specimens of *E. blanchardi* on the carapace the regions are more distinct, the surface is much more uneven, and the lines of granules are much better developed, as shown by Monod (1956, fig. 417). A character that appears to have some value is the width of the third anterolateral tooth. In *Eurypanopeus abbreviatus* this tooth is broader than the fourth tooth, whereas in *E. blanchardi* it is subequal in length to the fourth tooth. The male pleopods of the two species, as figured by Monod (1956, figs. 422–434) for *E. blanchardi* and by Williams (1965, fig. 183K) for *E. abbreviatus* are essentially similar, except that in *E. blanchardi* the slender, subterminal, triangular lobe overreaches the irregularly shaped median lobe, whereas in *E. abbreviatus* it does not.

The character mentioned by Rathbun, which is of relatively little value, is the exposure of the small piece of sternum between the second abdominal somite and the coxa of the last leg. In *E. blanchardi* the part of the sternum is clearly visible, but in material of *E. abbreviatus* examined for comparison the sternum is usually concealed in specimens from the Antilles (USNM 15658) whereas it usually is visible in specimens from Brazil (USNM 59844).

That A. Milne Edwards (1881, in 1873–1881) described this species as lacking an enlarged basal tooth on the dactylus of the chela is puzzling, for it is clearly present in our material. Monod (1956: 334), who examined what might be the types of *E. blanchardi* from Gabon, did not mention whether or not he observed the tooth.

Although Rathbun (in Stimpson, 1907:47, footnote) identified Dana's *Xantho parvulus* and Stimpson's *Xantho parvula*, both from the Cape Verde Islands, with *Xanthias melanodactylus* [= *Nanocassiope melanodactylus*, below], we believe that Monod (1956:329) was correct in identifying those records with *E. blanchardi* (as *Panopeus parvulus*). Dana's description fits *E. blanchardi* quite well.

The carapace of *E. blanchardi* (Figure 29*b*) does appear to be less oval in shape than that of *E. abbreviatus* (Figure 29*a*) as noted by Rathbun, but the length/width ratio of representatives of the two species overlaps broadly. Dana (1852b) noted that in his specimens from the Cape Verde Islands the length/width ratio was 1 to 1.53; his reported measurements were 5 × 7⅔ lines (10.6 × 16.2 mm). Monod (1956) included measurements of numerous specimens in his account; the length/width ratio for all material reported by Monod ranged from 1:1.17 to 1:1.64. The ratio for 22 larger specimens, carapace length 8.5 mm or more, ranged from 1:1.33 to 1:1.64, with a mean of 1.44. The ratio for 13 specimens from the western Atlantic from Brazil and Trinidad ranges from 1:1.47 to 1:1.56; the mean is 1:1.53. The difference in shape of the carapace of *E. blanchardi* and *E. abbreviatus* is shown in Figure 29.

The specific epithet *parvulus* has been applied

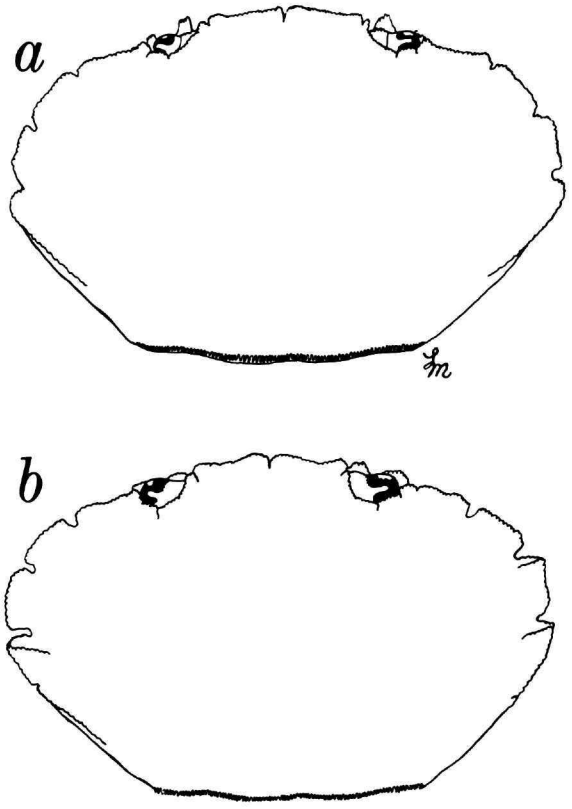

FIGURE 29—Carapaces: *a*, *Eurypanopeus abbreviatus* (Stimpson), male, cb 20.0 mm, Brazil; *b*, *Eurypanopeus blanchardi* (A. Milne Edwards), male, cb 19.1 mm, *Pillsbury* Sta 257.

to three distinct species of xanthid crabs from the Atlantic by three different authors. Fabricius (1793:451) named *Cancer parvulus* which Rathbun (1930:305), who had examined the type, placed in *Leptodius*. H. Milne Edwards (1834:395) identified a second species as *Xantho parvulus* (Fabricius); Rathbun (1930:404) placed this species in *Eurypanopeus*. *Actumnus parvulus* was described by A. Milne Edwards (1869), was placed in *Micropanope* by Monod (1933b, 1956), and finally was assigned to *Coralliope* by Guinot (1967c).

At least three authors, Dana (1852b:170), A. Milne Edwards (1881, in 1873–1881:322), and Benedict and Rathbun (1891:369), considered *Cancer parvulus* Fabricius and *Xantho parvulus* sensu H. Milne Edwards to be synonymous. Rathbun (1930), without discussing the problem, correctly replaced *parvulus* sensu H. Milne Edwards with the next oldest available name, *Panopeus abbreviatus* Stimpson, 1860, which she, as A. Milne Edwards (1881, in 1873–1881:320) had before her, considered to be a *Eurypanopeus*.

The problem of the two identical specific names has extended even further. Monod (1956: 285), in discussing the synonymy and affinities of *Xanthodius inaequalis* [as *Xantho (Leptodius)*], compared it with an American species which Rathbun (1930:305) called *Leptodius parvulus* (Fabricius, 1793), and concluded that the eastern and western Atlantic populations represented distinct species. Because of the confusion over the use of *parvulus*, Monod suggested that the American population be called *Xantho (Leptodius) americana* (Saussure, 1858): "Comme par ailleurs le binôme *"Xantho parvulus"* ne peut que provoquer de nouvelles confusions, je serais d'avis d'utiliser *Xantho (Leptadius)* [sic] *americana* (SAUSSURE)." Guinot (1968a:712; 1971:1068) followed Monod in substituting *americanus* for *parvulus*; she assigned De Saussure's species to *Xanthodius*. That species should be known as *Xanthodius parvulus* (Fabricius, 1793).

BIOLOGY.—*Eurypanopeus blanchardi* is an intertidal species, which may occur subtidally to a depth of 10–30 m; the majority of records in the literature are based on specimens taken intertidally on rocky shores. Gauld (1960) noted that it is common on rocky shores off Ghana, and Gauld and Buchanan (1959) characterize it as a member of the understone fauna. Uschakov (1970) found it in the mesolittoral zone of rocky shores of Guinea, in habitats with red algae and *Padina*.

It has been taken together with *Panopeus africanus*, but in general that species prefers lagoons and estuaries rather than rocky shores.

Ovigerous females have been collected in January, February, March, May, June, and November (Monod, 1956; Forest and Guinot, 1966; present paper). The species probably spawns all year.

DISTRIBUTION.—West Africa, where it occurs from the Cape Verde Islands and Mauritania southward to Angola, including the offshore islands in the Gulf of Guinea, Principe, São Tomé,

and Fernando Poo (new record); usually intertidal, rarely to a depth of 10–30 m. Records in the literature include the following.

West Africa: No specific locality (A. Milne Edwards, 1880, 1881, in 1873–1881; Monod, 1963).

Cape Verde Islands: No specific locality (Dana 1852b). São Tiago (as St. Jago) (Stimpson, 1858a). Porto da Praia, São Tiago, 12 fm (22 m) (Stimpson, 1907); beach (Guinot and Ribeiro, 1962; Ribeiro, 1964); same, (as La Praya), 10–30 m (A. Milne Edwards and Bouvier, 1900). São Vicente (Monod, 1956).

Mauritania: No specific locality; Bilaouakh [?] (Monod, 1956).

Senegal: Gorée (?); Ngazobil, shore (Monod, 1956).

Guinea: Conakry, shore (Monod, 1956). Île Tamara and Île Roume, Îles de Los, shore (Uschakov, 1970).

Sierra Leone: Aberdeen, near Freetown, shore (Monod, 1956).

Ghana: Accra, shore (Monod, 1956). Christiansborg, Accra (Monod, 1956). Tenkpobo (as Tenpobo), shore or reef (Monod, 1956; Gauld and Buchanan, 1959). Apam, Prampram; Dixcove (Monod, 1956). Tenkpobo to Dixcove, shore (Gauld, 1960).

Principe: Praia Ponta da Mina, shore (Forest and Guinot, 1966).

São Tomé: Harbormaster's dock, shore (Forest and Guinot, 1966).

Gabon: No specific locality (Monod, 1956).

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

Angola: Santo António do Zaire (as San Antonio), less than 20 ft [6.1 m] (Rathbun, 1921). Lucira, beach (Guinot and Ribeiro, 1962).

Genus *Globopilumnus* Balss, 1933

Globopilumnus Balss, 1933b:6 [type-species: *Pilumnus globosus* Dana, 1852, by original designation; gender: masculine].

Globopilumnus africanus (A. Milne Edwards, 1867)

Pilumnus africanus.—Capart, 1951:142, fig. 51, pl. 1: fig. 15, pl. 3: figs. 7, 8.—Garth, 1968:314 [discussion].

Globopilumnus africanus.—Monod, 1956:227, figs. 249–257.—Guinot-Dumortier, 1959:98, 99, 116, 118, fig. 14 [discussion; review of Indo-West Pacific *Globopilumnus*].—Guinot-Dumortier and Dumortier, 1960:138, fig. 21 [stridulation].—Guinot and Ribeiro, 1962:51.—Ribeiro, 1964:7.—Forest and Guinot, 1966:66.—Garth, 1968:312, 313 [discussion].—Türkay, 1976b:61 [listed], 67, fig. 4, pl. 2: figs. 3, 4.

MATERIAL EXAMINED—*Pillsbury Material*: None. *Other Material*: Senegal: No other data, 2♀ (W).

DESCRIPTION.—Capart, 1951:142.

Figures: Capart, 1951, fig. 51, pl. 1: fig. 15, pl. 3: figs. 7, 8; Monod, 1956, figs. 249–257.

Male Pleopod: Capart, 1951, pl. 3: figs. 7, 8 (Angola); Monod, 1956, figs. 254–257 (Senegal); Türkay, 1976b, fig. 4 (Madeira).

Color: "Rougeâtre plus ou moins foncé, à maculatures brun chocolat ou violettes; épines antéro-latérales et doigts de chélipèdes noirs" (Monod, 1956:235). The black color of the fixed finger of the chela extends well onto the palm (Monod, 1956, fig. 251).

MEASUREMENTS—Our specimens have carapace widths of 20 and 22 mm.

BIOLOGY.—*Globopilumnus africanus* is a shallow water species, generally found intertidally or subtidally; of 22 records for which depth is given in the recent literature, seven are from shore, 11 are from depths between shore and 12 m, and four are from depths greater than 12 m (15, 20–22, 30, and 35 m). Intertidally it appears to be part of the rocky shore fauna, where it lives among rocks or in algae; some specimens have been taken with bryozoans. Subtidally it has been taken on sandy mud, rocks, rocks and coral, rocks and sand, or on sand with calcareous algae, rocks and coral.

Ovigerous females have been collected in January and September (Capart, 1951; Guinot and Ribeiro, 1962; Ribeiro, 1964).

DISTRIBUTION.—Off West Africa, from Madeira, the Cape Verde Islands, Senegal, offshore islands of the Gulf of Guinea, and Angola, intertidal to 35 m, generally in shallower water. Monod (1956:230) commented on its apparent absence on the mainland between Senegal and Angola; he summarized earlier records and reported material from the Cape Verde Islands, Senegal, São Tomé, and Angola. Subsequent records in the literature include the following:

West Africa: No specific locality (Guinot-Dumortier and Dumortier, 1960).

Madeira: Funchal, fish market (from stomach of *Phycis phycis* (Linnaeus)) (Türkay, 1976b).

Cape Verde Islands: Matiota, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Principe: Ilhéu Caroço (as îlot Carioco), 2–8 m; 01°38′-35″N, 07°21′35″E, 35 m; and S of Ilhéu Santana (as île Sta. Ana), 12 m (all Forest and Guinot, 1966).

São Tomé: 00°25′N, 06°37′E, 5–6 m; Ponta Diogo Vaz, 0–6 m; Praia de Santa Catarina, 3–10 m; Baiá de São Miguel, 6–10 m; Ilhéu Macaco (as îlot dos Cocos), 3–8 m; E of the beach, Morro Peixe, 2–6 m; Ilhéu das Cabras, 0–2 m; Santana, shore; Ponta Furada, 3–8 m (all Forest and Guinot, 1966).

Annobon: Bay of Santa Cruz, 8–12 m (Forest and Guinot, 1966).

Angola: Baía da Caota, Benguela, shore; Baía das Vacas, shore; Lucira; Praia das Conchas, Moçâmedes, shore (all Guinot and Ribeiro, 1962).

**Globopilumnus stridulans* Monod, 1956

Globopilumnus stridulans Monod, 1956:230, figs. 258–269.—Guinot-Dumortier, 1959:98, 99, 116, 118, fig. 14 [discussion; review of Indo-West Pacific *Globopilumnus*].—Guinot-Dumortier and Dumortier, 1960:138, 139, figs. 20, 21 [stridulation].—Rossignol, 1962:116.—Crosnier, 1964: 31.—Forest and Guinot, 1966:67.—Garth, 1968:312, 313, 314, 315, 316 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 4♂, 12♀ (L). Sta 282, 18–37 m, nodular coralline algae, 1♂, 2♀ (W).

Other Material: Principe: 12 mi [19 km] SSW of Tinhosa Grande (as Hermano Grande) Island, 01°20′45″N, 07°17′-37″E, 25–40 m, rocks and coral, 7 Jul 1956, *Calypso* Sta 110, 1♂, 1♀ (W).

Annobon: 01°28.5′S, 05°37.5′E, 35–55 m, F. Poinsard, 2♂, 8♀, 8 juv (W).

DESCRIPTION.—Monod, 1956:231.

Figures: Monod, 1956, figs. 258–269.

Male Pleopod: Monod, 1956, figs. 263–267 (Senegal, Guinea, Annobon).

Color: "Blanc sale" (Monod, 1956:235). Our specimens have a reddish body, with red and white banded legs.

MEASUREMENTS.—Our specimens have carapace widths of 2 to 20 mm.

REMARKS.—The larger specimens taken by the *Pillsbury* off Annobon differ from Monod's account in having the anterolateral spines of the carapace and those on the outer face of the wrist and palm of the chela dark; in none of the specimens does the dark color of the fixed finger of the chela extend onto the palm. The large male from *Pillsbury* Sta 282 (carapace width 17 mm) differs from the specimen from Annobon illustrated by Monod (1956, fig. 261) in having the terminal segment of the abdomen semicircular rather than subtriangular.

BIOLOGY.—In contrast with *G. africanus*, this species prefers sublittoral habitats, as noted by Forest and Guinot (1966:67, 68). Of 16 depth records in the literature, 6 are from depths ranging from 0–6 m to 10 m whereas 10 are from depths ranging from 15–40 m to 73 m; none was from the intertidal. The *Calypso* took both species together at three stations, on sand with calcareous algae, rocks, and coral in 35 m and on rocks and coral in 0–6 m and 30 m. This species, like *G. africanus*, apparently prefers rough bottom with rocks and coral or coralline algae. Crosnier (1964: 31) found it off Cameroon in sponges, coral, and marl on rocky bottom with gorgonians. Part of Monod's material was taken from a wash of sponges.

No ovigerous females have been recorded.

DISTRIBUTION.—Off West Africa, from a few mainland localities between Senegal and Gabon and from the offshore islands of Principe, São Tomé, and Annobon; intertidal to a depth of 73 m. Monod (1956) described the species on material from Senegal, Guinea (the type-locality), and Annobon; the holotype from Guinea was taken in 40 m. Subsequent records in the literature include the following:

West Africa: No specific locality (Guinot-Dumortier and Dumortier, 1960).

Cameroon: No specific locality (Crosnier, 1964).

Principe: 01°36′50″N, 07°22′10″E, 19 m; S part, Baía das Agulhas, 4–8 m; 01°38′35″N, 07°21′35″E, 35 m; 01°-43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; and Tinhosa Grande (as Hermano Grande) Island, 12 mi [19 km] SSW of Principe, 01°20′45″N, 07°17′37″E, 25–40 m (all Forest and Guinot, 1966).

São Tomé: 00°20′N, 06°46′E, 10 m; Ponta Diogo Vaz, W coast, 0–6 m and 30 m; in front of Ponta Oquedelrei, 6 m; and off Ponta Diogo Nunes, 6 m (all Forest and Guinot, 1966).

Annobon: 01°24′04″S, 05°36′45″E, 7–10 m; 01°25′-12″S, 05°36′05″E, 20 m; and NW coast, Isla Tortuga, 15–40 m (all Forest and Guinot, 1966).

Gabon: W of Cap Santa Clara, Libreville, 45–47 m (Rossignol, 1962).

Genus *Glyptoxanthus* A. Milne Edwards, 1879

Glyptoxanthus A. Milne Edwards, 1879, in 1873–1881:253 [type-species: *Actaea erosa* Stimpson, 1859, by selection by Rathbun, 1930:263; gender: masculine].—Guinot, 1971: 1072 [list of species].

**Glyptoxanthus angolensis* (De Brito Capello, 1866)

Actaea angolensis.—Capart, 1951:157, fig. 59.—Longhurst, 1958:88.—Gauld, 1960:70.—Rossignol, 1962:117.

Actaea (Glyptoxanthus) angolensis.—Monod, 1956:296, fig. 361.—Serène, 1961:198 [listed].

Glyptoxanthus angolensis.—Forest and Guinot, 1966:77, fig. 6a, b.—Guinot, 1971:1073 [listed].

Glyptoxanthus anglolensis.—Guinot, 1967d:556 [listed; erroneous spelling].

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 282, 18–37 m, nodular coralline algae, 1♂, 1♀ (L, W).

Other Material: Annobon: S coast, 01°28.5′S, 05°37.5′E, 35–55 m, 16 Jun 1967, F. Poinsard, 1♂ (W).

DESCRIPTION.—Capart, 1951:158.

Figures: Capart, 1951, fig. 59; Monod, 1956, fig. 361; Forest and Guinot, 1966, fig. 6a,b.

Male Pleopod: Forest and Guinot, 1966, fig. 6a,b (Annobon).

Color: "Rouge orangé avec des taches plus claires" (Capart, 1951:158).

MEASUREMENTS.—Our specimens have carapace widths of 12, 17 and 25 mm.

BIOLOGY.—*Glyptoxanthus angolensis* is a shallow shelf species, occurring sublittorally in depths between 4–5 m and 40 m, with one record of 35–55 m. Like the West African species of *Paractaea*, habitats on rough bottom are preferred. The *Pillsbury* specimens were collected in nodular calcareous algae off Annobon, and the material collected by the *Calypso* (Forest and Guinot, 1966) was found on the following types of bottom: calcareous algae, 4–5 m; calcareous algae, sand and coral, 7–10 m; rocks and calcareous algae, 20 m; and rocks and coral, 15–40 m. Longhurst (1958) found the species on shelly sand in 25 m off Sierra Leone.

Ovigerous females have been recorded in January and June (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—West African coast, from scattered localities between Senegal and Angola, including Annobon and São Tomé islands in the Gulf of Guinea; sublittoral, from 4–5 m to 40 m (also 35–55m). Monod (1956) summarized earlier records and reported material from Senegal, Sierra Leone, Congo (Congo Français), and Annobon; records in the literature since 1956 include the following:

Sierra Leone: No specific locality, in 25 m (Longhurst, 1958).

Ghana: Off Accra, sublittorally; Tenkpobo (as Tenpobo), intertidal (Gauld, 1960).

São Tomé: Off Ponta Diogo Nunes, 4–5 m (Forest and Guinot, 1966).

Annobon: 02°24′04″S, 05°36′45″E, 7–10 m; 01°25′12″S, 05°36′05″E, 20 m; and Isla Tortuga, NW coast, 15–40 m (Forest and Guinot, 1966).

Congo: Pointe Indienne (Rossignol, 1962).

Angola: No specific locality (Forest and Guinot, 1966).

Glyptoxanthus cavernosus (A. Milne Edwards, 1878)

Xantho vermiculatus.—Osorio, 1906:149 [Cape Verde Islands; see Forest and Guinot, 1966:79] [not *Cancer vermiculatus* Lamarck, 1818].

Actaea (Glyptoxanthus) cavernosa.—Monod, 1956:298, fig. 362 [Cape Verde Islands; references].—Serène, 1961:198 [listed].

Glyptoxanthus cavernosa.—Forest and Guinot, 1966:79 [Cape Verde Islands].

Glyptoxanthus cavernosus.—Guinot, 1967d:551, 553 [discussion], 556 [listed], fig. 31 [Cape Verde Islands]; 1971:1073 [listed].

DISTRIBUTION.—Known only from the Cape Verde Islands.

Glyptoxanthus corrosus (A. Milne Edwards, 1869)

Actaea (Glyptoxanthus) corrosa.—Monod, 1956:298 [Cape Verde Islands; references].

Glyptoxanthus corrosus.—Guinot, 1967d:556 [listed], fig. 21 [Cape Verde Islands]; 1971:1073 [listed].

DISTRIBUTION.—Cape Verde Islands.

Genus *Heteropanope* Stimpson, 1858

Heteropanope Stimpson, 1858a:33 [type-species: *Heteropanope glabra* Stimpson, 1858, by subsequent selection by Balss, 1933b:32; gender: feminine; name 1627 on *Official List*].

Heteropanope acanthocarpus Crosnier, 1967

Heteropanope acanthocarpus Crosnier, 1967:325, figs. 3, 4, 7–10, 28 [Dahomey]; 1971:570 [Congo].

DISTRIBUTION.—West Africa, from Dahomey (06°10′N, 02°27′E), 55 m, and off Pointe-Noire, Congo, 20 m.

Heteropanope tuberculidens Monod, 1956

Heteropanope tuberculidens Monod, 1956:265, figs. 309–313.—Gauld, 1960:70.—Crosnier, 1967:325, figs. 1, 2, 6, 27.—Uschakov, 1970:444, 455 [listed].

Heteropanope tubulicidens.—Longhurst, 1958:88 [erroneous spelling].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Togo: 06°11′N, 01°28′30″E, 14–17 m, sand with gorgonians, mud, 17 Oct 1963, A. Crosnier, 1♂, 2♀ (W).

Congo: Pointe-Noire, 5–10 m, lobster net, 27 Jan 1967, J. Marteau, 1♂, 2♀, 1 juv (W).

DESCRIPTION.—Monod, 1956:265.

Figures: Monod, 1956, figs. 309–313; Crosnier, 1967, figs. 1, 2, 6, 27.

Male Pleopod: Monod, 1956, figs. 312, 313 (Ghana); Crosnier, 1967, fig. 27 (Guinea-Bissau).

Color: "Plus ou moins brun rouge, traces d'annelures aux pattes" (Monod, 1956:268).

MEASUREMENTS.—Our specimens have carapace widths of 2.6 to 5.2 mm.

REMARKS.—Our specimens agree well with accounts of this species, except that in our smaller specimens from the Congo the outer face of the chela is relatively smooth, and in one of the females from the same locality the tubercles on the palm are aligned in rows.

BIOLOGY.—*Heteropanope tuberculidens* is a sublittoral species living in relatively shallow water. Depth records for the species range from 0–2.5 m off Guinea (Uschakov, 1970) to 72 m off Sierra Leone (Longhurst, 1958); the latter is the only record for the species in depths below 25–30 m, and the majority of depth records are from less than 20 m; records include: 0–2.5, 8–16, 10–12, 14–17, 15 (2×), 25–30, and 72 m. The species apparently prefers rough bottom; it has been recorded from bottom with coral; gravel, sand and shell; muddy sand with gorgonians; sand, rock or mud, and gorgonians; and shelly mud.

Ovigerous females have been collected in March, April, and June (Monod, 1956; Crosnier, 1967).

DISTRIBUTION.—Off West Africa, from a few localities between Guinea-Bissau and the Congo, in depths to 72 m, generally in less than 20 m. Records in the literature include the following:

Guinea-Bissau: Channel between Ilha de Rubane (as Rouban) and Ilha de Bubaque, Bissagos Islands, 25–30 m, and channel near Ilha de Sogá, Arquipélago dos Bijagós (as Bissagos Islands), 8–16 m (Monod, 1956; Crosnier, 1967).

Guinea: Conakry, 0–2.5 m (Uschakov, 1970). Between Île Tamara and Île de Corail, 10–12 m (Monod, 1956).

Sierra Leone: No specific locality, in 72 m (Longhurst, 1958).

Ghana: Off Accra, 15 m (Gauld, 1960). 2 mi [3 km] off Densu, near Accra, 15 m (type-locality) (Monod, 1956).

Togo: 06°11′N, 01°28′30″E, 14–17 m (Crosnier, 1967).

Congo: Off Pointe-Noire (Crosnier, 1967).

Genus *Leopoldius* Serène, 1971

Leopoldius Serène, 1971:908 [an invalid junior homonym of *Leopoldius* Rondani, 1843 (Insecta); type-species: *Parapilumnus leopoldi* Gordon, 1934, by original designation; gender: masculine].

REMARKS.—R. Serène has informed us (in litt.) that he will propose a replacement name for this genus.

**Leopoldius pisifer* (MacLeay, 1838), new combination

Parapilumnus pisifer.—Capart, 1951:146, fig. 53, pl. 3: fig. 18.—Sourie, 1954b:150.—Monod, 1956:254, figs. 298–301.—Longhurst, 1958:88.—Gauld, 1960:70.—Rossignol, 1962:117.—Guinot and Ribeiro, 1962:52.—Forest and Guinot, 1966:71.—Crosnier, 1969:535.—Uschakov, 1970: 439, 455 [listed].—Takeda, 1974:216 [discussion].

Synonym.—*Pilumnus verrucosipes* Stimpson, 1858.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 6♂, 5♀ (4 ov) (W). Sta 47, 37 m, bottom with *Jullienella*, 2♂, 2♀ (1 ov) (L).

Nigeria: Sta 248, 33 m, 1♂, 1♀ (L, W). Sta 253, 33–40 m, mud, 1♂ (L).

Other Material: Senegal: Les Almadies, Dakar, 0–0.5 m, under stones, 9 Jun 1964, F. M. Bayer, R. B. Manning, and L. B. Holthuis, 1♂, 1♀ (L). Gorée, lobster net, 15 Sep 1950, M. Paraiso, 27♂, 26♀ (12 ov) (W). Same locality, 6 Oct 1950, M. Keita, 2♂, 1♀ ov (W).

Congo: Pointe-Noire, rocks with gorgonians, 25 Jan 1967, A. Crosnier, 4♂ (W).

DESCRIPTION.—Capart, 1951:146.

Figures: Capart, 1951, fig. 53, pl. 3: fig. 18; Monod, 1956, figs. 298–301.

Male Pleopod: Capart, 1951, pl. 3: fig. 18 (Senegal); Monod, 1956, figs. 300, 301 (Senegal).

MEASUREMENTS.—Our specimens have carapace widths of 3 to 10 mm; the carapace widths of ovigerous females are 6 to 9 mm.

REMARKS.—As suggested by Takeda (1974: 216), this species appears to belong to *Leopoldius* Serène, 1971, rather than to *Parapilumnus* Kossmann, 1877. In *L. pisifer* the carapace is covered with a thick coat, arranged more or less symmetrically, the lobes of the front are sinuous rather than truncated, the three posterior anterolateral teeth of the carapace are broad, not spiniform, and their borders are granulated, the greatest width of the carapace is at the level of the posteriormost tooth, the pereiopods are short and irregularly carinate, and the lateral palatal ridges are completely absent.

This is the only species of *Leopoldius* to occur in the Atlantic; the remainder of the species are from the Indo-West Pacific region.

BIOLOGY.—Like *Nanopilumnus boletifer* (p. 145), *Leopoldius pisifer* is a shallow shelf species, living from the intertidal zone to a depth of 50 m; the majority of records in the literature are from depths of 30 m or less. It can utilize a wide range of substrates. Sourie (1954b) found it on shelly sand in the Baie de Dakar and Longhurst (1958) reported in from muddy sand in 22 m off Dakar. Uschakov (1970) reported it from hard sand bottom in depths greater than 20 m in clear water. It was reported from rocks ornamented with gorgonians in 10 m off Pointe-Noire, and was taken by the *Calypso* on mud and shells in 18 m, on mud in 18–30 m and 50 m, on muddy sand with Foraminifera in 21–27 m, and on mud with *Arca* in 32 m (Forest and Guinot, 1966). The *Pillsbury* specimens were taken on mud or mud with *Jullienella*.

Ovigerous females have been recorded from all months (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—West Africa, from Mauritania southward to Gabon, including Ilha do Principe in the Gulf of Guinea; and southern Africa, from South Africa and Mozambique (Barnard, 1954); intertidal zone to a depth of 50 m. Monod (1956) summarized earlier records and reported material from Mauritania, Senegal, Gambia, Guinea, Guinea-Bissau, Sierra Leone, Ghana, Gabon, and Principe. In addition the species has been reported from the following localities:

Senegal: Baie de Dakar (Sourie, 1954b). Dakar, 22 m (Longhurst, 1958).

Guinea: No specific locality, in depths greater than 20 m (Uschakov, 1970). 09°40′N, 14°05′W, 18 m, and 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Ivory Coast: 05°02.5′N, 05°25′W, 21–27 m (Forest and Guinot, 1966).

Ghana: Tenkpobo (as Tenpobo), Christiansborg, Apam, Winneba and Axim, rarely sublittoral to 37 m (Gauld, 1960). 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m (Forest and Guinot, 1966).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Gabon: W of Libreville, 20–40 m (Rossignol, 1962).

Congo: Baie de Pointe-Noire, 6–8 m (Rossignol, 1962). Pointe-Noire, 10 m (Crosnier, 1969).

Angola: Baía da Caota, Benguela, 13 m and 30 m (Guinot and Ribeiro, 1962).

Genus *Menippe* de Haan, 1833

Menippe de Haan, 1833:21 [type-species: *Cancer rumphii* Fabricius, 1798, by subsequent designation by Glaessner, 1929:253; gender: feminine].—Guinot, 1971:1076 [list of species].

Menippe nodifrons Stimpson, 1859

Menippe nodifrons.—Frade, 1950:11, 26 [Congo].—Capart, 1951:138, fig. 49 [Guinea].—Monod, 1956:222, figs. 244–

248 [Senegal, Guinea, Sierra Leone, Ghana, Rio Muni; references].—Longhurst, 1957:374 [Sierra Leone].—Rossignol, 1957:82 [Congo].—Buchanan, 1958:20 [Ghana].—Longhurst, 1958:88 [Sierra Leone].—Gauld and Buchanan, 1959:127 [Ghana].—Gauld, 1960:70 [Ghana].—Rossignol, 1962:116 [Congo].—Guinot and Ribeiro, 1962: 50 [Angola].—Monod, 1967:180, pl. 17: fig. 3 [no material].—Le Loeuff and Intès, 1968, table 2 [Ivory Coast].—Guinot, 1968b:156 [discussion].—Uschakov, 1970:445, 446, 447, 455 [listed; Guinea].—Guinot, 1971: 1076 [listed].

Menippe nanus.—Capart, 1951:140 [discussion].

Menippe.—Gauld and Buchanan, 1959:128 [Ghana].

SYNONYMS.—*Menippe rudis* A. Milne Edwards, 1879; *Menippe nanus* A. Milne Edwards and Bouvier, 1898.

DISTRIBUTION.—Eastern Atlantic from the Cape Verde Islands and Senegal to Angola; western Atlantic from Florida to Brazil (Rathbun, 1930); littoral and sublittoral, from shore to about 20 m.

Genus *Microcassiope* Guinot, 1967

Microcassiope Guinot, 1967c:358 [type-species: *Xanthodes rufopunctatus* A. Milne Edwards, 1869, by original designation; gender: feminine]; 1971:1076 [list of species].

**Microcassiope minor* (Dana, 1852)

FIGURE 30

Xantho minor Dana, 1852b:169; atlas, 1855, pl. 8: fig. 7.—Miers, 1881a:214; 1886:124 [listed].

Pilumnus granulimanus Stimpson, 1871a:143 [Cuba].

Micropanope granulimanus.—Rathbun, 1930:439, pl. 180: figs. 1, 2 [western Atlantic records].

Micropanope granosa.—Chapman and Santler, 1955:374.

Micropanope rufopunctata.—Monod, 1956:313, figs. 386–392.—Gauld, 1960:70.—Guinot and Ribeiro, 1962:59.—Monod, 1963, fig.34 [no material].—Ribeiro, 1964:10—Forest and Guinot, 1966:81.—Chace, 1966:639, fig. 8.—Guinot, 1967c:348 [discussion], 358 [listed].—Le Loeuff and Intès, 1968, table 1.—Türkay, 1976b:61 [listed], 69.

Microcassiope rufopunctata.—Guinot, 1967c, figs. 10, 15; 1971: 1076 [listed].

Xanthodes rufopunctata.—Guinot, 1967c:359 [listed].

Xanthodes rufopunctatus.—Garth, 1968:314 [discussion].

Microcassiope granulimanus.—Guinot, 1971:1076 [listed; considered to be distinct from *M. rufopunctata*].

SYNONYMS.—*Xanthodes rufopunctatus* A. Milne Edwards, 1869; *Xanthodes granosus* A. Milne Edwards and Bouvier, 1898.

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 282,18–37 m, nodular coralline algae, 3♂, 5♀, 2 juv (L, W).

Other Material: Madeira: Ponta de São Lourenço, 32°44′N, 16°44′W, littoral, rocky shore with tide pools, 29 Feb 1976, *Onversaagd* Sta 16, 1♀ (L). SE coast, near Canical, 32°44′N, 16°44′W, 0–22 m, shore collecting, snorkeling, diving, 11 Mar 1976, *Onversaagd* Sta 48, 1♂ (L).

Cape Verde Islands: Porto da Praia (as La Praya), São Tiago, 10–30 m, Jun–Jul 1883, *Talisman*, syntype of *Xanthodes granosus* A. Milne Edwards and Bouvier, 1898, 1♂, 1♀ (L, W).

Annobon: S coast, 01°28.5′S, 05°37.5′E, 35–55 m, 16 Jun 1967, F. Poinsard, 1♀ (W).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:87.

Figures: Monod, 1956, figs. 386–392.

Male Pleopod: Monod, 1956, figs. 387–392 (Azores, Cape Verde Islands); Chace, 1966, fig. 8 (St. Helena, Curaçao, Cape Verde Islands); Guinot, 1967c, fig. 15 (Cape Verde Islands).

MEASUREMENTS.—Our specimens have carapace widths of 2.5 to 9.1 m.

REMARKS.—In his account of the Crustacea of the U.S. Exploring Expedition, Dana (1852b:169) described a small xanthid crab that had been collected at Madeira or the Cape Verde Islands, *Xantho minor*. His account is based on an ovigerous female 2.1 lines long, 3.1 lines wide (approximately 4.5 × 6.6 mm):

> Near *X. parvulus* [= *Eurypanopeus blanchardi*]. Carapax anteriorly areolate, areolets slightly raised, 2M, 3M, 5L, 6L circumscribed behind; antero-lateral margin thin, four-toothed, three posterior teeth subtriangular. Anterior feet of moderate size, subequal, carpus and hand above slightly granulous, hand exteriorly faint granulato-costate, and above sulcate, moveable finger not armed with a large basal tooth. Eight posterior feet sparsely pubescent.

Two small species of xanthids, both formerly placed in *Micropanope*, are now known to live in the Cape Verde Islands and one or more of the more northern islands or island groups, Madeira, the Azores, and the Canary Islands: *Microcassiope rufopunctata* (A. Milne Edwards, 1869) and *Nanocassiope melanodactyla* A. Milne Edwards, 1867). Earlier authors have identified *Xantho minor* with

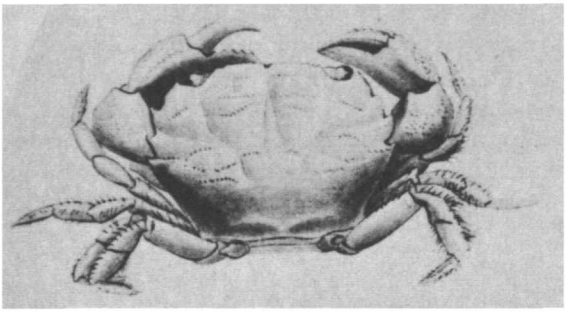

FIGURE 30.—*Microcassiope minor* (Dana) (from Dana, 1852b, pl. 8: fig.7).

one or the other of these species without adopting the specific epithet *minor*. A third small species of xanthid, also at one time placed in *Micropanope*, *Coralliope parvula* (A. Milne Edwards, 1869), also occurs in the Cape Verde Islands; that species, as noted above, has but three anterolateral teeth whereas *X. minor* was described as having four, and has an additional inner spine on the carpus of the chela; the spine is absent in *X. minor*.

Miers (1886:124) listed *Xantho minor* with other species now assigned to *Xantho* sensu stricto, and retained both *melanodactyla* and *rufopunctata* in *Xanthodes*, the genus to which they were assigned in Milne Edwards' original accounts.

A. Milne Edwards and Bouvier (1898:190), in their description of *Xanthodes talismani* [= *Coralliope parvula*], pointed out similarities between that species and *Xantho minor:*

> Cette espèce se rapproche beaucoup du *Xantho minor* Dana, de Madère et des îles du Cap Vert; mais cette dernière appartient à un genre différent; sa dent antérieure est encore nette, sa carapace est dépourvue de touffes de poils, ses pinces sont un peu costulées et il n'y a pas d'épines sur le bord interne du carpe.

Later A. Milne Edwards and Bouvier (1900: 93) repeated this observation in their account of *Xanthodes talismani*, in spite of the fact that on p. 85 of the same work they identified *Xantho minor* Dana, 1852 with *Xanthodes melanodactylus* A. Milne Edwards, 1867 (and used the junior synonym!) and on page 87 of the same work reported *Xanthodes melanodactylus* var. *rufopunctata* and noted: "il y a probablement lieu d'y rattacher [that material] plus specialement le *Xantho minor* de Dana." They also synonymized Dana's *Xantho parvulus*, which we believe should be identified with *Eurypanopeus blanchardi*, with *Xanthodes melanodactylus*.

Monod (1956:320, in synonymy) identified *Xanthodes melanodactylus* var. *rufopunctatus* of A. Milne Edwards and Bouvier, 1900, with *Micropanope melanodactyla*. Three females from one of the lots (in 75 m) reported by A. Milne Edwards and Bouvier and labeled *Xanthodes melanodactylus* var. *rufopunctata* are in the collection of the Smithsonian Institution; they are *Nanocassiope melanodactyla*.

Monod (1933b:519) pointed out the multiple use of the epithet *minor* by A. Milne Edwards and Bouvier and further noted: "En fait la figure de *Xantho minor* donnée par DANA semblerait plutôt représenter *Xanthias granosus* [= *Microcassiope rufopunctata*] ou *X. tuberculatus* [= *Monodaeus couchii*] que *X. melanodactylus*. L'examen du type est indispensable."

We believe that Monod (1956:314, synonymy) was correct in identifying *Xantho minor* Dana with *Xanthodes rufopunctatus* A. Milne Edwards. Dana's account mentioned the small size, the well-marked regions, the triangular anterolateral teeth of the carapace, the granular chela lacking a large basal tooth, and, in addition, clearly showed in his plate 8: figure 7 (see Figure 30) several transverse lines of granules on the carapace. All of these features are characteristic of the species now known as *Microcassiope rufopunctata*. We believe that the older name, *Microcassiope minor* (Dana, 1852), must be used for the species.

Chace (1966:639), in recording this species from Saint Helena in the south central Atlantic, showed that *Pilumnus granulimanus* Stimpson, 1871, from the western Atlantic, placed in *Micropanope* by Rathbun (1930), is conspecific with *M. minor* (as *M. rufopunctata*); the latter is now known to have a relatively wide range on both sides of the Atlantic. Guinot (1971:1076), in her summary of nomenclatural changes resulting from her studies of the xanthids, removed *M. granulimanus* from the synonymy of *M. minor* without stating her reasons. She noted: "Cette espèce a été mise en synonymie

avec *Micropanope rufopunctata* par CHACE (1966, p. 639, fig. 8), mais pour l'instant nous la maintenons séparée de l'espèce ouest-africaine."

In discussing the distribution patterns of some Atlantic-East Pacific xanthids, Garth (1968:314) was in error in stating that *Microcassiope* did not occur in the western Atlantic. It is represented there by *M. minor* (as *Micropanope granulimanus*). Garth apparently was misled by the omission of this species in Guinot's (1967c:358) original account of *Microcassiope*.

A male syntype of *Xanthodes granosus* (see "Synonyms") is in the collection of the National Museum of Natural History, Smithsonian Institution, under catalog number USNM 22956. A female syntype is in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden, under Crust. D.1564.

BIOLOGY.—Off West Africa, *Microcassiope minor* lives from the intertidal zone to a depth of ca 220 m. Of the recent records for which depth is available, 19 out of 26 (or 73%) are from depths of 10 m or less, and seven (or 27%) are from depths ranging from between 15 and 45 m to ca 220 m (15–40 m, 43–45 m, and ca 220 m). Eight of the 19 shallower collections are from shore. Forest and Guinot (1966:84) pointed out that *Nanocassiope melanodactyla* (as *Micropanope melanodactyla*) and *Microcassiope minor* both are common in the Gulf of Guinea, where they may occur together, but that the former lives in deeper water generally on less stable substrates whereas "la seconde, plus littorale, a souvent été capturée dans la zone intercotidale ou jusqu'à une dizaine de mètres, principalement sur des fonds durs, roches et coraux," a statement borne out by the capture of these two species off the offshore islands of the Gulf of Guinea. The deepest record is that of Türkay (1976b) from Madeira, in ca 220 m on a telegraph cable; he also recorded specimens from the littoral zone, under stones.

Off West Africa, ovigerous females have been collected in June (Forest and Guinot, 1966). Chace (1966) recorded ovigerous females from Saint Helena in January and April.

DISTRIBUTION.—Atlantic Ocean. Eastern Atlantic from the eastern Mediterranean (see Lewinsohn and Holthuis, 1964:59, for records), the Azores, the Canary Islands, Madeira, the Cape Verde Islands, the African mainland from Spanish Sahara, Ivory Coast, and Ghana, and the offshore islands of the Gulf of Guinea, Principe, São Tomé, and Annobon; central Atlantic from Saint Helena (Chace, 1966); western Atlantic from the Bahamas, Cuba, Curaçao, and Islas Los Roques (Chace, 1966); intertidal to a depth of ca 220 m, commoner in shallower water. Monod (1956) summarized earlier West African records and reported material from the Azores, the Canary Islands, the Cape Verde Islands, and Ghana. Other West African records in the literature include the following:

West Africa: No specific locality (Monod, 1963).

Azores: Pasteleiro, Feteira, and Horta, Ilha do Faial, intertidal (Chapman and Santler, 1955).

Madeira: Porto do Funchal, ca 220 m, on telegraph cable; Ilhéu do Gorgulho, littoral; between Ponta da Garajau and Ponta da Oliveira, 5–6 m (all Türkay, 1976b).

Cape Verde Islands: No specific locality (Guinot, 1967c). Baixo João Leitão, 25 m (Guinot and Ribeiro, 1962; Ribeiro, 1964). Porto da Praia (as La Praya), São Tiago (Chace, 1966).

Spanish Sahara: 21°05′N, 17°14′W, 43–45 m (Forest and Guinot, 1966).

Ivory Coast: Lagoon of Abidjan, 05°16′N, 04°01′20″W, (Forest and Guinot, 1966). Off Jacqueville, 40 m (Le Loeuff and Intès, 1968).

Ghana: Off Tenkpobo (as Tenpobo), littoral; off Accra, 37 m (Gauld, 1960).

Principle: Ilhéu Caroço, 2–8 m; Ponta da Mina, beach (Forest and Guinot, 1966).

São Tomé: 00°20′N, 06°46′E, 10 m; Ponta Diogo Vaz, W coast, 0–6 m; Praia de Santa Catarina, W coast, 3–10 m; off São Tomé, 8 m; off Ponta Diogo Nunes, shore and 4–5 m; in front of Ponta Oquedelrei, 6 m; Morro Peixe, 2–6 m; Ilhéu das Cabras, shore; in front of the harbormaster's office, shore; in front of Praia Lagarto, 5–6 m (all Forest and Guinot, 1966).

Annobon: No specific locality (Guinot, 1967c). 01°24′04″S, 05°36′45″E, 7–10 m; 01°25′12″S, 05°36′05″E, 20 m; Isla Tortuga, NW coast, 15–40 m (all Forest and Guinot, 1966).

Saint Helena: Rupert's Bay, 0–75 m; James Bay (Chace, 1966).

Genus *Monodaeus* Guinot, 1967

Monodaeus Guinot, 1967c:369 [type-species: *Xantho couchii* Couch, 1851, by original designation; gender: masculine]; 1971:1074 [list of species].

Monodaeus couchii (Couch, 1851)

Xantho couchii Couch, 1851:13.

Medaeus couchi.—Monod, 1956:310, figs. 383, 877, 878.—Pérès, 1964:20.—Forest and Guinot, 1966:80.—Crosnier, 1967:331, figs. 13, 14.—Zariquiey Alvarez, 1968:400, figs. 9, 15e, 133, 134a [Spain; references].—Crosnier, 1970:1215 [listed], 1216.

Micropanope (?) *couchi.*—Forest and Gantès, 1960:352.

Xantho couchi.—Pérès, 1964:27, 28, 29.—Guinot, 1967c:348, 349, 371 [all discussion], 373 [listed].—Maurin, 1968a:19, 116 [Spain, Mediterranean].—Forest, 1976:66 [discussion].

Monodaeus couchi.—Guinot, 1967c:372 [discussion], figs. 23, 32 [Spain]; 1971:1074 [listed].—Türkay, 1976a:25 [listed], 38, fig. 24 [Portugal, in part].—Forest, 1976:68 [discussion].

SYNONYM.—*Xantho tuberculatus* Bell, 1852.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Undaunted Material: South-West Africa: Sta 106, 225 m, 1♀ (L).

Other Material: Morocco: Off Cap de Mazagan, 33°40′N, 08°45′W, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 154, 1♂ (L).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1894:33.

Figures: A. Milne Edwards and Bouvier, 1899, pl. 3: figs. 3–15.

Male Pleopod: Monod, 1956, figs. 877, 878 (Senegal).

MEASUREMENTS.—Carapace width of our male 11 mm.

BIOLOGY.—*Monodaeus couchii* is a sublittoral species, occurring on the outer shelf and slope to a depth of at least 1300 m (Türkay, 1976a). It was found by Pérès (1964) off Morocco on a bottom with a coral bank and sponges on rock, 460 to 490 m; on muddy sand, partially consolidated, 295 to 340 m; and on bathyal mud in 333 to 360 and 260 to 500 m. It was taken by the *Calypso* (Forest and Guinot, 1966) on sand, mud and shells in 64 m and on sand and shells in 73 to 80 m. Crosnier (1967) reported it from 80 m on pebbles.

DISTRIBUTION.—Eastern Atlantic, from England southward to Angola, including the Mediterranean; sublittoral, in depths between about 60 m to at least 1300 m. Monod (1956) reported material from Senegal; since 1956 the species has been recorded from the following West African localities.

Morocco: Agadir, 60–130 m (Forest and Gantès, 1960).—35°47′N, 06°35′W, 460–490 m; 35°19′N, 06°32′W to 35°28.8′N, 06°39.2′W, 333–360 m; 35°17.5′N, 06°10.3′W to 35°13.9′N, 06°36.2′W, 295–340 m; and 34°39.6′N, 06°54.5′W to 34°33.5′N, 06°56′W, 260–500 m (Pérès, 1964). 33°34.2′N, 09°19.8′W, 1300 m, and 31°01′N, 10°16′W, 360–375 m (Türkay, 1976a).

Liberia: 05°21.5′N, 09°45.5′W, 73–80 m, and 04°34.5′N, 08°31′W, 64 m (Forest and Guinot, 1966).

Ivory Coast: S of Vridi, 80 m; SW of Vridi, 200–300 m; and S of Grand-Bassam, 100–300 m (Crosnier, 1967).

Congo: Pointe-Noire and off Pointe-Noire, 04°57′S, 11°22′E, 160 m (Crosnier, 1967).

South-West Africa: 17°18′S, 11°24′E, 225 m (Crosnier, 1970).

Monodaeus rectifrons (Crosnier, 1967)

? *Paraxanthias* sp.—Capart, 1951:163.

Medaeus rectifrons Crosnier, 1967:331, figs. 16–24, 29.—Guinot, 1967c:371 [listed].—Crosnier, 1969:531.—Forest, 1976:66 [discussion].

Monodaeus rectifrons.—Guinot, 1967c:371, 372, 373 [all discussion]; 1971:1074 [listed].—Forest, 1976:68 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Congo: Off Pointe-Noire, 255 m, 2 Apr 1968, A. Crosnier, 1♀ (W).

DESCRIPTION.—Crosnier, 1967:332.

Figures: Crosnier, 1967, figs. 16–24, 29.

Male Pleopod: Crosnier, 1967, figs. 24, 29 (Congo).

MEASUREMENTS.—The carapace width of the only specimen examined is 24 mm.

BIOLOGY.—*Monodaeus rectifrons* is a deepwater species, occurring on the shelf and upper slope, in depths between 75 m and 255 m; there is one record from a depth of 100–400 m so the species may live somewhat deeper than 255 m. It has been taken on brown mud in 215–220 m (Capart, 1951); mud in 80–100 m (Crosnier, 1967); and sandy mud in 75 m and mud and rocks in 115 m (Crosnier, 1969).

DISTRIBUTION.—Gulf of Guinea, from off the Ivory Coast and the Congo, in depths between 75 m and 255 m (100–400 m). Records in the literature include the following:

Ivory Coast: SW of Grand-Bassam, 100–400 m (Crosnier, 1967).

Congo: 51.5 mi [83 km] WNW of Banana [Zaire], 05°50′S, 11°32′E, 215–220 m (Capart, 1951). Off Pointe-Noire, 80–100 m (type-locality) (Crosnier, 1967); in 255 m (Crosnier, 1969). 04°53′S, 11°38′E, 75 m; 05°00′S, 11°26′E, 115 m (Crosnier, 1969).

* *Monodaeus rouxi* (Capart, 1951)

Micropanope rouxi Capart, 1951:153, fig. 57, pl. 3: fig. 17.—Forest, 1965a:380.—Forest and Guinot, 1966:81.—Guinot, 1967c:348, 349 [discussion], 371 [listed].—Forest, 1976:66 [discussion].

Medaeus (?) *rouxi*.—Monod, 1956:312, figs. 384, 385.—Guinot and Ribeiro, 1962:58, fig. 26.—Crosnier, 1967: 335, figs. 25, 26. [Not *Medaeus rouxi* Balss, 1935.]

Medaeus rouxi.—Forest, 1959:15 [not *Medaeus rouxi* Balss, 1935].

Monodaeus rouxi.—Guinot, 1967c:371, 372, 373 [all discussion], fig. 24; 1971:1074 [listed].—Forest, 1976:68 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 1♂ (W).

Ivory Coast: Sta 45, 73–97 m, 1♂ (L). Sta 49, 73–77 m, 1♂, fragments (L). Sta 50, 128–192 m, 1♂, 2♀ ov (W). Sta 62, 46 m, brown, branched and foliate Foraminifera, 1♂, 1♀ (L).

Nigeria: Sta 237, 101 m, coral ground, rough, 1♂ (L). Sta 239, 73 m, 1♀ (L).

Other Material: Ivory Coast: Off Sassandra, 11 m, 3 Apr 1964, Guinean Trawling Survey, Tr 22, Sta 1, 1♂ (L). 04°33′N, 06°36′W, 100–109 m, sand, mud, shells, rocks, 21 May 1956, *Calypso* Sta 16, 2♂, 3♀ (1 ov) (W).

Congo: Off Pointe-Noire, 04°56′S, 11°31′E, 95–97 m, trawl, 21–22 Sep 1965, 1♂ (W).

DESCRIPTION.—Capart, 1951:153.

Figures: Capart, 1951, fig. 57, pl. 3: fig. 17; Monod, 1956, figs. 384, 385; Guinot and Ribeiro, 1962, fig. 26; Crosnier, 1967, figs. 25, 26.

Male Pleopod: Capart, 1951, pl. 3: fig. 17 (Congo); Monod, 1956, fig. 385 (Congo); Guinot and Ribeiro, 1962, fig. 26 (Ivory Coast).

MEASUREMENTS.—Our specimens have carapace widths of 5 to 15 mm; the carapace widths of ovigerous females is 8 mm. Crosnier (1967:336) pointed out that this is a relatively small species; he examined one ovigerous female 6.6 mm wide, and the ovigerous female reported by Capart (1951) was only 6 mm wide.

BIOLOGY.—*Monodaeus rouxi* is an offshore species which lives on the continental shelf and upper slope. It usually occurs in depths between 46 m and 215–220 m; the extremes of depth recorded so far, 11 m herein and ?500 m (Guinot and Ribeiro, 1962), require verification. Nine of the 14 available depth records are for depths below 100 m, and seven of those are for depths between 64 and 97 m. The five deeper records are 100–109 m, 101 m, 128–192 m, 215–220 m, and ?500 m. The species has been collected on brown mud in 215–220 m and on muddy sand and rocks in 80 m (Capart, 1951); mud, sand and compacted sand (sable construit) in 65–75 m, sand, mud, and shells in 64 m, and on sand, mud, shells, and rocks in 100–109 m by the *Calypso* (Forest and Guinot, 1966). In the latter depth a large series of 56 specimens was collected. The specimens taken by the *Pillsbury* were taken on brown, branching, and foliate Foraminifera in 46 m, on broken shell in 70 m, and on coral on rough bottom in 101 m.

Ovigerous females have been collected in May and December (Capart, 1951; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—West Africa, from scattered localities between Senegal and Angola, in depths between 46 m and 215–220 m (11 m to ?500 m). No material was available to Monod (1956). Records in the literature include the following:

West Africa: No specific locality (Forest, 1976).

Senegal: No specific locality (Forest, 1965a); in 65–75 m (Forest, 1959). 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Liberia: 04°34.5′N, 08°31′W, 64 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality (Guinot and Ribeiro, 1962; Forest, 1965; Crosnier, 1967). 04°33′N, 06°36′W, 100–109 m (Forest and Guinot, 1966).

Congo: 51.5 mi [83 km] WNW of Banana [Zaire], 05°50′S, 11°32′E, 215–220 m (Capart, 1951). Off Pointe-Noire (Crosnier, 1967).

Angola: 11 mi [18 km] W of Cap Ledo, 09°40′S, 13°02′E, 80 m (Capart, 1951). Benguela, ?500 m (Guinot and Ribeiro, 1962).

Genus *Nanocassiope* Guinot, 1967

Nanocassiope Guinot, 1967c:355 [type-species: *Xanthodes melanodactylus* A. Milne Edwards, 1867, by original designation;

gender: feminine]; 1971:1075 [list of species].—Takeda, 1976:85 [definition].

**Nanocassiope melanodactyla* (A. Milne Edwards, 1867)

Micropanope polita Rathbun, 1893b:238; 1930:440, fig. 70, pl. 180: figs. 3, 4.—Garth, 1946:459, pl. 77: fig. 4 [eastern Pacific; considered distinct by Guinot, 1971].

Panopeus tanneri Faxon, 1893:154 [eastern Pacific].

Xanthodes melanodactylus var. *rufopunctatus*.—A. Milne Edwards and Bouvier, 1900:87, pl. 16: figs. 4, 5 [part?] [not *Xanthodes rufopunctatus* A. Milne Edwards, 1869 = *Xantho minor* Dana, 1852].

Micropanope melanodactylus.—Capart, 1951:151, fig. 56, pl. 3; figs. 15, 16.—Chace, 1966:637, fig. 7 [Saint Helena].

Micropanope melanodactyla.—Monod, 1956:320, figs. 401–405.—Gauld, 1960:70.—Guinot and Ribeiro, 1962:60.—Ribeiro, 1964:12.—Forest and Guinot, 1966:83.—Guinot, 1967c:348 [discussion], 355 [listed].—Le Loeuff and Intès, 1968, table 1.

Xanthodes melanodactylus.—Guinot, 1967c:358 [listed].

Nanocassiope melanodactyla.—Guinot, 1967c, figs. 8, 13; 1971: 1075 [listed].—Türkay, 1976b:61 [listed], 68.

Nanocassiope polita.—Guinot, 1971:1075 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 70, 33 m, branched Foraminifera, 3♂, 1♀ ov (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂ (W). Sta 46, 38–42 m, mud with dense *Jullienella*, 1♂, 2♀ (1 ov) (L). Sta 47, 37 m, bottom with *Jullienella*, 6♂, 9♀ (3 ov) (L).

Ghana: Sta 22, 51 m, rough bottom, 1♂, 1♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 13♂, 7♀ (1 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 2♂, 17♀ (6 ov), 1 juv (L, W).

Nigeria: Sta 250, 24 m, brackish water, mud, 1♀ (W).

Annobon: Sta 271, shore, sand beach, 1♂ (W). Sta 275, 9–69 m, rubble of coralline algae, 8♂, 8♀ (1 ov), 2 juv (L). Sta 282, 18–37 m, nodular coralline algae, 2♂, 1♀ (L, W). Sta 283, 51–55 m, nodular coralline algae, 42♂, 36♀ (7 ov) (W). Sta 284, 73 m, black basaltic rocks, 2♀ ov (L).

Other Material: Madeira: Porto da Abra, SE coast, 32°45′N, 16°41′W, to 12 m, diving, 13 Mar 1976, *Onversaagd* Sta 68, 1♂ (L). Near Canical, SE coast, 32°44′ N, 16°44′ W, 0–22 m, shore collecting, snorkeling, diving, 10 Mar 1976, *Onversaagd* Sta 39, 1 juv♂ (L). SE coast, 32°44′N, 16°41′W, 30 m, sand, marl, shell, gravel, clay, van Veen grab, 13 Mar 1976, *Onversaagd* Sta 67, 1♂ (L). Near Agua de Pena, SE coast, 32°41′N, 16°46′W, to 25 m, diving, 9 Mar 1976, *Onversaagd* Sta 27, 1♀ (L). S of Madeira, 32°38′N, 16°50′W, 98–105 m, triangular dredge, 16 Mar 1976, *Onversaagd* Sta 93, 1♂ (L).

Canary Islands: Estrecho de la Bocaina, 30 m, sand and rocks, 28 Jun 1883, *Talisman*, 1♂, 2♀ (L).

Cape Verde Islands: São Vicente, 75 m, 29 Jul 1883, *Talisman*, 3♀ (W) [labelled *Xanthodes melanodactylus* var *rufopunctatus*].

Annobon: 01°24′S, 05°37.5′E, 11 Dec 1965, A. Crosnier, 2♂, 3♀ (W). 01°27′S, 05°35′50″E, 50–60 m, 11 Dec 1965, A. Crosnier, 2♂, 3♀ (W). 01°27′S, 05°35′48″E, 50–60 m, 11 Dec 1965, *Ombango*, A. Crosnier, 1♂, 8♀ (2 ov) (W).

DESCRIPTION.—Capart, 1951:152.

Figures: Capart, 1951, fig. 56, pl. 3: fig. 16; Monod, 1956, figs. 401–405.

Male Pleopod: Capart, 1951, pl. 3: fig. 16 (Angola); Monod, 1956, figs. 403–405 (Senegal); Chace, 1966, fig. 7 (Cape Verde Islands, Baja California, Cocos Island); Guinot, 1967c, fig. 13 (Senegal).

Color: "Coloration dans l'alcool, gris tacheté de rose; les doigts des chélipèdes parfois bruns, parfois noirs" (Capart, 1951:152).

MEASUREMENTS.—Our specimens have carapace widths of 2.5 to 13 mm; the carapace widths of ovigerous females ranges from 4 to 9 mm.

REMARKS.—Chace (1966:637–638) reported *Micropanope melanodactylus* from Saint Helena in the south central Atlantic and noted: "I agree with Monod (1956, p. 324) that *M. melanodactylus* is probably not a synonym of *Xantho minor* Dana, 1852b. Unfortunately, the type-specimen of Dana's species is probably no longer extant, and his name is therefore likely to remain a *nomen dubium* indefinitely." We agree that *Xantho minor* cannot be identified with *Xanthodes melanodactylus*; we have identified it with *Microcassiope rufopunctata*, above.

We believe that Chace (1966:637) correctly synonymized *Micropanope polita* Rathbun, 1893, from the eastern Pacific, with *M. melanodactyla*. Guinot (1971:1075) did not accept this action, apparently preferring, without stating her reasons, to keep the two taxa separate. As Garth (1968:314) noted, discontinuous distribution between eastern Pacific and eastern Atlantic crabs is well documented at the generic level.

The relatively wide and transversely grooved front, the slender, sparsely setose pereiopods, the posteriorly projecting posterolateral angles of the sixth abdominal somite of the male and the form of the gonopods are good diagnostic features of

this species. The front is transversely grooved in all specimens examined by us.

BIOLOGY.—*Nanocassiope melanodactyla* is a sublittoral, usually shallow shelf species that apparently prefers a bottom with coralline algae or Foraminifera on mud or muddy sand. Of 70 recent depth records for the species off West Africa, 56 or 80% are from depths of 50 m or less; two of those are from shore, the remainder in depths from 3–11 m to 40–54 m or 9–69 m. Of the 14 records from deeper water, two, 200 m and 225 m, are from depths greater than 100 m and the remainder range from 60 to 85 m. The deepest records in the literature are in A. Milne Edwards and Bouvier (1900), who provided 11 depth records. Only three of these are from depths of less than 50 m, three are from depths generally more than 50 m but less than 100 m (75, 80, and 80–115 m), and the remainder are 100–150 m, 110–180 m, 225 m, 355 m, and 627 m. The reliability of these deeper records is questionable, but the species may stray into water that deep. Subsequently, Türkay (1976b) recorded it from 80 m on a telephone cable in the harbor of Funchal; in other samples he recorded it from blocks of stone. It generally occurs in depths between 20 and 50 m, as pointed out by Forest and Guinot (1966:84). They compared the apparent habitat preferences of *N. melanodactyla* and *Microcassiope minor* and noted: "La prémière a été recueillie à des profondeurs comprises entre 9 et 65–75 m, mais surtout entre 20 et 50 m, sur des fonds meubles, le plus souvent parmis les algues calcaires."

Apparently this species spawns all year off West Africa. Ovigerous females have been collected in all months but April, August, and December (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Ribeiro, 1964; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Eastern Pacific, from Baja California, Mexico, Cocos Island, and the Galapagos Islands; central Atlantic, from Saint Helena and Ascension Island; and eastern Atlantic, from the Azores, Madeira, Ilhas Desertas, the Canary Islands, the Cape Verde Islands and Senegal southward to Angola, including the offshore islands of the Gulf of Guinea, Principe, São Tomé, and Annobon; sublittoral, subtidal to a depth of more than 600 m. Monod (1956) summarized the literature and reported material from the Azores, Madeira, the Cape Verde Islands, the mainland from localities between Senegal and Gabon, and from the offshore islands of Principe and Annobon; other records, including those published since 1956, include the following.

Madeira: No specific locality (Dana, 1852b; Miers, 1881a). Funchal harbor, ca. 80 m; near Ponta da Garajau; between Ponta da Garajau and Ponta da Oliveira; and Ponta de São Lourenço (all Türkay, 1976b).

Cape Verde Islands: No specific locality (Dana, 1852b). Porto Grande, São Vicente (Chace, 1966). Baía de Fateixa, São Vicente, shore; Baía de Porto Grande, São Vicente, 4–6 m, 8 m, 8–10 m, 3–11 m (3.5–11 m); Baía do Tarrafal, São Tiago, 14–23 m and 9–17 m; Porto de São Francisco, São Tiago, 9 m; Porto da Furna, Brava, 6–20 m (all Guinot and Ribeiro, 1962; Ribeiro, 1964). Baía de Porto Novo, Santo Antão, 12 m; Porto Inglês, Maio (Ribeiro, 1964).

Senegal: No specific locality (Guinot, 1967c). 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Ivory Coast: Off Sassandra, 100 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 10 m (Gauld, 1960). 04°40′N, 02°08′W, 48 m; 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m; and 04°36.5′N, 01°31′W, 50 m (Forest and Guinot, 1966).

Principe: No specific locality (Guinot, 1967c). 01°35′N, 07°28′E, 45 m; 01°38′25″N, 07°22′05″E, 31 m; 01°38′35″N, 07°21′35″E, 35 m; 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; off Tinhosa Grande (as Hermano Grande) Island, 12 mi [19 km] SSW of Principe, 01°20′45″N, 07°17′37″E, 25–40 m; in front of [Cais de] Santana, 11 m (all Forest and Guinot, 1966).

São Tomé: 00°20′N, 06°47′E, 40–54 m; 00°20′N, 06°46′E, 10 m; 00°25′40″N, 06°40′10″E, 50 m; 00°25′15″N, 06°43′05″E, 8–30 m; in front of Ponta de São Sebastião, 11 m (all Forest and Guinot, 1966).

Annobon: 01°27.5′S, 05°36.5′E, 35 m; 01°26′15″S, 05°35′40″E, 60 m; 01°25′10″S, 05°36′10″E, 20–25 m; N of San Antonio, 9 and 23 m (all Forest and Guinot, 1966).

Angola: Baía Farta, Benguela, 22–28 m (Guinot and Ribeiro, 1962).

Saint Helena: Off Rupert's Bay, 0–75 m, 0–2 m (Chace, 1966).

Genus *Nanopilumnus* Takeda, 1974

Nanopilumnus Takeda, 1974:215 [type-species: *Medaeus rouxi* Balss, 1935; gender: masculine].

**Nanopilumnus boletifer* (Monod, 1956)

Parapilumnus boletifer Monod, 1956:260, fig. 302; 1963, fig. 36 [no material].—Forest and Guinot, 1966:72, fig. 5a,b—Takeda, 1974:216 [listed; transferred to *Nanopilumnus*].

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon, Sta 275, 9–69 m, rubble of coralline algae, 1♀ ov (L).

DESCRIPTION.—Monod, 1956:260.

Figure: Monod, 1956, fig. 302.

Male Pleopod: Forest and Guinot, 1966, fig. 5a,b (São Tomé).

Color: Cream (Monod, 1956:261).

MEASUREMENTS.—Our ovigerous female has a carapace width of 5 mm.

BIOLOGY.—*Nanopilumnus boletifer* is a sublittoral species, with a recorded depth range extending from shore to 9–69 m. All depth records other than that of the *Pillsbury* are from depths of less than 12 m. The *Pillsbury* specimen was collected in the rubble of coralline algae. The following bottom types were noted for the *Calypso* collections (Forest and Guinot, 1966): rocks and coral; rocks and sand; mud and calcareous algae; and calcareous algae.

Ovigerous females have been collected in May, June, and July (Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—West Africa, from the offshore islands of the Gulf of Guinea, Annobon (the type-locality), Principe, and São Tomé, from shore to a depth of 9–69 m, usually in 12 m or less. Records in the literature include the following:

Annobon: No specific locality, in 12 m (Monod, 1956).

Principe: Ilhéu Caroço, 2–8 m; Ilhéus dos Mosteiros, 3–10 m (Forest and Guinot, 1966).

São Tomé: Off São Tomé, 8 m; Baía de Ana de Chaves, 5 m; W of Ponta Diogo Nunes, shore; off Ponta Diogo Nunes, 4–5 m; in front of Ponta Oquedelrei, 6 m; Ilhéu das Cabras, 0–2 m; and in front of Praia Lagarto, 5–6 m (all Forest and Guinot, 1966).

Genus *Panopeus* H. Milne Edwards, 1834

Panopeus H. Milne Edwards, 1834:403.

REMARKS.—When H. Milne Edwards (1834: 403) erected the genus *Panopeus*, he assigned two species to it, viz., *Panopeus herbstii* (a new species) and *Panopeus limosus* (a new combination based on *Cancer limosa* Say, 1817, a species now known as *Eurytium limosum* (Say)). Two other species were doubtfully assigned by H. Milne Edwards to the new genus: *Cancer trispinosus* Herbst, 1803, and *Cancer ochtodes* Herbst, 1783. In the synonymy of his *Panopeus herbstii* H. Milne Edwards cited *Cancer panope* Herbst (1801:40, pl. 54: fig. 5) and Say's (1817:58, pl. 4: fig. 3) use of Herbst's name *Cancer panope* for an East American species. H. Milne Edwards indicated that his material of *Panopeus herbstii* came from "les côtes de l'Amérique septentrionale."

H. Milne Edwards did not indicate a type-species for his genus *Panopeus*, and the first valid type selection that we know of is the one by E. Desmarest (1852:17), who stated: "*Panopeus*: genre américain, ayant pour type le *Cancer panope*, Herbst, que M. Milne Edwards nomme Panopé d'Herbst." The type-species of *Panopeus* thus is *Cancer panope* Herbst, 1801, as H. Milne Edwards, 1834, cited that species by name in the synonymy of *Panopeus herbstii*. That this type selection was most unfortunate is shown below.

As was first pointed out by S. I. Smith (1869a: 278), *Cancer panope* Herbst, 1801, is an Indo-West Pacific species, different from the East American form which was figured by Say (1817) and described by H. Milne Edwards (1834). Von Martens (1872:87) examined Herbst's type material and came to the conclusion that Herbst's *Cancer panope* belongs to the genus *Menippe* de Haan, 1833; he also showed that the type locality of *Cancer panope* is Tranquebar, India, where the material was collected by Ingobert Karl Daldorff, an officer of the Danish garrison at Tranquebar (1790–1793) and a pupil of J. C. Fabricius for whom he collected (cf., Zimsen, 1964:12). Balss (1932:513) removed Herbst's species from *Menippe*

and placed it in the genus *Sphaerozius*; he pointed out that *Sphaerozius panope* is a rare species; apart from the type only three specimens were known to him.

Unpublished notes in the Division of Crustacea, National Museum of Natural History, Smithsonian Institution, Washington, D.C., made by the late Mary J. Rathbun, show that *Cancer panope* Herbst, 1801, is a junior subjective synonym of *Cancer scaber* Fabricius (1798:336). Miss Rathbun came to this conclusion after having examined the type-specimens of both species. Like Herbst's material of *C. panope*, the type-specimens of *Cancer scaber* were collected in India by Daldorff, and it thus is possible that the types of both species originally formed part of a single lot. The correct name of the species thus should be *Sphaerozius scaber* (Fabricus, 1798).

The acceptance of Desmarest's (1852) selection of *Cancer panope* Herbst as the type-species of *Panopeus* H. Milne Edwards, would cause an enormous confusion. Not only would the generic name *Sphaerozius* Stimpson, 1858 (type-species, designated in Opinion 85, *Smithsonian Miscellaneous Collections*, 73(3):17, 1925, *Sphaerozius nitidus* Stimpson, 1858) have to be replaced by the generic name *Panopeus* H. Milne Edwards, the well known and widely distributed genus of mud crabs now known as *Panopeus* would have to be given a different generic name. This genus is known from the eastern Atlantic (south coast of Portugal to Angola), both coasts of America (Massachusetts to Brazil and Lower California to Chile), and Hawaii; it consists of about 12 species, most of which live in the littoral zone and several are very common. The name *Panopeus* has been very consistently used for it. The only other name available for it is *Eupanopeus* Rathbun (1898:273; type-species, by original designation, *Panopeus herbstii* H. Milne Edwards, 1834), a name which has not been used since 1908.

In order to prevent the considerable confusion that a strict application of the Code would cause, Holthuis (1979b) has applied to the International Commission on Zoological Nomenclature to use their plenary power to set aside all type-selections for the genus *Panopeus*. Having done so, he also asked the Commission to select as the type-species of that genus the species *Panopeus herbstii* H. Milne Edwards, 1834. In the meantime, as prescribed by the Code, the name *Panopeus* will be used by us in the sense in which it is currently employed by zoologists.

As pointed out above, *Panopeus herbstii* is a composite species, its syntypes consisting of (1) the North American material that H. Milne Edwards had before him when he described the species, (2) the North American material described and figured by Say (1817) under the name *Cancer panope* Herbst, and (3) the type-specimen of *Cancer panope* figured by Herbst (1801, pl. 54: fig. 5). The material under (1) presumably is the species now generally known as *Panopeus herbstii*, that under (2) is a mixture of *Panopeus herbstii* and *Neopanope texana sayi* (Smith, 1869) (cf. Rathbun, 1930:335, 369), and that under (3) is *Sphaerozius scaber* (Fabricius, 1798). In order to legalize the current use of the name *Panopeus herbstii* for the common large East American mud crab, Holthuis (1979b:159) selected as the lectotype of *Panopeus herbstii* the specimen from oyster beds of the east coast of the United States, that Say (1817, pl. 4: fig. 3) figured.

By these actions it will remain possible to use both the generic name *Panopeus* H. Milne Edwards, 1834, and the specific epithet *herbstii* H. Milne Edwards, 1834, in the accustomed sense.

* *Panopeus africanus* A. Milne Edwards, 1867

Panopeus africanus.—Frade, 1950:11, 26.—Capart, 1951:148, fig. 54, pl. 3: fig. 3.—Monod, 1956:325, figs. 406–415.—Rossignol, 1957:82, 83.—Longhurst, 1957:374, 375, 380, 382; 1958:88.—Gauld, 1960:70.—Forest and Gantès, 1960:352.—Rossignol, 1962:118.—Guinot and Ribeiro, 1962:61.—Forest and Guinot, 1966:84.—Zariquiey Alvarez, 1968:404, fig. 134b [Spain; references].—Uschakov, 1970:443, 444, 447, 455 [listed].—Hartmann-Schröder and Hartmann, 1974:15.—Powell, 1979:127.

Panopeus sp.—Monod, 1956:335, figs. 435–438.

Eupanopeus africanus.—Bott, 1964:30.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 4♂, 1♀ (W).

Other Material: Liberia: Rock Spring, Monrovia, O. F. Cook, G. N. Collins, 1♀ (W). Free Port area, Monrovia, oyster cultch, 22 Apr 1953, G. C. Miller, 1♂ (W). Locality same, 24 Apr 1953, 1♀ ov (W).

Dahomey: Lagoon of Lac Nokoué near Zogbo, W of Cotonou, 29 Mar 1964, H. Hoestlandt, 1♀ (L). Point XI Lagoon near Contonou, 29 Mar 1964, H. Hoestlandt, 1♂ (L). Zogbo Lagoon near Contonou, 10 Apr 1964, H. Hoestlandt, 1♀ (L).

Nigeria: Harbor of Lagos, 13 Jun 1963, A. R. Longhurst, 1♂ (L). S bank of mouth of Escravos River near Ajudaibo, Niger delta, 05°34.5′N, 05°11.75′E, 30 Jul 1975, C. B. Powell, 1 large ♂ (L). W of Forcados town, near confluence of Odimodi Creek and Forcados River, 05°22′N, 05°26′E, 28 Feb 1976, C. B. Powell, 14 specimens (L). Niger delta, between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 1♂ (L).

Gabon: No specific locality, Duparquet, syntype of *Panopeus africanus*, 1 dry ♂ (W, USNM 20263).

Congo: Pointe-Noire, intertidal, Mar 1965, A. Crosnier, 2♂, 4♀ (1 ov) (W).

Zaire: Banana, mouth of Congo River, American Museum Congo Expedition 1909–1915, Jul–Aug 1915, H. Lang, 4♂, 5♀ (1 ov) (W). Data same, Jul 1915, 5♂, 3♀ (1 ov) (W).

Angola: Luanda, W coast; American Museum Congo Expedition 1909–1915, 21 Sep 1915, H. Lang, 1♀, 2 juv (W). Between Luanda and Cuanza, 23 km from Luanda, 20 Jun 1967, G. Hartmann, 1♀ (L). Lobito, 1899, P. Kamerman, 1♂ (L).

DESCRIPTION.—Capart, 1951:148.

Figures: Capart, 1951, fig. 54, pl. 3: fig. 3; Monod, 1956, figs. 406–415.

Male Pleopod: Capart, 1951, pl. 3: fig. 3 (Congo); Monod, 1956, figs. 410–414 (Senegal, Sierra Leone, Ivory Coast).

Color: "Coloration gris foncé à brun; extrémité des pinces noir et blanc" (Capart, 1951:148). Rossignol (1957:83) gave a more detailed color description: "marron plus ou moins foncée. Chélipèdes: face externe et bord supérieur de la main, de même que le pouce et le doigt, tête de nègre (bouts de doigts jaunâtres). Face inférieure et bord inférieure de la main jaunâtres."

MEASUREMENTS.—Our specimens have carapace widths ranging from 6 to 43 mm; the carapace widths of ovigerous females range from 17 to 30.5 mm.

REMARKS.—We suspect that Monod's *Panopeus* sp., a damaged male, 12 × 16 mm, from the Ivindo River, near Ogooué, a locality in a river some distance from the sea in Gabon, actually can be identified with this species. One of the characters used by Monod to distinguish this specimen is the laterally directed fifth anterolateral tooth on the carapace, which is also somewhat upturned; it is curved upward in some of our specimens. Rathbun (1921:439) noted that "there is considerable variation in the shape of the lateral teeth of the carapace . . . ," and she figured one specimen (1921, fig. 19a) in which the posterior teeth are directed almost laterally. The front of Monod's specimen is damaged. The deep sinus between the first and second tooth shown by Monod is also figured by Rathbun for three different specimens.

The male pleopod of Monod's specimen, which seems to terminate in a club-shaped tip rather than in the trilobed apex typical of *Panopeus*, may be abnormal or damaged; the specimen is quite small, so it may just be undeveloped. A survey of the pleopods of species of *Panopeus* in the Smithsonian Institution, in which males of all species but *P. convexus* A. Milne Edwards, 1880, are represented, reveals that all of the other species in the genus have the typically trilobed male pleopod.

Monod (1956:329) commented on the absence of the red spot on the inner surface of the ischium of the third maxilliped in the specimen from Ivindo. That spot, characteristic of *P. africanus*, is not always present in species in which it is known to occur (A. B. Williams, pers. comm.).

The occurrence of Monod's specimen from Gabon in a river is consistent with the known habitat preference of *P. africanus* for lagoons and estuaries.

Monod (1956:329) noted the occurrence of a red spot on the inner surface of the ischium of the third maxilliped in this species, as well as in *Eurypanopeus blanchardi* (p. 130). That spot also is characteristic of the western Atlantic *P. herbstii* H. Milne Edwards, 1834. In that species, Williams (1965:197) noted that in a sample of almost 600 specimens from Beaufort, North Carolina, that spot was present in 100% of the males but only in 55% of the females. The significance of the spot is unknown.

BIOLOGY.—*Panopeus africanus* is a characteristic inhabitant of estuaries and lagoons along the West African coast; it may also occur littorally and sublittorally. Longhurst (1958) found it in Sierra Leone in estuaries as well as offshore to a depth of 140 m. It is rarely found far from the intertidal zone.

Longhurst (1957) found this species in the stomach contents of the following fishes in the Sierra Leone River: *Arius latiscutatus* Günther, *Pomadasys jubelini* (Cuvier), *Diagramma macrolepis* (Boulenger), *Galeoides decadactylus* (Bloch), and *Cynoglossus senegalensis* (Kaup).

Apparently this species spawns all year. Ovigerous females have been collected in January, March, April, July, and November (Capart, 1951; Monod, 1956; Rossignol, 1957; p. 147 herein).

DISTRIBUTION.—Eastern Atlantic, from S Portugal and SW Spain southward to Angola, including the offshore islands of Fernando Poo, Principe, and São Tomé; possibly introduced to Durban Bay, South Africa (Barnard, 1954, 1955). Shallow water, usually in estuaries and lagoons. Monod (1956) summarized earlier records and reported many specimens from localities between Mauritania and Angola. Since 1956 it has been reported from the following localities.

Morocco: Oued Bou Regreg (Forest and Gantès, 1960).

Guinea: Conakry, 0–2.5 m; Île Roume, Îles de Los, shore (Uschakov, 1970).

Sierra Leone: Sierra Leone River (Longhurst, 1957). Off Sierra Leone, 0–140 m (Longhurst, 1958).

Ghana: Ada; off Accra, 8 m (Gauld, 1960).

Nigeria: Elechi Creek, Port Harcourt, 04°47′15″N, 06°48′45″E (Powell, 1979).

Principe: No specific locality (Frade, 1950; Forest and Guinot, 1966). Rio Papagaio, shore (Forest and Guinot, 1966).

São Tomé: No specific locality (Frade, 1950).

Congo: Lagoon of Loango (Rossignol, 1957). W of Pointe-Noire (Rossignol, 1962).

Angola: Mangais, Lobito (Bott, 1964). Baía de Luanda, shore; Baía do Lobito, shore; Praia da Rocha, near Benguela, shore (Guinot and Ribeiro, 1962). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Genus *Paractaea* Guinot, 1969

Paractaea Guinot, 1969d:241 [type-species: *Xantho rufopunctatus* H. Milne Edwards, 1834, by original designation; gender: feminine]; 1971:1071 [list of species: *Actaea margaritaria* A. Milne Edwards, 1867, not included]; 1976:249 (revision).

REMARKS.—The eastern Atlantic *Actaea margaritaria* A. Milne Edwards, 1867, was listed under neither *Actaea* (p. 1070) nor *Paractaea* (p. 1071) by Guinot (1971), who noted (1969d:244):

> Enfin, il convient de dire un mot de quelques autres espèces susceptibles d'entrer, après révision, dans le genre *Paractaea* gen. nov. En effet, un certain nombre d'espèces jusqu'à présent rattachées à *Actaea* et qui ne peuvent être conservées dans ce genre tel que nous l'avons délimité, offrent les mêmes caractères essentiels que les *Paractaea*. Il s'agit de *Actaea margaritaria* A. Milne Edwards, 1867, espèce est-atlantique.

In 1976 Guinot assigned *margaritaria* to *Paractaea*.

* *Paractaea margaritaria* (A. Milne Edwards, 1867)

Actaea margaritaria.—Capart, 1951:159.—Gauld, 1960:70.—Serène, 1961:197 [listed].—Rossignol, 1962:117.—Chace, 1966:637.—Forest and Guinot, 1966:77.—Guinot, 1969d: 224, 251 [discussion].

Actaea (Actaea) margaritaria.—Monod, 1956:294, figs. 357–360.—Guinot and Ribeiro, 1962:56.—Ribeiro, 1964:9.

Paractaea margaritaria.—Guinot, 1976:251.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 70, 33 m, branched Foraminifera, 1♀ (L).

Annobon: Sta 275, 9–69 m, rubble of coralline algae, 2♂ (W). Sta 282, 18–37 m, nodular coralline algae, 1♀, 3 juv (W). Sta 283, 51–55 m, nodular coralline algae, 3♂, 2♀ (L).

DESCRIPTION.—Capart, 1951:159.

Figures: Monod, 1956, figs. 357–360; Guinot, 1976, pl. 16: fig. 6.

Male Pleopod: Monod, 1956, figs. 358–360 (Ghana).

Color: "Rouge intense, une tache jaune en arrière des yeux" (Capart, 1951:159).

MEASUREMENTS.—Our specimens have carapace widths of 4 to 9 mm.

BIOLOGY.—*Paractaea margaritaria* is a sublittoral species, occurring on rough bottom in depths between 4–5 and 91 m. It has habitat preferences similar to those of *P. rufopunctata africana*; the two species were taken together at three stations by the *Calypso* (Forest and Guinot, 1966) and at two stations by the *Pillsbury*. Our material was collected on bottom with branched Foraminifera or the characteristic coralline algae found off Annobon. The *Calypso* specimens were taken in calcareous algae at four stations and on rocks and coral at two stations. Guinot (1976) reported one specimen from sand and gorgonians off Togo.

Off West Africa, ovigerous females have been collected in June and November (Guinot and Ribeiro, 1962; Ribeiro, 1964; Forest and Guinot, 1966). Chace (1966) recorded an ovigerous female from Saint Helena in April.

DISTRIBUTION.—West coast of Africa and Saint Helena (Chace, 1966). Off West Africa it is known from the Cape Verde Islands, Ghana, Gabon, and the offshore islands of the Gulf of Guinea: Annobon, São Tomé, and Principe; it has not previously been recorded from the African mainland as far north as Liberia. It is a sublittoral species, occurring in depths between 4–5 and 91 m. Monod (1956) reported material from Ghana and Annobon; since 1956 it has been recorded from the following:

Cape Verde Islands: No specific locality (Guinot, 1976). Porto da Praia, São Tiago (as La Praya) (Guinot, 1976). São Vicente (as Cap St. Vincent) (Guinot, 1976). Baía do Porto Grande, São Vicente, 3.5–11 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Ghana: Off Accra, 15 m (Gauld, 1960).

Togo: No specific locality (Guinot, 1976).

Principe: 01°43′N, 07°28′55″E, 37 m (Forest and Guinot, 1966).

São Tomé: 00°20′N, 06°46′E, 10 m; Ponta Diogo Vaz, W coast, 30 m; off Diogo Nunes, 4–5 m (all Forest and Guinot, 1966).

Annobon: No specific locality, 12 m (Guinot, 1976). 01°27.5′S, 05°36.5′E, 35 m, and Isla Tortuga, NW coast, 15–40 m (Forest and Guinot, 1966).

Gabon: No specific locality, in 50 m (Guinot, 1976). Off Libreville, 45–57 m (Rossignol, 1962).

Congo: Baie de Pointe-Noire, 13 m (Guinot, 1976).

Paractaea monodi Guinot, 1969

Actaea (Actaea) rufopunctata.—Monod, 1956:293 [part] [not *Actaea rufopunctata* H. Milne Edwards, 1834].

Actaea rufopunctata.—Guinot, 1969d:250 [discussion] [not *Actaea rufopunctata* H. Milne Edwards, 1834].

Paractaea monodi Guinot, 1969d:259, fig. 33; 1971:1072 [listed]; 1976:250 [listed], fig. 7.—Türkay, 1976b:61 [listed], 67.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Azores: No other data, paratypes, 1♂, 1♀ (W).

Madeira: S coast near Ponta da Oliveira, 32°39′N, 16°49′W, 0–20 m, diving, 15 Mar 1976, *Onversaagd* Sta 82, 1♂ (L).

Cape Verde Islands: São Vicente, 20 m, 26 Jul 1883, *Talisman*, paratype, 1♂ (W).

DESCRIPTION.—Guinot, 1969d:259.

Figure: Guinot, 1969d, fig. 33.

MEASUREMENTS.—Our specimens have carapace widths of 7 to 11 mm.

REMARKS.—Our specimen from the Cape Verde Islands, originally identified as *Actaea margaritaria*, may have been reported under that name by A. Milne Edwards and Bouvier (1900: 100, 101). Apparently this species and *P. margaritaria* were taken together by the *Talisman* off São Vicente.

The paratypes in the collection of the National Museum of Natural History, Smithsonian Institution, are cataloged under numbers USNM 22962 (Azores) and USNM 125482 (Cape Verde Islands).

BIOLOGY.—*Paractaea monodi* is a sublittoral species occurring from shallow water (0–20 and 10–30 m) to a depth of 100–150 m. The species was taken by the *Talisman* on sand, shells, and gravel and on coralline algae ("corallines") (A. Milne Edwards and Bouvier, 1900). Türkay (1976b) recorded it from blocks of rock in Funchal harbor and, from another locality, in 5–6 m.

Ovigerous females have been collected off the Canary Islands in June and the Cape Verde Islands in July (A. Milne Edwards and Bouvier, 1900).

DISTRIBUTION.—Eastern Atlantic, from the

Azores, Madeira, Ilhas Desertas, the Canary Islands, the Cape Verde Islands, and the Mediterranean; for comments on material from Mediterranean localities see Guinot (1969d:260, 261). Guinot (1969d) summarized the literature. We have found only the following records published since then:

Madeira: Funchal harbor; between Ponta da Garajau and Ponta da Oliveira, 5–6 m (Türkay, 1976b).

Canary Islands: Arrecife, E of Lanzarote (Guinot, 1976).

Egypt: W of Abou Kir; Abou Kir bay region: Rosetta to Port Said (Ramadan and Dowidar, 1976).

* *Paractaea rufopunctata africana* Guinot, 1976

Actaea rufopunctata.—Bouvier, 1906:496.—Balss, 1914:102.—Crosnier, 1964:31.—Forest and Guinot, 1966:76.

Actaea (Actaea) rufopunctata.—Monod, 1956:293 [part].

Paractaea rufopunctata forme *africana* Guinot, 1969d:251, fig. 26; 1971:1071 [listed].

Paractaea rufopunctata africana Guinot, 1976:250, pl. 16: fig. 5.

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 275, 9–69 m, rubble of coralline algae, 3♂, 1♀ (L, W). Sta 282, 18–37 m, nodular coralline algae, 1♂, 1♀ (L).

DESCRIPTION.—Guinot, 1969d:246 (*P. rufopunctata rufopunctata*), 251 (*P. rufopunctata* forme *africana*).

Figures: Guinot, 1969d, fig. 26; 1976, pl. 16: fig. 5.

MEASUREMENTS.—Our specimens have carapace widths of 13 to 18 mm.

REMARKS.—In her revision of *Actaea* and *Paractaea*, Guinot (1969d) recognized *Paractaea rufopunctata rufopunctata* as an Indo-West Pacific taxon and introduced the infrasubspecific name, *africana*, with no standing in nomenclature, for the tropical eastern Atlantic population; she later validated the name in 1976. In her discussion of the problem she noted (1969d:251) that "il y aura lieu de revenir sur le statut des représentants ouest-africains de *rufopunctata*, en d'autres termes de décider si ceux-ci méritent bien de constituer une forme distincte de la *rufopunctata* typique." Unfortunately, the *Pillsbury* material is not adequate for us to elucidate the problem.

BIOLOGY.—Off West Africa this species occurs from the intertidal zone to a depth of at least 45 m; there is one *Pillsbury* record of 9–69 m. It was taken at 10 stations by the *Calypso* (Forest and Guinot, 1966): three were on or near (0–6 m) shore, two were from depths of 6–8 m, and five were from depths ranging from 15 (15–40 m) to 45 m. The species apparently prefers rough bottom; the coralline algae habitat common around the offshore islands of the Gulf of Guinea has yielded several specimens from both the *Calypso* and the *Pillsbury* collections. This species also was found in the following habitats by the *Calypso* (Forest and Guinot, 1966): sand and rocks; rocks and coral; rocks, calcareous algae, and coral. Crosnier (1964) found the species in sponges, coral and marl on rocky bottom with gorgonians off Cameroon.

Off West Africa, ovigerous females have been recorded in June (Forest and Guinot, 1966).

DISTRIBUTION.—West Africa. Guinot (1969d) recognized a forme *africana* for the population occurring off tropical West Africa, from the offshore islands of the Gulf of Guinea: São Tomé, Annobon, and Principe, which she elevated to subspecific status in 1976. She erred, however, in considering the West African population to be exclusively insular (1969d:251); Crosnier (1964) has reported the species from the continental shelf off Cameroon. Guinot (1969d:259, fig. 33) assigned material from the Cape Verde Islands to *Paractaea monodi* Guinot (p. 149). West African records for *P. rufopunctata africana* are as follows:

Cameroon: No specific locality (Crosnier, 1964).

Principe: 01°35′N, 07°28′E, 45 m; 01°43′N, 07°28′55″E, 37 m; and Ponta da Mina, beach (Forest and Guinot, 1966).

São Tomé: No specific locality (Bouvier, 1906; Guinot, 1969d). Ponta Diogo Vaz, W coast, 0–6 and 30 m; in front of São Tomé, 8 m; W of Ponta Diogo Nunes, shore; in front of Ponta Oquedelrei, 6 m (all Forest and Guinot, 1966).

Annobon: No specific locality (Balss, 1914). 01°25′12″S, 05°36′05″E, 20 m, and NW side, Isla Tortuga, 15–40 m (Forest and Guinot, 1966; Guinot, 1976).

The identity of the material from Ascension Island assigned to this species by Benedict (1893)

and Rathbun (1930) remains to be determined. That material will be studied in a review of the decapods of Ascension now underway by Manning in collaboration with Fenner A. Chace, Jr.

Genus *Paraxanthias* Odhner, 1925

Paraxanthias Odhner, 1925:85 [type-species: *Xanthodes notatus* Dana, 1852, by original designation; gender: masculine].—Guinot, 1971:1069 [list of species].

Paraxanthias eriphioides (A. Milne Edwards, 1867)

Paraxanthias eriphioides.—Monod, 1956:304, figs. 371–375 [Cape Verde Islands; references].—Guinot and Ribeiro, 1962:57 [Cape Verde Islands].—Ribeiro, 1964:10 [Cape Verde Islands].—Guinot, 1968a:718 [discussion]; 1971: 1069 [listed].

Paraxanthias ?eriphioides.—Guinot, 1968a:720, figs. 48, 53 [Cape Verde Islands].

DISTRIBUTION.—Eastern Atlantic, from the Azores and the Cape Verde Islands; sublittoral, 10–85 m.

Genus *Pilumnopeus* A. Milne Edwards, 1863

Pilumnopeus A. Milne Edwards, 1863:289 [a genus without included nominal species; type-species: *Pilumnopeus crassimanus* A. Milne Edwards, 1867, a subjective junior synonym of *Ozius serratifrons* Kinahan, 1858, by subsequent designation by Balss, 1933b:33, 34; gender: masculine; name 1643 on *Official List*, there dated 1867 in error].—Takeda and Miyake, 1969:119 [definition; list of Indo-West Pacific species].

**Pilumnopeus africanus* (De Man, 1902)

Heteropanope (Pilumnopeus) africana.—Monod, 1956:270, figs. 319–325.

Pilumnopeus africanus.—Uschakov, 1970:455 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 224, Lagos, shore, sand beach, 1♀ (W).

Other Material: Liberia: Free Port area, Monrovia, oyster cultch, 13 Mar 1953, G. C. Miller, 1♂ (W).

Ivory Coast: Ile Chauve Souris, Lagune Ébrié, 4 Jan 1948, P. L. Dekeyser, 2♂, 2♀ (W).

Dahomey: Point XI Lagoon near Cotonou, brackish water (31g Cl/liter), 24 Mar 1964, H. Hoestlandt no 7, 1♂ (L). Ganvié lagoon near Cotonou, brackish water (30g Cl/liter), 20 Mar 1964, H. Hoestlandt no 11, 2♀ (1 ov) (L). Zogbo lagoon near Cotonou, brackish water (31 g Cl/liter), 10 Apr 1964, H. Hoestlandt no 13, 1♂, 1♀ (L).

Nigeria: Coastal lagoon, Kuramo Water, Lagos, Aug 1963, Federal Fisheries Service, 1♂, 1♀ ov (L).

Gabon: Port-Gentil, J. H. Logemann, 1♂ (L).

DESCRIPTION.—De Man, 1902:2–7.

Figures: Monod, 1956, figs. 319–325.

Male Pleopod: Monod, 1956, figs. 322–325 (Ivory Coast).

MEASUREMENTS.—Our specimens have carapace widths of 4 to 17 mm; the ovigerous females have carapace widths of 9 to 10 mm.

REMARKS.—It is with some hesitation that we assign the young female specimen from the *Pillsbury* to this species, but the distinctly spiniform anterolateral teeth of the carapace and the granular upper surface of the palm of the chela suggest that the specimen cannot be identified with the similar *P. caparti*.

BIOLOGY.—*Pilumnopeus africanus*, like *P. caparti*, is an inshore, estuarine, or lagoon species. All of the records of this species are from these kinds of inshore habitats; all of our specimens from Dahomey were taken from brackish water (30–31g Cl/liter).

Ovigerous females have been found in February, March and August (Monod, 1956; also herein).

DISTRIBUTION.—West Africa, from Guinea to Cameroon, in estuaries and lagoons. Monod (1956) summarized the earlier literature and reported on material from the Ivory Coast. The only mention of this species in the literature since 1956 is Guinea: No specific locality (Uschakov, 1970).

Pilumnopeus caparti (Monod, 1956)

Pilumnopeus africanus.—Capart, 1951:150, fig. 55, pl. 3: fig. 1 [not *Heteropanope africana* De Man, 1902].

Heteropanope (Pilumnopeus) caparti Monod, 1956:268, figs. 314–318.—Rossignol, 1962:117.

Heteropanope caparti.—Gauld, 1960:70.—Longhurst, 1957: 374; 1958:88.

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Nigeria, between Brass and Port Harcourt, Niger delta, May-Aug 1960, H. J. G. Beets, 1♂, 1♀ (L).

DESCRIPTION.—Capart, 1951:150.

Figures: Capart, 1951, fig. 55, pl. 3: fig. 1; Monod, 1956, figs. 314–318.

Male Pleopod: Capart, 1951, pl. 3: fig. 1 (Congo); Monod, 1956, figs. 316–318 (Ghana).

Color: According to Capart (1951:150) this species is "brun-rouge, les pinces plus claires, les doigts noirs à leur extrémité."

MEASUREMENTS.—Our specimens have carapace widths of 4 to 11 mm.

BIOLOGY.—*Pilumnopeus caparti* is an inshore, estuarine species; most of the material reported in the literature was collected at or near the mouths of rivers. Capart's (1951) material was taken in 6–8 m on brown, black mud, and one of Monod's specimens was taken from a beacon at a river mouth. Longhurst (1957) found this species in the stomach contents of *Arius latiscutatus* Günther in the Sierra Leone River and in 1958 characterized *P. caparti* as an estuarine, shallow shelf species; it was found on rocks, muddy sand, shelly mud, and sand. It also was reported by Longhurst in the latter paper from one shelf station in 72 m; that record appears to be questionable.

Ovigerous females have been collected in August (Capart, 1951).

DISTRIBUTION.—West Africa, from scattered localities between Sierra Leone and the Congo, usually in estuaries. Records in the literature include the following:

Sierra Leone: No specific locality, in estuaries (Longhurst, 1958). Freetown (Monod, 1956). Sierra Leone River (Longhurst, 1957).

Ghana: U.A.C. beach, Ada, River Volta (type-locality) (Monod, 1956; Gauld, 1960).

Cameroon: Mouth of Wouri (River) (Monod, 1956).

Congo: Mouth of Songololo River, Pointe-Noire (Rossignol, 1962).

Zaire: Crique de Banana, 06°01′S, 12°23′30″E, 6–8 m (Capart, 1951).

Genus *Pilumnus* Leach, 1815

Pilumnus Leach, 1815a:321 [type-species: *Cancer hirtellus* Linnaeus, 1761, by monotypy; gender: masculine; name 348 on *Official List*].—Takeda and Miyake, 1968:2 [list of Indo-West Pacific species].

Pilumnus hirtellus (Linnaeus, 1761)

Cancer hirtellus Linnaeus, 1761:493.

Pilumnus hirtellus.—Forest and Gantès, 1960:352 [Morocco].—Maurin, 1968a:107 [Mediterranean].—Zariquiey Alvarez, 1968:392, figs. 2g, 128c,d, 129f [Spain; references].—Christiansen, 1969:75, fig. 30, map 24 [Scandinavia].—Türkay, 1976b:61 [listed], 69 [Madeira].

SYNONYM.—*Pilumnus hirtellus ponticus* Czerniavsky, 1868.

DISTRIBUTION.—Eastern Atlantic, from Norway and British Isles southward to NW Morocco, Madeira, the Cape Verde Islands, Mediterranean; sublittoral, to a depth of 15–20 m.

Pilumnus inermis A. Milne Edwards and Bouvier, 1894

Pilumnus inermis.—Monod, 1956:247, figs. 291–295.—Longhurst, 1958:88.—Gauld, 1960:70.—Rossignol, 1962:117.—Crosnier, 1964:31.—Forest and Guinot, 1966:70.—Zariquiey Alvarez, 1968:391 [Portugal; references].—Uschakov, 1970:455 [listed].—Türkay, 1976a:25 [listed], 38, fig. 26 [Portugal in part]; 1976b:61 [listed], 69.

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Azores: Ilha do Faial, *Talisman*, syntype of *Pilumnus hirtellus* var. *inermis*, 1 damaged ♀ (W, USNM 22951).

Madeira: S of Madeira, 32°39′N, 16°49′W, 125–150 m, shells and shell agglomerates, triangular dredge, 16 Mar 1976, *Onversaagd* Sta 94, 1♂, 2♀, 1 juv (L).

Senegal: Around Dakar, 28 Jan 1941, Th. Monod, 1♂ (W).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1894:40.

Figures: Monod, 1956, figs. 291–295.

Male Pleopod: Monod, 1956, figs. 293–295 (Senegal); Türkay, 1976a, fig. 26 (Morocco).

MEASUREMENTS.—Our specimens have carapace widths of 4.5 to 13 mm. The damaged female syntype has a carapace width of 11.6 mm.

BIOLOGY.—*Pilumnus inermis* is generally a sublittoral species; Monod (1956:249) recorded one specimen taken at a beach, but the majority of

the records in the literature are from depths below 4–5 m. Of the eight West African records in Monod (1956) for which depth is given, seven are from depths between 15 and 30 m. Indeed, literature records for this species suggest that it lives in shallower water in the Gulf of Guinea than it does in the northern part of its range. Nunes-Ruivo (1961) found the species in 350 m off Portugal, and Türkay (1976a) reported it in depths between 120 and 375 m off Morocco and (1976b) recorded it from ca 150 m, 220 m, and 110–440 m off Madeira. Forest and Guinot (1966: 71) pointed out that of 14 stations at which this species was taken by the *Calypso* in the Gulf of Guinea, 13 were in depths between 4–5 and 21 m.

This species, like most *Pilumnus*, prefers a rough bottom. Longhurst (1958) reported it from shelly sand off Sierra Leone, and Crosnier (1964) took it in sponges, coral and marl on rocky bottom with gorgonians off Cameroon. Rossignol (1962) reported it from muddy sand with *Antedon* off Pointe-Noire. The *Calypso* collected it from a variety of bottoms off São Tomé and Principe islands in the Gulf of Guinea, usually on coralline algae or a mixture of coralline algae and other substrates (Forest and Guinot, 1966).

Off West Africa, ovigerous females have been collected in February, March, April, June, and July (Monod, 1956; Forest and Guinot, 1966). Nunes-Ruivo (1961) reported ovigerous females taken off Portugal in August.

DISTRIBUTION.—Eastern Atlantic, from Portugal, the Azores, Madeira, the Cape Verde Islands, and the African coast from Morocco and Cabo Bojador, Spanish Sahara, southward to the Congo and possibly Gabon (that record based on material collected by Heurtel, whose localities are unreliable, as pointed out by Monod, 1956), including the offshore islands of the Gulf of Guinea, Principe and São Tomé; sublittoral, in 4–5 m to 400 m. Monod (1956) reported material from the Azores, Madeira, Spanish Sahara, Senegal, Guinea, Guinea-Bissau, Sierra Leone, Ghana, Principe, São Tomé, and Gabon; since then the species has been recorded from the following:

Madeira: No specific locality; Funchal harbor, ca. 150 m, 220 m, and 110–440 m (Türkay, 1976b).

Morocco: 33°19′N, 09°00′W, 120–180 m; 33°05.5′N, 09°18′W, 160–250 m; 31°35′N, 10°05′W, 150–160 m; 31°-01′N, 10°16′W, 360–375 m (all Türkay, 1976a).

Guinea: No specific locality (Uschakov, 1970).

Sierra Leone: No specific locality, in 44–76 m (Longhurst, 1958).

Ghana: Off Accra, 15 m; Prampram; Dixcove (all Gauld, 1960).

Cameroon: No specific locality (Crosnier, 1964).

Principe: 01°42′30″N, 07°28′E, 21 m; 01°36′50″N, 07°-22′10″E, 19 m; 01°43′10″N, 07°28′20″E, 73 m; between Ponta da Mina and Ilhéu Santana, 8–10 m and 10–12 m; in front of [Cais de] Santana, 11 m; in front of Praia Pequena, 5–6 m (all Forest and Guinot, 1966).

São Tomé: Off São Tomé, 5 m; 00°20′N, 06°46′E, 10 m; 00°25′15″N, 06°43′05″E, 8–30 m; Baía de Ana de Chaves, 5 m; in front of Ponta Oquedelrei, 6 m; in front of Praia Lagarto, 5–6 m; off Ponta Diogo Nunes, 4–5 m (all Forest and Guinot, 1966).

Congo: Pointe-Noire, 8–9 m (Rossignol, 1962).

* *Pilumnus perrieri* A. Milne Edwards and Bouvier, 1898

Pilumnus perrieri.—Capart, 1951:143 [discussion].—Monod, 1956:244, figs. 288–290.—Rossignol, 1962:117.—Forest and Guinot, 1966:70.—Uschakov, 1970:455 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 23, 42 m, foliate brown to orange bryozoans, 1♀ (L). Sta 27, 33 m, 1♂, 1♀ ov (W).

Nigeria: Sta 248, 33 m, 1♂ (L).

Other Material: Guinea: Off Guinea, 30 m, 9 Mar 1953, J. Forest, 1♂ (W).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:73.

Figures: Monod, 1956, figs. 288–290.

MEASUREMENTS.—Our specimens have carapace widths of 7 to 17 mm; the carapace width of the ovigerous female is 9 mm.

BIOLOGY.—*Pilumnus perrieri*, like *P. stebbingi*, is a sublittoral shelf species, apparently preferring rough bottom in water of moderate depth; Forest and Guinot (1966) reported that these species were taken together at five stations off Principe and Annobon by the *Calypso*. The *Pillsbury* specimens were collected on bottom with foliate brown to orange bryozoans. The *Calypso* specimens were

taken on mud; mud with *Arca*; mud, calcareous algae, and shell; rocks; and on calcareous algae (five stations). Rossignol (1962:117) noted that the species is "assez commun dans le coralligène et les fonds rocheux."

Ovigerous females have been collected in March and May (Monod, 1956; *Pillsbury*).

DISTRIBUTION.—West Africa, from scattered localities between the Cape Verde Islands and Senegal to Gabon; sublittoral, in depths between 20 and 91 m. Monod (1956) summarized the earlier literature and reported material from Senegal and Guinea; since 1956 the species has been reported from the following:

Guinea: No specific locality (Uschakov, 1970).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Principe: Between Ilhéu Caroço and Ponta do Pico Negro, 40 m (Rossignol, 1962). 01°38′25″N, 07°22′05″E, 31 m; 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; in front of Baía de Santo Antonio, 50 m (Forest and Guinot, 1966).

Annobon: 01°27.5′S, 05°36.5′E, 35 m; N of San Antonio, 23 m (Forest and Guinot, 1966).

Rio Muni: W Corisco Bay, 40 m (Rossignol, 1962).

Gabon: W of Libreville, 45–57 m; W of Nyanga, 03°S, 65–70 m (Rossignol, 1962).

Pilumnus spinifer H. Milne Edwards, 1834

?*Pilumnus hirtellus*.—Capart, 1951:140, fig. 50 [Spanish Sahara] [not *Pilumnus hirtellus* Linnaeus, 1761)].

Pilumnus spinifer.—Monod, 1956:251, figs. 296, 297 [Azores, Mauritania; references].—Zariquiey Alvarez, 1968:391, fig. 129a–e [Spain; references].—Christiansen, 1969:77, fig. 31, map 25 [Scandinavia].—Türkay, 1976b:61 [listed], 69 [Madeira].

REMARKS.—There is a dry syntype of this species (USNM 20262), a male, carapace width 30.8 mm, from the Mediterranean, in the collections of the Smithsonian Institution.

DISTRIBUTION.—Eastern Atlantic, from Sweden, Portugal, Azores, Mediterranean, NW coast of Africa to Mauritania; sublittoral, to about 100 m.

**Pilumnus stebbingi* Capart, 1951

Pilumnus stebbingi Capart, 1951:144, fig. 52, pl. 3: fig. 6.—Monod, 1956:241, 632, figs. 279–287.—Longhurst, 1958: 88.—Rossignol, 1962:116.—Guinot and Ribeiro, 1962: 52.—Forest and Guinot, 1966:69.

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 24, 35–37 m, dark red bryozoans, 1♂ (L).

Annobon: Sta 283, 51–55 m, nodular coralline algae, 26♂, 39♀ (7 ov), 15 juv (L, W). Sta 284, 73 m, black basaltic rocks, 2♀, 2 juv (W).

DESCRIPTION.—Capart, 1951:144.

Figures: Capart, 1951, fig. 52, pl. 3: fig. 6; Monod, 1956, figs. 279–287.

Male Pleopod: Capart, 1951, pl. 3: fig. 6 (Angola); Monod, 1956, figs. 284–287 (Senegal, Guinea).

Color: Monod (1956:241) made the following observations on specimens from Guinea: "Epines rouges sur les pattes, qui sont annelées de rouge." Rossignol (1962:116) added: "Caractéristique par son tomentum épais, feutré, de couleur grise à gris-noir avec, sur les pinces, des tubercules épineux rouges."

MEASUREMENTS.—Our specimens have carapace widths of 3 to 13 mm; the carapace widths of ovigerous females is 10 to 12 mm.

REMARKS.—The ornamentation of the chelae in our specimens is very variable: some have only pink tubercles, others pink and white tubercles; in some specimens the entire outer surface of the chela is covered with tubercles, in others the tubercles are restricted to the upper half of the surface.

BIOLOGY.—*Pilumnus stebbingi* is a shelf rather than shore species, inhabiting moderate depths on relatively rough bottom. All but three of the 20 depth records in the literature are from depths between 30 and 73 m; the exceptions are 25–30 m (Capart, 1951), 10–25 m (Longhurst, 1958), and 23 m (Forest and Guinot, 1966). Capart's (1951) material was collected on rocks; rocks, gravel, and coral; and sandy, rocky green mud. In addition to several records of the species from the coralline algae off Principe and Annobon, the same habitat in which the *Pillsbury* collected a relatively large series off the latter island, Forest and Guinot (1966) reported the species from mud, shells, gorgonians and ascidians; mud and com-

pacted sand (sable construit); mud, shells, and *Cidaris*; and, either mud and shell or sand, rocks and coral and calcareous algae. Longhurst (1958) found the species on muddy shell or shelly sand.

Ovigerous females have been collected in May, June, and September (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Off West Africa, from scattered localities between Spanish Sahara and Angola, including the offshore islands of Principe and Annobon; sublittoral, in depths between 10–25 m and 73 m. Capart (1951) reported material from Gabon and Angola, and Monod (1956) added records from Senegal, Guinea, Sierra Leone, Annobon, and Principe. Records in the literature since 1956 include the following:

Spanish Sahara: 21°05′N, 17°14′W, 43–45 m (Forest and Guinot, 1966).

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, in 10–25 m (Longhurst, 1958).

Principe: 01°35′N, 07°28′E, 45 m; 01°38′25″N, 07°22′-05″E, 31 m; 01°38′35″N, 07°21′35″E, 35 m; 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′25″E, 37 m (all Forest and Guinot, 1966).

Annobon: 01°27.5′S, 05°36.5′E, 35 m; N of San Antonio, 23 m (both Forest and Guinot, 1966).

Gabon: W of Nyanga, 65–70 m (Rossignol, 1962).

Cabinda: W of Cabinda, 55 m (Rossignol, 1962).

Angola: Luanda (Guinot and Ribeiro, 1966).

Genus *Platychelonion* Crosnier and Guinot, 1969

Platychelonion Crosnier and Guinot, 1969:725 [type-species: *Platychelonion planissimum* Crosnier and Guinot, 1969, by monotypy; gender: neuter.].—Guinot, 1971:1078 [transferred with a question mark to Geryonidae].

Platychelonion planissimum Crosnier and Guinot, 1969

Platychelonion planissimum Crosnier and Guinot, 1969:725, figs. 1–9 [Congo].

DISTRIBUTION.—Known only from the type-locality, Pointe-Noire, Congo, in 10–20 m.

Genus *Platypodiella* Guinot, 1967

Platypodiella Guinot, 1967d:562 [type-species: *Cancer spectabilis* Herbst, 1794, by original designation; gender: feminine]; 1971:1074 [list of species].

Platypodiella picta (A. Milne Edwards, 1869)

Cancer geographicus.—Monod, 1933b:548 [footnote, nomen nudum].

Platypodia picta.—Monod, 1956:299, figs. 363–367 [Senegal, Sierra Leone, Ghana, Congo; references].—Rossignol, 1957:83, fig. 3 [Congo].—Longhurst, 1958:88 [Sierra Leone].—Gauld and Buchanan, 1959:128 [Ghana].—Gauld, 1960:70 [Ghana].—Guinot and Ribeiro, 1962:57 [Cape Verde Islands].—Rossignol, 1962:117 [Congo].—Ribeiro, 1964:10 [Cape Verde Islands].—Forest and Guinot, 1966:79 [São Tomé].—Guinot, 1967d:562 [listed], 563 [discussion; transferred to *Platypodiella*].

Platypodiella picta.—Guinot, 1971:1074 [listed].

DISTRIBUTION.—West Africa, from the Canary Islands, the Cape Verde Islands, several mainland localities between Senegal and the Congo, and the offshore islands of Annobon and São Tomé in the Gulf of Guinea; shallow water, intertidal and sublittoral.

Genus *Pseudomedaeus* Guinot, 1968

Pseudomedaeus Guinot, 1968a:718 [discussion], 726 [type-species: *Medaeus africanus* Monod, 1956, by original designation; gender: masculine]; 1971:1069 [list of species].

**Pseudomedaeus africanus* (Monod, 1956)

?*Paraxanthias eriphioides*.—Capart, 1951:161, fig. 61 [fide Guinot and Ribeiro, 1962:58] [not *Paraxanthias eriphioides* (A. Milne Edwards, 1867)].

Xanthias tuberculidens.—Capart, 1951, pl. 3: fig. 13 [fide Guinot and Ribeiro, 1962:58] [not *Xanthias tuberculidens* Rathbun, 1911].

Medaeus africanus Monod, 1956:306, fig. 380.—Longhurst, 1958:88.—Gauld,1960:70.—Rossignol,1962:118.—Guinot and Ribeiro, 1962:58, fig. 25.—Crosnier, 1964:34.—Forest and Guinot, 1966:80.—Crosnier, 1967:328, figs. 5, 11, 12, 15.—Guinot, 1968a:718 [discussion], 726, 727 [listed].

Pseudomedaeus africanus.—Guinot, 1968a:726 [discussion], 727 [listed], fig. 57; 1971:1069 [listed].—Williams, 1978:553, fig. 4*a*.

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 64, 68 m, 2♂ (L, W).

Geronimo Material: Gabon: Sta 211, 100 m, 1♂ (W).

Other Material: Dahomey: Off Dahomey, 55 m, Oct 1963, A. Crosnier, 2♀ (W).

DESCRIPTION.—Monod, 1956:306.

Figures: Capart, 1951, fig. 61, pl. 3: fig. 13; Monod, 1956, fig. 380; Guinot and Ribeiro, 1962, fig. 25; Crosnier, 1967, figs. 5, 11, 12, 15.

Male Pleopod: Capart, 1951, pl. 3: fig. 13 (Angola); Guinot and Ribeiro, 1962, fig. 25 (Spanish Sahara); Williams, 1978, fig. 4*a* (Gabon).

MEASUREMENTS.—Our specimens have carapace widths of 5 to 21 mm; the largest was taken by the *Geronimo*.

BIOLOGY.—*Pseudomedaeus africanus* is an offshore species, living on the shelf and upper slope in depths between 34 and 200 m. Crosnier (1964) characterized it as a cold water species, living in depths greater than 50 m off Cameroon. Longhurst (1958) found it on shelly mud in 34 to 100 m off Sierra Leone, and Gauld (1960) reported it from colonies of *Dendrophyllia* in 100 m off Ghana. A large series of more than 70 specimens was collected by the *Calypso* on mud shells, gorgonians and ascidians in 43–45 m off Spanish Sahara (Forest and Guinot, 1966).

Ovigerous females have been collected in March and May (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—West Africa, from scattered localities between Spanish Sahara and Angola, in depths between 34 and 200 m. Records since 1956 include the following:

Spanish Sahara: 21°05'N, 17°14'W, 43–45 m (Forest and Guinot, 1966).

Senegal: Dakar (Guinot, 1968a).

Sierra Leone: No specific locality, in 34–100 m (Longhurst, 1958).

Ghana: Off Accra, 100 m (Gauld, 1960).

Dahomey: No specific locality, 55 m (Williams, 1978).

Cameroon: No specific locality, deeper than 50 m (Crosnier, 1964).

Gabon: No specific locality (Crosnier, 1967). W of Libreville, 45–57 m, and W of Nyanga, Pointe Panga, 03°10'S (Rossignol, 1962). 02°32'S, 09°05'E, 101 m (Williams, 1978).

Congo: No specific locality (Crosnier, 1967). WSW of Pointe-Noire, 120 m (Rossignol, 1962).

Angola: Ilha de Luanda, 105 m (Guinot and Ribeiro, 1962).

Genus *Xantho* Leach, 1814

Xantho Leach, 1814:430 [type-species: *Cancer incisus* Leach, 1814, by monotypy; gender: masculine; name 1016 on *Official List*].—Guinot, 1971:1067 [list of species].

Salax Gistel, 1848:xi [substitute name for *Xantho* Leach, 1814; type-species: *Cancer incisus* Leach, 1814; gender; masculine].

Xantho incisus (Leach, 1814)

Xantho floridus.—Chapman and Santler, 1955:374 [Azores] [not *Cancer floridus* Linnaeus, 1767].

Xantho (Xantho) incisa.—Monod, 1956:274 [Cape Verde Islands, São Tomé(?); references].

Xantho incisus.—Figueira, 1960:9 [Azores].—Forest and Gantès, 1960:352 [Morocco].

Xantho incisus incisus.—Zariquiey Alvarez, 1968:398 [Spain; references].—Guinot, 1968a:703, figs. 17, 26 [discussion]; 1971:1067 [listed].—Türkay, 1976b:61 [listed], 68 [Madeira, Ilhas Desertas].

REMARKS.—There is material of this species from the Azores and the Canary Islands, but not from tropical West Africa, in the collection of the Smithsonian Institution.

In the Mediterranean this species is replaced by *Xantho granulicarpus* Forest, 1953 (Zariquiey Alvarez, 1968:398).

DISTRIBUTION.—Eastern Atlantic, from the North Sea southward to Morocco, including the Azores, Madeira, Ilhas Desertas, Canary Islands, and Cape Verde Islands; possibly also from São Tomé and Principe islands in the Gulf of Guinea (see Monod, 1956:274). It usually lives in shallow water, littorally to 30–40 m, but also has been recorded from as deep as about 100 m.

Xantho pilipes A. Milne Edwards, 1867

Xantho (Xantho) pilipes.—Monod, 1956:275, figs. 326–329 [Mauritania, Senegal; references].—Guinot and Ribeiro, 1962:53 [Angola].

Xantho pilipes.—Zariquiey Alvarez, 1968:395, fig. 130b [Spain; references].—Guinot, 1968a:704 [discussion].—Christiansen, 1969:79, fig. 32, map 26 [Scandinavia].—

Guinot, 1971:1068 [listed].—Türkay, 1975a:71 [listed], 74, figs. 4, 5 [Spanish Sahara].

DISTRIBUTION.—W coast of Norway, Shetland Isles, and England southward to Angola, Mediterranean; shallow water, intertidal to about 40 m.

Xantho sexdentatus (Miers, 1881)

Xantho sexdentatus.—Capart, 1951:157.—Guinot, 1968a:704 [discussion]; 1971:1068 [listed].
Xantho (Xantho) sexdentata.—Monod, 1956:277, figs. 330–334.

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Senegal: Les Almadies, Dakar, 0–0.5 m, under stones, 9 Jun 1964, F. M. Bayer, R. B. Manning, L. B. Holthuis, 1♂, 1 juv (L).

DESCRIPTION.—Miers, 1881a:211.
Figures: Monod, 1956, figs. 330–334.
Male Pleopod: Monod, 1956, figs. 332–334 (Senegal).

MEASUREMENTS.—Our specimens have carapace widths of 6 and 8 mm.

BIOLOGY.—*Xantho sexdentatus* is a shallow water species, occurring from the intertidal zone to a depth of 23 m. Apparently it is a characteristic inhabitant of rocky shores of Senegal (Sourie, 1954a).

Ovigerous females have been collected in January, February, July, and October (Monod, 1956).

DISTRIBUTION.—West Africa, where it is known only from the coasts of Spanish Sahara, Mauritania, and Senegal, from the intertidal zone to a depth of 23 m. Monod (1956) summarized earlier records. We have found no references to this species published since 1956, other than the remarks of Guinot (1968a) as part of her revision of the xanthids.

Genus *Xanthodius* Stimpson, 1859

Xanthodius Stimpson, 1859:52 [type-species: *Xanthodius sternberghii* Stimpson, 1859, by monotypy; gender: masculine; name 379 on *Official List*].—Guinot, 1971:1068 [list of species; *Xantho denticulata* White not included].

**Xanthodius denticulatus* (White, 1848)

Xantho (Xantho) denticulata.—Monod, 1956:280, figs. 335–339.
Xantho denticulata.—Gauld, 1960:70.
Xantho (Xantho) denticulatus.—Forest and Guinot, 1966:74.
Xantho denticulatus.—Guinot, 1968a:700 [discussion].
Xanthodius denticulatus.—Guinot, 1968a:712 [discussion].
[Xantho] denticulatus.—Guinot, 1971:1068 [listed; "Parfois aussi, rangé dans *Xanthodius*"].

MATERIAL EXAMINED.—*Pillsbury Material:* Fernando Poo: Sta 258, shore, 1♀ (L).
Annobon: Sta 271, shore, sand beach: 1♀ (L). Sta 275, 9–69 m, rubble of coralline algae, 1♀, 1 juv (W).

DESCRIPTION.—Monod, 1956:281.
Figures: Monod, 1956, figs. 335–339.
Male Pleopod: Monod, 1956, figs. 337–339 (Ghana).

MEASUREMENTS.—Our specimens have carapace widths of 5 to 11 mm.

REMARKS.—We assign this species, which was not assigned to any genus in Guinot's preliminary revision (1968a, 1971), to *Xanthodius*. Guinot (1971:1068) noted that it and three other xanthids, including the West African *Cycloxanthops occidentalis*, were "au voisinage de *Macromedaeus* [Ward, 1942], et présentant également des affinités avec *Leptodius* et peut-être aussi avec *Cycloxanthops*, trois-quatre espèces apparentées." Apparently this problem is under study by Guinot.

BIOLOGY.—*Xanthodius denticulatus* is a shallow water species, living from the intertidal zone to a depth of 21 m or more; it was taken in depths of 11 m or less in 11 of 12 of the stations occupied by the *Calypso* (Forest and Guinot, 1966). One of the collections taken by the *Pillsbury* was in 9–69 m, so it may also occur somewhat deeper than 21 m. It appears to be fairly abundant sublittorally off São Tomé, where it was taken at 9 stations by the *Calypso* (Forest and Guinot, 1966). The *Pillsbury* specimens were taken from shore stations and in the offshore bed of coralline algae off Annobon. The following bottom types were noted for the *Calypso* collections: calcareous algae (5 stations); rocks or sand and rocks (4 stations); and algae and calcareous algae (1 station).

Off West Africa ovigerous females have been

collected in February and June (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—Atlantic. Western Atlantic from Bermuda and the Bahamas southward to Brazil. Eastern Atlantic, from Ghana on the mainland and the offshore islands of the Gulf of Guinea: Fernando Poo, Principe, São Tomé, and Annobon; shallow water, intertidal to at least 21 m, possibly as deep as 69 m. Monod (1956) was the first to record the species from West Africa; he reported material from Ghana, São Tomé, and Annobon. Records in the literature since 1956 include the following:

Ghana: Prampram and Winneba, intertidal (Gauld, 1960).

Principe: 01°42'30"N, 07°28'E, 21 m; Ponta da Mina, beach (Forest and Guinot, 1966).

São Tomé: No specific locality, shore; 00°20'N, 06°46'E, 10 m; off São Tomé 8 m; in front of Ponta Oquedelrei, 6 m; Ilhéu das Cabras, 0–2 m; in front of the harbormaster's office, shore; in front of Praia Lagarto, 5–6 m; off Ponta Diogo Nunes, 4–5 m; in front of Ponta São Sebastião, 11 m (all Forest and Guinot, 1966).

Annobon: N of San Antonio, 9 m (Forest and Guinot, 1966).

Xanthodius inaequalis faba (Dana, 1852)

Actaeodes faba Dana, 1852b:195; atlas, 1855 pl. 11: fig. 1.

Chlorodius (Leptodius) convexus A. Milne Edwards, 1869:410.

Xantho (Leptodius) inaequalis convexa.—Monod, 1956:284 [part of synonymy], 290, figs. 341a, 349, 350.—Guinot and Ribeiro, 1962:55.—Ribeiro, 1964:8.

Xanthodius (Leptodius) inaequalis convexus.—Guinot, 1968a:712 [listed].

Xanthodius inaequalis convexus.—Guinot, 1968a:714 [discussion], fig. 31; 1971:1068 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Cape Verde Islands, São Vicente, 26 Jul 1883, *Talisman*, 1♂, 1♀ (L).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:97.

Figures: A. Milne Edwards and Bouvier, 1900, pl. 17: figs. 1–6.

Male Pleopod: Monod, 1956, figs. 349, 350 (Cape Verde Islands).

Color: "Coloration vert olivâtre, yeux grenat, pattes ambulatoires lavées de violet" (Monod, 1956:290).

REMARKS.—At least two authors, Odhner (1925:37, footnote, and 80) and Monod (1933b: 511–513), have pointed out that *Chlorodius convexus* A. Milne Edwards, 1869, from the Cape Verde Islands, is conspecific with *Actaeodes faba* Dana, 1852, from the same locality; Dana's name has priority and must be used for the taxon from the Cape Verde Islands.

Monod (1956:284, synonymy) noted that A. Milne Edwards (1869) included material from Gabon as well as from the Cape Verde Islands in his original account of *Chlorodius convexus*; we can find only localities from the Cape Verde Islands in his account (São Vicente, Santa Luzia, Maio, Santiago).

BIOLOGY.—Like the nominate subspecies, *X. inaequalis faba* is a littoral species inhabiting rocky shores. Monod (1956) recorded one specimen taken in pools with coral, and Guinot and Ribeiro (1962) and Ribeiro (1964) found it in rocks, on calcareous algae, and in worm tubes on rocks.

Ovigerous females have been collected in May, August, September, and October (Monod, 1956; Guinot and Ribeiro, 1962; Ribeiro, 1964).

DISTRIBUTION.—Known only from the Cape Verde Islands, where it occurs in the littoral zone. The nominate subspecies, *Xanthodius inaequalis inaequalis* occurs on the African mainland and the offshore islands of the Gulf of Guinea. Monod (1956) summarized the literature. Records since his paper were published include the following:

Cape Verde Islands: No specific locality (Guinot, 1968a). Baía das Gatas, Praia da Matiota, and Baía da Calheta, São Vicente; Baía de Sal Rei, Boavista; Pedra Lume, Sal; and Baía do Tarrafal and Porto da Praia, São Tiago (all Guinot and Ribeiro, 1962; Ribeiro, 1964).

**Xanthodius inaequalis inaequalis* (Olivier, 1791)

Xantho faba.—Capart, 1951:155, fig. 58, pl. 3: fig. 14 [not *Actaeodes faba* Dana, 1852].

Xantho (Leptodius) inaequalis punctata.—Monod, 1956:284 [part of synonymy], 286, figs. 340, 341b, 342–348.

Xantho inaequalis.—Gauld and Buchanan, 1959:127.—Gauld, 1960:70.—Bassindale, 1961:491, fig. 5.

Xantho (Leptodius) inaequalis inaequalis.—Guinot and Ribeiro, 1962:54.—Forest and Guinot, 1966:75.—Guinot, 1968a: 712 [listed].

Leptodius angolensis Bott, 1964:30, fig. 3, pl. 1: figs. 4, 5.—Guinot, 1968a:712 [discussion].

Xanthodius inaequalis inaequalis.—Guinot, 1968a:714 [discussion]; 1971:1068 [listed].

SYNONYM.—*Leptodius punctatus* Miers, 1881.

MATERIAL EXAMINED.—*Pillsbury Material:* Fernando Poo: Sta 257, shore, 2♂, 1♀ (L). Sta 258, shore, 15♂, 17♀ (8 ov), 4 juv (W).

Annobon: Sta 271, shore, 2♀, 2 juv (L).

Other Material: Senegal: Dakar, littoral zone, very rocky, 30 Dec 1965, 1♂ (W). Dakar, littoral zone, 2 Aug 1966, D. E. Harvey, 2♂, 1 juv (W). Dakar: low tide, R. Mauny, 3♂ (W). Soumb-Dioun, Dakar, shore, 0–0.5 m, 9 Jun 1964, F. M. Bayer, R. B. Manning, L. B. Holthuis, 6♂, 7♀ (3 ov) (L, W). Les Almadies, Dakar, among rocks, near watermark, 0–0.5 m, 9 Jun 1964, F. M. Bayer, R. B. Manning, L. B. Holthuis, 9♂, 7♀ (1 ov) (L).

DESCRIPTION.—Capart, 1951:155.

Figures: Capart, 1951, fig. 58, pl. 3: fig. 14; Monod, 1956, figs. 340–348.

Male Pleopod: Capart, 1951, pl. 3: fig. 14 (Angola); Monod, 1956, figs. 342–348 (Senegal).

Color: "Coloration brun rougeâtre avec des taches plus claires; les doigts noirs" (Capart, 1951: 155). Monod (1956:285) noted that West African specimens are "brun-chocolat marbré de gris, avec des yeux rouge vif."

MEASUREMENTS.—Our specimens have carapace widths of 3 to 24 mm; the carapace widths of ovigerous females range from 9 to 18 mm.

REMARKS.—Guinot and Ribeiro (1962:55) correctly pointed out that Monod (1956) was in error in using Miers' (1881a) name for the population of this species occurring south of the Cape Verde Islands. The type-locality for both *Cancer inaequalis* Olivier, 1791, and *Leptodius punctatus* Miers, 1881, is Senegal (Gorée), so Olivier's name clearly has priority.

BIOLOGY.—*Xanthodius inaequalis inaequalis* is an intertidal species, characteristic of rocky shore habitats of West Africa. Bassindale (1961) reported that it occurred across the whole tidal flat off Tenkpobo, Ghana.

Apparently this species breeds all year. Ovigerous females have been collected in January, March, April, May, June, July, September, October, and November (Monod, 1956; Guinot and Ribeiro, 1962; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—West Africa, from Mauritania southward to Angola as well as from the offshore islands of the Gulf of Guinea, Principe, São Tomé, Fernando Poo, and Annobon; intertidal. It has not been recorded previously from Fernando Poo. In the Cape Verde Islands it is replaced by *Xanthodius inaequalis faba*. Monod (1956) summarized the earlier literature and reported numerous specimens from localities between Senegal and Angola; records in the literature since 1956 include the following:

Ghana: No specific locality (Gauld, 1960). Tenkpobo (Gauld and Buchanan, 1959; Bassindale, 1961).

Principe: Ponta da Mina; Santo António (Forest and Guinot, 1966).

São Tomé: Praia Pantufo; Praia Melão; W of Ponta Diogo Nunes; off the harbormaster's office; Ilhéu das Cabras; Praia das Conchas (all Forest and Guinot, 1966).

Angola: Baía de Benguela and Mangais, Lobito (type-localities of *Leptodius angolensis*) (Bott, 1964). Baía do Lobito; Praia da Rocha, Benguela; Baía da Caota; Baía Farta; Baía das Vacas; Lucira; Baía de Santa Marta; Praia das Conchas, Moçâmedes; Praia Amélia, Moçâmedes; Baía dos Tigres (all Guinot and Ribeiro, 1962).

Family GONEPLACIDAE MacLeay, 1838

GONOPLACIDAE MacLeay, 1838:63 [corrected to Goneplacidae by Stebbing, 1902:15].

CARCINOPLACINAE H. Milne Edwards, 1852:164.

RHIZOPIDAE Stimpson, 1858b:95.

Galénides A. Milne Edwards, 1862a:40.

EURYPLACINAE Stimpson, 1871a:150.

EUCRATOPSINAE Stimpson, 1871a:151.

GALENOIDA Alcock, 1898:77, 136 [corrected to Galeninae by Alcock, 1898:136].

PRIONOPLACIDAE Alcock, 1900:286, 292.

PSEUDORHOMBILINAE Alcock, 1900:286, 292, 297.

TYPHLOCARCINOPSINAE Rathbun, 1909:112 [corrected to Typhlocarcinopinae herein].

CHASMOCARCININAE Serène, 1964a:185.

EASTERN ATLANTIC GENERA.—Six, of which five are represented by species occurring off tropical West Africa. The extralimital genus is *Eucrate* de Haan (1835:36). Type-species: *Cancer* (*Eucrate*) *crenatus* de Haan, 1835, by monotypy; gender: feminine; name 301 on *Official List*.

EASTERN ATLANTIC SPECIES.—Seven, six of which occur off tropical West Africa. Several of the names used by Monod (1956) have been changed, as follows:

Name in Monod	Current Name
Pilumnoplax atlantica	*Machaerus atlanticus**
Pilumnoplax oxyacantha	*Machaerus oxyacantha**
Carcinoplax barnardi	*Carcinoplax barnardi**
Goneplax angulata	*Goneplax rhomboides*
Typhlocarcinodes integrifrons	*Typhlocarcinodes integrifrons**
Acidops cessaci	*Acidops cessacii*
Hexapus (Thaumastoplax) anomalipes (Goneplacidae)	*Thaumastoplax anomalipes* (Hexapodidae)
Hexapus (Pseudohexapus) platydactylus (Goneplacidae)	*Pseudohexapus platydactylus* (Hexapodidae)
Hexapus (Parahexapus) africanus (Goneplacidae)	*Parahexapus africanus* (Hexapodidae)
Hexapus (Hexapus) buchanani (Goneplacidae)	*Hexapinus buchanani* (Hexapodidae)

The four species assigned by Monod to *Hexapus* (Goneplacidae: Hexapodinae) are herein assigned to the Hexapodidae (pp. 166–181).

The extralimital species is *Eucrate crenata* de Haan, 1835. An Indo-West Pacific immigrant into the eastern Mediterranean (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Subfamily CARCINOPLACINAE H. Milne Edwards, 1852

Genus *Carcinoplax* H. Milne Edwards, 1852

Curtonotus de Haan, 1833:4 [a subgenus established without included nominal species; an invalid junior homonym of *Curtonotus* Stephens, 1827 (Coleoptera)].

Carcinoplax H. Milne Edwards, 1852:164 [substitute name for *Curtonotus* de Haan, 1833; type-species: *Cancer (Curtonotus) longimanus* de Haan, 1833, by subsequent designation by Glaessner, 1929:111; gender: feminine].—Guinot, 1969b:524 [revision]; 1971:1081 [list of species].

**Carcinoplax barnardi* Capart, 1951

Carcinoplax barnardi Capart, 1951:170, fig. 65, pl. 3: figs. 5, 12.—Monod, 1956:351, figs. 456–461.—Forest, 1963:627, 628.—Maurin, 1968b:484.—Guinot, 1969b:526 [discussion]; 1971:1081 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 44, 403–586 m, hard dark gray mud, 1♂ (L). Sta 51, 329–494 m, 2♂, 1♀, 1 juv (L).

Nigeria: Sta 255, 264–269 m, 1♂, 1♀ ov (L). Sta 256, 409–485 m, 1♀ (L).

Geronimo Material: Gabon: Sta 179, 293 m, 2♀ (W). Sta 198, 300 m, 2♂, 2♀ (W). Sta 203, 200 m, 1♀ (W).

DESCRIPTION.—Capart, 1951:170.

Figures: Capart, 1951, fig. 65, pl. 3: figs. 5, 12; Monod, 1956, figs. 456–461.

Male Pleopod: Capart, 1951, pl. 3: figs. 5, 12 (Angola); Monod, 1956, figs. 460, 461 (Senegal).

Color: Capart (1951:172) gave the following notes on color: "Coloration rose bistre, des taches noires à l'extrémité des doigts des pinces."

MEASUREMENTS.—Our specimens have carapace widths of 15 to 28 mm; the carapace width of the single ovigerous female is 23 mm.

BIOLOGY.—*Carcinoplax barnardi* is a deep water species, living in depths between 200 m and at least 500 m; there is one record for the species in depths ranging from 403 to 586 m. Of 16 available depth records for the species, there are only five from depths of less than 300 m, none shallower than 200 m. It has been collected on mud, sandy mud, or hard dark gray mud.

Ovigerous females have been collected in March and May (Capart, 1951; *Pillsbury*).

DISTRIBUTION.—West Africa, from scattered localities between Spanish Sahara and Angola, in depths between 200 m and at least 500 m (403–586 m). The species has not previously been recorded from off Nigeria or Gabon, although these records are well within its known range. Monod (1956), who was the second to record the species, reported material from Senegal; records in the literature since 1956 include the following:

Spanish Sahara: Off Villa Cisneros, 300–500 m (Maurin, 1968b).

Ivory Coast: 04°54′N, 03°23′W, 380–400 m (Forest, 1963).

Ghana: 04°16′S, 02°09′30″W, 380–400 m (Forest, 1963).

Subfamily EURYPLACINAE Stimpson, 1871

Genus *Machaerus* Leach, 1818

Machaerus Leach, 1818, in 1817–1818:413 [a genus established without included nominal species; type-species: *Pilumnoplax oxyacantha* Monod, 1956, by present designation; gender: masculine].

DEFINITION.—Carapace smooth, convex anteroposteriorly, broader than long, with 3 or 4 pairs of anterolateral teeth, outer orbital tooth distinct from first anterolateral tooth. Frontal margin straight, short, less than ⅓ carapace width, transversely grooved, with median notch. Supraorbital margin with 2 closed incisions. Basal antennal segment not fused to front, lacking lateral projection into orbit, flagellum in orbit. Male abdomen with 7 somites, third covering width of sternum, terminal somite elongate triangular. Chelipeds stout, slightly unequal. Walking legs slender, compressed, elongate, distal 3 segments setose dorsally and ventrally. Male first pleopod stout, curved, tapering distally, spinulose subapically.

REMARKS.—Leach (1818, in 1817–1818:413) introduced the generic name *Machaerus* with the following remarks: "*Machaerus*; a new genus allied to *Gonoplax*, but differing in having short peduncles to its eyes, which are inserted into the same part of the shell as in that genus." The name apparently has been overlooked by most carcinologists; it was mentioned by Monod (1956:351, footnote). We believe that two West African goneplacid crabs placed in *Pilumnoplax* by Monod (1956), *P. atlantica* Miers, 1881, and *P. oxyacantha* Monod, 1956, but subsequently excluded from *Pilumnoplax* and the related *Neopilumnoplax*, should be assigned to *Machaerus*.

The genus *Pilumnoplax* Stimpson, 1858, in which the two species here assigned to *Machaerus* were placed by Monod (1956), has as its type-species *Pilumnoplax sulcatifrons* Stimpson, 1858 (designated by Rathbun, 1918:21). Tesch (1918: 154, 155) assigned *P. sulcatifrons* to *Eucrate* de Haan, 1835, making *Pilumnoplax* Stimpson a subjective junior synonym of *Eucrate* de Haan. As noted by Guinot (1969c:688) carcinologists, including Balss (1957:1656) and Glaessner (1969: R527) have continued to employ *Pilumnoplax* sensu Miers, 1886.

Serène recognized that a new genus was required for *Pilumnoplax* sensu Miers, and in his checklist of the Indo–West Pacific Brachyura, Serène (1968:90) first introduced *Neopilumnoplax* as a manuscript name; it is a nomen nudum. Serène considered that five Indo–West Pacific species belonged to *Neopilumnoplax: Pilumnus heterochir* Studer, 1882, *Pilumnoplax sinclairi* Alcock, 1899, *Pilumnoplax abyssicola* Miers, 1886, *Pilumnoplax cooki* Rathbun, 1911, and, with a question-mark, *Pilumnoplax acanthomerus* Rathbun, 1911.

Neopilumnoplax Serène, 1969, was named in Guinot (1969c:689, footnote); its type-species is *Pilumnus heterochir* Studer, 1882. *Neopilumnoplax* was "established to include the species [of *Pilumnoplax*] described after Stimpson (1858)" (Serène, in Guinot, 1969c:689, footnote). Guinot noted that Serène included several species in this genus. She, however, restricted it to *Pilumnus heterochir, Pilumnoplax americana* Rathbun, 1898, and, possibly, to *Pilumnoplax sinclairi* Alcock, 1899 (erroneously spelled *sainclairi* throughout Guinot). Of the five species listed in *Neopilumnoplax* by Serène in 1968, two, *P. heterochir* and *P. sinclairi*, were retained in *Neopilumnoplax* by Guinot (1969c:689, footnote), two, *Pilumnoplax abyssicola* Miers, 1886, and *P. cooki* Rathbun, 1911, were transferred to *Carcinoplax*, and one, *Pilumnoplax acanthomerus* Rathbun, 1911, was not assigned to any genus. Guinot (1969c:689) made the following comment about that species: "C'est un Crabe énigmatique dont nous nous demandons s'il s'agit d'une Goneplacidae."

Guinot (1969b:517) studied the two West African species here assigned to *Machaerus* and noted that "les deux espèces ouest-africaines décrites dans le genre *Pilumnoplax* Stimpson à savoir *P. atlantica* Miers, 1881 (p. 259; cf. MONOD, 1956, p. 341, fig. 442–449) et *P. oxyacantha* Monod, 1956 (p. 346, fig. 450–455), offrent tous les caractères communs à *Euryplax-Eucrate-Frevillea* et doivent être rattachés aux Euryplacinae." She went on to

discuss differences between these two species and those genera and concluded that "pour le moment, nous laisserons *atlantica* et *oxyacantha* sans attribution générique: en effet, ni *Eucrate*, ni *Heteroplax*, ni *Euryplax*, ni *Frevillea* ne peuvent vraiment convenir."

Machaerus appears to show closest affinities with *Neopilumnoplax* Serène, differing primarily in having the outer orbital tooth distinct from the first anterolateral tooth and a much slenderer male abdomen, the terminal somite of which resembles a slender isosceles triangle, much longer than broad.

* *Machaerus atlanticus* (Miers, 1881), new combination

Pilumnoplax atlantica.—Monod, 1956:341, figs. 442–449.—Buchanan, 1958:24.—Longhurst, 1958:88.—Gauld, 1960: 70.—Forest and Guinot, 1966:85.—Crosnier, 1969:531.—Guinot, 1969b:517, 518 [discussion]; 1969c:688 [discussion].—Uschakov, 1970:455 [listed].

"*Pilumnoplax*" *atlantica.*—Guinot, 1969b:507, 508 [discussion], figs. 36, 53 [*atlantica* Stimpson in legends].

[*Pilumnoplax*] *atlantica.*—Guinot, 1971:1081 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 1♂, 1♀ ov, 1 juv (W). Sta 62, 46 m, brown, branching and foliate Foraminifera, 1♂ (L).

Ghana: Sta 24, 35–37 m, dark red bryozoans, 1♂, 2♀ (L).

DESCRIPTION.—Monod, 1956:343.

Figures: Monod, 1956, figs. 442–449; Guinot, 1969b, figs. 36, 53.

Male Pleopod: Monod, 1956, fig. 448 (Senegal); Guinot, 1969b, fig. 53 (Senegal).

Color: Monod (1956:345) gave the following color account taken from a specimen, preserved in alcohol, one day after capture:

> Une large bande transversale brune, convexe en avant, rectiligne en arrière, séparée du bord fronto-orbitaire, à points rouges, par une zone courbe plus claire correspondant à la gouttière post-frontale; partie postérieure de la carapace blanc-jaunâtre. Pattes blanchâtres proximalement, jaune orange à partir de la région distale du mérus. Chélipèdes blancs tachetés de carmin à la face supérieure du carpe et de la main; doigt fixe blanc à apex brun-clair; doigt mobile rose à la base, avec de points carmin, brun-clair ensuite. Face inférieure blanchâtre, avec des taches pourpres arrondies: sur le bord infraorbitaire, la région ptérygostomienne, le bord antérieur du cadre buccal, le bord infra-antennulaire de l'épistome et l'article basal antennulaire.

In his section on material, Monod (1956:342) made the following observations on two different lots of specimens:

> Une tache rouge sur le bord supérieur du doigt mobile [♂, 7 × 8 mm, Guinea]; carapace grise, surtout en avant (à l'exception d'une bande post-frontale plus claire), pattes plus ou moins annelées de sombre, doigt mobile avec 2 anneaux orangs, doigt fixe incolore [5 specimens, Îles de Los].

MEASUREMENTS.—Our specimens have carapace widths of 3 to 8 mm; the single ovigerous female examined has a carapace width of 5 mm.

BIOLOGY.—*Machaerus atlanticus* is a sublittoral, shallow shelf species, generally occurring in depths of less than 50 m. Of 26 recent depth records, 25 are from depths of less than 46 m; one, from off Ghana, is from a depth of 90–100 m (Forest and Guinot, 1966). Seventeen of the 26 records are from depths of less than 30 m. The *Pillsbury* specimens were taken on mud with *Jullienella* or bottom with bryozoans; the *Calypso* specimens were taken on mud and shells in 90–100 m, and mud with *Arca* in 32 m (Forest and Guinot, 1966). Buchanan (1958) considered the species to be a representative of the infauna in the sandy silt community in 15 to 37 m off Ghana. The species was relatively common off Sierra Leone, where Longhurst (1958) collected 32 specimens: one was taken from an estuary on muddy sand, and 31 were taken on the shelf, in depths between 6 and 30 m. Of this latter group, 22 were collected on shelly sand, 9 on shelly mud.

This species seems to prefer the same kinds of habitat as does *Machaerus oxyacantha*; the species were taken together by the *Pillsbury* at Sta 46, off the Ivory Coast in 38–42 m.

Ovigerous females have been collected in January, February, March, and May (Monod, 1956; *Pillsbury*).

DISTRIBUTION.—West Africa, from Senegal to the Congo; in moderate depths, between 4 and 90–100 m, usually in less than 50 m. Monod (1956) studied material from Senegal, Guinea,

Sierra Leone, and Ghana. Since 1956 the species has been recorded from the following:

Senegal: Joal, 10–11 m (Guinot, 1969b).

Guinea: No specific locality (Uschakov, 1970). 09°40′N, 14°05′W, 18 m (Forest and Guinot, 1966).

Sierra Leone: Off Sierra Leone, 6–30 m (Longhurst, 1958).

Ghana: Off Accra, 8–20 fm (15–37 m) (Buchanan, 1958); 10 and 36 m (Gauld, 1960). 04°37′N, 00°50′W, 90–100 m (Forest and Guinot, 1966).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Congo: Pointe-Noire, 5–10 m (Crosnier, 1969).

* *Machaerus oxyacantha* (Monod, 1956), new combination

Pilumnoplax atlantica.—Capart, 1951:166, fig. 63 [not *Pilumnoplax atlantica* Miers, 1881].

Pilumnoplax oxyacantha Monod, 1956:346, figs. 450–455.—Gauld, 1960:70.—Rossignol, 1962:118.—Guinot and Ribeiro, 1962:63.—Crosnier, 1964:38, fig. on pl. A.—Forest and Guinot, 1966:85.—Le Loeuff and Intès, 1968:31, table 1.—Guinot, 1969b:517, 518 [discussion]; 1969c:688 [discussion].

"*Pilumnoplax*" *oxyacantha.*—Guinot, 1969b:507, 508 [discussion], figs. 38, 42, 54, 55.

[*Pilumnoplax*] *oxyacantha.*—Guinot, 1971:1081 [listed].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 4♂ (W). Sta 47, 37 m, bottom with *Jullienella*, 1♂, 1 juv (L). Sta 48, 22 m, 1♂ (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, several specimens (L). Sta 28, 49–53 m, 1♀, 1 carapace (W).

Nigeria: Sta 241, 59–63 m, mud and shell, 3♂, 1♀ (W). Sta 250, 24 m, brackish water, 1♂, 1 juv (L). Sta 251, 27 m, mud, 1♂, 1♀ (W). Sta 252, 30 m, mud, 2♂, 1♀ (W).

Other Material: Ghana: Shama Bay, 29 Jan 1961, Amegah: 1♂, 1♀ ov (W).

Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 2♂ (L).

DESCRIPTION.—Monod, 1956:348.

Figures: Capart, 1951, fig. 63; Monod, 1956, figs. 450–455.

Male Pleopod: Monod, 1956, figs. 454, 455 (Ghana); Guinot, 1969b, figs. 54, 55 (Senegal).

Color: "Couleur beige claire avec taches brunâtres" (Capart, 1951:167); "plus ou moins rose saumon à grisâtre ou blanchâtre" (Monod, 1956: 350).

MEASUREMENTS.—Our specimens have carapace widths of 7 to 27 mm; the single ovigerous female has a carapace width of 26 mm.

BIOLOGY.—*Machaerus oxyacantha*, like *M. atlanticus*, is a sublittoral, shallow shelf species that prefers various types of mud bottoms including sandy mud and mud with Foraminifera or shells, in depths between 7–8 m and 73 m. Of 50 depth records available, only one (7–8 m) is shallower than 10 m and only five are deeper than 50 m; 88% of the depth records fall between 13 m (13–26 m) and 50 m. The species may occur in brackish water but it apparently prefers normal sea water: It was collected by the *Pillsbury* in brackish water off Nigeria, and Monod (1956) reported one specimen from Ghana taken in a river seine.

Ovigerous females have been recorded in January, April, May, and December, suggesting that the species may spawn all year (Monod, 1956).

DISTRIBUTION.—West Africa, from Mauritania to Angola, possibly including Principe Island in the Gulf of Guinea; sublittoral, from 7–8 m to 73 m. Monod (1956) recorded material from Senegal and Ghana. Records in the literature since 1956 include the following:

Senegal: Gorée, 20 m (Guinot, 1969b).

Guinea: between Île Tamara and Île Cassa, Îles de Los, 7–8 m; 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: 07°20′N, 12°39′W, 30–34 m (Forest and Guinot, 1966).

Liberia: 06°40′N, 11°23′W, 51 m (Forest and Guinot, 1966).

Ivory Coast: Off Sassandra, off Fresco, off Grand Bassam, 18–40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra and Takoradi, 16–44 m (Gauld, 1960).

Cameroon: No specific locality (Crosnier, 1964).

?Principe: 01°37′N, 07°22′E, 30 m (Forest and Guinot, 1966).

Congo: W of Pointe-Noire, 20–50 m (Rossignol, 1962).

Angola: No specific locality; Benguela, 24 m and 13–26 m (Guinot and Ribeiro, 1962).

Subfamily GONEPLACINAE MacLeay, 1838

Genus *Goneplax* Leach, 1814

Goneplax Leach, 1814:393, 430 [type-species: *Cancer angulatus* Pennant, 1777, a subjective junior synonym of *Cancer*

rhomboides Linnaeus, 1758, by monotypy; gender: feminine; name 313 on *Official List*].—Guinot, 1969b:520 [comments on genus]; 1971:1081 [list of species].

Goneplat Leach, 1814:393, 430 [invalid original spelling for *Goneplax* Leach, 1814; name 482 on *Official Index*].

Gonoplax Leach, 1816:409, 413 [invalid spelling of *Goneplax* Leach, 1814; name 483 on *Official Index*].

Frevillea A. Milne Edwards, 1880:15 [type-species: *Frevillea barbata* A. Milne Edwards, 1880, by subsequent designation by Rathbun, 1918:25; gender: feminine].

Goneplax rhomboides (Linnaeus, 1758)

Cancer rhomboides Linnaeus, 1758:626.

Goneplax angulata.—Capart, 1951:168, fig. 64, pl. 3: figs. 4, 9 [England], 10.—Barnard, 1954:126 [discussion].—Monod, 1956:354, figs. 462–465.—Pérès, 1964:27, 28, 29.—Maurin, 1968a:19 [Spain]; 1968b:482, 489.

Goneplax rhomboides.—Capart, 1951, pl. 3: fig. 11 [Nice].—Forest and Gantès, 1960:353.—Guinot and Ribeiro, 1962: 63.—Forest and Guinot, 1966:86.—Zariquiey Alvarez, 1968:414, figs. 1e, 138a,b [Spain; references].—Crosnier, 1970:1215 [listed], 1216.—Türkay, 1976a:25 [listed], 38, fig. 28 [Portugal, in part]; 1976b:61 [listed], 71.

Goneplax.—Maurin, 1968a:14 [Spain].

Goneplax rhomboïdes.—Le Loeuff and Intès, 1968, table 1.

SYNONYMS.—*Cancer angulatus* Pennant, 1777; *Ocypode bispinosa* Lamarck, 1801; *Ocypode longimana* Latreille, 1803.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Undaunted Material: Angola: Sta 94, 90 m, 1♂ (L). Sta 95, 126 m, 1♂ (L).

Other Material: Madeira: S of Madeira, 32°38′N, 16°49′W, 300 m, triangular and quadrangular dredges, 16 Mar 1976, *Onversaagd* Sta 102, 1♂ (L).

Morocco: Off Cap de Mazagan, 33°38′N, 08°45′W, 420 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 150, 1♀ (L). Off Cap Hadid, 31°54′N, 09°54′W, 85 m, muddy sand, 5m beam trawl, 25 Mar 1976, *Onversaagd* Sta 126, 13♂, 8♀ (L).

DESCRIPTION.—Capart, 1951:168.

Figures: Capart, 1951, fig. 64, pl. 3: figs. 4, 9, 10, 11; Monod, 1956, figs. 462–465.

Male Pleopod: Capart, 1951, pl. 3: figs. 9 (England), 10 (Angola), 11 (Nice); Monod, 1956, figs. 463–465 (Senegal).

Color: "Couleur général rose, la moitié antérieure de la carapace violacée et plus foncée; pince brun-rouge clair, les doigts violacés, partiellement noirs" (Capart, 1951:169).

REMARKS.—Capart (1951) considered that *G. angulata* and *G. rhomboides* were distinct "varieties," the former inhabiting the Atlantic, the latter the Mediterranean. He noted (1951:169):

> Il serait intéressant de pouvoir déterminer si cette variété [*G. rhomboides*] n'est pas plutôt une espèce différente de la première [*G. angulata*]. Les pléopodes sont nettement différents. . . . En tous cas il est curieux de constater qu'il n'y a pratiquement aucune différence entre les spécimens de *G. angulata* récoltés sur les côtes de l'Angleterre et ceux provenant des côtes du Congo et de l'Afrique du Sud.

Monod (1956) did not comment on these observations in his account of the species, based on two specimens taken from stomach contents of fishes. Unfortunately, there is not enough material available to us for an evaluation of the differences observed by Capart. The identity of the Mediterranean and Atlantic populations of *Goneplax*, following recent practice (Zariquiey Alvarez, 1968), are here considered to represent one species, *G. rhomboides*.

BIOLOGY.—*Goneplax rhomboides* is a sublittoral species, occurring off West Africa on the outer shelf and upper slope; the shallowest record in the recent literature is 33 m, but the majority of records are from depths in excess of 100 m. It was recorded by Capart (1951) on muddy sand or sandy mud in depths between 85 and 215–220 m, by Forest and Guinot (1966) on rocks and shells in 90–100 m, by Maurin (1968b) on sandy mud in 400–700 m and muddy detritic fine sand in 200 to 400 m, and by Pérès (1964) on yellow terrigenous coastal mud in 175 to 185 m and on bathyal mud in 333 to 360 m.

Off West Africa, ovigerous females have been collected in January (Forest and Gantès, 1960).

DISTRIBUTION.—Eastern Atlantic, from the English Channel to South Africa, including the Mediterranean, in depths from about 30 m to more than 700 m. Monod (1956) reported material from Senegal; since 1956 the species has been recorded from the following:

Madeira: Funchal (Türkay, 1976b).

Morocco: 35°19′N, 06°32′W to 35°28.8′N, 06°39.2′W, 333–360 m; 34°37.4′N, 06°49′W, 180 m; and 34°33.5′N, 06°52′W to 34°39′N, 06°50′W, 175–185 m (Pérès, 1964).

33°19.3′N, 08°39′W, 85 m; 33°17.2′N, 08°34.5′W, 65 m; 31°01′N, 10°16′W, 360–375 m; and 30°20′N, 10°03′W, 255–355 m (Türkay, 1976a). Off Agadir, 60–130 m; off Essaouira, 32°08′N, 09°02′W, 33 m; and 31°37′N, 09°54′W, 70 m (Forest and Gantès, 1960).

Spanish Sahara: Off Cabo Garnet, 400–700 m (Maurin, 1968b).

Mauritania: Off Tamzak (as Tamxat), 200–400 m (Maurin, 1968b).

Ivory Coast: Off Grand-Bassam, 200 m (Le Loeuff and Intès, 1968).

Ghana: 04°37′N, 00°50′W, 90–100 m (Forest and Guinot, 1966).

Angola: Baía dos Tigres, 110 m (Guinot and Ribeiro, 1962). 16°27′S, 11°35′E, 90 m; and 16°37′S, 11°22′E, 126 m (Crosnier, 1970).

Subfamily RHIZOPINAE Stimpson, 1858

Genus *Acidops* Stimpson, 1871

Acidops Stimpson, 1871b:110 [p. 137 on separate] [type-species: *Acidops fimbriatus* Stimpson, 1871, by monotypy; gender: masculine].

Epimelus A. Milne Edwards, 1878:227 [p. 8 on separate] [type-species: *Epimelus cessacii* A. Milne Edwards, 1878, by monotypy; gender: masculine; name 147 on *Official List*].

Acidops cessacii (A. Milne Edwards, 1878)

Acidops cessaci.—Monod, 1956:359, figs. 469, 470 [Senegal].—Guinot and Ribeiro, 1962:64, figs. 27, 28 [Cape Verde Islands].—Ribeiro, 1964:13 [Cape Verde Islands].—Forest and Guinot, 1966:88 [São Tomé, Annobon].

Epimelus cessaci.—Garth, 1968:314 [discussion].

DISTRIBUTION.—West Africa, from the Cape Verde Islands, Senegal, and São Tomé and Annobon islands in the Gulf of Guinea; intertidal to 10–30 m.

Subfamily TYPHLOCARCINOPINAE Rathbun, 1909

Genus *Typhlocarcinodes* Alcock, 1900

Typhlocarcinodes Alcock, 1900:326 [a genus established without included nominal species; type-species: *Typhlocarcinus integrifrons* Miers, 1881, by subsequent designation by Tesch, 1918:227; gender: masculine].

REMARKS.—Alcock (1900) established this genus for an Indian species that he did not name and that he compared with the West African *Typhlocarcinus integrifrons* Miers, 1881. The genus was established without any included nominal species. Tesch (1918:226, 227) considered that *Typhlocarcinodes* included four species: *T. integrifrons* (Miers, 1881), *Caecopilumnus hirsutus* Borradaile, 1903, *Typhlocarcinops piroculata* Rathbun, 1911, and *Typhlocarcinodes crassipes* Tesch, 1918; he designated *T. integrifrons* as the type-species. According to Article 69(a)(ii) of the *International Code of Zoological Nomenclature*, "if no nominal species were included at the time the genus was established, the nominal species-group taxa that were first subsequently and expressly referred to it are to be treated as the only original included species." Thus Tesch's designation of *Typhlocarcinus integrifrons* Miers as the type-species of *Typhlocarcinodes* is valid.

Monod (1956:365) questioned whether the Indo-West Pacific species were congeneric with *T. integrifrons*. Tesch (1918:227) and Serène (1964b:237) pointed out differences between *T. integrifrons* and Indo-West Pacific species, and Takeda (1973:52) accepted the possibility that two genera might be involved.

Those authors who consider the three Indo-West Pacific species assigned to this genus, *Typhlocarcinodes hirsutus* (Borradaile, 1902), *T. piroculatus* (Rathbun, 1911), and *T. crassipes* Tesch, 1918, to be generically distinct from the eastern Atlantic *T. integrifrons* (Miers, 1881) should refer those species to *Caecopilumnus* Borradaile (1902b: 267; type-species: *Caecopilumnus hirsutus* Borradaile, 1902, by monotypy; gender: masculine).

* *Typhlocarcinodes integrifrons* (Miers, 1881)

Typhlocarcinodes integrifrons.—Monod, 1956:356, 632, figs. 466–468.—Longhurst, 1958:88.—Forest and Guinot, 1966:87, fig. 8.—Crosnier, 1967:334.

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

DESCRIPTION.—Miers, 1881a:260.

Figures: Monod, 1956, figs. 466–469; Forest and Guinot, 1966, fig. 8.

Male Pleopod: Forest and Guinot, 1966, fig. 8 (Principe).

MEASUREMENTS.—Our specimens have carapace widths of 6 to 9 mm.

BIOLOGY.—*Typhlocarcinodes integrifrons* is a sublittoral species, known to occur in depths between 12 and 90–100 m. It may prefer shallower water, as suggested by the only depth records available, viz. 16–44, 18, 30, 30–34, 35–37, 48, 51, and 90–100 m.

Bottom types on which it is known to occur include: dark red bryozoans, 35–37 m (*Pillsbury*); shelly mud (2 specimens) and shelly sand (4 specimens) in 16–44 m (Longhurst, 1958); sand and mud in 12 m, mud and shells in 30 m, and rocks and shells in 90–100 m (Forest and Guinot, 1966); and coarse sand in 30 m and green mud in 48 m (Crosnier, 1967).

Ovigerous females have been collected in May (Forest and Guinot, 1966).

DISTRIBUTION.—West Africa, from localities between Senegal and Dahomey as well as Principe Island in the Gulf of Guinea; sublittoral, from 12 m to 90–100 m. Records in the literature include the following:

Senegal: Gorée (Miers, 1881a; Monod, 1956).

Guinea: 1 mi [1.6 km] SE of Île Blanche, off Conakry, 18 m (Monod, 1956).

Sierra Leone: No specific locality, in 44 m (Monod, 1956); in 16–44 m (Longhurst, 1958).

Ivory Coast: 04°36′N, 06°50′W, 48 m (Crosnier, 1967).

Ghana: 04°37′N, 00°50′W, 90–100 m (Forest and Guinot, 1966).

Dahomey: 06°04′N, 02°26′E, 30 m (Crosnier, 1967).

Principe: 01°39′35″N, 07°26′53″E, 12 m, and 01°37′N, 07°22′E, 30 m (Forest and Guinot, 1966).

Family HEXAPODIDAE Miers, 1886

HEXAPODINAE Miers, 1886:275.

EASTERN ATLANTIC GENERA.—Four, *Hexapinus,* new genus, *Parahexapus, Pseudohexapus*, and *Thaumastoplax*, each of which is represented by a tropical West African species.

EASTERN ATLANTIC SPECIES.—Four, all occurring off West Africa. This family was not represented in the *Pillsbury* collections. The following name changes have occurred since Monod (1956):

Name in Monod	Current Name
Hexapus (Thaumastoplax) anomalipes	*Thaumastoplax anomalipes*
Hexapus (Pseudohexapus) platydactylus	*Pseudohexapus platydactylus*
Hexapus (Parahexapus) africanus	*Parahexapus africanus*
Hexapus (Hexapus) buchanani	*Hexapinus buchanani*

REMARKS.—The subfamily Hexapodinae was established within the Family Pinnotheridae by Miers (1886), who included four genera: *Hexapus* de Haan, 1833; *Amorphopus* Bell, 1859; *Thaumastoplax* Miers, 1881; and *Asthenognathus* Stimpson, 1858. The latter genus is now considered to be a pinnotherid (Schmitt, McCain and Davidson, 1973:128). Ortmann (1894:690) retained the Hexapodinae within the Pinnotheridae. Alcock (1900:287) recognized the affinities of the Hexapodinae with the Goneplacidae and included it as one of five subfamilies of the latter. He was followed in this by Borradaile (1907) and subsequent authors.

We believe that the complete suppression of the last pair of pereiopods in members of this subfamily is a fundamental character which warrants the recognition of the Hexapodidae as a family distinct form but related to the Goneplacidae. We treat it as a family here.

The following genera and species have been named in the family: *Hexapus* was erected by de Haan (1833:5; 1835:63) for *Cancer sexpes* Fabricius, 1798; it is apparent that several different species have erroneously been identified with *H. sexpes* by subsequent authors. Other species described in *Hexapus* include: *H. williamsi* Glassell, 1938, eastern Pacific; *H. stebbingi* Barnard, 1947, South Africa; *H. buchanani* Monod, 1956, West Africa; *H. granuliferus* Campbell and Stephenson, 1970, Australia; and *H. estuarinus* Sankarankutty, 1975, India. Each of these latter species are assigned to different genera below.

Amorphopus (Bell, 1859:27) was established for a single species from an unknown locality, *A. cylindraceus* Bell. According to Bell, it differs from *Hexapus* in having a rudimentary pair of fifth legs, a feature shared with no other member of the family. Rathbun (1897b:163) pointed out that this name was preoccupied twice [according to Neave, *Nomenclator Zoologicus*, the oldest name is *Amorphopus* Audinet-Serville, 1838 (Insecta)] and substituted *Paeduma* for it. Rathbun's name apparently has been overlooked by nearly all zoologists dealing with this group; Gordon (1971:108) pointed out that *Amorphopus* was preoccupied. *Amorphopus* Bell has been recognized by Alcock (1900:293), Stebbing (1910:315) (who suggested that "there seems little justification for the separation either of *Amorphopus* or *Thaumastoplax* from *Hexapus*."), Tesch (1918:238), Balss (1957:1658), and Serène (1968:93). We recognize *Paeduma* Rathbun (p. 173).

Thaumastoplax Miers (1881a:261) was established for a single species from Senegal, *T. anomalipes* Miers; it was distinguished from *Hexapus* in having a slender third maxilliped with the propodus dilated distally. Rathbun (1910:113) described two additional species from Thailand, *T. orientalis* and *T. chuenensis*. A fourth species, *T. spiralis* Barnard (1950:301), was described from South Africa. Although Monod (1956:362, 363) treated *Thaumastoplax* as a subgenus of *Hexapus*, Tesch (1918:238), Balss (1957:1658), Glaessner (1969:R527) and Sakai (1976:555) all considered it to be a distinct genus. We also consider *Thaumastoplax* to be a valid genus; species described in it subsequent to 1881 are assigned to other genera below.

Lambdophallus Alcock (1900:329) was based on an Indian species, *L. sexpes* Alcock, in which the apices of the male pleopods extended laterally well beyond the abdomen, lying in deep lateral, transverse grooves in the sternum. A second species, *Lambdophallus anfractus*, was described on material from Thailand by Rathbun (1909:113). Stephensen (1945:182) considered *Lambdophallus* to be a synonym of *Hexapus* and synonymized both *L. sexpes* and *L. anfractus* with *H. sexpes*. Monod (1956:362) and Sakai (1976:554) both considered *Lambdophallus* to be a subgenus of *Hexapus*; Tesch (1918:239) and Balss (1957:1658) both considered it to be a distinct genus, as we do.

Hexaplax Doflein (1904:122) was established for a deep water species from India, *H. megalops* Doflein. It is characterized by long slender walking legs and very large, hammer-shaped eyes. It has been considered a distinct genus by all subsequent authors (see Sakai, 1976:556, for synonymy).

Parahexapus was erected by Balss (1922:77) for *P. africanus* from Cabinda; one of its distinguishing features is its slender third maxilliped. Balss (1957:1658) retained *Parahexapus* as a distinct genus, but Monod (1956:362) considered it to be a subgenus of *Hexapus*. We believe that it is generically distinct.

Pseudohexapus was recognized by Monod (1956: 362, 365) as a subgenus of *Hexapus*. It included but one species from West Africa, *Hexapus* (*Pseudohexapus*) *platydactylus*, characterized by broadened, flattened dactyli on the walking legs. We recognize *Pseudohexapus* here.

Monod (1956), who studied four species representing four different subgenera, reviewed the literature and pointed out numerous discrepancies in accounts in the literature purporting to deal with the same species. He pointed out that Stephensen's (1945:182) *H. sexpes* probably was not the same species reported by de Haan and provided diagnoses of five subgenera within *Hexapus: Hexapus, Thaumastoplax, Parahexapus, Pseudohexapus*, and *Lambdophallus*.

West African material available to us includes representatives of only two species, *Thaumastoplax anomalipes* and *Parahexapus africanus*. The collections of the Smithsonian Institution, however, include specimens identified with several additional species from Indo-West Pacific localities: *Hexapus sexpes* (Fabricius) from Japan and the Philippine Islands, *Thaumastoplax orientalis* (Rathbun) from Japan, paratypes of *Lambdophallus anfractus* Rathbun from Thailand, and *Hexapus williamsi* Glassell from Mexico. Examination of this relatively rich material, which proved to be nec-

essary in order to determine the status of the species known from West Africa, has suggested to us that all of the subgenera recognized by Monod should be recognized as distinct genera, that several new genera should be recognized, and that several name changes are required for known species. All existing genera and the new genera that we believe should be recognized are characterized below.

Monod's (1956:361) excellent review of the subgenera of *Hexapus* stressed the importance of several characters that appear to have been overlooked in the past; several of these have not been described for all species. They include: the shape of the third maxillipeds, whether slender or broad, and especially the shape of the propodus, slender or distally dilated, and the presence or absence of a flagellum on the exopod; eye shape; relative length of walking legs; shape and configuration of the male abdomen; the shape and extent of sternal grooves in the male, and structure of the male pleopod. These characters appear to us to afford reliable features for differentiation of genera.

Gordon (1971:108) was correct in stating that "the taxonomy of the Hexapodinae poses some problems which can only be solved by a careful re-examination of all of the available material." We believe that all records in the literature require verification. Descriptions of several new species and a redescription of the type of *Cancer sexpes* Fabricius are in preparation by Manning.

Key to Genera of Hexapodidae

1. Eye hammer-shaped, cornea very large [carpus, propodus, and dactylus of third maxilliped slender; walking legs long, slender, merus of longest pair longer than carapace] ..... ***Hexaplax***
   Eye small, reduced, cornea scarcely or not at all broader than stalk ... 2
2. Eyes fixed. Walking legs (Figure 34*a*) long, slender, merus of longest pair longer than carapace. Male with long, narrow transverse grooves in sternum extending laterally from abdominal fossa beyond bases of third maxillipeds (Figure 34*b*) (carpus, propodus, and dactylus of third maxilliped slender) ..... ***Lambdophallus***
   Eyes movable. Walking legs short, merus of longest pair shorter than carapace. Male lacking long, narrow transverse grooves in sternum extending laterally from abdominal fossa beyond bases of third maxillipeds 3
3. Propodus of third maxilliped strongly dilated distally (Figure 37*b*, 39*a*) . 4
   Propodus of third maxilliped not strongly dilated distally, slender, like carpus and dactylus (Figures 31*a*, 33*a*) 6
4. Male pleopod stout, strongly twisted into a tight spiral (Figure 37*e*) ..... ***Spiroplax***, new genus
   Male pleopod variously shaped, not twisted into a tight spiral 5
5. Third to fifth abdominal somites fused in male. Male pleopod (Figure 39*c*) slender, sinuous, apex directed anteriorly ..... ***Thaumastoplax***
   Third and fourth and fourth and fifth abdominal somites fused in male. Male pleopod (Figure 35*b*) slender, strongly recurved posteriorly, apex directed posteriorly or recurved anteriorly, shaped like a figure 8 ..... ***Paeduma***
6. Male abdomen with second through sixth somites fused. ..... ***Stevea***, new genus

Male abdomen with third to fifth somites fused 7
7. Dactylus of each walking leg enlarged, triangular, strongly flattened dorsoventrally (male pleopod stout, with proximally directed subapical spines) ..... ***Pseudohexapus***
Dactyli of walking legs not enlarged or strongly flattened dorsoventrally 8
8. Terminal somite of male abdomen (Figure 40*a,d*) trilobed or trefoil in shape, with distinct lateral angular projections (sixth abdominal somite divided longitudinally in type-species; male pleopod stout, bent laterally, apex directed anteriorly) ..... ***Tritoplax***, new genus
Terminal somite of male abdomen (Figures 31*b*, 32*c*) broadly rounded, not trilobed 9
9. Third maxilliped (Figure 36*a*) slender, almost pediform, ischium width about ⅔ merus length. Male pleopod (Figure 36*c*) slender, sinuous, tapering abruptly to almost filiform apex, with strong, recurved spines near midlength (sixth and seventh somites of male abdomen (Figure 36*b*) very slender, width half that of first fused somite) . ***Parahexapus***
Third maxilliped broad, ischium width usually subequal to or greater than merus length 10
10. Sternum in male (Figure 33*b*) with broad, deep grooves extending anterolaterally from end of abdominal fossa to bases of third maxillipeds. Male pleopods bent laterally, apices lying in sternal grooves . ***Hexapus***
Sternum in male (Figure 32*c*) lacking broad, deep grooves extending anterolaterally from end of abdominal fossa to bases of third maxillipeds, with at most triangular anterolateral projections on abdominal fossa, not extending laterally beyond border of first fused somite. Male pleopods not bent, apices concealed under abdomen or visible on either side of terminal somite ..... ***Hexapinus***, new genus

Genus *Hexapinus*, new genus

FIGURES 31, 32*c,d*

TYPE-SPECIES.—*Hexapus latipes* de Haan, 1835, pl. D.

ETYMOLOGY.—The masculine name *Hexapinus* is derived from the name *Hexapus* and the Latin suffix–*inus*, pertaining to.

DIAGNOSIS.—Eyes very small, cornea subglobular. Third maxilliped (Figure 31*a*) with broad ischium and merus, inner margin of ischium concave proximally, straight or convex distally, carpus, propodus, and dactylus slender, cylindrical, dactylus longer than propodus; exopod with flagellum. Walking legs short, stout, merus of longest pair shorter than carapace. Male pleopods (Figure 31*c,d*) stout, sinous but not strongly angled distally, apices concealed under abdomen or scarcely visible next to seventh somite. Male abdomen (Figure 31*b*) with third to fifth somites fused, terminal somite rounded apically, smooth laterally. Female abdomen of 7 somites.

INCLUDED SPECIES.—*Hexapus latipes* de Haan, 1835, from Japan; *Hexapus buchanani* Monod, 1956, from West Africa; *Hexapus granuliferus* Campbell and Stephenson, 1970, from Australia; and one or more species identified with *Hexapus sexpes* by various authors: A. Milne Edwards, 1873b:253, pl. 12: fig. 1 (New Caledonia); De Man, 1888:322, pl. 13: fig. 3 (Amboina); Zehntner, 1894:159 (Amboina); Nobili, 1906a:146 (Persian Gulf); Tesch, 1918:240, pl. 17: fig. 1 (Indonesia); Balss, 1938:74 (Marshall Islands); Stephensen, 1945:182, fig. 53 (Persian Gulf); Guinot-

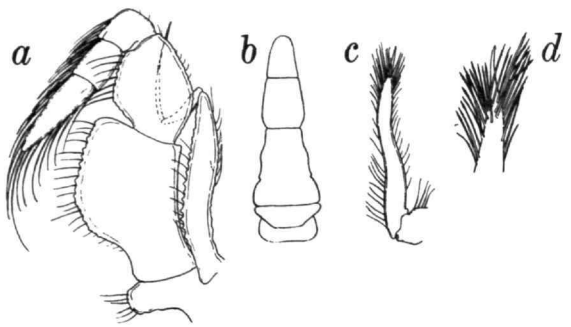

FIGURE 31.—*Hexapinus buchanani* (Monod): *a*, third maxilliped; *b*, male abdomen; *c*, male pleopod; *d*, apex of male pleopod (all from Monod, 1956, figs. 498–500).

Dumortier and Dumortier, 1960:130, fig. 9 (no locality); Griffin, 1972:85 (Australia).

Hexapus sexpes sensu A. Milne Edwards, 1873(b) (Figure 32*a,b*) from New Caledonia differs from our material of *Hexapinus latipes* from Japan in having a narrow cornea and the surface of the carapace covered with setae. It may well represent a new genus. Unfortunately, the female holotype could not be located at the Muséum national d'Histoire naturelle, Paris, in October 1977 (J. Forest, pers. comm.).

We suspect that two distinct Japanese species have been referred to *H. sexpes* by various authors. De Haan (1835) reported that his material measured 3 × 5 lines (1 line = 2.12 mm) or 6 × 11 mm; thus it was a relatively small species. Sakai (1976) noted that some specimens from Japan measured as large as 18 × 29.2 mm. Available material of both forms in the collection of the Smithsonian Institution exhibit specific differences.

An examination of the Japanese specimen that de Haan (1835:35, 63, pl. 11: fig. 5) described and figured as *Hexapus sexpes* (Fabricius, 1798) and which still is preserved dry in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden (a male, cl 6.7 mm, cb 10.0 mm, Crust. D. 31783), shows that it is different from Fabricius' type of *Cancer sexpes* and should be referred to the genus *Hexapinus*. For it the specific epithet *latipes* de Haan is available. On plate D of *Fauna Japonica*, namely, de Haan (1835) used the name *Hexapus latipes* for a figure of the mouthparts of his Japanese *Hexapus*, which he named *H. sexpes* in his text and on pl. 11: fig. 5. That the word *latipes* is not a typographical error is shown by the fact that the piece of cardboard on which de Haan glued the mouthparts of this specimen, and which is also present in the collection of the Leiden Museum, bears the following inscription in de Haan's handwriting: "Hexapus latipes Faun. Jap." Evidently de Haan at first considered the species new and gave it the name *Hexapus latipes*, and when he later changed his mind and identified the species with *Cancer sexpes*, the name *latipes* had already been engraved on plate D and could not be changed. It is peculiar that de Haan under *Hexapus sexpes* nowhere referred to plate D and did not correct the name *latipes* in the erratum.

The specific epithet *latipes*, published in the combination *Hexapus latipes* with a figure, is an available name and must be used for the present Japanese *Hexapinus*.

Hexapinus latipes has been discussed under the name *Hexapus sexpes* by Tesch (1918), Sakai (1934, 1936, 1939, 1976), and Odawara (1965).

Although de Haan identified his species with *Cancer sexpes*, he noted that in his specimens the

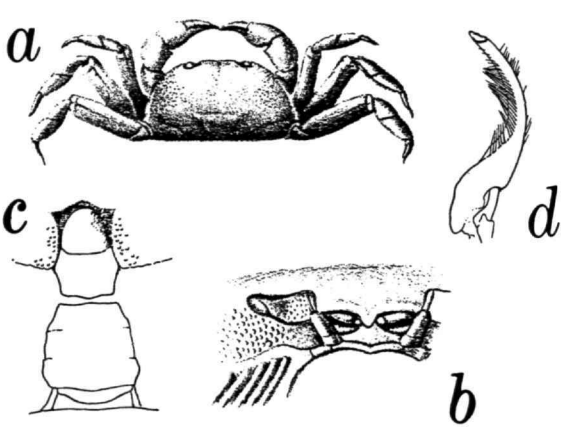

FIGURE 32.—*Hexapus sexpes* sensu A. Milne Edwards: *a*, dorsal view; *b*, front (from A. Milne Edwards, 1873b, pl. 12: fig. 1, 1a). *Hexapinus granuliferus* (Campbell and Stephenson): *c*, abdomen of male; *d*, gonopod (apex broken?) (from Campbell and Stephenson, 1970, fig. 49g,h).

front was truncate and deflexed and further noted (1835:64) that "Fabricius dicit frontem emarginatam."

Hexapinus differs from the other hexapodid genera with short legs, broad maxillipeds, and the third to fifth abdominal somites fused in males, *Hexapus* and *Tritoplax*, as follows: In *Hexapus* sternal grooves extend anterolaterally from the abdominal fossa almost to the level of the bases of the third maxillipeds, and the male pleopods are bent laterally and are situated in these grooves; in *Hexapinus* these grooves are restricted to the end of the abdominal fossa and the male pleopods are more or less straight and are concealed under the abdomen (Figure 32*c,d*). In *Tritoplax* the terminal somite of the male abdomen is trilobed or trefoil in shape, whereas in *Hexapinus* it is evenly rounded.

We are not certain that *Hexapus granuliferus* Campbell and Stephenson, 1970, should be assigned here, although superficially it resembles *Hexapinus latipes*. Their figure (49*g*) of the male pleopod (Figure 32*d* herein) may have been based on a broken one, for the apex appears to be unusually broad; it tapers to a slender tip in both *H. latipes* and *H. buchanani* (Figure 31*c,d*); it is sinuous and much less curved in the latter species than in either *H. latipes* or *H. granuliferus*.

Hexapinus buchanani (Monod, 1956), new combination

FIGURE 31

Hexapus (*Hexapus*) *buchanani* Monod, 1956:372, figs. 497–501 [Ghana, Sierra Leone]; 1963, fig. 38 [no material].
Hexapus buchanani.—Gauld, 1960:71 [Ghana].

DISTRIBUTION.—West Africa, from Sierra Leone, Ghana, and Dahomey; sublittoral in 7 to 10 m.

Genus *Hexaplax* Doflein, 1904

Hexaplax Doflein, 1904:122 [type-species: *Hexaplax megalops* Doflein, 1904, by monotypy; gender: feminine].

DIAGNOSIS.—Eyes large, hammer-shaped, cornea much broader than stalk. Third maxilliped with broad ischium and merus, mesial margin of ischium concave proximally, convex distally, carpus, propodus and dactylus slender, dactylus longer than propodus; exopod with flagellum. Walking legs slender, elongate, merus of longest pair longer than carapace. Apices of male pleopods concealed under abdomen, pleopods straight or faintly sinuous, tapering to slender apex, directed anteriorly, with few minute subdistal spinules. Male abdomen with 6 visible somites, third to fifth fused but distinct, terminal somite triangular, rounded distally.

INCLUDED SPECIES.—*Hexaplax megalops* Doflein, 1904.

REMARKS.—*Hexaplax megalops* has been reported from Indonesia, Thailand, the Philippines, and off Japan in moderately deep water. The female abdomen has not been described. Serène (1964b, fig. 21) has illustrated the male pleopod as well as the third maxilliped, and Sakai (1976: 556) provided a synonymy for the species.

In an adult male from the collection at Leiden examined by us (cl 9.8 mm, cb 14 mm, *Siboga* Sta 12), the first abdominal somite is concealed by the carapace, so that the first visible somite is the second and the abdomen seems to comprise six somites: 2, 3–4–5, 6, and 7. Sutures are clear between the third and fourth and the fourth and fifth somites, but the somites seem to be immovable.

Genus *Hexapus* de Haan, 1833

FIGURE 33

Hexapus de Haan, 1833:5 [a genus established without included nominal species; type species: *Cancer sexpes* Fabricius, 1798, by designation in Opinion 85, 1925, *Smithsonian Miscellaneous Collections*, 73(3):15; gender: masculine; name 317 on *Official List*].

DIAGNOSIS.—Eyes short and stout, cornea not broader than stalk. Third maxilliped (Figure 33*a*) with broad ischium and merus, mesial margin of ischium distally straight or sinuous, carpus, propodus and dactylus slender, subcylindrical; dac-

tylus longer than propodus; exopod with flagellum. Walking legs short, merus of longest leg (third) shorter than carapace. Male pleopods (Figure 33*c*) not concealed under abdomen, lying in deep, oblique grooves (Figure 33*b*) on anterior part of sternum, apices setose, directed anterolaterally. Male abdomen (Figure 33*b*) with third to fifth somites fused, terminal somites rounded, not trilobed. Female abdomen with 7 free somites.

INCLUDED SPECIES.—*Cancer sexpes* Fabricius, 1798, from southern India; *Lambdophallus anfractus* Rathbun, 1909, from Thailand and Japan; and *Hexapus estuarinus* Sankarankutty, 1975, from India.

REMARKS.—De Haan (1835:35, 63, pl. 11: fig. 5, pl. D) included in the genus *Hexapus* (which he had established in 1833 without nominal species) two nominal species: *Cancer sexpes* Fabricius, 1798, and his new *Hexapus latipes*. On plate D, de Haan used the name *Hexapus latipes* for the specimen, which in his text (pages 35 and 63, and pl. 11: fig. 5), he had indicated with the name *Hexapus sexpes* (Fabricius). *Hexapus latipes* is an available name, and the epithet *latipes* has to be used for the species of *Hexapinus* to which de Haan's specimen belongs. This specimen, namely, is specifically (and generically) distinct from the type-specimen of *Cancer sexpes* Fabricius, 1798. As *Cancer sexpes* is the type-species of the genus *Hexapus* it should be known as *Hexapus sexpes* (Fabricius, 1798); for de Haan's Japanese species the name *Hexapinus latipes* (de Haan, 1835) is correct.

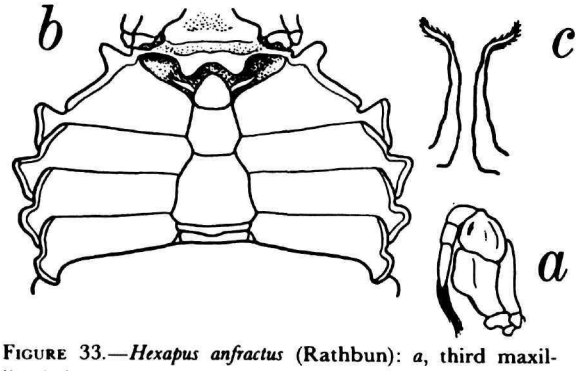

FIGURE 33.—*Hexapus anfractus* (Rathbun): *a*, third maxilliped; *b*, sternum of male; *c*, male pleopod. (All from Rathbun, 1910, fig. 36.)

De Haan (1835:64) did note differences between his Japanese specimen, of which he described the front as deflexed and truncate, and the description of *Cancer sexpes* in which "Fabricius dicit frontem emarginatam."

Fabricius (1798:334) gave the following description of *Cancer sexpes*:

> C. thorace laevi integerrimo, fronte emarginata, pedibus senis.
>
> Habitat in India orientali Dom. Daldorff.
>
> Parvus thorax laevis in medio lineolis duabus impressis. Frons deflexa, emarginata. Pedes omnino sex inermes. Chelae breves, laeves altera maiore.

The type of *Cancer sexpes* Fabricius, in the Universitetets Zoologiske Museum, Copenhagen (see Zimsen, 1964:650), was examined by Manning in Copenhagen in 1977. It is a male, cl 6.2 mm, cb 9.5 mm, preserved dry, and in very good condition. As mentioned by Fabricius, the front is faintly emarginate. It was compared with the holotype of *Lambdophallus anfractus* Rathbun, and differs from the latter in having the carapace less granular, the fingers of the chela longer than the palm, and the walking legs are slenderer and less setose. There is no doubt, however, that the two species are congeneric. Both share the deep, oblique sternal grooves, figured well by Rathbun (1910, fig. 36a; see Figure 33*b* herein), with similar male pleopods. The abdomen of the male in both species has the third to the fifth somites fused. A redescription of the type-specimen of *Hexapus sexpes* is in preparation.

Hexapus estuarinus Sankarankutty, 1975, from the Cochin region, SW India, may well prove to be synonymous with *Hexapus sexpes*. In both species the chelae are unequal and the second leg is the longest of the walking legs.

This genus has deep sternal grooves like *Lambdophallus* sensu stricto, but differs in having very short pereiopods, as in most other genera in the family. The sternal grooves are deep and well defined but extend anterolaterally almost to the base of the maxillipeds rather than extending laterally as in *Lambdophallus* (Figure 34*b*). In *H.*

anfractus the third legs are the longest, the male abdomen extends almost to the level of the insertion of the third maxillipeds, and the carapace is relatively broad (width = 1.5 times length).

We do not agree with Campbell and Stephenson (1970:291) that *Hexapus anfractus* (Rathbun) can be identified with *Hexapinus latipes* from Japan. The sternal grooves in our material of *H. anfractus* are much better developed than they are in our Japanese material of *H. latipes*, in which the grooves are represented only by an emargination in the lateral margins of the sternal abdominal trench. We refer Japanese specimens previously assigned to *H. sexpes* to a new genus, *Hexapinus*. In *L. anfractus* the grooves extend anterolaterally from the terminal segment of the abdomen to the bases of the articulations of the third maxillipeds. The size and extent of development of these grooves are completely different in the two forms, and different from that found in *Lambdophallus*, sensu stricto, in which they extend laterally from the last abdominal somite.

Genus *Lambdophallus* Alcock, 1900

FIGURE 34

Lambdophallus Alcock, 1900:329 [type-species: *Lambdophallus sexpes* Alcock, 1900, by monotypy; gender: masculine].

DIAGNOSIS.—Eyes small, immovable, cornea slightly broader than stalk. Third maxilliped (Figure 34*b*) broad, ischium slightly convex distally, carpus, propodus, and dactylus slender, subcylindrical, dactylus as long as propodus; flagellum of exopod not described. Pterygostomian region with row of oblique striae. Walking legs (Figure 34*a*) elongate, merus of longest pair longer than carapace. Transverse grooves on sternum (Figure 34*b*) for reception of male pleopods present. Male pleopods (Figure 34*b*,*c*) with apices not concealed under abdomen, each bent at right angle, distal part of each lying in deep transverse groove on sternum, apices naked, with subterminal setae, directed laterally. Male abdomen (Figure 34*b*,*c*) with 5 segments, third to fifth fused, terminal segment rounded apically, smooth laterally.

REMARKS.—This genus contains only the type-species, *L. sexpes* Alcock. The fixed eyes, long pereiopods, and long, L-shaped male pleopods extending laterally into transverse grooves in the anterior part of the sternum are diagnostic for the genus.

In *L. sexpes* the third and fourth legs are subequal in length, the male abdomen falls short of the level of insertion of the third maxillipeds, and the carapace is relatively broad (width = 1.6 times length).

Another species subsequently described in this genus, *L. anfractus* Rathbun, 1909, from Thailand, is transferred to *Hexapus* (p. 171).

Genus *Paeduma* Rathbun, 1897

FIGURE 35

Amorphopus Bell, 1859:27 [invalid junior homonym of *Amorphopus* Audinet-Serville, 1838 (Insecta); type-species: *Amorphopus cylindraceus* Bell, 1859, by monotypy; gender: masculine].

Paeduma Rathbun, 1897b:163 [substitute name for *Amorphopus* Bell, 1859; type-species: *Amorphopus cylindraceus* Bell, 1859; gender: neuter].

DIAGNOSIS.—Eyes small, movable, cornea about as broad as stalk. Third maxillipeds slender, ischium convex mesially, propodus dilated distally, as broad as merus, longer than carpus or dactylus; exopod with flagellum. Pterygostomian region lacking oblique striae. Walking legs short, merus of longest pair (second) shorter than carapace. Sternal grooves absent. Apices of male pleopods (Figure 35*b*) concealed under abdomen, pleopods slender, recurved posteriorly or doubly recurved into a figure 8, apices apparently naked or nearly so. Male abdomen (Figure 35*a*) with third and fourth and fifth and sixth somites fused, terminal somite short, subtriangular, rounded apically, not trilobed.

INCLUDED SPECIES.—*Amorphopus cylindraceus* Bell, 1859, locality unknown, and *Thaumastoplax orientalis* Rathbun, 1909 and *T. chuenensis* Rathbun, 1909, both from Thailand.

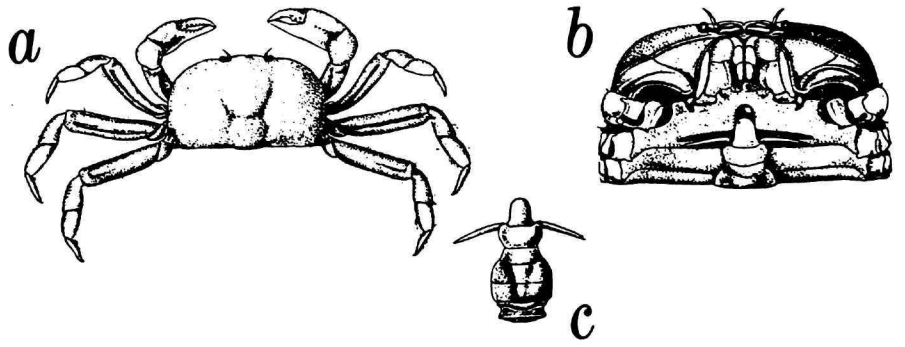

FIGURE 34.—*Lambdophallus sexpes* Alcock: *a*, dorsal view; *b*, ventral view; *c*, male abdomen and apices of pleopods. (From "Illustrations of the Zoology of H. M. Indian Marine Surveying Steamer *Investigator*," *Crustacea*, 10 (1902), pl. 62: fig. 1–1b.)

REMARKS.—The genus *Amorphopus* was recognized by Bell (1859:27) for a single species, *A. cylindraceus*, from an unknown locality. Bell's name *Amorphopus* is preoccupied, as pointed out by Rathbun (1897b:163), who substituted *Paeduma* for it. As we noted above, with the exception of Gordon (1971:108) and Sankarankutty (1975: 4), subsequent authors apparently have overlooked *Paeduma.*

Paeduma has remained unidentifiable since its introduction by Bell; no subsequent workers on the group have been able to identify any species with it. As Gordon (1971:108) pointed out, one of the characters mentioned by Bell, the fusion of segments of the abdomen, is unusual (i.e., the third and fourth segments and the fifth and sixth segments are fused, rather than the third, fourth, and fifth, as we have found in all other genera of the family, save two: in *Stevea*, new genus, the second through the sixth segments are fused and in *Hexaplax* some segments are indistinctly fused).

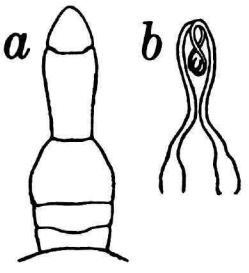

FIGURE 35.—*Paeduma orientale* (Rathbun), male: *a*, abdomen; *b*, pleopod. (Both from Rathbun, 1910, fig. 33.)

However, in her expanded account of *Thaumastoplax orientalis* Rathbun, 1909, Rathbun (1910:347) reported an identical configuration of the abdomen in that species, and Sakai (1939:579) mentioned it in material from Japan identified with *T. orientalis.* Further, Bell (1859:28) also had noted: "the abdomen very long and narrow, the first and second joint transversely linear, the third and fourth united and forming a triangle truncated anteriorly at the articulation of... the fifth and sixth joints united, and which with the seventh form a very narrow and linear piece extending forwards to the posterior margin of the oral aperture." This is precisely the condition figured by Rathbun (1910, fig. 33) (Figure 35*a* herein) for *T. orientalis.* In Rathbun's species, the fused third and fourth somites taper abruptly, forming a truncated triangle anteriorly, and the slender terminal sections of the abdomen extend forward to a point between the maxillipeds. Inasmuch as all other hexapodid genera, with the exception of *Stevea* and possibly *Hexaplax*, have the third to fifth somites of the male abdomen fused, we believe that Rathbun's species, *T. orientalis*, must be assigned to *Paeduma.* This genus also now includes *P. chuenense* (Rathbun, 1909), based on a juvenile male, and a species from Japan, identified by earlier workers with *T. orientalis*, which we believe represents a new species, the description of which is in preparation. *Paeduma cyclindraceum* (Bell), with its unequal chelipeds, remains un-

identifiable; the holotype, long thought to be lost, has been rediscovered in the Bell collection at the University Museum, Oxford, England, by Angelo A. DiMauro, Jr., of the University of Connecticut. His study of the Bell collection should allow us to be able to identify Bell's species.

Paeduma resembles *Thaumastoplax* in having the propodus of the third maxillipeds dilated distally, in having the second walking legs strongest, and, in *P. orientale* at least, in lacking the oblique striae on the pterygostomian region. *Paeduma* differs from other hexapodid genera in having the third and fourth and the fifth and sixth somites of the abdomen fused in males.

Genus *Parahexapus* Balss, 1922

Parahexapus Balss, 1922:77 [type-species: *Parahexapus africanus*, Balss, 1922, by monotypy; gender: masculine].
Hexapus (*Parahexapus*).—Monod, 1956:362, 370.

DIAGNOSIS.—Eyes small, movable, cornea slightly broader than stalk. Third maxillipeds (Figure 36*a*) slender, pediform, ischium convex mesially, carpus, propodus and dactylus slender, cylindrical, dactylus longer than propodus; exopod with flagellum. Pterygostomian region with transverse granulate ridge. Walking legs short, merus of longest pair shorter than carapace. Sternal grooves absent. Apices of male pleopods concealed by abdomen, pleopods (Figure 36*c*) sinuous, slender, abruptly tapering distally to slender apex, directed anteriorly, with large spines near midlength directed proximally. Male abdomen (Figure 36*b*) with third to fifth somites fused, slender, subterminal and terminal somites long, latter rounded distally, not trilobed.

INCLUDED SPECIES.—*Parahexapus africanus* Balss, 1922.

REMARKS.—*Parahexapus* shares slender third maxillipeds with *Thaumastoplax*, *Spiroplax*, and *Paeduma*; but in *Parahexapus* the propodus of the third maxilliped is very slender, not dilated distally. The first male pleopod (Figure 36*c*) of *Parahexapus africanus* differs from those of known species in the other three genera in having strong spines near midlength and in abruptly tapering distally.

In *P. africanus* the interantennular septum is scarcely discernible in anterior view, the male abdomen extends anteriorly between the bases of the third maxillipeds, and the carapace is rather broad (width = 1.5–1.9 times length). Although the sutures in the abdomen of the single male available to us are very indistinct, it appears that the third to fifth somites are fused and the sixth somite is elongated, as figured by Crosnier (1967, fig. 33) (Figure 36*b* herein), as in *Thaumastoplax anomalipes*.

Parahexapus africanus Balss, 1922

FIGURE 36*a–c*

Hexapus (*Parahexapus*) *africanus*.—Monod, 1956:370, figs. 494–496.—Rossignol, 1962:118.—Crosnier, 1967:337, figs. 30, 33.
Hexapus africanus.—Longhurst, 1958:88.—Gauld, 1960:71.

MATERIAL EXAMINED.—*Pillsbury Material*: None.
Other Material: Congo: Baie de Pointe-Noire, A. Crosnier, 2♂, 1♀ (W).

DESCRIPTION.—Monod, 1956:370.
Figures: Monod, 1956, figs. 494–496; Crosnier, 1967, figs. 30, 33.
Male pleopod: Crosnier, 1967, fig. 30 (Congo).

MEASUREMENTS.—The carapaces of our males measure 3.4 × 5.6 and 2.8 × 4.9 mm; that of the female measures 3.0 × 4.6 mm. Monod (1956) reported ovigerous females measuring 4 × 7 mm and 5 × 7.5 mm, and Crosnier (1967) reported males measuring 3.2 × 5 mm and 3.4 × 5.6 mm and a female as large as 3.4 × 5.6 mm. Balss (1922) reported that the female holotype measured 4 × 7.5 mm.

BIOLOGY.—*Parahexapus africanus* is a sublittoral species, which has been collected in depths between 5 m and about 25 m (16–27 m; 22–25 m). Longhurst (1958) found the species off Sierra Leone in 16–27 m on shelly sand and sandy mud. Crosnier (1967) found it on sandy mud in 22–25 m off the mouth of the Congo River.

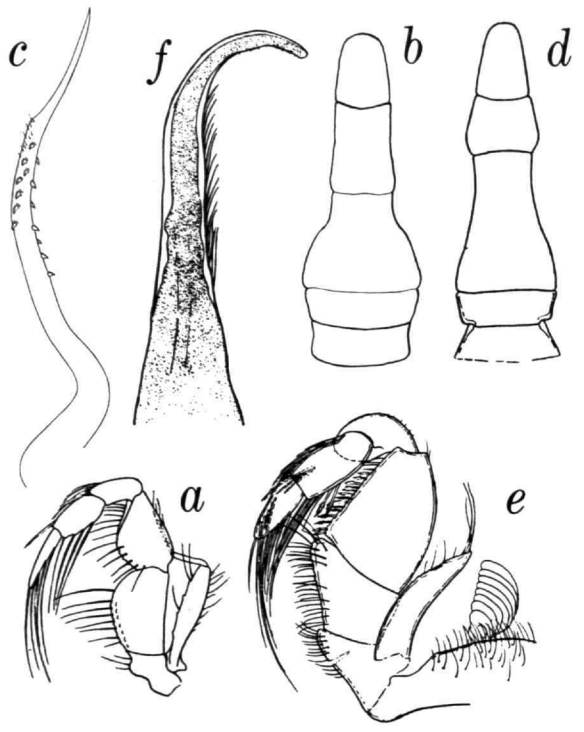

FIGURE 36.—*Parahexapus africanus* Balss: *a*, third maxilliped (from Monod, 1956, fig. 496); *b*, abdomen of male; *c*, male pleopod (*b,c*, from Crosnier, 1967, figs. 30, 33). *Pseudohexapus platydactylus* Monod: *d*, abdomen of male; *e*, third maxilliped; *f*, male pleopod (*d–f*, from Monod, 1956, figs. 481, 484, 488).

Ovigerous females have been collected in February (Monod, 1956).

DISTRIBUTION.—West Africa, where it has been recorded from localities on the mainland between Sierra Leone and Cabinda, in depths between 5 m and about 25 m (16–27 m is the deepest record). Records in the literature include the following:

Sierra Leone: No specific locality, in 16–27 m (Longhurst, 1958).

Ghana: Off Accra, 5 m (Monod, 1956; Gauld, 1960).

Congo: Baie de Pointe-Noire (Rossignol, 1962; Crosnier, 1967). Off the mouth of the Congo River, 05°56′S, 12°07′E, 22–25 m (Crosnier, 1967).

Cabinda: Landana, 6 m (Balss, 1922).

Genus *Pseudohexapus* Monod, 1956

Hexapus (*Pseudohexapus*) Monod, 1956:362, 365 [type-species: *Hexapus* (*Pseudohexapus*) *platydactylus* Monod, 1956, by monotypy; gender: masculine].

DIAGNOSIS.—Eyes small, movable, cornea as broad as stalk. Third maxilliped (Figure 36*e*) broad, ischium short, mesial margin concave, projecting distally, carpus, propodus and dactylus slender, cylindrical, propodus longer than dactylus; exopod without flagellum. Pterygostomian region lacking oblique striae, with hairy ridge. Walking legs short, merus of longest pair (fourth) shorter than carapace. Dactyli of walking legs flattened dorsoventrally. Sternal grooves absent (?). Apices of male pleopods completely concealed by abdomen; pleopods (Figure 36*f*) stout, apices curved mesially, with terminal spinules and few subterminal setae. Male abdomen (Figure 36*d*) with 5 free somites, third to fifth fused, terminal somite elongate, rounded apically, not trilobed.

INCLUDED SPECIES.—*Pseudohexapus platydactylus* Monod, 1956.

REMARKS.—In *Pseudohexapus* the carapace is subquadrate (width = 1.2–1.3 times length), the pterygostomian region lacks a row of oblique striae, the propodus of the third maxilliped is slender and the exopod lacks a flagellum, the sternal grooves are absent, and the male pleopod is stout with its apex turned mesially. The flattened dactyli of the walking legs apparently are unique within the family.

Pseudohexapus platydactylus Monod, 1956

FIGURE 36*d–f*

Hexapus (*Pseudohexapus*) *platydactylus* Monod, 1956:365, figs. 478–493 [Senegal, Gambia, Ghana].—Gordon, 1971:107, fig. 2 [Ghana].

Hexapus platydactylus.—Gauld, 1960:71 [Ghana].—Longhurst, 1958:88 [Sierra Leone].

DISTRIBUTION.—West Africa, from Senegal, Gambia, Sierra Leone, and Ghana, sublittoral, in 5–15 m.

Genus *Spiroplax*, new genus

FIGURE 37

TYPE-SPECIES.—*Thaumastoplax spiralis* Barnard, 1950:301, fig. 56*h–l*, South Africa.

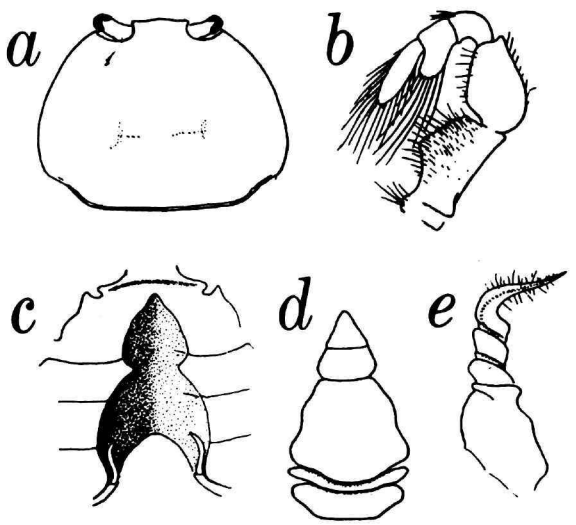

FIGURE 37.—*Spiroplax spiralis* (Barnard): *a*, carapace; *b*, third maxilliped; *c*, sternum; *d*, abdomen of male; *e*, male pleopod. (All from Barnard, 1950, fig. 56h–l.)

ETYMOLOGY.—From the Greek, *speira* (coil, twist), in combination with the noun *plax* (a plate), alluding to the form of the male pleopod; the gender of the name is feminine.

DIAGNOSIS.—Eyes movable, cornea slightly broader than stalk. Third maxilliped (Figure 37*b*) slender, ischium with obtuse mesial projection, propodus shorter than dactylus, with mesial expansion distally; exopod flagellum not described. Pterygostomian region not described. Walking legs not described. Sternal grooves not described. Male pleopods (Figure 37*e*) apparently concealed under abdomen, strongly calcified, stout, spiral, apices setose. Male abdomen (Figure 37*d*) with third to fifth somites fused, very broad, terminal somite triangular, not trilobed.

REMARKS.—The dilated propodus of the third maxillipeds suggests affinities with both *Thaumastoplax* and *Paeduma*, but in *Spiroplax* the carapace is much more oval (Figure 37*a*) (width = 1.3 times length), the male abdomen is much broader, and the stout, spiral male pleopods are very different from the slender, almost filamentous male pleopods of representatives of the other two genera. *Spiroplax* includes only the type-species.

Genus *Stevea*, new genus

FIGURE 38

TYPE-SPECIES.—*Hexapus williamsi* Glassell, 1938:445, pl. 35, Guatemala (type locality) and Gulf of Tehuantepec, W coast of Mexico (♀, 9.4 × 14.4 mm, W).

ETYMOLOGY.—The genus is named for Steve A. Glassell, the first carcinologist to record a hexapodid crab from the Americas; the gender of the generic name is feminine.

DIAGNOSIS.—Carapace suboval (Figure 38*a*). Eyes small, movable, cornea subglobular, narrower than stalk. Third maxilliped (Figure 38*c*) broad, ischium flattened or slightly concave distally, carpus, propodus and dactylus slender, subcylindrical, dactylus longer than propodus; exopod with flagellum. Pterygostomian region with row of oblique striae. Walking legs short, merus of longest pair (third) shorter than carapace. Sternal grooves absent. Apices of male pleopods completely concealed by abdomen; structure of male pleopod not described. Male abdomen (Figure 38*d*) with three free somites, second through sixth fused, terminal somite triangular, not trilobed.

REMARKS.—In the only species assigned to this genus, *Stevea williamsi* (Glasssell, 1938) (incorrectly spelled *Hexapus williamsoni*, in Stephensen, 1945:182), there is a distinct median lobe on the front, visible in anterior view, the interantennular septum is poorly developed, the male abdomen extends beyond the bases of the third maxillipeds, and the carapace is relatively broad (width = 1.5 times length).

The presence of only three free somites in the male abdomen will distinguish this genus from all others in the family.

Genus *Thaumastoplax* Miers, 1881

Thaumastoplax Miers, 1881a:261 [type-species: *Thaumastoplax anomalipes* Miers, 1881, by monotypy; gender: feminine].

DIAGNOSIS.—Eyes small, movable, cornea rounded, only slightly broader than stalk. Third maxilliped (Figure 39*a*) slender, ischium convex

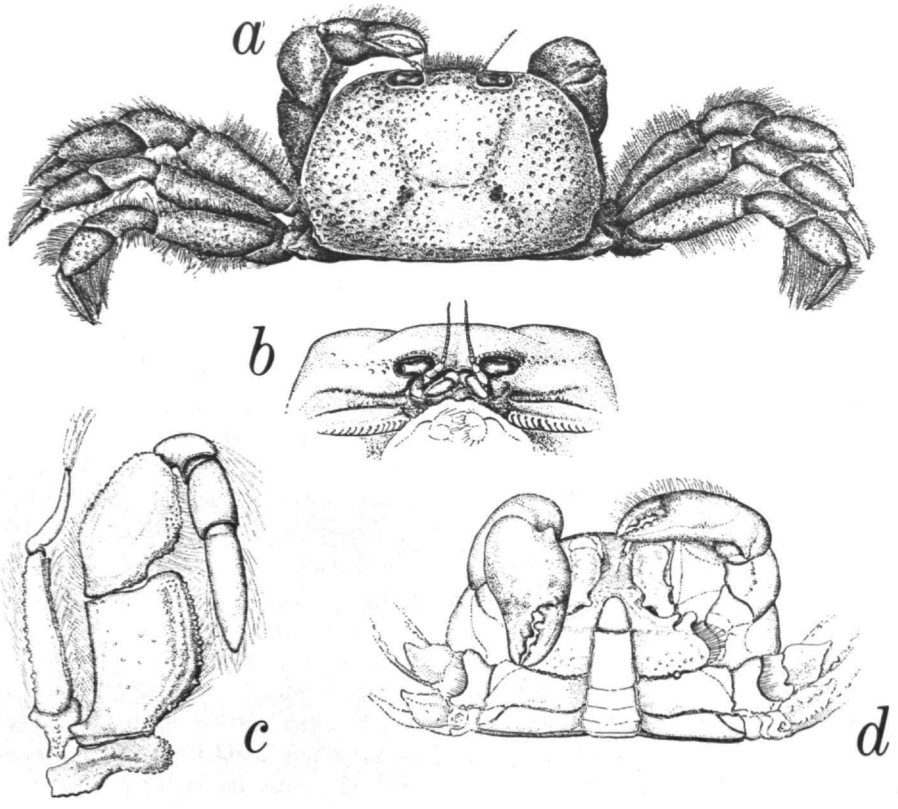

FIGURE 38.—*Stevea williamsi* (Glassell): *a*, dorsal view; *b*, front; *c*, third maxilliped; *d*, ventral view. (All from Glassell, 1938, pl. 35.)

mesially, propodus strongly dilated distally, almost as broad as merus, longer than carpus or dactylus; exopod with flagellum. Pterygostomian region lacking row of oblique striae. Walking legs short, merus of longest pair (second) shorter than carapace. Sternal grooves absent. Male pleopods (Figure 39*c*) slender, sinuous, apices directed anteriorly, completely concealed under abdomen, armed with minute spinules. Male abdomen (Figure 39*b*) with third to fifth somites fused, terminal somite elongate, sinuous laterally, rounded apically, not trilobed.

INCLUDED SPECIES.—*Thaumastoplax anomalipes* Miers, 1881, from West Africa. Two other species assigned to this genus, *T. orientalis* Rathbun, 1909, and *T. chuenesis* Rathbun, 1909, are here transferred to *Paeduma* (p. 173). The fourth species assigned to this genus, *T. spiralis* Barnard, 1950, is transferred to *Spiroplax* (p. 176).

REMARKS.—Several features appear to be diagnostic for this genus, now known to include only a single species from tropical West Africa. The third maxilliped is slender and the propodus is strongly dilated distally, being almost as broad as the merus; the pterygostomian region is not ornamented with oblique striae; the second pair of walking legs is much the strongest of the three; the interantennular septum is very low, scarcely visible in frontal view; and the male pleopod is slender, sinuous, and directed anteriorly.

Two other genera, *Paeduma* and *Spiroplax*, share the maxilliped with the distally dilated propodus, but both can be differentiated readily from *Thaumastoplax*. In *Paeduma* the third and fourth and fifth and sixth, rather than the third to fifth, abdominal somites in the male are fused, and the male pleopods are strongly recurved posteriorly

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: Baie 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 pereiopods, more prominent in female, scarcely visible in male. Regions poorly marked, H-shaped depression prominent on surface near middle, vertical 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. Pterygostomian region lacking oblique striae. Lower part of carapace and mouthfield densely hairy.

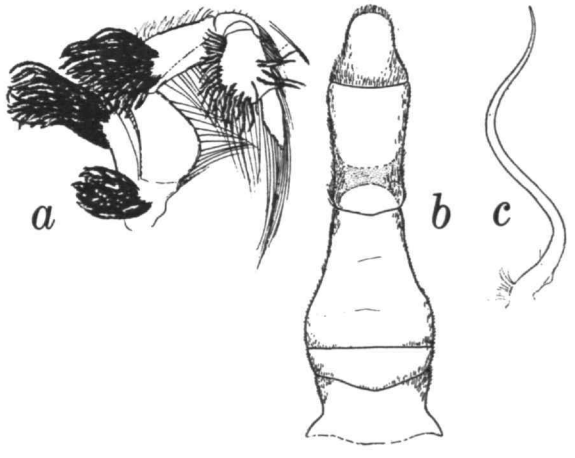

FIGURE 39.—*Thaumastoplax anomalipes* Miers: *a*, third maxilliped; *b*, male abdomen; *c*, male pleopod. (All from Monod, 1956, figs. 472, 474, 476.)

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 × 5.7 mm, the female 4.8 × 8.0 mm. The largest specimen studied by Monod was an ovigerous female 11 × 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, *tritos* (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.

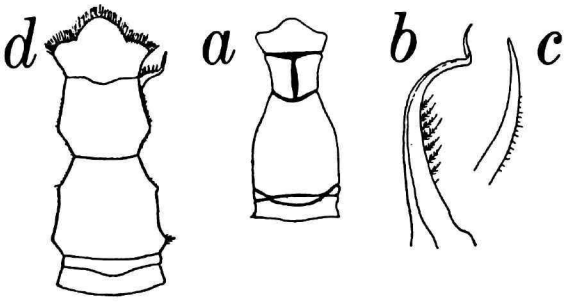

FIGURE 40.—*Tritoplax stebbingi* (Barnard): *a*, abdomen of male; *b*, male pleopod; *c*, apex; *d*, abdomen and apex of pleopod of male (*a–c*, from Barnard, 1950, fig. 56*e,f*; *d*, from Stephensen, 1945, fig. 53b).

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 leloeuffi* 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. leloeuffi*, *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 inaequipes* 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].—Rossignol, 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

Pinnoteres 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 Alagarswami, 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 pereiopods, 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 42*a*) 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 42*b–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 42*e–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

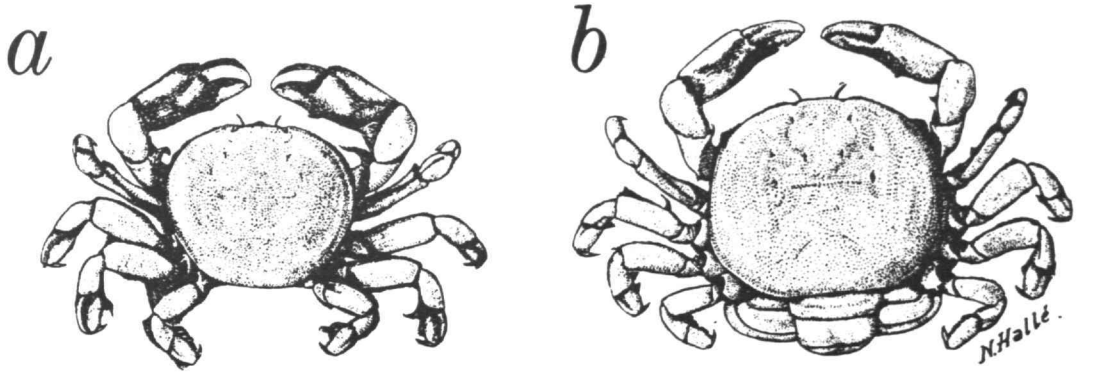

FIGURE 41.—*Pinnotheres conicola*, new species: *a*, male; *b*, female.
(From Monod, 1956, figs. 524, 525.)

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*

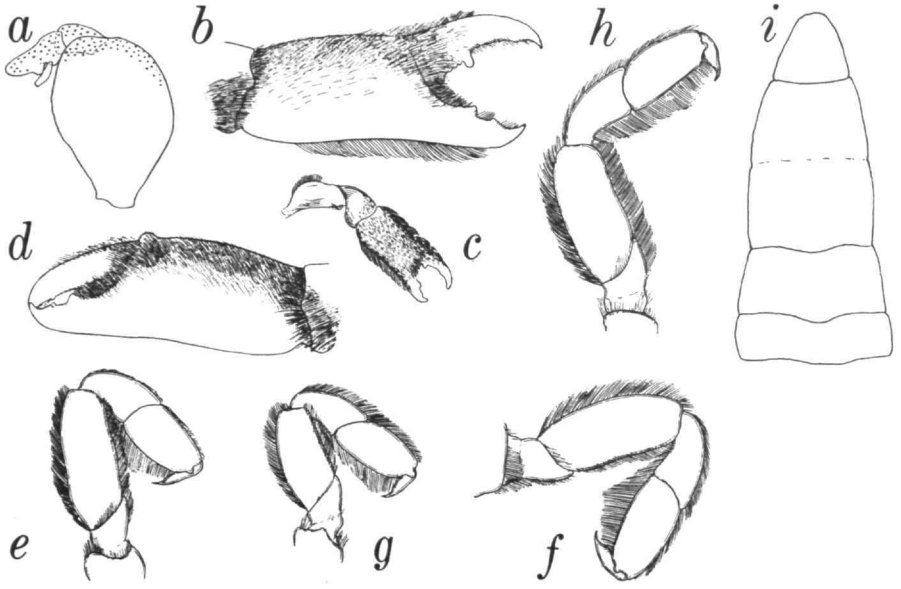

FIGURE 42.—*Pinnotheres conicola*, new species: *a*, third maxilliped; *b–d*, chelipeds; *e–h*, second to fifth pereiopods; *i*, abdomen of holotype, male, cl. 10.0 mm, Kribi (*a–h* from Monod, 1956, figs. 526–532).

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 Alagarswami, 1967:1208 [listed].—Schmitt, McCain, and Davidson, 1973:2, 57 [synonymy]. [Preoccupied by *Pinnotheres rouxi* H. Milne Edwards, 1837.]

Pinnoteres 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 43*a,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 43*c*) 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 43*d–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

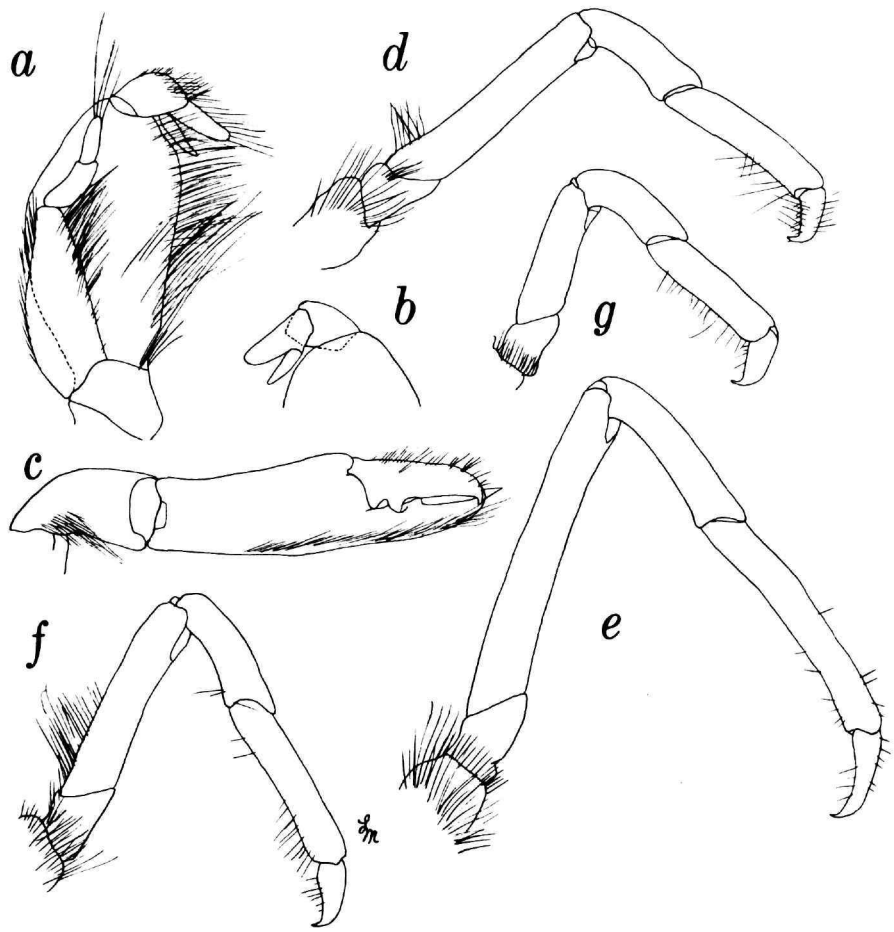

FIGURE 43.—*Pinnotheres mccainae* Schmitt, ovigerous female, cl 5.3 mm, Pointe-Noire: *a,b*, third maxilliped; *c*, chela; *d*, second pereiopod; *e*, third pereipod; *f*, fourth pereiopod; *g*, fifth pereiopod.

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 Alagarswami (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)

Pinnoteres pinnoteres.—Balss, 1922:79 [Cameroon, Gabon].
Pinnoteres pinnotheres.—Monod, 1956:376 [references].
Pinnotheres pinotheres.—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].
Pinnoteres 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 modioli* Leach, 1814; *Pinnotheres cranchii* Leach, 1814; *Pinnotheres latreillii* Leach, 1817; *Cancer eubolinus* Nardo, 1847.

DISTRIBUTION.—Eastern Atlantic, from Norway southward to Port Etienne, Mauritania; Mediterranean; commensal in bivalves and possibly ascidians; intertidal to about 45 m.

Pinnotheres tellinae, new species

FIGURES 44, 45

Pinnoteres 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 44*a*): 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 45*a*) 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 45*b*) 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 45*c*) strong. Fingers about 4/5 as long as palm, gaping. Dactylus with large tooth on basal part of cutting edge, large basal

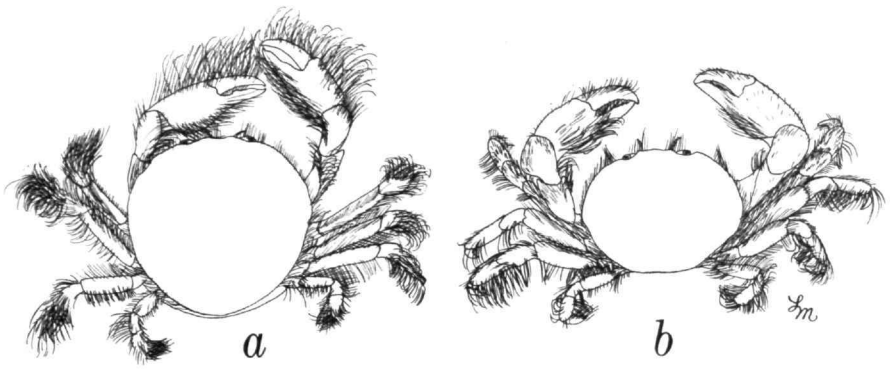

FIGURE 44.—*Pinnotheres tellinae*, new species, paratypes, Kissy: *a*, adult female, cl 4.7 mm; *b*, adult male, cl 3.0 mm.

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 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, 1¼ times as wide as long; difference 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 1½ times wider at base than distally. Fifth somite slightly longer than sixth, width same throughout length, 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

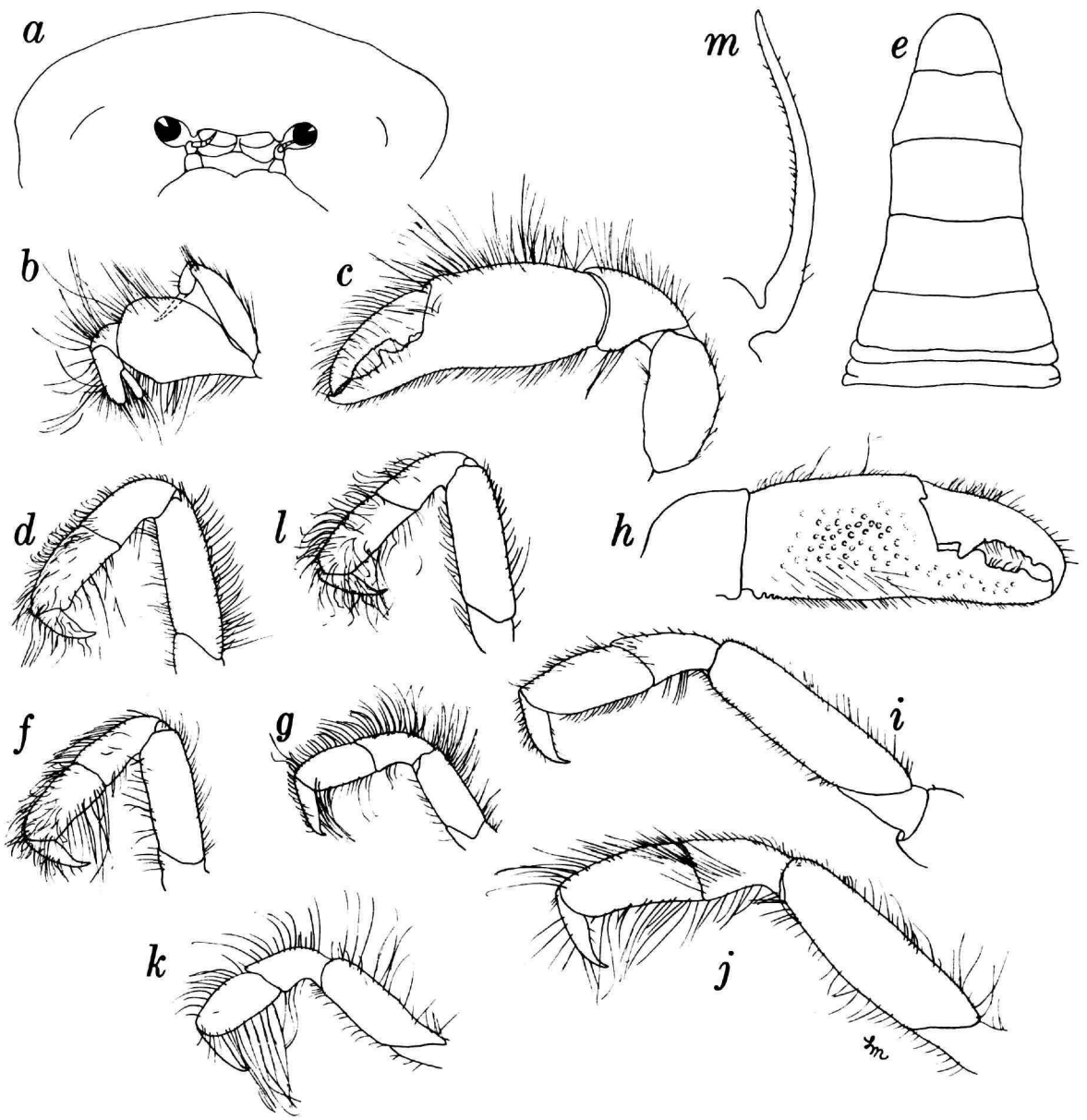

FIGURE 45.—*Pinnotheres tellinae*, new species, paratypes, Kissy. Female, cl 5.9 mm: *a*, front; *b*, third maxilliped; *c*, cheliped; *d*, second pereiopod; *e*, third pereiopod; *f*, fourth pereiopod; *g*, fifth pereiopod. Male, cl 2.5 mm: *h*, chela; *i*, second pereiopod; *j*, third pereiopod; *k*,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

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

Pinnotheres sp. A.—Silas and Alagarswami, 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

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

Pinnotheres sp. B.—Silas and Alagarswami, 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

Pinnoteres sp. D.—Monod, 1956:382, figs. 539, 540 [Congo].—Rossignol, 1962:118 [Congo].
Pinnotheres sp. D.—Silas and Alagarswami, 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

CYMOPOLIDAE 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*].
DOTINAE Dana, 1851c:286 [unavailable, based on a homonym].
MACROPHTHALMINAE Dana, 1851c:286.
UCAINAE Dana, 1851c:289.
HELOECIACAEA 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, *Ecphantor*, new genus, *Lillyanella*, new genus (see addendum), *Ocypode*, *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*: *Ocypode cursor* and *Uca tangeri*. Three species were recorded by Monod (1956) under the same names used here, although he used *Ocypoda* for *Ocypode*.

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

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

Ocypode 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 *Leipocten* 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 ..... ***Paratylodiplax***
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 pereiopods 7

First somite of male abdomen, though usually slightly wider than second, separated from coxae of fifth pereiopods 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 pereiopods with blunt spines on lower (flexor) surface ..... ***Leipocten***

Merus of pereiopods 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 pereiopods 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 pereiopods 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 pereiopods longer than second and fifth. Merus of second to fifth pereiopods 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 pereiopods. 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 46*a*) 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 46*a*,*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 unarmed. 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 46*b*) 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 pereiopods of male (Figure 46*e*) small, equal, much shorter than second pereiopods 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 pereiopod, 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 46*c*) 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 pereiopod (Figure 46*f*) reaching with carpus beyond front of carapace. Dactylus slender with curved, sharp tip, lacking teeth; some hairs

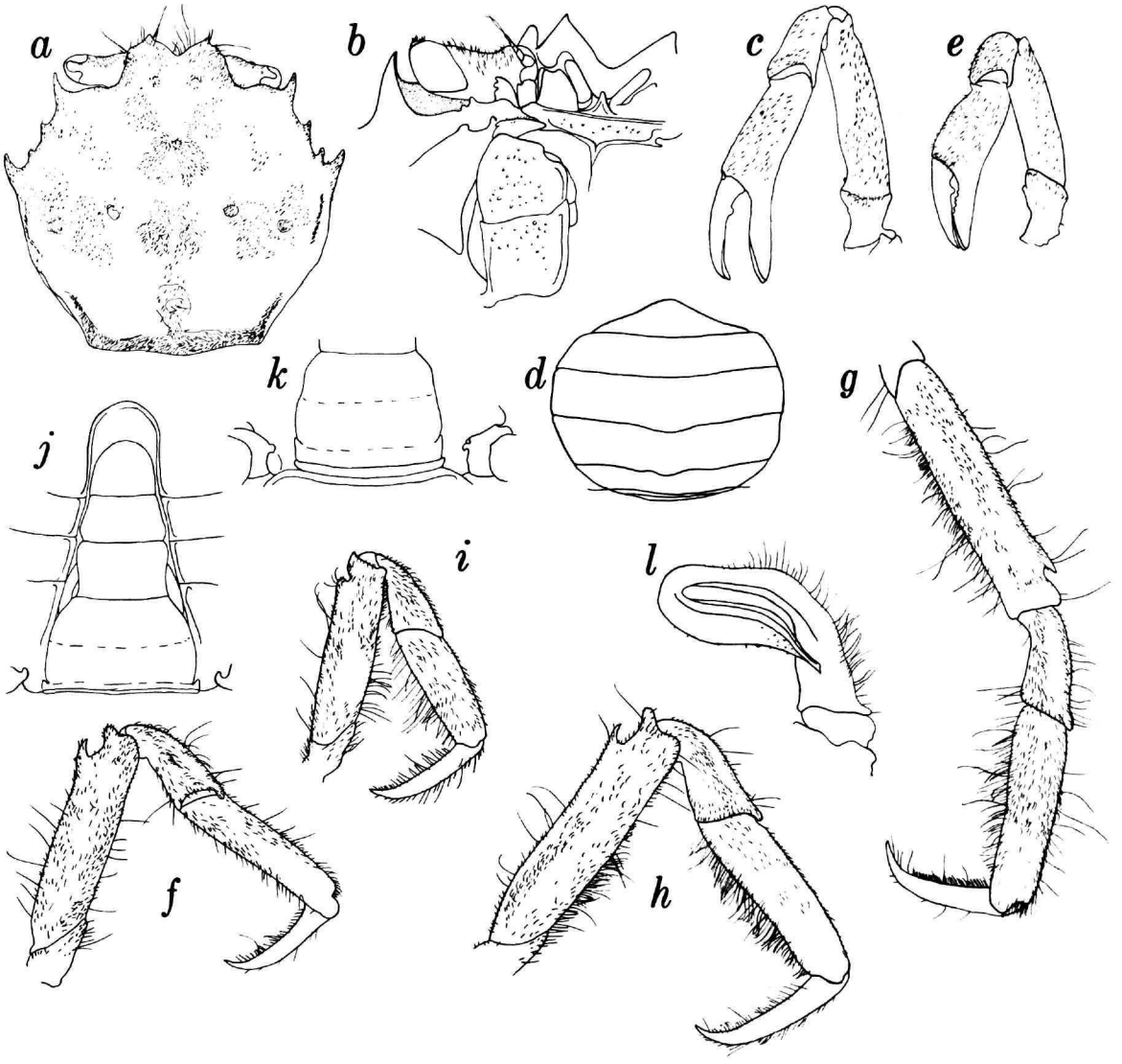

FIGURE 46.—*Calabarium crinodytes*, new genus, new species. Ovigerous female paratype: *a*, carapace; *b*, frontorbital region, ventral view; *c*, cheliped; *d*, abdomen. Male paratype: *e*, cheliped; *f*, second pereiopod; *g*, third pereiopod; *h*, fourth pereiopod; *i*, fifth pereiopod; *j*, abdomen 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 46*g*) 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 pereiopods, 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 pereiopod, 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 pereiopods. 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*, *Ecphantor modestus*, and *Telmatothrix powelli*, are so far the only known West African Camptandriinae. *Ecphantor* 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 pereiopods 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 pereiopods. 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 other sinuous and longer of the two; appendages longer than recurved part of gonopod.

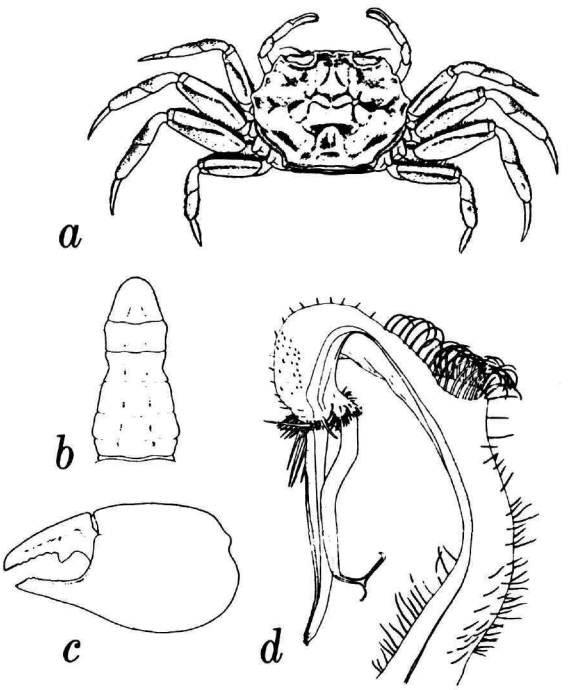

FIGURE 47.—*Camptandrium sexdentatum* Stimpson: *a*, female, dorsal view; *b*, male abdomen; *c*, male chela; *d*, gonopod. (All from Shen, 1932, figs. 138, 140a,c,e.)

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: *Ocypode* (*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 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-

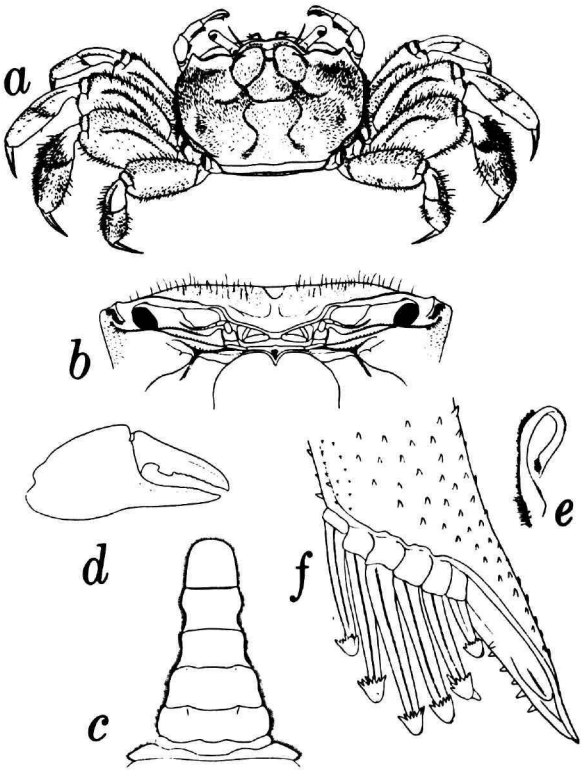

FIGURE 48.—*Cleistostoma dilatatum* (de Haan): *a*, female, dorsal view; *b*, male, frontal view; *c*, male abdomen; *d*, male chela; *e*, gonopod; *f*, tip of gonopod, enlarged. (From Shen, 1932, figs. 145, 146, 147b,c, 148.)

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 *Paratylodiplax* (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 *Cleistotoma* 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

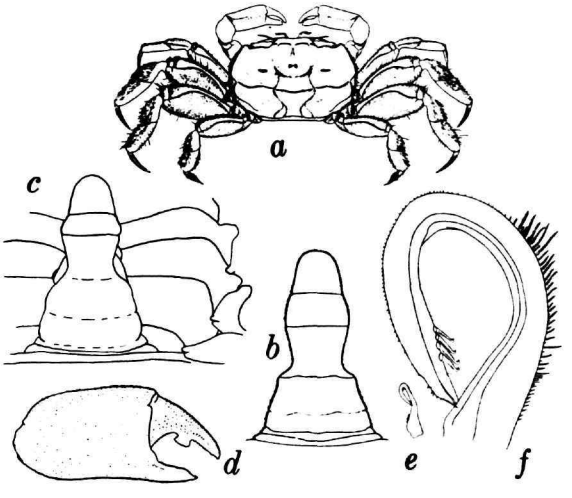

FIGURE 49.—*Deiratonotus cristatus* (De Man): *a*, male, dorsal view; *b*, male abdomen; *c*, abdomen in situ, male, cl. 7.5 mm, Japan; *d*, male chela; *e*, gonopod; *f*, tip of gonopod, enlarged (*a,b,d–f* from Shen, 1932, figs. 141, 143b,c, 144).

margins convex. Surface very flat, except for 3 elevations forming a transverse ridge slightly behind middle, and short but distinct epigastric ridges. Ridges accentuated by covering of short dark brown hairs absent from rest of carapace except for marginal rim and additional ridge in posterolateral area. Inner dorsal orbital angle rounded. Front slightly concave in middle and with anterolateral angles angularly rounded but not produced. Suborbital ridge lying somewhat below distinct lower orbital margin, but reaching farther forward. Anterolateral margin of carapace unarmed. Sharp carina placed on posterolateral part of carapace, joining lateral margin anteriorly. Chelipeds with distinct sexual dimorphism. In male, chelipeds large, chelae with large molariform tooth on cutting edge of dactylus, but not on fixed finger. Meri of walking legs unarmed. Male abdomen with first somite somewhat wider than any of other somites, but failing to reach coxae of fifth legs by considerable distance. First somite of male abdomen free, second, third, fourth, and fifth fused, sutures only faintly indicated; incision in lateral margin marking separation between second and third somites. Outline of male abdomen narrowing gradually towards telson, but strongly constricted at level of the fifth somite, constriction revealing part of gonopods, even when abdomen is fully pressed against thoracic sternum. Exposed parts of gonopods, however, not flush with surface of abdomen. Sixth somite of male abdomen and telson are free. Male gonopod strongly recurved, ending in sharp point, neither swollen distally nor bearing appendages there.

REMARKS.—This genus, in the shape of the abdomen, which leaves part of the gonopods exposed, resembles the genera *Camptandrium* and *Paratylodiplax*, and differs in this respect from all other Camptandriine genera. In *Camptandrium* and *Paratylodiplax*, however, the gonopods have two distinct appendages distally, while in *Deiratonotus* such appendages are entirely lacking. In the general shape of the carapace, with elevated hairy ridges the present new genus resembles the West African genus *Telmatothrix*.

The type-species is the Indo-West Pacific *Paracleistostoma cristatum* De Man, 1895 (Figure 49). A second species that we assign to this genus is *Paracleistostoma japonicum* Sakai. Although we saw no material, Sakai's (1934:321, fig. 26, pl. 18: fig. 1) good description indicates the main characters of *Deiratonotus*: ridged carapace, male abdomen revealing the gonopods, and the shape of the male gonopod. *Deiratonotus cristatus* is known from Japan, China and Korea, *D. japonicus* only from Japan.

Genus *Ecphantor*, new genus

TYPE-SPECIES.—*Ecphantor modestus*, new species.

ETYMOLOGY.—From the Greek word *ekphantor* (revealer), referring to the partly exposed gonopods of the male; gender of name is masculine.

DIAGNOSIS.—A genus of Camptandriinae. Carapace subhexagonal, being only slightly (1.1 to 1.2 times) wider than long. Surface of carapace flat but slightly uneven, with dense, uniform, short pubescence. Front directed obliquely down. Epigastric lobes strong, placed on base of front; no other distinct ridges present. Anterolateral margins without teeth. Orbits transverse, situated in common straight line. Eyes with distinct pigmented cornea. Antennules obliquely folded. Antennae entering orbit. Lower margin of orbit straight, without tubercles or teeth. Epistome short, concave. Third maxilliped filling entire oral field; merus and ischium covering palp and part of exopod. Merus shorter than ischium. Anterolateral angle of merus widely rounded, not produced. Inner anterior angle of ischium produced forward. Chelipeds equal, left and right; those of adult male much stronger and more robust than in female. Dactylus of cheliped in male with strong tooth in basal half of cutting edge, no other teeth present. No teeth on either finger in female. Tips of fingers of chelipeds spoon-shaped. Ambulatory legs longer than chelipeds; third and fourth pereiopods longer than second and fifth. No spines or teeth on any segments of ambulatory legs, latter covered by uniform short pubescence and scattered longer hairs.

Male abdomen narrow; all somites distinct, regularly tapering from first to sixth. First somite failing to reach coxa of fifth pereiopods. Fifth somite slightly constricted in basal part, first gonopods thereby slightly exposed. Female abdomen very wide, almost semicircular. Male gonopods strongly recurved; pointed apex with broad subdistal lobe, but without appendages.

REMARKS.—The shape of the carapace of this new genus is somewhat similar in its hexagonal form to that of *Calabarium*, but it can immediately be distinguished by the total lack of anterolateral teeth. Like *Camptandrium*, *Calabarium*, *Paratylodiplax*, and *Deiratonotus*, *Ecphantor* has the abdomen constricted in such a way that the gonopods are partly visible even when the abdomen is firmly pressed against the sternum. The distal part of the gonopod, which carries a broad subdistal lobe but no appendages, distinguishes *Ecphantor* immediately from the other genera in the subfamily.

Ecphantor modestus, new species

FIGURE 50

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Nigeria: Elechi Creek at College of Science and Technology, Port Harcourt, 04°47.3'N, 06°58.6'E, 19 Oct 1979, C. B. Powell, 1♂ holotype (L). Same locality, 21 Feb 1979, C. B. Powell, 1♀ paratype (W). Same locality, 25 Feb 1979, C. B. Powell, 1♀ paratype (L).

DESCRIPTION.—Carapace (Figure 50*a*) subhexagonal, slightly (1.1 to 1.2 times) wider than long. Surface flat, margins slightly elevated; with pubescence removed, surface appearing slightly uneven, smooth, shining and pitted. Hair cover of carapace uniform, consisting of short, dark, curved, stiff hairs; cover dense enough to obscure surface, especially so since mud particles usually are caught between hairs. Central part of cervical groove rather distinct, with another median transverse depression some distance behind it; latter, however, very vague. Front directed obliquely down, separated from rest of carapace by distinct epigastric lobes, falling off precipitously anteriorly, separated from each other by short, distinct median groove; short longitudinal lateral groove, less distinct than median groove, present on either side of frontal lobes. Width of front at level of epigastric lobes slightly less than half frontorbital width; distal width of front 2/5 frontorbital width. Upper surface of front rather flat, slightly concave in middle. Anterior margin produced somewhat forward in middle, top slightly emarginate. Anterolateral angles of front broadly rounded. Lateral margin of front merging with orbital margin under wide curve. Orbital margin with indistinct notch in inner, posterior part, latter otherwise slightly convex. Outer orbital angle rectangularly rounded. Anterolateral margin of carapace unarmed. Angle between anterolateral and posterolateral margins blunt and wide. Posterolateral margin less sharply defined than anterolateral. Angle between anterolateral and posterolateral margins lying in anterior half of body, forming widest part of carapace. Faint but broad rim present on posterior margin; latter about 2/3 as wide as frontorbital width.

Eyes with cornea distinct and globular but narrower than eyestalk. Lower margin of orbit straight, smooth, bearing several long hairs, lacking granules or teeth. Suborbital ridge similarly unarmed.

Antennules folding obliquely, almost transversely. Antennae entering orbit. Flagellum short, consisting of 4 articles and terminating in long seta.

Epistome wide, short, concave, anterior margin almost straight or slightly sinuous, posterior margin ending posteriorly in median carina separating the two halves of the oral field. No granules present.

Third maxillipeds filling entire oral field. In ventral view merus and ischium covering larger part of both exopod and palp, of both only basal part being visible. Merus shorter than ischium, with anterolateral angle broadly rounded, not produced or auricular. Palp articulating in middle of anterior margin of merus. Exopod rather broad, with well-developed flagellum.

First legs (Figure 50*c,h*) showing conspicuous sexual dimorphism. Chelipeds of male relatively small, shorter than any of other legs, but distinctly

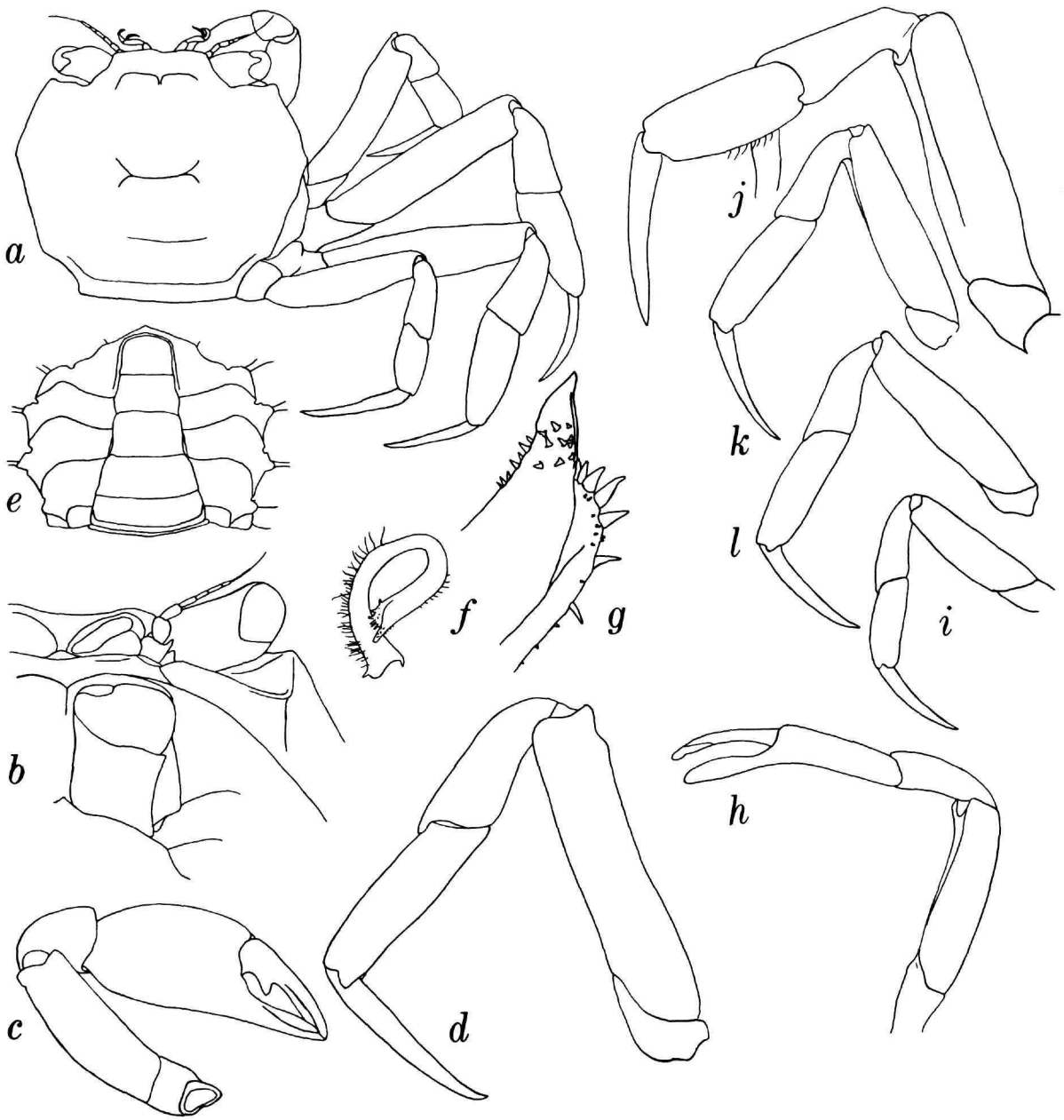

FIGURE 50.—*Ecphantor modestus*, new genus, new species. Male, holotype: *a*, dorsal view; *b*, anterior part of body, ventral view; *c*, cheliped; *d*, second pereiopod; *e*, abdomen; *f*, gonopod; *g*, apex of gonopod, enlarged. Smaller female, paratype: *h*, cheliped; *i–l*, second to fifth pereiopods.

more robust than those of female. Left and right chelipeds equal in both sexes. In adult male fingers of chela somewhat shorter than palm, gaping basally, tips spoon-shaped, with small horn-colored hoofs. Cutting edge of dactylus bearing strong tooth in gap, no other teeth present on it or on fixed finger. Palm slightly swollen, about 2/3 as high as long, highest in distal half. Carpus short, cup-shaped, slightly more than half as long as palm and distinctly less high. Merus elongate, slightly more than half as high as palm and about 2.5 times as long as wide. Chelipeds slenderer in female. Fingers narrow and elongate, somewhat shorter than palm, with spoon-shaped tips and fully unarmed cutting edges. Palm elongate, being about 3 times as long as high, increasing slightly in height distally. Carpus about as long as and as high as palm. Merus about 4 times as long as high, being slightly higher than carpus or palm.

Of following legs (Figure 50*d*, *i–l*) second and third (= third and fourth pereiopods) longest. Second and fifth pereiopods (= first and fourth ambulatory legs) shorter, but still longer than cheliped. Second pereiopod slightly more slender than fifth, especially in shape of propodus. Dactylus of each ambulatory leg slender, about as long as propodus, unarmed. Carpus about as long or slightly shorter than propodus and about 2/3 as long as merus. Merus totally lacking subdistal dorsal tooth, at most barely noticeable slight elevation there. All legs covered with same short, stiff, curved, dark hairs as are on carapace. Long, soft, somewhat plumose hairs present between short hairs, more distinct on anterior and posterior margins of segments. Longer hairs denser on posterior margins of dactylus and propodus than on anterior margins, and denser on posterior legs than on anterior ones.

Male abdomen (Figure 50*e*) slender, with all somites distinct and slightly and gradually tapering distally. First somite only slightly wider than second, largely failing to reach coxae of fifth legs. Second somite slightly longer than first, slightly wider than third. Fourth somite distinctly longer but slightly narrower than third, of all somites narrowing most strongly distally, anterior margin distinctly narrower than posterior. Fourth, fifth, and sixth somites of about same length. Fifth somite slightly constricted in basal half, enough to partially show first gonopods in opening between somite and sternum. Sixth somite broadest in basal half, narrowing slightly in distal half. Telson about as long as sixth somite, broadly rounded distally, with lateral margins converging slightly. In females, abdomen semicircular, with all somites free, very wide, covering entire sternum.

Male first gonopod (Figure 50*f,g*) with typical camptandriine shape, being very strongly recurved. Proximal half with some setae on outer margin. Distal recurved half widening slightly distally, forming blunt, wide, subdistal lobe, ending in narrow, elongate, triangular tip. Lobe bearing some heavy, rather short spines on margin and small spinules on rest of surface; tip with some spines, smaller than those of lobe.

MEASUREMENTS.—The male holotype has the carapace 3.5 mm long and 4.0 mm wide. The two female paratypes, both of which are ovigerous, have carapace lengths of 3.9 and 4.5 mm and carapace widths of 4.3 and 5.0 mm, respectively. The eggs measure 0.3 to 0.4 mm in diameter.

TYPE-LOCALITY.—Elechi Creek at College of Science and Technology, Port Harcourt, Nigeria, 04°47.3′N, 06°58.6′E.

DISPOSITION OF TYPES.—The male holotype (Crust. D. 32430) is in the Rijksmuseum van Natuurlijke Historie, Leiden; the smaller female paratype is in the same collection. The larger female paratype is in the National Museum of Natural History, Washington, D.C.

ETYMOLOGY—The specific epithet is derived from the Latin *modestus* (modest, unassuming), referring to the small size of the animals, which thereby may have been overlooked by most zoologists, and to the relatively very small portion of the male gonopods that are exposed.

BIOLOGY.—Mr. C. B. Powell, who collected all of the specimens and to whom we owe also for all of the material of West African Camptandriinae discussed here, described the habitat of the holo-

type as follows:

> The specimen was taken from a bed of leaf fragments etc., with no sand and not much mud. At low tide seepage water drains through the bed, and the crab was in a handful of the litter I had scooped from the edge of the main trickle of water. The most common macro-invertebrate present in the litter was the amphipod *Quadrivisio.*

According to Powell (1979:126), Elechi Creek is a mangrove creek of

> about 6–12 meters wide and 1–2 meters deep, draining a large area of mangrove peat flats. The vegetation consists mainly of *Avicennia africana* and *Laguncularia racemosa*; also present are *Rhizophora* spp. incl. *R. mangle*, the fern *Acrostichum aureum* and the grass *Paspalum vaginatum.* The tidal range is close to 2 meters so that at low tide the creek is dry except for a small shallow stream of drainage water running along the central sandy part of the creek bottom. . . . The maximum salinity of the creek water is probably about 20% . . . the normal dry-season salinity range is in the order of 5–20%. In the rainy-season the maximum salinity is probably nearly as high . . . but the average and minimum salinities must be somewhat less.

The type-locality of *Ecphantor modestus* is also the type-locality of *Potamalpheops pylorus* Powell, 1979, the description of which is cited here. Powell (1979:127) also provided a list of other invertebrates present at the type locality.

Ovigerous females were collected in February.

DISTRIBUTION.—Known only from the type-locality.

Genus *Ilyogynnis*, new genus

FIGURE 51

TYPE-SPECIES.—*Paracleistostoma microcheirum* Tweedie, 1937.

ETYMOLOGY.—From the Greek *ilyos* (mud) and *gynnis* (a womanish man); gender of generic name is masculine.

DIAGNOSIS.—Carapace transversely quadrangular, only slightly wider than long, with lateral margins convex. Surface of carapace flat, but regions rather well indicated by grooves. Dense pubescence covering entire carapace. Epigastric ridges distinct. Front deeply grooved longitudinally in middle, with oblique grooves extending into anterolateral angles, latter triangularly produced. Posterior margin of orbit sinuous, with distinct incision at inner end. Suborbital ridge placed below distinct lower orbital margin, but reaching farther forward. Anterolateral margin of carapace showing 2 blunt lobes behind outer orbital angle. Sharp carina placed in posterolateral part of carapace above and mesial to posterolateral margin, forming pseudo-posterolateral margin, about parallel with true posterolateral margin but not touching it. Chelipeds of male small, equal, similar to those of female; fingers with spoon-shaped tips, neither showing molariform tooth. No sexual dimorphism shown by chelipeds. Meri of walking legs lacking spines. Male abdomen about triangular in shape. First somite widest and shortest, reaching laterally as far as coxae of fifth pereiopods. Second to fifth somites fused, separated by indistinct sutures only. Second somite much narrower than first and about as wide as third. Sixth somite and telson free. Lateral margins of male abdomen from third somite to telson about straight, being only slightly concave in sixth somite. Abdomen fitting closely against thoracic sternum, entirely covering gonopods. Male gonopods recurved, ending in widened bulbous apex, lacking distal appendage.

REMARKS.—The only species that we assign to this genus is *Paracleistostoma microcheirum* Tweedie (Figure 51), of which we examined material from Singapore (USNM 137238). The genus *Ilyogynnis* is primarily distinguished from *Paracleistostoma* by the very wide first segment of the male abdomen, which reaches sideways as far as the coxae of the fifth pereiopods, the absence of sexual dimorphism in the chelipeds, and by the shape of the male gonopod, which lacks a distal appendage. In other respects the male gonopod strongly resembles that of *Paracleistostoma.* Also the shape of the orbit with the distinct incision at the inner end of the posterodorsal margin, and the rather distinct regions of the carapace serve to distinguish the new genus.

The correct spelling of the name of the present species is *Ilyogynnis microcheirum* (Tweedie). Tweedie (1937) did not give the derivation of the

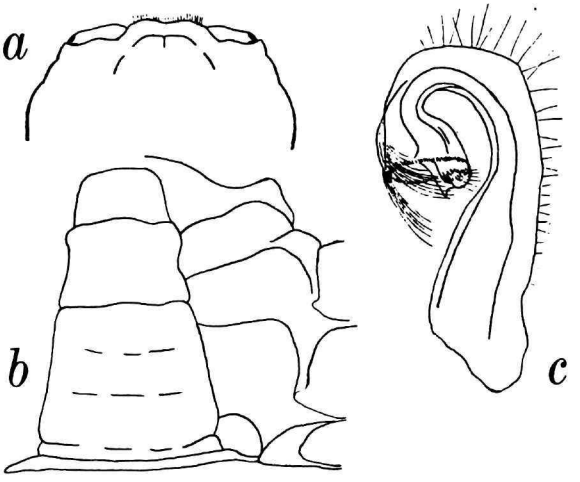

FIGURE 51.—*Ilyogynnis microcheirum* (Tweedie): *a*, anterior part of carapace of male; *b*, abdomen in situ, male, cl 6.5 mm, South China Sea; *c*, gonopod. (*a,c*, from Tweedie, 1937, fig. 6a,d).

specific epithet *microcheirum*, and since cheirum is not a known adjective, the word "microcheirum" must be considered either a noun or an arbitrary combination of letters; in either case the removal of the epithet from a neuter genus (*Paracleistostoma*) to one of which the name is masculine (*Ilyogynnis*) does not necessitate a change in spelling of the epithet.

Genus *Leipocten* Kemp, 1915

FIGURE 52

Leipocten Kemp, 1915:243 [type-species: *Leipocten sordidulum* Kemp, 1915, by monotypy; gender: neuter].

DIAGNOSIS.—Carapace subquadrangular, slightly convex in both longitudinal and transverse directions. Upper surface with regions weakly indicated and bearing hairs and granules. Epigastric lobes faint, placed on base of front. Anterolateral teeth present. Third maxilliped with merus hardly auriculate. Part of exopod of third maxilliped visible. Chelipeds with distinct sexual dimorphism. Male chela with molariform tooth on cutting edge of dactylus, but not on fixed finger. Female with strong spines on chela, fingers about as long as palm. Walking legs short, robust, with spines on lower margin of merus. Male abdomen with first somite narrow, not reaching coxae of fifth pereiopods. Second and third abdominal somites of male fused. Male gonopod strongly recurved, ending in 2 processes, one narrow, pointed, the other lobiform, with several curved spines.

REMARKS.—Only one species, the type, *L. sordidulum* (Figure 52), is known in this genus. It has an Indo-West Pacific distribution (India to Formosa and Australia).

Serène (1974:62, 64, 66) justifiably intimated that *Baruna* Stebbing, 1904, probably is a senior synonym of *Leipocten* Kemp, 1915. Unfortunately, Stebbing's (1904:3, 4, pl. 1: fig. A) description and illustrations of his new genus *Baruna* and its single new species, *Baruna socialis* Stebbing, 1904, are insufficient by modern standards. For one thing the male pleopods have neither been described nor figured. On the other hand, the great similarity of the shapes of the male chelipeds, of the peculiar pereiopods, of the male abdomen, and of the anterolateral margin of the carapace of *Leipocten* and *Baruna*, as well as the sizes and the habitats of their species, strongly suggest that the two genera might be synonymous. The differences between the two, so far as can be judged by the available data, are minor: *Baruna socialis* has the carapace wider (1.4 times as wide as long) than *Leipocten sordidulum* (1.27–1.33 times); the exopod of the third maxilliped seems wider in *Baruna* than in *Leipocten*; the posterior anterolateral tooth of the carapace in *Leipocten* is granular, whereas in *Baruna* it is smooth, having been described by Stebbing as simple (i.e., not subdivided into small teeth); the fact that Stebbing's illustration of the front and the orbit of *Baruna socialis* show these without tubercles may be due to the inaccuracy of the drawing. Should the gonopods of *Baruna* and *Leipocten* prove to be very similar there would be no good reason not to synonymize the two names and the older of them, *Baruna* Stebbing, 1904, would have to be used.

Baruna socialis Stebbing, 1904, so far the only species assigned to *Baruna*, is known only from the

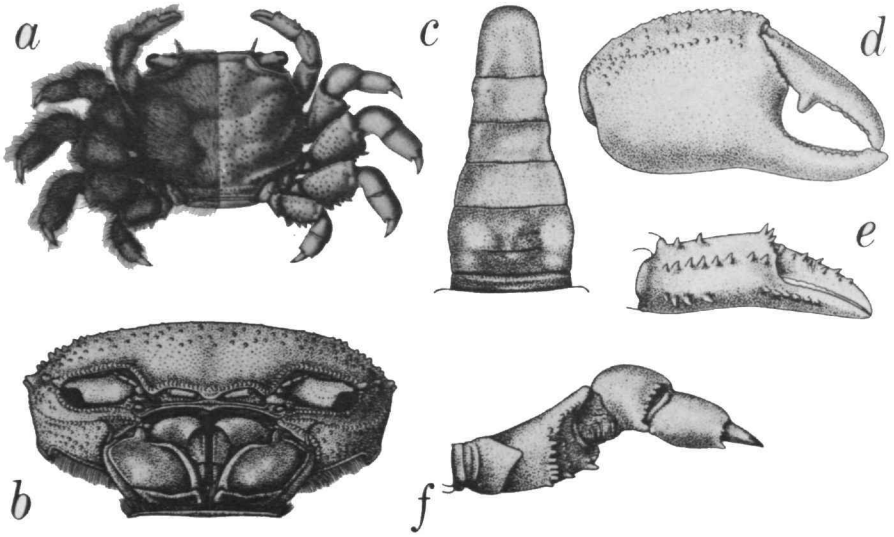

FIGURE 52.—*Leipocten sordidulum* Kemp: *a*, female, dorsal view; *b*, female, frontal view; *c*, male abdomen; *d*, male chela; *e*, female chela; *f*, fourth pereiopod. (From Kemp, 1915, figs. 16, 18, 19, 20a, and pl. 12: fig. 8.)

type-material, which originated from brackish water of Lake Negombo, Ceylon.

Genus *Paracleistostoma* De Man, 1895

FIGURE 53

Paracleistostoma De Man, 1895a:580 [type-species: *Paracleistostoma depressum* De Man, 1895, by selection by Guinot and Crosnier, 1963:608; gender: neuter].

DIAGNOSIS.—Carapace flat, being only slightly curved down at margins, lacking ridges, with only depressed H-shaped groove in center. Surface of carapace hairy or glabrous, outline quadrangular, being wider than long. Epigastric ridges indistinct, placed at base of front. Anterior margin of front with blunt or triangular projection at either lateral angle. Anterolateral margin of carapace lacking teeth. Suborbital ridge forming lower margin of orbit, true lower margin being barely visible as row of granules inside orbit. Shape and sexual dimorphism of chelipeds similar to *Cleistostoma*. Walking legs lacking spines on merus. First somite of male abdomen only slightly wider than second, failing by far to reach coxae of fifth pereiopods. Second to fifth somites of male abdomen fused, although lines separating these somites only faintly or more distinctly indicated by sutures. Male abdomen narrowing regularly distally, showing no constrictions; abdomen pressed against thorax, completely covering male gonopods. Latter recurved, strongly and bulbously widened apically, carrying distal appendage.

REMARKS.—Guinot and Crosnier (1963) listed the following species as belonging to *Paracleistostoma*: *P. depressum* De Man, 1895 (Figure 53); *P. leachii* (Audouin, 1826); *P. cristatum* De Man, 1895; *P. eriophorum* Nobili, 1903; *P. dentatum* Tesch, 1918; *P. longimanum* Tweedie, 1937; *P. fossulum* Barnard, 1955; *P. microcheirum* Tweedie, 1937; and *P. japonicum* Sakai, 1934. In our opinion only the following species actually belong to *Paracleistostoma*: *P. depressum*, *P. longimanum*, *P. wardi*, and *P. dotilliforme* (we have examined material of all except *P. longimanum*). The last two species (*P. wardi* and *P. dotilliforme*) formerly had been assigned to *Cleistostoma* (p. 200). We doubtfully refer the following two species to *Paracleistostoma*:

Cleistostoma mcneilli Ward, 1933: This species was placed by Barnes (1967:246) in *Paracleistos-*

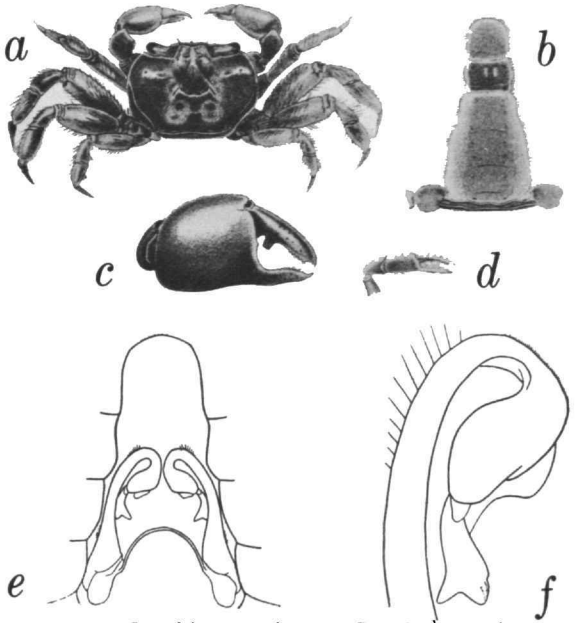

FIGURE 53.—*Paracleistostoma depressum* De Man: *a*, male, dorsal view; *b*, male abdomen; *c*, male chela; *d*, female chela; *e*, gonopods in situ; *f*, gonopod. (*a–d* from De Man, 1897, pl. 14: figs. 13, 13*d–f*; *e*, *f* from Gordon, 1931, fig. 26).

toma. However, the anterolateral margin of the carapace has distinct teeth, and the male gonopod figured by Barnes (1967, fig. 16d) differs somewhat from that of the typical *Paracleistostoma* species. It is possible that *C. mcneilli* is a true *Paracleistostoma*, and that the definition of the genus as given above should be somewhat modified.

Paracleistostoma eriophorum Nobili, 1903: Judging by Nobili's (1903:23) description of the carapace, the chelipeds, and the male abdomen, this species could well be a true *Paracleistostoma.* However, nothing is known about the shape of the male gonopods, while also some important characters of the abdomen are not mentioned by Nobili. Of this species, which so far has not been illustrated, we have not seen any material.

The following five species are excluded from the genus *Paracleistostoma*:

Paracleistostoma leachii (Audouin, 1826): The shape of the male gonopod, which ends in a narrow apex, shows that the species is not a *Paracleistostoma* and we make it the type of a new genus *Serenella* (p. 211).

Paracleistostoma cristatum De Man, 1895, and *P. japonicum* Sakai, 1934, are both placed here in the new genus *Deiratonotus* (p. 201).

Paracleistostoma microcheirum Tweedie, 1937, is made the type of a new genus, *Ilyogynnis* (p. 206).

Paracleistostoma dentatum Tesch, 1918: The general shape of the carapace is wholly unlike that of *Paracleistostoma* and resembles more that of *Camptandrium.* Since the only known specimen is a small female, very little can be said about the generic status of this species.

Paracleistostoma fossulum Barnard, 1955: In this species the dorsal surface of the carapace shows transverse ridges. The anterolateral margins of the carapace have some feeble teeth. The third maxillipeds are separated by a wide gap and the peduncle of the exopod is fully exposed. The female chelipeds are larger than those in *Paracleistostoma*, have the fingers shorter than the palm and the cutting edges of both fingers show several teeth. The species certainly is no *Paracleistostoma* and possibly not even an ocypodid. Unfortunately it is only known from a female specimen.

Genus *Paratylodiplax* Serène, 1974

FIGURE 54

Paratylodiplax Serène, 1974:62 [type-species: *Cleistostoma blephariskios* Stebbing, 1924, by original designation; gender: feminine].

DIAGNOSIS.—Carapace quadrangular or oval, wider than long, rather flat, somewhat more convex in longitudinal than in transverse direction. Dorsal surface smooth, showing only deep, H-shaped depression formed by central part of cervical groove and anterior part of cardiac grooves. Carapace pubescent or naked. Epigastric ridges present as rather indistinct rounded elevations at base of front. Latter somewhat concave in middle. Anterior margin of front with angularly rounded, but not produced, anterolateral angles. Inner orbital angle broadly rounded. Suborbital ridge lying distinctly below lower margin of orbit,

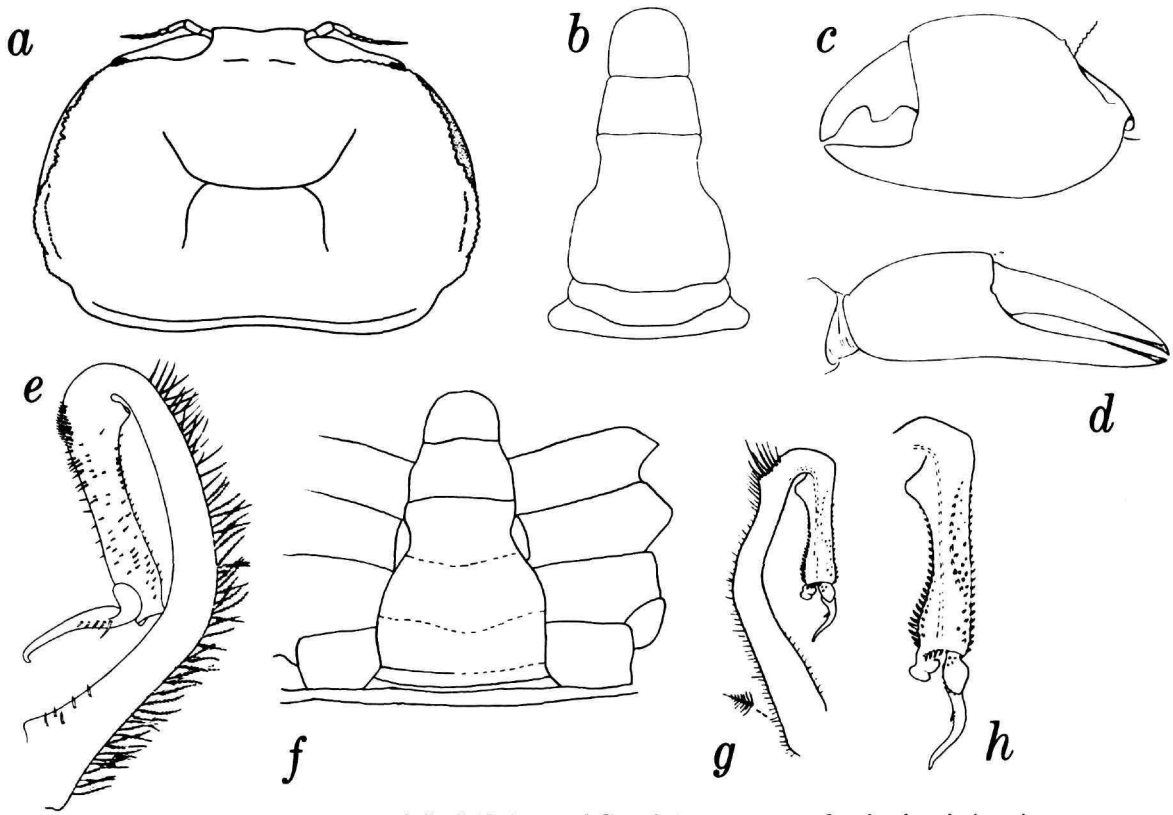

FIGURE 54.—*Paratylodiplax derijardi* (Guinot and Crosnier): *a*, carapace of male, dorsal view; *b*, male abdomen; *c*, male chela; *d*, female chela; *e*, gonopod. *Paratylodiplax edwardsii* (MacLeay): *f*, abdomen, male, cl 7.8 mm, South Africa; *g*, gonopod; *h*, tip of gonopod, enlarged. (*a–e* from Guinot and Crosnier, 1963, figs. 1–3, 8, 9; *g,h* from Barnard, 1954, fig. 2e,f).

reaching only slightly farther forward. Anterolateral teeth of carapace distinct or obscure. Anterolateral margin continuing into posterolateral; no additional ridge present posterolaterally on carapace. Chelipeds equal in female, subequal in male, showing strong sexual dimorphism, chelipeds of male being much stronger than those of female and having different shape. Dactylus of male cheliped with distinct molariform tooth in basal part of cutting edge; this tooth absent in female. Pereiopods lacking spines on merus. First somite of male abdomen widest of all abdominal somites, failing by considerable distance to reach coxae of fifth pereiopods. Second somite of male abdomen slightly narrower than first, either free (*P. derijardi*, *P. blephariskios*) or fused with abdominal somites 3 to 5. Latter fused, showing only traces of sutures between somites; sixth somite and telson free. Somites narrowing gradually from first to sixth, outline of male abdomen being bluntly triangular, except for constriction caused by concavity in lateral margin at level of fifth somite. Depressed area of thoracic sternum, which receives abdomen when latter is fully pressed against thorax, regularly triangular, leaving an opening between abdomen and thoracic sternite; through opening part of gonopod visible. Exposed part of gonopod completely filling gap between abdomen and sternum, exposed surface lying flush with lower surface of abdomen. Male gonopod strongly recurved, ending in 2 rather short appendages, inner slender, curved or sinuous,

outer lobiform; both shorter than recurved part of shaft.

REMARKS.—The following four species are here assigned to this genus; material of the first three has been examined by us:

Paratylodiplax edwardsii (MacLeay, 1838:64) (Figure 54*f–h*), originally described as *Cleistotoma edwardsii*, was included in this genus by Serène (1974:62). In it the second somite of the male abdomen is fused with the following three; in our specimen the suture between the second and third somites is rather distinct in the right half, but altogether absent in the left. Barnard's (1950:150) statement (in his definition of the genus *Cleistostoma* in which he placed the present species) that all somites of the abdomen are free certainly does not apply here.

Paratylodiplax algoensis (Barnard, 1954:122, figs. 1, 2a–d) originally described as *Cleistostoma algoense*, was correctly considered by Barnard to be close to *P. edwardsii*. Barnard (1954) described the chelipeds and the male gonopods, but gave no description or figure of the entire animal nor of the male abdomen. Examination of specimens (1 male and 1 female) from Knysna estuary, South Africa (USNM collection, uncataloged), confirmed our idea that the species belongs in *Paratylodiplax*. It fully agrees with the above-cited definition of the genus. The male abdomen has the second somite either free or, if fused with the third, separated by a deep suture. The fifth somite is constricted, so that in ventral view the gonopods show next to the closed abdomen. Serène (1974:62) believed that this species probably was conspecific with *P. edwardsii*.

Paratylodiplax blephariskios (Stebbing, 1924:3, pl. 116), the type-species, was originally described as *Cleistostoma blephariskios*. Stebbing's (1924) description was rather poor, and Barnard (1950: 816, 817) gave some additional details, e.g., of the chelipeds and the male gonopods, which agree with those of *Paratylodiplax*. A rather poorly preserved specimen at our disposal shows that the shape of the male abdomen was incorrectly described and figured by Stebbing as consisting of seven free somites. The male abdomen shows the shape typical for the present genus. There is a distinct suture between the second and third abdominal somites, but not between the third, fourth, and fifth somites. The male gonopods are visible lateral to the closed abdomen. The examined specimen came from Cape Town, South Africa, collected by J. Day, 1973, in USNM collection, uncataloged.

Paratylodiplax derijardi (Guinot and Crosnier, 1963:612, figs. 1–3, 5–11) (Figure 54*a–e*), was originally placed in the genus *Tylodiplax*. The species is well described and figured in the original publication, and shows all the characters listed in the above generic diagnosis of *Paratylodiplax*, in which genus we therefore do not hesitate to place it, following Serène (1974:62).

The present genus differs from *Cleistostoma* (1) in the less strong development of the suborbital ridges, (2) by the fact that the first abdominal segment of the male does not reach the coxae of the fifth legs, (3) in showing part of the male gonopods when the abdomen is pressed against the thorax, and (4) by the presence of distal appendages at the end of the male gonopods.

Of the four known species of *Paratylodiplax*, three (*P. algoensis*, *P. blephariskios*, and *P. edwardsii*) are known only from South Africa. The fourth, *P. derijardi*, has been reported from Madagascar.

Genus *Serenella*, new genus

FIGURE 55

TYPE-SPECIES.—*Macrophthalmus leachii* Audouin, 1826.

ETYMOLOGY.—This genus is named for Dr. Raoul Serène in recognition of his many valuable contributions to the study of Brachyura; the gender of the generic name is feminine.

DIAGNOSIS.—Carapace broadly quadrangular, being distinctly wider than long. Dorsal surface of carapace smooth, without ridges or tubercles, with only shallow grooves indicating regions. Front curved down, anterior margin at either end with 2 angular lobes, inner larger than outer and reaching farther forward. Epigastric ridges dis-

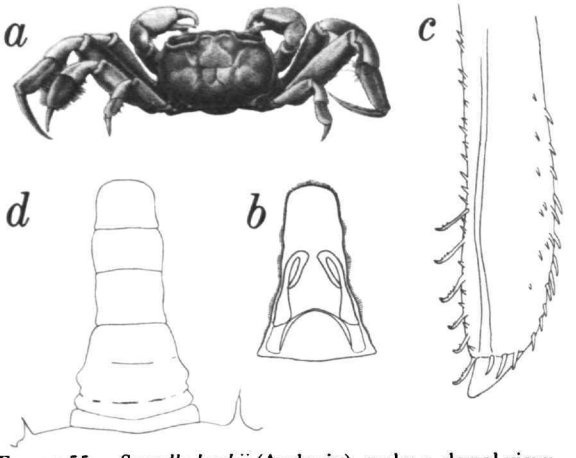

FIGURE 55.—*Serenella leachii* (Audouin), male: *a*, dorsal view; *b*, gonopods in situ; *c*, tip of gonopod (L, Crust. D. 26887), Melita Bay, Red Sea; *d*, abdomen (L, Crust. D. 26888), Museri Island, Red Sea. (*a*, from Paulson, 1875, pl. 8: fig. 6; *b*, from Gordon, 1931, fig. 27 left.)

tinct, placed before base of front. Lateral margins of carapace without teeth, converging posteriorly. Orbits transverse, situated in single straight line. Upper orbital border convex, lacking incisions. Eyes with cornea well developed although small. Antennules transversely folded. Antennae not entering orbit. Suborbital ridge fused with outer third of lower orbital margin, provided with granules. Epistome short, with transverse, smooth, sharp ridge; posterior margin produced, tonguelike, in middle between third maxillipeds, latter filling entire oral field. Merus and ischium covering part of exopod and entire flagellum; merus wider than ischium, somewhat auriculate, lacking lobe near base of carpus. Chelipeds equal, those of adult males larger than those of females and with quadrangular tooth on cutting edge of dactylus. Third pereiopod longer than other legs, fifth pereiopod shortest. No spines present on any pereiopod. Male abdomen narrow, not constricted at fifth abdominal somite. First somite only slightly wider than second and failing considerably to reach coxa of fifth pereiopod. Second, third, and fourth abdominal somites fused, only some faint grooves indicating borders between them. Fifth and sixth somites free. Female abdomen almost circular, with all somites free. Male gonopods strongly recurved, so much so that apex overlaps base of shaft. Distal part of gonopod not widened, ending in narrow, bluntly rounded apex. Morphological inner side of apex bearing strong spines, curved at tip and on one side bearing some granules. Tip of gonopod bearing short, wide triangular lobe.

REMARKS.—So far *S. leachii* is the only species known of this genus. It is possible that *Tylodiplax indica* Alcock, 1900, also should be placed here (p. 217), but this species differs in several important respects from the type-species. In the first place Alcock's species evidently shows no sexual dimorphism in the chelipeds, while also the shape of the third maxilliped and the male gonopod are different. Stephensen's (1945, fig. 58D) illustration shows the male abdomen of *T. indica* slightly constricted at the fifth somite, but no information is available on whether or not this constriction is so strong that the gonopods become visible. A closer study of Alcock's species is necessary to solve its generic position.

Genus *Telmatothrix*, new genus

TYPE-SPECIES.—*Telmatothrix powelli*, new species.

ETYMOLOGY.—The name is derived from the Greek words *telma* (mud of a pool) and *thrix* (hair) in allusion to the hairs of the animal, which are made quite conspicuous by the mud caught between them; the gender of the generic name is feminine.

DIAGNOSIS.—Carapace transversely quadrangular, being wider than long. Surface of carapace flat, but regions rather distinct, some with elevations forming blunt transverse ridges. Short, dark pubescence visible on dorsal surface, especially dense and conspicuous on ridges. Front curved down. Epigastric ridges strong, placed on base of front. Anterolateral margins of carapace with distinct teeth. Orbits transverse, situated in common straight line; upper orbital border lacking incisions. Eyes with cornea well developed. Antennules obliquely folded. Antennae entering or-

bit. Lower orbital margin and suborbital ridge visible in front view, granulated. Epistome short, with smooth, sharp, transverse ridge. Third maxillipeds filling entire oral field; merus and ischium covering palp and part of exopod. Merus longer than ischium, and with anterolateral angle rounded or somewhat flattened, not produced, but with small lobe near base of carpus. Inner anterior angle of ischium bluntly triangularly produced. Chelipeds equal; those of adult males much larger than those of females and with different shape; dactylus in males with strong molariform tooth on cutting edge, no such tooth present on fixed finger of either sex or on dactylus of female. Third and fourth pereiopods longer than second and fifth. No spine on any of segment of pereiopods, but pubescence present on several. Male abdomen narrow, with second, third, and fourth somites fused. First somite only slightly wider than second, largely failing to reach coxae of fifth pereiopods. Female abdomen almost circular, consisting of 7 free somites. Male gonopods strongly recurved, ending in cleft apex, latter narrowing gradually, lacking distal appendages.

The type and only species so far known of this genus is described below.

Telmatothrix powelli, new species

FIGURES 56, 57

"a new ocypodid".—Powell, 1976:315.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Nigeria: Mayuku Creek at Ugbekoko (= Gbekoko), approximately 10 mi [16 km] W of Sapele, Midwest State, at about 05°54′N, 05°37′E, among mangroves (*Rhizophora*), oligohaline, 5 Oct 1975, C. B. Powell, 3♂, 3 juv ♀, 1 juv (L). Same locality, Oct–Dec 1975, C. B. Powell, 3♂, 4♀ (2 ov) (L). Same locality, 1–3 Nov 1975, C. B. Powell, 10♂ (one is holotype), 6 adult ♀, 2 juv ♀ (L). Same locality, 31 Dec 1975, C. B. Powell, 200♂, ♀, juv (L, W).—New Calabar River at Okpo waterside, Niger delta, 04°52′N, 06°54′E, 7 Aug 1978, C. B. Powell, 5♂, 2♀ (W).

DESCRIPTION.—Carapace (Figure 56) 1.3 to 1.5 times as wide as long, flat, but with regions reasonably well marked. Central part of cervical groove deeply sunken, sharply defined, forming posterior limit of mesogastric region. Carapace with several elevated areas placed in more or less distinct transverse rows, elevated areas made more conspicuous by covering of dense pubescence of short dark hairs; such hairs also present on rest of carapace, but usually much less dense there. Distinct transverse pubescent area formed by upper orbital margins and epigastric lobes. Second such area, broader than first, formed by transverse elevation in anterior part of each branchial region, as well as one in posterior part of mesogastric region. Third pubescent elevated region extending over middle of branchial regions and cardiac region, separated by narrow naked strip from less densely pubescent area covering posterior part of carapace. Some pubescence also visible on protogastric regions. Pubescent elevated area on anterior branchial region separated by wide groove from distinct tubercle placed laterally to elevated area. Also third transverse elevated pubescent area with lateral tubercle, placed behind and somewhat mediad of first-mentioned tubercle.

Basal width of front (Figure 56) slightly more and distal width of front, slightly less than 1/3 of frontorbital width. In frontal view anterior margin of front convex, in dorsal view front emarginate in middle. Margin slightly elevated and granular. Anterolateral angles of front produced beyond rim as small tooth-like processes reaching to base of antennae. Front itself twice as long as wide and directed distinctly down, upper surface longitudinally concave. Behind middle of each half of anterior margin of front dorsal surface slightly elevated, bearing group of short hairs, forming impression that 2 tubercles are placed just behind anterior margin of front (this is especially distinct when, as usual, mud particles are caught between the hairs).

Both epigastric lobes very distinct, reaching over base of front, sloping abruptly forwards and down, separated from each other and from lateral margin of front by deep grooves. Both lobes covered by heavy tomentum of short dark hairs. Left and right posterior orbital margins lying in single straight transverse line; both finely but

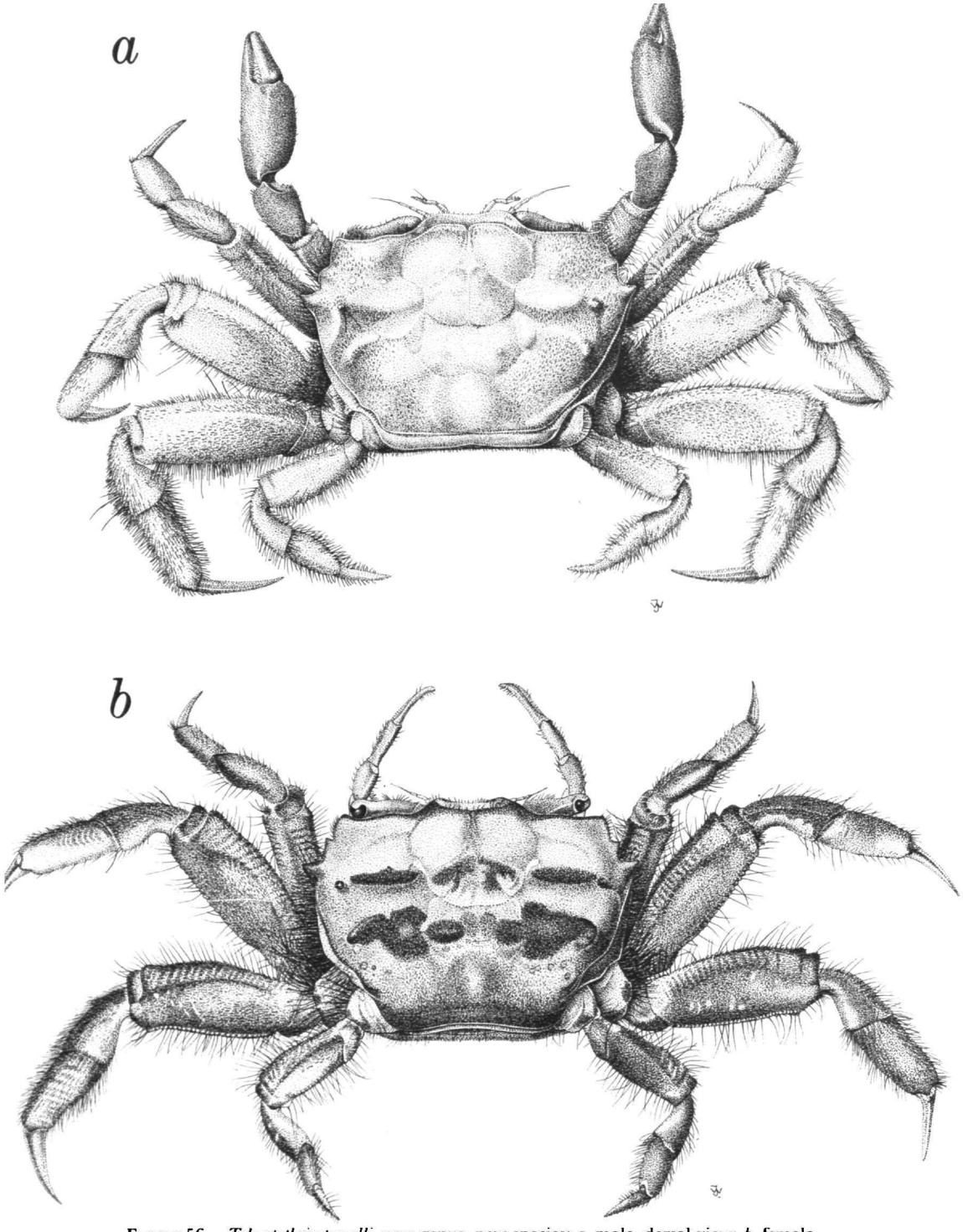

FIGURE 56.—*Telmatothrix powelli*, new genus, new species: *a*, male, dorsal view; *b*, female, dorsal view. (Drawn by J. Wessendorp.)

distinctly granular, slightly sinuous, showing no indentations. Inner half of posterior orbital margin widened ventrally, with granules in lower part of widened area. Between widened area and base of eye short sharp carina present, branching off from orbital margin. Outer orbital tooth bluntly angular. Behind this tooth anterolateral margin of carapace bearing 2 distinct teeth, anteriormost lower, more rounded than second; latter longer, more triangular, directed more sideways; lateral 3 teeth separated from each other by deep triangular incisions, margins granular. Posterolateral margin longer than anterolateral, unarmed but granular; just before reaching posterior margin row of granules curving inward, not touching posterior margin. Second granular ridge present branching off from posterolateral ridge slightly behind posterior lateral tooth, lying more medially from posterolateral ridge. This second ridge, stronger than posterolateral, extending posteriorly, ending in sharp, elongate posterolateral tubercle, lying near margin of carapace above base of fifth pereiopod. Posterolateral margin of carapace with blunt tooth protruding between bases of fourth and fifth pereiopods. Posterior margin of carapace, like posterolateral, somewhat granular and elevated; another parallel granular ridge present, placed more anteriorly.

Eyes (Figure 57*a*) elongate, cornea terminal, not surrounding stalk completely; lower margin of orbit finely granular, bearing long hairs that partly cover eye when latter retracted. Below lower orbital margin ridge present with about 11 to 16 low but distinct tubercles, outer smaller, slightly more closely placed than inner.

Antennules folding obliquely, almost transversely. Antenna entering orbit; flagellum short, consisting of about 6 segments, bearing long bristle, slightly longer than flagellum itself.

Front (Figure 57*a*) touching epistome in middle. Epistome showing smooth transverse ridge in middle, posterior margin, strongly produced posteriorly in middle, distinctly granular.

Third maxillipeds (Figure 57*d*) fill entire oral cavity. In ventral view only part of exopod and part of palp visible, slender dactylus, somewhat

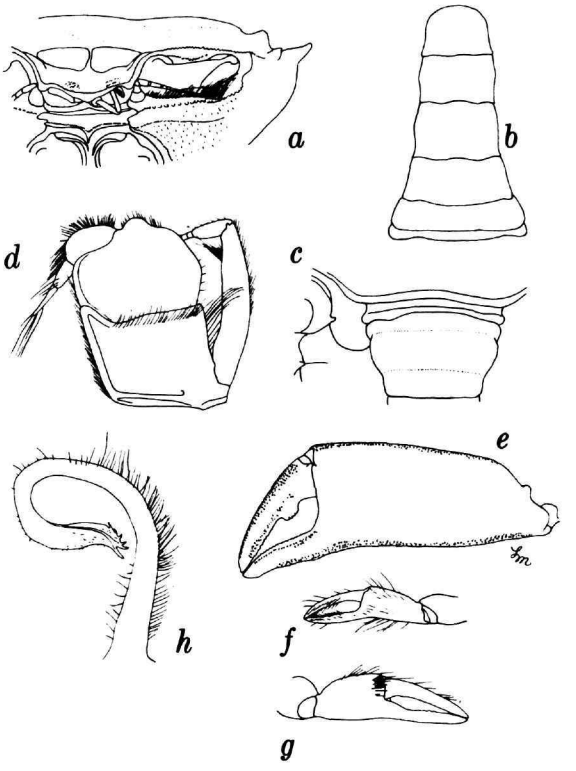

FIGURE 57.—*Telmatothrix powelli*, new genus, new species: *a*, front; *b*, male abdomen; *c*, base of male abdomen in situ; *d*, third maxilliped; *e*, male chela; *f*, female chela; *g*, chela of juvenile male; *h*, gonopod.

less slender propodus, part of carpus, and distal part of exopod hidden behind merus and ischium. Merus with anterolateral angle rounded or somewhat flattened, but not auricular, forming shallow, anteriorly directed lobe just outside base of palp. Latter articulating in middle of anterior margin of merus. Inner anterior angle of merus rectangularly rounded. Ischium almost as long as and as wide as merus. Inner margin of both segments elevated, rim-like, otherwise no longitudinal carinae or grooves present.

First legs (Figure 57*e–g*) showing conspicuous sexual dimorphism. In adult males chelipeds large, robust, being far larger than following legs and more than twice as long as carapace. Fingers slightly more than half as long as palm, gaping distinctly. Finger tips slightly spoon-shaped, each

bearing row of long hairs on inner margin. Cutting edges of fingers bearing small granules, distalmost larger than proximals. Cutting edge of dactylus with wide molariform tooth, occupying slightly more than 1/4 of length of edge; no such tooth present on cutting edge of fixed finger. Palm highest distally, narrowing proximally, bearing scattered small granules, densest dorsally. Carpus about half as long as palm, merus slightly shorter than palm. Both carpus and merus showing granules, but bearing no spines. Left and right chelipeds in male equal in shape and size. In female chelipeds much shorter than second pereiopods, of about same length as carapace, slender and equal. Fingers somewhat longer than palm, gaping and having spoon-shaped tips bordered with long hairs. Cutting edges entire. Carpus about as long as palm and less than 2/3 as long as merus.

Dactyli of following legs simple, slightly shorter than propodi, provided on both dorsal and ventral surfaces with 3 longitudinal pubescent grooves separated by 2 ridges. Propodi about twice as long as wide and longer than carpi, neither bearing any granules. Merus about as long as propodus and carpus combined but wider, bearing distinct granules on lower surface, especially along margins; some granules visible also in upper part of outer (= posterior) surface. Third and fourth pereiopods distinctly longer and wider than second and fifth; third leg largest, fifth smallest of walking legs. Outer (= posterior) surface of these legs bearing numerous short black hairs, among which some longer hairs visible, especially on upper and lower margins. Third, fourth, and fifth pereiopods showing numerous soft, long, woolly hairs on lower surface of merus; such woolly hairs also visible in outer distal part of carpus and dorsal part of propodus of third and fifth legs, and on inner, upper, and lower surfaces of propodus and distal part of carpus of fourth legs. Woolly hairs more distinct in males than in females. No teeth or spines on any of segments of legs; anterodorsal and anteroventral angles of merus bluntly rounded.

Male abdomen (Figure 57*b*,*c*) slender. First somite only slightly wider than second, largely failing to reach coxae of fifth pereiopods. Second somite slightly wider than third, of about same length as first and about half as long as third. Third somite about as long as but somewhat wider than fourth. Second, third, and fourth somites fused, but grooves indicating lines separating somites, while deep incisions in lateral margins of fused part also indicate limits of somites. Distal 3 somites of about equal width. Fifth somite longest of three, also longer than fourth; differences slight. Sixth and seventh somites of about equal length. Sixth quadrangular, seventh with tip semicircularly rounded. Weak, low transverse carina, interrupted in middle, present in distal half of exposed surface of seventh somite. Other somites not showing any carinae, except first, traversed by distinct smooth carina. In adult female abdomen with all somites free, almost semicircular, reaching to, or overlapping, bases of the pereiopods.

Male gonopods (Figure 57*h*) reaching to line between sternites of second and third pereiopods, strongly recurved, tapering gradually towards tip. Tip ending in 2 points, of which 1 minutely dentate on outer margin. Tip neither widened nor bearing any appendages. Male sexual openings placed on sternum.

MEASUREMENTS.—The largest male examined (the holotype) has the carapace 10 mm long and 14 mm wide, the largest females were of the same length and 14 and 15 mm wide. Females, with the abdomen wide and reaching to the bases of the pereiopods, ranged in length from 7 to 10 mm and in width from 9 to 15 mm. Ovigerous females had a carapace length of 9 and 9.5 mm and a carapace width of 12 and 13 mm. Juveniles (including females with a narrow abdomen and males in which the chelae still showed the female type) ranged from carapace width 2.5 to 8 mm. The eggs are numerous and have a diameter of about 0.35 mm, they are spherical.

A male with a carapace length of 6 mm and a carapace width of 8 mm showed the chelipeds very similar to those of the females, the fingers (Figure 57*g*) were longer than the palm, with only

faint traces of the molariform tooth of the dactylus and of the granulation of the cutting edge of the fixed finger are visible. In still smaller males the chelipeds are indistinguishable from those of the female, e.g., in a male with cl 3.5 mm and cb 5 mm, in which the abdomen and the gonopods showed the typical male shape.

TYPE-LOCALITY.—Mayuku Creek at Ugbekoko (= Gbekoko), approximately 10 miles [16km] west of Sapele, Midwest State, Nigeria, at 05°54′N, 05°37′E. This locality was described in detail by Powell (1976:315), who also dealt with the various animal species found in it.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31508), a male collected 1–3 November 1975, forms part of the collection of the Rijksmuseum van Natuurlijke Historie, Leiden; the greater part of the paratypes are in the same museum. Series of paratypes are also deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., and in the Koninklijk Museum voor Centraal Afrika, Tervuren, Belgium.

ETYMOLOGY—The specific epithet is given in honor of the collector of the material, C. B. Powell, University of Port Harcourt, Nigeria, who by careful collecting activities, and even more by his investigations, has greatly furthered the knowledge of West African fresh and brackish water Decapoda.

Genus *Tylodiplax* De Man, 1895

FIGURE 58

Tylodiplax De Man, 1895a:598 [type-species: *Tylodiplax tetratylophora* De Man, 1895, by monotypy; gender: feminine].

DIAGNOSIS.—Carapace almost semicircular, with anterolateral margins widely rounded and long, provided with 2 indistinct teeth of which anterior more pronounced than posterior. Posterolateral margins of carapace short. Dorsal surface of carapace somewhat convex, with 2 transverse ridges in anterior half and 4 tubercles in posterior half. Epigastric ridges not high, placed on base of front. Anterolateral angles of front distinct, little produced. Dorsal margin of orbit showing no incisions. Ischium and merus of third maxilliped covering part of exopod and part of palp; merus slightly longer than ischium and not auriculate, but with small lobe on anterior margin near base of carpus. Chelipeds of adult male small, not larger than those of female, and without teeth on cutting edges. Third and fourth pereiopods larger than second or fifth. First somite of male abdomen narrow, not reaching coxae of fifth pereiopods; second to fourth somites fused, fifth and sixth free. Abdomen of male not constricted at fifth somite and in reflexed position covering gonopods. Male gonopods strongly recurved, ending in somewhat swollen distal parts, the one on morphological inner half bearing broad lobe and that on morphological outer half several strong and some small spines.

REMARKS.—So far three species have been described as belonging in the genus *Tylodiplax*: *T. tetratylophora* De Man, 1895; *T. indica* Alcock, 1900; and *T. derijardi* Guinot and Crosnier, 1963. Some authors also placed *Cleistostoma blephariskios* Stebbing, 1924, in this genus. As has been explained (p. 211), both *T. derijardi* and *C. blephariskios* are assigned to the genus *Paratylodiplax*, differing from *Tylodiplax* in several important characters. Also *Tylodiplax indica* has to be removed from *Tylodiplax*; it is here provisionally placed in *Serenella* (p. 211), but its generic position is still far from clear, and can only be decided upon after examination of additional material.

The only species thus remaining in the genus *Tylodiplax* is its type-species, *T. tetratylophora* De Man, which is known only from Malaya.

Subfamily OCYPODINAE Rafinesque, 1815

Genus *Ocypode* Weber, 1795

Ocypode Weber, 1795:92 [type-species: *Cancer ceratophthalmus* Pallas, 1772, by selection by Holthuis, 1962:244, 245; gender: feminine; name 1637 on *Official List*].

Ocypode Fabricius, 1798:312, 347 [invalid junior objective synonym and homonym of *Ocypode* Weber, 1795; type-species: *Cancer ceratophthalmus* Pallas, 1772, by selection by Latreille, 1810:95, 422; gender: feminine; name 1738 on *Official Index*].

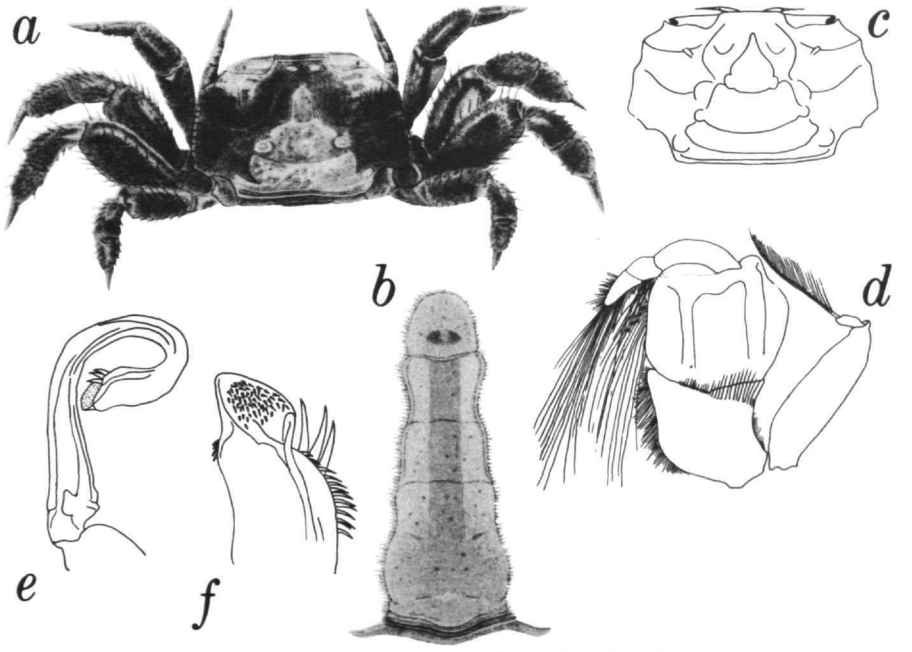

FIGURE 58—*Tylodiplax tetratylophora* De Man: *a*, male, dorsal view; *b*, male abdomen; *c*, carapace, dorsal view; *d*, third maxilliped; *e*, gonopod; *f*, tip of gonopod. (*a,b*, from De Man, 1897, pl. 14: fig. 15, 15d; *c–f*, from Serène and Kumar, 1971, figs. 1, 3–5.)

Ocypoda Lamarck, 1801:149 [incorrect spelling of *Ocypode* Weber, 1795; name 1737 on *Official Index*].

Monolepis Say, 1817:155 [type-species: *Monolepis inermis* Say, 1817, a subjective junior synonym of *Cancer quadratus* Fabricius, 1787, by selection by Fowler, 1912:457; gender: feminine].

Ceratophthalma MacLeay, 1838:64 [type-species: *Cancer cursor* Linnaeus, 1758, by monotypy; gender: feminine].

Parocypoda Neumann, 1878:26 [type-species: *Cancer ceratophthalmus* Pallas, 1772, by monotypy; gender: feminine].

Ocypode africana De Man, 1881

Ocypode africana.—Büttikofer, 1890:465, 487.—Rossignol, 1957:86.—Guinot-Dumortier and Dumortier, 1960:136.—Bott, 1964:30.—Forest and Guinot, 1966:89.—Kensley, 1970:180.—Penrith and Kensley, 1970b:252, 260.

Ocypoda africana.—Bruce-Chwatt and Fitz-John, 1951:117, 118.—Capart, 1951:176, fig. 67.—Monod, 1956:395, figs. 555–558.—Gauld and Buchanan, 1956:295, 296, 299.—Dubois, 1957:7.—Sourie, 1957:14, 31 [footnote], 45.—Rossignol, 1957:119 [key].—Longhurst, 1958:53, 88.—Gauld, 1960:71.—Rossignol, 1962:119.—Guinot and Ribeiro, 1962:66.—Uschakov, 1970:447, 455 [listed].

SYNONYM.—*Ocypoda hexagonura* Hilgendorf, 1882.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Liberia: Grand Cape Mount, near Robertsport, 1880–1882, J. Büttikofer and J. H. Sala, 12 specimens (L). Monrovia, Apr 1894, O. F. Cook and G. N. Collins, 1 juv (W). Ocean beach in front of Camp Johnson, Monrovia, G. C. Miller, 21 Jul 1952, 1♂, 1♀ (W). Mouth of Mesurado River, Monrovia, O. F. Cook, 1♂, 1♀, 1 juv (W).—Beach at mouth of Junk River, Harbel, dug from under roots, T. C. Rutherford, 20 Jul 1968, 2♂ (W).

Ghana: Chorkor, near Accra, Dec 1950, R. Bassindale, 1♀ (L).

Dahomey: Lagoon of Lac Nokoué near Zobgo, north of Cotonou, 29 Mar 1963, H. Hoestland, 1♀ (L).

Nigeria: Lagoon side of Victoria Beach, Lagos, 5 Oct 1957, J. Crane, 8♂, 3♀ (W).—S bank of Escravos River near Ajudaibo, Niger delta, 05°34.5′N, 05°11.75′E, 30 Jul 1975, C. B. Powell, 1♂ (L). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 1♂ (L).

Cameroon: Kribi, in burrows above water line, sandy beach, caught at night, 8 Mar 1964, B. de Wilde-Duyfjes, 1♀ (L).

Zaire: Banana, mouth of Congo River, Jul–Aug 1915, American Museum Congo Expedition, 5♂, 2♀, 2 juv (W).

Angola: Musserra, P. Kamerman, lectotype, 1♂ "from Congo coast" (L, reg. no. D. 235). Musserra, P. Kamerman, 8 specimens (L).

DESCRIPTION.—Capart, 1951:176.

Figures: Monod, 1956, figs. 555–558.

Male Pleopod: Monod, 1956, figs. 557, 558 (Ghana).

MEASUREMENTS.—Our specimens have carapace widths of 8 to 34 mm.

REMARKS.—De Man (1881:253–255), when describing the present species, based it on a male (Crust. D. 235) from "Congo" [almost certainly Musserra, Angola], collected by P. Kamerman. However, De Man also assigned to his new species a specimen from Liberia, not seen by him, but reported upon by Hilgendorf (1869:81), and noted as ZMB 3118. Both specimens are syntypes of De Man's species and the one from "Congo" is now selected to be the lectotype. Monod (1956: 395) already indicated that specimen as the holotype of *Ocypode africana.*

BIOLOGY.—Like all species of *Ocypode*, *O. africana* is an inhabitant of sandy beaches, making its burrows above the tide line. Gauld and Buchanan (1956) and Gauld (1960) found the species "very common in sandy ground above high water marks, such as coconut groves; juveniles are found, with *O. cursor*, below high water mark but adults rarely so" (Gauld, 1960:71). According to Gauld and Buchanan (1956:295, 299), *O. africana* occupies a habitat more distant from the sea than *O. cursor* with, in certain places, "no evidence of overlap of the two species . . . . *O. africana* is quite terrestrial in habit, emerging from its burrows at night." Longhurst (1958:53), on the other hand, found that "in Sierra Leone—at least on the beaches examined—both species occur together and excavate burrows above H.W. of springs; from these, isolated individuals of both species emerge during the daytime to feed along the lines of foam left by the surf. At night, the beaches are crowded with feeding individuals of both species, which appear to gather—as in the daytime—at the edge of the surf."

DISTRIBUTION.—West Africa, from southern Mauritania to South-West Africa as far as 19° 23′S. Monod (1956) enumerated the records of the species then known. To these the following can now be added:

Senegal: Plage de Cambérène, N of Dakar and Plage de Bargny Gouddou (as Bargny), E of Dakar (Sourie, 1957).

Guinea: Îles de Los (Uschakov, 1970).

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

Liberia: No specific locality (Büttikofer, 1890).

Ghana: No specific locality (Gauld, 1960). Denu and Labadi (Gauld and Buchanan, 1956).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951).

Principe: No specific locality (Forest and Guinot, 1966).

Congo: Baie de Pointe-Noire (Rossignol, 1957, 1962).

Zaire: Banana to Vista (Dubois, 1957).

Angola: Lobito (Bott, 1964). Moçâmedes (Guinot and Ribeiro, 1962).

South-West Africa: Rocky Point, 18°59′S, 12°29′E (Penrith and Kensley, 1970; Kensley, 1970). Near Kunene River mouth, 17°15′S, 11° 45′E; *Dunedin Star* wreck site, 18°13′S, 11°56′E; False Cape Frio, 18°29′S, 12°01′E; Westies Mine Camp, 19°12′S, 12°37′E; and Möwe Point, 19° 23′S, 12°42′E (all Kensley, 1970).

* *Ocypode cursor* (Linnaeus, 1758)

?*Ocypode rhomba.*—Pechüel-Loesche, 1882:287 [not *Ocypode rhombea* Fabricius, 1798].

Ocypode cursor.—Hilgendorf, 1879:802.—Büttikofer, 1890: 465, 487.—Johnston, 1906:862.—Rossignol, 1957:86, pl. 2: fig. 1.—Bott, 1964:31.—Forest and Guinot, 1966:89.—Voss, 1966:30.—Kensley, 1970:180.—Penrith and Kensley, 1970b:252, 261.—Hartmann-Schröder and Hartmann, 1974:13, 23.—Sakai and Türkay, 1977:178.

Ocypode ippeus.—Monod, 1933b: 548.

Ocypoda cursor.—Capart, 1951:178, fig. 68.—Monod, 1956: 391, 632, figs. 552–554.—Dubois, 1957:7, fig. 22.—Rossignol, 1957:119 [key].—Sourie, 1957:14, 31, 43, 45.—Longhurst, 1958:53, 88.—Gauld, 1960:71.—Nicou, 1960: 140.—Guinot and Ribeiro, 1962:65.—Rossignol, 1962: 119.—Ribeiro, 1964:14.

Ocypoda hippeus.—Gauld and Buchanan, 1956:295, 296, 298, 301; 1959:127.

Ocypode.—Voss, 1966:52.—Bayer, 1966:98, 102.

SYNONYM.—*Ocypode ippeus* Olivier, 1804.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 224, Lagos, sand beach, 1♂, 2 juv (W). Sta 316, Lagos, sand beach, 1♂ (L).

Annobon: Sta 273, shore, 2 juv (W). Sta 278, shore, 2♂ (W). Sta 281, shore, 4 juv (L).

Other Material: Senegal: Mboro, approximately 120 km

north of Dakar, 3 Dec 1975, W. Böhme, 1♂ (L). Ocean beach near Dakar, 3 May 1892, O. F. Cook, 2♂, 1♀ (W).

Liberia: Grand Cape Mount near Robertsport, 1882, J. Büttikofer, 2♂, 2♀ (L). Ocean beach in front of Camp Johnson, Monrovia, 21 Jul 1952, G. C. Miller, 1♂ (W). Mouth of Mesurado River, Monrovia, O. F. Cook, 1♂, 2 juv (W). Beach at mouth of Junk River near Harbel, 20 Jul 1968, T. C. Rutherford, 2♂, 3♀ (W). St. John River, Upper Buchanan, on sand at river mouth, at night, 24 Aug 1967, T. C. Rutherford, 4♂, 2♀, 3 juv, 3 damaged (W).

Ghana: Accra, 1868–1869, M. Sintenis, 1♂ (L).

Nigeria: Lagoon side of Victoria Beach, Lagos, 5 Oct 1957, J. Crane, 4♂, 1♀ (W). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 1♂, 1♀ (L).

Cameroon: Kribi, sandy beach, adults caught at night, juveniles in the daytime, 8 Mar 1964, B. de Wilde-Duyfjes, 6♂, 3♀, juv (L).

Congo: Pointe-Noire, M. Rossignol, 1♂ (W).

Zaire: Banana, Jul–Aug 1915, American Museum Congo Expedition, 6♂, 5♀, 16 juv (W).

Angola: "Congo," 1878, P. Kamerman, 3♂, 4 juv (L). Musserra, 1882, P. Kamerman, 2♀ (L). Luanda, 11 Dec 1889, U. S. Eclipse Expedition, 2♂, 1♀ (W). Lobito, P. Kamerman, 1♂ (L). Porto Alexandre, 9 Jul 1967, G. Hartmann, 1♂ (L).

DESCRIPTION.—Capart, 1951:178.

Figures: Capart, 1951, fig. 68; Monod, 1956, figs. 552–554.

Male Pleopod: Monod, 1956, figs. 557, 558 (Ghana).

MEASUREMENTS.—Carapace widths of males 14 to 55.2 mm, of females 25.9 to 53.5 mm.

BIOLOGY.—This species lives on sandy beaches and has its burrows above the tide line. According to Gauld (1960) the adults are found above and below the tide mark.

DISTRIBUTION.—West African coast from southern Mauritania to South-West Africa, as far south as 19°23′S. It is also found in the eastern Mediterranean: Egypt, Israel, Lebanon, SE Turkey, and Greece. Monod (1956) listed all of the West African records then known; to these the following can be added:

Mauritania: Portendick (Monod, 1933b).

Cape Verde Islands: Baía de Murdeira, Sal; between Ponta do Esbarradeiro and Ponta da Praia Formosa, São Antão (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: No specific locality (Sakai and Türkay, 1977). Marigot de Ngor, Dakar (Nicou, 1960). Anse de Hann and Plage de Cambérène, both N of Dakar; Plage de Bargny Gouddou, E of Dakar (Sourie, 1957).

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

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ghana: No specific locality (Gauld, 1960). Denu, Labadi, and Apam (Gauld and Buchanan, 1956). Tenkpobo (Gauld and Buchanan, 1959).

Nigeria: Lagos harbor (Bayer, 1966; Voss, 1966).

Cameroon: Kribi (Forest and Guinot, 1966).

Principe: Ponta da Mina (Forest and Guinot, 1966).

São Tomé: Praia Almoxarife, Diogo Nunes, and Iógoiógo (Forest and Guinot, 1966).

Annobon: No specific locality (Forest and Guinot, 1966). Between Punta del Palmor and Isleta Yebatulu, 01°24′S, 05°37′E (Bayer, 1966; Voss, 1966).

Congo: Loango (Pechüel-Loesche, 1882). Pointe-Noire (Rossignol, 1957, 1962).

Zaire: Banana to Vista (Dubois, 1957).

Angola: No specific locality (Guinot and Ribeiro, 1962). Luanda (Hilgendorf, 1879; Guinot and Ribeiro, 1962). Porto Amboim; Baía Farta, Benguela; Baía dos Tigres (Guinot and Ribeiro, 1962). Moçâmedes (Guinot and Ribeiro, 1962; Bott, 1964). Between Cacuaco and Lobito-Benguela; near Porto Alexandre (16°S) but not at Cape Cross (22°S), South-West Africa (Hartmann-Schröder and Hartmann, 1974).

South-West Africa: Rocky Point, 18°59′S, 12°29′E (Penrith and Kensley, 1970b; Kensley, 1970). Near Kunene River mouth, 17°15′S, 11°45′E; *Dunedin Star* wreck site, 18°13′S, 11°56′E; False Cape Frio, 18°29′S, 12°01′E; Westies Mine Camp, 19°12′S, 12°37′E; 4 miles [6.4 km] N of Möwe Point, 19°23′S, 12°24′E (Kensley, 1970).

Genus *Uca* Leach, 1814

Uca Leach, 1814:430 [type-species: *Uca una* Leach, 1814, an objective junior synonym of *Cancer vocans major* Herbst, 1782, by monotypy; gender: feminine; name 1648 on *Official List*].

Gelasimus Latreille, 1817b:517 [type-species: *Cancer vocans* Linnaeus, 1758, selected by H. Milne Edwards, 1841, in 1836–1844, pl. 18: fig. 1; gender: masculine].

Gelasima Latreille, 1817b:519, 520 [incorrect original spelling of *Gelasimus* Latreille, 1817, first selected as such by Schultze, et al., 1929:1350.]

Acanthoplax H. Milne Edwards, 1852:151 [type-species: *Acanthoplax insignis* H. Milne Edwards, 1852, by monotypy; gender: feminine].

Eurychelus Rathbun, 1914:126 [type-species: *Uca monilifera* Rathbun, 1914, by monotypy; gender: masculine; name invalid because originally published in synonymy].

Minuca Bott, 1954:155, 160 [type-species: *Gelasimus mordax* Smith, 1870, by original designation; gender: feminine].

Mesuca Bott, 1973b:316 [type-species: *Cancer tetragonon* Herbst, 1790, by original designation; gender: feminine].

Latuca Bott, 1973b:317 [type-species: *Mesuca* (*Latuca*) *neocultrimana* Bott, 1973, by original designation; gender: feminine].

Tubuca Bott, 1973b:322 [type-species: *Gelasimus urvillei* H. Milne Edwards, 1852, by original designation; gender: feminine].

Austruca Bott, 1973b:322 [type-species: *Gelasimus annulipes* H. Milne Edwards, 1837, by original designation; gender: feminine].

Paraleptuca Bott, 1973b:322 [type-species: *Gelasimus chlorophthalmus* H. Milne Edwards, 1837, by original designation; gender: feminine].

Heteruca Bott, 1973b:323 [type-species: *Gelasimus heteropleurus* Smith, 1870, by original designation and monotypy; gender: feminine].

Planuca Bott, 1973b:324 [type-species: *Uca thayeri* Rathbun, 1900, by original designation; gender: feminine].

Leptuca Bott, 1973b:324 [type-species: *Gelasimus stenodactylus* H. Milne Edwards and Lucas, 1843, by original designation; gender: feminine].

Deltuca Crane, 1975:21 [type-species: *Gelasimus forcipatus* Adams and White, 1848, by original designation; gender: feminine].

Australuca Crane, 1975:62 [type-species: *Gelasimus bellator* Adams and White, 1848, by original designation; gender: feminine].

Thalassuca Crane, 1975:75 [type-species: *Cancer tetragonon* Herbst, 1790, by original designation; gender: feminine].

Amphiuca Crane, 1975:96 [type-species: *Gelasimus chlorophthalmus* H. Milne Edwards, 1837, by original designation; gender: feminine].

Borboruca Crane, 1975:109 [type-species: *Uca thayeri* Rathbun, 1900, by original designation and monotypy; gender: feminine].

Afruca Crane, 1975:116 [type-species: *Gelasimus tangeri* Eydoux, 1835, by original designation and monotypy; gender: feminine].

Celuca Crane, 1975:211 [type-species: *Uca deichmanni* Rathbun, 1935, by original designation; gender: feminine].

REMARKS.—Latreille (1817b:517), when introducing the generic name *Gelasimus*, cited it as "*Gelasimus* (Buffon)." This caused Stebbing (1905:40) to remark: "Latreille at the first institution of *Gelasimus* attributed the genus to Buffon, though in 1820 he claims it as his own. He gave no reference for the name to any part of Buffon's works, and no such reference has since been discovered." Also Crane (1975:20) remarked: "I have been unable to trace the use of the word by Buffon." The solution of this problem may be that Latreille did not intend to refer to George Louis Leclerc, comte de Buffon, but that the word "Buffon" is merely cited as a translation of the latin word "Gelasimus," which means "buffoon," "jester," or "mocker."

* *Uca tangeri* (Eydoux, 1835)

Cancer Uka una, Brasiliensis Seba, 1759:44, pl. 18: fig. 8.

Cancer vocans major Herbst, 1782:83, pl. 1: fig. 11.

Ocypoda heterochelos Lamarck, 1801:150.—Bosc, 1802:197.—Desmarest, 1830:250.

Cancer Uka Shaw and Nodder, 1803, pl. 588.

Uca una Leach, 1814:430.

Gelasimus Tangeri Eydoux, 1835, pl. 17.

Gelasimus perlatus.—Hilgendorf, 1879:806.—De Man, 1879: 66.—Pechüel-Loesche, 1882:288.—Büttikofer, 1890:464, 487.—Aurivillius, 1893:31.—Johnston, 1906:862.

Uca tangeri.—Maccagno, 1928:33, fig. 19.—Frade, 1950:11, 26.—Capart, 1951:180, fig. 69.—Monod, 1956:399, figs. 559, 560.—Dubois, 1957:7, fig. 23.—Rossignol, 1957:86, 119 [key].—Sourie, 1957:14, 50.—Longhurst, 1958:53, 88.—Gauld, 1960:71.—Guinot-Dumortier and Dumortier, 1961:136.—Nicou, 1960:135–156, figs. 1–4.—Guinot and Ribeiro, 1962:67.—Rossignol, 1962:119.—Forest and Guinot, 1966:90.—Monod, 1967:180, pl. 17: fig. 4.—Uschakov, 1970:448, 455, fig. 4.—Bright and Hogue, 1972: 13.—Bott, 1973a:311–314, figs. 1, 3; 1973b:316, fig. 1.—Hartmann-Schröder and Hartmann, 1974:19.—Pauly, 1975:57.—Powell, 1979:127.

Gonoplax speciosus Monod, 1933b:548 [footnote; nomen nudum].

Gelasimus (Uca) tangeri.—Bruce-Chwatt and Fitz-John, 1951: 117 [also *Gelasimus tangeri*, pp. 117 and 119; and *Gelasimus Tangery*, p. 119].

Uca tangeri typique Monod and Nicou, 1959:988, figs. 2, 4, 5.

Uca tangeri matandensis Monod and Nicou, 1959:988, figs. 1, 3, 6.

Uca (Minuca) tangeri.—Bott, 1968:168.

Uca (Afruca) tangeri.—Crane, 1975:118, figs. 27D–F, 37E, 45E–I, 45EE–II, 46F, 63D, 81E, 82F, 99, pl. 18A–D.

SYNONYMS.—*Gelasimus perlatus* Herklots, 1851; *Gelasimus cimatodus* De Rochebrune, 1883.

MATERIAL EXAMINED—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 2♂, 1♀ (W).

Other Material: Morocco: Tangier, H. Milne Edwards, ?type-material, 1♂, 1♀ (dry, L).

Senegal: Dakar, 1887, J. Büttikofer, 1♀ (L). Dakar, 3 May 1882, O. F. Cook, 2♂, 1♀ (W).

Liberia: Grand Cape Mount near Robertsport, 1882, J.

Büttikofer, 4♂, 2♀ (L). Monrovia, Apr 1894, O. F. Cook and G. N. Collins, New York State Colonization Society, 1♂ (W). Rock Spring, Monrovia, Apr 1894, O. F. Cook and G. N. Collins, 1♂ (W). Mouth of Mesurado River, Monrovia; O. F. Cook: 3♂ (W). Tive's farm, Bushrod Island, Monrovia, 16 Nov 1953, G. C. Miller, 2♂ (W).

Ghana: Locality not specified, 1840–1855, H. S. Pel, paralectotypes of *Gelasimus perlatus* Herklots, 4♂ (L). Butre (04°50′N, 01°56′W), 1841–1850, H. S. Pel, types of *Gelasimus perlatus* Herklots, 1♂ lectotype, 3♀ paralectotypes (L; lectotype Crust. D. 262). Elmina, 27 Nov 1889, U. S. Eclipse Expedition, 3♂, 4♀ (W). Accra, 1868–1869, M. Sintenis, 6♂, 4♀ (L).

Nigeria: Lagos, Apr 1964, F. Klüge, 2♂, 1♀ (L). Tarkwa Bay, Lagos, Oct 1957, J. Crane, 29♂, 17♀ (W). S bank of Escravos River near Ajudaibo, Niger delta, 05°34.5′N, 05°11.75′E, 20 Jul 1975, C. B. Powell, 2♂ (L). W of Forcados near confluence of Odimodi Creek and Forcados River, 05°22′N, 05°26′E, 28 Feb 1976, C. B. Powell, 15 specimens (L). Between Brass and Port Harcourt, Niger delta, May–Aug 1960, H. J. G. Beets, 12 specimens (L).

Cabinda: Chinchoxo (= Quinchoxo, = Tschintschotscho, 05°09.24′S, 12°03.75′E) (see Holthuis and Manning, 1970: 250, 251), 1873–1876, J. Falkenstein, don. Mus. Berlin, 1♂ (W). "Quilla Mündung" (= mouth of the Quila River, 05°58′S, 14°47′E), 1873–1876, J. Falkenstein, don. Mus. Berlin, 1♂ (W).

Zaire: Congo, Jan 1895, H. C. Kooiman, 1♀ (L). Banana, mouth of the Congo River, Aug 1915, H. Lang, American Museum Congo Expedition, 10♂, 9♀ (W). Banana, R. I. Meyer, 2♂, 1♀ (L).

Angola: Musserra, 1882, P. Kamerman, 20 specimens (L). Santo Antonio do Zaire, mouth of the Congo River, Aug 1915, H. Lang, American Museum Congo Expedition, 1♂ (W). Luanda (= St. Paul do Loanda), 11 Dec 1889, U. S. Eclipse Expedition, 1♂ (W). Samba, Luanda, Sep 1957, J. Crane, 68♂, 34♀, 33 juv (W). Ilha de Cabo, Luanda, Sep 1957, J. Crane, 94♂, 98♀ (W). Luanda, 18 June 1967, G. Hartmann, 2♂, 1♀ (L). Morro da Cruz, between Luanda and Cuanza, 23 km S of Luanda, 20 Jun 1967, G. Hartmann, 2♂, 1♀ (L). Baía Farta, near Benguela, 3 Jul 1967, G. Hartmann, 1♂, 1♀ (L).

DESCRIPTION.—Crane, 1975:118–124.

Figures: Capart, 1951, fig. 69; Monod, 1956, figs. 559, 560; Bott, 1973a, figs. 1, 3; Crane, 1975, figs. 27D–F, 37E, 45E–I, 45EE–II, 46F, 63D, 81E, 82F, 99, pl. 18A–D.

Male Pleopod: Bott, 1973b, fig. 1 (Zaire); Crane, 1975, fig. 63D (no locality).

MEASUREMENTS.—The examined males have the carapace width between 13 and 42 mm, the females between 12 and 28 mm.

REMARKS.—Bott (1973a) very convincingly showed that the specimen which Seba (1759) showed on his figure 8 of plate 18 as *"Cancer Uka una, Brasiliensis"* belongs to the species that is best known as *Uca tangeri* (Eydoux, 1835), and not to the American species which Rathbun (1918:381) in her monograph of the American grapsoid crabs had indicated with the name *Uca heterochelos* (Lamarck, 1801), Lamarck's species being based on Seba's figure. Holthuis (1959b:277; 1962:239, 240) rejected the specific epithet *heterochelos* Lamarck, 1801, and replaced it by its senior objective synonym *major* Herbst, 1782; he used the name *Uca major* (Herbst) for the American species, accepting Rathbun's interpretation of the identity of *Ocypoda heterochelos* Lamarck, and thus of Seba's specimen. Holthuis (1962:240) selected the specimen figured by Seba (1759, pl. 18: fig. 8) as the lectotype of *Cancer vocans major* Herbst, 1782, *Ocypoda heterochelos* Lamarck, 1801, and *Uca una* Leach, 1814, and thereby made these species objective synonyms of each other. As *Uca una* Leach, 1814, is the type-species (by monotypy) of the genus *Uca* Leach, 1814, the correct name of that type-species becomes *Uca major* (Herbst, 1782).

Bott's (1973a) discovery that the epithets *major* Herbst, 1782, *heterochelos* Lamarck, 1801, and *una* Leach, 1814, do not pertain to the American species (as Rathbun and most later authors thought), but to the European and West African *Uca tangeri* (Eydoux), would cause considerable confusion in the nomenclature of the group, unless action by the International Commission on Zoological Nomenclature prevents this. Bott (1973a) showed that the oldest available name for the American species is *Gelasimus platydactylus* H. Milne Edwards, 1837, and he suggested that henceforth this species be known as *Uca platydactylus* (H. Milne Edwards, 1837). This change in itself would not have been disturbing, as the species is not a very common one and had been known under several names before 1918 when Miss Rathbun's monograph stabilized the use of the name *Uca heterochelos* for it; not until 1959 was the epithet *major* reintroduced for it. However,

the name *Uca major* is now generally used for it and is also adopted in the recent monumental monograph of the genus *Uca* published by Crane (1975:136).

If the change of the name *Uca major* sensu Crane to *Uca platydactylus* (H. Milne Edwards) is somewhat disturbing, this is very much so for the other nomenclatural change that results from Bott's discovery. The species which at present is best known as *Uca tangeri* (Eydoux, 1835) under the strict application of the *International Code of Zoological Nomenclature* should have to be given the name *Uca major* (Herbst, 1782). This species occurs on the extreme southwest coast of the Iberian peninsula and in West Africa as far south as Angola. Since 1835 the epithet *tangeri* (also spelled *tangieri*) has been mostly used for it and since 1900 this usage has been unanimous. *Uca tangeri* is a far better known species than *U. platydactylus,* and, being the only species of *Uca* occurring in Europe, its behavior has been studied by many European zoologists and the ethological literature concerning it is extensive (see Crane, 1975:124, for a listing of this literature). The change of the epithet *tangeri* to *major* would be most undesirable, the more so as the epithet *major* at present is regularly in use for a different species. Also the fact that Crane adopted the epithet *tangeri* in her fundamental monograph, which will be the basis for all taxonomic and ethological studies of *Uca* by generations of biologists to come, is a most important argument for not changing this name. Dr. Bott (1973a:313, 314) was of the opinion that the names *Cancer vocans major* Herbst, *Ocypoda heterochelos* Lamarck, and *Uca una* Leach could be considered "nomina oblita" and should be conveniently ignored. This is not true, however. In the first place, only *Uca una* Leach under the Code before it was revised in 1972 (at the International Congress of Zoology held in Monaco) could qualify as a nomen oblitum, but certainly not the other two names, as those have been repeatedly used in the last 50 years (be it for a species different from *U. tangeri*, which, however, is irrelevant here). Secondly the present revised Code does not allow rejection of so-called "nomina oblita" without a definite action by the International Commission on Zoological Nomenclature.

As far as we can see, there are two ways open to save the use of the name *Uca tangeri* for the present species:

1. To request the International Commission on Zoological Nomenclature to use its plenary powers to suppress the names *Cancer vocans major* Herbst, 1782, *Ocypoda heterochelos* Lamarck, 1801, *Cancer uka* Shaw and Nodder, 1803, and *Uca una* Leach, 1814. This is a complicated procedure and is especially inadvisable as the names are those of the type-species of the genus *Uca* Leach. The results of such an action by the Commission would be that the valid name for the African species would remain *Uca tangeri*, while that of the American species would become *U. platydactylus*. The Commission then also has to decide which of these two species (or any other) should be made the type of the genus *Uca*.

2. To request the International Commission to indicate under their plenary powers a specimen of *Uca platydactylus* (H. Milne Edwards) to be the neotype specimen of *Cancer vocans major* Herbst, 1782. In this way the name *Uca major* (Herbst) would become the valid name for *Uca platydactylus* and the name *Uca tangeri* would become that of the African species. This action would preserve the current usage of both names and legalize the names used by Crane (1975) for the two species. Furthermore, no change in the name of the type-species of the genus *Uca* is then necessary.

The second of these two actions seems to us to be preferable, and an application has been submitted on these lines to the International Commission on Zoological Nomenclature. In it the Commission is requested to use its plenary powers to validate the selection of the type-specimen of *Uca platydactylus* (H. Milne Edwards) to be the neotype of *Cancer vocans major* Herbst, 1782. This specimen, a full grown male from Cayenne, now forms part of the collection of the Muséum national d'Histoire naturelle in Paris (see Crane, 1975:601). In case H. Milne Edwards' (1837) original material of *Gelasimus platydactylus* consisted of more than one specimen, the type-spec-

imen examined by Crane (1975) is made the lectotype of that species. Of all the specimens of *Uca platydactylus* known at present, the neotype of *Cancer vocans major* Herbst originates from a locality (Cayenne) that is closest to the originally indicated type-locality of Herbst's species, viz. Brazil. By this neotype selection *Cancer vocans major* Herbst, 1782, *Ocypoda heterochelos* Lamarck, 1801, *Cancer uka* Shaw and Nodder, 1803, *Uca una* Leach, 1814, and *Gelasimus platydactylus* H. Milne Edwards, 1837, become objective synonyms.

Bott's (1973a) discovery that Seba's specimen is identical with *Uca tangeri* also has consequences for the nomenclature of the subgenera of *Uca*. In 1968 Bott placed *Uca tangeri* in the subgenus *Minuca* Bott, 1954, but in 1973 he (Bott, 1973b: 316) split the old genus *Uca* into 10 genera (7 new), one of which consisted of 2 subgenera (both new). The genus *Uca* was restricted to two species: *Uca tangeri* (Eydoux, 1835) and *Uca marionis* (Desmarest, 1825) [= *Uca vocans* (Linnaeus, 1758)]. In Crane's (1975) monograph of *Uca*, all the fiddler crabs were still placed in a single genus, *Uca*, within which Crane recognized 9 subgenera (7 of which were given new names by her). *Uca tangeri* was placed by itself in a monotypic subgenus *Afruca* Crane, 1975. The limits of Crane's subgenera in many instances do not coincide at all with those of Bott's genera and subgenera. It furthermore is most unfortunate that Bott's (1973b) preliminary paper was published before Crane's (1975) monograph, the manuscript of which was in press too early to take either Bott's system into consideration or to adopt his new names. Bott's final revision of the genus *Uca* sensu lato was never published, as he died in 1974 before finishing it. We have now the most unpleasant situation that Crane's subgenera are well defined and exhaustively treated in an ideal way, while Bott's names, published in a short, not too well-documented paper, have priority. Von Hagen (1976:223), in his review of Crane's monograph, has already pointed to this unfortunate nomenclatural situation and stated:

> Because of their being objective synonyms Crane's names *Thalassuca, Amphiuca* and *Borboruca* must be replaced by Bott's *Mesuca, Paraleptuca* and *Planuca*, respectively. When accepting Crane's limits of species groups, one has also to use *Tubuca* Bott instead of *Deltuca* Crane and should use *Leptuca* (not *Austruca*) Bott instead of *Celuca* Crane. Only *Australuca* Crane and (provided the shift of the type species name in consequence of Bott, 1973a, is avoidable) *Afruca* Crane remain valid.
>
> Unfortunately, in practice (though not in theory) a chaos of names seems inevitable. Many non-taxonomists, taking Crane's monograph as the sound reference work that it actually is, will unsuspiciously use her new but invalid subgeneric names, while taxonomists would, of course, have to use Bott's names (regardless, whether on a subgeneric or generic level).

If the *International Code of Zoological Nomenclature* is strictly applied, the name of the present species would be *Uca (Uca) major* (Herbst, 1782); if Bott's system is followed it should be named *Uca tangeri* (Eydoux, 1835); and under Crane's system it is *Uca (Afruca) tangeri* (Eydoux, 1835). Pending the decision of the International Commission on Zoological Nomenclature on this case, the well known name *Uca tangeri* (Eydoux) is used here. We also follow Von Hagen's (1976) suggestion not to use subgeneric names for the time being.

Another change, in both Crane's (1975) and Bott's (1973b) nomenclature is needed. If Crane's system is adopted, then the name *Thalassuca* Crane, 1975, should not be replaced by *Mesuca* Bott, 1973, as Von Hagen (1976) thought, but by *Gelasimus* Latreille, 1817, because the type-species of *Gelasimus, Cancer vocans* Linnaeus, 1758, belongs in Crane's *Thalassuca* (see Crane, 1975:20). Under Bott's classification *Gelasimus* Latreille, 1817, must fall as a junior synonym of *Uca* Leach, 1814, and for the genus that Bott (1973b:323) indicated with the name *Gelasimus*, the generic name *Acanthoplax* H. Milne Edwards, 1852, would become available.

DISTRIBUTION.—The species is found in the eastern Atlantic, its range extending from the south coast of Portugal to southern Angola; it does not occur in the Mediterranean. The records from America (West Indies, Brazil; cf. Rathbun, 1918:388 and Bott, 1973a) in all likelihood are erroneous, due to incorrect labeling. Monod (1956) enumerated the localities from which the

species was then known. Since that time it has been reported from the following West African localities (including those overlooked by Monod; Crane's (1975) records are not duplicated here):

Senegal: Saloum (Sourie, 1957). Ngor, near Dakar (Nicou, 1960).

Guinea-Bissau: Bissau (Maccagno, 1928; Frade, 1950).

Guinea: Île Marara, mouth of Rio Pongo (Uschakov, 1970). Boulbinet, Tanéné, and Ralompa, all near Conakry (Monod and Nicou, 1959).

Liberia: No specific locality (Hilgendorf, 1879; Büttikofer, 1890; Johnston, 1906).

Sierra Leone: Robene Point and Cline Bay (as Kline) (Longhurst, 1958).

Ivory Coast: Lagoon of Abidjan, 05°16′12″N, 04°00′-20″W (Forest and Guinot, 1966).

Ghana: "Coast of Guinea" (De Man, 1879). Estuaries of Volta and Ankobra rivers (Gauld, 1960). Sakumo Lagoon (Pauly, 1975).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951). Elechi Creek, Port Harcourt, 04°47′15″N, 06°58′45″E (Powell, 1979).

Cameroon: No specific locality (Aurivillius, 1893). Douala (Monod and Nicou, 1959).

Principe: No specific locality (Maccagno, 1928; Forest and Guinot, 1966). Praia Ponta da Mina and Santo António (Forest and Guinot, 1966).

São Tomé: No specific locality (Maccagno, 1928; Forest and Guinot, 1966).

Congo: No specific locality (Maccagno, 1928). Loango (Pechüel-Loesche, 1882; Rossignol, 1957). Mouth of Songololo River (Rossignol, 1957, 1962). Djeno (Rossignol, 1957).

Cabinda: Chinchoxo (Hilgendorf, 1879).

Zaire: Banana (Dubois, 1957; Bott, 1973a,b).

Angola: Luanda (Hilgendorf, 1879; Bott, 1968). Baía de Luanda, Lobito; Baía Farta, Benguela; and Baía dos Tigres (Guinot and Ribeiro, 1962). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Family GRAPSIDAE MacLeay, 1838

GRAPSIDAE MacLeay, 1838:63, 65.
SESARMINAE Dana, 1851c:288.
PLAGUSINAE Dana, 1851c:288 [corrected to Plagusiinae by Miers, 1878:147; name 377 on *Official List*].
VARUNACEA H. Milne Edwards, 1853:175 [corrected to Varuninae by Alcock, 1900:288, 400].
CYCLOGRAPSACEA H. Milne Edwards, 1853:191.

EASTERN ATLANTIC GENERA.—Thirteen, 12 of which are represented by species occurring from localities between Mauritania and Angola. The other genus is: *Eriocheir* de Haan (1835:32), type-species: *Grapsus (Eriocheir) japonicus* de Haan, 1835, by selection by H. Milne Edwards (1854: 146); gender: masculine.

EASTERN ATLANTIC SPECIES.—Twenty-five, 19 of which occur in tropical waters (the included Atlantic species of *Brachynotus* is not known to occur south of Mauritania so is not strictly tropical). The other species are as follows:

Brachynotus foresti Zariquiey Alvarez, 1968. Mediterranean; littoral (Zariquiey Alvarez, 1968; Froglia and Manning, 1978).

Brachynotus gemmellari (Rizza, 1839). Mediterranean; sublittoral (Froglia and Manning, 1978).

Brachynotus sexdentatus (Risso, 1827). Mediterranean; introduced into Great Britain in artificially heated water at Swansea; northern part of Suez Canal and Black Sea (Zariquiey Alvarez, 1968; Froglia and Manning, 1978).

Eriocheir sinensis H. Milne Edwards, 1853. A native of China, introduced into NW Europe and now reported from Finland, Sweden, and Norway to England and the Atlantic coast of France, in rivers (Christiansen, 1969); and from Lake Erie, North America (Nepszy and Leach, 1973).

Pachygrapsus marmoratus (Fabricius, 1787). Mediterranean and Atlantic coast of Europe from Brittany (France) southward to Morocco, including Madeira, the Azores, and the Canary Islands; intertidal (Zariquiey Alvarez, 1968).

Pachygrapsus maurus (Lucas, 1846). Western Mediterranean, Madeira, the Azores and the Canary Islands; intertidal (Zariquiey Alvarez, 1968).

Four species of Grapsidae at one time or another reported from West Africa in all probability do not belong to the West African fauna, and the material on which these records are based either is incorrectly identified or is labeled with a wrong locality. These species are as follows:

Metopograpsus messor (Forskål, 1775). A species known with certainty from the Red Sea, the east coast of Africa, Madagascar and the Persian Gulf (Holthuis, 1977a). Monod (1956:422, 423) listed the records of this species from West Africa and indicated that most probably they were based on incorrect identifications. There was, however, a

correctly identified specimen of *Metopograpsus messor* in the collection of the Muséum national d'Histoire naturelle, Paris, labeled "Gabon," the correctness of which was doubted by Monod as this same lot included a specimen of another species, *Pseudograpsus elongatus* (see below), which also occurs only in the Indo-West Pacific region.

Platychirograpsus spectabilis De Man, 1896. This species was originally described by De Man (1896:292, fig. 1) from Gabon. Apart from the types of this very characteristic species, no material has ever been reported from West Africa, whereas it has been found repeatedly in fresh water on the E coast of Mexico and also has been introduced into Florida (Marchand, 1946:93–100). As pointed out by Monod (1956:426–428) there is a definite possibility that De Man's material did not originate from West Africa but from Mexico.

Pseudograpsus elongatus (A. Milne Edwards, 1873). A well known species from the Indo-West Pacific (Red Sea, E Africa, Madagascar, the Seychelles, and New Caledonia) (Holthuis, 1977a), but not known from West Africa other than from the specimen labeled as originating from Gabon and found together with *Metopograpsus messor* (see above).

Sesarma roberti H. Milne Edwards, 1853. Originally described from Gorée, Senegal, but otherwise only reported from the West Indies and the Atlantic coasts of Central and South America. As stated by Monod (1956:443) and Chace and Hobbs (1969:184), the type-locality indication is very likely erroneous, so that this species, as well as *Metopograpsus messor, Pseudograpsus elongatus,* and *Platychirograpsus spectabilis*, had best be removed from the list of the West African Brachyura.

Other than the subgeneric names of the West African *Sesarma* , our resurrection of *Goniopsis pelii* from the synonymy of *Goniopsis cruentata*, and our use of *Metagrapsus* instead of *Sarmatium* for *S. curvatum*, the grapsid names used by Monod (1956) have not changed so we have not listed them separately for this family.

Subfamily GRAPSINAE MacLeay, 1838

Genus *Geograpsus* Stimpson, 1858

Geograpsus Stimpson, 1858b:101 [p. 47 on separate] [type-species: *Grapsus lividus* H. Milne Edwards, 1837, by subsequent designation by Rathbun, 1918:231; gender: masculine].

Orthograpsus Kingsley, 1880a:188, 194 [type-species: *Orthograpsus hillii* Kingsley, 1880, a subjective junior synonym of *Grapsus lividus* H. Milne Edwards, 1837, by present selection; gender: masculine].

**Geograpsus lividus* (H. Milne Edwards, 1837)

Geograpsus lividus.—Monod, 1956:410, figs. 562, 563.—Dubois, 1957:7.—Guinot and Ribeiro, 1962:69.—Ribeiro, 1964:15.—Forest and Guinot, 1966:91.

SYNONYMS.—*Grapsus brevipes* H. Milne Edwards, 1853; *Orthograpsus hillii* Kingsley, 1880.

MATERIAL EXAMINED.—*Pillsbury Material*: Nigeria: Sta 1, Lagos harbor, shore, 2♀ (L).

Other Material: Zaire: Banana, mouth of the Congo River, Aug 1915, H. Lang, American Museum Congo Expedition, 2♂, 2♀ (W).

Angola: Lobito, P. Kamerman, 1♀ (L).

DESCRIPTION.—Rathbun, 1921:442; Chace and Hobbs, 1969:157.

Figures: Rathbun, 1921, pl. 15: fig. 1, pl. 22: figs. 2, 3; Monod, 1956, figs. 562, 563; Chace and Hobbs, 1969, fig. 48.

Male Pleopod: Monod, 1956, fig. 563 (Senegal); Chace and Hobbs, 1969, fig. 52a–c (West Indies).

MEASUREMENTS.—The females collected by the *Pillsbury* have the carapace width 12 and 13 mm.

DISTRIBUTION.—The species inhabits the tropical Atlantic, and has also been reported from the eastern Pacific. In the Indo-West Pacific area it is represented by the closely related *Geograpsus stormi* De Man. In West Africa the species is known from the Cape Verde Islands and Senegal to Angola and São Tomé. Monod (1956) listed all West African records known to him, to which now the following can be added:

Cape Verde Islands: Baía das Gatas, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964). São Tiago (Forest and Guinot, 1966).

Fernando Poo: No specific locality (Forest and Guinot, 1966).

Annobon: No specific locality (Forest and Guinot, 1966).

Zaire: No specific locality (as Belgian Congo) (Dubois, 1957).

Angola: Baía Farta, Benguela; Baía da Caota, Benguela; Baía de Santa Maria; and Praia Amélia, Moçâmedes (all Guinot and Ribeiro, 1962).

Genus *Goniopsis* de Haan, 1833

Goniopsis de Haan, 1833:5 [genus established without included nominal species; the first nominal species to be assigned to the genus, by de Haan (1835:33), are *Cancer strigosus* Herbst, 1799, *Grapsus pictus* Latreille, 1803, and *Grapsus cruentatus* Latreille, 1803; type-species: *Grapsus cruentatus* Latreille, 1803, by selection by Rathbun, 1918: 236; gender: feminine].

**Goniopsis pelii* (Herklots, 1851)

FIGURE 59

Grapsus (Grapsus) Pelii Herklots, 1851:8, 23, pl. 1: figs. 6, 7.

Grapsus (Grapsus) simplex Herklots, 1851:9, 23, pl. 1: fig. 8.

Grapsus (Goniopsis) cruentatus.—Von Martens, 1872:105, 106 [not *Grapsus cruentatus* Latreille, 1803].

Grapsus Pelii.—De Man, 1879:68; 1900, pl. 2: fig. 6 [*Peli* on pp. 43–46, 64].

Grapsus simplex.—De Man, 1879:68.—Miers, 1886:255.—De Man, 1900:43, pl. 2: fig. 7.

Goniopsis cruentatus.—Kingsley, 1880a:190.—Studer, 1882: 333 [listed].—Büttikofer, 1890:487.—Thallwitz, 1891: 52.—Benedict, 1893:538.—Doflein, 1900:142.—Johnston, 1906:862.—Vilela, 1949:63.—Frade, 1950:11, 26 [not *Grapsus cruentatus* Latreille, 1803].

Grapsus pelli.—Kingsley, 1880a:190 [in synonymy].

Pachygrapsus simplex.—Kingsley, 1880a:201.

Goniograpsus cruentatus.—Osorio, 1887:227; 1888:191; 1889: 130, 134, 139; 1890:46; 1892:199; 1895a:54; 1895b:57, 58; 1898:193 [not *Grapsus cruentatus* Latreille, 1803].

Grapsus Peli.—De Man, 1900:43, 64, pl. 2: fig. 6 [*Pelii* on plate].

Goniopsis cruentata.—Rathbun, 1900a:278.—Nobili, 1906b: 311.—Rathbun, 1918:237; 1921:443, pl. 39.—Balss, 1922: 80.—Monod, 1927:620; 1928:124.—Irvine, 1947:292, fig. 197.—Bruce-Chwatt and Fitz-John, 1951:117.—Capart, 1951:183, fig. 7.—Sourie, 1954a:84, 112, 293, 297, 306.—Monod, 1956:412, figs. 564–567.—Rossignol, 1957:89, 121.—Longhurst, 1958:88.—Gauld, 1960:71.—Rossignol, 1962:119.—Forest and Guinot, 1966:91.—Uschakov, 1970:443, 455 [listed].—Pauly, 1975:57. [Not *Grapsus cruentatus* Latreille, 1803.]

Gonopsis cruentatus.—J. Roux, 1927:237 [not *Grapsus cruentatus* Latreille, 1803].

Goniopsis cruenta.—Hartmann-Schröder and Hartmann, 1974:19 [erroneous spelling].

Goniopsis pelii.—Powell, 1979:127.

Not *Goniograpsus cruentatus*.—Osorio, 1892:199 [=*Grapsus grapsus* (Linnaeus), see Forest and Guinot, 1966:90].

Not *Pachygrapsus simplex*.—Doflein, 1904:129.—Lenz, 1910: 125.—Lenz and Strunck, 1914:283 [= *P. gracilis* (Saussure), see Balss, 1922:81].

MATERIAL EXAMINED.—*Pillsbury Material*: Nigeria: Sta 1, Lagos harbor, shore, 2 ♂, 4 ♀ (1 ov) (L). Sta 227, Lagos harbor, shore, 2 ♀ (W).

Other Material: Senegal: Dakar, 3 May 1892, O. F. Cook, 1 ♂ (W).

Liberia: No specific locality, 1882, J. Büttikofer, 1♂, 1♀ ov (L). Mouth of Mesurado River, Monrovia, O. F. Cook, 1♀ (W). Rock Spring, Monrovia, Apr 1894, O. F. Cook and G. N. Collins, 5♂ (W). Monrovia, Mar 1895, O. F. Cook, 2♂ (W). Harbel, mouth of Junk River, mangrove bank, dug from under roots, 20 Jul 1968, T. C. Rutherford, 6♂, 4♀ ov (W). St. John River at Upper Buchanan, on mud, in mangroves, at night, 24 Aug 1967, T. C. Rutherford, 2♂, 3♀ (1 ov) (W).

Ghana: Butre (04°49'N, 01°55'W), 1840–1851, H. S. Pel, 1♂ lectotype of *Grapsus Pelii* Herklots (L, Crust. D.68), 3♂ and 5♀ paralectotypes of *Grapsus Pelii* Herklots (L, Crust. D.69), 1 juvenile ♂ lectotype of *Grapsus simplex* Herklots (L, Crust. D.90), 1 juvenile ♀ paralectotype of *Grapsus simplex* Herklots (L, Crust. D.427). Baya River, Elmina, 27 Nov 1889, W. H. Brown, U. S. Eclipse Expedition, 4♂, 2♀ (W). Accra, 1868, 1869, M. Sintenis, 3♂, 3♀ (L).

Nigeria: Mangrove (*Avicennia*) creek behind the Madagho-Ajudaibo road, S shore of the mouth of the Escravos River, Niger delta, 05°35'N, 05°12.5'E, 31 Jul 1975, C. B. Powell, 2♂ (L). West side of the town of Forcados, near the confluence of Odimodi Creek and Forcados River, 05°22'N, 05°-26'E, 28 Feb 1976, C. B. Powell, numerous males and females (L). Niger delta between Brass and Port Harcourt, May-Aug 1960, H. J. G. Beets, 2♂, 2♀ (L).

Cameroon: Small creek about 3 km S of Kribi, among mangrove roots, in burrow, 1964, B. de Wilde-Duyfjes, 1♀ ov (L).

Zaire: Banana, mouth of Congo River, Jul 1915, H. Lang, American Museum Congo Expedition, 4♂, 4♀ (3 ov) (W).

DESCRIPTION.—Capart, 1951:183.

Male Pleopod: Monod, 1956, figs. 565–567 (Senegal). In a denuded condition the gonopods of this species are very similar to those of *Goniopsis cruentata* (see Chace and Hobbs, 1969, fig. 52d–f) and *G. pulchra* (see Abele, 1971, pl. 1).

MEASUREMENTS.—The carapace width of our

specimens varied from 16 to 49 mm. There is no obvious size difference in males and females. Ovigerous females have carapace widths between 25 and 47 mm. The male lectotype of *G. pelii* has a carapace width of 48 mm, the male lectotype of *G. simplex* one of 20 mm.

REMARKS.—A comparison of the present West African material with specimens of *Goniopsis cruentata* from the north coast of South America and the Caribbean shows some differences, which, although small, seem to be constant and induce us to distinguish the two populations as distinct species. A closer study based on much more material and taking also the West American *G. pulchra* into account may establish that the three should be considered subspecies of a single species.

Goniopsis pelii differs from *G. cruentata* in the following points.

1. The front is relatively shorter and wider. The anterior margin of the front not only is emarginate in the middle, but in the middle of each half as well; this secondary emargination is less distinct in *G. cruentata*. The surface of the front bears coarse tubercles, some of which, near the anterior margin, form more or less distinct transverse ridge-like rows; in *G. cruentata* such transverse ridges, if present, are usually short and inconspicuous. This latter character, which was already described by Von Martens (1872), however, is not very constant.

2. The pereiopods in *G. pelii* have the propodi more slender than in *G. cruentata*, and the dactyli are more robust. In *G. pelii* the length of the dactylus of the last pereiopod (Figure 59*b*) is distinctly less than that of the lower margin of the propodus, while in *G. cruentata* (Figure 59*c*) these two lengths are about equal.

3. The most striking difference, however, is in the color pattern of the two species. In the ovigerous female of *Goniopsis pelii* from Cameroon, collected in 1964 by Mrs. De Wilde-Duyfjes, the color pattern is very well preserved (Figure 59*a*). It shows as follows: The carapace is dark purple with many minute uncolored spots in the areas before the cervical groove and between the branchiocardiac grooves; a narrow area outside the branchiocardiac grooves also shows these uncolored spots. The transverse carinae of the carapace are marked by a dark line. A similar pattern is found in *G. cruentata*, but here the spots are larger and form a reticulated structure, leaving the purple color visible as small spots. The posterolateral part of the carapace in *G. pelii* is of an evenly dark purple color, except for a very conspicuous rather broad white band, which extends along the upper side of the posterolateral margin of the carapace from the third or fourth transverse ridge behind the cervical groove to the next to last ridge. A short longitudinal white streak is present in the middle of the intestinal region just before the posterior margin; this streak is continued as a row of spots on the anterior part of the abdomen.

The eyestalks are uniformly dark purple.

The chelae are creamy white with a few purple marblings on the upper surface of the palm and of the base of the dactylus. The horny tips of the fingers are dark. The purple color of the chelae is more distinct on the inner than on the outer part of the upper surface. The outer surface of the carpus is dark purple with the spines and tubercles sharply contrasting white; also the anterior margin is white. The inner surface of the carpus as well as the lower surface of the merus are uncolored. The inner and outer surfaces of the merus are dark purple with a few rounded white spots, the spots of the outer surface being larger and fewer than those of the inner. The teeth of this segment are white. The upper (posterior) surfaces of the walking legs are dark purple, except for the dactyli and the distal lobe of the propodi, which are strongly constrastingly yellowish. On the merus there are several rounded pale spots, which are absent from the other segments. The characteristic dark and pale checkered upper margin of the segments as seen in *G. cruentata* is practically absent here. The lower (= anterior) surface of the merus is pale with a distal orange spot. The lower surface of the carpus and propodus is as dark and as uniformly purple as the upper surface.

The lower surface of the thorax is dark, with

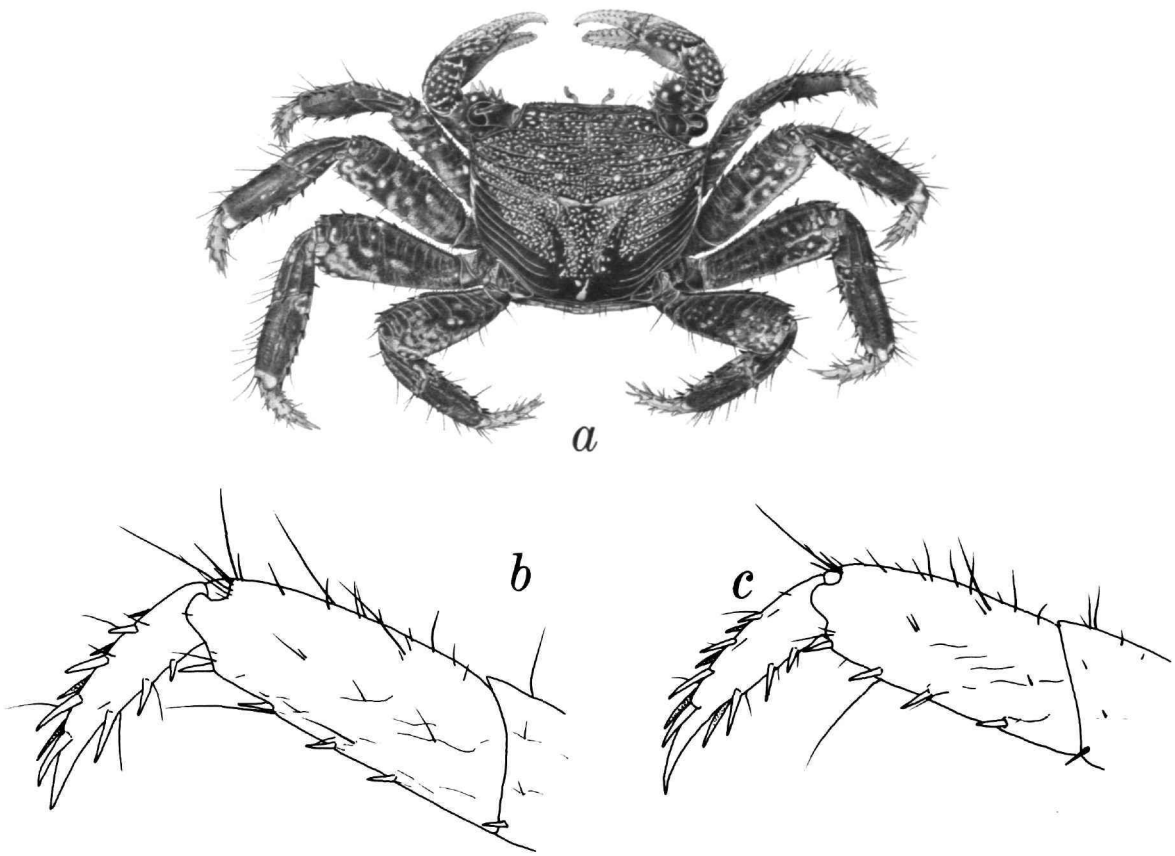

FIGURE 59.—*Goniopsis pelii* (Herklots), ovigerous female, Cameroon: *a*, dorsal view; *b*, propodus and dactylus of fifth pereiopod. *Goniopsis cruentata* (Latreille): *c*, propodus and dactylus of fifth pereiopod.

the exception of the third maxillipeds, which are pale with a dark purple spot on the carpus and in the distal part of the merus. The distal four somites of the abdomen are whitish; the basal three are pale purple.

The specimens from Nigeria in which the color is well preserved show the same color pattern, although the color itself is more reddish. Also the Liberian material agrees well with this description. In most other specimens the color has faded, but in a few some traces of the original pattern are visible, agreeing, as far as can be ascertained, with the above description.

The color pattern of the West African specimens differs strikingly from that of *G. cruentata*, of which an excellent description is provided by Chace and Hobbs (1969:161), who also provided a beautiful figure of the color pattern. In *Goniopsis cruentata* (1) the carapace is lighter, instead of having small light spots on a purple background, it shows small purple or red spots on a pale background; (2) instead of having a pale streak along the posterolateral margin, it shows in the posterolateral area a number of characteristic white spots that are surrounded by a dark purple or red ring; (3) the eyestalks are marbled with purple or red instead of being uniformly colored; (4) the carpus of the cheliped is "scarlet with

purple lines" (Chace and Hobbs, 1969:161) and does not show the bright white tubercles of *G. pelii*; (6) the merus of the chelipeds is of a uniform red color inside or orange red with darker marblings and shows on the outer surface conspicuous large pale spots surrounded by a dark red ring; (7) the pereiopods are paler than in *G. pelii*, the upper margins of merus, carpus, and propodus are blocked with dark and light color; the dactylus is not conspicuously paler than the propodus. The merus has conspicuous white spots with dark rings around them.

Only very few authors give some information on the color of the present species. Herklots (1851: 8) described the carapace as "ruber, viridi flavo marmoratus." Von Martens (1872:106) when dealing with a specimen from Liberia observed that the coloration of the carapace was more "kleinfleckig" than in his American material. De Man (1900:43) stated that the types of *Grapsus pelii* at that time had still "une belle couleur rouge jaunâtre, moins intense sur les pattes antérieures." Rathbun (1921:443) published the following color description of a living animal "A very showy crab, distinguished by its colors; carapace brownish yellow or brick-red; legs red, with spots of a darker red, extremities yellow. Chelipeds red, except the palms, which are almost white, and the fingers, which are yellow." Irvine (1947:292) described the colors as follows: "The carapace is dark reddish black. . . . The eyes are black. The claws are pale, with yellowish tips, their upper segments being of a beautiful purple colour. The legs are dark red in colour and are flat and covered with long stiff bristles."

Capart (1951:183) gave the following account "Couleurs vives, carapace brun-rouge; pattes rouges, de même que les chélipèdes, sauf les pinces, qui sont jaune clair." Unfortunately most of these authors paid more attention to the colors than to the color pattern of their animals, while the latter is far more important. The color description provided by Rossignol (1957:89) is far superior to most others. It is as follows:

> Face dorsale: Carapace noire avec des points jaunes très petits et très serrés, sauf sur les régions branchiales. Une ligne médiane courte de couleur jaune sur la partie postérieure de la carapace (ligne continuée par une série de points de même couleur sur chaque segment abdominal). Une ligne blanche sur chaque bord latéral. Deux taches rouges entre la région gastrique et la région cardiaque.
>
> Pinces: face externe jaune clair à vert amande. Face interne: violacée. Sur le bord supérieur de la main et du doigt, une série de tubercules blancs ou jaunâtres.
>
> Pattes: brun foncé, noir, avec une tache rouge à chaque articulation. Dactyle rouge.
>
> Face ventrale: jaunâtre. Les deux premiers segments abdominaux violacés. Mxp. 3 blancs, tranchant sur le brun sale des régions pterygostomiales. [The species is also] très facilement reconnaissable avec ses tubercules blancs sur le bord supérieur des pinces.

This description, obviously made after living specimens, agrees excellently with the one we made (quite independently from Rossignol's account, with which we were not aware at that time) after preserved specimens that had kept their coloration quite well. An illustration of our specimen is provided here to show the color pattern (Figure 59*a*).

It is interesting to note that Dana (1855, atlas, pl. 21: fig. 7) published a colored figure of *Goniopsis cruentata* from Brazil that shows a color pattern different from that of the West Indian form and in a few respects resembles that of *G. pelii* (presence of a white streak along the posterolateral margin of the carapace; pale dactyli of the pereiopods); however, it differs conspicuously from both types, and a more thorough study of Brazilian material of *Goniopsis* might yield interesting results.

Herklots (1851:8, 9, pl. 1: figs. 6, 7, 8) described the present species under two different names, viz., *Grapsus pelii* and *G. simplex*. As pointed out by De Man (1900:43, pl. 2, figs. 6, 7), *G. simplex* is based on juvenile specimens of *G. pelii*. The types of both species are still extant in the Rijksmuseum van Natuurlijke Historie, Leiden, and after examining them we can fully confirm De Man's conclusions. We use here the specific name *pelii* in preference to *simplex*, as the former is based on fully adult, the latter on juvenile specimens. The two names are of the same data, and under the Law of Priority have equal rights. In an earlier paper De Man (1879:68) synonymized

Grapsus pelii with *Goniopsis cruentata* and was followed in this by all subsequent authors. The specimens brought by Doflein (1904:129), Lenz (1910:125), and Lenz and Strunck (1914:283) to *Pachygrapsus simplex*, as Balss (1922:81) has pointed out, are not Herklots' species, but *Pachygrapsus gracilis* (De Saussure).

Forest and Guinot (1966:91) reported on a specimen of *Geograpsus lividus* from Fernando Poo in the collection of the Museu Bocage, which was identified as "*Goniograpsus cruentatus*"; it is possible that this is one of the specimens reported by Osorio (1895b:57) from that island. The same authors also showed that the material that Osorio (1892:199) reported as *Goniograpsus cruentata* from Bindá, São Tomé, actually belongs to *Grapsus grapsus*. On the other hand, they could confirm Osorio's (1889:139) identification of this species from Praia Salgada, Principe.

BIOLOGY.—The *Pillsbury* specimens were taken on a muddy bottom near the sea wall of Lagos harbor in brackish water. Most records in the literature indicate the species from a similar brackish muddy habitat. The best characterization is that given by Rathbun (1921:444):

> These crabs avoid the seashore, and on finding them in good numbers in mangrove swamps one might at first consider these their favorite habitat. However, they are not found in any of these swamps far inland for they remain near the mouth of rivers, where the salinity of the water is less than in the sea but still greater than about the creeks up-river where mangroves are still able to flourish.

Irvine (1947:292, 293) described the species as living "mainly in the wet mud underneath the tangled mass of aerial prop roots of the red mangrove (*Rhizophora*). It occupies small holes hollowed out in the mud and is often to be seen crawling on the surface." Furthermore, he stated that they "are also seen to a smaller extent in the slightly drier swamps round the banks of the lagoons, where the land is covered with a growth of white mangrove (*Avicennia nitida*)." Several other authors also reported the species from mangroves (e.g., Monod, 1927, 1956; Capart, 1951; Longhurst, 1958; Gauld, 1960; Rossignol, 1957, 1962). However, *Goniopsis pelii* also is found to be common among stones and debris on the ground (Rathbun, 1921:444; Uschakov, 1970:443), and Sourie (1954a:84, 293) mentioned that near Dakar the species lives "dans les anfractuosités des maçonneries; abondant au voisinage des mangroves," and "commun sur les falaises" near Conakry. Pauly (1975:57) noted that it was not common near the mouth of the Sakumo Lagoon, Ghana.

This species has been reported to live in burrows that it makes in the mud of mangrove areas. It is commonly seen climbing on the aerial roots of mangrove trees and also on slender vertical stems, up to 5 feet [1.5 m] over the surface (Rathbun, 1921). Irvine (1947:293) described this as follows:

> It is often seen climbing up an aerial root of the red mangrove with four legs on either side of it. The claws are kept underneath as it climbs, and are used as legs, working alternately in pushing the animal up the aerial roots. When pursued it can climb rapidly, and if closely pressed it often drops into the water and escapes along submerged roots.

They are very agile and when disturbed seek shelter between mangrove roots, or under stones and debris (Rathbun, 1921). They feed on the ground. Irvine (1947:293) also remarked that "it appears to feed on the bark of dead roots and other rotting vegetation, but may live on minute animals living in the bark. When feeding it brings its claws up to its mouth alternately in a most amusing manner."

Humes (1957) reported that this species was the host of the harpacticoid copepod *Cancrincola longiseta* Humes at several localities on the West African coast between Sierra Leone and the Congo.

Ovigerous females have been reported during April, May, July, August, and November.

The species seems to be of very little economic value. Only Irvine (1947:293) remarked that it is sold in the fish markets in Ghana.

VERNACULAR NAME.—Both Irvine (1947) and Bruce-Chwatt and Fitz-John (1951) give this species the vernacular name "Mangrove crab," a name also found on the field label of the speci-

mens from the mouth of the Junk River, Liberia, examined by us.

DISTRIBUTION.—*Goniopsis pelii* is known from the West African coast from Dakar, Senegal, in the north to Moçâmedes, Angola, in the south. Monod (1956:414, 415) listed many localities in Senegal, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Rio Muni, Gabon, and Congo, whence he had examined material of the present species. The other localities mentioned in the literature are as follows.

Senegal: Dakar (Rathbun, 1900a, 1918; Sourie, 1954a). Casamance (Sourie, 1954a).

Guinea-Bissau: No specific locality (Osorio, 1895a). Agongoon on Ilha Caravela, and Porto de Bissau on Ilha de Bissau (Vilela, 1949).

Guinea: Conakry (Capart, 1951; Sourie, 1954a; Uschakov, 1970).

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

Liberia: No specific locality (Von Martens, 1872; Büttikofer, 1890; Johnston, 1906). Monrovia (Rathbun, 1918). Rock Spring and mouth of Mesurado River, near Monrovia (Rathbun, 1900a, 1918). Cape Mesurado (Balss, 1922).

Ivory Coast: Lagune Ébrié at Adiapo-doumé (Humes, 1957).

Ghana: No specific locality (Gauld, 1960). Butre (type-locality; Herklots, 1851; De Man, 1879, 1900). Baya River near Elmina (Benedict, 1893, as Ashantee; Rathbun, 1918). Accra (Irvine, 1947). Sakumo lagoon, near mouth (Pauly, 1975).

Nigeria: Lagos (Balss, 1922; Bruce-Chwatt and Fitz-John, 1951). Iru Fisheries Station near Lagos (Humes, 1957). Elechi Creek, Port Harcourt, 04°47′15″N, 06°58′45″E (Powell, 1979).

Cameroon: No specific locality (Doflein, 1900; Balss, 1922; Monod, 1927, 1928). Douala (Monod, 1927, 1956).

Rio Muni: Cabo San Juan (Nobili, 1906b). Rio Muni, 20 km up from Elobey (Balss, 1922). Islas de Elobey (Osorio, 1895a).

Fernando Poo: San Carlos and Mongola (Osorio, 1895a; see "Remarks").

Principe: No specific locality (Frade, 1950).—Praia Salgada (Osorio, 1889; Forest and Guinot, 1966).—Rio Papagaio (Forest and Guinot, 1966).

São Tomé: No specific locality (Osorio, 1888, 1889; Balss, 1922; Frade, 1950; Forest and Guinot, 1966). Praia das Conchas (Osorio, 1889). Iógoiógo (Osorio, 1890). Bindá (Osorio, 1892).

Gabon: No specific locality (Kingsley, 1880a). Cap Lopez (Balss, 1922). Port-Gentil (Roux, 1927). Ogooué (Thallwitz, 1891).

Congo: Songololo River near Pointe-Noire; Loeme River, about 18 km S of Pointe-Noire (Humes, 1957). Loango, and mouth of Songololo River (Rossignol, 1957, 1962). Djeno, near Pointe-Noire (Rossignol, 1962).

Zaire: Banana (Rathbun, 1921; Capart, 1951). Moanda (Rathbun, 1921).

Angola: No specific locality (Osorio, 1887). Santo António do Zaire (as San Antonio) (Rathbun, 1921). Lobito (Osorio, 1887). Moçâmedes (Osorio, 1895a). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Genus *Grapsus* Lamarck, 1801

Grapsus Lamarck, 1801:150 [type-species: *Cancer grapsus* Linnaeus, 1758, by tautonomy; gender: masculine].

**Grapsus grapsus* (Linnaeus, 1758)

Grapsus maculatus.—Büttikofer, 1890:465, 487.—Johnston, 1906:862.

Grapsus grapsus.—Bruce-Chwatt and Fitz-John, 1951:117.—Capart, 1951:181, fig. 70.—Monod, 1956:407, fig. 561.—Dubois, 1957:7.—Rossignol, 1957:87, 121 [key].—Gauld and Buchanan, 1959:124.—Forest and Gantès, 1960: 353.—Gauld, 1960:71.—Guinot and Ribeiro, 1962:68.—Rossignol, 1962:119.—Ribeiro, 1964:14.—Chace, 1966: 640.—Forest and Guinot, 1966:90.—Zariquiey Alvarez, 1968:422, fig. 139a [Portugal].—Kensley, 1970:181.—Penrith and Kensley, 1970b:246, 250, 252, 260.—Hartmann-Schröder and Hartmann, 1974:24.

SYNONYMS.—*Grapsus pictus* Latreille, 1803; *Grapsus maculatus* H. Milne Edwards, 1853; *Grapsus webbi* H. Milne Edwards, 1853; *Grapsus pictus ocellatus* Studer, 1883; *Cancer jumpibus* Swire, 1938.

MATERIAL EXAMINED.—*Pillsbury Material:* Fernando Poo: Sta 258, shore, 8♂, 3♀, 3 juv (W).

Annobon: Sta 271, shore, 3♂, 2♀, 5 juv (L). Sta 273, shore, 2♂, 3 juv (L). Sta 281, shore, 1 cast (L).

Other Material: Azores: No specific locality, W. Trelease, 3♂, 3♀ ov (W). Near harbor of Ilha do Corvo, 4 Jun 1976, W. Backhuys, 6 spec (L). Ponta Delgada, Ilha de São Miguel, 31 Aug 1949, G. J. Jacobs, 1♂ (W). Horta, Ilha do Faial, U. S. Exploring Expedition, 1♀ (W). Pim Bay, Horta, Ilha do Faial, L. Dexter, 1♀ (W).

Senegal: Dakar, in tide pool, 12 Feb 1969, D. E. Harvey, 1♂, 2♀ ov (W). Pointe des Almadies near Dakar, among rocks, 0–0.5 m deep, 9 Jun 1964, F. M. Bayer, R. B. Manning, and L. B. Holthuis, 1♂ (L).

Liberia: No specific locality, 1882, J. Büttikofer, 1♂ (L). Buchanan, on rocks in surf, 24 Aug 1967, T. C. Rutherford, 2♂, 7♀ (1 ov) (W).

Ghana: Virgins Pool, Takoradi, 27–29 Jul 1961, Bane and Richards, 4♂, 3♀ (1 ov) (W).

Cameroon: Kribi, common on rocky boulders, below and above low tide line, very fast, 8 Mar and 6 Aug 1964, B. de Wilde-Duyfjes, 1♀, 1 juv (L).

Zaire: Banana, mouth of the Congo River, Jul 1915, H. Lang, American Museum Congo Expedition, 2♂, 1♀ ov (W).

DESCRIPTION.—Capart, 1951:181; Chace and Hobbs, 1969:163.

Figures: Capart, 1951, fig. 70; Monod, 1956, fig. 561; Chace and Hobbs, 1969, figs. 50, 52g–i.

Male Pleopod: Chace and Hobbs, 1969, fig. 52g–i (West Indies).

MEASUREMENTS.—The carapace width of the examined males ranged between 16 and 70 mm, that of the non-ovigerous females between 23 and 43 mm, that of the ovigerous females between 32 and 71 mm, and that of the juveniles between 5 and 14 mm.

BIOLOGY.—The species can be found on rocks in the surf- or splash-zone. A good description of its habitat is given by Chace and Hobbs (1969: 165, 166).

The species is very agile and exceedingly difficult to catch in the daytime; at night it can be approached far easier. See also Chace and Hobbs (1969:166). Off West Africa ovigerous females have been collected in February, May, July, and August (Guinot and Ribeiro, 1962; Ribeiro, 1964; present paper).

DISTRIBUTION.—The species has a wide range in the tropical Atlantic and East Pacific regions. In the East Atlantic it is found from the Azores and Morocco to South-West Africa; there is a single record from Setubal, Portugal (Osorio, 1905), but this needs confirmation. Monod (1956) listed the West African records, to which the following can now be added.

Morocco: Temara, S of Rabat (Forest and Gantès, 1960).

Cape Verde Islands: Baía de Monte Trigo, Santo Antão; Matiota, Baía da Fateixa, and Baía da Calheta, São Vicente; Baía da Murdeira and Pedra Lume, Sal; Baía do Tarrafal, São Tiago; and Ponta Rodrigo, Boavista (all Guinot and Ribeiro, 1962; Ribeiro, 1964).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ghana: No specific locality (Gauld, 1960). Teshi, 8 mi [13 km] E of Accra (Gauld and Buchanan, 1959). Takoradi and Tema harbors (Gauld, 1960).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951).

Principe: Praia Ponta da Mina (Forest and Guinot, 1966).

São Tomé: Praia Pantufo, Praia Melão, Ilhéu das Cabras, Bindá, and Ilhéu Gago Coutinho (as Ilot das Rollas) (Forest and Guinot, 1966).

Annobon: San Antonio (Forest and Guinot, 1966).

Congo: Djeno (Rossignol, 1957, 1962). Baie de Loango and Pointe-Noire (Rossignol, 1962).

Zaire: No specific locality (as Belgian Congo) (Dubois, 1957).

Angola: Baía de Luanda; Lobito; Baía Farta, Baía da Caota, and Ponta da Caruíta, Benguela; Baía de Santa Marta; and Praia Amélia, Moçâmedes (all Guinot and Ribeiro, 1962). Near Moçâmedes (Hartmann-Schröder and Hartmann, 1974).

South-West Africa: Rocky Point, 18°59′S, 12°29′E (Kensley, 1970; Penrith and Kensley, 1970b). Möwe Point, 19°-23′S, 12°42′E (Kensley, 1970).

Saint Helena: several localities (Chace, 1966).

Genus *Pachygrapsus* Randall, 1840

Pachygrapsus Randall, 1840:126 [type-species: *Pachygrapsus crassipes* Randall, 1840, by selection by Kingsley, 1880a: 198; gender: masculine; name 1638 on *Official List*].

Goniograpsus Dana, 1851c:247, 249 [type species: *Goniograpsus innotatus* Dana, 1851, a subjective junior synonym of *Pachygrapsus transversus* (Gibbes, 1850), by present selection; gender: masculine].

**Pachygrapsus gracilis* (De Saussure, 1858)

Pachygrapsus gracilis.—Frade, 1950:11, 26.—Capart, 1951: 187, fig. 74, pl. 3: fig. 19.—Monod, 1956:419, figs. 569, 571, 574–577.—Rossignol, 1957:89, 122 [key].—Gauld, 1960:71.—Guinot and Ribeiro, 1962:71.—Rossignol, 1962:120.—Forest and Guinot, 1966:92.—Uschakov, 1970:443, 444, 445.—Powell, 1979:127.

Pachygrapsus "africanus".—Hartmann-Schröder and Hartmann, 1974:19 [error for *P. gracilis*].

SYNONYM.—*Grapsus guadulpensis* Desbonne and Schramm, 1867.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 15♂, 17♀ (8 ov) (L). Sta 227, Lagos harbor, shore, 3♂, 2♀ (W).

Other Material: Liberia: No specific locality, 13 Mar 1953, G. C. Miller, 1♂, 2♀ (W). Freeport area, Monrovia, oyster cultch, 12 Mar 1953, G. C. Miller, 3♂, 8♀ (4 ov) (W).

Ghana: Virgins Pool, Takoradi, near sports club, 24 Jul 1961, Bane and Richards, 1♀ (W).

Dahomey: Cotonou, Point XI Lagune, 8 Apr 1964, H. Hoestlandt, 1♀ ov (L).

Nigeria: Ogudu River, 8 Aug 1926, A. S. Pearse, 2♀ (W). Lagos, harbor, 18 Jul 1963, A. R. Longhurst, 1♂ (L). W of Forcados, near confluence of Odimodi Creek and Forcados River, 05°22′N, 05°26′E, 28 Feb 1976, C. B. Powell, 1♂, 1♀ (L). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 3♂, 3♀ (2 ov), 2 juv (L).

Gabon: Port-Gentil, J. H. Logemann, 1♀ (L).

Zaire: Banana, mouth of Congo River, shore, under and between stones, somewhat nocturnal, Jul 1915, H. Lang, American Museum Congo Expedition, 20♂, 17♀ (7 ov) (W).

DESCRIPTION.—Capart, 1951:187; Chace and Hobbs, 1969:167.

Figures: Capart, 1951, fig. 74; Monod, 1956, figs. 569, 571; Chace and Hobbs, 1969, fig. 51.

Male Pleopod: Capart, 1951, pl. 3: fig. 19 (Zaire); Monod, 1956, figs. 574–577 (Ivory Coast); Chace, 1966, fig. 11b (West Indies); Chace and Hobbs, 1969, fig. 52*j* (West Indies).

Color: "Variable. Carapace allant du brun verdâtre au brun-noir. Tous nos examplaires ont les pinces jaune sale" (Rossignol, 1957:89).

BIOLOGY.—This is a littoral species found among and under stones, pieces of wood, etc. Gauld (1960:71) reported it to be "not uncommon intertidally among mangroves and near river mouths."

Ovigerous females have been observed in Africa in all months between December and May, in July, and in September.

DISTRIBUTION.—This species inhabits the tropical Atlantic. Off West Africa it is known from Senegal to Angola; it is remarkable that it has not been reported from the Cape Verde Islands. Monod (1956) listed the localities known at that time, to which the following can now be added.

Guinea: Conakry (Uschakov, 1970).

Ghana: No specific locality (Gauld, 1960).

Nigeria: Elechi Creek, Port Harcourt, 04°47′15″N, 06° 58′45″E (Powell, 1979).

Principe: Rio Papagaio (Forest and Guinot, 1966).

Congo: Loango and Djeno (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Zaire: Banana (Frade, 1950).

Angola: Baía de Luanda and Baía dos Tigres (Guinot and Ribeiro, 1962). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

* *Pachygrapsus transversus* (Gibbes, 1850)

Leptograpsus rugulosus.—Hilgendorf, 1879:808.

Pachygrapsus transversus.—Capart, 1951:186, fig. 73, pl. 3: fig. 20.—Monod, 1956:415, figs. 568, 570, 572, 573.—Rossignol, 1957:87, 121 [key], fig. 5.—Gauld and Buchanan, 1959:126.—Forest and Gantès, 1960:353.—Gauld, 1960:71.—Bassindale, 1961:491, fig. 5.—Guinot and Ribeiro, 1962:69.—Rossignol, 1962:120.—Bott, 1964: 30.—Ribeiro, 1964:16.—Forest and Guinot, 1966:91.—Zariquiey Alvarez, 1968:425, fig. 140c [Spain].—Christiansen, 1969:92, fig. 38, map 31 [introduced in Copenhagen harbor].—Uschakov, 1970:441, 443, 444, 446, 455.

Pachygrapsus Transversus.—Rossignol, 1957:133, pl. 2: fig. 3.

SYNONYMS.—*Goniograpsus innotatus* Dana, 1851; *Leptograpsus rugulosus* H. Milne Edwards, 1853; *Metopograpsus dubius* DeSaussure, 1858; *Metopograpsus miniatus* De Saussure, 1858; *Grapsus declivifrons* Heller, 1862; *Pachygrapsus intermedius* Heller, 1865; *Pachygrapsus advena* Catta, 1876.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 316, Lagos, shore, 1 soft ♀ (L).

Fernando Poo: Sta 257, shore, 3♂, 1♀ (L). Sta 258, shore, 28♂, 28♀ (4 ov), 32 juv (W).

Annobon: Sta 271, shore, 16♂, 9♀, 26 juv (L, W). Sta 273, shore, 4♂, 4♀, 3 juv (L).

Other Material: Canary Islands: Isla de Gran Canaria, 23 Oct 1905, 23 Jun 1916, P. Buitendijk, 1♂, 2♀ (L). Puerto de Orotava, Isla de Tenerife, Mar–Apr 1947, C. O. van Regteren Altena, 1♀ (L).

Morocco: Casablanca, 33°35′N, 07°35′W, intertidal zone, rocky littoral, 31 Mar 1976, *Onversaagd* Sta 158, 3♂, 1 juv (L).

Senegal: Dakar, littoral zone, 2 Aug 1966, D. E. Harvey, 3♂, 6♀ (3 ov), 1 juv (W). Pointe des Almadies near Dakar, under stones in littoral zone, 0–0.5 m deep, 9 Jun 1964, F. M. Bayer, R. B. Manning and L. B. Holthuis, 5 specimens (L). Soumb-Dioun, Dakar, under stones, 0–0.5 m deep, 9 Jun 1964, F. M. Bayer, R. B. Manning, and L. B. Holthuis, 4 specimens (L).

Liberia: Freeport area, Monrovia, oyster cultch, 13 Mar 1953, G. C. Miller, 2♂, 3♀, 1 juv (W).

Nigeria: West mole, Lagos, 16 Jun 1963, A. R. Longhurst, 1♂ (L).

Cameroon: Kribi, in ship-worm burrows in palm trunk on the beach in spray zone, 10 Mar 1964, B. de Wilde-Duyfjes, 2♀ ov (L). Kribi, on alga covered boulder, exposed at low tide, 6 Aug 1964, B. de Wilde-Duyfjes, 1♂, 1♀ ov (L). Kribi, among vegetation on rocks in littoral zone, 8 Mar 1964, B. de Wilde-Duyfjes, 5♂, 9♀ (4 ov) (L).

Zaire: Banana, mouth of Congo River, under and among

stones on river shore, 15 Jul 1915, H. Lang, American Museum Congo Expedition, 10♂, 8♀ (1 ov) (W).

Angola: Luanda, 21 Sep 1915, H. Lang, American Museum Congo Expedition, 1♀ (W). Lobito, 1899, P. Kamerman, 4♂, 3♀ (L).

DESCRIPTION.—Capart, 1951:186; Chace and Hobbs, 1969:169.

Figures: Capart, 1951, fig. 73; Monod, 1956, figs. 568, 570.

Male Pleopod: Capart, 1951, pl. 3: fig. 20 (Angola); Monod, 1956, figs. 572, 573 (Sierra Leone); Chace, 1966, fig. 11h (Florida); Chace and Hobbs, 1969, fig. 52k (West Indies).

Color: Observations on color have been given by Rossignol (1957:87).

MEASUREMENTS.—The examined males have carapace widths of 7 to 14 mm, the ovigerous females 12 to 18 mm, the non-ovigerous females 8 to 11 mm, and the juveniles 3 to 5 mm.

BIOLOGY.—The species is common on rocky and stony shores in the littoral zone, found among algae, mussels etc. Gauld and Buchanan (1959) reported it from sheltered rock in the Lithothamnion zone.

Off West Africa ovigerous females have been reported in March, May through October, and December.

DISTRIBUTION.—The species inhabits both the eastern and the western tropical Atlantic region, as well as the tropical eastern Pacific. The records of the species from the Indo-West Pacific region (Australia, New Zealand, Tahiti) are either erroneous or very dubious (see Holthuis and Gottlieb, 1958:102). In West Africa the range of the species extends from Angola north (it is also known from the entire north coast of Africa and the eastern Mediterranean (Karpathos (Greece), Cyprus, S Turkey, Syria, Lebanon, Israel). Monod (1956) listed the West African localities known to him at that time, to which the following may be added.

Morocco: Sidi Bou Knadel (as Bouknadel), Temara, Mannesman, El Hank (all Forest and Gantès, 1960).

Cape Verde Islands: Matiota, Baía de Porto Grande, Baía das Gatas, and Baía da Calheta, São Vicente; Baía de Sal-Rei, Boavista; Pedra Lume, Sal; Baía do Tarrafal and Porto da Praia, São Tiago (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Guinea: Conakry (Uschakov, 1970).

Ghana: No specific locality (Gauld, 1960). Dixcove, 15 mi [24 km] W of Takoradi (Gauld and Buchanan, 1959). Tenkpobo Beach, near Prampram (Bassindale, 1961).

Principe: Ilhéus dos Mosteiros and Ponta da Mina (Forest and Guinot, 1966).

São Tomé: No specific locality; W of Ponta Diogo Nunes; Ilhéu das Cabras (Forest and Guinot, 1966).

Congo: Pointe-Noire (Rossignol, 1957, 1962).

Angola: Baía de Luanda; Baía do Lobito; Baía Farta, Baía das Vacas, Morro da Macaca, Ponta da Caruíta, and Praia da Rocha, Benguela; Lucira; Baía de Santa Marta; Praia das Conchas, Moçâmedes; Baía de Moçâmedes; and Baía dos Tigres (all Guinot and Ribeiro, 1962). Lobito (Bott, 1964).

Genus *Planes* Bowdich, 1825

Planes Bowdich, 1825:xi, 15 [type-species: *Planes clypeatus* Bowdich, 1825, a subjective junior synonym of *Cancer minutus* Linnaeus, 1758, by monotypy; gender: masculine; name 353 on *Official List*].

Nautilograpsus H. Milne Edwards, 1837:89 [type-species: *Cancer minutus* Linnaeus, 1758, by monotypy; gender: masculine].

Planes cyaneus Dana, 1851

Planes cyaneus Dana, 1851e:250.

?Varuna atlantica Melliss, 1875:203.

Planes cyaneus.—Chace, 1966:656.—Crosnier, 1967:337.

SYNONYM.—*Nautilograpsus angustatus* Stimpson, 1858.

MATERIAL EXAMINED.—None.

DESCRIPTION.—Chace, 1951:67.

Figures: Chace, 1951, figs. 1b, 2b,e,h,m–o, 3i–n.

Male Pleopods: Chace, 1951, fig. 2m–o (California).

BIOLOGY.—Like *Planes minutus* this is an oceanic species found on marine turtles and floating objects; so far it does not seem to have been found on *Sargassum*. Crosnier's (1967) specimen from Gabon was taken from a buoy that had drifted off; Melliss' (1875) St. Helena specimen came from the hull of a ship, and Chace's (1966) material from the same island was taken from a buoy and from drifting kelp.

DISTRIBUTION.—Chace (1951) reported on ma-

terial of this species from the Pacific Ocean between roughly 41°N and 35°S latitudes and from the Indian Ocean; no reliable records of the species from the Atlantic Ocean were known to him. Later records showed that the species is rather common in the South Atlantic Ocean, being found there far more frequently than *P. minutus*; Juanico (1976:149) is of the opinion that it is the only species of *Planes* there (but see p. 237). Juanico reported an extensive material (28 specimens) of the species from various localities on the Uruguay coast. Chace (1966:646) examined 11 specimens from various parts of the coast of St. Helena. The only certain record of the species from the coast of tropical West Africa is the one by Crosnier (1967), who examined a female from a buoy off Gabon, 02°50′S, 08°50′E. The species has once been reported from the North Atlantic, viz., by Shirley (1974) from North Padre Island, Texas, U.S.A. The unconfirmed records of *Planes minutus* from the West coast of Africa (Gambia, Liberia, Cameroon and "Gulph of Guinea"), discussed below, might pertain to the present species.

Planes minutus (Linnaeus, 1758)

Cancer minutus Linnaeus, 1758:625.

Grapsus minutus.—Leach, 1818, in 1817–1818:414.—Monod, 1970:66.

Planes minutus.—Monod, 1956:425, fig. 583.—Christiansen, 1969:94, fig. 39, map 32 [Netherlands].

SYNONYMS.—*Cancer pusillus* Fabricius, 1775; *Grapsus pelagicus* Say, 1818; *Planes clypeatus* Bowdich, 1825; *Grapsus testudinum* Roux, 1828; *Nautilograpsus major* MacLeay, 1838; *Nautilograpsus smithii* MacLeay, 1838; *Grapsus diris* Costa, 1838–1853; *Planes linnaeana* Bell, 1845.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Morocco: Off Cap Blanc du Nord, 33°-16′N, 09°10′W, surface, collected with hand net, 27 Mar 1976, *Onversaagd* Sta 140, 1♂ (L).

DESCRIPTION.—Chace, 1951:68.

Figures: Chace, 1951, figs. 1a, 2a,d,g,j,k, 3a–h; Monod, 1956, fig. 583.

Male Pleopod: Chace, 1951, fig. 2j,k (off New Jersey).

REMARKS.—As already pointed out by Chace (1951:68), *Cancer minutus* Linnaeus (1758:625) is a composite species; the original description, namely, is based on material of both *Planes minutus* and *P. cyaneus*. Linnaeus' description runs as follows:

> C[ancer] brachuyrus, thorace laevi integerrimo subquadrato: margine acutiusculo. *Mus.Ad.Fr.* I.*p.*85. *It.wgoth.* 137.*t.*3.*f.*1. *Kalm.iter.*2.p.143. *Sloan.jam.*2.*t.*245.*f.*1. *Osbeck.iter.* 307. [p.626:] *Habitat in Pelagi* Fuco natante, *supra aquam saepius cursitans.*

This description fits either species. The reference "*Mus.Ad.Fr.*" is to Linnaeus (1754:85), where under the name *Cancer minimus* Linnaeus gives the following description:

> CANCER *brachyurus, testa subquadrata, integerrima, margine acutiusculo.*
>
> *Cancer cantonensis. It.W-goth.*137.*t.*3.*f.*1. [p. 86:] *Cancer marinus minimus quadratus. Sloan.hist.*2.*p.*270.*t.*245.*f.*1.
>
> Habitat in INDIIS.
>
> TESTA subrotunda, quadrata, laevis margine & fronte integra. CHELAE laeves. PEDES parum compressi.

The four other references given by Linnaeus (1758) in his description are all four original observations of the species. "It.wgoth." is to Linnaeus (1747:137, pl. 3: fig. 1a,1b), who described and figured *Planes* material from Canton, China, that he received from the apothecary Lut in Göteborg. As Chace (1951:88) already indicated, this material in all probability belongs to *Planes cyaneus*.

"*Kalm.iter.*" refers to Kalm (1756, in 1753–1761 (2):143), who made observations on *Cancer minutus* obtained from floating *Sargassum* in the North Atlantic during a crossing from London to Philadelphia. Kalm's account is not very clear and it is difficult to make out whether he observed *Planes minutus* or *Portunus sayi* Gibbes, 1850.

"*Sloan.jam.*" is a reference to Sloane (1725:270, pl. 245, fig. 1), who under the name *Cancellus marinus minimus quadratus* described and figured what at present is known as *Planes minutus* from "the *Sargasso* and other Submarine Sea-Plants, on

the Northside of Jamaica." Chace (1951:81) gave this as the first reliable record of *Planes minutus*.

Finally Linnaeus' reference, "*Osbeck.iter.*," is to Osbeck (1757:307), who mentioned *Cancer minutus* from the Sargasso Sea (Gräs-Sjö) at 22°N in the Atlantic north of Ascension. Osbeck gave no morphological description of this species, but did so of *Cancer pelagicus*, which showed the latter to be *Portunus sayi* Gibbes; therefore, there can be little doubt that Osbeck's *Cancer minutus* is a *Planes*, and Chace (1951:81) also considered it as such.

LECTOTYPE.—So far as we know no lectotype has ever been selected for *Cancer minutus* L. and in order to legalize the continued use of the epithet *minutus* for the North Atlantic *Planes* species, we now select as the lectotype of Linnaeus' species the specimen from the north coast of Jamaica figured by Sloane (1725, pl. 245, fig. 1).

BIOLOGY.—Monod (1927:621) reported on four specimens found in Douala Bay near Souellaba, Cameroon, on a floating trunk of a tree (*Aucoumea* sp., family Burseraceae). The same author later (1956:426) examined eight specimens found near Cotonou, Dahomey, on floating weeds "*Fucus natans*," by which the collector doubtless meant *Sargassum*. Outside the tropical West African region the species has been reported from floating *Sargassum* weed, from marine turtles, and from pieces of wood and other floating objects; it is a true oceanic form.

DISTRIBUTION.—There are very few records of the species from West Africa. Monod (1956:425, 426) listed only four: Gambia River (Gambia), Monrovia (Liberia), Cotonou (Dahomey), and Souellaba (Cameroon). Later, Monod (1970:66) drew attention to Leach's (1818, in 1817–1818: 414) record of the species from the "Gulph of Guinea." No other West African records are known to us.

Chace (1951:80, fig. 8) indicated the specimens from Gambia, Liberia, and Cameroon as of uncertain identity, being either *Planes minutus* or *P. cyaneus* Dana; no material from these localities was seen by Chace and the data provided in the literature were insufficient to identify them with certainty. The specimens mentioned by Leach (1818, in 1817–1818) and Monod (1970) as *Grapsus minutus* cannot be identified, because too little is known about them.

Quite different is the case with the specimens from Cotonou mentioned and figured by Monod (1956:425, fig. 583). Monod based the identification of his material on Chace's (1951) revision of the genus *Planes*, in which the differences between *P. minutus* and *P. cyaneus* were extensively dealt with. Furthermore, the Cotonou specimen figured by Monod shows the slender second pereiopod indicated by Chace as characteristic for *P. minutus*, and resembles that species also in other respects, so that there is no good reason to doubt Monod's identification. It is rather difficult therefore to understand Juanico (1976:146), who tried to show that Monod's identification is not reliable by stating on this account: "Monod (1956), dispone de un material de 8 ejemplares, pero no hace ninguna referencia a haberlos analizado respecto a los parámetros que permiten distinguir una especie de otra [= *P. minutus* from *P. cyaneus*]." Juanico reached the conclusion that *P. minutus* is restricted to the North Atlantic, but did not define what he considered the line between the North and South Atlantic. Judging by the fact that he evidently considered Surinam, Pernambuco, and Dahomey to be in the South Atlantic, this line is not the equator. Therefore, we consider for now that both species of *Planes* occur in West African waters, with Monod's (1956) record of *Planes minutus* from Cotonou constituting the only reliable record of that species for the area.

Outside the tropical West African region *Planes minutus* is known with certainty only from the North Atlantic between 11° and 52°N (see also Chace, 1951, fig. 8).

Subfamily PLAGUSIINAE Dana, 1851

Genus *Percnon* Gistel, 1848

Acanthopus de Haan, 1833:5, 6 [invalid junior homonym of *Acanthopus* Klug, 1807 (Hymenoptera); a genus established without included nominal species; the first species assigned to the genus, by de Haan, 1835:29, 30, were *Plagusia*

clavimana Latreille, 1806, *Cancer planissimus* Herbst, 1804 (as a synonym of *P. clavimana*), and *Plagusia serripes* Lamarck, 1818. Type-species: *Cancer planissimus* Herbst, 1804, by selection by Rathbun, 1918:337; gender: masculine; name 465 on *Official Index*].

Percnon Gistel, 1848:viii [substitute name for *Acanthopus* de Haan, 1833; type-species: *Cancer planissimus* Herbst, 1804; gender: neuter; name 345 on *Official List*].

Leiolophus Miers, 1876:46 [substitute name for *Acanthopus* de Haan, 1833; type-species: *Cancer planissimus* Herbst, 1804; gender: masculine].

Liolophus Alcock, 1900:439 [emendation of *Leiolophus* Miers, 1876; gender: masculine].

* *Percnon gibbesi* (H. Milne Edwards, 1853)

Acanthopus Gibbesi H. Milne Edwards, 1853:180.

Percnon planissimum.—Monod, 1956:453, fig. 613.—Gauld and Buchanan, 1959:128.—Forest and Gantès, 1960: 355.—Gauld, 1960:71.—Guinot and Ribeiro, 1962:72.—Ribeiro, 1964:17.—Forest and Guinot, 1966:93.—Zariquiey Alvarez, 1968:436, fig. 146a [Portugal]. [Not *Cancer planissimus* Herbst, 1804.]

Percnon gibbesi.—Chapman and Santler, 1955:375.—Figueira, 1960:11.

SYNONYM.—*Plagusia Delaunayi* De Rochebrune, 1883.

MATERIAL EXAMINED.—*Pillsbury Material:* Fernando Poo: Sta 258, shore, 1♂, 1 juv (W).

Annobon: Sta 271, shore, 3♂, 1♀, 2 juv (L).

Other Material: Madeira: No specific locality, U. S. Exploring Expedition, 1♂, 1♀ (dry) (W). Ponta de São Lourenço, SE coast, 32°44′N, 16°44′W, rocky shore with tidepools, 29 Feb 1976, *Onversaagd* Sta 16, 6 specimens (L). SE coast near Porto da Abra, 32°45′N, 16°41′W, 0–12 m, diving, 13 Mar 1976, *Onversaagd* Sta 68, 1♀ ov (L). S coast, W of harbor of Funchal, 32°38′N, 17°05′W, rocky littoral, sublittoral, with boulders, snorkeling, 24 Feb 1976, *Onversaagd* Sta 8, 1 juv (L). SE coast near Canical, 32°44′N, 16°44′W, 0–22 m, shore collecting, snorkeling, diving, 2 Mar 1976, *Onversaagd* Sta 14, 14 specimens (L); Same, 11 Mar 1976, *Onversaagd* Sta 48, 2 specimens (L).

Canary Islands: Puerto Orotava, Isla de Tenerife, shore, 10 Mar 1947, C. O. van Regteren Altena, 1♂ (L).

DESCRIPTION.—Rathbun, 1918:337; Schmitt. 1939:23, 24.

Figures: Rathbun, 1918, pl. 105; Monod, 1956, fig. 613.

MEASUREMENTS.—The carapace width of the examined specimens ranged from 6 to 30 mm; that of the ovigerous female was 30 mm.

Remarks.—Several previous authors (Monod, Forest, and Guinot) synonymized *Percnon gibbesi* with *P. planissimum* (Herbst) from the Indo-West Pacific region. However, in our opinion the two species, although closely related, differ sufficiently in the characters enumerated by Schmitt (1939: 24) to be considered distinct species.

BIOLOGY.—The species is a littoral form and is usually found on rocky shores. Off West Africa ovigerous females have been collected in February, March, April, and August (Monod, 1956; Forest and Gantès, 1960; present paper).

DISTRIBUTION.—*Percnon gibbesi* is known from both sides of the Atlantic and from California to Chile in the eastern Pacific. In the western Atlantic it ranges from Florida to Brazil, and in the eastern Atlantic from Madeira, the Azores, and Morocco to Ghana and the offshore islands of the Gulf of Guinea; a record from Portugal requires confirmation. Monod (1956) listed the West African localities known to him; to those the following can be added:

Azores: No specific locality (Chapman and Santler, 1955; Figueira, 1960).

Morocco: Lucien Saint (?), Temara, and David (Forest and Gantès, 1960).

Cape Verde Islands: Praia de Matiota, São Vicente, and Baía do Monte Trigo, São Antão (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Ghana: No specific locality (Gauld, 1960). Tenkpobo (Gauld and Buchanan, 1959).

São Tomé: Praia Santa Catarina and Ilhéu das Cabras (Forest and Guinot, 1966).

Principe: Ilhéu Caroço (Forest and Guinot, 1966).

Annobon: No specific locality (Forest and Guinot, 1966).

Genus *Plagusia* Latreille, 1804

Plagusia Latreille, 1804:125 [type-species: *Cancer depressus* Fabricius, 1775, by monotypy; gender: feminine; name 1644 on *Official List*].

Philyra de Haan, 1833:5 [invalid junior homonym of *Philyra* Leach, 1817; a genus established without included species; type-species: *Cancer depressus* Fabricius, 1775, by subsequent monotypy by de Haan, 1835:31; gender: feminine].

* *Plagusia depressa* (Fabricius, 1775)

Plagusia depressa.—Büttikofer, 1890:487.—Johnston, 1906: 862.—Monod, 1956:455, figs. 614-617.—Rossignol, 1957: 95, 121 [key], fig. 9.—Figueira, 1960:11.—Forest and Gantès, 1960:356.—Gauld, 1960:71.—Guinot and Ribeiro, 1962:72.—Rossignol, 1962:121.—Ribeiro, 1964: 17.—Chace, 1966:647.—Forest and Guinot, 1966:93.—Hartmann-Schröder and Hartmann, 1974:24.
Plagusia squamosa.—Stimpson, 1907:122.

SYNONYMS.—*Cancer squamosus* Herbst, 1790; *Plagusia sayi* De Kay, 1844; *Plagusia gracilis* De Saussure, 1858.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 225, Lagos harbor, shore, 1♀ ov (W).

Annobon: Sta 271, shore, 1♂, 1♀ ov (L). Sta 273, shore, 2♀ (1 ov) (W).

Other Material: Madeira: No specific locality; U. S. Exploring Expedition, 1♂, 1♀ (W).

Liberia: No specific locality, 1882, J. Büttikofer, 1♂, 1♀ (L). No specific locality, 1890, J. Demery, 1♀ (L).

Ghana: Butre, 1840-1855, H. S. Pel, 1♀ (L). Sekondi, 1853, H. S. Pel, several specimens (L). Baya River, Elmina, 27 Nov 1889, W. H. Brown, U. S. Eclipse Expedition, 1♂ (W). Accra, 1868-1869, M. Sintenis, 2♂, 1♀ (L).

Cameroon: Kribi, among algae on rocks on a sandy beach, 11 Mar 1964, B. de Wilde-Duyfjes, 8♂, 7♀, 1 juv (L).

DESCRIPTION.—Rathbun, 1918:332; Chace and Hobbs, 1969:192.

Figures: Rathbun, 1918, fig. 154a, pl. 101; Monod, 1956, fig. 614; Rossignol, 1957, fig. 9; Chace and Hobbs, 1969, fig. 63.

Male Pleopod: Monod, 1956, figs. 615-617 (Senegal); Chace and Hobbs, 1969:190, fig. 62r-t (West Indies).

MEASUREMENTS.—The carapace width of the examined specimens varied from 15 to 42 mm, that of the ovigerous females was 28 and 32 mm.

BIOLOGY.—This is a littoral species, inhabiting rocky shores or rocks on sandy beaches. Off West Africa ovigerous females have been collected in May, August, September, October, and December.

DISTRIBUTION.—The species occurs on both sides of the Atlantic. In American waters its range extends from North Carolina (U.S.A.) to Brazil, in the eastern Atlantic from the Azores and Morocco to Angola. Monod (1956) listed the West African records of the species known to him; to these the following can be added:

Azores: Faial (Figueira, 1960).

Morocco: Temara (Forest and Gantès, 1960).

Madeira: No specific locality (Stimpson, 1907).

Cape Verde Islands: Baía das Gatas, São Vicente and Tarrafal do Monte Trigo, São Antão (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ghana: No specific locality (Gauld, 1960).

São Tomé: No specific locality (Forest and Guinot, 1966). Baía de São Miguel, and Sant'Ana (Forest and Guinot, 1966).

Congo: Djeno (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Angola: Baía de Benguela; Baía da Caota and Ponta das Vacas, Benguela; Praia das Conchas, Moçâmedes (all Guinot and Ribeiro, 1962). Near Moçamêdes (Hartmann-Schröder and Hartmann, 1974).

Saint Helena: James Bay and Rupert's Bay (Chace, 1966).

Subfamily SESARMINAE Dana, 1851

Genus *Cyclograpsus* H. Milne Edwards, 1837

Cyclograpsus H. Milne Edwards, 1837:77 [type-species: *Cyclograpsus punctatus* H. Milne Edwards, 1837, by selection by Rathbun, 1918:325; gender: masculine].
Gnathochasmus MacLeay, 1838:65 [type-species: *Gnathochasmus barbatus* MacLeay, 1838, a subjective junior synonym of *Cyclograpsus punctatus* H. Milne Edwards, 1837, by monotypy; gender: masculine].

* *Cyclograpsus integer* H. Milne Edwards, 1837

Cyclograpsus integer.—Sourie, 1954a:294.—Monod, 1956:451, figs. 609-612.—Guinot and Ribeiro, 1962:71.—Rossignol, 1962:121.—Ribeiro, 1964:17.—Uschakov, 1970:443, 455 [listed].
Cyclograpsus occidentalis.—Rossignol, 1957:93, 122 [key], fig. 8.—Bott, 1964:30.

SYNONYM.—*Cyclograpsus occidentalis* A. Milne Edwards, 1878.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 11♂, 11♀ (2 ov) (L, W).

Other Material: Cape Verde Islands: Praia, São Tiago, Jul 1883, *Talisman* Expedition, don. Mus. Paris, 1♂ (L).

Angola: Lobito, 1899, P. Kamerman, 1♀ (L).

DESCRIPTION.—Rathbun, 1921:455; Chace and Hobbs, 1969:173.

Figure: Monod, 1956, fig. 609.

Male Pleopod: Monod, 1956, figs. 610–612 (Cape Verde Islands; Senegal); Chace and Hobbs, 1969, fig. 58b-d (West Indies).

Color: "Brun-rouge uniforme. Extrémité des pattes brun foncé, extrémités des pinces jaunâtres" (Rossignol, 1957:94).

MEASUREMENTS.—Our specimens have carapace widths ranging from 6 to 12 mm, those of ovigerous females being 8 and 9 mm.

BIOLOGY.—This species is found under rocks in the intertidal zone. Off West Africa ovigerous females have been collected in March, May, and July.

DISTRIBUTION.—The species inhabits both the eastern and the western Atlantic; it has also been reported from the Indo-West Pacific region, from East Africa to Polynesia (Campbell and Griffin, 1966; Griffin, 1968b). In the western Atlantic it occurs from Bermuda and Florida to Brazil. In the eastern Atlantic its range extends from the Cape Verde Islands and Senegal to Angola. To the West African localities enumerated by Monod (1956) the following can be added:

Cape Verde Islands: Baía da Murdeira, Sal (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: Dakar (Sourie, 1954a).

Guinea: Conakry (Sourie, 1954a; Uschakov, 1970).

Congo: Loango lagoon (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Angola: Lobito (Bott, 1964). Baía Farta and Baía de Santa Marta, Benguela (Guinot and Ribeiro, 1962).

Genus *Metagrapsus* H. Milne Edwards, 1853

Metagrapsus H. Milne Edwards, 1853:188 [type-species: *Sesarma curvatum* H. Milne Edwards, 1837, selection by Rathbun, 1918:321; gender: masculine].

REMARKS.—Serène and Soh (1970:397) restricted the genus *Sarmatium* Dana, 1851, to include only two species: the type, *Sarmatium crassum* Dana, 1851, and *Sesarma germaini* A. Milne Edwards, 1869. The West African species, which is best known as *Sarmatium curvatum* (H. Milne Edwards, 1837), according to these authors belongs to a distinct genus, for which the name *Metagrapsus* H. Milne Edwards, 1853, is available. Serène and Soh (1970:398) placed a second species in the genus *Metagrapsus*, viz., *Metagrapsus pectinatus* H. Milne Edwards, 1853. According to Rathbun (1918:322), who examined the type of *Metagrapsus pectinatus*, this species is synonymous with *M. curvatus*. Some authors, however, doubted the correctness of Rathbun's identification, mainly on zoogeographic grounds. As the type of *M. pectinatus* (said to be from Martinique) so far is the only specimen of the genus ever reported from the western Atlantic, there seems to be more reason to doubt the correctness of the locality label "Martinique" than Rathbun's identification. If Rathbun is correct, *M. curvatus* at present is the only species known of the genus *Metagrapsus*.

* *Metagrapsus curvatus* (H. Milne Edwards, 1837)

Sarmatium curvatum.—Capart, 1951:193.—Monod, 1956:449, fig. 608.—Rossignol, 1957:93, 122 [key], fig. 7.—Jordan, 1957:198.—Humes, 1957:184, 187, 189.—Longhurst, 1958:88.—Gauld, 1960:71.—Rossignol, 1962:121.—Uschakov, 1970:448, 455 [listed].—Powell, 1979:129.

Sesarma curvatum.—Humes, 1957:186.

Sarmatium.—Humes, 1957:188, 189.

SYNONYMS.—*Sesarma violacea* Herklots, 1851; ?*Metagrapsus pectinatus* H. Milne Edwards, 1853.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 3♂ (W).

Other Material: Liberia: Harbel, mouth of Junk River, mangrove bank, dug from mud under rocks, 20 Jul 1968, T. C. Rutherford, 1♂ (W).

Ghana: Butre, 1840–1851, H. S. Pel, 1♂ lectotype, 2♂ and 1♀ paralectotypes of *Sesarma violacea* Herklots, 1851 (L, Crust. D.180). Sekondi, 1840–1851, H. S. Pel, 1♂, 1♀ paralectotypes of *Sesarma violacea* Herklots, 1851 (L, Crust. D.182). Accra, 1868, 1869, M. Sintenis, 1♂ (L).

Nigeria: Mangrove creek behind the Mao-Ajudaibo road, south bank of the mouth of the Escravos River, 05°35'N, 05°12.5'E, in *Avicennia* mangroves, 31 Jul 1975, C. B. Powell, 1♂ (L). W side of Forcados near confluence of Odimodi Creek and Forcados River, 05°22'N, 05°26'E, 28 Feb 1976, C. B. Powell, 2♂, 2♀, 1 juv (L). Mayuku Creek near Ugbe-

koko, about 10 km west of Sapele, 05°N, 05°34.5'E, Oct-Dec 1975, C. B. Powell, 1♂ (L). Between Brass and Port Harcourt, Niger delta, May-Aug 1960, H. J. G. Beets, 2♂, 1♀ (L).

Congo: No specific locality, 1894, Dybowski, legator, 1♂, 1♀ (W).

Zaire: Banana, mouth of the Congo River, Jul–Aug 1915, H. Lang, American Museum Congo Expedition, 4♂, 1♀ (W). Maléla, 8 Jul 1915, H. Lang, American Museum Congo Expedition, 5♂, 4♀, 3 juv (W).

Angola: Santo António do Zaire, Aug 1915, H. Lang, American Museum Congo Expedition, 3♂, 1 juv (W).

DESCRIPTION.—Rathbun, 1918:321; Rathbun, 1921:454; Capart, 1951:193.

Figures: Rathbun, 1918, pl. 95; Rathbun, 1921, pl. 16, pl. 42: fig. 3, pl. 46, pl. 47: fig. 1; Monod, 1956, fig. 608.

Color: "Violet-mauve. Pinces et pattes un peu plus claires. Dactyles et sternites jaunâtres" (Rossignol, 1957:93).

MEASUREMENTS.—The examined males have carapace widths ranging from 9 to 26 mm.

BIOLOGY.—This species is a characteristic inhabitant of mangroves; Rathbun (1921) gave an account of the habitat of the species in the Congo estuary. Gauld (1960) found it in mangroves and creeks, and Uschakov (1970) reported it from the intertidal above the *Avicennia* zone. Humes (1957) reported that this species was the host of the harpacticoid copepods *Cancrincola longiseta* Humes (rarely) and *C. abbreviatus* Humes (usually). Off West Africa, ovigerous females have been found in March.

DISTRIBUTION.—*Metagrapsus curvatus* is a West African species known from localities between Senegal and Angola. The single record from Martinique in the West Indies (Monod, 1956:449) is evidently based on an incorrectly labeled specimen. In addition to the West African localities mentioned by Monod (1956) for this species the following can be listed:

Guinea: Île Marara and Rio Pongo (Uschakov, 1970).

Sierra Leone: Rokupr (Jordan, 1957). Sierra Leone River (Longhurst, 1958). Bunce River near Freetown (Humes, 1957).

Ghana: Butre, Sekondi, Ada, and Angaw Lagoon (Gauld, 1960).

Nigeria: Elechi Creek, Port Harcourt, 04°47'15"N, 06°58'45"E (Powell, 1979).

Congo: Mount of the Songololo River (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962). Loeme River near Pointe-Noire (Humes, 1957).

Genus *Sesarma* Say, 1817

Sesarma Say, 1817:76 [type species: *Ocypode reticulatus* Say, 1817, by monotypy; gender: neuter].

REMARKS.—The systematics and the nomenclature of the genus *Sesarma* sensu lato are quite unsatisfactory. Serène and Soh (1970) assigned the Indo-West Pacific species, that until then were considered to belong to the genus *Sesarma*, to 13 genera and 3 subgenera, for the greater part new. Serène and Soh's preliminary revision contains several inconsistencies and inaccuracies and furthermore does not cover the Atlantic species of *Sesarma* sensu lato. Therefore, for the time being, we follow Monod (1956) in recognizing a single genus *Sesarma* in the eastern Atlantic with two subgenera, both of which are found in the tropical West African region.

The following is a list of genera and subgenera, the type-species of which either (1) were considered to belong to *Sesarma* in Tesch's (1917) review of that genus or (2) were assigned to *Sesarma* by later authors. So far as we can determine, the gonopods of West African species of *Sesarma* have not been illustrated.

Sesarma Say (1817:76).

Pachysoma de Haan (1833:5, circ. pl. 2, pl. 7: fig. 4, pl. 8: fig. 3). Invalid junior homonym of *Pachysoma* MacLeay, 1821 (Coleoptera); type-species: *Grapsus* (*Pachysoma*) *haematocheir* de Haan, 1833, by selection by Holthuis (1977a:170); gender: neuter.

Chiromantes Gistel (1848:x). Substitute name for *Pachysoma* de Haan, 1833; type-species: *Grapsus* (*Pachysoma*) *haematocheir* de Haan, 1833; gender: masculine.

Holometopus H. Milne Edwards (1853:187). Type-species: *Grapsus* (*Pachysoma*) *haematocheir* de Haan, 1833, by monotypy; gender: masculine.

Geosesarma De Man (1892:341). Type-species: *Sesarma* (*Geosesarma*) *nodulifera* De Man, 1892, selected by Serène and Soh (1970:402); gender: neuter.

Episesarma De Man (1895b:165). Type-species: *Sesarma taeniolatum* Miers, 1877 (= *Sesarma taeniolata* White, 1847, a nomen nudum), a subjective junior synonym of *Sesarma mederi* H. Milne Edwards, 1853, selected by Holthuis (1978:24); gender: neuter.

Parasesarma De Man (1895b:181). Type-species: *Cancer quadratus* Fabricius, 1798 (not Fabricius, 1787)(= *Ocypode plicata* Latreille, 1803), by selection by Rathbun, 1918:284); gender: neuter.

Perisesarma De Man (1895b:208). Type-species: *Sesarma (Perisesarma) eumolpe* De Man, 1895, selected by Holthuis (1977a:170); gender: neuter.

Nanosesarma Tweedie (1950:310). Type-species: *Sesarma andersonii* De Man, 1887, by original designation; gender: neuter.

Beanium Serène and Soh (1970:389, 394). Type-species: *Sesarma batavica* Moreira, 1903, by original designation; gender: neuter.

Neosesarma Serène and Soh (1970:389, 394). Type-species: *Sesarma gemmiferum* Tweedie, 1936, by original designation; gender: neuter.

Neoepisesarma Serène and Soh (1970:390, 395). Type-species: *Sesarma mederi* H. Milne Edwards, 1853, by original designation; gender: neuter.

Muradium Serène and Soh (1970:390, 396). Type-species: *Cancer tetragonus* Fabricius, 1798, by original designation; gender: neuter.

Selatium Serène and Soh (1970:390, 397). Type-species: *Sesarma brockii* De Man, 1887, by original designation; gender: neuter.

Tiomanum Serène and Soh (1970:391, 398). Type-species: *Sesarma indica* H. Milne Edwards, 1837, by original designation; gender: neuter.

Bresedium Serène and Soh (1970:391, 399). Type-species: *Sesarma edwardsii brevipes* De Man, 1889, by original designation; gender: neuter.

Pseudosesarma Serène and Soh (1970:391, 399). Type-species: *Sesarma edwardsi* De Man, 1888, by original designation; gender: neuter.

Sesarmops Serène and Soh (1970:391, 400). Type-species: *Sesarma impressa* H. Milne Edwards, 1837, by original designation; gender: masculine.

Labuanium Serène and Soh (1970:392, 401). Type-species: *Sesarma polita* De Man, 1888, by original designation; gender: neuter.

Sesarmoides Serène and Soh (1970:392, 403). Type-species: *Sesarma krausii* De Man, 1887, by original designation; gender: masculine.

Namlacium Serène and Soh (1970:392, 404). Type-species: *Sesarma crepidatum* Calman, 1925, by original designation; gender: neuter.

Subgenus *Chiromantes* Gistel, 1848

REMARKS.—The name *Chiromantes* was proposed by Gistel (1848:x) as a replacement for the generic name *Pachysoma* de Haan, 1833, which is preoccupied by *Pachysoma* MacLeay, 1821 (Coleoptera) and *Pachysoma* Geoffroy, 1828 (Mammalia).

De Haan (1833:5, circ. pl. 2, pl. 7: fig. 4, pl. 8: fig. 3) introduced the name *Pachysoma* in the first fascicle of his Crustacea volume of Ph. F. von Siebold's *Fauna Japonica*. In the text of this fascicle the name *Pachysoma* was given in a key to the subgenera of the genus *Grapsus*, and no species were mentioned there. However, on two of the plates of this first fascicle two species of the subgenus *Pachysoma* were figured and mentioned by name: *Grapsus (Pachysoma) haematocheir* de Haan (1833, pl. 7: fig. 4) and *Grapsus (Pachysoma) quadratus* (Fabricius, 1798) (pl. 8: fig. 3). As these two species are the only nominal species referred to *Pachysoma* in the original publication of that subgenus, it is from among them that a type may be selected for the subgenus. Therefore, as Holthuis (1977a:170) pointed out, the selection of *Grapsus (Pachysoma) bidens* de Haan, 1835, as the type of *Pachysoma*, made by Fowler (1912:439) is invalid. The first valid type selection for *Pachysoma* de Haan, 1833 (and thus automatically for *Chiromantes* Gistel, 1848) is the one by Holthuis (1977a:170), who selected *Grapsus (Pachysoma) haematocheir* de Haan, 1833, as the type of that subgenus.

As *Grapsus (Pachysoma) haematocheir* de Haan, 1833, is also the type-species (by monotypy) of the subgenus *Holometopus* H. Milne Edwards, 1853, the name *Chiromantes*, being the senior of the two, has to be used.

Although the transfer of a name from one

taxon to another usually is harmful and to be avoided, the status of the taxonomy and nomenclature of the subgenera of *Sesarma* is at present in such a state of flux that it seems best to adhere strictly to the Code in the present case, at least until a revision of the *Sesarma* complex is achieved.

The subgenus *Chiromantes* is represented in the eastern Atlantic by three species, all three of which occur in tropical West Africa. *Sesarma roberti*, erroneously reported from West Africa (p. 226), also belongs in the present subgenus.

The subgenus was referred to as *Holometopus* by Monod (1956) and all later authors, while they used the name *Chiromantes* for the subgenus here indicated with the name *Perisesarma*.

Sesarma (Chiromantes) angolense De Brito Capello, 1864

Sesarma angolensis.— Büttikofer, 1890:487.—Johnston, 1906: 861.—Longhurst, 1958:88.—Gauld, 1960:71.

Sesarma (Holometopus) angolensis.—Dartevelle, 1950:48.—Monod, 1956:445, fig. 605.—Rossignol, 1962:120.

Sesarma (Holometopus) angolense.—Dartevelle, 1950:50.—Capart, 1951:191, fig. 76.—Rossignol, 1957:92, 122 [key].—Jordan, 1957:198.—Humes, 1957:186, 187, 189.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Liberia: No specific locality, 1890, 1897, J. Demery, 2♀ (L). Grand Cape Mount near Robertsport, 1882, J. Büttikofer, 4♂, 3♀ (L).

Nigeria: Mayuku Creek near Ugbekoko, 10 km W of Sapele, Midwest State, ca. 05°54'N, 05°34.5'W, Oct, Oct–Dec, Dec 1975, Jan 1976, C. B. Powell, many specimens (L). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 1♂, 2♀ (L).

Angola: Lobito, 1899, P. Kamerman, 1♂, 2♀ (L).

DESCRIPTION.—Rathbun, 1921:451; Capart, 1951:191.

Figures: Rathbun, 1921, pl. 43, pl. 45: fig. 1; Capart, 1951, fig. 76; Monod, 1956, fig. 605.

Color: Rossignol (1957:92) gave a detailed description of the color of this species.

BIOLOGY.—Rathbun (1921) gave extensive notes on the biology and habitat of this species. It inhabits mangroves and was found by Mr. C. B. Powell (in litt.) "in shallow holes, perhaps burrows, in the intertidal mud among mangroves." Humes (1957) reported that this species was the host of the harpacticoid copepod *Cancrincola abbreviatus* Humes. Ovigerous females have been recorded in December (Capart, 1951).

DISTRIBUTION.—The species is restricted to West Africa and is known from Sierra Leone to Angola. Records in the literature, additional to the ones given by Monod (1956), are the following:

Sierra Leone: Rokupr (Jordan, 1957). Rice bunds, Sierra Leone River (Longhurst, 1958).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ghana: No specific locality (Gauld, 1960).

Congo: Loya River (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962). Loeme River about 18 km S of Pointe-Noire (Humes, 1957).

Zaire: Maléla, Katala, Zambi, and Île de Mateba, estuary of the Congo River; Tumuna [?], estuary of the Rio Shiloango (= Louango River) (Dartevelle, 1950).

**Sesarma (Chiromantes) buettikoferi* De Man, 1883

Sesarma büttikoferi.—Büttikofer, 1890:464, 487.—Rossignol, 1957:91, fig. 6, pl. 2: fig. 5.

Sesarma buettikoferi.—Johnston, 1906:861.

Sesarma (Holometopus) buttikoferi.—Dartevelle, 1950:48.

Sesarma (Holometopus) buettikoferi.—Monod, 1956:447, figs. 606, 607.—Rossignol, 1962:121.

Sesarma (Holometopus) büttikoferi.—Rossignol, 1957:91, 122 [key].

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 1, Lagos harbor, shore, 1♀ (W).

Other Material: Liberia: Grand Cape Mount, near Robertsport, 1882, J. Büttikofer, 1♂ (L). Lake Piso (as Fisherman's Lake), near Robertsport, Jan 1881, J. Büttikofer and J. A. Sala, 1♂ holotype (L, Crust. D. 148). Rock Spring, Monrovia, Apr 1894, O. F. Cook and G. N. Collins, 4♂, 3♀ (W). Junk River, 1882, F. X. Stämpfli, numerous specimens (L). Junk River, 1♂ dry (W). Farmington River at Snafu Docks, Nov 1946, H. A. Beatty, 10♂, 6♀ (1 ov) (W). Bromley [?], W. Mann, Smithsonian-Firestone Liberia Expedition, 3♀ (W).

Ivory Coast: Near Lagune Ébrié, about 17 km W of Abidjan, among rotting leaves in rainwater puddles in hollow trees in shaded areas, 11 Aug 1963, B. de Wilde-Duyfjes, 1 specimen (L). Near ORSTOM office, Lagune Ébrié, 11 Aug 1963, W. J. J. O. de Wilde, several males and females (L).

Nigeria: Mayuku Creek near Ugbekoko, about 10 km W

of Sapele, 05°54'N, 05°37'E, in mangrove swamp, Oct–Dec 1975, C. B. Powell, 28 specimens (1♀ ov) (L).

Cameroon: Kribi, among humid dead leaves on the bank of a forest stream not far from the sea, 8 Aug 1964, B. de Wilde-Duyfjes, 1♂, 2♀ (L).

Zaire: Banana, mouth of the Congo River, Jul–Aug 1915, H. Lang, American Museum Congo Expedition, 1♂, 1♀ (W). Maléla, 8 Jun 1915, H. Lang, American Museum Congo Expedition, 22♂, 10♀ (2 ov) (W). Zambi, 4 Jul 1915, H. Lang, American Museum Congo Expedition, 1 juv (W).

DESCRIPTION.—Rathbun, 1921:449.

Figures: Monod, 1956, figs. 606, 607; Rossignol, 1957, fig. 6.

Color: The specimens from Lagune Ébrié carried a note stating that in life the chelae are purplish blue with red tips. Additional color notes were provided by Rossignol (1957:91).

BIOLOGY.—This species inhabits littoral estuarine areas, particularly mangroves and adjoining inland regions (see Rathbun, 1921:449, 450).

Ovigerous females have been collected in March, June, July–August, and October through December (Rathbun, 1921; Rossignol, 1957; present paper).

DISTRIBUTION.—*Sesarma buettikoferi* is found along the West African coast from Liberia to Angola. Monod (1956) listed the locality records known to him; to these the following can now be added:

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Congo: Mouth of the Songololo River (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Zaire: Kunga, Maléla, and Katala, in estuary of Congo River (Dartevelle, 1950).

Sesarma (*Chiromantes*) *elegans* Herklots, 1851

Sesarma (*Holometopus*) *elegans*.—Dartevelle, 1950:48.—Capart, 1951:192, fig. 77.—Monod, 1956:442, fig. 601.—Rossignol, 1957:92, 122 [key]; 1962:120.

Sesarma elegans.—Longhurst, 1958:88.—Gauld, 1960:71.—Uschakov, 1970:448, 455 [listed].—Powell, 1979:127.

Sesarma.—Uschakov, 1970, fig. 4.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Liberia: Farmington River at Snafu Docks, Nov 1946, H. A. Beatty, 1♂ (W).

Ghana: Butre, 1840–1855, H. S. Pel, 1♂ lectotype, 3♂ and 5♀ paralectotypes (L, lectotype Crust. D. 150, paralectotypes Crust. D. 151).

Nigeria: Harbor of Lagos, 13 Jun 1963, A. R. Longhurst, 1♂ (L). W of Forcados near confluence of Odimodi Creek and Forcados River, 05°22'N, 05°26'E, 28 Feb 1976, C. B. Powell, 1♂, 3♀ (L). Mayuku Creek near Ugbekoko, about 10 miles [16 km] W of Sapele, Midwest State, ca. 05°54'N, 05°34.5'E, in mangroves, 1–3 Nov 1975 and Jan 1976, C. B. Powell, 30 specimens (10♀ ov) (L). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 7 specimens (1♀ ov) (L). Creek between Eagle Island and College of Science and Technology, Port Harcourt, 04°47.5'N, 06°58.5'E, on vertical poles of a fish fence and mangrove trunks, 30 Jan 1977, C. B. Powell, 18♂, 28♀ (8 ov), 3 juv (L).

Gabon: Owendo, 27 Aug 1961, F. Zielinski, 1 specimen (Zoologisches Museum, Hamburg).

Zaire: Banana, mouth of Congo River, July–Aug, 1915, H. Lang, American Museum Congo Expedition, 11♂, 11♀ (1 ov) (W).

DESCRIPTION.—Rathbun, 1921:453; Capart, 1951:192.

Figures: Rathbun, 1921, pl. 44, pl. 45: fig. 2; Capart, 1951, fig. 77; Monod, 1956, fig. 601.

Color: Rathbun (1921:453) and Rossignol (1957:92) both gave color descriptions for this species.

BIOLOGY.—Rathbun (1921:453, 454) gave an extensive description of habits and habitat of the species. Monod (1956) mentioned it from pilings in the estuarine area. Dartevelle (1950) found it "dans les criques à salinité moins élevée." The specimens from Nigeria dealt with here were found in the estuarine and mangrove area. C. B. Powell (in litt.) stated that the specimens from Mayuku Creek were observed at night on the mangrove prop roots above the water, and near Forcados the specimens were taken "from piles of a jetty and from small branches of shrubs overhanging the water. They appeared to be naturally arboreal, and dropped into the water only as a last resort."

Ovigerous females have been reported taken in the following months: January (present material), February (Capart, 1951), March–April (Rossignol, 1957), May–August (present material), July–August (Rathbun, 1921, present material), November (present material).

DISTRIBUTION.—The species is known only from

West Africa (Guinea to Angola). To the localities listed by Monod (1956) the following can be added.

Guinea: Île Marara, Rio Pongo (Uschakov, 1970).

Sierra Leone: Kissy (Longhurst, 1958).

Ghana: Near Butre (Gauld, 1960).

Nigeria: Elechi Creek, Port Harcourt, 04°47′15″N, 06° 48′45″E (Powell, 1979).

Congo: Loya River and Djeno (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Zaire: Banana, mouth of the Congo River (Dartevelle, 1950).

Angola: Santo António do Zaire (as Saint-Antoine) (Dartevelle, 1950).

Subgenus *Perisesarma* De Man, 1895

REMARKS.—This subgenus was cited by Monod (1956) and most other authors as *Chiromantes* Gistel, 1848. However, as shown by Holthuis (1977: 170) the type-species of *Chiromantes* is *Grapsus (Pachysoma) haematocheir* De Haan, 1833; hereby *Chiromantes* Gistel, 1848, becomes a senior objective synonym of *Holometopus* H. Milne Edwards, 1853, and should replace the latter name (p. 242). For the subgenus usually cited as *Chiromantes* the name *Perisesarma* is available.

Three species of *Perisesarma* are known from the eastern Atlantic area, all three are restricted to tropical West Africa.

Sesarma (Perisesarma) alberti Rathbun, 1921

Sesarma (Chiromantes) alberti.—Dartevelle, 1950:48.—Capart, 1951:189, fig. 75.—Monod, 1956:440, fig. 594.—Jordan, 1957:198.—Rossignol, 1957:122 [key]; 1962:120.—Forest and Guinot, 1966:93.

Sesarma (chiromantes) alberti.—Rossignol, 1957:90.

Sesarma alberti.—Longhurst, 1958:88.—Powell, 1979:127.

MATERIAL EXAMINED—*Pillsbury Material:* None.

Other Material: Liberia: St. John River at upper Buchanan, mud in mangroves, collected at night, 24 Aug 1967, T. C. Rutherford, 1♀ (W). Rock Spring, Monrovia, O. F. Cook and G. N. Collins, 9 juv (W). St. Paul River lagoon at True Rubber Farm, 9 Oct 1953, G. C. Miller, 1♂ (W). Farmington River at Snafu Docks, Nov 1946, H. A. Beatty, 1♂, 2♀ (W).

Nigeria: Mayuku Creek near Ugbekoko, about 10 km W of Sapele, ca. 05°54′N, 05°34.5′E, Oct-Dec 1975, C. B. Powell, 24 specimens (L). Between Brass and Port Harcourt, Niger delta, May-Aug 1960, H. J. G. Beets, 1♂, 2♀ (1 ov) (L).

Congo: Bank of Loya River, 3 juv (W).

Zaire: Banana, mouth of Congo River, Jul-Aug 1915, H. Lang, American Museum Congo Expedition, 3 juv (W). Maléla, 8 Jul 1915, H. Lang, American Museum Congo Expedition, 3♂, 3♀ (W).

Angola: Santo António do Zaire, Aug 1915, H. Lang, American Museum Congo Expedition, 1♂, 1♀ (W).

DESCRIPTION.—Rathbun, 1921:448; Capart, 1951:189.

Figures: Rathbun, 1921, pl. 42: fig. 1, pl. 48: fig. 3; Capart, 1951, fig. 75; Monod, 1956, fig. 594.

Color: Rossignol (1957:90) provided color notes.

BIOLOGY.—The species is usually found in mangroves. Ovigerous females have been reported in April (Monod, 1956) and summer (May-Aug, present paper).

DISTRIBUTION.—*Sesarma alberti* is known from the West African coast from Guinea to Angola. An enumeration of the localities known at that time was given by Monod (1956). To these the following can now be added:

Sierra Leone: Rokupr (Jordan, 1957). Great Scarcies River (Longhurst, 1958).

Ivory Coast: Abidjan (Forest and Guinot, 1966).

Nigeria: Elechi Creek, Port Harcourt, 04°47′15″N, 06° 58′45″E (Powell, 1979).

Principe: Rio Papagaio (Forest and Guinot, 1966).

Congo: Loya River (Rossignol, 1957, 1962). Pointe-Noire (Rossignol, 1962).

Zaire: Kunga, Maléla, and Katala, all in estuary of Congo River (Dartevelle, 1950).

Sesarma (Perisesarma) huzardi (Desmarest, 1825)

Sesarma africana.—Pechüel-Loesche, 1882:287.—Büttikofer, 1890:487.—Johnston, 1906:861.

Sesarma (Chiromantes) africanum.—Dartevelle, 1950:48.—Bruce-Chwatt and Fitz-John, 1951:117.—Rossignol, 1957: 122 [key].—Bright and Hogue, 1972:8.

Sesarma africanum.—Bruce-Chwatt and Fitz-John, 1951: 118.—Jordan, 1955:734.—Rossignol, 1957:133, pl. 2: fig. 4.

Sesarma (Chiromantes) huzardi.—Monod, 1956:437, fig. 593.—Jordan, 1957:198.—Rossignol, 1962:120.

Sesarma (chiromantes) africanum.—Rossignol, 1957:90.

Sesarma huzardi.—Humes, 1957:181, 184, 185, 186, 187, 189.—Longhurst, 1958:88.—Gauld, 1960:71.—Hart-

mann-Schröder and Hartmann, 1974:19.—Powell, 1979: 127.

SYNONYM.—*Sesarma africana* H. Milne Edwards, 1837.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Senegal: Senegal, legator M. Delambre, donor Mus. Paris, 1♂ syntype of *Sesarma africanum* H. Milne Edwards, dry (W).

Liberia: Liberia, 1881, J. Büttikofer and J. A. Sala, 1♂ (L). Grand Cape Mount near Robertsport, 1882, J. Büttikofer, 4 specimens (L). Near Monrovia, 1947–1948, H. A. Beatty, 1 juv (W). Rock Spring, Monrovia, Apr 1894, O. F. Cook and G. N. Collins, 4 juv (W). Harbel, mouth of Junk River, mangrove bank, dug from mud under rocks, 20 Jul 1968, T. C. Rutherford, 5♂, 1♀ ov (W). Harbel, Capt. M. S. Briscoe, 1♂ (W). Inlet near football field, lower Buchanan, collected at night in the water, 24 Aug 1967, T. C. Rutherford, 3♂, 5♀ (W).

Ivory Coast: Near Lagune Ébrié, about 17 km W of Abidjan, among rotting leaves in rainwater puddles in hollow trees in shaded area, 11 Aug 1963, B. de Wilde-Duyfjes, 1♂, 1♀ (L). Near Lagune Ébrié, in fresh water stream, the species is also found on land, 3 Sep 1963, B. de Wilde-Duyfjes, 1♂ (L).

Ghana: Butre, 1840–1855, H. S. Pel, 3♂, 3♀ (L). Baya River near Elmina, 27 Nov 1889, W. H. Brown, U. S. Eclipse Expedition, 2♂, 1♀ ov (W). Sakumo Lagoon, 19 Jul 1961, Bane and Richards, 1♂, 1♀ ov (W).

Dahomey: Lagoon of Lac Nokoué near Zogbo, north of Cotonou, 29 Mar 1963, H. Hoestlandt, 2♂, 1♀ (L).

Nigeria: Yaba, near Lagos, 26 Jul 1926, A. S. Pearse, 1♀ (W). South bank of mouth of Escravos River at Ajudaibo, Niger delta, 05°34.5′N, 05°11.75′E, 30 Jul 1975, C. B. Powell, 4♂ (L). Mayuku Creek near Ugbekoko, about 10 km W of Sapele, 05°54′N, 05°34.5′E, Oct–Dec 1975, C. B. Powell, 1♀ (L).

Cameroon: Douala, in rotting wood with shipworm, 14 Dec 1951, Th. Monod, 1♂ (W).

Zaire: Mouth of Congo River near Banana, Jul 1915, H. Lang, American Museum Congo Expedition, 9♂, 4♀ (W).

Angola: Santo António do Zaire, Aug 1915, H. Lang, American Museum Congo Expedition, 2♂, 1♀ ov (W). Mouth of Cuanza River near Luanda, 17 Jun 1967, G. Hartmann, 2♂, 1♀, 1 juv (L). Luanda, 18 Jun 1967, G. Hartmann, 1♂ (L).

DESCRIPTION.—Rathbun, 1918:287; Rathbun, 1921:446.

Figures: Rathbun, 1918, pl. 75; Rathbun, 1921, pl. 41, pl. 42: fig. 2, Monod, 1956, fig. 593.

Color: Rossignol (1957:90) gave the following color description of the species: "variable, du jaune clair au brun foncé. En général, carapace jaune ou beige avec les touffes de poils courts soulignées d'un trait noir. Pinces jaune-clair." Irvine (1947:292, 293) indicated that in young specimens the carapace is dark in color, but that it becomes lighter and yellowish in older specimens. Monod (1956:406) used the color of the chelipeds ("jaunâtre à violacé") to distinguish *S. huzardi* from *S. alberti*, where the chelipeds in alcohol are bright red. Mrs. De Wilde-Duyfjes, who collected the species at Lagune Ébrié, Ivory Coast, commented upon the yellowish white color of the chelipeds of the living animals, which contrasted strongly with the purplish blue chelipeds with red tips of *S. buettikoferi*, with which the present species was found.

MEASUREMENTS.—The carapace breadth of the examined males varies between 12 and 37 mm, that of the examined non-ovigerous females between 24 and 33 mm, and that of the ovigerous females between 19 and 27 mm.

BIOLOGY.—This is a common species of muddy estuarine areas; it is found in mangroves, salt marshes, tidal rice lands, and mouths of rivers.

Humes (1957) reported that this species served as host of the harpacticoid copepods *Cancrincola jamaicensis* Wilson (rarely), *C. longiseta* Humes (rarely), and *C. abbreviatus* Humes (usually).

Ovigerous females have been collected in February, July, August, and November (Monod, 1956; present paper).

DISTRIBUTION.—*Sesarma huzardi* inhabits the coast of West Africa from Senegal to Angola. To the list of localities cited by Monod (1956) the following can now be added:

Sierra Leone: No specific locality (Jordan, 1955). Rokupr (Jordan, 1957). Bunce River opposite Kamatare Island near Freetown (Humes, 1957). Great Scarcies River (Longhurst, 1958).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ivory Coast: Lagune Ébrié at Adiapo-doumé and 8 km W of Grand Bassam; Koumassi near Abidjan (Humes, 1957).

Ghana: Volta River (Gauld, 1960).

Nigeria: No specific locality (Bruce-Chwatt and Fitz-John, 1951). Iru Fisheries Station near Lagos (Humes, 1957).

Elechi Creek, Port Harcourt, 04°47′15″N, 06°58′45″E (Powell, 1979).

Congo: Loango (Pechüel-Loesche, 1882). Mouths of the Songololo and Loya rivers (Rossignol, 1957, 1962). Songololo River near Pointe-Noire; mouth of Loeme River near Pointe-Noire (Humes, 1957).

Zaire: Banana, mouth of the Congo River (Dartevelle, 1950).

Angola: Santo António do Zaire (as Saint Antoine) (Dartevelle, 1950). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Sesarma (Perisesarma) kamermani De Man, 1883

Sesarma (Chiromantes) kamermani.—Monod, 1956:441, figs. 595–600.—Rossignol, 1957:122 [key].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Angola: Musserra, 1882, P. Kamerman, 1♂ holotype (L. Crust. D. 166).

DESCRIPTION.—De Man, 1883:165; Balss, 1936:1.

Figures: Balss, 1936, figs. A, B; Monod, 1956, figs. 595–600.

MEASUREMENTS.—The carapace length of the holotype is 27 mm, its carapace width is 32 mm.

DISTRIBUTION.—So far only two specimens, both males, have become known of this species. The type-specimen (in the Leiden Museum) originated from Musserra, Angola. The second specimen was reported upon by Balss (1936) and Monod (1956) and was collected at Banana, Zaire.

Subfamily VARUNINAE H. Milne Edwards, 1853

Genus *Brachynotus* de Haan, 1833

Brachynotus de Haan, 1833:5, 7 [subgenus established without included nominal species; type-species: *Goneplax sexdentatus* Risso, 1827, by subsequent monotypy by de Haan, 1835: 34; gender: masculine; name 1610 on *Official List*].

Heterograpsus Lucas, 1846:18 [type-species: *Heterograpsus sexdentatus* Lucas, 1846, a subjective junior synonym and homonym of *Goneplax sexdentatus* Risso, 1827, by monotypy; gender: masculine].

Shurebus Verany, 1846:7 [type-species: *Shurebus genuensis* Verany, 1846, an objective junior synonym of *Cleistotoma gemmellari* Rizza, 1839, by monotypy; gender: masculine].

Brachynotus atlanticus Forest, 1957

Brachynotus sexdentatus.—Monod, 1933a:219, fig. 7.—Bouvier, 1940, fig. 184A only [copied from Monod, 1933a, fig. 7]. [Not *Goneplax sexdentatus* Risso, 1827.]

Brachynotus sexdentatus lucasi.—Monod, 1956:428, 631, figs. 589–592, 881 [not *Heterograpsus lucasi* H. Milne Edwards, 1853 = *Goneplax sexdentatus* Risso, 1827].

Brachynotus atlanticus Forest, 1957:505, figs. 2, 4, 6, 8, 10, 12, 14.—Forest and Gantès, 1960:354, fig. 2.

MATERIAL EXAMINED.—None.

DESCRIPTION.—Forest, 1957:505.

Figures: Monod, 1933a, fig. 7; Monod, 1956, figs. 589–592, 881; Forest, 1957, figs. 2, 4, 6, 8, 10, 12, 14.

Male Pleopod: Monod, 1956, figs. 591, 592 (Mauritania); Forest, 1957, fig. 14 (Mauritania).

DISTRIBUTION.—This species, which until recently was not distinguished from *B. sexdentatus*, is only known from the Atlantic coast of Morocco and from the Cap Blanc peninsula (Mauritania). The records are the following.

Morocco: Numerous localities as far north as 34°53′N (Monod, 1933a; Forest and Gantès, 1960).

Mauritania: Baie de l'Ouest, coast of Cap Blanc peninsula (Monod, 1956: Forest, 1957). Pointe de Cansado (Monod, 1956). Baie de Cansado (Monod, 1956; Forest, 1957). Port-Étienne (Monod, 1956). Baie du Repos near Port-Étienne (Monod, 1956).

The Mauritanian localities are all situated on the east coast of the Cap Blanc peninsula. The species is not known to occur farther south.

Genus *Euchirograpsus* H. Milne Edwards, 1853

Euchirograpsus H. Milne Edwards, 1853:175 [type-species: *Euchirograpsus liguricus* H. Milne Edwards, 1853, by monotypy; gender: masculine; name 300 on *Official List*].

Euchirograpsus liguricus H. Milne Edwards, 1853

Euchirograpsus liguricus H. Milne Edwards, 1853:175.—Türkay, 1975b:105, figs. 1–3, 17, 23; 1976a:25 [listed], 39, figs. 29–31.

Euchirograpsus americanus.—A. Milne Edwards and Bouvier, 1894:46, pl. 4: figs. 10–14; 1900:107.—Dollfus and

Monod, 1927:216, figs. 1, 2.—Monod, 1933a:320; 1933b: 535.—Capart, 1951:184, fig. 72.—Monod, 1956:434, figs. 592 *bis*, 882–884.—Rossignol, 1957:121 [key].—Forest and Gantès, 1960:355.—Rossignol, 1962:120.—Forest and Guinot, 1966:92.—Crosnier, 1970:1215 [listed], 1217. [Not *Euchirograpsus americanus* A. Milne Edwards, 1880].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Geronimo Material: Gabon: Sta 211, 100 m, 1♂ (W).

Undaunted Material: South-West Africa: Sta 106, 225 m, 10♂, 6♀ (1 ov) (L). Sta 107, 359 m, 2♂ (L).

Other Material: Morocco: 33°19′N, 09°00′W, 120–180 m, 23 Nov 1977, *Meteor* Sta 8–13a, 1♂, 1♀ (W). Off Cap Hadid, 31°55′N, 09°52′W, 78 m, muddy sand, 5m beam trawl, 25 Mar 1976, *Onversaagd* Sta 127, 1 specimen (L).

Guinea: Off the coast of Guinea, Mar–Apr 1964, Guinean Trawling Survey, 1♀ (L).

DESCRIPTION.—Türkay, 1975b:105.

Figures: Capart, 1951, fig. 72; Monod, 1956, figs. 592 bis, 882–884; Türkay, 1975b, figs. 1–3, 17, 23; Türkay, 1976a, figs. 29–31.

Male Pleopod: Monod, 1956, figs. 883, 884 (Senegal); Türkay, 1975b, fig. 17a, b (no locality); Türkay, 1976a, fig. 31 (Morocco).

MEASUREMENTS—Our specimens have carapace widths of 7 to 16 mm.

REMARKS.—Until recently most authors were of the opinion that the genus *Euchirograpsus* was represented in the eastern Atlantic by two species: *E. liguricus* H. Milne Edwards, and *E. americanus* A. Milne Edwards. However, Türkay (1975b) showed that the eastern Atlantic specimens assigned to *E. americanus* usually were juveniles of *E. liguricus*, and that the true *E. americanus* is restricted to the western Atlantic. In his 1975(b) paper Türkay dealt with the material from Guinea and South-West Africa, which we examined for the present paper. The South-West African material, collected by the *Undaunted*, had before that also been reported upon by Crosnier (1970).

BIOLOGY.—This species has been reported from bottoms of sand, sandy mud, mud, rock with gorgonians and/or sponges, and gravel at depths between 10 and 359 m, most of the records being from between 100 and 250 m.

Few ovigerous females have been recorded from West Africa; the only record in the recent literature is that by Crosnier (1970) based on a specimen taken by the *Undaunted* in March and also recorded herein.

DISTRIBUTION.—The range of this species extends from west of Portugal and Madeira and the Azores south to South-West Africa; it also occurs in the western Mediterranean. It does not occur outside of the eastern Atlantic and is there the only species of the genus (see Türkay, 1975b). West African records include:

Madeira: No specific locality (Türkay, 1975b).

Azores: E of Ilha do Pico, 38°23′30″N, 30°20′20″E, 318 m (A. Milne Edwards and Bouvier, 1894).

Morocco: Port of Casablanca, 10 m (Forest and Gantés, 1960). 35°35′N, 08°42′W, 150 m (A. Milne Edwards and Bouvier, 1900). 33°54′ 30″N, 07°34′W, 125 m; 33°54′30″N, 07°54′16″W, 145 m; 33°31′30″N, 07°47′26″W, 133 m (all Dollfus and Monod, 1927; Monod, 1933a). 33°48′30″N, 08°04′35″W, 132 m; 30°38′10″N, 09°58′40″W, 180 m; 30°23′N, 09°54′30″W, 110–118 m (Dollfus and Monod, 1927). 33°53′N, 07°43′W, 126 m; 33°47′N, 07°56′16″W, 122 m; 30°30′30″–30°32′30″N, 09°47′–09°47′20″W, 150 m (Monod, 1933a). 33°19′N, 09°00′W, 120–180 m, and 31°-35′N, 10°10.5′W, 145–180 m (Türkay, 1975b, 1976a).

Spanish Sahara: 21°05′N, 17°14′W, 43–45 m (Forest and Guinot, 1966).

Mauritania: Cap Blanc, 10–30 m (Dollfus and Monod, 1927; Monod, 1933b).

Cape Verde Islands: Between Ilhéu Branco and Ilhéu Raso, 110–180 m (A. Milne Edwards and Bouvier, 1900).

Senegal: Joal, 50 m (Monod, 1956).

Gambia to Sierra Leone: On cable between Bathurst (Gambia) and Sierra Leone (Türkay, 1975b).

Guinea: Off the coast of Guinea (Türkay, 1975b).

Gabon: Between Nyanga and Pointe-Panga, 65–70 m (Rossignol, 1962).

Congo: Off Pointe-Noire, 04°55′S, 11°35′E, 115 m (Capart, 1951).

Angola: Off Ponta do Dandé, 08°30′S, 13°E, 150 m (Capart, 1951).

South-West Africa: 17°18′S, 11°24′E, 225 m, and 17°-23′S, 11°20′E, 359 m (Crosnier, 1970; Türkay, 1975b).

Family GECARCINIDAE MacLeay, 1838

Gécarciniens H. Milne Edwards, 1837:7, 16–20.
GECARCINIDAE MacLeay, 1838:63.
Cardisomaceen Nauck, 1880:27, 65.
GEOCARCINIDAE Miers, 1886:xiv, 216, 346.

EASTERN ATLANTIC GENERA.—Two, *Cardisoma* and *Gecarcinus*, each represented by one tropical species.

EASTERN ATLANTIC SPECIES.—Two, both reported below. Neither species is represented in the *Pillsbury* collections.

Genus *Cardisoma* Latreille, 1828

Cardisoma Latreille, 1828b:685 [type-species: *Cardisoma guanhumi* Latreille, 1828, selected by H. Milne Edwards, 1838, in 1836–1844, pl. 20; gender: neuter].

Perigrapsus Heller, 1862:522 [type-species: *Perigrapsus excelsus* Heller, 1862, a subjective junior synonym of *Cancer carnifex* Herbst, 1794, by monotypy; gender: masculine].

Discoplax A. Milne Edwards, 1867b:284 [type-species: *Discoplax longipes* A. Milne Edwards, 1867, by monotypy; gender: feminine].

Cardiosoma S.I. Smith, 1869b:16, 36 [unjustified emendation of *Cardisoma* Latreille, 1828; type-species: *Cardisoma guanhumi* Latreille, 1828; gender: neuter].

Cardisoma armatum Herklots, 1851

Cardisoma Guanhuni.—Studer, 1882:333, 353 [discussion] [not *C. guanhumi* Latreille, 1828].

Cardisoma armatum.—Pechüel-Loesche, 1882:299.—Büttikofer, 1890:464, 487, fig. on p. 465.—Johnston, 1906:861.—Gruvel, 1913:169 [listed].—Capart, 1951:196, fig. 79.—Monod, 1956:458, fig. 618.—Rossignol, 1957:95, 120 [key], pl. 2: fig. 2.—Humes, 1957:181, 189.—Dubois, 1957: 7, fig. 24.—Gauld, 1960:72.—Rossignol, 1962:121.—Guinot and Ribeiro, 1962:73.—De Leersnyder and Hoestlandt, 1963:211 [physiology].—Ribeiro, 1964:18.—De Leersnyder and Hoestlandt, 1966:43 [physiology].—Forest and Guinot, 1966:94.—Monod, 1967:180, pl. 17: fig. 1.—Uschakov, 1970:450, 455 [listed].—Bright and Hogue, 1972:17.—Türkay, 1973:86, figs. 1, 3, 7–8, map 1.—Hartmann-Schröder and Hartmann, 1974:19.

Cardisoma Guanhumi var. *armatum.*—Bouvier, 1911:226.

Cardisoma guanhumi.—Gruvel, 1913:169 [listed] [not *C. guanhumi* Latreille, 1828].

Cardiosoma armata.—Bruce-Chwatt and Fitz-John, 1951:117, 118, 119.

Gardiosoma.—Bruce-Chwatt and Fitz-John, 1951:120.

Cardisoma.—Uschakov, 1970, fig. 4.

Cardiosoma armatum.—Pauly, 1975:57.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Cape Verde Islands: Porto da Praia, São Tiago, coconut grove, North Pacific Exploring Expedition, 1♂ (W).

Senegal: Dakar, O. F. Cook, 1♂, 1♀ (W).

Liberia: Grand Cape Mount, 1882, J. Büttikofer, 3♂, 3♀ (L).

Ghana: Accra, 1868–1869, M. Sintenis, 1♂ (L). Elmina, 1840–1855, H. S. Pel, 1♀ holotype (L, Crust. D.58).

Dahomey: Near Cotonou, Oct 1962, H. Hoestlandt, 1♂, 1♀ (L).

Nigeria: Lagos, 16 Aug 1926, A. S. Pearse, 1♀ (W). Adu, 25 Aug 1926, A. S. Pearse, 1♂ fragmented (W). Niger delta between Brass and Port Harcourt, May–Aug 1960, H. J. G. Beets, 4♂, 5♀ (L).

Cameroon: Batanga, A. J. Good, 13 Mar 1931, 1♂, 1♀ (W).

Zaire: Banana, Jul 1915, H. Lang, American Museum Congo Expedition, 18♂, 8♀ (W).

Angola: Musserra, P. Kamerman, several specimens (L).

DESCRIPTION.—Rathbun, 1921:457; Capart, 1951:197; Türkay, 1973:87.

Figures: Capart, 1951, fig. 79; Monod, 1956, fig. 618.

Male Pleopod: Türkay, 1973, fig. 1 (no locality).

MEASUREMENTS.—Carapace widths of males 25 to 109 mm, of females 27 to 85 mm.

BIOLOGY.—This species, like other gecarcinids, is terrestrial, living in burrows inland. Rathbun (1921:458) gave an account of its habits. Gauld (1960:72) noted that the species is "very common in the marshy ground around lagoons where they dig large burrows; they are extensively trapped for food." Bruce-Chwatt and Fitz-John (1951: 117–118) called it the edible land crab and noted that it may attain a carapace width of 7 inches (17.5 cm). They reported a burrow 5 feet 9 inches (172.5 cm) deep. Pauly (1975:57) noted that this species was very common in the Sakumo Lagoon, Ghana.

Humes (1957) reported that this species was the host of the harpacticoid copepod *Cancrincola jamaicensis* Wilson.

Ovigerous females have been recorded in August (Guinot and Ribeiro, 1962; Ribeiro, 1964).

DISTRIBUTION.—*Cardisoma armatum* is a tropical West African species, known from the Cape Verde Islands and from Senegal to Angola, including Fernando Poo and São Tomé islands in the Gulf of Guinea. Monod (1956) and Türkay (1973) summarized the older literature and the latter author has provided the most recent ac-

count of the species. To the references in Monod the following can be added:

West Africa: No specific locality (Türkay, 1973).

Cape Verde Islands: Baía de Sal-Rei, Boavista (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: No specific locality (Türkay, 1973). Marigots de Hann (Bouvier, 1911). Saint-Louis (Monod, 1967; Türkay, 1973). Dakar (Monod, 1967). Rtombo [?](Türkay, 1973). Joal; Ngor near Dakar (Humes, 1957).

Guinea: Conakry (Uschakov, 1970).

Sierra Leone: Bunce River, opposite Kamatare Island, near Freetown (Humes, 1957).

Liberia: No specific locality (Büttikofer, 1890; Johnston, 1906).

Ivory Coast: From market in Abidjan (Forest and Guinot, 1966). Koumassi, near Abidjan (Humes, 1957). Abidjan (Türkay, 1973).

Ghana: No specific locality (Gauld, 1960; Türkay, 1973). Kumasi and Sekondi (Türkay, 1973). Sakumo lagoon (Pauly 1975). Accra; Osu Fisheries Station near Accra (Humes, 1957).

Dahomey: No specific locality (De Leersnyder and Hoestlandt, 1963, 1966).

Nigeria: Lagos (Bruce-Chwatt and Fitz-John, 1951; Türkay, 1973). Iru Fisheries Station near Lagos (Humes, 1957).

Cameroon: Douala (Türkay, 1973).

Fernando Poo: No specific locality (Türkay, 1973).

São Tomé: "environs de la ville" and Iógoiógo (Forest and Guinot, 1966).

Gabon: No specific locality (Türkay, 1973).

Congo: No specific locality (Rossignol, 1957). Baie de Pointe-Noire (Rossignol, 1962). Bahua [?] and Pointe-Noire (Türkay, 1973). Loango (Pechüel-Loesche, 1882). Pointe-Noire; Songololo River near Pointe-Noire (Humes, 1957).

Zaire: Banana (Dubois, 1957; Türkay, 1973).

Angola: Luanda (Türkay, 1973). Santo António do Zaire; Moçâmedes (Guinot and Ribeiro, 1962). Between Cacuaco and Lobito-Benguela (Hartmann-Schröder and Hartmann, 1974).

Genus *Gecarcinus* Leach, 1814

Gecarcinus Leach, 1814:430 [type-species: *Cancer ruricola* Linnaeus, 1758, by selection by H. Milne Edwards, 1838, in 1836–1844, pl. 21; gender: masculine].

Geocarcinus Miers, 1886:xiv, 216, 219 [invalid emendation of *Gecarcinus* Leach, 1814; type-species: *Cancer ruricola* Linnaeus, 1758; gender: masculine].

Johngarthia Türkay, 1970:335, 341, 343 [type-species: *Gecarcinus planatus* Stimpson, 1860, by original designation; gender: feminine].

Gecarcinus weileri (Sendler, 1912)

Pelocarcinus weileri Sendler, 1912:191, figs, 4, 5.

Gecarcinus lagostoma.—Capart, 1951:198, fig. 80.—Monod, 1956:461 [not fig. 619 = *G. lagostoma* sensu stricto].—Rossignol, 1957:120 [key].—Forest and Guinot, 1966:94. [Not *G. lagostoma* H. Milne Edwards, 1837.]

Gecarcinus (Johngarthia) weileri.—Türkay, 1973:96, figs. 15–17, map 2.

Johngarthia weileri.—Türkay, 1976c:69, 70, 71 [lectotype designated].

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Fernando Poo: No specific locality, Feb 1959, J. A. Warners, 1♀ dry (L).

DESCRIPTION.—Türkay, 1973:97.

Figures: Türkay, 1973, figs. 15–17.

MEASUREMENTS.—Our specimen has a carapace width of 60 mm.

BIOLOGY.—This is a terrestrial species from the Gulf of Guinea, largely restricted to the offshore islands but also known from the mainland in Cameroon. Capart (1951) recorded an ovigerous female in January.

DISTRIBUTION.—West Africa, where it has been taken from two localities in Cameroon and from the offshore islands of the Gulf of Guinea. Monod (1956) saw no material. Records in the literature since 1956 include:

West Africa: No specific locality (Türkay, 1973).

Cameroon: Bibundi (Türkay, 1973; 1976c).

Fernando Poo: No specific locality (Türkay, 1973).

Principe: Ilhéu Caroço (Forest and Guinot, 1966).

São Tomé: No specific locality (Türkay, 1973). Ribeiro do Peixe (Forest and Guinot, 1966). Ilhéu Gago Coutinho (as Ilot das Rollas) (Forest and Guinot, 1966; Türkay, 1973).

Annobon: No specific locality (Forest and Guinot, 1966; Türkay, 1973).

Family HAPALOCARCINIDAE Calman, 1900

Lithoscaptes A. Milne Edwards, 1862b: F 10.

HAPALOCARCINIDAE Calman, 1900:3, 49.

EASTERN ATLANTIC GENERA.—One, *Neotroglocarcinus*, represented in the tropical fauna.

EASTERN ATLANTIC SPECIES.—One, *Neotroglocarcinus balssi*, reported below. It is not represented in the *Pillsbury* collections.

Genus *Neotroglocarcinus* Fize and Serène, 1957

Neotroglocarcinus Fize and Serène, 1957:134 [type-species:

Troglocarcinus monodi Fize and Serène, 1955, by original designation; gender: masculine].

Neotroglocarcinus balssi (Monod, 1956)

Troglocarcinus balssi Monod, 1956:463, 632, figs. 620–627.—Longhurst, 1958:88.—Gauld, 1960:72.—Monod, 1963, fig. 37 [no locality].—Crosnier, 1969:535.

Neotroglocarcinus Balssi—Fize and Serène, 1957:135, 136, 141–143.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Canary Islands: Ponta de Matorra, Fuerteventura, 14 km from Morro, 20–25 m, in *Phyllangia mouchezi* (Lacaze-Duthiers, 1897), 27 Jan 1975, M. Grasshoff and F. Engelhardt, 1 damaged specimen (MP).

West Africa: No specific locality, in *Asterosimilia marchadi* (Chevalier, 1966), A. R. Longhurst, 1♀ ov (BMNH).

Ivory Coast: Off Abidjan, 62 m, 23 Aug 1968, C.R.O., Abidjan, 1♀ (MP).

DESCRIPTION.—Monod, 1956:463.

Figures: Monod, 1956, figs. 620–627.

Male Pleopod: Monod, 1956, fig. 623 (Ghana).

MEASUREMENTS.—Our specimens have carapace lengths of 3.2 to 3.8 mm; that of the ovigerous female is 3.8 mm.

REMARKS.—As the single adult female from Sierra Leone listed by Monod (1956:632) was collected by A. R. Longhurst, and the single specimen reported upon by Longhurst (1958:88) was identified by Monod (see Longhurst, 1958: 5), it seems likely that they are the same specimen and that an error crept into the ecological data reported for either: Monod reported the specimen as an epibiont of *Cidaris cidaris* (Linnaeus) from 68 m depth, while Longhurst listed it as an epibiont of *Eucidaris tribuloides* (Lamarck) from 200 m. (Under *Eucidaris tribuloides*, however, Longhurst (1958:101) only mentioned two specimens, both from 25–88 m depth, and under *Cidaris cidaris* 6 specimens from depths between 88 and 132 m.) Longhurst (1958:7) reported that his collection finally was deposited in the British Museum (Natural History). Manning examined a specimen of this species of the British Museum collection, viz., the above-mentioned ovigerous female labeled "West Africa" and collected by Longhurst; this specimen is said to be taken from the coral *Asterosimilia marchadi* (Chevalier). The fact that both *Cidaris* and *Eucidaris* are very unlikely hosts for the species, and the conflicting information in the ecological data suggest that these should be regarded with the utmost reserve, and the possibility is not precluded that both the Monod (1956) and the Longhurst record pertain to the ovigerous female now in the British Museum, and that this specimen was collected in *Asterosimilia marchadi* in a depth of 68 m, at 08°25'N, 14°18'W (off Freetown, Sierra Leone) on a sandy bottom on 22 Feb 1956 (*Cape St. Mary* Sta MB1/A3).

BIOLOGY.—This is a sublittoral species usually associated with corals. It has been taken with *Dendrophyllia*, in 44 m (Gauld, 1960); on rocks with gorgonians, probably associated with *Phyllangia*, in 10 m (Crosnier, 1969); on *Eucidaris tribuloides* (?) in 200 m (Longhurst, 1958); on *Cidaris cidaris* (?) in 68 m (Monod, 1956); and with *Phyllangia mouchezi* and *Asterosimilia marchadi*.

Ovigerous females have been recorded in January (Crosnier, 1969; present paper); ova measured 0.4 mm in the ovigerous female we examined.

DISTRIBUTION.—West Africa, from localities in the Canary Islands, off West Africa proper from localities between Sierra Leone and the Congo, and from Ilhéu Gago Coutinho (as I. das Rolas), near São Tomé in the Gulf of Guinea (Balss, 1922) in depths between 10 and 200 m. It has not previously been recorded from the Canary Islands or the Ivory Coast. Monod's specimens came from Ghana; since 1956 the species has been recorded from the following:

Sierra Leone: No specific locality, 200 m (Longhurst, 1958); 08°25'N, 14°18'W, 68 m (Monod, 1956).

Ghana: Off Accra, 44 m (Gauld, 1960).

Congo: Pointe-Noire, ca. 10 m (Crosnier, 1969).

Family HYMENOSOMATIDAE MacLeay, 1838

HYMENOSOMIDAE MacLeay, 1838:68 [corrected to Hymenosomatidae by Stebbing, 1905:49].

HYMENICINAE Dana, 1851c:290.

EASTERN ATLANTIC GENERA.—Two, *Elamena*

and *Hymenosoma*, both represented by West African species.

EASTERN ATLANTIC SPECIES.—Two, both listed below. This family was not represented in the *Pillsbury* collections.

Genus *Elamena* H. Milne Edwards, 1837

Elamena H. Milne Edwards, 1837:33 [type-species: *Hymenosoma mathaei* Desmarest, 1825, by monotypy; gender: feminine].

Trigonoplax H. Milne Edwards, 1853:224 [type-species: *Ocypode (Elamene) unguiformis* de Haan, 1839, by monotypy; gender: feminine].

Elamena (Trigonoplax) gordonae Monod, 1956

Elamena (Trigonoplax) gordonae Monod, 1956:469, figs. 629–637 [between Conakry, Guinea and Monrovia, Liberia, 30–40 m; Sierra Leone]; 1963, fig. 40 [no locality].

Elamena gordonae.—Uschakov, 1970:455 [listed; Guinea].

DISTRIBUTION.—West Africa, from the localities cited above.

Genus *Hymenosoma* Desmarest, 1825

Hymenosoma Desmarest, 1825:163 [type-species: *Hymenosoma orbiculare* Desmarest, 1825, by selection by H. Milne Edwards, 1842, in 1836–1844, pl. 35: fig. 1; gender: neuter].

Leachium MacLeay, 1838:68 [type-species: *Hymenosoma orbiculare* Desmarest, 1825, by original designation; gender: neuter].

Centridion Gistel, 1848:viii [substitute name for *Leachium* MacLeay, 1838; type-species: *Hymenosoma orbiculare* Desmarest, 1825; gender: neuter].

Hymenosoma orbiculare Desmarest, 1825

Hymenosoma orbiculare.—Capart, 1951:61, fig. 18 [Angola; South-West Africa].—Monod, 1956:468, fig. 628 [Gabon (?); South-West Africa].—Penrith and Kensley, 1970a: 209, 232 [South-West Africa].

DISTRIBUTION.—Known with certainty from localities in Angola, South-West Africa, and South Africa. The record from Gabon is questionable.

Family MAJIDAE Samouelle, 1819

MAÏADAE Samouelle, 1819:88 [corrected to Majidae by Neumann, 1878:5].

MACROPODIADAE Samouelle, 1819:90.

INACHIDAE MacLeay, 1838:56 [given preference over Macropodiadae Samouelle, 1819, by International Commission on Zoological Nomenclature, Opinion 763, 1966; name 400 on *Official List*].

EPIALTIDAE MacLeay, 1838:56.

HUENIDAE MacLeay, 1838:56.

EURYPODIDAE MacLeay, 1838:56.

MITHRACIDAE MacLeay, 1838:56.

LEPTOPODIADAE Bell, 1844:1.

MACROCHEIRINAE Dana, 1851a:427.

PISINAE Dana, 1851a:428 [name 368 on *Official List*, date and citation erroneous there].

LIBININAE Dana, 1851a:429.

PRIONORHYNCHINAE Dana, 1851a:429.

MICIPPINAE Dana, 1851a:429.

CHORININAE Dana, 1851a:429.

PYRINAE Dana, 1851a:430.

OTHONINAE Dana, 1851a:430.

SALACINAE Dana, 1851a:430.

CYCLACINAE Dana, 1851a:431.

TYCHIDAE Dana, 1851a:431.

CRIOCARCININAE Dana, 1851a:431.

CAMPOSCINAE Dana, 1851a:431.

AMATHINAE Dana, 1851a:431.

STENORHYNCHINAE Dana, 1851a:432.

ACHAEINAE Dana, 1851a:432.

PERICERIDAE Dana, 1851a:432.

PARAMICIPPINAE Dana, 1851a:432.

INACHOIDINAE Dana, 1851a:432.

MENAETHINAE Dana, 1851a:433.

STENOCIOPINAE Dana, 1851a:433.

ONCININEA Dana, 1852b:77.

ONCINOPIDAE Stimpson, 1858d:222.

LEPTOPINAE Stimpson, 1871a:109.

NAXIINAE Stimpson, 1871a:114.

COLLODINAE Stimpson, 1871a:119.

ANOMALOPINAE Stimpson, 1871a:124.

ACANTHONYCHINAE Stimpson, 1871a:127.

IXIONINAE Neumann, 1878:10.

ACANTHOPHYRINAE Neumann, 1878:10.

PICROCERINAE Neumann, 1878:12.

PODOCHELINAE Neumann, 1878:13.

CYPHOCARCININAE Neumann, 1878:15.

EURYNOMINAE Neumann, 1878:17.

MICRORHYNCHINAE Miers, 1879a:651.

SCHIZOPHRYSINAE Miers, 1879a:659.

LISSOIDA Alcock, 1895:161.

BLASTIDAE Stebbing, 1902:2.

MAMAIIDAE Stebbing, 1905:22.

OPHTHALMIINAE Balss, 1929:6.

HYASTENIINAE Balss, 1929:8, 14.

MACROCOELOMINAE Balss, 1929:8, 16, 20.

OREGONIINAE Garth, 1958:134.

EASTERN ATLANTIC GENERA.—Twenty, of which the following 15 are represented by tropical species: *Acanthonyx*, *Achaeus*, *Apiomithrax*, *Calypsachaeus*, new genus, *Capartiella*, new genus, *Dorhynchus*, *Ergasticus*, *Eurynome*, *Herbstia*, *Inachus*, *Macropodia*, *Maja*, *Micropisa*, *Pisa*, and *Stenorhynchus*. The other genera are as follows:

Anamathia Smith (1885:493). Substitute name for *Amathia* Roux (1828, pl. 3), an invalid junior homonym of *Amathia* Lamouroux, 1812; type-species: *Amathia rissoana* Roux, 1828, by monotypy; gender: feminine; name 1606 on *Official List.*

Hyas Leach (1814:431). Type-species: *Cancer araneus* Linnaeus, 1758, by monotypy; gender: masculine.

Hyastenus White (1847b:56). Type-species: *Hyastenus sebae* White, 1847, by monotypy; gender: masculine.

Lissa Leach (1815b:69). Type-species: *Cancer chiragra* Fabricius, 1775, by monotypy; gender: feminine; name 1302 on *Official List.*

Rochinia A. Milne Edwards (1875, in 1873–1881:86). Type-species: *Rochinia gracilipes* A. Milne Edwards, 1875, by monotypy; gender: feminine; name 1647 on *Official List.*

EASTERN ATLANTIC SPECIES.—Sixty-six, of which 49 occur in tropical waters. Monod (1956) recorded the following species.

Name in Monod	Current Name
Maja squinado	*Maja squinado*
Maja verrucosa	*Maja crispata*
Maja goltziana	*Maja goltziana*
Eurynome aspera	*Eurynome aspera**
Herbstia rubra	*Herbstia rubra*
Herbstia rubra	*Herbstia condyliata**
Pisa tetraodon	*Pisa tetraodon*
Pisa nodipes	*Pisa nodipes*
Pisa gibbsi	*Pisa armata**
Pisa carinimana	*Pisa carinimana**
Micropisa ovata	*Micropisa ovata*
Apiomithrax violaceus	*Apiomithrax violaceus**
Apiomithrax bocagei	*Apiomithrax bocagei*
Acanthonyx lunulatus	*Acanthonyx lunulatus*
Dorhynchus thomsoni	*Dorhynchus thomsoni*
Ergasticus clouei	*Ergasticus clouei*
Inachus angolensis	*Inachus angolensis*
Inachus dorsettensis	*Inachus nanus*, new species*
Inachus guentheri	*Inachus guentheri*
Inachus phalangium	*Inachus phalangium*
Inachus thoracicus	*Inachus biceps*, new species*
Inachus aguiari	*Inachus aguiarii*
Inachus leptochirus	*Inachus leptochirus*
Physachaeus (?) *longipes*	*Capartiella longipes**
Achaeus cranchi	*Achaeus cranchii*
Achaeus foresti	*Achaeus foresti**
Achaeus sp.	*Achaeus trifalcatus*
Achaeus monodi	*Achaeus monodi*
Macropodia gilsoni	*Macropodia gilsoni**
Macropodia macrocheles	*Macropodia macrocheles**
Macropodia rostrata	*Macropodia spinulosa**
Macropodia straeleni	*Macropodia straeleni**
Stenorhynchus seticornis	*Stenorhynchus lanceolatus**

Representatives of 24 species were taken by the *Pillsbury*, eight of them previously undescribed.

The following species occur outside of the tropical region:

Achaeus gracilis O. Costa, 1839 (= *Achaeus gordonae* Forest and Zariquiey Alvarez, 1955). Forest and Zariquiey Alvarez (1955:68, figs. 2, 4, 6, 8) pointed out that two species of *Achaeus* could be recognized in the Mediterranean, *A. cranchii* Leach, 1817, and a second species that they named *Achaeus gordonae*. In their account Forest and Zariquiey Alvarez noted that O. Costa (1839, in Costa and Costa, 1838–1871:25) in his *Fauna del Regno di Napoli*, named a small crab, *Macropodia gracilis*, which has the general aspect of an *Achaeus* and that Costa also had recognized *A. cranchii*. Forest and Zariquiey Alvarez (1955:66) considered Costa's *M. gracilis* to be unidentifiable ("espèce douteuse") and they did not synonymize it with *A. cranchii*. An examination of Costa's account and figure (pl. 3: fig. 1A,b) suggests to us that he was dealing with an *Achaeus*, one in which the rostral teeth are almost contiguous and the hepatic lobes of the carapace are poorly developed, characters which Forest and Zariquiey Alvarez used to separate *A. gordonae* from *A. cranchii*. In addition, in Costa's figure 1A the length/width ratio of the illustrated specimen is 1.44; this ratio was given by Forest and Zariquiey Alvarez as 1.16 to 1.38 in *A. cranchii*, 1.32 to 1.55 in *A. gordonae*. Thus this ratio in *A. gracilis* is larger than that of *A. cranchii* but fits well within the range reported for *A. gordonae*. We believe that *Achaeus*

gordonae must be considered a synonym of *Macropodia gracilis* O. Costa, 1839. *Achaeus gracilis* occurs in the Mediterranean and adjacent Atlantic; sublittoral, to about 20 m (Zariquiey Alvarez, 1968).

Anamathia rissoana (Roux, 1828). Azores and eastern Mediterranean; sublittoral to about 400 m (Zariquiey Alvarez, 1968).

Eurynome spinosa Hailstone, 1835. Eastern Atlantic, from Scandinavia and British Isles southward to NW Spain, Azores, Mediterranean; sublittoral, from about 180 to about 400 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Hyas araneus (Linnaeus, 1758). Eastern Atlantic from Barents Sea southward to NW France; also western Atlantic; sublittoral, shallow water to more than 300 m (Christiansen, 1969).

Hyas coarctatus Leach, 1815. Eastern Atlantic from Barents Sea and Arctic southward to NW France; also western Atlantic, northern Pacific; sublittoral, between 1 and 500 m (Christiansen, 1969).

Hyastenus hilgendorfi De Man, 1887. An Indo–West Pacific immigrant into the eastern Mediterranean, now known from the coasts of Israel (Lewinsohn and Holthuis, 1964) and Egypt (Ramadan and Dowidar, 1976).

Inachus communissimus Rizza, 1839. Mediterranean and adjacent Atlantic, at least as far as Portugal; sublittoral, 15 to 24 m (Zariquiey Alvarez, 1968).

Lissa chiragra (Fabricius, 1775). Mediterranean, sublittoral, between 20 and 40 m (Zariquiey Alvarez, 1968).

Macropodia czernjawskii (Brandt, 1880). Mediterranean; sublittoral, between 10 and 30 m (Zariquiey Alvarez, 1968).

Macropodia deflexa Forest, 1978. Northeastern Atlantic, from southern England to Portugal; sublittoral, shallow water to 20 m (Forest, 1978).

Macropodia intermedia Bouvier, 1940. (See page 300).

Macropodia linaresi Forest and Zariquiey Alvarez, 1964. Eastern Atlantic, from southern England and France to Spain, Mediterranean; sublittoral, between 30 and 80 m (Zariquiey Alvarez, 1968; Forest, 1978).

Macropodia longirostris (Fabricius, 1775). Mediterranean; sublittoral, between 4 and 50 m (Zariquiey Alvarez, 1968).

Macropodia rostrata (Linnaeus, 1761). Northeastern Atlantic, from Norway southward at least to Mediterranean; sublittoral; tropical West Africa records are referable to *M. spinulosa* (Zariquiey Alvarez, 1968; Christiansen, 1969; Forest, 1978).

Macropodia tenuirostris (Leach, 1814). Northeastern Atlantic, from the Faroes southward to Portugal; sublittoral, to more than 150 m (Zariquiey Alvarez, 1968; Christiansen, 1969; Forest, 1978).

Pisa corallina (Risso, 1816). Mediterranean; sublittoral, usually in less than 10 m (Zariquiey Alvarez, 1968).

Pisa muscosa (Linnaeus, 1758). Mediterranean; sublittoral, from 4–5 to about 40 m (Zariquiey Alvarez, 1968).

Rochinia carpenteri (Thomson, 1873). Eastern Atlantic, from Iceland and the Faroes southward to NW Africa, Azores; sublittoral, from about 180 to about 1300 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

We believe that the following species, tentatively recorded by Monod (1956) from West Africa, are based on erroneously labeled specimens (each is known from a single specimen thought to be West African) and should not be included in the West African fauna:

Libinia erinacea A. Milne Edwards, 1879. A western Atlantic species recorded from "West Africa" as *Libinia dubia* by Streets (1870:105) and subsequently recorded by Rathbun (1925:321). Monod (1956:514, fig. 705), who examined the specimen, identified it with *L. erinacea.*

Notolopas brasiliensis Miers, 1886. A western Atlantic species reported by Monod (1956:513, figs. 703, 704), based on a specimen collected off South-West Africa in 1900.

Rochinia gracilipes A. Milne Edwards, 1875. A western Atlantic species included by Monod (1956:516, figs. 706–708), on the basis of a single specimen from Gabon collected by Heurtel. Much of the material from Gabon in this collection apparently has been erroneously labeled.

REMARKS.—In our account of this family we

have departed from our usual format in presenting synonymies for several Mediterranean-North Atlantic species which may not be represented in the tropical fauna. The occurrence of three such species, *Pisa armata, Acanthonyx lunulatus*, and *Herbstia condyliata*, is well documented, but in the cases of the latter two species older records may well pertain to other species recognized herein.

The occurrence of several other northern species off tropical West Africa should be verified: *Achaeus cranchii, Inachus aguiarii, I. dorsettensis* (tropical records of which are referred to *I. nanus*, new species, p. 291), *I. leptochirus* (tropical records are referred to *I. biceps*, new species, p. 285), *I. phalangium, I. thoracicus, Macropodia intermedia, M. longipes,* and *Pisa nodipes.*

Subfamily EPIALTINAE MacLeay, 1838

Genus *Acanthonyx* Latreille, 1828

Acanthonyx Latreille, 1828a:698 [type-species: *Maia lunulata* Risso, 1816, by monotypy; gender: masculine; name 1603 on *Official List*, there erroneously dated 1827].

Gonosoma Costa, 1844:69 [type-species: *Gonosoma viridis* Costa, 1844 (= *Acanthonyx viridis* Costa, 1838), a subjective junior synonym of *Maia lunulata* Risso, 1816, by monotypy; gender: neuter].

Peltinia Dana, 1851d:272 [type-species: *Peltinia scutiformis* Dana, 1851, a subjective junior synonym of *Acanthonyx petiverii* H. Milne Edwards, 1834, by present selection; gender: feminine].

REMARKS.—*Acanthonyx* is dated from 1827 in the *Official List of Generic Names in Zoology*. So far as we can determine, this is an error that originated in Neave, *Nomenclator Zoologicus*, in which 1827 is given. Other genera named in the same article by Latreille are correctly dated 1828 in Neave.

Until now *Acanthonyx* included seven species, as follows: *A. petiverii* H. Milne Edwards, 1834, from both coasts of the Americas (Rathbun, 1925; Garth, 1958); *A. lunulatus* (Risso, 1816) (with *A. brevifrons* A. Milne Edwards, 1869, as a synonym), from the eastern Atlantic (see p. 256, and Zariquiey Alvarez, 1968 for Mediterranean references); *A. sanctaehelenae* Chace, 1966, from Saint Helena; *A. simplex* Dana, 1852, from the Pacific; and three species from the western Indian Ocean: *A. consobrinus* A. Milne Edwards, 1862, *A. limbatus* A. Milne Edwards, 1862, and *A. elongatus* Miers, 1877 (Stephensen, 1945; Barnard, 1950; Guinot, 1967a).

Acanthonyx closely resembles *Dehaanius* MacLeay, 1838, the only difference mentioned in the literature being the presence of a seven-segmented abdomen in the male in the latter, and an abdomen with six or less somites in the former. Stephensen (1945) and Barnard (1950) both suggest that this character is unreliable. The status of the two genera requires clarification.

According to accounts in the literature (cited above), the four Indo-West Pacific species of *Acanthonyx* can be distinguished from those occurring in the Atlantic as follows: *A. simplex* lacks dorsal spines or tubercles on the carapace; *A. dentatus* has a strong tooth on the orbital margin; *A. consobrinus* has a tooth on the orbital margin and four lateral projections on the carapace; and *A. limbatus* has much stronger lateral projections on the carapace.

In his account of *A. sanctaehelenae*, Chace (1966: 13) provided good comparative illustrations of the three species then known from the Atlantic, *A. lunulatus, A. petiverii*, and *A. sanctaehelenae.*

Material of *Acanthonyx* available to us from West African localities includes one new species from the *Pillsbury* collections, a second new species from Point-Noire, and *A. brevifrons* from the Cape Verde Islands. We recognize four species from the eastern Atlantic.

Key to Eastern Atlantic Species of *Acanthonyx*

1. Carapace with only 2 lateral lobes. [Rostral teeth short. 8–13 tubercles ventrally on dactyli of pereiopods] ..... ***A. brevifrons***
   Carapace with 3 lateral lobes 2

2. Orbital margin with blunt tooth or projection. [Size very small, adults with carapace lengths of less than 4 mm. 6–8 tubercles ventrally (usually 6; 3 or 4 in juveniles) on dactyli of walking legs] .... ***A. minor***, new species
   Orbital margin smooth, evenly concave 3
3. Rostral teeth strongly depressed. Rostral sinus V-shaped. Merus of claw with 1 tubercle. [Size very small, adults with carapace lengths of less than 5 mm. 4–6 tubercles ventrally on dactyli of walking legs] ..... ***A. depressifrons***, new species
   Rostral teeth not markedly depressed. Rostral sinus U-shaped. Merus of claw with 2 tubercles. [Size moderate to large, adults with carapace lengths of 15 mm or more. Males with 11–17 and females with 8–12 tubercles ventrally on dactyli of walking legs] ..... ***A. lunulatus***

Acanthonyx brevifrons A. Milne Edwards, 1869

FIGURES 60*a*, 61

Acanthonyx brevifrons A. Milne Edwards, 1869:353.—A. Milne Edwards and Bouvier, 1894:12; 1900:152.—Bouvier, 1940:349.

?*Acanthonyx lunulatus*.—Miers, 1886:43.—Barrois, 1888:9. [See p. 258, references to *A. lunulatus* from Cape Verde Islands; not *Acanthonyx lunulatus* (Risso, 1816)].

?*Acanthonyx lunulatus* var. *brevifrons*.—Chapman and Santler, 1955:375.

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Cape Verde Islands; between Ilhéu Branco and Ilhéu Raso, 110–180 m, sand and rock, *Talisman*, 27 Jul 1883, 1♀, 1 juv (W).

DESCRIPTION.—Carapace (Figure 61*a*) pear-shaped, length in midline 1/5 longer than maximum breadth. Dorsal surface of carapace smooth, lacking distinct pubescence (in material studied). Hepatic lobe scarcely produced anteriorly. One prominent rounded lobe on branchial region, lateral margin between hepatic and branchial lobes straight, subparallel or slightly convergent posteriorly. Rostral teeth, preorbital, hepatic, and branchial lobes each with terminal tuft of stout setae. Rostral sinus (Figure 61*b,e*) broadly V-shaped. Rostral teeth depressed in lateral view (Figure 60*a*). Basal article of antennae with proximal spine on outer margin; 2 succeeding articles subcyclindrical, extending to or slightly beyond rostral teeth. Chelipeds (Figure 61*c,f*) with 2 lobes proximally on outer margin, 1 smaller lobe near midline, and 1 triangular distal lobe. Carpus with low crest dorsally. Fingers about as long as palm, with small proximal gape. Dactyli of walking legs (Figure 61*d*) with 8–13 tubercles on opposable margin in females.

MEASUREMENTS.—Female with carapace length of 8.8 mm, juvenile with carapace length of 5.4 mm. A. Milne Edwards (1869) reported that the type had a carapace length of 13 mm.

REMARKS.—Our examination of two specimens of this species taken by the *Talisman* in the Cape Verde Islands, part of the material recorded by A. Milne Edwards and Bouvier (1900), leads us to believe that *A. brevifrons* should be recognized as a distinct species. It is a smaller and smoother species than *A. lunulatus*, and it further differs in having shorter rostral teeth, a less prominent hepatic lobe on the carapace, and in the complete absence of a lateral lobe between the hepatic and branchial lobes. Females of *A. brevifrons* resemble those of *A. lunulatus* in having 8–13 tubercles on the opposable margin of the dactyli of the walking legs. In our material of *A. lunulatus*, there were 8–12 tubercles on the dactyli of the female and 11–17 tubercles on the dactyli of the males.

The confusion that has existed until now over the identity of this species is understandable, as it closely resembles *A. lunulatus* and both species occur in West African waters, although there is no indication that the species have been found together. The species originally was described from material taken in the bay of São Vicente,

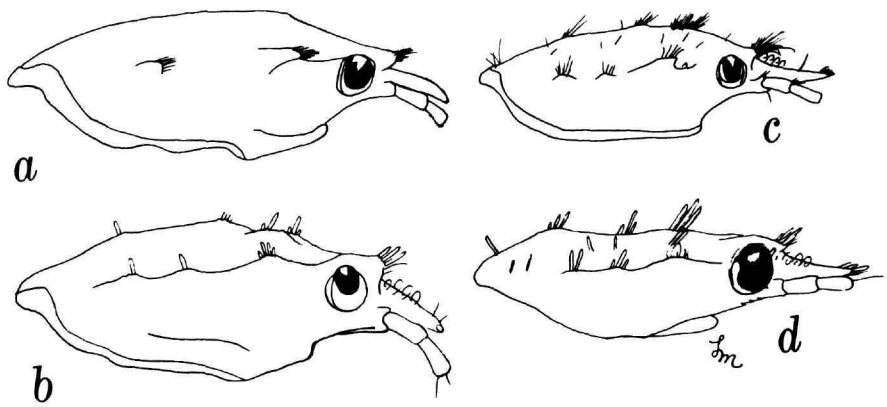

FIGURE 60.—Carapaces of West African species of *Acanthonyx* in lateral view: *a*, *A. brevifrons* A. Milne Edwards, female, cl 8.8 mm, Cape Verde Islands; *b*, *A. depressifrons*, new species, holotype, male, cl 4.0 mm, Pointe-Noire; *c*, *A. lunulatus* (Risso), female, cl 6.8 mm, Tunis; *d*, *A. minor*, new species, paratype, male, cl 2.6 mm, *Pillsbury* Sta 271.

Cape Verde Islands by A. Milne Edwards (1869); no depth data were given. Miers (1886:43) recorded a small female of *A. lunulatus* from São Vicente and noted that it approached the "species or variety *Acanthonyx brevifrons* A. Milne Edwards, in the form of the front, but there are indications of three antero-lateral teeth, and the carapace, as in *Acanthonyx lunulatus*, bears several tufts of setae." Miers' material, which could not be located, may be referable to *A. lunulatus*. A. Milne Edwards and Bouvier (1894, 1900) gave additional differences between this species and *A. lunulatus*, but did not give figures. Balss (1914) identified material from Annobon with this species, but in 1922 he synonymized *A. brevifrons* with *A. lunulatus*. We suspect that the material reported by Balss from Annobon actually belongs to a new species, *A. minor* (p. 261). Bouvier (1940:348) suggested that *A. brevifrons* should be considered as a race of *A. lunulatus*, and Chapman and Santler (1955) identified material from the Azores as *A. lunulatus* var. *brevifrons*. Monod (1956) synonymized *A. brevifrons* with *A. lunulatus*, and figured a male of the latter species from Dakar. In his list of material, Monod noted that his figured specimen, a large male (cl 15 mm), had an obsolete intermediate tooth on the carapace and corresponded to "f. *brevifrons*". The figured specimen appears to be a typical *lunulatus*, as does the specimen from Mauritania figured earlier by Monod (1933b, fig. 7D). None of the material of *A. lunulatus* that we have examined approaches our material of *A. brevifrons* in short-

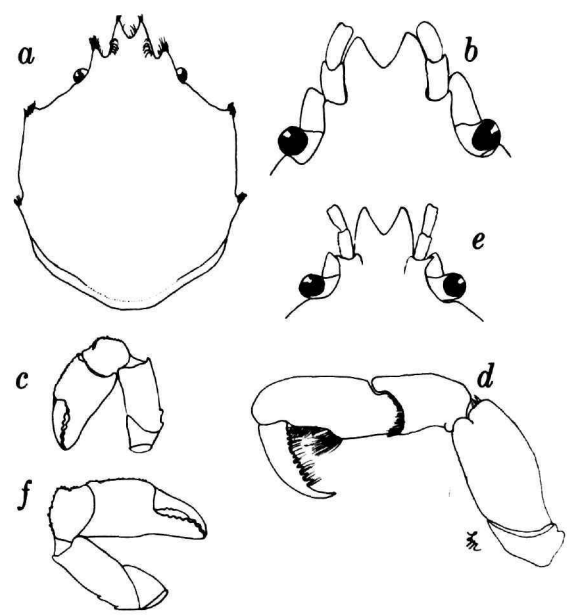

FIGURE 61.—*Acanthonyx brevifrons* A. Milne Edwards, Cape Verde Islands. Female, cl 8.8 mm: *a*, carapace; *b*, front, ventral view; *c*, cheliped; *d*, fifth pereiopod. Juvenile, cl 5.4 mm: *e*, front, ventral view; *f*, chela.

ness of rostral teeth or in the total suppression of the second lateral tooth on the carapace.

Bouvier (1940) noted that *A. lunulatus* occurred to a depth of about 20 m; it is usually taken in shallow water on algae. In the Mediterranean it often occurs on the algal genus *Cystoseira*. Two of the records for *A. brevifrons* given by A. Milne Edwards and Bouvier (1900) are from depths of 75 m and 110–180 m (our material is from the latter collection). It seems likely that *A. brevifrons* occurs in much deeper water than does *A. lunulatus*, and it is possible that both occur together in the Cape Verde Islands. All of the material from the Cape Verde Islands, the Azores, and Madeira (below) should be reexamined to determine which species occurs in the localities.

BIOLOGY.—Little information is available on the ecology of this species. Our specimens were taken by the *Talisman* on sand and rock in 110–180 m; no information was given for the type. A. Milne Edwards and Bouvier (1900) also recorded material from 75 m but did not record the habitat. In 1894 these same authors recorded the species from algae and rocks in 10 m. Shallower water records for this species, as well as those based on material collected in the alga *Cystoseira*, a favorite habitat for *A. lunulatus*, may be based on this latter species.

DISTRIBUTION.—*Acanthonyx brevifrons* has been reported from localities in the Azores, Madeira, and the Cape Verde Islands. At least some of the following records may be referable to *A. lunulatus*; all should be verified. Records in the literature include:

Azores: No specific locality (A. Milne Edwards and Bouvier, 1900; Bouvier, 1940; Barrois, 1888). E coast of Ilha das Flores, 39°26′30″N, 33°29′15″W of Paris (= 31°09′15″W of Greenwich), intertidal, and Graciosa, Ilhéu da Praia, 39°-03′15″N, 30°18′15″W of Paris (= 27°48′15″W of Greenwich), beach, 10 m (A. Milne Edwards and Bouvier, 1894). Pasteleiro, Feteira, and Almoxarife [?], Ilha do Faial; and Madalena, Ilha do Pico (Chapman and Santler, 1955).

Madeira: No specific locality (Chapman and Santler, 1955).

Cape Verde Islands: São Vicente (A. Milne Edwards, 1869; Miers, 1886). Channel between São Vicente and Santo Antão, 75 m, and between Ilhéu Branco and Ilhéu Raso, 110–180 m (A. Milne Edwards and Bouvier, 1900).

Acanthonyx depressifrons, new species

FIGURES 60*b*, 62

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Congo: Pointe-Noire, 5–10 m, in lobster nets, 24 Jan 1967, J. Marteau, 2♂ (larger male is holotype), 4♀ (L, W).

DESCRIPTION.—Carapace (Figure 62*a*) smooth, length 1.20–1.35 times greatest width, greatest width at level of anterolateral tooth. Surface with 2 protogastric, 1 gastric, and 1 cardiac tubercle in midline, lateral branchial tubercle also present. All dorsal tubercles with 1 or 2 broad setae. Rostral sinus (Figure 62*a,b*) V-shaped, rostral teeth noticeably depressed in lateral view (Figure 60*b*), teeth blunt. Carapace, posterior to base of rostrum, with usual 2 diverging rows of curved, hook-shaped hairs. Preorbital tooth blunt, rounded, much shorter than rostral teeth. Orbital margin curving evenly to anterior margin of first anterolateral tooth, which is not markedly set off as in *A. lunulatus*. No tooth present on orbital margin as in *A. minor*. First anterolateral tooth much larger than second and third, which are distinct and subequal in size. Carapace lacking subhepatic tubercle. Eyes small.

Basal segment of antennal peduncle (Figure 62*b*) unarmed. Antennal peduncle extending to or beyond apices of rostral teeth.

Chelipeds (Figure 62*c*) small in both sexes. Fingers about as long as palm, cutting edges dentate, gape slight. Palm smooth. Carpus with low dorsal crest; carpus about as long as palm, much shorter than merus. Merus with single blunt tubercle on basal half.

Dactyli of walking legs (Figure 62*d*) broad, opposable margins with 4–6 pairs of teeth. Second pereiopod with dactyl shorter than propodus. Propodus about 3 times as long as high, outer surface with disc-like projection extending over base of dactylus; posterior margin of propodus with broad tubercle, ornamented with large setae, near midline. Carpus about as long as propodus,

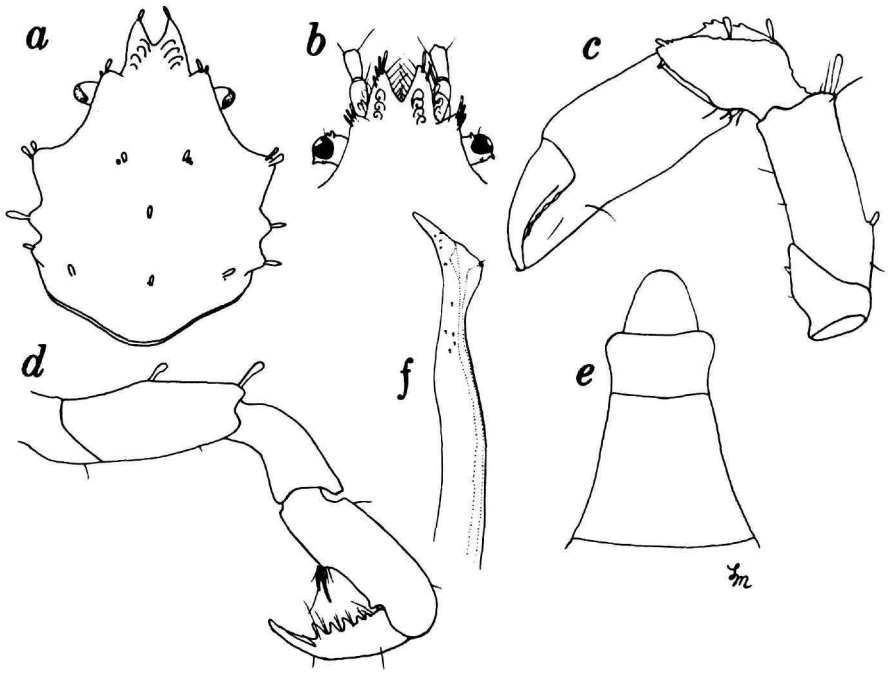

FIGURE 62.—*Acanthonyx depressifrons*, new species. Female paratype, cl 3.6 mm, Pointe-Noire: *a*, carapace. Holotype, male, cl 4.0 mm, Pointe-Noire: *b*, front, dorsal view; *c*, cheliped; *d*, fifth pereiopod; *e*, abdomen; *f*, gonopod.

much shorter than merus. Third and fourth pereiopods shorter than, but otherwise similar to, second. Fifth pereiopod shortest. Dactylus about as long as propodus. Propodus stout, slightly more than 2 times as long as wide; tubercles on posterior margin low, with slender setae and club-like hairs. Carpus shorter than propodus. Merus longer than propodus.

Male abdomen (Figure 62*e*) narrow. Telson triangular, length and width subequal. Sixth somite expanded distally. Male pleopod as illustrated (Figure 62*f*).

MEASUREMENTS.—Carapace lengths of males 3.5 to 4.0 mm, of females 3.3 to 4.3 mm.

REMARKS.—*Acanthonyx depressifrons* differs from the other three eastern Atlantic species of the genus in having the rostrum strongly depressed and in having only one tubercle on the merus of the cheliped. It further differs from *A. brevifrons* in having three distinct lateral lobes on the carapace and fewer tubercles on the dactyli of the walking legs; from *A. lunulatus* in having the rostral sinus V-shaped and fewer tubercles on the dactyls of the pereiopods; and from *A. minor*, new species, in lacking a projection on the orbital margin and in having its greatest width at the level of the anterolateral tooth of the carapace in both sexes and at all sizes. Like *A. minor*, and perhaps *A. brevifrons*, *A. depressifrons* is a much smaller species than *A. lunulatus*, which can attain 15 mm or more in carapace length.

Acanthonyx depressifrons is a much smaller species than *A. petiverii* or *A. sanctaehelenae*, both of which as adults may attain a carapace length of 18 mm (Rathbun, 1925; Chace, 1966). It also differs from *A. petiverii* in having the rostral sinus V-shaped rather than broadly U-shaped and from *A. sanctaehelenae* in having one rather than two lobes or tubercles on the outer margin of the merus of the chelipeds.

TYPE-LOCALITY.—Off Pointe-Noire, Congo.

DISPOSITION OF TYPES.—The holotype is the

larger male, carapace length 4.0 mm (USNM 127191); three female paratypes (USNM 169535) also have been deposited in the collections of the Smithsonian Institution. A male and a female paratype have been deposited in the Rijksmuseum van Natuurlijke Histoire, Leiden.

ETYMOLOGY.—The specific epithet is from the Latin and refers to the characteristic depressed front of this species.

DISTRIBUTION.—Known only from the type-locality, Point-Noire, Congo, where it was taken at a depth of 5–10 m.

Acanthonyx lunulatus (Risso, 1816)

FIGURES 60*c*, 63

Acanthonyx lunulatus.—Capart, 1951:84, fig. 26.—Monod, 1956:517, figs. 709, 710.—Rossignol, 1957:78, 116 [key].—Forest and Gantès, 1960:356.—Gauld, 1960:72.—Rossignol, 1962:122.—Guinot and Ribeiro, 1962:76.—Ribeiro, 1964:20.—Chace, 1966, fig. 13a-d [Mediterranean].—Forest and Guinot, 1966:106.—Zariquiey Alvarez, 1968:466, figs. 7d, 153e,f, 154i,j [Spain; references].—Kensley, 1970:181.—Penrith and Kensley, 1970b:252, 260.—Uschakov, 1970:455 [listed].

SYNONYMS.—*Maia glabra* Latreille, 1836; *Acanthonyx viridis* O. Costa, 1838; *Gonosoma viridis* O. Costa, 1844.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: Madeira: SE coast near Agua de Pena, 32°41'N, 16°46'W, 0–25 m, diving, 9 Mar 1976, *Onversaagd* Sta 27, 1♀ (L).

REMARKS.—Monod (1956) summarized earlier records for this species and provided a good illustration of a large male from Dakar. He reported

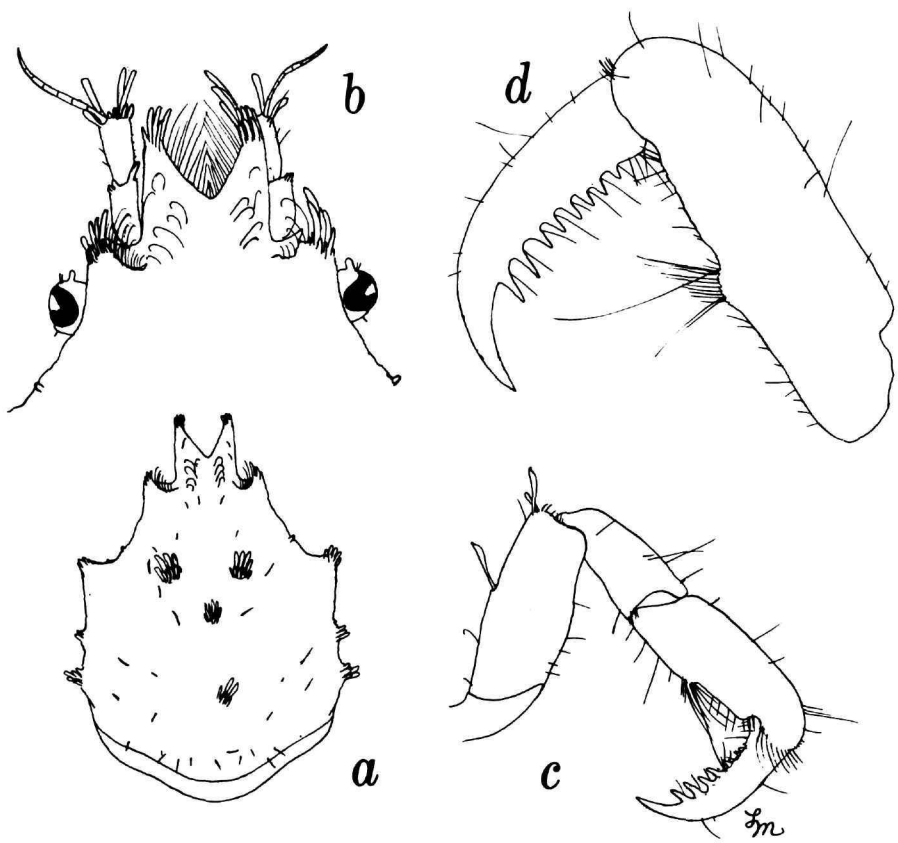

FIGURE 63.—*Acanthonyx lunulatus* (Risso), female, cl 6.8 mm, Tunis: *a*, carapace; *b*, front, dorsal view; *c*, fifth pereiopod; *d*, distal segments of fifth pereiopod, enlarged.

numerous specimens from localities in Mauritania, Senegal, Ghana, and Cameroon, and noted that its range in the Atlantic extended from Portugal to the equatorial region.

We have examined material of *A. lunulatus* from the Gulf of Tunis, Messina and Trapani, Sicily, Naples, Nice, and Cadaqués, Spain (all W) and have provided here some sketches of a young female from the Gulf of Tunis (Figures 60*c*, 63) to help distinguish this species from the three others occurring off West Africa.

Our discovery of two previously undescribed species of *Acanthonyx* in West African waters and our recognition of *A. brevifrons* from the Cape Verde Islands and other localities indicate that earlier records of *A. lunulatus* may have been based on one or more of the four species now known to occur off West Africa. The specimens reported in Monod, the literature records cited by him, and the records given below all need to be verified.

DISTRIBUTION.—Mediterranean Sea and adjacent Atlantic, from Portugal to South-West Africa, generally in shallow water, littoral and subtidal. Records since 1956 include the following.

Morocco: Rabat, Temara, Skhirat, Oued Cherrat, David, Tillet [?], Sidi Moussa, Agadir, and Foum Assaka (all Forest and Gantès, 1960).

Cape Verde Islands: Matiota, São Vicente, beach and shore, and Tarrafal do Monte Trigo, Santo Antão (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Guinea: No specific locality (Uschakov, 1970).

Ivory Coast: Lagoon of Abidjan, 05°16′12″N, 04°00′-20″W (Forest and Guinot, 1966).

Ghana: Tenkpobo to Dixcove (Gauld, 1960).

São Tomé: Ilhéu Macao (as îlot dos Cocos), 3–8 m, and Sant'Ana, shore (Forest and Guinot, 1966).

Congo: Pointe Indienne (Rossignol, 1957). Baie de Loango and near Pointe-Noire (Rossignol, 1962).

Angola: Baía do Lobito, shore; Praia das Conchas, Moçâmedes, shore; and Baía das Vacas, Benguela, shore (all Guinot and Ribeiro, 1962).

South-West Africa: Rocky Point, 18°59′S, 12°29′E (Kensley, 1970; Penrith and Kensley, 1970b). Kunene River mouth, 17°15′S, 11°45′E, and Möwe Point, 19°23′S, 12°-42′E (Kensley, 1970).

Möwe Point is the southernmost record for *Acanthonyx* on the West African coast.

**Acanthonyx minor*, new species

FIGURES 60*d*, 64

?*Acanthonyx brevifrons*.—Balss, 1914:101 [not *A. brevifrons* A. Milne Edwards, 1869].

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 271, shore, 6♂ (includes holotype), 4♀ (1 ov) (L, W). Sta 273, shore, 1♂ (L).

DESCRIPTION.—Carapace (Figure 64*a,f,i*) smooth, rather wide, length 1.1 to 1.3 times greatest width in adults, about 1.5 times width in juveniles. Greatest width at level of anterior anterolateral teeth in juveniles (Figure 64*i*), at level of posterior anterolateral teeth in adults (Figure 64*a,f*). Surface of carapace coarsely pitted, with normal elevations: 2 protogastric, 1 mesogastric, 1 cardiac, all low, each bearing 2 or more broad setae. Rostral teeth elongate-triangular, separated by wide, V-shaped sinus, rostrum not markedly depressed (Figure 60*d*). Dorsal surface of carapace, behind rostrum, with normal 2 divergent rows of curved, hook-shaped hairs. Preorbital tooth short, blunt, much shorter than rostral teeth. Orbital margin continuing gradually into anterior margin of first anterolateral tooth, latter not distinctly set off as in *A. lunulatus*. Orbital margin with small tooth or lobe situated about halfway between eye and first anterolateral tooth (Figure 64*a,f*); this tooth absent in all other Atlantic species of *Acanthonyx*, present in all but smallest specimens of *A. minor* (Figure 64*i*). First anterolateral tooth large, wide, rounded apically, second and third teeth distinct, smaller, subequal; each tooth with several broad setae. Eyes relatively large, in comparison with those of *A. lunulatus* of similar size. Ventral surface of carapace with subhepatic tooth behind orbit.

Basal segment of antennal peduncle with distinct outer anterolateral tooth (Figure 64*b*). Antennal peduncle variable in length, shorter than or slightly longer than rostrum.

Cheliped of adult female (Figure 64*c*) small.

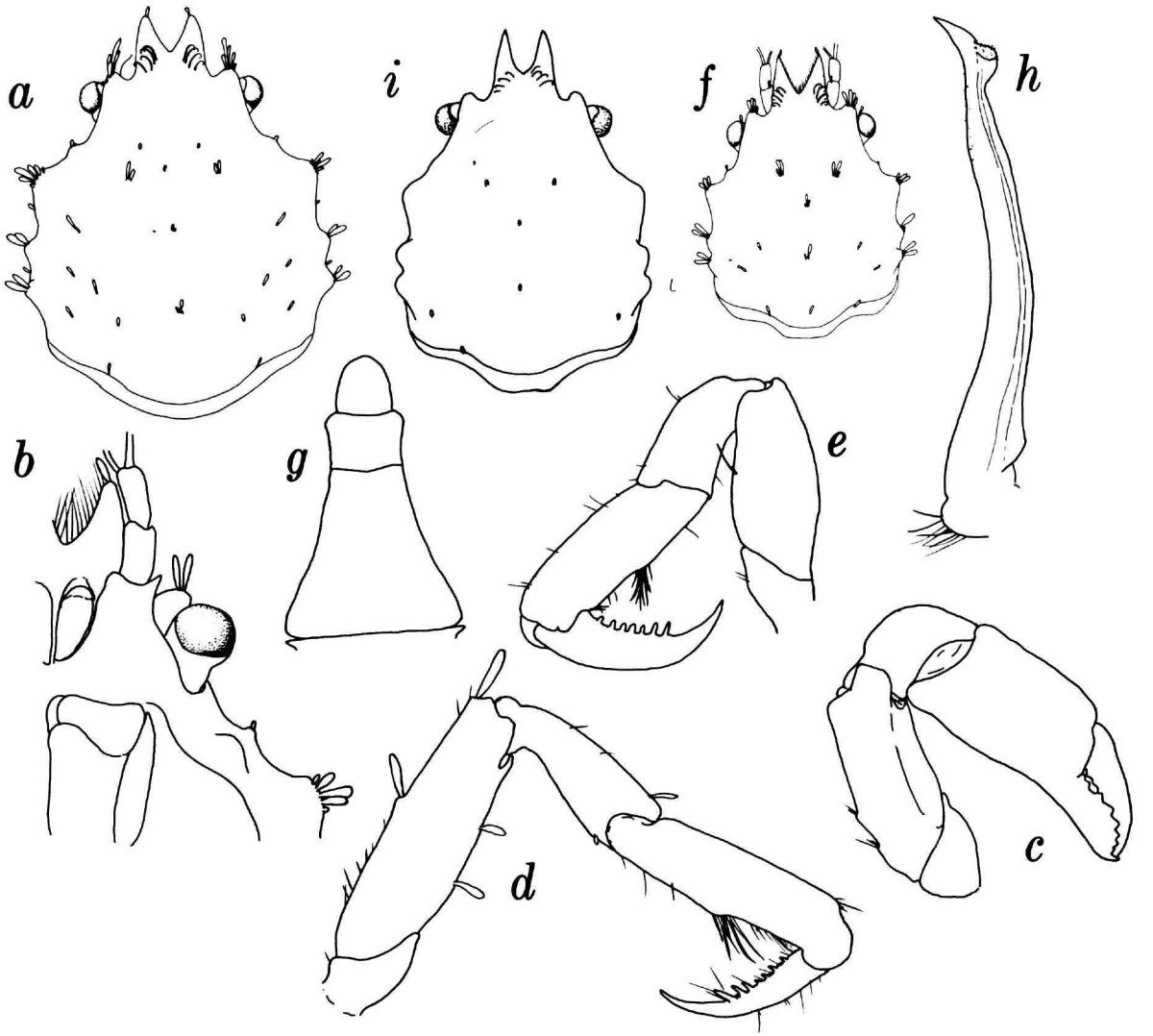

FIGURE 64.—*Acanthonyx minor*, new species, *Pillsbury* Sta 271. Female paratype, cl 3.8 mm: *a*, carapace; *b*, front, ventral view; *c*, cheliped; *d*, second pereiopod; *e*, fifth pereiopod. Male paratype, cl 2.6 mm: *f*, carapace; *g*, abdomen; *h*, first pleopod. Male paratype, cl 1.7 mm: *i*, carapace.

Fingers almost as long as palm (measured along upper surface). Cutting edges dentate, with only slight gape proximally. Palm smooth. Carpus globular, smooth, bearing no carinae or tubercles, shorter than palm, much shorter than merus. Latter smooth except for 2 blunt tubercles on basal half.

Walking legs similar to those of other *Acanthonyx* species, but dactylus appearing more slender, with tip less strongly curved, terminating in slender apex, posterior margin with 7 or 8 small but distinct teeth. Second pereiopod (first walking leg) dactylus about as long as propodus (measured dorsally). Latter 4 times as long as high,

outer surface ending in disc-like projection covering base of dactylus. Posterior margin of propodus with low tubercle or prominence near midlength ornamented with strong, stiff hairs. Carpus as long as propodus, much shorter and narrower than merus. First walking leg longer than remainder, latter of similar shape but decreasing in size posteriorly. Fifth pereiopod (Figure 64*e*) shortest. Dactylus slightly longer than propodus, more robust than that of second leg. Propodus about 2.5 times as long as wide. Tubercle on posterior margin low but distinct because of tuft of hairs. Carpus distinctly shorter than propodus, merus about as long as propodus.

Male abdomen (Figure 64*g*) narrow. Telson tongue-shaped. Sixth somite broad proximally, distinctly narrowing at telson. Abdomen of largest females very broad, reaching to bases of legs; sixth somite widest.

First male pleopod as shown in Figure 64*h*. It does not differ significantly from that of *A. sanctaehelenae* Chace from Saint Helena (Chace, 1966, fig. 12f).

MEASUREMENTS.—Carapace lengths of males 1.7 to 3.4 mm, of non-ovigerous females 1.8 to 3.8 mm, of the ovigerous female 3.7 mm.

REMARKS.—*Acanthonyx minor*, like *A. depressifrons*, is a very small species, as the name implies. It can be distinguished from all of the Atlantic species now known by the distinct projection on the orbital margin; that margin is evenly concave in the other species.

It is likely that the two specimens reported by Balss (1914:101) from Annobon under the name *A. brevifrons* belong to the present species; Balss indicated that they were juveniles. Later, Balss (1922:72) identified this material with *A. lunulatus*, synonymizing *A. brevifrons* with that species.

TYPE-LOCALITY.—Annobon Island, 01°25′S, 05°38′E, equatorial Guinea.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31762), a male from *Pillsbury* Sta 271 with a carapace length of 3.4 mm, and seven paratypes are in the Rijksmuseum van Natuurlijke Historie, Leiden; two male and one female paratypes are in the collection of the Smithsonian Institution.

ETYMOLOGY—The specific epithet is from the Latin and refers to the diminutive size of this species.

BIOLOGY.—The present material all originates from Annobon. It was collected at two fish poison stations on the shore of Annobon. The first (Sta 271) was situated on the NE shore between Punta Yoyo and Punta Pedrinha, the coast here was rocky with rubble and a small sandy beach; collecting was done in the surge where the water was rather turbid. The second station (Sta 273) was on the north shore of Annobon near Islote Pirámide on a rocky and sandy shore. Because of the high surf, collecting was difficult, but most of the fishes and invertebrates killed at this station were gathered at the outer edge of the surf zone in about 5 to 8 feet (1.5 to 2.4 m) of water over rocks.

DISTRIBUTION.—Known only from the type-locality, Annobon Island, equatorial Guinea.

Subfamily INACHINAE MacLeay, 1838

REMARKS.—The extensive *Pillsbury* collections of inachine crabs has necessitated a much more detailed coverage of this subfamily than we had originally expected. Eight genera of this subfamily occur off West Africa. Two of these are characterized and named herein. Representatives of six genera are included in the *Pillsbury* material; *Dorhynchus* and *Ergasticus*, each represented in the eastern Atlantic by one species, were not collected. 37 species of inachine crabs are now known to occur in the eastern Atlantic, a surprising increase in recognized species since 1956 when Monod recognized 22 species, 19 from tropical West African waters; we recognize 29 tropical species below.

Because the *Pillsbury* collections included what appear to be representatives of two new genera, we have examined representatives of *Achaeopsis*, *Dorhynchus*, *Ergasticus*, *Physachaeus*, and several related genera in order to better understand generic characters and relationships. As a result, we believe that *Dorhynchus* Thomson, 1873, is distinct from *Achaeopsis* Stimpson, 1858. We have in-

cluded a diagnosis of *Dorhynchus* (p. 279), under which our conclusions are discussed.

We also believe that three interrelated "major" morphological features of inachine crabs are subject to misinterpretation: the supraorbital spine, the postorbital spine(s), and whether or not the eyes are retractile.

The supraorbital spine of *Dorhynchus* (Barnard, 1950, fig. 4d) or of *Macropodia gilsoni* probably should be interpreted as an outgrowth of the supraorbital eave rather than as being homologous with the intercalated spine or lobe in the Majinae. Balss (1929) stressed the importance of the intercalated spine in majid classification but his conclusions do not appear to have gained general acceptance. Garth (1958:37), however, includes in his key to American genera of Inachinae the genus *Achaeopsis*, which can be distinguished by the presence of a spine intercalated between pre- and postorbital spines. Griffin (1966b:35) suggested that "if the supraorbital spine found in *Achaeopsis* species is regarded as homologous with the intercalated spine of other majids, *Achaeopsis* becomes widely separated from these genera ...." We agree with Griffin, for *Achaeopsis* and the closely related *Dorhynchus* (which Griffin considered a synonym of *Achaeopsis*), are otherwise similar to *Macropodia*, differing primarily in having the rostral spines divergent rather than appressed. Further, the West African *Macropodia gilsoni* and *M. intermedia*, which have a supraorbital spine but otherwise closely resemble the other species of the genus, would have to be separated into a distinct genus, a taxon which, to us, would be unnecessary and unnatural. We suspect that the supraorbital spine, like that of *Dorhynchus* and *Macropodia gilsoni*, which clearly arises from the supraorbital eave, should not be considered homologous to the intercalated spine. In the case of *M. gilsoni*, it is one of several specific characters that can be used to distinguish that species.

The question of homologies of the postorbital or postocular spine in the subfamily Inachinae is perhaps more troublesome. The term has been used for a spine arising from the posterior margin of the orbit (Rathbun, 1925, fig. 1, for example), as well as for any spine that may be situated on the lateral margin of the carapace between the orbital margin and the hepatic lobe, i.e., posterior to the orbit (Griffin, 1966a, fig. 1, upper left figure). If this latter spine, which is situated between the orbit and the hepatic lobe, is considered to be a displaced, "true" postorbital spine like that of *Inachus*, then, again, *Macropodia gilsoni* would have to be generically distinct from *M. rostrata*, which lacks it. We believe that this latter spine should not be considered to be a true postorbital spine; we propose to call this the nuchal spine to differentiate it from the postorbital. Among the eastern Atlantic genera of Inachinae, a postorbital spine is found only in *Inachus* and *Ergasticus*; in *Dorhynchus*, *Achaeopsis*, *Stenorhynchus*, and in some species of *Macropodia*, there is a nuchal spine but no postorbital spine. Indeed, the eastern Atlantic species of *Macropodia* show a complete range of development of the nuchal spine.

Finally, the question of whether the eye is retractile or not may be one of semantics but it is a feature that can be difficult to interpret. Among the eastern Atlantic genera of Inachinae, all of which have movable eyes, the eye in some appears to be retractile, that is, it can be moved into a position adjacent to the postocular spine. This occurs only in two genera, *Inachus* and *Ergasticus*. In *Dorhynchus*, in which the eye is said to be retractile to the sides of the carapace (Rathbun, 1925:27, definition of *Achaeopsis*) (and which also has been described as having a postocular spine but which we interpret as a nuchal spine), the eye in material available to us is no more retractile than in our material of *Macropodia*. In *Macropodia* the eye is described as not retractile (Christiansen, 1969:110), that is, the eye in representatives of the two genera folds backward about to the same level. The eye can approach the carapace in *Dorhynchus*, but, we suspect, only because the carapace is broader in that genus and the angle

formed by a line extending from the orbit to the hepatic lobe is quite different in *Dorhynchus* than it is in *Macropodia*. We would describe the eye as retractile only when it can be folded back into a postocular process like that of *Inachus*.

Finally, although *Ergasticus* was assigned to the subfamily Pisinae by Bouvier (1940) and by Zariquiey Alvarez (1968), we can see no reason to exclude it from the Inachinae, where it was placed by Balss (1957) and Monod (1956). The basal antennal article is extremely slender and the orbit is incomplete, with a supraorbital eave divided into spines, a large, postorbital spine, but no ventral orbital margin. We have not examined the male pleopod, which does not appear to have been illustrated.

Key to Eastern Atlantic Genera of Inachinae

1. Rostrum undivided, elongate (as long as or longer than postrostral carapace), with spinules laterally. Basal antennal article convex ventrally, not longitudinally sulcate. [Abdomen of 6 somites in male, 5 in female] ..... ***Stenorhynchus***

   Rostrum distinctly bilobed or very short, anteriorly truncate. Basal antennal article flattened or longitudinally channelled ventrally 2

2. Orbit with distinct spine or cupped process on posterior margin against which eye can be folded 3

   Orbit lacking distinct spine or process on posterior margin. [Carapace, between orbit and hepatic lobe, smooth, tuberculate, or with erect spine (nuchal). Abdomen of 6 somites in both sexes] 4

3. Supraorbital spines present. Postorbital spine slender, not a cupped process. Rostrum composed of 2 long, slender, divergent spines. First walking leg not markedly longer than second. Abdomen of 7 somites in male, 6 in female ..... ***Ergasticus***

   Supraorbital margin unarmed dorsally. Postorbital spine a broad, cupped process. Rostrum short, of 2 blunt lobes or broad, triangular spines. First walking leg much longer than second, noticeably enlarged. Abdomen of 6 somites in both sexes ..... ***Inachus***

4. Rostral spines slender, divergent, upturned, extending anteriorly slightly beyond end of antennal peduncle. [Distinct supraorbital spine present. Antennular fossae grading into rostrum, lacking anterior rim. Nuchal spine present. Merus of pereiopods with distal spine(s). Dactyli of posterior 2 pereiopods not falciform] ..... ***Dorhynchus***

   Rostral spines usually short, separate, triangular or with spiniform apices, or composed of 2 appressed spines of varying length 5

5. Front truncate, simple or obscurely bilobed, overreached slightly by interantennular septum. Carapace lacking spines dorsally. [Antennular fossae with anterior rim. Interantennular septum not produced ventrally into beak. None of dactyli falciform] ..... ***Capartiella***, new genus

   Front produced into 2 spines or spined lobes. Carapace with spines or tubercles dorsally. [Interantennular spine may be visible at base of rostral teeth] 6

6. Interantennular septum distinct but not strongly produced ventrally, scarcely if at all visible in lateral view below level of basal antennal segment. [Rostrum bilobed. Antennular fossae lacking anterior rim, grading into rostrum. Chelae of male inflated. Dactyli of posterior 2 or 3 pereiopods falciform] ..... ***Achaeus***

Interantennular septum produced ventrally into distinct, prominent beak, visible in lateral view, extending well below level of basal antennal segment 7

7. Rostrum produced into 2 distinctly separate spines, spinulous laterally, truncated and spinulous apically. Chelae compressed, palm cristate above and below in both sexes. Orbital margin spinulous above. [Basal article of antenna lined with spines on inner and outer margins. Dactyli of posterior 2 pereiopods falciform] ..... ***Calypsachaeus***, new genus

Rostrum produced into 2 smooth, unarmed spines, contiguous throughout their length. Chelae inflated, especially in adult males. Orbital margins unarmed above or with 1 or 2 dorsal spines, not lined with spinules. [Basal article of antenna, if armed, with 1 line or irregular row of tubercles or spines] ..... ***Macropodia***

Genus *Achaeus* Leach, 1817

Achaeus Leach, 1817, in 1815–1875, legend of pl. 22C [type-species: *Achaeus cranchii* Leach, 1817, by monotypy; gender: masculine; name 1605 on *Official List*].

DIAGNOSIS.—Carapace pyriform to elongate triangular, length usually greater than width, somewhat narrowed behind orbit as a neck, smooth or ornamented with tubercles, spinules, or, rarely, with long dorsal spine on cardiac or gastric region or both (as in *A. monodi* sensu stricto). Rostrum very short, of 2 acute or rounded lobes or of 2 spinules. Orbit dorsally with only narrow supraorbital eave, laterally spinulated or smooth; postorbital spine absent, nuchal lobe or spine, if present, not prominent. Eyestalks long, nonretractile, cornea obliquely subterminal, slightly ventral, large, ovoid. Interantennular septum not produced into ventrally directed beak. Basal antennal article extremely slender, smooth, channelled longitudinally, weakly tuberculate, spinulous, or armed with lateral spines, spines not arranged in 2 rows flanking longitudinal channel. Merus of third maxilliped ovate, not notched distally, narrower than ischium, palp articulating at summit. Chelipeds usually spinous, greatly enlarged with inflated palm in males. Walking legs long and slender, dactyli of posterior 2 or 3 pairs usually strongly falcate and ventrally spinulated. Abdomen of 6 somites in both sexes, male abdomen widest at middle of third somite. Male first pleopod bluntly pointed, aperture located subterminally in groove (modified from Griffin, 1966b).

REMARKS.—*Achaeus* now includes more than 30 species (Serène, 1968, listed 25 Indo-West Pacific species) occurring in the eastern Atlantic and in the Indo-West Pacific, from South Africa to Japan (Griffin, 1966b, 1968a; Griffin and Yaldwyn, 1965).

The *Pillsbury* collections, comprising four species, bring to six the number of nominal species known from tropical West Africa, between Senegal and Angola. Two of the species taken by the *Pillsbury* are described here as new, and the other two are redescribed. One species, originally assigned to *Achaeus* and described from the *Calypso* collections in 1966 (Forest and Guinot, 1966), is transferred to another genus, *Calypsachaeus*.

The seventh eastern Atlantic species, *A. gracilis* (O. Costa, 1839) (= *A. gordonae* Forest and Zariquiey Alvarez, 1955), occurs in the Mediterranean and so far has not been recorded from Atlantic localities. Monod (1956:542, figs. 767–770) supplemented the original description.

It seems very likely that several additional species of *Achaeus* from West Africa remain to be recognized and described. Monod (1956:539, figs. 747–766) almost certainly included two species in his account of *A. cranchii*: *A. cranchii* sensu stricto from European waters and an undescribed species from Senegal. The male pleopods of the two species, as figured by Monod (1956, figs. 760–762 from Senegal and figs. 763–766 from Spain, France, and the Canary Islands) are quite different. Monod's account of *Achaeus monodi* (1956:548, figs. 782-810), which he, as well as Forest and Guinot (1966:110), considered to be an extremely variable species, may be represented in Monod's account by three distinct species: (1) *A. monodi* sensu stricto (fig. 782, reproduced from Capart, 1951, pl. 1: fig. 11); a broad, pyriform species from the Congo and Angola with spiniform rostral spines and slender, erect spines dorsally on the gastric and cardiac regions of the carapace; (2) a slender, elongate-triangular species from Senegal with broad, triangular rostral spines and no dorsal spines (figs. 783–785); and (3) a second species from Senegal with appressed rostral spines (figs. 786–789), similar to those of the South African *A. spinosissimus* Griffin, 1968(b). None of these species was represented in the *Pillsbury* collections.

Our generic diagnosis, based on Griffin (1966b), has been modified to include *A. monodi*, sensu stricto, with its erect dorsal spines. That species should be restudied, however, because it is different enough from the other species of *Achaeus* for Capart (1951) to have assigned it to *Podochela*.

The relative proportions of the carapace, even though they may vary within a species with size and sex, provide a helpful recognition character for species of *Achaeus*. They allow the immediate distinction between slender species, like *A. turbator*, new species (in which the carapace width varies from 0.64 to 0.72 times the carapace length), from the broader species, like *A. foresti* (in which the carapace width varies from 0.86 to 0.90 times the length). Key characters employed for species not in the collections have been extracted from the literature: Forest and Zariquiey Alvarez, 1955, for *A. cranchii* and *A. gracilis* (as *A. gordonae*); Forest and Guinot, 1966, for *A. trifalcatus*; and Forest, 1968, for *A. foresti*. A similar feature to illustrate the relative proportions of the carapace, the relation of the width at the hepatic lobes to the distance between the summit of the gastric prominence and the anterior margin of the rostral spines, also proves to be helpful. In *A. turbator*, new species, for example, the width of the carapace at the hepatic lobes is less than the distance from the gastric prominence to the anterior margin of the rostral spines, whereas in *A. buderes*, new species, the hepatic width is far greater. The relative length of the neck also provides a helpful recognition character: the neck is almost absent in *A. buderes*, new species, whereas it is quite distinct and elongate in *A. turbator*, new species. The shape of the rostral spines or projections also is important and appears to be characteristic. In *A. trifalcatus* the rostrum is made up of two rounded, unarmed lobes; in *A. turbator*, new species, it is made up of two rounded lobes, each of which has an anterior spinule. There is a definite shoulder on each side of the apical spinule; and in *A. cranchii* and *A. gracilis* the rostrum is made up of two slender, separate spines, tapering evenly from the base to the apex and lacking a distinct shoulder posteriorly. Note that in *A. cursor* (A. Milne-Edwards and Bouvier, 1900:161, pl. 21: figs. 15, 16, and pl. 22: figs. 1–3), considered a synonym of *A. cranchii* by Forest and Zariquiey Alvarez, 1955, there may be a distinct shoulder at the base of the rostrum. The proportions of the segments of the pereiopods also appears to be important. Forest (1968), for example, pointed out that in *A. foresti* the dactylus of the fourth pereiopod, measured across its arc, is equal to the length of the ischium and merus together; in *A. monodi*, according to the figure of the holotype (Capart, 1951, fig. 31), the dactylus, measured across its arc, is less than half as long as the merus alone. The size of the eye (compare Figures 65 and 66*b* of the eye in *A. foresti* and *A. buderes*, new species) appears to be important. Finally, the relative height of the gastric and cardiac promi-

nences and whether or not they are produced into erect spines seems to be important; in none of the eastern Atlantic species are these spines so well developed as in *A. monodi* sensu stricto.

The key to eastern Atlantic *Achaeus* given below should be used with caution, for it does not take into account the "variants" identified with *A. cranchii* and *A. monodi* by Monod (1956).

Key to Eastern Atlantic Species of *Achaeus*

1. Rostrum unarmed, scarcely bilobed. Posterior 3 pereiopods with falciform dactyli. [Carapace lacking erect dorsal spines. Width between hepatic lobes greater than distance between gastric prominence and anterior margin. Carapace width 0.70 to 0.83 times carapace length] ..... ***A. trifalcatus***

   Rostrum with apical spinules or spines. At most posterior 2 pereiopods with falciform dactyli 2

2. Rostrum consisting of 2 sharp spines, tapering evenly from base to apex. 3

   Rostrum consisting of 2 lobes, each with apical spinule (i.e., rostrum posteriorly with distinct shoulder) 4

3. Fissure between rostral spines narrow. Orbits usually unarmed dorsally, occasionally with tubercle or spinules. Posteromedian margin of carapace unarmed. Cardiac protuberance rounded, lower than gastric protuberance. Width between hepatic lobes equal to distance between gastric prominence and anterior margin. [Carapace width 0.65 to 0.79 times carapace length in males, 0.75 to 0.86 times carapace length in females] ..... ***A. gracilis***

   Fissure between rostral spines wide, U- or V-shaped. Orbits armed dorsally. Posteromedian margin of carapace usually tuberculate or lightly spinulose. Cardiac protuberance conical, as high as gastric protuberance. Width between hepatic lobes greater than distance between gastric prominence and anterior margin. [Carapace width 0.73 to 0.87 times carapace length in males, 0.75 to 0.95 times carapace length in females] ..... ***A. cranchii***

4. Carapace with erect spines on both cardiac and gastric regions. [Width between hepatic lobes greater than distance from gastric protuberance to anterior margin. Carapace width greater than 0.8 times carapace length. Only 1 pereiopod with falciform dactylus (?)] ..... ***A. monodi***

   Carapace without erect spines on either cardiac and gastric regions 5

5. Supraorbital margin spinulate. Posterior margin of carapace with strong spines posterolaterally, smaller spinules and tubercles posteriorly. Eyes slender, diameter of stalk about one-fourth length. [Width between hepatic lobes greater than distance from gastric protuberance to anterior margin. Carapace width 0.86 to 0.90 times carapace length] . ***A. foresti***

   Supraorbital margin unarmed. Posterior margin of carapace unarmed, with at most low, inconspicuous tubercles posterolaterally. Eyes stout, diameter about half length 6

6. Carapace stout, pyriform, greatest width 0.67 to 0.81 (mean 0.75) times carapace length. Width at hepatic lobes greater than distance from gastric protuberance to anterior margin. Hepatic lobe with apical spine and several subapical spinules. Neck very short, stout ..... ***A. buderes,*** new species

Carapace slender, elongate triangular, greatest width 0.64 to 0.72 (mean 0.68) times carapace length. Width at hepatic lobes subequal to or less than distance from gastric protuberance to anterior margin. Hepatic lobe angled apically, unarmed. Neck very long, tapering anteriorly ..... ***A. turbator,*** new species

**Achaeus buderes,* new species

FIGURE 65

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 17, 48 m, fine sand and green mud, 1♂, 4♀ (3 ov) (L). Sta 22, 51 m, rough bottom, 1♀ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♀ ov (holotype, L). Sta 24, 35–37 m, dark red bryozoans, 1♀ ov (W).

DESCRIPTION.—Carapace (Figure 65*a*) pyriform, width 0.67 to 0.81 (mean 0.75) times length, slenderer in males and juveniles, not markedly constricted behind orbits, neck short, branchial regions swollen, lateral margins and dorsal surface with some tubercles or sharp denticles, regions generally poorly defined. Surface appearing smooth, not markedly granular.

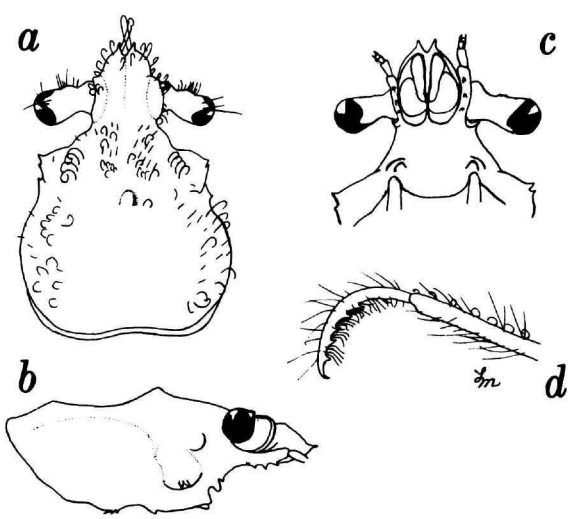

FIGURE 65.—*Achaeus buderes,* new species, female paratype, cl 4.5 mm, *Pillsbury* Sta 22: *a*, carapace, dorsal view; *b*, carapace, lateral view; *c*, front, ventral view; *d*, dactylus of fifth pereiopod.

Rostrum (Figure 65*a-c*) consisting of 2 short, sharp spines arising from broader, rounded frontal lobes, separated by a deep V-shaped emargination, base of emargination extending posterior to base of spinules. Apices of rostrum directed anteriorly, not upturned in lateral view (Figure 65*b*).

Supraorbital eave (Figure 65*a*) smooth, not denticulate or spined. Postorbital margin smooth, unarmed. Eyestalks stout, expanded distally, anterior margin with low, broad prominence, anteroventral margin minutely spinulose and ornamented with setae. Narrow process on anterior margin extending to rounded, setigerous tubercle over cornea. Latter large, oval, obliquely terminal.

Hepatic region well defined, distinctly projecting laterally, with apical spine, directed obliquely forward, and smaller tubercles. Carapace width at hepatic lobes exceeding distance from gastric prominence to anterior margin.

Dorsal surface of carapace with 2 low, conical prominences in midline, gastric slightly higher than cardiac. Protogastric region with low, unarmed tubercle. Branchial region smooth, with inconspicuous mesobranchial tubercle centered dorsally. Epibranchial swelling distinct. Low swelling present on metabranchial region above posterior pereiopods. Lateral margin with irregularly placed low spinules, posterolateral margins with inconspicuous tubercles, posterior margin smooth.

Basal antennal article (Figure 65*b*) with 2

spines distally and 1 or 2 tubercles or spinules proximally. Antennal segments unarmed.

Antennular fossae large, longitudinally suboval, margins of fossae smooth. Basal antennular segment with line of tubercles ventrally. Interantennular process slender, terminating posteriorly in rounded right angle. Anterior process of epistome very thin.

Epistome (Figure 65*c*) broader than long, widening posteriorly, most of surface smooth, with sharp spinule anterolateral to opening of antennal gland. Pterygostomian region with sharp spine along lateral border.

Third maxillipeds not meeting in midline, hairy, not heavily spined. Ischium with 2 parallel lines of sharp denticles, mesial margin tuberculate or with small spines, lacking large spines. Merus with line of sharp denticles on surface, several small spines on mesial margin. Palp with slender dactylus, shorter than stout carpus and propodus combined. Carpus and propodus each with distal spine mesially.

Chelipeds slender in adult female, merus not extending beyond orbit. Ischium with line of spines ventrally. Merus with line of spines, some large, on ventrolateral border, 2 widely separated and 1 distal spine dorsally, and 1 distal spine mesially. Carpus with proximal outer spine, 2 spines on oblique dorsal line, and 1 inner distal spine, flanked proximally by sharp tubercle. Chela shorter than remainder of cheliped, fingers longer than palm. Palm with row of spines dorsally and ventrally, inner and outer surfaces smooth. Fingers flattened, lacking prominent gape (in ♀), cutting edges crenulate, lacking enlarged tooth on movable finger. Chela largely naked, with few long and short hairs scattered over surface.

Walking legs short, slender, merus and propodus of first walking leg each shorter than carapace, with curled hairs arising singly on dorsal surface of carpus and propodus, longer hairs scattered over surfaces of both segments. First walking leg longest, remainder decreasing in length posteriorly. Proximal segments of walking legs unarmed, merus lacking conspicuous distal dorsal spine. Dactylus of first walking leg straight proximally, slightly curved distally, unarmed ventrally, more than half as long as propodus, latter slightly shorter than merus. Dactylus of second walking leg shorter than that of first, more evenly curved, with 1 subdistal tooth ventrally; dactylus, measured across arc, more than half as long as propodus, latter shorter than merus. Dactylus of third walking leg falciform, with 3 large distal and 3 smaller proximal ventral teeth, length, measured across arc, slightly more than half propodus length, latter 4/5 as long as merus. Dactylus of fourth walking leg (Figure 65*d*) falciform, with 5 or 6 large distal and several smaller proximal teeth ventrally, length, measured across arc, more than half that of propodus, latter shorter than merus. Sternum unarmed. Male too damaged to determine details of abdomen and gonopod.

MEASUREMENTS.—Carapace length of male 4.7 mm, of non-ovigerous females 3.4 to 4.0 mm, of ovigerous females 3.0 to 7.0 mm.

REMARKS.—*Achaeus buderes*, with its stout, pyriform carapace with a very short neck, most closely resembles *A. foresti*. As in that species, there is a spinulose patch on the anterior margin of the eye, the hepatic lobes are armed, and there are spines and tubercles laterally on the carapace. This new species differs from *A. foresti* in having much stouter eyes, with the diameter of the stalk about half its length, having the supraorbital margin unarmed, having the posterior margin of the carapace unarmed, and in having a much shorter dactylus on the fourth pereiopods. In *A. foresti* that dactylus, measured across its arc, is longer than the ischium and merus combined, whereas in *A. buderes* it is slightly longer than half the length of the merus.

TYPE-LOCALITY.—Off Ghana, 05°10′N, 00°-25′W to 05°08′N, 00°28′W, in 42 m (*Pillsbury* Sta 23).

DISPOSITION OF TYPES.—The holotype (Crust. D. 23903), an ovigerous female, is in the Rijksmuseum van Natuurlijke Historie, Leiden. One lot of paratypes is also deposited there and two lots of paratypes are in the National Museum of

Natural History, Smithsonian Institution, Washington, D.C.

ETYMOLOGY.—The specific epithet is derived from the Greek prefix *bou-*, large, and *dere*, neck.

BIOLOGY.—This species was taken by the *Pillsbury* in depths between 35 and 51 m, usually on soft bottom, fine sand and green mud, with bryozoans. Ovigerous females were taken in May.

DISTRIBUTION.—Known only from type-locality, in 35 to 51 m.

Achaeus cranchii Leach, 1817

Achaeus cranchi.—Monod, 1956:539, 632, figs. 747–766 [Europe, Mediterranean, Canary Islands, Senegal, Sierra Leone].—Longhurst, 1958:89 [Sierra Leone].—Forest and Gantès, 1960:357 [Morocco].

Achaeus cranchii.—Zariquiey Alvarez, 1968:474, fig. 160e,f [Spain; references].—Christiansen, 1969:109, fig. 45, map 38 [North Atlantic].

SYNONYM.—?*Achaeus cursor* A. Milne Edwards and Bouvier, 1898.

DISTRIBUTION.—Eastern Atlantic from the British Isles southward to Sierra Leone, including the Azores and the Canary Islands; Mediterranean. Littoral to at least 68 m.

**Achaeus foresti* Monod, 1956

FIGURE 66

Achaeus foresti Monod, 1956:545, figs. 771–776.—Forest, 1968:1096, figs. 1–6.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 1♀ (?).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♂ (?).

DESCRIPTION.—Forest, 1968:1096.

Male Pleopod: Forest, 1968, fig. 6 (Ghana).

MEASUREMENTS.—Carapace length of male 2.8 mm, of female 3.7 mm. The only other known specimen, the holotype, is an ovigerous female with a carapace length of 5 mm.

REMARKS.—Forest (1968) redescribed this species from two specimens collected by the *Pillsbury*. His figures have been reproduced here (Figure 66) for the sake of completeness and to facilitate the recognition of this species and the other species from the *Pillsbury* collections.

The holotype, in the Muséum national d'Histoire naturelle, Paris, is in poor condition. As Forest (1968:1098) pointed out, all that remains of the type is the carapace on which the apices of the rostrum have been broken. Thus, these rostral spinules are shown by Forest (1968, fig. 1) but the rostrum appears unarmed in the illustrations given by Monod (1956, figs. 771–773); this latter figure also does not show the marginal spinules on the basal portion of the rostrum. Monod (1956, fig. 776) illustrates one of the pereiopods of the type on which the merus is

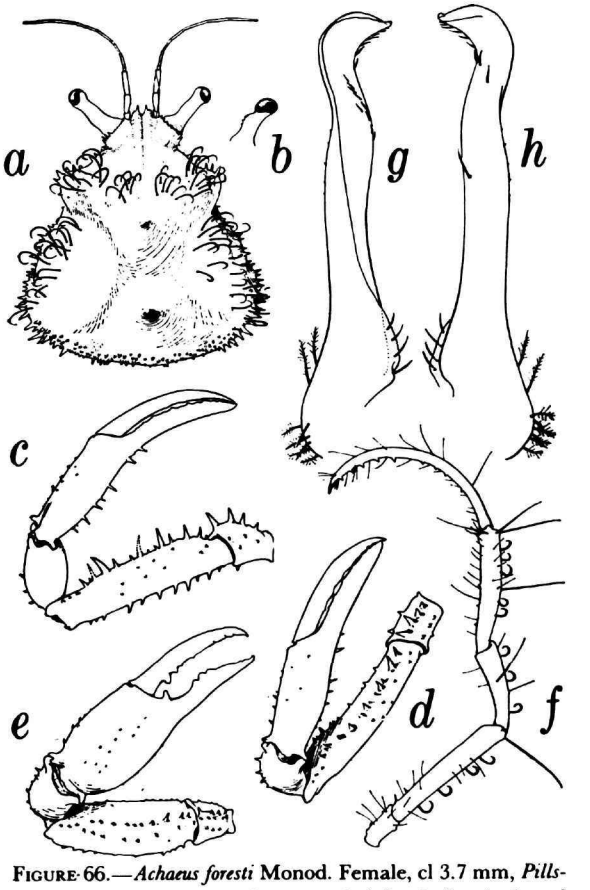

FIGURE 66.—*Achaeus foresti* Monod. Female, cl 3.7 mm, *Pillsbury* Sta 68: *a*, carapace; *b*, eye; *c*, *d*, right cheliped, viewed from different angles. Male, cl 2.8 mm, *Pillsbury* Sta 17: *e*, right cheliped; *f*, fifth pereiopod; *g,h*, gonopod in anterior and posterior views. (All from Forest, 1968, figs. 1–6.)

considerably longer than the propodus and the dactylus is subequal to the propodus; he may have shown the second pereiopod, for in the other species of *Achaeus* reported here that is the only pereiopod with the dactylus unarmed. Forest (1968) described the second pereiopod as having the merus shorter than the propodus and the dactylus 0.7 times as long as the propodus; his account of the third pereiopod indicates that the merus is slightly longer than the propodus and, as on the second pereiopod, the dactylus is 0.7 times as long as the propodus. Finally, the strong spines near the opening of the antennal gland mentioned by Forest in the *Pillsbury* specimens are not shown in Monod's original illustration of the species. We have not had an opportunity to reexamine the two *Pillsbury* specimens.

BIOLOGY.—Almost nothing is known of the biology of this species, represented by three specimens, one taken in 40 m off Senegal, one in 70 m on broken shell off Liberia, and one from 48 m on fine sand and green mud off Ghana. The only ovigerous female so far known was collected in March.

DISTRIBUTION.—Known from the following three localities off West Africa.

Senegal: S of Île de la Madeleine, near Dakar, 40 m (Monod, 1956).

Liberia: 04°23′N, 08°05.5′W to 04°24′N, 08°07.5′W, 70 m (Forest, 1968).

Ghana: 05°35′N, 00°10′E to 05°36′N, 00°11.5′E, 48 m (not 42 m)(Forest, 1968).

Achaeus monodi (Capart, 1951)

Podochela monodi Capart, 1951:95, fig. 31, pl. 1: figs. 8, 11, pl. 2: figs. 17, 18, 20 [Cabinda, Zaire, Angola].

Achaeus monodi.—Monod, 1956:548, figs. 782–810 [Senegal, Guinea, Sierra Leone, Gabon].—Longhurst, 1958:89 [Sierra Leone].—Rossignol, 1962:122 [Congo].—Forest and Guinot, 1966:109 [Guinea, Ivory Coast, Nigeria, Principe, São Tomé].—Le Loeuff and Intès, 1968, table 1 [Ivory Coast].

DISTRIBUTION.—West Africa, from Senegal to Angola, including the offshore islands of the Gulf of Guinea, Principe, and São Tomé; sublittoral, 0–4 to 100 m.

Achaeus trifalcatus Forest and Guinot, 1966

Achaeus sp.—Monod, 1956:547, figs. 777–781 [Annobon].

Achaeus trifalcatus Forest and Guinot, 1966:110, figs. 15–17, [Principe, São Tomé, Annobon].

DISTRIBUTION.—Known only from the offshore islands of the Gulf of Guinea, Principe, São Tomé, and Annobon, in depths from 0–6 to 37 m.

**Achaeus turbator*, new species

FIGURE 67

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 248, 33 m, 9♂ (includes holotype), 2♀ ov (L, W).

DESCRIPTION.—Carapace (Figure 67*a*,*c*) elongate triangular, width 0.64–0.72 (mean 0.68) times length, strongly narrowed anteriorly, slightly constricted behind orbits, neck appearing elongate, branchial regions swollen, regions well defined. Surface appearing smooth, not markedly granular.

Rostrum (Figure 67*a*,*c*) consisting of 2 very short, slender spinules with distinct posterior or basal shoulder, arising from truncate lobe or from 2 lobes separated by very shallow median emargination. Rostral spines directed anteriorly, not upturned in lateral view (Figure 67*b*).

Supraorbital eave (Figure 67*a*,*b*) smooth or lightly tuberculate, not armed with spinules. Postorbital margin smooth, unarmed. Eyestalks stout, width about half length, expanded distally, anterior margin sinuous, lacking well-marked projection. Narrow process on anterior margin of stalk extending to rounded tubercle over cornea. Latter large, oval, obliquely terminal.

Hepatic region moderately expanded, produced into acute or subacute unarmed lobe, anterior margin almost perpendicular to body line, occasionally with lateral tubercle but lacking apical spine. Width at hepatic lobes subequal to or less than distance from gastric protuberance to anterior margin.

Dorsal surface of carapace with 2 prominences on midline, gastric prominence an inflated tubercle, smaller and lower than cardiac prominence,

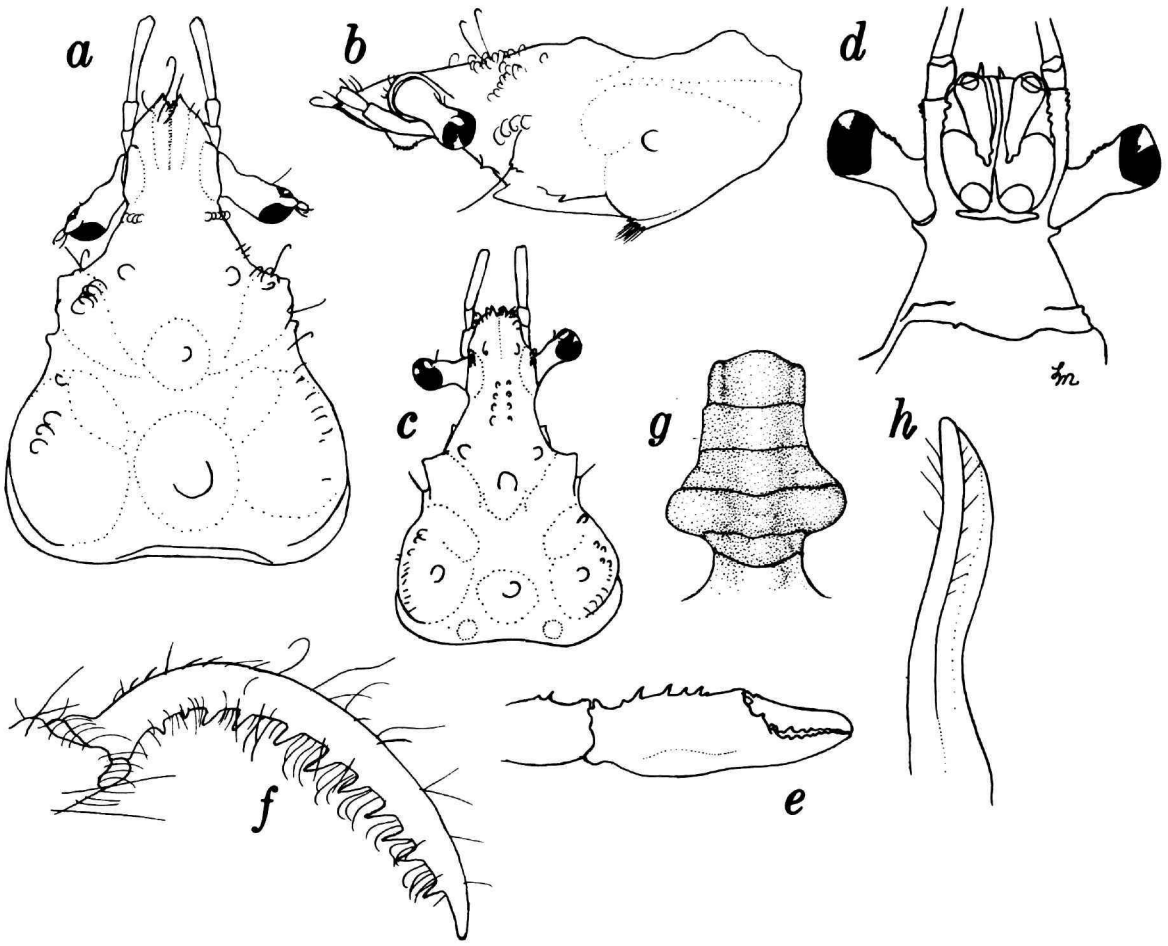

FIGURE 67.—*Achaeus turbator*, new species. Ovigerous female paratype, cl 6.0 mm, *Pillsbury* Sta 248: *a*, carapace, dorsal view; *b*, carapace, lateral view. Male paratype, cl 6.6 mm, *Pillsbury* Sta 248: *c*, carapace, dorsal view; *d*, epistome; *e*, chela; *f*, dactylus of fifth pereiopod; *g*, abdomen; *h*, gonopod.

neither spined dorsally. Protogastric region with low, unarmed tubercle. Branchial region smooth, with low mesobranchial tubercle centered dorsally. Epibranchial swelling, if present, low, inconspicuous. Low swelling present on metabranchial region above posterior pereiopods. Posterior and posterolateral margins unarmed, tubercles present anteriorly on margin above chelipeds.

Basal antennal article (Figure 67*d*) usually smooth, lightly tuberculate or with 1 or 2 low spinules in some specimens. Antennal segments unarmed.

Antennular fossae large, longitudinally subovate, lateral margins of fossae irregularly crenulate along border with basal antennal segment. Basal antennular segment bearing irregular line of tubercles ventrally. Interantennular process slender, terminating posteriorly in thin, blunt, obtuse, triangular lobe. Anterior process of epistome very slender.

Epistome (Figure 67*d*) appearing elongate, actually broader than long, widening posteriorly, most of surface smooth, with single sharp tubercle present anterolateral to opening of antennal

gland. Pterygostomian region with sharp tubercle on lateral border.

Third maxillipeds not meeting in midline, hairy, not heavily spined. Ischium with 2 parallel lines of small tubercles, mesial margin tuberculate, erect spines present on margin in some specimens. Merus largely smooth, with few surface tubercles, narrow, unarmed mesially or with tubercles or small spines. Palp with slender dactylus, shorter than stout carpus and propodus combined; carpus and propodus each with distal spine mesially.

Chelipeds (Figure 67*e*) long and stout, not heavily armed or setose. Ischium with several spines ventrally. Merus inflated, with row of large spines on ventrolateral border, inner distal spine mesially, upper surface largely smooth, with seta-tipped tubercle near midlength and small distal, dorsal spine. Carpus with proximal outer spine, row of spines of varying size dorsally, shorter row distolaterally, terminating in large distal spine. Chela shorter than remainder of cheliped, fingers shorter than palm. Palm with row of spines dorsally and ventrally, outer surface smooth, inner surface spinulose in males, nearly smooth in females. Fingers flattened, without prominent gape, cutting edges crenulate, proximal tooth of movable finger largest, not markedly enlarged. Chela largely naked, with few long and short hairs scattered over surface.

Walking legs very long and slender, merus and propodus of first each longer than carapace, with curled hairs arising singly on dorsal surface of carpus and propodus, longer hairs arising distally on propodus. First walking leg longest, remainder decreasing in length posteriorly. Proximal segments of walking legs unarmed, merus with distal dorsal spine. Dactylus of first walking leg straight proximally, slightly curved distally, unarmed ventrally, slightly more than half as long as propodus, latter slightly shorter than merus. Dactylus of second walking leg shorter than that of first, slightly curved, with 1 or 2 subdistal teeth ventrally, length across arc about half that of propodus, latter shorter than merus. Dactylus of third walking leg falciform, with about 12 sharp ventral teeth, length across arc less than half that of propodus, latter shorter than merus. Dactylus of fourth walking leg (Figure 67*f*) falciform, with about 12 sharp teeth ventrally, length across arc more than half that of propodus, latter shorter than merus.

Sternum unarmed or with few, low tubercles, and with short, oblique carina in males posterior to articulation of cheliped.

Abdomen in male of 6 somites (Figure 67*g*). All somites wider than long, third widest. Distal somite not expanded laterally, not markedly wider than fifth, apex obtuse, rounded. Surface with broad elevation on first and third to fifth somites. Male pleopod as illustrated (Figure 67*h*).

MEASUREMENTS.—Carapace lengths of males 5.8 to 7.8 mm, of ovigerous females 6.0 mm.

REMARKS.—*Achaeus turbator* is a relatively large, slender species which can readily be distinguished from the other Atlantic species of the genus. The rostrum, comprising two small spinules set on a rounded or truncate lobe will distinguish it from *A. trifalcatus*, which lacks rostral spines, and from *A. cranchii* and *A. gracilis*, both of which have rostral spines that taper evenly from base to apex; the latter two species also have spinulose posterolateral margins on the carapace and a much more prominent anterior projection on the eye. *Achaeus turbator* resembles *A. monodi*, *A. foresti*, and *A. buderes*, but is a much slenderer species than any of these and further differs from *A. monodi* in lacking erect dorsal spines on the cardiac and gastric prominences of the carapace, from *A. foresti* in lacking supraorbital spinules and spinules and tubercles posteriorly and posterolaterally on the carapace, and from *A. buderes* in having a long neck and unarmed hepatic lobes on the carapace.

TYPE-LOCALITY.—*Pillsbury* Sta 248, off Nigeria, 04°03′N, 05°41′E to 04°07′N, 05°40′E, in 33 m.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31764), a male, cl 7.0 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. The paratypes have been deposited in the Leiden Museum and in the Smithsonian Institution.

ETYMOLOGY.—The name is from the Latin, *turbator*, meaning disturber or trouble-maker.

DISTRIBUTION.—Known only from the type-locality, off Nigeria.

Genus *Calypsachaeus*, new genus

TYPE-SPECIES.—*Achaeus calypso* Forest and Guinot, 1966.

ETYMOLOGY.—The name is derived from the name of the vessel *Calypso* in combination with the generic name *Achaeus*; gender of the name is masculine.

DIAGNOSIS.—Carapace subtriangular, longer than broad, narrowed behind orbit, largely smooth dorsally, margins spinulous. Rostrum of 2 elongate, anteriorly truncated lobes, apex and margins spinulous. Orbit with only supraorbital eave above, lined with long spinules. Postorbital spine absent. Eyestalks long, nonretractile, cornea obliquely subterminal, slightly ventral, large, ovoid. Interantennular septum produced ventrally into cupped process with distal sharp spine, visible in dorsal view. Basal antennal article slender, channelled longitudinally, depression flanked on each side by line of tubercles, with strong distolateral spine. Merus of third maxilliped ovate, not notched distally, narrower than ischium, palp articulating at summit. Chelipeds spinous, slightly enlarged in adult male, palm strongly compressed, cristate dorsally and ventrally. Walking legs long and slender, dactyli of posterior 2 falciform, ventrally spinulated. Abdomen of 6 free somites in both sexes, male abdomen widest at third somite. Male first pleopod bluntly pointed, aperture terminal in groove.

REMARKS.—*Calypsachaeus* superficially resembles *Achaeus*, differing in the form of the rostrum, which is much better developed, in the strong development of the interantennular septum, in the ornamentation of the basal antennal segment, and in the form of the chelae, on which the palms are strongly compressed and cristate dorsally and ventrally. The male pleopod of *Calypsachaeus* (Forest and Guinot, 1966, fig. 19*c–d*) is similar to that of *Achaeus* in overall shape, but opens terminally rather than subterminally. *Achaeus calypso* is the only species we assign to this genus.

**Calypsachaeus calypso* (Forest and Guinot, 1966), new combination

FIGURE 68

Achaeus calypso Forest and Guinot, 1966:113, figs. 18, 19.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 2♂ (L).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♂, 2♀ (1 ov)(W). Sta 22, 51 m, rough bottom, 1♂ (W).

Nigeria: Sta 248, 33 m, 3♂, 1♀ ov (L).

Cameroon: Sta 260, 46 m, 1♂ (W).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 2♂ (L).

DESCRIPTION.—Carapace (Figure 68*a*) pyriform, width 0.75 to 0.87 (mean 0.82) times length, constricted behind orbit, branchial regions only slightly inflated, not extending over lateral margin, latter spinulous, regions not well defined. Surface sparsely granular, with scattered long, hooked hairs, especially laterally and anteriorly.

Rostrum (Figure 68*a,c*) consisting of 2 broad projections, separated by broad V- or U-shaped emargination, inner margins extending ventrally to sharp interantennular spine, clearly visible in dorsal view. Margins and blunt apices of rostrum spinulous, apices raised dorsally.

Orbital margin (Figure 68*c*) including supra

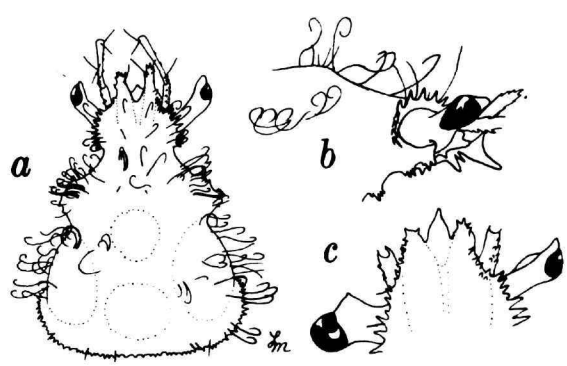

FIGURE 68.—*Calypsachaeus calypso* (Forest and Guinot), male, cl 6.8 mm, *Pillsbury* Sta 260: *a*, carapace; *b*, lateral view of front; *c*, oblique dorsal view of front.

orbital eave, completely lined with denticles or strong spinules. Distinct postorbital spine absent. Eyestalks slender, elongate, anterior or anteroventral margin with prominent, thin, blade-like, obtuse projection, as wide as or wider than stalk, with anterior spinules. Narrow process from anterior margin extending to rounded, setiferous tubercle over cornea. Latter broad, oval, obliquely terminal.

Hepatic region well defined, strongly projecting laterally, smooth or with apical spine or with apical row of spinules flanked anteriorly by spinular crest on hepatic lobe. Carapace width at hepatic lobes subequal to or greater than distance from gastric prominence to anterior margin.

Dorsal surface of carapace with 2 prominences in midline, gastric slender, usually an erect spine, often obsolete or broken, much the higher, cardiac prominence a low, obtusely rounded, conical lobe. Branchial regions smooth, unarmed, subregions not well marked. Lateral and posterior margins of carapace completely lined with tubercles or erect spinules.

Basal antennal article longitudinally sulcate, with inner and outer lines of spinules, fewer in smaller specimens, outer line terminating in enlarged distolateral tooth. Free segments of antennal peduncle variably tuberculate or spinulose.

Antennular fossae elongate-triangular, margins unarmed, lacking anterior rim, each fossa grading anteriorly into rostral spine. Basal antennular segment with patch or line of spiniform tubercles. Interantennular process strongly produced (Figure 68*b*), projecting well beyond level of basal antennal segment, expanded laterally to form broad, anteriorly cupped lobe, curved anteriorly, apically acute or spiniform. Inner, dorsal margin of cupped lobe grading evenly into inner surfaces of rostral horns. Anterior process of epistome thin, rounded, blade-like, projecting ventrally.

Epistome subrectangular, broader than long, most of surface smooth, with spinulose crest or patch of spinules lateral to opening of antennal gland. Pterygostomian region with stalked projection, apically spinulose, on lateral border.

Third maxillipeds not meeting in midline, hairy, heavily spined. Exopod lined with spinules. Ischium with 2 divergent rows of sharp denticles, mesial margin spinulose, tuberculate. Merus with line of sharp denticles on surface, spined mesially, with spinules laterally and distally. Palp with slender dactylus, shorter than stout carpus and propodus combined. Carpus and propodus each with distal spine mesially.

Chelipeds slender in both sexes, longer and slightly inflated in males, merus extending beyond eye in males, not extending to eye in females and juveniles. Ischium very spinous, largest spine set distoventrally. Merus with line of erect spines on sharp ventral border, outer surface smooth, upper border cristate, smooth or with line of tubercles, inner surface with some lines of tubercles. Palm strongly compressed, cristiform dorsally and ventrally, upper margin with spaced spines and tubercles, lower margin smooth, inner surface of lower margin with line of spines and denticles, outer surface smooth, inner surface tuberculate. Fingers longer than palm, flattened, lacking prominent gape, cutting edges crenulate, lacking enlarged proximal tooth on movable finger. Chelae largely naked, with few hooked hairs on outer surface, upper and lower borders with few long, stiff hairs interspersed between spines.

Walking legs long and slender (merus of second pereiopod longer than carapace, propodus subequal to or slightly longer than carapace), with curled hairs arising in groups on dorsal surface of distal 4 segments and longer hairs scattered over surface, especially on propodus and dactylus. Second pereiopod longest, remainder decreasing in length posteriorly. Merus of walking legs with distal arc of spinules or low tubercles dorsally. Dactylus of second pereiopod straight proximally, curved distally, unarmed ventrally, more than half as long as propodus, latter shorter than merus. Dactylus of third pereiopod as long as that of second, slightly more curved distally, unarmed ventrally, more than half as long as propodus, latter subequal to merus. Dactylus of fourth pereiopod falciform, ventral margin with numerous triangular teeth, some swollen, proximally tuberculate, length across arc subequal to that of

propodus, latter shorter than merus. Dactylus of fifth leg falciform, armature similar to that of fourth, length across arc subequal to that of propodus, latter shorter than merus.

Male abdomen narrowed distally, apex broadly rounded, with median tubercle on each somite, sixth somite with 2 subapical tubercles or spinules. Male pleopod as figured by Forest and Guinot (1966, fig. 19c,d).

Sternum granular in both sexes, in male ornamented with anteriorly convex arc of strong spines and tubercles, with 1 enlarged spine near base of each cheliped.

MEASUREMENTS.—Carapace lengths of males 5.7 to 9.0 mm, of females 4.8 to 9.3 mm, of ovigerous females 8.6 to 9.3 mm. The male holotype has a carapace length of 10.0 mm (Forest and Guinot, 1966).

REMARKS.—This striking species can readily be recognized by its relatively smooth carapace, eyes with their flattened anterior projection, broad rostral spines, well-developed interantennular spine, flattened chelae, and the spinous ventral surface.

BIOLOGY.—This species occurs on the shelf in the Gulf of Guinea in depths between 30 and 70 m. The *Pillsbury* specimens were taken in 48 m on fine sand and green mud, in 51 m on rough bottom, and in 70 m on broken shell. The holotype was taken by the *Calypso* in 32 m on mud with *Arca*, and Forest and Guinot (1966) also recorded material taken on mud in 30, 50, and 70 m. Ovigerous females were collected in May.

DISTRIBUTION.—Gulf of Guinea, where it has been recorded from localities between Liberia and Cameroon in depths between 30 and 70 m. Records in the literature, all from Forest and Guinot (1966), include the following:

Ivory Coast: No specific locality, 30, 50, and 70 m.
Nigeria: Off the mouths of the Niger River, 04°03'N, 06°12'E, 32 m.

It has not been recorded previously from Liberia, Ghana, Dahomey, or Cameroon.

Genus *Capartiella*, new genus

TYPE-SPECIES.—*Achaeus longipes* Capart, 1951.

ETYMOLOGY.—We take great pleasure in dedicating this genus to A. Capart. His pioneering work on West African crabs published in 1951 added much to our knowledge of the brachyuran fauna there. Gender of the generic name is masculine.

DIAGNOSIS.—Carapace pyriform, length slightly greater than width, scarcely narrowed behind the orbit as a neck, lacking long spines or sharp tubercles. Rostrum a single short rounded projection, depressed anteriorly, overreached by strong interantennular spine. Orbit consisting above of narrow supraorbital eave, postorbital spines absent. Eyestalks long, nonretractile, movable. Cornea terminal, slightly ventral. Interantennular septum produced into distinct spine. Basal article of antennule slender, longitudinally sulcate, ornamented with low, rounded tubercles and distal blunt angular projection. Merus of third maxilliped subovate, not notched distally, narrower than ischium, palp articulating anterointernally. Chelipeds short, slender in both sexes. Walking legs long, slender, dactyli elongate, arched, with triangular ventral spines. Abdomen of 6 somites in both sexes. Male first pleopod with blunt apex, aperture terminal.

REMARKS.—In his original description, based on a single non-ovigerous female, Capart (1951: 63) noted that "c'est avec grande hésitation que je place cette curieuse espèce dans le genre *Achaeus*. . . . " He further noted that *C. longipes* could be separated from other species of *Achaeus* by its simple rostrum and by the shape of the dactyls of the walking legs. Monod (1956), who had no additional material, transferred the species to *Physachaeus* Alcock, with reservations, noting the superficial resemblance of *C. longipes* to *P. ctenurus* Alcock. Subsequent authors recording the species have followed Monod in placing the species in *Physachaeus*.

Forest and Guinot (1966:108, 109), in recording the first males to be collected, interpreted the rostrum as being formed of two very short lobes which were overreached ventrally by the interantennular septum, i.e., the rostrum comprised two fused lobes rather than a single one. They also pointed out differences in the eyes and the

basal antennal segment of *C. longipes* and those of species of *Physachaeus*, based on accounts in the literature, and noted (p. 109) "il est possible que l'on soit amené par la suite à créer pour elle un nouveau genre."

We have been able to compare our material with a male and female *Physachaeus ctenurus* (13°-17'15"N, 93°10'25"E, 185 fm (339 m), *Investigator*, USNM 42757) and from this comparison conclude that the resemblance between *C. longipes* and *P. ctenurus* is superficial. In *Physachaeus* the rostrum is clearly bifid, the eyes are short and fixed, with a terminal cornea, there are large gastric and cardiac spines on the carapace, the basal article of the antenna bears a long spine, and there are but 5 somites in the abdomen of the female. The condition of the eyes in *C. longipes*, long and movable, versus those of *P. ctenurus*, would be enough to exclude *C. longipes* from *Physachaeus*.

Capartiella most closely resembles *Achaeus* Leach, *Achaeopsis* Stimpson, *Dorhynchus* Studer, and the American *Podochela* Stimpson (definition of the latter genus in Rathbun, 1925). It resembles *Achaeus*, *Achaeopsis*, and *Dorhynchus* and differs from *Podochela* in having the abdomens of each sex composed of 6 somites. In *Podochela*, which also has an unarmed carapace and usually has a simple but anteriorly produced rostrum, the abdomen is composed of 6 somites in the male, 5 in the female. The legs of *Capartiella*, like those of *Achaeopsis*, are very long, slender, setose, with the dactyl slender, not strongly recurved, but *Capartiella* lacks the spines on the carapace. *Capartiella* shares many features with *Achaeus*, but differs in having a single rostrum, slender chelipeds that are not inflated or enlarged in adult males, and slender dactyli on the walking legs. The male pleopod of *Capartiella longipes* (figured by Forest and Guinot, 1966, fig. 14), resembles that of some species of *Achaeus* figured by Griffin (1970, figs. 13-15) in general configuration, and differs strongly from the pleopods of *Podochela*, which are apically acute with a subterminal opening flanked by a rounded flap, as shown by Garth (1958, pl. H).

* *Capartiella longipes* (Capart, 1951), new combination

FIGURES 69, 70

Achaeus ? longipes Capart, 1951:62, fig. 19, pl. 1: fig. 1, pl. 2: figs. 21, 22.

Physachaeus (?) *longipes*.—Monod, 1956:537, fig. 746.—Forest, 1959:15.—Rossignol, 1962:122.—Forest and Guinot, 1966:108, fig. 14.—Crosnier, 1967:340.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 2♀ (L).

Ivory Coast: Sta 42, 62-75 m, mud with brown, branched Foraminifera, 1♂, 1♀ (L, W). Sta 46, 38-42 m, mud with dense *Jullienella*, 1♀ ov (L). Sta 60, 79-82 m, coral or rock, 2♂ (W).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂, 2♀ ov (L). Sta 23, 42 m, foliate brown to orange bryozoans, 3♀ ov (L, W). Sta 24, 35-37 m, dark red bryozoans, 1♀ (W). Sta 28, 49-53 m, 1♂, 1♀ ov (L).

Nigeria: Sta 239, 73 m, 1♀ (W). Sta 240, 37 m, 1♂ (L). Sta 241, 59-63 m, mud and shell, 1♀ (L). Sta 248, 33 m, 1♂, 1♀ (W).

Other Material: Congo: Off Pointe-Noire, 04°48'S, 11°-39'E, 54-56 m, sandy mud, 23 Sep 1965, *Ombango*, A. Crosnier, 2♂, 4♀ (1 ov) (W).

Cabinda: SW of Landana, 50 m, 23 May 1959, *Ombango*, A. Crosnier, 1♀ ov (W).

DESCRIPTION.—Capart, 1951:63.

Male Pleopod: Forest and Guinot, 1966, fig. 14 (Ghana).

MEASUREMENTS.—Carapace lengths of males 6.0 to 11.1 mm, of non-ovigerous females 4.0 to 13.9 mm, of ovigerous females 6.0 to 13.0 mm.

REMARKS.—We have provided here sketches of *C. longipes*, as well as Capart's original figures (Figures 69, 70) of it, apparently one of the more common species on the shallow part of the shelf in the Gulf of Guinea. All of our specimens were completely covered with a dense coat of algae and mud, so dense that their shape was scarcely discernible. This may have caused the species to be overlooked in earlier collections, for the shelf from Ghana to Nigeria has been well sampled in the last 25 years.

BIOLOGY.—This species apparently lives on soft bottoms in depths of no more than 82 m. The *Pillsbury* specimens were taken in depths of 33 to 82 m, usually on mud bottom with foraminifera

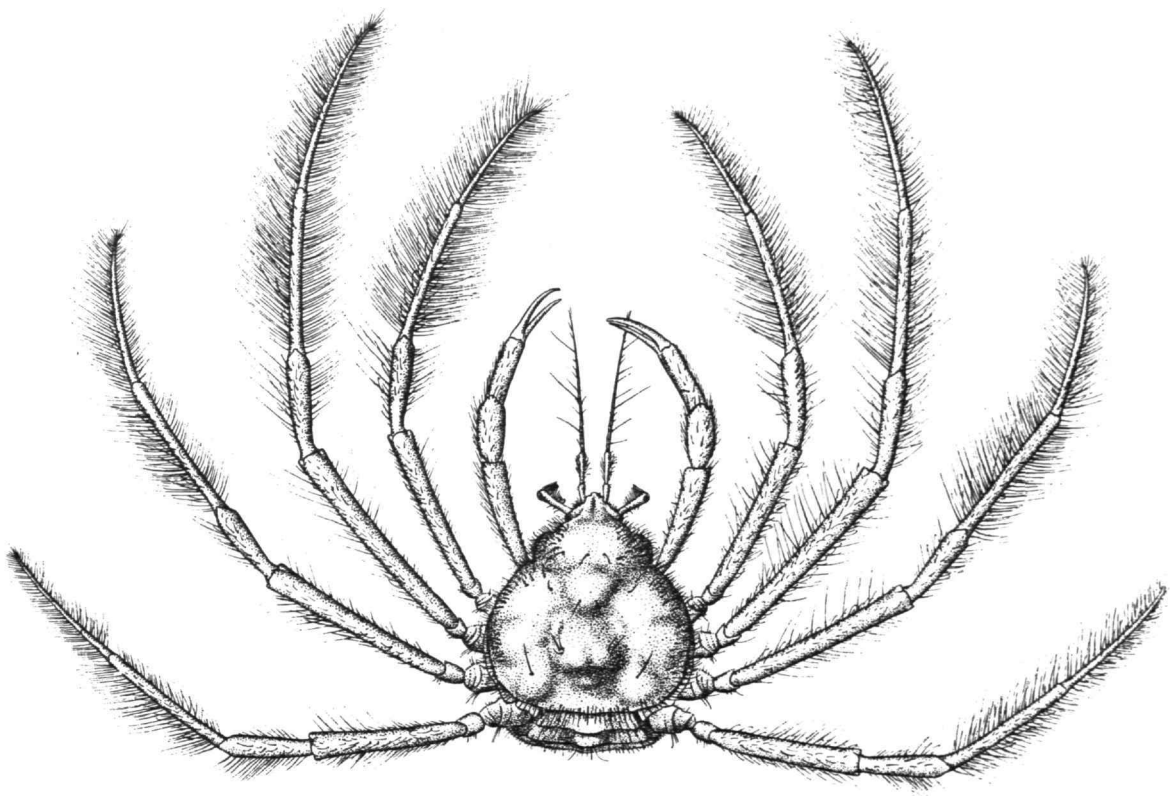

FIGURE 69.—*Capartiella longipes* (Capart) (from Capart, 1951, fig. 19.)

or Bryozoa; one sample was taken on broken shell and one on coral or rock (which terminated the haul; a rock outcrop may have been encountered on an otherwise soft bottom). Capart (1951) reported the species from a depth of 60 m in green mud. The specimens reported by Forest and Guinot (1966) came from mud, sand, and compact sand (sable construit) in 67–75 m and from mud in 50 m. Crosnier (1967) found the species on mud and sandy mud in depths between 35 and 58 m.

Ovigerous females have been collected in February, May, June, and September.

DISTRIBUTION.—Tropical West Africa, where it has been taken at a few localities between Senegal and Angola; sublittoral, in depths between 33 and 82 m. Records include the following:

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest, 1959; Forest and Guinot, 1966).

Ivory Coast: No specific locality (Forest and Guinot, 1966).

Ghana: 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m (Forest and Guinot, 1966).

Dahomey: No specific locality, 35–38 m (Crosnier, 1967).

Cabinda: W of Landana, 50 m (Rossignol, 1962).

Angola: 10 mi NxW of Luanda, 08°37′S, 13°12′E, 60 m (Capart, 1951).

Genus *Dorhynchus* Thomson, 1873

Dorhynchus Thomson, 1873:175 [type-species: *Dorhynchus thomsoni* Thomson, 1873, by monotypy; gender: masculine; name 1619 on *Official List*].

Lispognathus A. Milne Edwards, 1881, in 1873–1881:349 [type-species: *Lispognathus furcillatus* A. Milne Edwards, 1881, by monotypy; gender: masculine].

DIAGNOSIS.—Carapace triangular, pyriform, longer than broad, expanded behind orbit, with dorsal spines, margins spinulous. Rostrum of 2

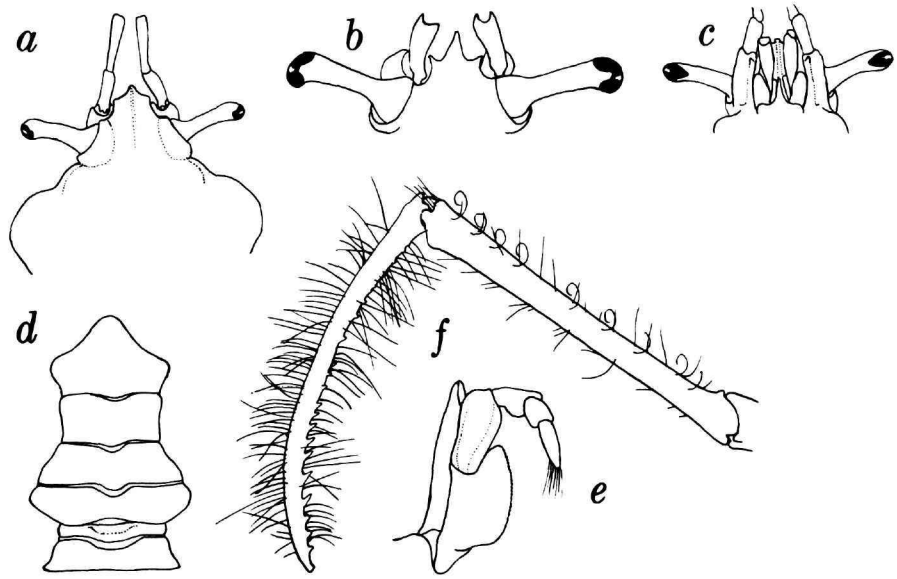

FIGURE 70.—*Capartiella longipes* (Capart). Male, cl 10.0 mm, *Pillsbury* Sta 248: *a*, front, dorsal view; *b*, front, oblique anterior view; *c*, front, ventral view; *d*, abdomen. Female, cl 12.0 mm, *Pillsbury* Sta 248: *e*, third maxilliped. Male, cl 11.1 mm, Congo: *f*, propodus and dactylus of fifth pereiopod.

slender, sharp spines usually divergent anteriorly. Orbits with supraorbital eave provided with supraorbital spine(s), preorbital spine absent. Postorbital spine absent, nuchal spine present between hepatic lobe and orbit. Eyestalks short, movable but nonretractile, cornea terminal, large, subglobular. Interantennular septum produced into sharp spine, usually visible in dorsal view. Basal antennal article slender, channelled longitudinally, channel flanked by inner and outer rows of spines, with enlarged terminal spine distolaterally. Merus of third maxilliped spinous, ovate or subrectangular, not notched distally, narrower than ischium, palp articulating at summit. Chelipeds spinous, slenderer in female, palm inflated. Walking legs long and slender, dactyli elongate, not falciform, posterior 2 with low teeth ventrally. Abdomen of 6 somites in both sexes. Male first pleopod bluntly pointed, with distinct subterminal lappet.

REMARKS.—Although the *Pillsbury* collections included no representatives of this genus, our recognition herein of some new genera in this subfamily necessitated examination of representatives of all of the genera of Inachinae in the eastern Atlantic. In the case of *Dorhynchus*, considered by some (Rathbun, 1925; Barnard, 1950; Griffin, 1966b) but not others (Bouvier, 1940; Monod, 1956; Zariquiey Alvarez, 1968; and Christiansen, 1969) to be synonymous with *Achaeopsis* Stimpson (1858d:218; type-species: *A. spinulosa* Stimpson, 1858, by monotypy; gender: feminine; name 1604 on *Official List*), comparison of material of *D. thomsoni* (off Morocco, 1105 m, *Talisman*, USNM 22974, 3♂, cl 7.3–7.5 mm, 3♀, cl 5.8–7.5 mm) with a specimen of *A. spinulosa* (South Africa, 36°40′S, 21°26′E, 200 m, USNM: 1♂, cl 12 mm) leads us to suggest that the two should be regarded as distinct but closely related genera.

Dorhynchus differs from *Achaeopsis* in several features: the rostral spines are much longer; the interantennular spine is much larger, projects further ventrally, and its apex usually is visible between the rostral spines in dorsal view; the walking legs are longer and slenderer: in *D. thom-*

soni the merus of the second pereiopod is longer than the carapace whereas in *A. spinulosa* it is shorter than the carapace; and the dactyli of the pereiopods are slender and similar on all legs in *D. thomsoni*, whereas they are falciform in the last two legs of *A. spinulosa*. Also, as Barnard (1950: 25) pointed out, *A. spinulosa* generally occurs in shallower water than does *D. thomsoni*.

If this interpretation is correct and *Achaeopsis* and *Dorhynchus* are retained as separate genera, then two other species assigned to *Achaeopsis* sensu lato by Griffin (1966b), *Achaeopsis rostrata* Sakai, 1932, from Japan and *Stenorhynchus ramusculus* Baker, 1906, from South Australia and New Zealand, both of which have slender legs, should be transferred to *Dorhynchus*, and *Achaeopsis* should be restricted to include only the type-species, *A. spinulosa*.

Although *Dorhynchus thomsoni* is now considered to be widely distributed ["virtually cosmopolitan," Griffin (1966b:35)], we agree with Bouvier (1940:351), Monod (1956:523), and Guinot (1967a:289, footnote), all of whom question whether the populations from different areas are conspecific. In the collection of the Smithsonian Institution, for example, there is one lot from Chiloe Island, off Chile (USNM 156225), in which the rostrum is spinulose ventrally, rather than smooth, and in which there are three distal spines on the meri of the pereiopods, rather than one as shown for *D. thomsoni* by Christiansen (1969:106, fig. 44). Material of *Dorhynchus thomsoni* should be examined from throughout its range to determine the relationship of the various populations.

Dorhynchus thomsoni Thomson, 1873

Dorynchus thomsoni Thomson, 1873:174, 175, fig. 34.
Dorynchus Thomsoni.—Filhol, 1885a:56.
Lispognathus Thompsoni.—Filhol, 1885a, fig. 1.
Dorhynchus thomsoni.—Monod, 1956:522 [references].—Zariquiey Alvarez, 1968:467 [Spain; references].—Christiansen, 1969:106, fig. 44, map 37 [North Atlantic].

DISTRIBUTION.—Eastern Atlantic, W and S of Iceland and the Faroes southward to the Cape Verde Islands; deep water species, in depths between 100 and 2100 m. The occurrence of this species outside of the eastern Atlantic requires verification.

Genus *Ergasticus* Studer, 1883

Ergasticus Studer, 1883:7 [type-species: *Ergasticus clouei* Studer, 1883, by monotypy; gender: masculine; name 1620 on *Official List*].

Ergasticus clouei Studer, 1883

Ergasticus Clouei Studer, 1882:335 [nomen nudum]; 1883:8.
Ergasticus clouei.—Monod, 1956:523.—Pérès, 1964:20.—Zariquiey Alvarez, 1968:463, fig. 155b [Spain; references].—Türkay, 1976a:25 [listed], 39, fig. 32 [Portugal, in part].

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Morocco: Off Cap de Mazagan, 33°39'N, 08°46'W, 500 m, Agassiz trawl, 20 Mar 1976, *Onversaagd* Sta 151, 1♀ (L).
Cape Verde Islands: 16°52'N, 27°30'W of Paris (25°10'W of Greenwich), 400–580 m, sand and rock, 29 Jul 1883, *Talisman* Sta 111, 1♂, 1♀ ov (W).

DESCRIPTION.—A. Milne Edwards and Bouvier, 1900:140.
Figure: A. Milne Edwards and Bouvier, 1900, pl. 21: figs. 1–7.

MEASUREMENTS.—Carapace length of non-ovigerous females 8–10 mm, of ovigerous female 8 mm.

BIOLOGY.—*Ergasticus clouei* is a deepwater species, occurring in depths between 70 m and 1241 m; more than 90% of the depth records in the literature are from depths between 300 and 750 m.

Ovigerous females have been recorded in July and August (A. Milne Edwards and Bouvier, 1899, 1900; Bouvier, 1922).

DISTRIBUTION.—Eastern Atlantic from the Bay of Biscay to the Cape Verde Islands, including Madeira and the Azores; Mediterranean. Deepwater, in depths between 70 and 1241 m. Monod (1956) reported no specimens. Other West African records include the following:

Morocco: Banc de Spartel, 35°54'N, 06°14'W, 210 m

(Pérès, 1964). 33°12.6'N, 09°15.2'W, 500 m, and 33°10.5'N, 19°17.5'W, 170–345 m (Türkay, 1976a).

Cape Verde Islands: 15°40'N, 23°06'W, 38 fm (70 m) (Studer, 1882).

Genus *Inachus* Weber, 1795

Inachus Weber, 1795:93 [type-species: *Cancer scorpio* Fabricius, 1779, a subjective junior synonym of *Cancer dorsettensis* Pennant, 1777, by subsequent designation by H. Milne Edwards, 1840, in 1836–1844, pl. 34: fig. 2; gender: masculine; name 1698 on *Official List*].

Macropus Latreille, 1803a:27 [an invalid junior homonym of *Macropus* Shaw, 1790; type-species: *Cancer phalangium* Fabricius, 1775, by monotypy; gender: masculine; name 1777 on *Official Index*].

Leptopodia Leach, 1814:431 [type-species: *Cancer phalangium* Fabricius, 1775, by monotypy; gender: feminine].

Pseudocollodes Rathbun, 1911:247 [type-species: *Pseudocollodes complectens* Rathbun, 1911, by monotypy; gender: masculine].

REMARKS.—Griffin (1974:18) correctly synonymized *Pseudocollodes* Rathbun, 1911 with *Inachus* Weber, 1795, but, as pointed out later (p. 290), we suspect that *Inachus complectens* (Rathbun), known from the western Indian Ocean and South Africa (Barnard, 1950; Griffin, 1974) is not conspecific with *I. dorsettensis* (Pennant).

As is the case with most of the West African spider crabs, the species of *Inachus* appear to require much further study. Four species are represented in the *Pillsbury* collections and three of these are undescribed; two of the species previously were identified with European species.

Monod (1956) recorded seven species from West Africa: *Inachus angolensis* Capart (the only endemic species to be listed), *I. dorsettensis* (Pennant), *I. guentheri* (Miers), *I. phalangium* (Fabricius), *I. thoracicus* (Roux), *I. aguiarii* De Brito Capello, and *I. leptochirus* Leach. Monod's accounts of *I. dorsettensis* and *I. leptochirus*, both relatively well-known European species, appear to be based on material of the two new species described herein. Monod's account of *I. guentheri* (Miers), which unfortunately is not represented in the *Pillsbury* collections, does not agree with the account of that species in Barnard (1950:27): the rostral teeth and the spination of the carapace appear to be quite different in the Gulf of Guinea and South African populations now referred to this species. Our studies of the *Pillsbury* collections have suggested that relatively few West African species identified by earlier workers with European or Mediterranean species actually are conspecific with those species. We suspect, therefore, that available West African material referred to *I. phalangium*, *I. thoracicus*, and *I. aguiarii*, should be carefully reexamined.

The identity of the dwarf forms of *Inachus dorsettensis* reported by Doflein (1904) and Odhner (1923) from deep water off West Africa cannot be determined with certainty without examining their material; they could have been dealing with the new species *I. grallator* or *I. nanus*, both of which occur in relatively deep water and are smaller than European Atlantic specimens of *I. dorsettensis* sensu stricto. We have tentatively referred them to *I. grallator*.

The identity of the juvenile female from Angola reported by Odhner (1923:19) as *Inachus* sp. also cannot be determined with certainty on the basis of his account. He may have been dealing with *I. biceps*, new species, or with *I. guentheri* sensu lato.

The following key distinguishes the West African species of *Inachus*. The key would be complete for the eastern Atlantic by adding the Mediterranean *I. communissimus* (Rizza), which would key out with *I. nanus*, new species, *I. dorsettensis*, which would key out with *I. angolensis* and *I. grallator*, new species, and *I. leptochirus*, which would key out with *I. biceps*, new species. We decided against adding these species to the key because of the uncertain status of the Mediterranean population of *I. dorsettensis* (see *Inachus grallator*, new species, p. 287).

Key to Tropical West African Species of *Inachus*

1. Gastric areas of carapace with transverse row of 4 tubercles anterior to gastric spine 2

   Gastric area of carapace with at most 2 tubercles anterior to gastric spine 4

2. Interantennular spine short, not visible between rostral spines in dorsal view ..... ***I. nanus***, new species
   Interantennular spine large, well developed, visible between rostral spines in dorsal view [often overreaching rostral spines] 3
3. Cardiac and branchial regions of carapace with erect spines ..... ***I. grallator***, new species
   Cardiac and branchial regions of carapace lacking erect spines ..... ***I. angolensis***
4. Rostral spines appressed for most of their length [white sternal callosity absent in male] ..... ***I. phalangium***
   Rostral spines separate for all of their length 5
5. Branchial regions of carapace each with erect dorsal spine 6
   Branchial regions of carapace each with obtuse swelling or rounded tubercle dorsally, lacking erect dorsal spine 7
6. Male lacking white sternal callosity ..... ***I. guentheri***
   Male with prominent, simple sternal callosity ..... ***I. biceps***, new species
7. Walking legs elongate, first (= second pereiopod) more than 4 times as long as carapace in males. Sternal callosity in males only .. ***I. thoracicus***
   Walking legs short, first (= second pereiopod) less than 4 times as long as carapace in males. Sternal callosity present in both sexes .... ***I. aguiarii***

Inachus aguiarii De Brito Capello, 1876

Inachus aguiari.—Monod, 1956:533, figs. 736–739 [Guinea]. —Forest and Guinot, 1966:107 [Spanish Sahara].
Inachus aguiarii.—Zariquiey Alvarez, 1968:473, fig. 158c,d [Spain; references].

DISTRIBUTION.—Eastern Atlantic, from Portugal, Madeira, and Guinea; Mediterranean. Sublittoral, in depths between 20 and 200 m.

**Inachus angolensis* Capart, 1951

Inachus angolensis Capart, 1951:72, fig. 22, pl. 1: fig. 7, pl. 2: fig. 10.—Monod, 1956:524, figs. 711–714.—Rossignol, 1957:77, 116 [key], pl. 1: fig. 1.—Gauld, 1960:72.— Rossignol, 1962:122.—Crosnier, 1964:34.—Forest, 1965b:394 [discussion].—Forest and Guinot, 1966:106.—Le Loeuff and Intès, 1968:31, 46, table 1, figs. 51, 63.—Maurin, 1968a:62; 1968b:486, 489, 491.—Le Loeuff and Intès, 1969:66.—Crosnier, 1970:1215 [listed], 1218.
Inachus.—Maurin, 1968b, figs. 4, 9.
?*Inachus mauritanicus.*—Maurin, 1968b:484 [not *Inachus mauritanicus* Lucas, 1846 = *I. communissimus* Rizza, 1839].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 2♂, 2♀ (L). Sta 49, 73–77 m, 1♀ (L). Sta 50, 128–192 m, 1♀ (L). Sta 62, 46 m, brown, branched and foliate Foraminifera, 5♂, 1♀ (L). Sta 63, 64 m, sandy mud with shells, 3♂, 1♀ ov (L). Sta 64, 68 m, 1♂ (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♀ (L). Sta 22, 51 m, rough bottom, 1♀ (W). Sta 28, 49–53 m, 2♂, 4♀ (L).

Nigeria: Sta 239,73 m, 2♂ (L). Sta 241, 59–63 m, mud and shell, 7♀ (6 ov) (L).

Cameroon: Sta 259, 59 m, mud and broken shell, 26♂, 21♀ (3 ov) (W).

Undaunted Material: Angola: Sta 94, 90 m, 1♂, 1♀ (L). Sta 96, 162 m, 1♂, 1♀ (L). Sta 103, 90 m, 1♀ (L).

Other Material: Congo: Off Pointe-Noire, 150 m, slightly sandy mud, 27 Feb 1967, A. Crosnier, 1♂ (W).

DESCRIPTION.—Capart, 1951:72.

Figures: Capart, 1951, fig. 22, pl. 1: fig. 7; Monod, 1956, figs. 711–714.

Male Pleopod: Capart, 1951, pl. 2: fig. 10 (Angola); Monod, 1956, fig. 714 (Senegal).

MEASUREMENTS.—Our specimens have carapace lengths of 7 to 23 mm; the ovigerous females have carapace lengths of 12 to 16 mm. The largest

specimen recorded by Capart (1951) was 23 mm long.

REMARKS.—*Inachus angolensis*, one of five Atlantic species now known to have a transverse line of four tubercles on the gastric region of the carapace, is one of three of those species in which the interantennular spine is strongly developed, being clearly visible in dorsal view. It is the only one in this group of species lacking erect spines on the cardiac and branchial regions.

In *I. angolensis* the branchial margin of the carapace is continuous with the free epineral margin as described by Forest (1965a) for *I. dorsettensis* (Pennant). The dactylus of the chela is provided with 1 or 2 large basal teeth. The second pereiopod may be as much as 5 times as long as the carapace in adult males, and the merus of that leg may be up to 1.5 times as long as the carapace. The dactylus of the fifth pereiopod lacks subapical spinules as in the Mediterranean *I. communissimus* Rizza (Forest, 1965a:393).

Monod (1956) suggested that *I. angolensis* might be a southern form of *I. mauritanicus* Lucas [a junior synonym of *I. communissimus* Rizza, according to Forest (1965a) who examined the types of *I. mauritanicus*], but *I. angolensis* differs in numerous features and, as pointed out by Forest (1965a) and Forest and Guinot (1966), can be distinguished by the long interantennular spine alone.

BIOLOGY.—This species apparently prefers soft bottoms in moderate depths on the shelf and upper slope. Most of the specimens collected by the *Pillsbury* were taken at depths between 46 and 77 m, but one sample came from 128–192 m; the samples were taken on mud with Foraminifera and shells and brown, branching and foliate Foraminifera in 46 m, rough bottom in 51 m, mud with brown, branched Foraminifera in 62–75 m, mud and broken shell in 59 m, and sandy mud with shells in 64 m. The specimen recorded here from Pointe-Noire was taken in slightly sandy mud in 150 m. Capart (1951) recorded material on green mud in 60–110 m, on black, brown mud in 100 m, on sand and mud in 240 m, and on green sandy mud in 250–300 m. Monod (1956) did not specify bottom type, but recorded material in depths between 82 and 350 m.

Crosnier (1964) characterized *I. angolensis* as a cold water species, living at depths greater than 50 m. Maurin (1968b) found this species off Spanish Sahara on muddy detritic bottom in 50–90 m and off Mauritania on mud or sandy mud in 90–100 m and on fine detritic sand, occasionally muddy, in 200–400 m. Le Loeuff and Intès (1968:46) note that "c'est une espèce d'eaux froides (19°5 à 15°2) et salées (35,4 ‰ à 35,72 ‰)"; they found the species in 80 to 200 m. Capart (1951) recorded it in 240 m with a bottom temperature of 10.85°C. Forest and Guinot (1966) found *I. angolensis* on sand and compact sand [sables construit] in 65–75 m and on mud in 50 m.

Ovigerous females have been recorded in February, March, April, May, June, September, and October (Capart, 1951; Monod, 1956; Crosnier, 1970; *Pillsbury*).

DISTRIBUTION.—West Africa, from localities between Spanish Sahara and southern Angola in depths between 46 and at least 350 m. Capart's (1951) material came from off the Congo and Angola and Monod (1956) reported material from Senegal; since 1956 it has been recorded from the following localities.

Spanish Sahara: Between Cabo Corbeiro and Cabo Blanco, 50–90 m (Maurin, 1968b).

Mauritania: Banc d'Arguin, 90–150 m (Maurin, 1968a), and 40–60, 60–70, and 90–100 m (Maurin, 1968b). Off Tamzak (as Tamxat), 200–400 m (Maurin, 1968b).

Senegal: Saint-Louis, 75–85 m (Maurin, 1968b). 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality, 60+ m (Le Loeuff and Intès, 1969), 80–200 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 60 m (Gauld, 1960). 04°40′N, 02°08′W to 04°39′N, 02°05′W, 50 m (Forest and Guinot, 1966).

Cameroon: No specific locality, depths greater than 50 m (Crosnier, 1964).

Congo: Off Pointe-Noire (Rossignol, 1957). W of Pointe-Noire (Rossignol, 1962).

Angola: 16°27′S, 11°35′E, 90 m; 16°41′S, 11°21′E, 162 m; and 17°06′S, 11°35′E, 90 m (Crosnier, 1970).

*Inachus biceps, new species

FIGURES 71, 72

Inachus leptochirus.—Monod, 1956:535, 632, figs. 740–745.—Longhurst, 1958:89.—Gauld, 1960:72.—Forest and Guinot, 1966:107. [Not *Inachus leptochirus* Leach, 1817.]

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 17, 48 m, fine sand and green mud, 1♂ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 6♂, 3♀ (2 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 14♂ (includes holotype), 14♀ (13 ov) (L, W). Sta 26, 27m, shell bottom (scallops), 1♂, 2♀ (1 ov) (L).

Nigeria: Sta 248, 33 m, 1♂, 2♀ ov (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2: 1♂, 1♀ ov (L).

DESCRIPTION.—Carapace (Figure 71*a,d*) broader than long. Gastric region with pair of tubercles anterior to erect gastric spine (Figure 72*a*). Cardiac region with low, rounded or obtuse dorsal projection, lower than gastric spine, flanked posteriorly on midline by lower prominence. Branchial regions each with dorsal tubercle, lateral branchial margin tuberculate. Hepatic region irregularly tuberculate anteriorly. Rostrum very short, teeth obtusely rounded, each usually with minute apical tubercle. Eyes large, cornea often extending laterally beyond broad postocular spine. Interantennular spine a very small, obtuse lobe, not visible in dorsal view, scarcely or not at all visible in lateral view (Figure 72*a*). Posterolateral border of carapace continuous with free epimeral margin. Basal antennal segment (Figure 72*a,b*) with row of tubercles, some sharp, on mesial and lateral margins, anterolateral angle of basal segment lacking prominent spine.

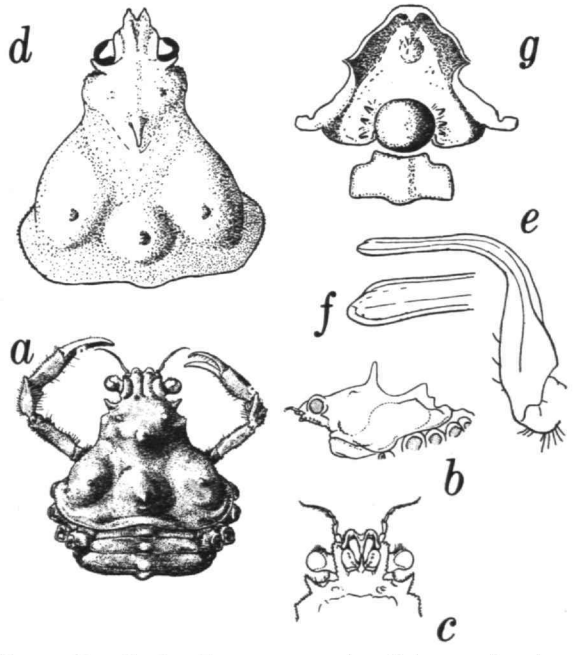

FIGURE 71.—*Inachus biceps*, new species. Ovigerous female, Ghana: *a*, dorsal view; *b*, carapace, lateral view; *c*, front, ventral view. Male, Ghana: *d*, dorsal view; *e*, first pleopod; *f*, apex of first pleopod; *g*, sternum. (From Monod, 1956, figs 740–745.)

Chelipeds (Figure 72*c*) enlarged in adult males, about 1.5 times as long as carapace, merus and propodus markedly inflated in adult. Chelipeds in females slender, subequal to or slightly longer than carapace. Merus and carpus spiny in both sexes. Palm with row of large tubercles proximally on outer face in males. Palm depth 1/2 length in females, 2/3 length in males. Fingers subequal to or slightly longer than palm. Cutting edges of fingers unarmed basally in females, dactylus with 2 prominent proximal teeth in males.

First walking leg 4 or slightly more than 4 times as long as carapace, merus, propodus, and dactylus each longer than carapace in males, relatively shorter in females. Dactylus unarmed, sinuous distally, apex gently curved, length subequal to or slightly greater than that of propodus. Second to fourth walking legs decreasing in size posteriorly, fourth about twice carapace length in females, slightly longer in males. Second walking leg scarcely overreaching propodus of first by tip of dactylus. Latter sinuous, gently curved distally, shorter than propodus, with 1 or 2 subdistal teeth ventrally. Third walking leg not extending to end of propodus of second, overreaching carpus of second by distal third of propodus. Dactylus more curved than that of preceding leg, shorter than propodus, with 2 subdistal teeth ventrally. Fourth walking leg rather short, not extending to end of propodus of third. Dactylus short, more strongly

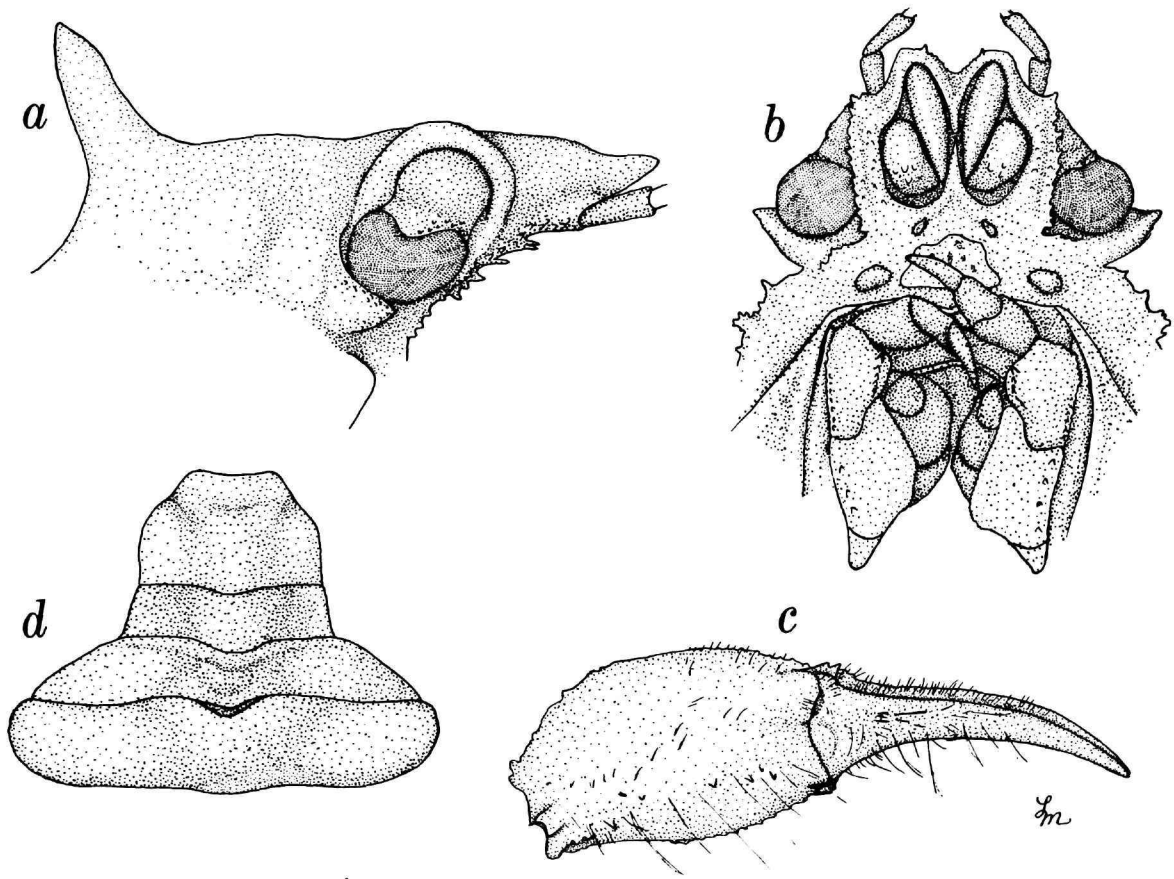

FIGURE 72.—*Inachus biceps*, new species, paratype, male, cl 8.3 mm, *Pillsbury* Sta 24: *a*, front, lateral view; *b*, front, ventral view; *c*, chela; *d*, abdomen.

curved than those of preceding legs but not sickle-shaped, length across arc subequal to that of propodus, armed ventrally with 1 or 2 large, subdistal teeth and several teeth proximally.

Male abdomen (Figure 72*d*) with terminal somite apically truncated. Male pleopod as shown in Figure 71*e,f*. Males with subcircular pearly sternal callosity (Figure 71*g*).

MEASUREMENTS.—Carapace lengths of males 5.9 to 10.7 mm, of non-ovigerous females 7 to 9 mm, of ovigerous females 6.8 to 8.7 mm.

REMARKS.—*Inachus biceps* closely resembles *I. leptochirus* Leach, differing as follows: the rostral spines are short, rounded lobes, which usually terminate in an apical spinule; the interantennular spine is much smaller; the basal antennal segment lacks a distinct distolateral spine; both the merus and the propodus of the chela are inflated in adult males; there is a row of three prominent tubercles on the outer face of the propodus of the chela in males; the terminal somite of the abdomen in males is truncated rather than rounded; and the sternal callosity in the male is subcircular rather than oval in shape.

In the synonymy of this species we include only references to *I. leptochirus* from tropical West Africa; some of the references to that species from other localities, summarized below under *I. leptochirus*, may well refer to *I. biceps*. All require verification.

Inachus biceps can be distinguished readily from the other West African species which have two gastric tubercles and a sternal callosity in the male. The new species differs from *I. aguiarii* De Brito Capello in several features: the interantennular spine is smaller; there is a dorsal tubercle rather than a spine on the branchial region; and the sternal callosity is subcircular in shape. In *I. aguiarii* the sternal callosity is developed in both sexes, rather than only in the males as in *I. biceps*. Neither of the other West African species with two gastric tubercles, *I. phalangium* (Fabricius) or *I. guentheri* (Miers), have the sternal callosity developed in either sex.

TYPE-LOCALITY.—Off Ghana, 04°56′N, 00°-47.5′W to 04°56′N, 00°50′W, in 35 to 37 m (*Pillsbury* Sta 24).

DISPOSITION OF TYPES.—The holotype (Crust. D. 31770), a male, cl 9.4 mm, cb 10.3 mm, from *Pillsbury* Sta 24, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes are in the collections of the National Museum of Natural History, Smithsonian Institution, and the Rijksmuseum van Natuurlijke Historie at Leiden.

ETYMOLOGY.—The specific epithet is from the English derivative of the Latin *musculus biceps*, alluding to the inflated cheliped.

BIOLOGY.—*Inachus biceps* is a sublittoral species, occurring in depths between 27 and 300 m. Only two of the 16 depth records available are from relatively deep water, namely off Sierra Leone in 220–240 m (Monod, 1956) and 300 m (Longhurst, 1958); the remainder of the records are from depths of less than 60 m. Material from the two deepest records should be reexamined. The *Pillsbury* collected the species off Ghana, where it appears to be relatively common (28 specimens at Sta 24), on fine sand and green mud and on bottom with bryozoans or shell. It was taken by the *Calypso* on shells, and mud with *Arca*.

Ovigerous females have been collected in February, May, and November (Monod, 1956; Forest and Guinot, 1966; present paper).

DISTRIBUTION—*Inachus biceps* is a tropical West African species, known from a few localities between Senegal and Nigeria in depths between 27 and 300 m. The following records are in the literature:

Senegal: S of Gorée, 40–41 and 46–50 m (Monod, 1956).

Sierra Leone: No specific locality, 220–240 m (Monod, 1956), 300 m (Longhurst, 1958).

Ghana: Off Accra, 43, 44, and 51 m (Monod, 1956) and 44–51 m (Gauld, 1960).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

It has not been recorded previously from Dahomey, although that is well within its known range.

Inachus dorsettensis (Pennant, 1777)

Cancer Dorsettensis Pennant, 1777:8, pl. 9A: fig. 18.

Inachus dorsettensis.—A. Milne Edwards and Bouvier, 1899:45 [key], 46 [Azores]; 1900:143 [?part; Ilhas Desertas; Spanish Sahara].—Balss, 1922:72 [listed].—Bouvier, 1922:79 [Canary Islands].—Monod, 1933b:503 [p. 48 on separate; listed].—Capart, 1951:70 [part; Spanish Sahara].—Maurin, 1968a:31 [Morocco]; 1968b:489 [Mauritania].—Zariquiey Alvarez, 1968:472, figs, 157f, 159b, 160b [Spain; references].—Christiansen, 1969:100, fig. 41, map 34 [North Atlantic].—Türkay, 1976a:26 [listed], 40, fig. 34 [Portugal, Morocco].

SYNONYMS.—?*Cancer dodecos* Linnaeus, 1767; *Macropus parvirostris* Risso, 1816; *Doclea fabriciana* Risso, 1827.

DISTRIBUTION.—Eastern Atlantic, from the Hebrides southward to Mauritania (?), including the Azores and the Canary Islands; Mediterranean; ?South Africa. Sublittoral, from a few meters to about 110 m. All of these records require verification.

* *Inachus grallator*, new species

FIGURES 73, 74

?Inachus dorsettensis.—A. Milne Edwards and Bouvier, 1900: 143 [part?: Cape Verde Islands, 75–90 and 318 m].—Doflein, 1904:72 [Banc de la Seine; Spanish Sahara].—Odhner, 1923:19 [Angola, 72–108 m].—Monod, 1956:526 [? part].—Longhurst, 1958:89 [Sierra Leone, 72–118 m].—Guinot and Ribeiro, 1962:77 [Angola, 150–220 m].

Inachus dorsettensis.—Capart, 1951:70, fig. 21, pl. 1: fig. 6, pl. 2: fig. 11 [part, not specimens from Spanish Sahara?].—

Crosnier, 1970:1218. [Not *Inachus dorsettensis* (Pennant, 1777).]

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 255, 264–269 m, 3♂ (includes holotype), 1♀ (L, W).

Undaunted Material: Angola: Sta 96, 162 m, 1♀ (L).

Other Material: Congo: 05°03'S, 11°23'E, 247–250 m, sandy mud, 23 Jan 1968, A. Crosnier, 3♀ ov (W).

DESCRIPTION.—Carapace (Figure 73*a*) distinctly longer than broad, length 1.06 to 1.12 times width. Gastric region of carapace with 4 tubercles in transverse row anterior to erect gastric spine. Cardiac region of carapace with erect dorsal spine. Each branchial region with shorter erect spine, not markedly recurved anteriorly, and with dorsal tubercle anterior to each spine. Hepatic lobe with 2 distinct tubercles, and smaller, less conspicuous tubercles scattered on surface. Rostrum (Figures 73*b*, 74*b*) short, spines broad, lateral margins convergent anteriorly. Eyes large, but not extending laterally beyond strong postorbital spine. Interantennular spine well developed, clearly visible in dorsal view (Figure 73*a,b*) overreaching rostral spines in some specimens. Branchial margin of carapace tuberculate, anteriorly continuous with free epimeral margin. Basal antennal segment (Figure 73*b*) with row of tubercles, posteriormost largest, anterolateral angle lacking prominent spine.

Chelipeds subequal to or slightly longer than carapace, slender, not markedly inflated (slightly inflated in some males), equal and similar in both sexes; ischium with inner row of 4 or 5 erect tubercles; merus rounded, with low, blunt spines and tubercles, primarily on ventral surface; carpus with scattered small tubercles and spinules; palm covered with small, blunt spines; dactylus much longer than palm, cutting edge lacking enlarged proximal tooth or teeth.

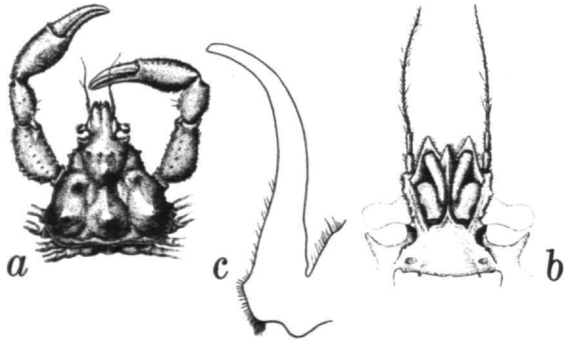

FIGURE 73.—*Inachus grallator*, new species: *a*, dorsal view; *b*, ventral view of front; *c*, male pleopod. (All from Capart, 1951, fig. 21, pl. 1: fig. 6, pl. 2: fig. 11.)

Second pereiopod (Figure 74*c*) about 4 (3.8 to 4.5, mean 4.1) times as long as carapace, very slender, merus, propodus, and dactylus each longer than carapace; dactylus unarmed, subequal to or slightly shorter than propodus. Third pereiopod not extending to end of propodus of second, overreaching carpus of second by half of propodus and all of dactylus; latter shorter than propodus, lacking subdistal spines ventrally. Fourth pereiopod extending to or slightly overreaching propodus of third; dactylus slightly curved, with 2 low, subdistal tubercles, subequal to propodus. Fifth pereiopod (Figure 74*d,e*) scarcely overreaching propodus of fourth by tip of dactylus; latter similar to those of third and fourth pereiopods, subequal to propodus, with 2 subapical tubercles apically. Male pleopod shown in Figure 73*c*.

MEASUREMENTS.—Carapace lengths of males 14.2 to 15.5 mm, of non-ovigerous females 12.7 to 13.0 mm, of ovigerous females 14.5 to 14.6 mm.

REMARKS.—*Inachus grallator* is the southern counterpart of *Inachus dorsettensis*, which it closely resembles. It may be a smaller species than *I. dorsettensis*, Atlantic populations of which may attain a carapace length of 30 mm (Christiansen, 1969), almost twice as large as adult specimens of *I. grallator* available for study. It also appears to live in deeper water, occurring off West Africa in depths of 162–269 m. Zariquiey Alvarez (1968) noted that *I. dorsettensis* is usually found at depths of 30–40 m in Spain, and Christiansen (1969) recorded it from 6–10 m to about 110 m, and, because Bouvier (1940) noted that it occurred from the shore to 550 m, it seems possible that he was dealing with more than one species. Material of *I. dorsettensis* from Spain in the collections of the Smithsonian Institution comprises more than 30 lots from the Ria de Arosa, where it is common

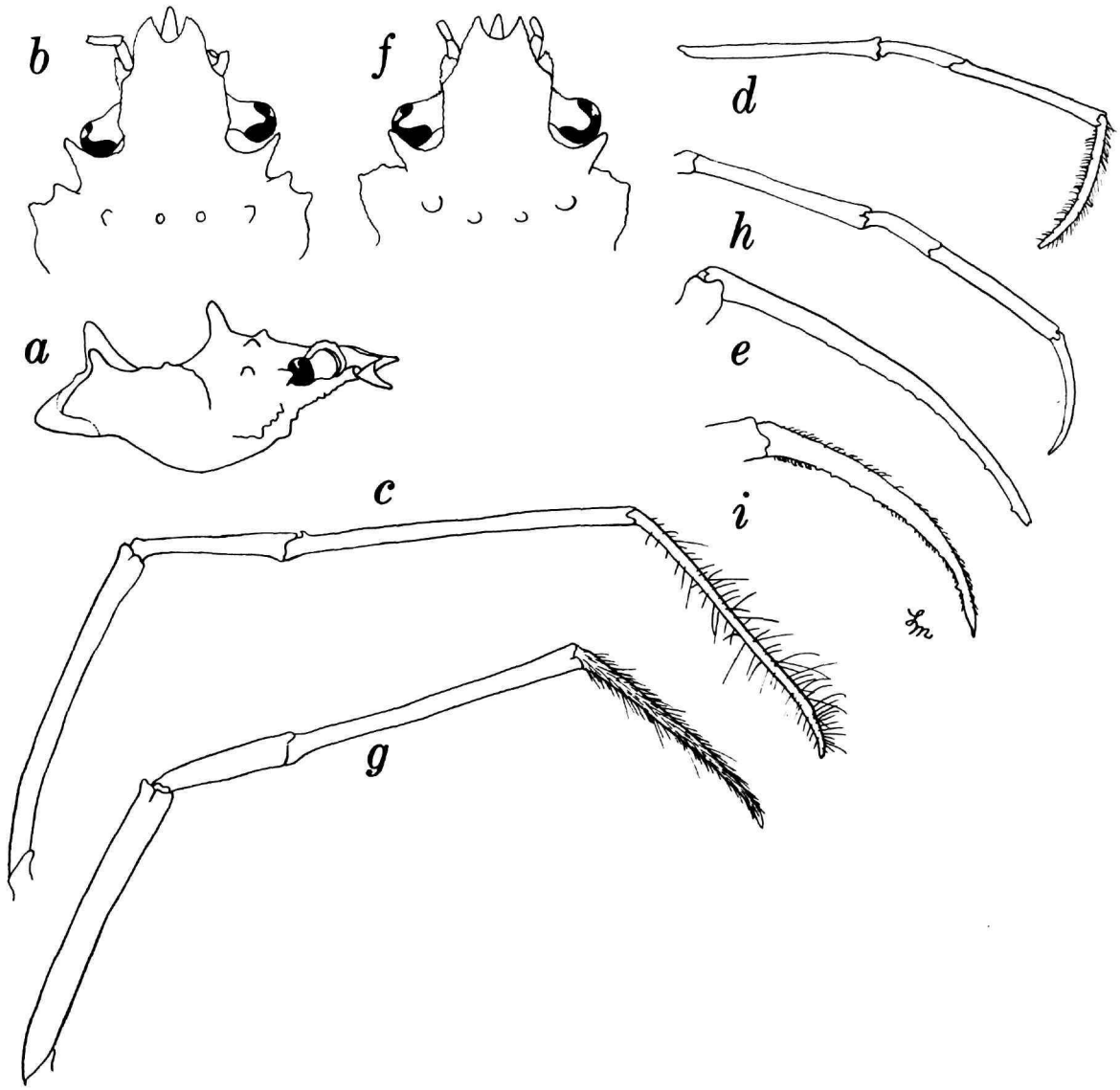

FIGURE 74.—*Inachus grallator*, new species, male paratype, cl 14.2 mm, *Pillsbury* Sta 255: *a*, carapace, lateral view; *b*, front, dorsal view; *c*, second pereiopod; *d*, fifth pereiopod; *e*, dactylus of fifth pereiopod. *Inachus dorsettensis* (Pennant), male, cl 15.1 mm, Spain: *f*, front, dorsal view; *g*, second pereiopod; *h*, fifth pereiopod; *i*, dactylus of fifth pereiopod.

in depths of less than 40 m, although 8 lots were taken in depths between 45 and 70 m.

The best way to distinguish *I. grallator* from *I. dorsettensis* is by the slenderness of the pereiopods and the shape of the dactyli of the fifth pereiopods. In *I. grallator*, the pereiopods are slenderer, appearing longer, and the dactyli of the fifth pereiopods are much less curved, being subsimilar to those of the fourth pereiopods (compare Figure 74*d*,*e* with 74*b*,*i*), as well as comparatively longer.

In adult females of *I. grallator* the dactylus of the fifth pereiopod is longer than the carapace, whereas in *I. dorsettensis* it is shorter. In females of the new species the pereiopods are slightly stouter than in males, but they are noticeably slenderer than the same pereiopods of *I. dorsettensis*.

Although Forest (1965a:392–393), in differentiating the Mediterranean *I. communissimus* Rizza from *I. dorsettensis*, stated that in the latter species the carapace is longer than broad (mean length/width ratio of 1.1 to 1), that the second pereiopod was three times as long as the carapace, and that the merus of the second leg was equal to the carapace, our material from Spain suggests that *I. dorsettensis* may be somewhat variable in these features. Our specimens have the carapace length/width ratio varying from 0.97 in ovigerous females to 1.04 in males; the carapace of adult females is noticeably broader than long. In our specimens the second pereiopods are 3.29 to 4.09 (mean 3.65) times as long as the carapace, being comparatively longer in males, and, in all of the specimens measured, the merus is perceptibly longer than the carapace.

As Forest (1965a:391) noted, Atlantic specimens of *I. dorsettensis* appear to be much larger than do Mediterranean specimens; the former may attain a carapace length of 30 mm, whereas the latter rarely exceed 20 mm in length. Our material suggests that in the Mediterranean population the dorsal spines of the carapace are much slenderer and higher than they are in material from Atlantic localities except in very large females in which the median spines usually are worn down. If the Mediterranean population proves to be distinct, the name *Inachus parvirostris* (Risso, 1816), which Risso originally proposed as *Macropus parvirostris*, is available.

Although Griffin (1974) synonymized *Pseudocollodes complectens* Rathbun, 1911, with *I. dorsettensis* (Pennant, 1777), reexamination of Griffin's material from the western Indian Ocean, as well as the type of *P. complectens*, leads us to believe that the Indian Ocean form is a distinct species. As noted above Griffin was correct in synonymizing *Pseudocollodes* with *Inachus*. We suspect that Griffin was misled in using the accounts of Monod (1956) and Barnard (1950) to help identify his material with *I. dorsettensis*. Monod was not dealing with *I. dorsettensis* but with an undescribed species, *I. nanus*, new species (p. 291). Although we have seen no material from South Africa, Barnard's (1950) account of *I. dorsettensis* suggests that he was dealing with *I. complectens*, a much spinier species with sharper rostral teeth, in which the four dorsal spines of the carapace all attain the same height (in *I. dorsettensis*, *I. grallator*, and *I. nanus*, the median spines are higher than the branchials). A redescription of *I. complectens* (Rathbun) is in preparation.

Specimens identified with *I. dorsettensis* from West African localities by A. Milne Edwards and Bouvier (1900), Odhner (1923), Longhurst (1958), Guinot and Ribeiro (1962), and, possibly, part of the material referred to *I. dorsettensis* by Monod (1956) may be referable to *I. grallator*; all of these records have been questioned in the synonymy, above. Both Doflein and Odhner commented on the small size of specimens they identified with *I. dorsettensis* from deep water off West Africa. All of their material, as well as all of the material listed above under *I. dorsettensis* from NW African localities, should be restudied.

Some of the deeper records for *I. dorsettensis*, assigned to *I. nanus*, new species (p. 291), may well be based on *I. grallator*. The specimen from Senegal illustrated by Monod (1956, fig. 720; Figure 75*d* herein) with long dorsal spines resembles *I. grallator* in that feature, but the interantennular spine appears to be small as in typical *I. nanus*.

ETYMOLOGY.—The specific epithet is derived from the Latin and means "one who goes on stilts," alluding to the long, slender legs of this species.

TYPE-LOCALITY.—Gulf of Guinea off Nigeria, 03°49′N, 07°38′E to 03°48′N, 07°42′E, in 264–269 m (*Pillsbury* Sta 255).

DISPOSITION OF TYPES.—The holotype (Crust. D. 27154) a male from *Pillsbury* Sta 255, is in the Rijksmuseum van Natuurlijke Historie, Leiden;

paratypes also are in that collection and in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

BIOLOGY.—*Inachus grallator* is a deep water species, known to occur in depths between 100 m and 250–300 m on soft bottom; Capart (1951) reported specimens from green mud, brown sandy mud, muddy sand and green muddy sand. The specimens recorded herein from the Congo were taken on sandy mud in 247–250 m.

Ovigerous females have been recorded in January and November (Capart, 1951; present paper).

DISTRIBUTION.—West Africa, from a few localities between Nigeria and Angola. Records in the literature include the following:

Gabon: 45 mi [72.5 km] NxE of Port-Gentil, 00°S, 08°-58′E, 250–300 m (Capart, 1951).

Angola: 25 mi [40 km] WNW of Ambriz, 07°39′S, 12°47′40″E, 100 m; 8 mi [12.8 km] NxE of Baía dos Elefantes, 13°05′S, 12°46′E, 100–110 m; 18 mi [29 km] WSW of Baía dos Tigres, 16°36′S, 11°27′E, 110 m (all Capart, 1951). 16°37′S, 11°22′E, 126 m (Crosnier, 1970).

Inachus guentheri (Miers, 1879)

Inachus guentheri.—Monod, 1956:529, figs 723–730 [Senegal, Gabon, Angola].

SYNONYM.—*Inachus antarcticus* Doflein, 1904.

DISTRIBUTION.—Off West Africa and South Africa, sublittoral, from about 18 to more than 180 m.

Inachus leptochirus Leach, 1817

Inachus leptochirus Leach, 1817, in 1815–1875, pl. 22B.—A. Milne Edwards and Bouvier, 1894:7 [Azores]; 1899:45 [key]; 1900:145 [part; Spain; Azores; Mauritania].—Doflein, 1904:73 [Seine Seamount].—Bouvier, 1922:79, pl. 2: fig. 5 [color] [Josephine Seamount; Princesse Alice Bank; S of Almadena].—Balss, 1922:72 [listed].—Monod, 1933b:503 [p. 48 on separate] [listed].—Chapman and Santler, 1955:376 [Azores].—Maurin, 1968b:484 [Spanish Sahara].—Zariquiey Alvarez, 1968:472, fig. 157a,b [Spain; references].—Christiansen, 1969:104, fig. 43, map 36 [North Atlantic].—Türkay, 1976a:26 [listed], 40, fig. 35 [Morocco].

SYNONYM.—*Inachus affinis* Rizza, 1839.

DISTRIBUTION.—Eastern Atlantic, from the Hebrides southward to Mauritania, including the Azores; Mediterranean. Sublittoral, from about 30 m to more than 500 m.

**Inachus nanus*, new species

FIGURE 75

Inachus dorsettensis.—Monod, 1956:526, 632, figs. 715–722 [?part].—Rossignol, 1957:116 [key]. [Not *Inachus dorsettensis* (Pennant, 1777).]

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 3♂, 2♀ ov (L). Sta 69, 29 m, coral or rock, 1♂ (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂ (holotype), 4♀ ov (L). Sta 49, 73–77 m, 1♂ (W). Sta 60, 79–82 m, coral or rock, 1♂, 2♀ ov (L). Sta 64, 68 m, 1♂, 1♀ ov (W).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂, 1♀ ov (W). Sta 22, 51 m, rough bottom, 1♂, 2♀ ov (L). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂, 1♀ ov (L). Sta 29, 58–60 m, 1♂ (W).

Nigeria: Sta 239, 73 m, 1♀ (W).

Cameroon: Sta 260, 46 m, 6♂, 1♀ ov (L).

DESCRIPTION.—Carapace (Figure 75*a*) with length and width subequal or length greater. Gastric region of carapace with transverse row of 4 tubercles anterior to erect gastric spine. Cardiac region with sharp, erect dorsal spine. Branchial regions each with dorsal spine, and, anterior to each, 1 blunt tubercle. Surface, anterior to branchial area, with 3–5 large tubercles, lateral margins of branchial regions irregularly tuberculate. Hepatic regions each with prominent lateral tubercle, margins irregularly tuberculate. Rostrum (Figure 75*a,b*) very short, margins tuberculate, outer margins convergent anteriorly. Interantennular spine acute but small, not visible in dorsal view between rostral teeth (Figure 74*a*). Eyes large, cornea extending laterally beyond prominent postocular spine. Posterolateral border of carapace continuous with free epimeral margin. Basal antennal segment (Figure 75*b*) with row of tubercles mesially and laterally, with larger spinule anterolaterally.

Chelipeds enlarged in males, about 1.3–1.4 times as long as carapace, merus and propodus markedly inflated (at cl 8.5 mm), extending with

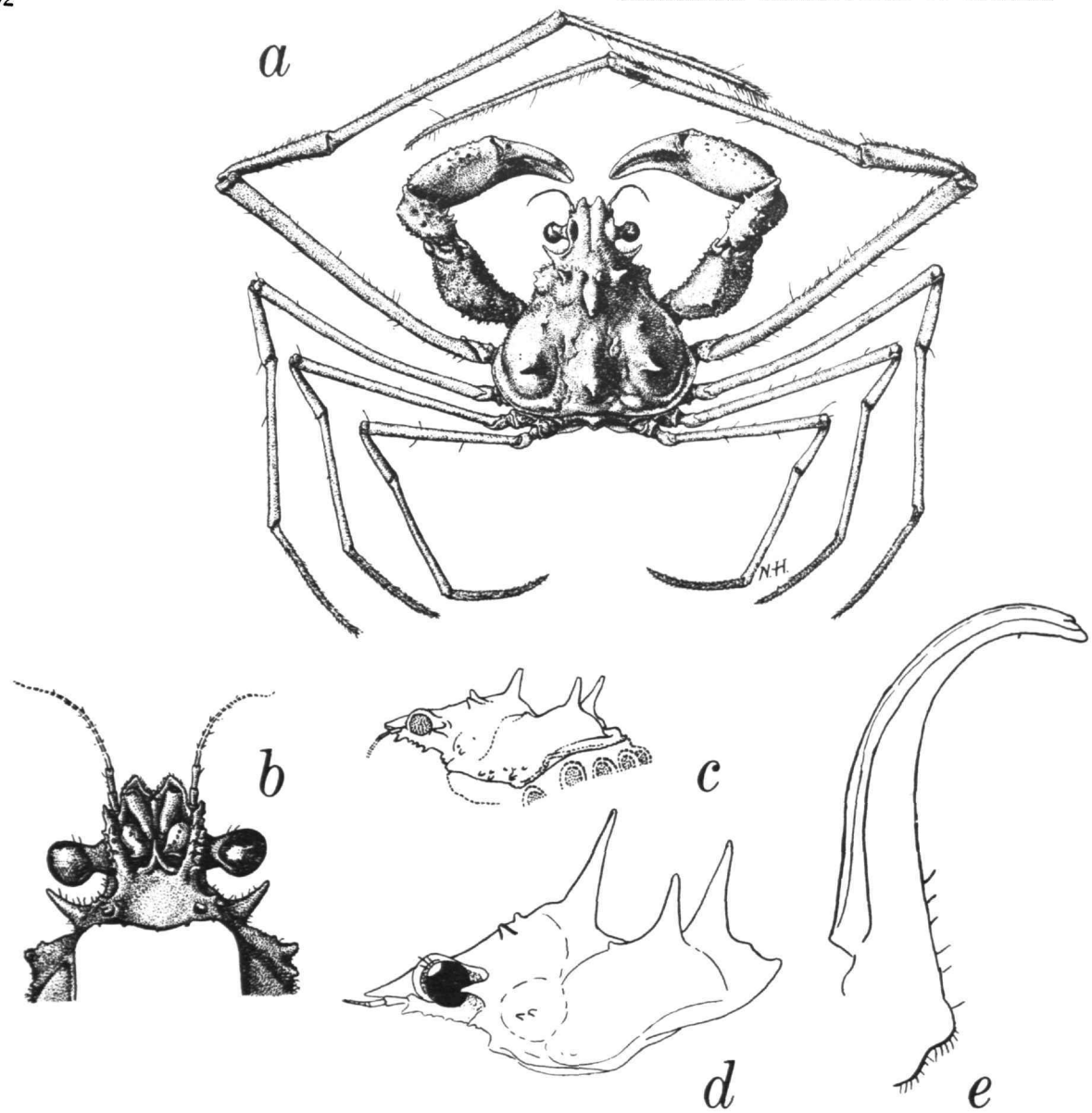

FIGURE 75.—*Inachus nanus*, new species: *a*, dorsal view; *b*, front, ventral view; *c*, carapace, lateral view; *d*, carapace of different specimen, lateral view (this could be based on *I. grallator*, new species); *e*, male pleopod. (All from Monod, 1956, figs. 715–717, 720, 722.)

half the carpus beyond front. Chelipeds in females slenderer than in males, about 1.1 times as long as carapace, carpus not extending to front. Chelipeds in both sexes with lower margin of merus and inner border of carpus very spiny. Palm tuberculate in both sexes, length about 1.7 times height in females, 1.3–1.4 times greatest height in males. Dactylus of chela with 2 rounded teeth proximally on cutting edge in males.

Second pereiopod about 4 times carapace

length in males, about 3.5 times carapace length in females (most second pereiopods detached); dactylus with minute tubercles ventrally, shorter than propodus, latter slightly shorter than merus. Dactylus of third pereiopod not overreaching propodus of second. Second to fifth pereiopods decreasing in size posteriorly, fifth about twice as long as carapace in males, about 1.5 times as long as carapace in females. Dactylus of fifth pereiopod curved but not strongly falcate, with 1 or 2 large, subdistal spinules flanked proximally by line of smaller spinules and tubercles.

Terminal somite of male abdomen rounded apically. Male pleopod as shown (Figure 75*e*).

MEASUREMENTS.—Carapace lengths of males 4.9 to 8.9 mm, of ovigerous females 4.8 to 8.3 mm.

REMARKS.—*Inachus nanus* resembles the Mediterranean *I. communissimus* Rizza and differs from the other Atlantic species of *Inachus*, which have a transverse row of four tubercles on the gastric region. It differs from *I. dorsettensis* (Pennant) and *I. grallator*, new species, in having a very small interantennular spine, which is not visible between the teeth of the rostrum in dorsal view. *Inachus nanus*, which has a maximum carapace length of less than 10 mm, is a much smaller species than *I. communissimus*; in the latter species Forest (1965a) recorded specimens with carapace lengths up to 26 mm. The carapace in *I. nanus* is longer than broad or about as broad as long; in *I. communissimus* it is much broader than long. In *I. nanus* the posterolateral margin of the carapace is continuous with the free epimeral margin whereas in *I. communissimus* it is not continuous, being interrupted on the anterior part of the branchial region.

Some of the West African records of *I. dorsettensis*, referred above to *I. grallator*, new species, may well be based on *I. nanus*; this can only be determined by examining the material.

TYPE-LOCALITY.—Gulf of Guinea off the Ivory Coast, 05°02.5′N, 03°49.5′W to 05°05′N, 03°52′W, in 62–75 m (*Pillsbury* Sta 42).

DISPOSITION OF TYPES.—The holotype (Crust. D. 27155), a male, cl 8.3 mm, cb 7.8 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden; paratypes also are deposited there and in the National Museum of Natural History, Smithsonian Institution.

ETYMOLOGY.—The specific epithet is from the Latin and refers to the diminutive size of this species.

BIOLOGY.—*Inachus nanus* is a sublittoral species, occurring in depths between 29 and 118 m. Only three of the 21 depth records available are from 100 m or more and only one is from less than 40 m. Although three of the lots taken by the *Pillsbury* were from rough bottom, coral or rock, most of the specimens were taken on mud, either with *Jullienella* or bryozoans. Some of the deeper records in Monod (1956) may be based on specimens of *I. grallator.*

Ovigerous females have been taken in February, May, June, July, September, and October, suggesting that the species spawns all year (Monod, 1956; *Pillsbury).*

DISTRIBUTION.—*Inachus nanus* is a sublittoral West African species, known from a few localities between Senegal and Gabon. The following records are all from Monod (1956):

Senegal: S of Cap Vert, 97–98 m; Fosse de Kayar, 100 m; S of Fosse de Kayar, 50 m; SE of Île de la Madeleine, Dakar, 48 m; off Gorée, 95, 96, and 132 m.
Sierra Leone: No specific locality, 118 m.
Gabon: Libreville, 60 m.

It has not previously been recorded from Liberia, Ivory Coast, Ghana, Nigeria, or Cameroon, but all of these lie within its known range.

Inachus phalangium (Fabricius, 1775)

Inachus phalangium.—Monod, 1956:531 [references].—Zariquiey Alvarez, 1968:472, fig. 159c [Spain; references].—Christiansen, 1969:102, fig. 42, map 35 [North Atlantic].
Inachus dorhynchus.—Rossignol, 1957:115 [key].—Forest and Gantès, 1960:357 [Morocco].

SYNONYMS.—?*Cancer tribulus* Linnaeus, 1767 [name suppressed by ICZN]; *Inachus dorynchus* Leach, 1814; *Macropus aracnides* Risso, 1816.

DISTRIBUTION.—Eastern Atlantic, from about 60°N latitude southward to the Cape Verde Is-

lands; Mediterranean. Sublittoral, from about 10 to at least 150 m.

Inachus thoracicus Roux, 1830

Inachus thoracicus.—Capart, 1951:68 [Congo].—Monod, 1956: 532, figs. 731–735 [Senegal, Gambia].—Rossignol, 1957: 115 [key].—Longhurst, 1958:89 [Sierra Leone].—Maurin, 1968a:48, 59; 1968b:480, 484, 486, fig. 5 [both Spanish Sahara, Mauritania].—Zariquiey Alvarez, 1968:473, figs. 157c,d, 158a,b [Spain; references].

SYNONYM.—*Inachus cocco* Rizza, 1839.

DISTRIBUTION.—Eastern Atlantic, from southern Europe to the Congo, including the Canary Islands; Mediterranean. Sublittoral, to at least 100 m.

Genus *Macropodia* Leach, 1814

Macropodia Leach, 1814:395 [type-species: *Cancer longirostris* Fabricius, 1775, by monotypy; gender: feminine; name 1699 on *Official List*].

Peridromus Gistel, 1848:ix [replacement name for *Macropodia* Leach, 1814 (as *Macropus*); type species: *Cancer longirostris* Fabricius, 1775; gender: masculine].

REMARKS.—Specific identification of the eastern Atlantic species of *Macropodia* has remained particularly difficult until recently when Forest and Zariquiey Alvarez (1964) reviewed the Mediterranean species and their nomenclature (Forest, 1965b). They pointed out that in the past identification often was based on keys provided by A. Milne Edwards and Bouvier (1899:48) or Bouvier (1940:362) and that results obtained through using these keys generally were unsatisfactory.

Forest and Zariquiey Alvarez (1964) recognized five species in the Mediterranean: *M. rostrata* (Linnaeus, 1761); *M. longipes* (A. Milne Edwards and Bouvier, 1899); *M. longirostris* (Fabricius, 1775); *M. czernjawskii* (Brandt, 1880); and a new species they named *M. linaresi.*

In discussing the literature relating to these species, Forest (1965b:349) pointed out that the epithet *longirostris* in the past had been applied to three distinct taxa: *M. longirostris* proper, *M. longipes*, and a third species from areas in the northeastern Atlantic north of the Mediterranean, *M. tenuirostris* Leach, 1814. Thus many earlier records of *M. longirostris* from the Mediterranean were based on that species or *M. longipes.*

Monod (1956:559) included *M. longirostris* as a member of the West African fauna, based on earlier records by A. Milne Edwards and Bouvier (1900:156, 157) who reported two males and a female from the Banc d'Arguin, one male from Senegal, and one female from the Cape Verde Islands, as well as material from Morocco. Forest and Zariquiey Alvarez (1964:228) considered *M. longirostris* to be a Mediterranean endemic and identified many of A. Milne Edwards and Bouvier's records of *M. longirostris* with *M. longipes*, noting (1964:226, footnote) that material reported by these authors from three localities, including Morocco and Senegal, no longer was in the collection at Paris. Apparently there are no substantiated records for either *M. longipes* or *M. longirostris* from tropical African waters, and we have omitted these species from our accounts below.

Material from the third locality, the Strait of Bonifaccio (between Corsica and Sardinia), is in the collection of the National Museum of Natural History, Smithsonian Institution, under catalog number USNM 22978. It consists of a single male, cl 15.9 mm, clearly identifiable with *M. longirostris.* Outside of the Mediterranean, *M. longipes* is known with certainty from the Bay of Biscay (Forest and Zariquiey Alvarez, 1964:226).

The eastern Atlantic species of *Macropodia* still require a great deal of work, especially the status of the species occurring on the NW African coast, including *M. longirostris* auctorum (including Pérès, 1964:20, Morocco), *M. longipes* auctorum (Forest and Gantès, 1960:357, Morocco; Bas, Arias, and Guerra, 1976, table 3, Spanish Sahara; Türkay, 1976a:40, fig. 33, Portugal and Morocco), *M. egyptia* sensu A. Milne Edwards and Bouvier, 1900, and *M. intermedia* Bouvier, 1940 (see p. 300). We believe that the status of Mediterranean material identified with *M. rostrata (Linnaeus, 1761) also requires investigation.*

Key to Tropical West African Species of *Macropodia*

1. Dactylus of fifth leg slightly curved 2
   Dactylus of fifth leg strongly arcuate 4
2. Rostrum longer than antennal peduncle, more than 2/3 postrostral length of carapace. [Nuchal spine present. Basal article of antenna with strong spines ventrally] ..... ***M. longipes***
   Rostrum shorter than antennal peduncle, less than half postrostral length of carapace 3
3. Rostrum extending beyond midlength of distal article of antennal peduncle. Nuchal spine present. Orbital margin with dorsal spines or tubercles. Basal article of antenna with strong spines ventrally ..... ***M. gilsoni***
   Rostrum falling short of midlength of distal article of antennal peduncle. Nuchal spine absent. Orbital margin smooth. Basal article of antenna smooth, unarmed ..... ***M. spinulosa***
4. Epistome with longitudinal ridge on each side extending from pore of antennnal gland to basal article of antenna ..... ***M. macrocheles***
   Epistome lacking longitudinal ridge on each side 5
5. Rostrum longer than antennal peduncle. Basal segment of antenna unarmed 6
   Rostrum not reaching end of antennal peduncle. Basal segment of antenna armed with spinules and tubercles 7
6. Rostrum more than 2/3 postrostral length of carapace. Basal article of antenna smooth ..... ***M. longicornis***
   Rostrum less than half postrostral length of carapace. Basal article of antenna irregularly tuberculate ..... ***M. straeleni***
7. Rostrum extending beyond midlength of distal segment of antennal peduncle. Gastric region with sharp, erect spine ... ***M. doracis***, new species
   Rostrum not extending to midlength of distal segment of antennal peduncle. Gastric region with low, conical prominence ..... ***M. hesperiae***, new species

Macropodia doracis, new species

FIGURE 76

Stenorhynchus aegyptius.—A. Milne Edwards and Bouvier, 1900:155 [part] [not *Stenorynchus egyptius* H. Milne Edwards, 1834 = *Cancer longirostris* Fabricius, 1775].

MATERIAL EXAMINED.—*Pillsbury Material:* None.
Other Material: Cape Verde Islands: between Ilhéu Branco and Ilhéu Raso, 110–180 m, sand, rocks, *Talisman* No. 105, 27 Jul 1883, 1♀ ov (W, holotype).

DESCRIPTION.—Size small, carapace length of adult less than 10 mm (7.8 mm).

Rostrum (Figure 76*a*) moderately long, extending almost to but falling short of end of distal segment of antennal peduncle, ornamented with curved hairs. Apices of rostral teeth appressed. Rostrum upturned dorsally. Nuchal region with lateral spinule, visible in dorsal view (Figure 76*a*). Protogastric region smooth, lacking dorsal tubercles medially. Hepatic regions each with low, conical prominence dorsally. Hepatic lobes each with bluntly rounded tubercle apically. Gastric region with high, erect spine dorsally. Cardiac region with broad, obtuse prominence dorsally, lower than gastric spine. Branchial regions each

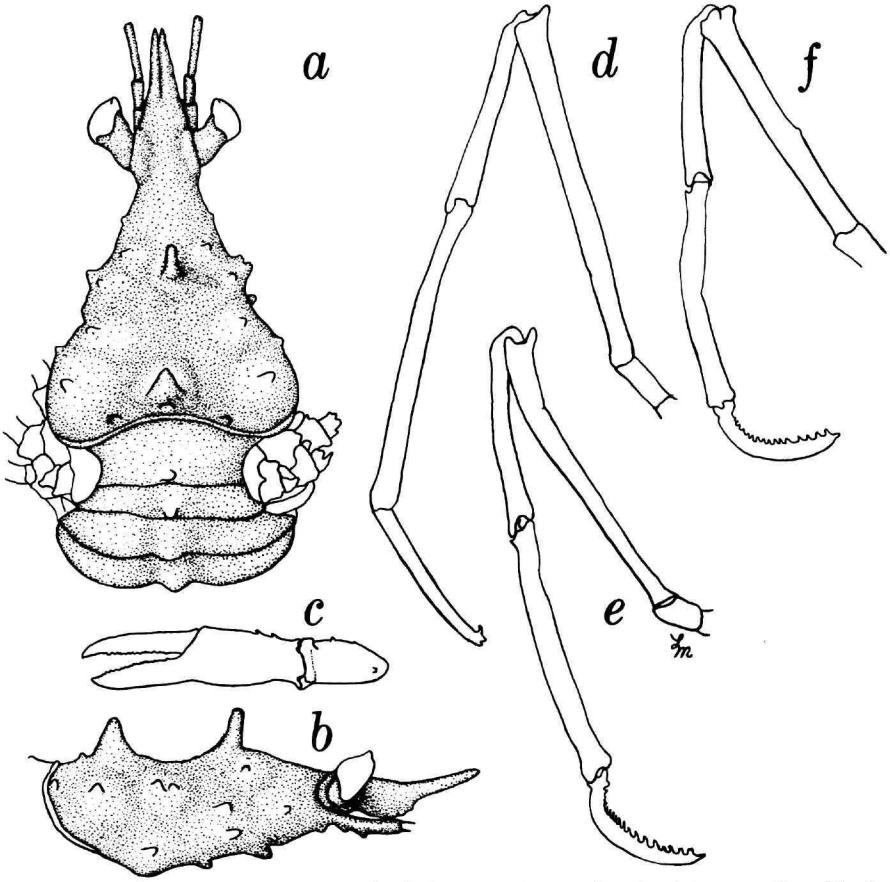

FIGURE 76.—*Macropodia doracis*, new species, holotype, ovigerous female, cl 7.8 mm, Cape Verde Islands: *a*, carapace, dorsal view; *b*, carapace, lateral view; *c*, chela; *d*, third pereiopod; *e*, fourth pereiopod; *f*, fifth pereiopod. (All pereiopods slightly damaged.)

with 1 low dorsal epibranchial tubercle, 1 broadly rounded anterolateral epibranchial tubercle, 1 dorsal mesobranchial tubercle, and 1 metabranchial tubercle situated almost on posterior margin. Anterolateral margins with rounded tubercle posterior to hepatic lobe.

Basal antennal segment (Figure 76*b*) with 2 tubercles on each side, larger, almost spiniform, anteriormost. Distal article of antennal peduncle about twice as long as penultimate. Epistome with rounded lobule near opening of antennal gland and with tubercle at base of antenna.

Ocular peduncle lacking distinct anterior lobe. Cornea with distal dorsal tubercle.

Cheliped (Figure 76*c*) of adult female slender, fingers, measured dorsally, longer than palm, latter with row of spinules dorsally. Merus with 2 prominent dorsal tubercles.

Dactylus of second pereiopod slender, slightly curved distally, apex broken; merus shorter than carapace. Merus of each walking leg with blunt, unarmed dorsal projection (Figure 76*d*). Dactyli of fourth and fifth pereiopods (Figure 76*e*,*f*) strongly arcuate, ventral margin toothed along entire margin.

MEASUREMENTS.—Carapace length of ovigerous female 7.8 mm.

REMARKS.—*Macropodia doracis* approaches *M. hesperiae*, (p. 298), in general facies, but differs in having a longer rostrum, which extends almost to

the end of the antennal peduncle, in having a shorter distal segment on the antennal peduncle, and in having a sharp, erect gastric spine. The present species may be closest to *Macropodia aegyptia* sensu Bouvier (1940:364, fig. 220), from the Canary Islands, but in that species the epistome has more spines and the basal segment of the antennal peduncle is armed with three large sharp spines rather than a spinule and a tubercle.

TYPE-LOCALITY.—Cape Verde Islands, between Ilhéu Branco (16°39'N, 24°41'W) and Ilhéu Raso (16°37'N, 24°36'W) in 110–180 m.

DISPOSITION OF TYPES.—The unique holotype (USNM 22980), an ovigerous female, cl 7.8 mm, is in the National Museum of Natural History, Smithsonian Institution. Apparently it was sent to the Smithsonian on exchange early in the 1900's.

ETYMOLOGY.—The specific epithet is derived from a Latin name for the Cape Verde Islands, *Doraces insulae*.

DISTRIBUTION.—Known only from the type-locality in the Cape Verde Islands.

**Macropodia gilsoni* (Capart, 1951)

Achaeopsis gilsoni Capart, 1951:65, fig. 20, pl. 1: figs. 4, 10, pl. 2: fig. 3.—Rossignol, 1957:115 [key].

Macropodia gilsoni.—Monod, 1956:555, figs. 811–822.—Longhurst, 1958:89.—Rossignol, 1962:123.—Crosnier, 1964:34.

Macropodia intermedia.—Guinot and Ribeiro, 1962:78.—Forest and Guinot, 1966:115.—Crosnier, 1970:1215 [listed], 1218. [Not *M. intermedia* Bouvier, 1940.]

Macropodia.—Voss, 1966:22.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 4♂, 2♀ (1 ov) (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂, 1♀ (W). Sta 45, 73–97 m, 2♂, 2♀ ov (W). Sta 47, 37 m, bottom with *Jullienella*, 1♀ ov (L). Sta 50, 128–192 m, 1♀ ov (L). Sta 59, 55–64 m, mud with dense branched Foraminifera, 1♂ (L). Sta 62, 46 m, brown branched and foliate Foraminifera, 6♂, 6♀ (4 ov) (L). Sta 63, 64 m, sandy mud with shells, 5♂, 8♀ (5 ov) (W). Sta 64, 68 m, 2♂, 1♀ ov (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 2♀ (1 ov) (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂ (W). Sta 28, 49–53 m, 4♂, 4♀ ov (L). Sta 30, 61–64 m, coral, 2♂ (W). Sta 32, 110 m, 1♀ ov (W).

Nigeria: Sta 237, 101 m, 1♂, 2♀ (L). Sta 239, 73 m, 8♂, 7♀ (L). Sta 241, 59–63 m, mud and shell, 11♂, 8♀ (5 ov) (W).

Cameroon: Sta 259, 59 m, mud and broken shell, 3♂, 3♀ (W). Sta 260, 46 m, 1♂ (L).

Geronimo Material: Gabon: Sta 235, 100 m, 1♂ (W).

Undaunted Material: Angola: Sta 95, 126 m, 2♂, 1♀ ov (L).

Other Material: Cameroon: 03°54'N, 08°53'E, 64 m, Aug 1963, A. Crosnier, 5♂, 2♀ (1 ov) (W). 03°55.5'N, 08°52.5'E, 60 m, *Ombango*, A. Crosnier, 5 Jan 1963, 1♀ ov (W).

DESCRIPTION.—Capart, 1951:65.

Figures: Capart, 1951, fig. 20, pl. 1: figs. 4, 10, pl. 2: fig. 3; Monod, 1956, figs. 811–822.

Male Pleopod: Capart, 1951, pl. 2: fig. 3 (Cabinda); Monod, 1956, fig. 821 (Senegal).

MEASUREMENTS.—Carapace lengths of males 6.5 to 19 mm, of non-ovigerous females 7.5 to 14 mm, of ovigerous females 11 to 16.7 mm.

REMARKS.—*Macropodia gilsoni*, *M. hesperiae*, new species, *M. intermedia*, and *M. longipes* are the only West African species of the genus with strong, well-developed nuchal spines; these spines are also present in the northern species, *M. tenuirostris* (Leach) (Christiansen, 1969, fig. 47). Further, *M. gilsoni* and *M. intermedia* are the only species in the genus with spines on the supraorbital margin. Differences between these two species are pointed out (p. 300) under the account of *M. intermedia*.

Macropodia gilsoni appears to be quite variable in some features, especially in the extent of spination: the supraorbital spines may be reduced to tubercles; the walking legs often have but one spine or even up to five spines on the merus of the fourth leg rather than three; the hairiness of the legs is variable; and in some specimens the rostrum is sharply upturned. The distal third of the dactylus of the fifth leg usually is smooth; the proximal two-thirds are ornamented with strongly recurved teeth and dense setae. There is a small intestinal tubercle on the carapace in some specimens.

BIOLOGY.—*Macropodia gilsoni* is a sublittoral species, occurring in depths between 37 m (30–50 m) and 200+ m. Of 51 depth records available, 32 (about 62%) are from depths of less than 100 m and only 8 (about 16%) are from less than 50 m. It has been taken on various kinds of muddy

bottoms, including bottoms with shells and bryozoans or foliate Foraminifera.

Ovigerous females have been found in all months but July, indicating that the species spawns all year.

DISTRIBUTION.—West Africa, from localities between Senegal to Angola (16°37'S); sublittoral, in depths between 37 and about 200 m. Capart (1951) studied numerous specimens from localities between Gabon and Angola, and Monod (1956) had material from Senegal and Guinea. Records since 1956 include the following:

Senegal: 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19'N, 16°34'W, 60–73 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 54–200 m (Longhurst, 1958).

Ivory Coast: 04°35'N, 06°40'W to 04°35'N, 06°41'W, 64 m (Voss, 1966).

Cameroon: No specific locality, deeper than 50 m (Crosnier, 1964).

Gabon: W of Barre des Portugais; W of Mayumba, 110 m (Rossignol, 1962).

Angola: Luanda, 102–122 m (Guinot and Ribeiro, 1962). 16°37'S, 11°22'E, 126 m (Crosnier, 1970).

**Macropodia hesperiae*, new species

FIGURE 77

Macropodia linaresi.—Forest and Guinot, 1966:117 [not *Macropodia linaresi* Forest and Zariquiey Alvarez, 1964].
Macropodia.—Voss, 1966:31.

MATERIAL EXAMINED.—*Pillsbury Material*: Ivory Coast: Sta 60, 79–82 m, coral or rock, 1♂, 1♀ (L). Sta 65, 46–49 m, 1♂ (holotype), 1♀ (L).

Ghana: Sta 22, 51 m, rough bottom, 1♂ (W).

Nigeria: Sta 230, 82–97 m, hard ground, with gorgonians, coral, rock, 1♂ (W).

DESCRIPTION.—Size small, carapace lengths of adults less than 10 mm. Rostrum (Figure 77*a*,*e*) short, overreaching base but falling short of middle of fifth article of antennal peduncle, ornamented with curved hairs. Apices of rostral teeth divergent in some specimens. Rostrum slightly upturned dorsally (Figure 77*b*). Nuchal region usually with lateral spinule or tubercle, visible in dorsal view. Protogastric region smooth, lacking dorsal tubercles medially. Hepatic regions each with low, conical prominence dorsally. Hepatic lobes each with apical spinule, flanked mesially with spine on anterior margin in some specimens. Gastric and cardiac regions each with low, conical prominence. Branchial regions with poorly marked prominences: 1 low, rounded epibranchial, 1 broad dorsal mesobranchial, 1 low metabranchial near posterior margin, and sharp tubercles laterally. Anterolateral margins with sharp, anteroventrally directed spine posterior to hepatic lobe.

Basal antennal segment (Figure 77*b*) with 1–3 spinules or sharp tubercles, anteriormost largest. Distal article of antennal peduncle about 3 times as long as penultimate. Epistome with spinule near opening of antennal gland, occasionally with spinule anteriorly near base of antenna.

Ocular peduncles lacking distinct anterior lobe. Cornea with distinct dorsal tubercle.

Chelipeds of adult males larger and more robust than in females. Fingers as long as palm, latter with row of spinules dorsally. Merus with 3 erect dorsal spines or lobes.

Dactylus of second pereiopod (Figure 77*c*) slender, slightly curved distally, 7/9 as long as merus, latter longer than carapace and antennal peduncles. Meri of second through fifth pereiopods each with single large distal dorsal spine, latter lower on merus of fifth pereiopod. Dactyli of fourth and fifth (Figure 77*d*) pereiopods strongly arched, ventral margin toothed along entire margin.

MEASUREMENTS.—Carapace lengths of males 5.2 to 9.4 mm, of females 4.2 and 7.3 mm.

REMARKS.—*Macropodia hesperiae* resembles *M. linaresi* Forest and Zariquiey Alvarez, 1964, but differs as follows: The rostrum is longer, with the apices of the spines divergent rather than appressed; the dorsal prominences of the carapace are much less prominent; the carapace is smoother and less hairy; and the legs are longer, the merus of the second pereiopod being longer than the carapace and antennal peduncles combined.

If our interpretation of the original account of

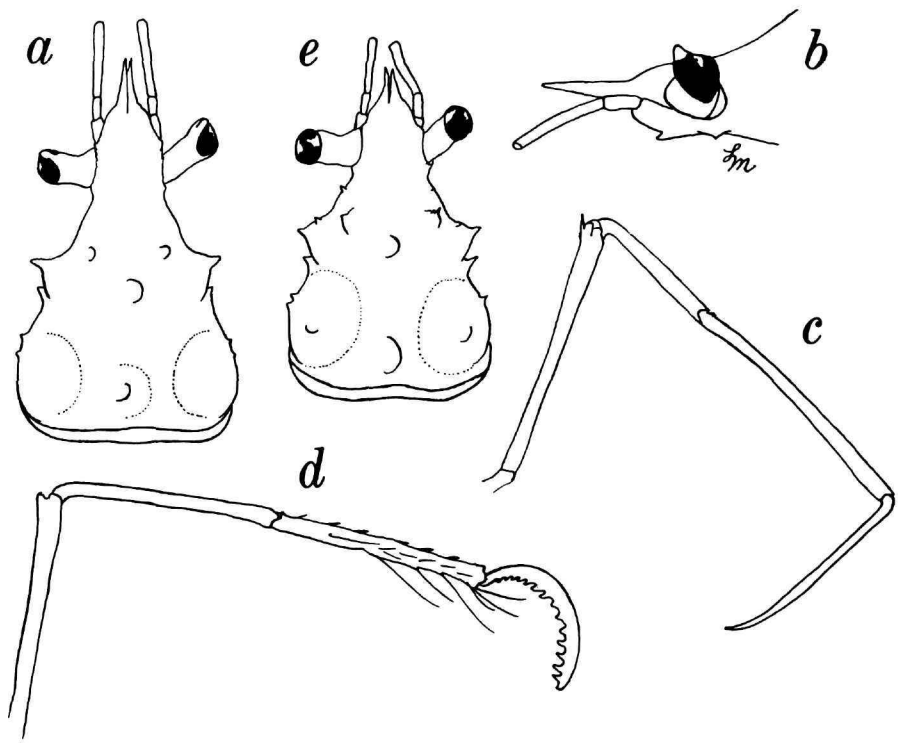

FIGURE 77.—*Macropodia hesperiae*, new species. Male paratype, cl 6.0 mm, *Pillsbury* Sta 60: *a*, carapace; *b*, front, lateral view; *c*, second pereiopod; *d*, fifth pereiopod. Female paratype, cl 4.2 mm, *Pillsbury* Sta 60: *e*, carapace.

M. linaresi is correct, the basal antennal segment in that species lacks distinct spines; it was described as "avec des granules ou des courtes spinules" (Forest and Zariquiey Alvarez, 1964:241). Also, in that species, the merus of the second pereiopod was described as being slightly longer than the carapace. We have examined a male cl 7 mm, and a female, cl 7 mm (RMNH Crust. D. 20133), from Cadaqués, Spain, and found that both specimens had three spinules ventrally on the basal segment of the antenna, the anteriormost largest, and, in the female, the merus of the second pereiopod is longer than the carapace; all the pereiopods of the male were detached.

We have no hesitation in identifying material identified with *M. linaresi* from Senegal by Forest and Guinot (1966:117) with *M. hesperiae* as they noted that "elle ne diffère guère des exemplaires typiques ... que par un rostre légèrement plus grêle et une carapace plus lisse et plus glabre." *Macropodia hesperiae* is a much smoother species than *M. linaresi*.

TYPE-LOCALITY.—Off the Ivory Coast, 04°15'N, 07°32'W to 04°12'N, 07°35.5'W, 46–49 m, *Pillsbury* Sta 65.

DISPOSITION OF TYPES.—The holotype (Crust. D. 23891), a male from *Pillsbury* Sta 65, is in the Rijksmuseum van Natuurlijke Historie, Leiden; paratypes also are at Leiden and in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

ETYMOLOGY.—The specific name is derived from the Latin name for the Gulf of Guinea, *Hesperium mare*.

BIOLOGY.—*Macropodia hesperiae* is a sublittoral species known from depths of 46–49 m, 51 m, 79–82 m, and 82–97 m (*Pillsbury*) and 65–75 m (*Calypso*; Forest and Guinot, 1966). Our specimens

were taken on rough bottom at three or four stations. The *Calypso* specimens were taken on mud, sand, and compact sand (sable construit).

An ovigerous female was taken in May by the *Calypso* (Forest and Guinot, 1966).

DISTRIBUTION.—Gulf of Guinea, from off Senegal, the Ivory Coast, Ghana, and Nigeria, in depths between 46–49 and 82–97 m. Records in the literature include the following:

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Nigeria: 06°11′N, 03°36′E to 06°10′N, 03°38′E, 82–97 m (Voss, 1966).

Macropodia intermedia Bouvier, 1940

Macropodia longirostris var. *intermedia* Bouvier, 1940:366.—Capart, 1951:76.

?*Macropodia gilsoni*.—Maurin, 1968a:48, 62; 1968b:484, 486, 489, fig. 5 [not *Macropodia gilsoni* (Capart, 1951)].

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: Morocco: No specific locality, holotype of *Macropodia longirostris* var. *intermedia*, 1♂ (MP).

Remarks.—Although several authors have synonymized *Macropodia gilsoni* Capart, 1951, with *Macropodia intermedia* Bouvier, 1940 (p. 297), we believe that two taxa may be involved, *M. intermedia* from areas to the north of the tropical region and *M. gilsoni* from the Gulf of Guinea proper, and, until more material from the two regions can be studied together, we prefer to recognize two species.

The holotype of *M. intermedia*, a male, cl 19 mm, cb 13.5 mm, was examined by Manning at the Muséum national d'Histoire naturelle in Paris in 1971. Several differences between it and our material of *M. gilsoni* were observed: (1) The rostrum is longer than the antennal peduncle; it is shorter in *M. gilsoni* (Monod, 1956, fig. 814). (2) The posterior margins of the antennular fossae as well as those portions that overlap the basal segment of the antenna are smooth; they usually are spinulose in *M. gilsoni* (Monod, 1956, figs. 814, 815). (3) The ventral spine on the ischium of the fifth pereiopod appears to be much less prominent and appears to be directed laterally rather than posteriorly as in *M. gilsoni*.

Although these differences are relatively minor, they suggest to us that *M. intermedia* should be considered distinct from *M. gilsoni*, at least for the time being.

DISTRIBUTION.—Eastern Atlantic, from the NW coast of Africa, sublittoral. All but the first of the following records require verification:

Morocco: Atlantic coast (Bouvier, 1940).

Spanish Sahara: Pulpito Bay, 20–30 m (Capart, 1951). Between Cabo Corbeiro and Cabo Blanco, 60–80 m (Maurin, 1968a). Between Cabo Barbas and Cabo Blanco, 50–90 m (Maurin, 1968b).

Mauritania: S Banc d'Arguin, 90–150 m (Maurin, 1968a). Banc d'Arguin, 40–60, 60–70, 90–100 m (Maurin, 1968b).

Macropodia longicornis (A. Milne Edwards and Bouvier, 1899)

Macropodia longicornis.—Monod, 1956:562 [references].

DISTRIBUTION.—Cape Verde Islands; sublittoral, to at least 275 m.

Macropodia longipes (A. Milne Edwards and Bouvier, 1899)

Stenorhynchus longipes A. Milne Edwards and Bouvier, 1899: 48.

?*Macropodia longirostris*.—Monod, 1956:559 [references].—Rossignol, 1957:115 [key].—Pérès, 1964:20 [Morocco]. [Not *Cancer longirostris* Fabricius, 1775.]

Macropodia longipes.—Forest and Gantès, 1960:357 [Morocco].—Forest and Zariquiey Alvarez, 1964:226, 241 [key], figs. 2, 6, 13 [review of Mediterranean species].—Forest, 1965b:349, 350 [discussion].—Bas, Arias, and Guerra, 1976, table 3 [Spanish Sahara].—Türkay, 1976a: 25 [listed], 40, fig. 33 [Portugal, Morocco].

Macropodia tenuirostris longipes.—Forest, 1978:337, figs. 9, 16.

REMARKS.—Forest (1978:337) considers *M. longipes* to be the southern subspecies of *M. tenuirostris* (Leach, 1814).

DISTRIBUTION.—Eastern Atlantic, from the Gulf of Gascogne to Mauritania, Cape Verde Islands, and western Mediterranean; sublittoral, in 50–445 m (Forest, 1978).

*Macropodia macrocheles (A. Milne Edwards and Bouvier, 1898)

Macropodia macrocheles.—Capart, 1951:77, fig. 23.—Monod, 1956:560, 632, figs. 823–827.—Rossignol, 1957:115 [key].—Longhurst, 1958:89.—Guinot and Ribeiro, 1962: 78.—Forest and Guinot, 1966:116.
Macropodia.—Voss, 1966:27.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 82, 146–150 m, 1♂, 1♀ ov (L).

Nigeria: Sta 255, 264–269 m, 3♂, 2♀ (1 ov) (L, W).

Geronimo Material: Gabon: Sta 197, 200 m, 1♀ (W).

Other Material: Mauritania: Off Cabo Blanco, 240 m, *Talisman*, 13 Jul 1883, syntype, 1♀ ov (W, USNM 22979).

DESCRIPTION.—Capart, 1951:77.

Figures: Capart, 1951, fig. 23; Monod, 1956, figs. 823–827.

Male Pleopod: Monod, 1956, fig. 827 (Senegal).

MEASUREMENTS.—Carapace lengths of males 12.3 to 21 mm, of non-ovigerous females 11.8 to 15.2 mm, of ovigerous females 8.0 to 13.8 mm.

BIOLOGY.—*Macropodia macrocheles* is a deep water species, occurring between 96 and 300 m on soft bottoms (mud and sand, muddy sand), generally in depths greater than 150 m.

Ovigerous females have been taken in January, February, May, June, and December (Capart, 1951; Monod, 1956; *Pillsbury*).

DISTRIBUTION.—West Africa, from localities between Mauritania and Angola, in depths between 96 and 300 m. Monod (1956) reported the species from Senegal and Sierra Leone; since 1956 it has been taken from the following localities:

Guinea-Bissau: 10°32′N, 16°53.5′W, 174 m (Forest and Guinot, 1966).

Sierra Leone: 08°45′N, 14°38′W, 220–240 m (Longhurst, 1958).

Liberia: 04°57′N, 09°30′W to 04°58′N, 09°32′W, 146–150 m (Voss, 1966).

Angola: Baía dos Tigres, 150–200 m (Guinot and Ribeiro, 1962).

*Macropodia spinulosa (Miers, 1881)

FIGURE 78*a*

Stenorhynchus rostratus var. *spinulosus* Miers, 1881a:206.
Stenorhynchus phalangium.—Studer, 1882:335; 1883:7 [not *Cancer phalangium* Fabricius, 1775].
Macropodia rostrata spinulosa.—Rathbun, 1900a:293 [listed].
Macropodia rostrata.—Rathbun, 1900a:293 [listed].—Balss, 1922:71.—Odhner, 1923:18.—Monod, 1933b:501 [listed].—Capart, 1951:74, pl. 1: fig. 3.—Sourie, 1954b: 147.—Monod, 1956:562, figs. 828–836.—Rossignol, 1957: 115 [key].—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962:78, pl. 4: figs. 2, 3.—Forest and Guinot, 1966:116.—Le Loeuff and Intès, 1968:46, table 1.—Crosnier, 1970:1218. [Not *Macropodia rostrata* (Linnaeus, 1761).]
Stenorhynchus rostratus.—Doflein, 1904:69.—Lenz and Strunck, 1914:272 [part, not South African specimens?]. [Not *Macropodia rostrata* (Linnaeus, 1761).]
?*Stenorhynchus phalangium.*—Stimpson, 1907:22 [Madeira] [not *Cancer phalangium* Fabricius, 1775].

MATERIAL EXAMINED.—*Pillsbury Material:* Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 5♂, 10♀ (7 ov) (W). Sta 47, 37 m, bottom with *Jullienella*, 1♂ (L). Sta 48, 22 m, 1♂, 3♀ ov (L). Sta 65, 46–49 m, 1♂ (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂, 1♀ (W). Sta 17, 48 m, fine sand and green mud, 1♂ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂, 2♀ ov (L). Sta 24, 35–37 m, dark red bryozoans, 2♂, 1♀ ov (W). Sta 28, 49–53 m, 10♂, 8♀ (6 ov) (L).

Nigeria: Sta 248, 33 m, 1♂ (W).

Undaunted Material: Angola: Sta 95, 126 m, 1♀ ov (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 1♂ (L).

Congo: Off Pointe-Noire, 04°48′S, 11°39′E, 54–56 m, *Ombango*, A. Crosnier, 23 Sep 1965, 1♂ (W).

DESCRIPTION.—Capart, 1951:74.

Figures: Capart, 1951, pl. 1: fig. 3; Monod, 1956, figs. 828–836.

Male Pleopod: Monod, 1956, figs. 834–836 (Senegal).

MEASUREMENTS.—Carapace lengths of males 5 to 18.7 mm, of non-ovigerous females 10 to 11 mm, of ovigerous females 11 to 16 mm. Capart (1951) noted that his largest specimens were a male cl 17 mm, cb 12 mm and a female cl 16.5 mm, cb 13 mm.

REMARKS.—*Macropodia spinulosa* differs from *M. rostrata* in numerous features: the rostrum is shorter, extending just beyond the base of the distal segment of the antennal peduncle rather than almost to the middle of that segment as in *M. rostrata*; the anterior margins of the antennular fossae are visible in dorsal view (Monod, 1956, fig. 829), whereas they cannot be seen in *M.*

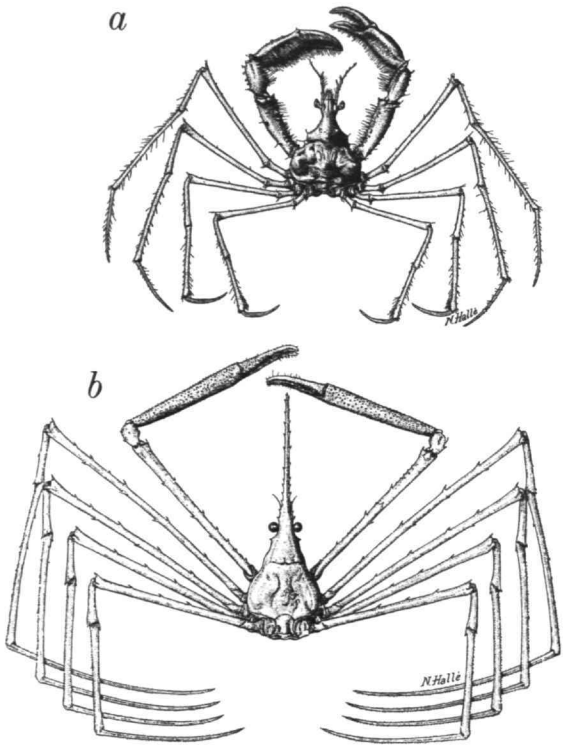

FIGURE 78.—*a*, *Macropodia spinulosa* (Miers) (from Monod, 1956, fig. 828); *b*, *Stenorhynchus lanceolatus* (Brullé) (from Monod, 1956, fig. 838).

rostrata (a character mentioned by Forest and Zariquiey Alvarez, 1964:241, key); only the proximal third or fourth of the dactylus of the fifth pereiopod is armed with spinules or low tubercles whereas in *M. rostrata* the proximal two-thirds to three-fourths is armed (most of the dactylus of that leg is naked in *M. spinulosa*, lacking even setae); and the dorsal spines of the carapace are much longer (Monod, 1956, fig. 830). In addition the pereiopods are longer, with the third leg almost five times rather than three times as long as the carapace (Christiansen, 1969:112) and, as noted by Miers (1881a:206) the chelipeds are very spinulose. Some of these differences already had been noted by Guinot and Ribeiro (1962:79) and by Crosnier (1970:1218).

We have compared our material of *M. spinulosa* with *M. rostrata* from the North Sea, as well as from the Mediterranean, and we found some differences in material of *M. rostrata* from those two areas. The Mediterranean form is more slender (compare carapace shape in Forest and Zariquiey Alvarez, 1964, fig. 1, and Christiansen, 1969, fig. 46), a feature reflected in the shape of the epistome, which in Mediterranean specimens is as long as wide but in northern specimens is much broader than long. Also, the carapace in Mediterranean specimens is much smoother and less hairy. Finally, in Mediterranean specimens the dactylus of the fifth leg is longer, more slender, less curved, less setose, and has low denticles only on the proximal third; in northern specimens the dactylus is short, more strongly curved, much more setose, and has erect spinules on the proximal two-thirds. These differences strongly suggest that two species may be involved. If they prove to be constant and the Mediterranean form is a distinct species, the name *Macropodia inermis* (Heller, 1856) is available. It was named originally as *Stenorhynchus inermis* from the Adriatic Sea (Heller, 1856:3).

Material from South Africa identified with *M. rostrata* by Lenz and Strunck (1914) and Barnard (1950, 1954) resembles *M. spinulosa* rather than *M. rostrata* in having a short rostrum, with the margins of the antennular fossae visible at the base of the rostrum. Barnard's material, at least, differs from both of these more northern species in having distal spinules on the basal segment of the antenna, an apical seta on the eye, and in having spinules along the entire margin of the dactylus of the fifth pereiopod.

BIOLOGY.—*Macropodia spinulosa* is a sublittoral species, having been taken in depths between ca 1 and 126 m; of 55 depth records available, only 3 (5%) are from depths of more than 100 m (108, 110, and 126 m), 11 (20%) are from between 50 and 100 m, 11 (20%) are from depths of 20 m or less, and the remainder (55%) are from depths between 20 and 50 m. The deeper material identified here with this species probably should be restudied.

The species generally occurs on soft bottoms, mud or muddy sand, but it was taken by the *Calypso* (Forest and Guinot, 1966) on mud, rocks,

calcareous algae, sand, and Foraminifera; mud, sand, and compacted sand (sable construit); mud; mud with *Arca*; and on calcareous algae. Our specimens were taken on mud, mud with Foraminifera, fine sand and green mud, and on bottom with bryozoans. Sourie (1954b) found it on coarse, shelly sand, bottom with *Arca* and *Pyura*, in 10–12 m in the Baie de Dakar. Longhurst (1958) found it on shelly mud in 60 m, and Le Loeuff and Intès (1968) considered it a eurythermic species, living on muddy sand in 25–40 m.

Ovigerous females have been collected from January through June, and August (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Forest and Guinot, 1966; Crosnier, 1970; herein p. 301).

DISTRIBUTION.—West Africa, from the Cape Verde Islands and at least Senegal on the African mainland S to Angola; sublittoral, in depths between 1 and 126 m, generally in less than 50 m.

Records of *M. rostrata* from areas N of Senegal, such as those by Capart (1951) from Spanish Sahara and Stimpson (1907) from Madeira, especially the latter, may be based on either this species or *M. rostrata* proper. They require verification.

Records in the literature include the following:

Cape Verde Islands: 15°40′N, 23°06′W, 38 fm [70 m] (Studer, 1882, 1883).

Senegal: Off Dakar, 14°40′–41′N, 17°18′30″–20′30″W, 20–25 m; 14°38′–41′N, 17°20′–23′W, 22–34 m; 14°38′–40′N, 17°17′–18′W, 22–27 m; off Dakar; Anse Bernard, 8–10 m; Baie de Hann; between Gorée and Thiaroye-sur-Mer (as Tiaroye), 15 m; and between Dakar and Gorée, 16 m (all Monod, 1956). Baie de Dakar, 10–12 m (Sourie, 1954b). Gorée (the type-locality) (Miers, 1881a; Lenz and Strunck, 1914; Monod, 1956); in 20 m (Balss, 1922). Around Gorée, ca. 1, 5–11, 7–8, 13, 15–20, 19, 20, 25, 40–41, and 46–50 m; between Thiaroye-sur-Mer and Bel-Air, 9 m; Mbao; SE Île de la Madeleine, 35 and 48 m; and off Joal, 15–17 m (Monod, 1956). 13°01′N, 17°24′W, 51–55 m, and 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea: Off Île Kassa, Îles de Los (Capart, 1951). 09°–36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 60 m (Longhurst, 1958).

Ivory Coast: Off Grand Bassam, 25–40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 26 and 44 m (Monod, 1956; Gauld, 1960).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

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

Annobon: 2 mi [3.2 km] off Annobon, 18–20 m (Capart, 1951).

Gabon: Libreville, 60 m (Monod, 1956).

Congo: 11 mi [17.7 km] WSW Pointe-Noire, 04°52′S, 11°39′30″E, 58–60 m (Capart, 1951).

Cabinda: Off the lighthouse (Capart, 1951).

Zaire: Off the mouth of the Congo River, 44 m (Doflein, 1904). 28 mi [32 km] WNW of Banana, 05°54′S, 11°58′–30″E, 50 m, and 05°56′S, 12°E, 50–60 m (Capart, 1951).

Angola: Benguela, 13–26 m; Baía da Caota, 13, 16, and 18 m; and Baía Farta, 5 m (Guinot and Ribeiro, 1962). Porto Alexandre, 72 and 108 m (Odhner, 1923). 18 mi [29 km] WSW Baía dos Tigres, 16°36′S, 11°27′E, 110 m (Capart, 1951). 16°37′S, 11°22′E, 126 m (Crosnier, 1970).

**Macropodia straeleni* Capart, 1951

Macropodia straeleni Capart, 1951:79, fig. 24, pl. 1: fig. 5.—Monod, 1956:566, fig. 837.—Rossignol, 1957:115 [key].—Forest and Guinot, 1966:117.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 2♂ (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 2♂ (L). Sta 60, 79–82 m, coral or rock, 2♂, 2♀ ov (W). Sta 65, 46–49 m, 1♀ ov (L).

Nigeria: Sta 239, 73 m, 1♀ ov (W).

Other Material: Congo: 05°20′S, 11°37′E, 200 m, 10 Dec 1963, A. Crosnier, 3♂, 1♀ ov (W).

DESCRIPTION.—Capart, 1951:79.

Figures: Capart, 1951, fig. 24, pl. 1: fig. 5.

MEASUREMENTS.—Carapace lengths of males 5.1 to 8.7 mm, of ovigerous females 5.2 to 6.5 mm.

BIOLOGY.—*Macropodia straeleni* occurs sublittorally in moderately deep water. Capart (1951) took it in 73 to 140–150 m on sandy mud and it was taken by the *Calypso* in 65–75 m on mud, sand, and compacted sand (sable construit) (Forest and Guinot, 1966). The *Pillsbury* specimens, for which data are available, were taken on mud

with brown, branched Foraminifera in 62–75 m, broken shell in 70 m, and on coral or rock in 79–82 m. The deepest recorded occurrence of the species is in 200 m off the Congo and the Ivory Coast (Forest and Guinot, 1966).

Ovigerous females have been taken in May, June, October, November, and December (Capart, 1951; Forest and Guinot, 1966; present paper).

DISTRIBUTION.—West Africa, from localities between Senegal (12°55.5'N) and Angola (07°39'S), in depths between 46–49 m and 200 m. Capart (1951) based his account on material from off the Congo, Cabinda, and Angola; Monod (1956) added no material. Other records in the literature include the following:

Senegal: 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

Ivory Coast: No specific locality, 200 m (Forest and Guinot, 1966).

Genus *Stenorhynchus* Lamarck, 1818

Pactolus Leach, 1815b:19 [type-species: *Pactolus boscii* Leach, 1815, a subjective junior synonym of *Cancer seticornis* Herbst, 1788, by monotypy; gender: masculine; suppressed by the International Commission on Zoological Nomenclature under its plenary powers (Opinion 763, 1966); name 1778 on *Official Index*].

Stenorynchus Lamarck, 1818:236 [invalid original spelling of *Stenorhynchus*; name 1779 on *Official Index*].

Stenorhynchus Lamarck, 1818:236 [emendation for *Stenorynchus* by the International Commission of Zoological Nomenclature under its plenary powers (Opinion 763, 1966); type-species: *Cancer seticornis* Herbst, 1788, by designation by the International Commission on Zoological Nomenclature under its plenary powers (Opinion 763, 1966:19); gender: masculine; name 1700 on *Official List*].

**Stenorhynchus lanceolatus* (Brullé, 1837)

FIGURE 78*b*

Leptopodia lanceolata Brullé, 1837, unnumbered pl.: fig. 1a,b.

Leptopodia Canariensis Brullé, 1839:15.

Leptopodia sagittaria.—Brullé, 1839:15.—White, 1847a:1 [part].—Stimpson, 1858d:219.—Kingsley, 1880b:383 [part].—Miers, 1886:3, 4.—Osorio, 1887:221; 1888:187, 191.—Koelbel, 1892:114.—Osorio, 1898:187, 192.—A. Milne Edwards and Bouvier, 1900:153.—Stimpson, 1907:23.—Balss, 1922:72. [Not *Cancer sagittarius* Fabricius, 1793 = *Cancer seticornis* Herbst, 1788.]

"une nouvelle espèce de ce genre" [*Leptopodia*].—Guérin-Méneville, 1844:10.

Leptopodia Sagittarius.—Herklots, 1861:136 [part].

Leptopodia vittata (Guérin MS).—Kingsley, 1880b:384.

Leptopodia sagitaria.—Osorio, 1889:130; 1898:185.

Stenorynchus sagittarius.—Rathbun, 1900a:293.—Stimpson, 1907:23.

Stenorhynchus sagittarius.—Odhner, 1923:19.

Stenorynchus seticornis.—Rathbun, 1925:13 [part, not pl. 2, 3]. [Not *Stenorhynchus seticornis* (Herbst, 1788).]

Stenorhynchus seticornis.—Monod, 1933b:503.—Capart, 1951: 81, fig. 25.—Sourie, 1954b:147.—Monod, 1956:567, figs. 838, 839.—Rossignol, 1957:78, 115 [key].—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962: 79.—Rossignol, 1962:123.—Ribeiro, 1964:21.—Crosnier, 1964:38, fig. on pl. A.—Forest and Guinot, 1966:117.—Maurin, 1968b:484, 486.—Le Loeuff and Intès, 1968, table 1; 1969:65.—Uschakov, 1970:455 [listed].

Stenorynchus.—Voss, 1966:17, 19.

Stenorhynchus lanceolatus.—Yang, 1967:220.—Barr, 1975:47 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 70, 33 m, branched Foraminifera, 1♀ (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂, 1 juv (L). Sta 46, 38–42 m, mud with dense *Jullienella*, 1♂ (W). Sta 65, 46–49 m, 1♂ (W). Sta 48, 22 m, 1♂, 3♀ (W).

Ghana: Sta 22, 51 m, rough bottom, 1♂, 1♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂ (W). Sta 24, 35–37 m, dark red bryozoans, 1♂, 2 juv (L). Sta 26, 27 m, shell bottom (scallops), 1♀ (W). Sta 28, 49–53 m, 2♀ (L). Sta 30, 61–64 m, coral, 2♀ (1 ov) (L).

Nigeria: Sta 246, 37 m, 1♂, 2♀ (1 ov) (L). Sta 248, 33 m, 5♂, 2♀ ov (W). Sta 252, 30 m, mud, 1♀ ov (W). Sta 253, 33–40 m, mud, 1♀ (W).

Annobon: Sta 275, 9–69 m, rubble of coralline algae, 2♀ ov (L).

Other Material: Madeira: SE coast, near Canical, 32°44'N, 16°44'W, 0–22 m, shore collecting, snorkeling and diving, 7 Mar 1976, *Onversaagd* Sta 14, 3♀ ov (L). Same, 11 Mar 1976, *Onversaagd* Sta 48, 1♀ ov (L). SE coast, NE of Canical, 32°44'N, 16°43'W, 0–20 m, diving, 11 Mar 1976, *Onversaagd* Sta 47, 1♀ (L). SE coast, Cabo de Santo Amaro near Santa Cruz, 32°41'N, 16°47'W, 0–20 m, rocky coast, diving and shore collecting, 9 Mar 1976, *Onversaagd* Sta 30, 1♀ (L). SE coast, near Agua de Pena, 32°41'N, 16°46'W, 0–25 m, diving, 9 Mar 1976, *Onversaagd* Sta 27, 1♂ (L). S coast, near Ponta do Garajau, 32°38'N, 16°51'W, 25–26 m, diving, 17 Mar 1976, *Onversaagd* Sta 111, 1♂, 1♀ (L).

DESCRIPTION.—Capart (1951:82). Yang (1967: 221), who distinguished three Atlantic species of

Stenorhynchus (*S. seticornis*, *S. lanceolatus*, and *Stenorhynchus* species A), gave the differences between the latter two species in the following tabular form:

Stenorhynchus species A	*S. lanceolatus*
Propodite of female chela smooth	Propodite of female chela covered by fine spines
Hiatus of female chela narrow	Hiatus of female chela round; similar to *S. seticornis*
Meropodite of male chela strongly granulated	Meropodite of male chela smooth

The differences between *S. seticornis* (Herbst) and *S. lanceolatus* were discussed by Yang (1967: 221) as follows:

> *S. seticornis* is also different from *S. lanceolatus* in having three spines at the distal margin of the meropodite (rather than two). Also *S. seticornis* is distinguished from *S. lanceolatus* by having smooth propodite of the female chelae, and strongly granulated meropodite of the male chelae. The tip of the male first pleopod of *S. lanceolatus* is round without a tooth-like projection and resembles that of *S.* species A (based on one large specimen). However, the hiatus of the female chela and the spination of pereiopod carpodite of *Stenorhynchus lanceolatus* is very similar to that of *S. seticornis*. The future larval study of *S. lanceolatus* will show the affinity of this species to *Stenorhynchus* sp. A or *S. seticornis*.

Figures: Capart, 1951, fig. 25; Monod, 1956, figs. 838, 839.

Color: Koelbel (1892:115) mentioned "tief purpurbraunen, manchmal auch lauchgrünen Rückenstreifen" and noted in a footnote "Vermöge eines ausgeprägt grünlichen Schimmers entspricht die Färbung derartiger Streifen vollständig jener der Flügeldecken der Männchen von *Dyticus marginalis*." He described the background of the stripes as "Elfenbeinweiss." A. Milne Edwards and Bouvier (1900: 154) described the color of the species as follows:

> Les couleurs de ce Crabe sont disposées d'une façon très remarquable. Une série de bandes brunes, jaunâtres ou presque blanches, s'étendent longitudinalement; elles se réunissent en avant sur la ligne médiane, puis se dirigent en arrière en suivant les contours de la carapace, les plus longues étant en dehors, les plus courtes au centre et la région cardiaque pouvant être considérée comme le centre de ces lignes concentriques. Les pattes sont brunes, relevées de taches et de bandes longitudinales d'un jaune vif. Les doigts des pinces sont d'un bleu violacé.

Capart (1951:82) described the color as follows: "La carapace de couleur orange, avec bande longitudinale violette, les pattes et pinces marquées de bandes de mêmes couleurs."

Male Pleopod: Monod, 1956, fig. 839 (Sierra Leone).

MEASUREMENTS.—The carapace lengths of the present male specimens ranged from 18 to 24 mm, in the females from 19 to 28 mm (the same range was shown by the ovigerous females). In the literature males have been reported with cl 18.2–54.5 mm (Guinot and Ribeiro, 1962), 62.5 mm (Miers, 1886), 71 and 75 mm (Rossignol, 1957) and 72 mm (Capart, 1951); A. Milne Edwards and Bouvier (1900) gave the span of their males as 200 to 250 mm. Non-ovigerous females with cl 14.4–49.5 mm and ovigerous females with cl 36.9, 40.2, and 44.2 mm were listed by Guinot and Ribeiro (1962). Monod (1956) gave the diameter of the eggs as 0.6 to 0.7 mm.

REMARKS.—Brullé (1837) gave a figure of the present species and on the plate used the name *Leptopodia lanceolata* for it. Later the same author (Brullé, 1839), now using the name *Leptopodia canariensis* sank it as a synonym of *Leptopodia sagittaria* (Fabricius, 1793) [= *Stenorhynchus seticornis* (Herbst, 1788)]. Practically all later authors accepted this synonymy. Only recently Yang (1967) showed that not one but three distinct species of the present genus have to be distinguished in the Atlantic region, one West African and two western Atlantic. Yang showed that the correct name for the West African species is *Stenorhynchus lanceolatus* (Brullé, 1837) and he indicated the differences between the three species. He based the West African form largely on part of the *Pillsbury* material listed above. Dr. Won Tack Yang intends to publish a more extensive paper on this problem, for which reason we only deal briefly with it here.

BIOLOGY.—The species has been collected at depths between 6 and 96 m (extremes 2–6 m, 5–7 m, 80 m, 75–90 m, and 96 m); more than 85% of the catches were from between 20 and 80 m.

The bottom on which the species was found was variously reported: sand and rock; sand and shells (A. Milne Edwards and Bouvier, 1900). Mud; green mud; brown and green mud; sand, mud, and rock (Capart, 1951). Coarse shelly sand, bottom with *Arca* and *Pyura* (Sourie, 1954b). Mud and sand; shell and sand (Longhurst, 1958). Stones; rock (Guinot and Ribeiro, 1962). Mud; mud and sand; mud and shells; sand and rock; sand, rock, coral, and calcareous algae; calcareous algae; calcareous and other algae; sand, calcareous and other algae; rock (Forest and Guinot, 1966).

Ovigerous females have been reported from all months except February (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Forest and Guinot, 1966; present paper).

Monod (1956) reported upon a specimen carrying a branchial isopod parasite.

DISTRIBUTION.—*Stenorhynchus lanceolatus* is an eastern Atlantic species, known from Madeira, the Canary Islands, the Cape Verde Islands, and from numerous localities on the African mainland between Spanish Sahara and Angola. The following records are in the literature:

Madeira: No specific locality (White, 1847a; Miers, 1886). Off the S side of Madeira 15 fm [27 m] (Stimpson, 1858d, 1907).

Canary Islands: E coast of Isla de Gran Canaria and near the harbor of Puerto de Cabras, Isla de Fuertaventura (Koelbel, 1892). Near Isla de Tenerife, 28°28′N, 18°32′W [of Paris, 16°12′W of Greenwich], 80 m, and Estrecho de la Bocaina, 28°49′N, 16°13′W [of Paris, 13°53′W of Greenwich], 30 m (A. Milne Edwards and Bouvier, 1900).

Cape Verde Islands: No specific locality (Osorio, 1898). São Vicente (Miers, 1886; Osorio, 1888). Channel between Santo Antão and São Vicente, 75–90 m (A. Milne Edwards and Bouvier, 1900). Fajã di Agua, Brava, 8 and 50 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Spanish Sahara: 21°05′N, 17°14′W, 43–45 m (Forest and Guinot, 1966). Between Cabo Barbas and Cabo Blanco and between Cabo Corbeiro and Cabo Blanco, 200 m (Maurin, 1968b).

Mauritania: Banc d'Arguin, 50 m (Maurin, 1968b).

Senegal: No specific locality (Herklots, 1861; Kingsley, 1880b). S of Ile de la Madeleine, 40 m; near Dakar, 14°41′30″–41″N, 17°18′30″–20′30″W, 20–25 m; 14°39′30″–40′30″N, 17°16′–18°30′W, 18–19 m; 14°38′–39′N, 17°16.5′–17.5′W, 26 m; between Gorée and Dakar, 16 m; area around Gorée, 33–35 and 41 m; Banc du Séminole, Baie de Gorée, ca. 38 m; between Cap Manuel and S point of Gorée, 24–27 m; and off Ngaparou (all Monod, 1956). Baie de Dakar, 10–12 m (Sourie, 1954b). Rufisque, 14°30′N, 17°25′W, 24 m (Capart, 1951). 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Guinea: No specific locality (Uschakov, 1970). 09°44′N, 13°56′W, 10 m; 09°40′N, 14°21′W, 25 m; 09°16′N, 13°42′W, 20 m; 09°16′N, 13°34′W, 10 m; 09°07′N, 13°41′W, 25 m; and 09°N, 13°50′W, 30 m (Monod, 1956). 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966). Off Conakry, 10 m; Matakong, ca. 15 m (Monod, 1956). Between Île Tamara and Île Roume, Îles de Los, 10–12 m (Capart, 1951).

Sierra Leone: No specific locality, in 25 m (Longhurst, 1958). 08°38′–08°42′N, 8–12 m (Monod, 1956).

Ivory Coast: 05°05′N, 04°59.5′W, 22 m (Voss, 1966; Yang, 1967). Lagoon at Abidjan, 05°16′N, 04°01′20″W (Forest and Guinot, 1966). Off Port-Bouët (Monod, 1956). Off Grand-Bassam, 15–60 m (Le Loeuff and Intès, 1968). Over all of the continental shelf (Le Loeuff and Intès, 1969).

Ghana: 04°46′N, 02°30′W to 04°45′N, 02°33′W, 61–64 m (Voss, 1966; Yang, 1967). Off Takoradi (Gauld, 1960). Off Accra, 32–51 m (Monod, 1956; Gauld, 1960).

Nigeria: No specific locality (Monod, 1956). Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966). Off the Niger delta, 04°03′N, 05°41′E to 04°07′N, 05°40′E, 33 m, and 04°04′N, 06°18′E to 04°05′N, 06°22′E, 30 m (Yang, 1967).

Cameroon: No specific locality, in 30–50 m (Crosnier, 1964).

Principe: 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; 01°38′35″N, 07°21′35″E, 35 m; 01°35′N, 07°28′E, 45 m (Forest and Guinot, 1966).

São Tomé: No specific locality (Osorio, 1887, 1889, 1898; Balss, 1922). Praia da Fernão Dias (Osorio, 1888). 00°25′40″N, 06°40′10″E, 50 m; 00°25′15″N, 06°43′05″E, 8–30 m; Morro Peixe, 2–6 m (Forest and Guinot, 1966).

Annobon: No specific locality, 18–20 m (Capart, 1951). N of San Antonio, 23 m (Forest and Guinot, 1966).

Congo: Off Pointe-Noire (Monod, 1956; Rossignol, 1957). W of Pointe-Noire, 40 m (Rossignol, 1962). 32 mi [51.5 km] W of Pointe-Noire, 04°48′S, 11°30′E, 50 m; 11 mi [17.7 km] WSW of Pointe-Noire, 04°52′S, 11°39′30″E, 58–60 m; 8 mi [12.9 km] WSW of Pointe-Noire, 04°53′S, 11°53′E, 50–70 m (Capart, 1951).

Cabinda: 05°03′S, 11°24′E, 36–48 m (Capart, 1951).

Angola: No specific locality (Miers, 1886; Guinot and Ribeiro, 1962). 11 mi [17.7 km] W of Cabo Ledo, Luanda, 09°40′S, 13°02′E, 80 m (Capart, 1951). Benguela, 13–26 m; Baía Farta, 30 m; Baía da Caota, 13.5 and 30 m (Guinot

and Ribeiro, 1962). Porto Alexandre, Moçâmedes (Odhner, 1923).

Subfamily MAJINAE Samouelle, 1819

Genus *Maja* Lamarck, 1801

Maja Lamarck, 1801:154 [type-species: *Cancer squinado* Herbst, 1788, by subsequent designation under the plenary powers of the International Commission on Zoological Nomenclature in Opinion 511; gender: feminine; name 1260 on *Official List*].

Meria Griffith and Pidgeon, 1833:165 [erroneous spelling of *Maja*].

Paramya de Haan, 1837, pl. 24 [type-species: *Pisa* (*Paramÿa*) *spinigera* de Haan, 1837, by monotypy; gender: feminine].

Mamaia Stebbing, 1905:23 [substitute name for *Maja*; type-species: *Cancer squinado* Herbst, 1788; gender: feminine].

REMARKS.—Guinot and Ribeiro (1962:76, footnote), in their account of *M. squinado*, remarked on the status of West African species of *Maja* as follows: "Nous identifions provisoirement ces spécimens à *Maja squinado*, mais la systématique des *Maja* ouest-africaines n'est pas entièrement satisfaisante et fera l'objet d'une mise au point ultérieure." To our knowledge these authors have not pursued this problem, and, inasmuch as we lack material of *Maja* from tropical localities, we have not been able to investigate it ourselves. Those working with West African *Maja* in the future should take this into account.

Maja crispata Risso, 1827

Maia crispata Risso, 1827:23.

Maja verrucosa.—Monod, 1956:477 [references].—Zariquiey Alvarez, 1968:447, figs. 149b, 150a–f, 156a [Spain; references].

SYNONYMS.—*Maia verrucosa* H. Milne Edwards, 1834 (see Holthuis, 1977b:72); *Cancer majodes* Nardo, 1847.

DISTRIBUTION.—Eastern Atlantic, from Portugal to Cabo Blanco and the Cape Verde Islands, Mediterranean; shallow water, littoral and sublittoral.

Maja goltziana d'Oliveira, 1888

Maja goltziana.—Capart, 1951:100, fig. 33 [Gabon].—Monod, 1956:478, 632, figs. 644, 645 [Guinea, Sierra Leone, Nigeria, Principe].—Rossignol, 1957:116 [key]; 1962:121 [Congo].—Crosnier, 1967:339, figs. 31, 32 [Congo, Annobon].—Longhurst, 1958:88 [Sierra Leone].—Zariquiey Alvarez, 1968:447 [Portugal; references].—Massuti, 1970:127 [Rio Muni].

Maïa goltziana.—Le Loeuff and Intès, 1968, table 1 [Ivory Coast].

Maia goltziana.—Maurin, 1968a:30, 48 [Morocco, Spanish Sahara]; 1968b:484 [Spanish Sahara].

DISTRIBUTION.—Eastern Atlantic, from the Mediterranean and Portugal S to the Congo, including Annobon and Principe islands in the Gulf of Guinea; sublittoral, in 15–200 m.

Maja squinado (Herbst, 1788)

Maja squinado.—Capart, 1951:98, fig. 32 [Spanish Sahara, Mauritania].—Monod, 1956:474, figs. 638–643 [Spanish Sahara, Mauritania, Senegal, Guinea].—Figueira, 1960: 11 [Azores].—Guinot and Ribeiro, 1962:75 [Cape Verde Islands, Angola].—Ribeiro, 1964:18 [Cape Verde Islands].—Forest and Guinot, 1966:95 [Guinea-Bissau].—Crosnier, 1967:339 [Gabon; Congo or Gabon].—Monod, 1967:182, pl. 16: fig. 2 [no localities].—Zariquiey Alvarez, 1968:446, figs. 149a, 150g,h [Spain; references].—Christiansen, 1969:131, fig. 54, map 47 [North Atlantic].—Kensley, 1970:180 [South-West Africa].—Ribeiro, 1973:6 [Cape Verde Islands].

Maïa squinado.—Sourie, 1954b:147 [Senegal].

Maia squinado.—Chapman and Santler, 1955:375 [Azores].—Forest and Gantès, 1960:356 [Morocco].—Gauld, 1960:72 [Ghana].—Maurin, 1968a:48; 1968b:484 [both Spanish Sahara].—Bas, Arias, and Guerra, 1976: 169 [Spanish Sahara].

Maja squinada.—Massuti, 1970:127 [Rio Muni].

SYNONYM.—*Maia squinado* var. *brachydactyla* Balss, 1922.

DISTRIBUTION.—Eastern Atlantic, from the North Sea southward to South-West Africa, including the Mediterranean; sublittoral to about 75 m.

Subfamily PISINAE Dana, 1851

Genus *Apiomithrax* Rathbun, 1897

Phycodes A. Milne Edwards, 1869:374 [invalid junior homonym of *Phycodes* Guenée, 1852 (Lepidoptera); type-

species: *Phycodes antennarius* A. Milne Edwards, 1869, a subjective junior synonym of *Micropisa violacea* A. Milne Edwards, 1867, by monotypy; gender: masculine].

Apiomithrax Rathbun, 1897b:164 [substitute name for *Phycodes* A. Milne Edwards, 1869; type-species: *Phycodes antennarius* A. Milne Edwards, 1869, by monotypy; gender: masculine].

Apiomithrax bocagei (Osorio, 1887)

Micropisa violacea.—A. Milne Edwards and Bouvier, 1900: 130 [part].—Rathbun, 1925:303, pl. 241: figs. 5–8 [part].—Capart, 1951:93, fig. 30, pl. 2: figs. 12, 13 [part, all but one specimen from Dakar (Monod, 1956:509)]. [Not *Micropisa violacea* A. Milne Edwards, 1867.]

Apiomithrax bocagei.—Monod, 1956:508, figs. 692–702.—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962:76.—Forest and Guinot, 1966:105.—Le Loeuff and Intès, 1968:46, 70, table 1, figs. 52, 61; 1969:63, 64, 65.

Micropisa bocagei.—Rossignol, 1957:78, 116 [key], pl. 1: figs. 6–9, pl. 3: fig. 2.

Micropisa (Apiomithras) bocagei.—Rossignol, 1962:122.

Micropisa spinosa Forest and Guinot, 1966:105 [nomen nudum; discussion of manuscript name].

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: West Africa: 1906, F. P. Vermeulen, 1♂ (L).

Spanish Sahara: Off Cabo Blanco, 21°47′N, 19°47′W of Paris (17°27′W of Greenwich), 140 m, green sandy mud, 1883, *Talisman*, 1♂ (W).

Liberia: Off Saint Paul River mouth, 4–11 fm [11–20 m], G. C. Miller, 6 Jan 1953, 2♂, 1♀ (W).

Cameroon: Kribi, caught by fisherman with beach seine, 9 Aug 1964, B. de Wilde-Duyfjes, 18♂, 19♀ (some ov) (L).

Congo: Near Pointe-Noire, 04°45′S, 11°48′E, 15–18 m, 18 Jan 1966, *Ombango*, A. Crosnier, 2♂, 7♀ (5 ov) (W).

DESCRIPTION.—Capart, 1951:93; Monod, 1956: 500–501 (comparison with *A. violaceus*).

Figures: Monod, 1956, figs. 692–702.

Male Pleopod: Monod, 1956, figs. 701, 702 (Ghana); Rossignol, 1967, pl. 3: fig. 2 (Congo).

MEASUREMENTS.—Carapace lengths of males 26.2 to 33.0 mm, of non-ovigerous females 26.3 to 29.5 mm, of ovigerous females 27.8 to 34.1 mm. Monod (1956) recorded specimens as large as 48 mm.

REMARKS.—Monod (1956) transferred this species and *A. violaceus* from *Micropisa* to *Apiomithrax*.

The male specimen from Spanish Sahara cited above, collected by the *Talisman* in 1883, had been identified with *A. violaceus* by A. Milne Edwards and Bouvier (1900) and Rathbun (1925). As suggested by Monod (1956:504, footnote), it appears to be a typical *A. bocagei*.

BIOLOGY.—This species occurs off West Africa from the shore to a depth of 140 m; most specimens have been collected in shallower water, 20 m or less. Monod (1956) included material collected at a beach, on bottom with *Palythoa* and *Molgula* on sand in 15 to 20 m, and on muddy sand in 10 m. Gauld (1960) noted that off Ghana it was occasionally taken in shore seines and was common in tangle nets in depths to 20 m. Guinot and Ribeiro (1962) reported material taken off Angola in a beach seine, by hand at low tide, and in mud at a depth of 40 m. It was taken off Principe by the *Calypso* in calcareous algae, sand, and mud at a depth of 6 m (Forest and Guinot, 1966). Our specimen from the *Talisman* collection was taken on green sandy mud in 140 m.

Le Loeuff and Intès (1968) took it off the Ivory Coast in depths of 8 to 40 m, usually between 15 and 30 m, in all types of sediment. They recorded only *A. bocagei* there and commented (1968:46):

> Il semble que ce phénomène d'exclusion d'une espèce par l'autre soit la règle. Il y aurait des régions à *A. bocagei* (Ghana - Côte d'Ivoire), d'autre à *A. violaceus* (Sénégal, Iles Principe et San Tomé). Les données sont encores insuffisantes pour suivre la distribution des deux espèces dans l'espace, du Sénégal à l'Angola, et bien sûr dans le temps: mais il serait intéressant de savoir s'il existe des alternances dans la dominance d'une espèce sur l'autre, en un lieu donné.

They later commented (1969:64): "Il se peut donc que *A. violaceus* ait été éliminé [off the Ivory Coast] par *A. bocagei* ou qu'il n'ait jamais pu s'installer." In this paper they described *A. bocagei* as a mud-dwelling species.

Ovigerous females have been collected in January, February, March, April, May, August, November, and December (Capart, 1951; Monod, 1956; present paper).

DISTRIBUTION.—West Africa, where it has been recorded from numerous localities between Cabo Blanco and southern Angola, from the shore to 140 m, generally in 50 m or less. Monod (1956)

recorded many specimens from localities between Senegal and the Congo. Since 1956 it has been reported from the following:

Sierra Leone: No specific locality, 8–25 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueville, off Grand-Bassam, 8–40 m (Le Loeuff and Intès, 1968).

Ghana: No specific locality, shore to 20 m (Gauld, 1960).

Principe: Between Ponta da Mina and Ponta Novo Destino, 6 m (Forest and Guinot, 1966).

Congo: Pointe-Noire (Rossignol, 1957). Baie de Pointe-Noire (Rossignol, 1962).

Angola: No specific locality; Benguela (Forest and Guinot, 1966). Luanda, beach seine; Porto Amboim, 40 m; Baía de Benguela, shore (Guinot and Ribeiro, 1962).

*Apiomithrax violaceus (A. Milne Edwards, 1867)

Micropisa eryophora De Rochebrune, 1883:167.—Rathbun, 1900a:294 [listed].—Balss, 1922:73 [listed].—Monod, 1956:513.

Herbstia eryophora.—Miers, 1886:49 [listed].—Rathbun, 1893a:93 [listed].

Micropisa violacea.—Capart, 1951:93 [part, not illustrated specimen].—Sourie, 1954b:147, 152.—Rossignol, 1957:78, 116 [key], fig. 2, pl. 1: figs. 2–5, pl. 3: fig. 1.—Buchanan, 1958:20, 24.—Crosnier, 1964:31, 32.

Apiomithrax violaceus.—Monod, 1956:502, figs. 682–691.—Longhurst, 1958:89.—Gauld, 1960:72.—Monod, 1963, fig. 41 [no material].—Forest and Guinot, 1966:104.—Le Loeuff and Intès, 1969:64 [discussion].

Micropisa (Apiomithras) violacea.—Rossignol, 1962:122 [erroneous spelling].

SYNONYMS.—*Phycodes antennarius* A. Milne Edwards, 1869; *Micropisa eryophora* De Rochebrune, 1883.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 70, 33 m, branched Foraminifera, 1♂ (L).

Other Material: Dahomey: Harbor of Cotonou, 26 Mar 1964, H. Hoestlandt, 1 juv ♀ (L).

Congo: Off Pointe-Noire, 04°46′15″S, 11°48′15″E, 18 m, 25 Jan 1966, *Ombango*, A. Crosnier, 1♂ (W).

DESCRIPTION.—Monod, 1956:500–501 (comparison with *A. violaceus*).

Figures: Monod, 1956, figs. 682–691.

Male Pleopod: Monod, 1956, figs. 687–689 (Senegal); Rossignol, 1957, pl. 3: fig. 1 (Congo).

MEASUREMENTS.—Our specimens are all quite small, having carapace lengths of 10.5 mm or less. Monod (1956) recorded a specimen 50 mm long.

REMARKS.—The identity of the species described by De Rochebrune (1883) as *Micropisa eryophora*, from the mouths of the Casamance and Gambia rivers, has remained unsolved until now. Miers (1886) placed it in *Herbstia* and Balss (1922) retained it in *Micropisa* but suggested it could be identified with *A. violaceus*. Monod (1956) listed it as "*Micropisa eryophora*" and discussed it after his account of *Apiomithrax*, but did not identify it with any West African species then known.

De Rochebrune's longer French account (1883: 167, 168), based on a small specimen, 18 mm long, 15 mm wide, is as follows:

> Carapace plus longue que large, couverte ainsi que les pattes de longs poils grisâtres enchevêtrés; les parties [p. 168] inférieures garnies de poils courts, rigides; front bifide, à cornes courtes et obtuses; bord externe de l'orbite armé d'une dent obtuse, dirigée en dehors; bords latéraux garnis d'épines assez longues, molles; trois tubercules saillants disposés sur une ligne transversale au niveau de la région gastrique; quatre autres épines au centre de la carapace; régions branchiales et hépatiques supportant des épines assez fortes, terminées par une étranglement surmonté d'un bouton de consistance molle; pinces faibles, à doigts écartés, se touchant seulement à leur extrémité; pattes ambulatoires assez fortes, laineuses.
>
> Couleur générale brun rougeâtre, visibles à travers le feutrage des poils; pointe des épines rose, pattes rosées.

The body proportions of *M. eryophora*, length 6/5 width, suggest that it is based upon an *Apiomithrax* rather than a *Herbstia* or *Micropisa*; small specimens of *Herbstia* are relatively slender (Monod, 1956, figs. 649, 650) and *Micropisa ovata* (Monod, 1956, fig. 669) lacks dorsal spines on the midline of the carapace. That the branchial and hepatic spines were described as terminating in spongy buttons suggests that the specimen was covered with a sponge, not that the spines were enlarged distally. The mention of long setae on the carapace and legs suggests that De Rochebrune was dealing with the relatively hairy *A. violaceus* rather than *A. bocagei*. Finally, the de-

scription of three prominent tubercles arranged in a transverse row across the level of the gastric region plus four other spines in the center of the carapace (not described by De Rochebrune as being in a longitudinal row) is precisely the condition figured by Monod (1956, fig. 682) for *A. violaceus*. We have no hesitation in identifying *Micropisa eryophora* De Rochebrune, 1883, with *Micropisa violacea* A. Milne Edwards, 1867.

Although Monod (1956:502, synonymy) indicated that the type-locality of *Micropisa violacea* was "St. Vincent du Cap Vert," A. Milne Edwards (1867a:33–35) actually had material from two localities, São Vicente and "la côte d'Angola," and specimens from these two localities are syntypes. Monod (1933b:506 and 1956: 508) examined the specimen from Angola and, like A. Milne Edwards, considered it to be conspecific with the material from the Cape Verde Islands. However, the type-locality of *M. bocagei* also is Angola. In order to insure that the name *Micropisa violacea* will continue to be used in the sense originally employed by A. Milne Edwards (1867a), we select the specimen figured by him on the plate (pl. 21: fig. 1) that accompanied his account of the species in volume 1 of *Les Fonds de la Mer*. Apparently the plates that accompanied this volume were not issued with it but were issued after livraison 24 of volume 2, published in 1872, i.e., with one of the livraisons of that volume issued between 1873 and 1876 (see Rehder, 1946: 74, for an account of the dates of publication of the individual livraisons and some of the figures).

BIOLOGY.—Like *A. bocagei*, this species apparently prefers soft bottoms in relatively shallow water. Although it has been recorded from a depth of 110–180 m from the *Talisman* collections, it usually occurs in depths of 35 m or less. The single specimen taken by the *Pillsbury* was collected from branched Foraminifera in 33 m. Sourie (1954b) in a study of sand habitats, found it in Senegal in 10–12 m on bottom with *Arca* and *Pyura*, in coarse shelly sand and on fine shelly sand with mud and with *Molgula hannensis* (Pérès), 2–7 m. In a study of the rocky shore fauna of Senegal, Sourie (1954a) included it with the "hypobiotes lapidicoles mobiles," the "hypobioses detricicoles" where it was associated with *Sidonops senegalensis* (Topsent) and *Eurythoe complanata* (Pallas), and as a representative of the "horizons moyens et inférieurs" on rocky shores. Buchanan (1958) reported that it was abundant in the sandy silt community in 8–20 fm (15–36 m) and also in the inshore fine sand community in 3–8 fm (6–15 m) off Accra, Ghana. Monod (1956) recorded a few notes on habitat: bottom with *Palythoa* and *Molgula* on sand in 15–20 m, muddy sand in 10 m, and specimens collected at the shore, beach, or reef. Longhurst (1958) found the species off Sierra Leone in sandy mud in estuaries or on shelly sand offshore, in depths between 6 and 25 m. Crosnier (1964) found it off Cameroon in 0–32 m, in sand with Foraminifera on rocky bottom with gorgonians, and characterized it as a warm water crustacean. Gauld (1960) noted that it was common on rocky shores throughout Ghana and was occasionally taken sublittorally. Forest and Guinot (1966) recorded the following habitats: from mud with *Arca* in 32 m off the Niger delta; from rocks, coral, sand, and calcareous algae in 3–10 to 35 m off Principe; from rocks on shore and from calcareous algae, rocks, coral, sand, on an anchor and in a sponge, in 2 to 10 m off São Tomé; and from similar bottoms in 7 to 60 m off Annobon.

Ovigerous females have been taken in January through June and July through September (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—This species, like *A. bocagei*, occurs off West Africa from numerous localities between Cabo Blanco and Angola; in depths to 110–180 m, generally in less than 35 m; unlike *A. bocagei*, it also occurs off Brazil (Rathbun, 1925). Monod (1956) reported on many specimens from localities between Mauritania and Gabon; in addition to Monod's records, *A. violaceus* has been recorded from the following:

Senegal: Dakar (Sourie, 1954b). Mouth of the Casamance River (De Rochebrune, 1883).

Gambia: Mouth of the Gambia River (De Rochebrune, 1883).

Sierra Leone: No specific locality, in 6–25 m (Longhurst, 1958).

Ghana: Off Accra, 6–36 m (Buchanan, 1958). No specific locality (rocky shores throughout Ghana) (Gauld, 1960).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Cameroon: No specific locality, 0–32 m (Crosnier, 1964).

Principe: Baía das Agulhas, 4–8 m; 01°38′35″N, 07°21′-35″E, 35 m; Ilhéus dos Mosteiros, 3–10 m (Forest and Guinot, 1966).

São Tomé: In front of São Tomé, 8 m; 00°20′N, 06°46′E, 10 m; Ponta Diogo Vaz; Praia Santa Catarina; Ilhéu Macaco; off Ponta Diogo Nunes, shore and 4–5 m; in front of Ponta Oquedelrei; Morro Peixe; and Ilhéu das Cabras, shore (all Forest and Guinot, 1966).

Annobon: 01°24′04″S, 05°36′45″E, 7–10 m; 01°26′15″S, 05°35′40″E, 60 m; NW coast, Isla Tortuga, 15–40 m (all Forest and Guinot, 1966).

Congo: Pointe-Noire (Rossignol, 1957). Baie de Pointe-Noire (Rossignol, 1962).

Genus *Eurynome* Leach, 1814

Eurynome Leach, 1814:431 [type-species: *Cancer asper* Pennant, 1777, by monotypy; gender: feminine; name 1623 on *Official List*].

**Eurynome aspera* (Pennant, 1777)

Eurynome aspera.—Capart, 1951:86, pl. 2: fig. 4.—Chapman and Santler, 1955:375.—Monod, 1956:480, figs. 646–648.—Longhurst, 1958:89.—Forest and Guinot, 1966: 95.—Zariquiey Alvarez, 1968:462, figs. 14g, 153a, 154f [Spain; references].—Christiansen, 1969:126, fig. 52, map 45 [North Atlantic].—Crosnier, 1970:1217, pl. 1: figs. 1–4 [Mediterranean in part].—Türkay, 1976a:25 [listed], 39 [Portugal in part].

SYNONYMS.—*Eurynome scutellata* Risso, 1827; *Eurynome boletifera* Costa, 1838; ?*Eurynome longimana* Stimpson, 1858; *Eurynome aspera* var. *acuta* A. Milne Edwards and Bouvier, 1900.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 1♂, 1 juv (L).

Undaunted Material: Angola: Sta 96, 162 m, 1♂ (L).

DESCRIPTION.—Hartnoll, 1961:173; Christiansen, 1969:126.

Figures: Monod, 1956, figs. 646–648.

Male Pleopod: Hartnoll, 1961, fig. 4a,b (Isle of Man); Capart, 1951, pl. 2: fig. 4 (Spanish Sahara); Monod, 1956, figs. 647, 648 (Senegal).

REMARKS.—Apparently this species is rare off West Africa. Monod (1956) recorded six specimens and only two were taken by the *Pillsbury*.

Barnard (1950) has recorded this species from South Africa and suggested that *E. longimana* Stimpson, 1858, should be considered a synonym of *E. aspera*. Capart (1951) considered *E. longimana* to be a distinct species, but Griffin (1964, 1974) left it in synonymy. Crosnier (1970) agreed with Barnard and Griffin and pointed out additional similarities between material available to him and that reported by Barnard. If those considering *E. longimana* to be a synonym of *E. aspera* are correct, the latter species occurs from Norway southward to South Africa.

BIOLOGY.—Little information is available for West African specimens of *E. aspera*, but apparently it prefers a firm substrate with relatively large particles in it. Chapman and Santler (1955) reported it from rocks in a harbor. Longhurst (1958) took one specimen on shelly sand in 100 m and Forest and Guinot (1966) also reported one specimen from algae and calcareous algae in 60 m. Our specimens were taken on broken shell in 70 m. The overall depth range is wide, from 10 m or less to 550 m (Monod, 1956).

DISTRIBUTION.—*Eurynome aspera* is widely distributed in the eastern Atlantic, from Norway to Angola, including the Mediterranean, and, possibly, from South Africa, in depths between 10 and 550 m. Monod (1956) reported on material from Senegal and Principe Island; in addition to Monod's records the species has been recorded from the following:

Azores: Horta, Faial (Chapman and Santler, 1955).

Morocco: 33°27.7′N, 08°50.8′W, 161–168 m; and 33°10.5′N, 09°17.5′W, 170–345 m (Türkay, 1976a).

Mauritania: Banc d'Arguin, 21°31′N, 19°48′W of Paris (17°28′W of Greenwich), 235 m (Crosnier, 1970).

Sierra Leone: No specific locality, 100 m (Longhurst, 1958).

Annobon: 01°26′15″S, 05°35′40″E, 60 m (Forest and Guinot, 1966).

Angola: 16°41′S, 11°21′E, 162 m (Crosnier, 1970).

**Eurynome parvirostris* Forest and Guinot, 1966

Eurynome parvirostris Forest and Guinot, 1966:95, fig. 9.

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♀ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♀ ov (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 1♂ (L).

DESCRIPTION.—Forest and Guinot, 1966:95.

Figure: Forest and Guinot, 1966, fig. 9.

MEASUREMENTS.—Our specimens have carapace lengths of 6 mm. The two type-specimens had carapace lengths of 6.3 mm each.

BIOLOGY.—This species may have different habitat requirements than *E. aspera*, for most specimens have been taken on soft bottoms: mud with *Arca* in 32 m (Forest and Guinot, 1966), and mud with Foraminifera and shells in 46 m, or mud with foliate bryozoans in 42 m. The known depth range is relatively narrow, from 30 to 46 m.

DISTRIBUTION.—Off tropical West Africa, where it has been recorded from off Dahomey, Ghana, and off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Genus *Herbstia* H. Milne Edwards, 1834

Herbstia H. Milne Edwards, 1834:301 [type-species: *Cancer condyliatus* Fabricius, 1787, by monotypy; gender: feminine; name 1625 on *Official List*].

Rhodia Bell, 1835:169 [type-species: *Rhodia pyriformis* Bell, 1835, by monotypy; gender: feminine].

Herbstiella Stimpson, 1871b:93 [type-species: *Herbstia depressa* Stimpson, 1860, by original designation; gender: feminine].

Fisheria Lockington, 1877:72 [type-species: *Fisheria depressa* Lockington, 1877, a subjective junior synonym of *Herbstiella camptacantha* Stimpson, 1871, by monotypy; gender: feminine].

Key to Species of Adult *Herbstia* from West Africa

1. Posterior median margin of carapace with trilobed projection. [Opposable margins of dactyli of walking legs with fixed, triangular teeth] ..... ***H. condyliata***

   Posterior median margin of carapace with single projection 2

2. Carapace, smooth, regions poorly defined. Upper surface of palm in males smooth. Opposable margins of dactyli of walking legs with fixed triangular teeth ..... ***H. nitida***, new species

   Carapace rugose, regions well defined. Upper surface of palm in males with row of tubercles. Opposable margins of dactyli of walking legs lacking fixed triangular teeth ..... ***H. rubra***

**Herbstia condyliata* (Fabricius, 1787)

FIGURE 79

Cancer condyliatus Fabricius, 1787:324.

Herbstia condyliata.—Monod, 1933a:212.—Forest and Gantès, 1960:356.—Zariquiey Alvarez, 1968:455, fig. 153c,d [Spain; references].

Herbstia rubra.—Sourie, 1954a:113, 254, 256, 294; 1954b: 147.—Chapman and Santler, 1955:375.—Monod, 1956: 482, figs. 650–653 [part, not fig. 649]. [Not *Herbstia rubra* A. Milne Edwards, 1869.]

SYNONYMS.—*Mithrax herbsti* Risso, 1827; *Mithrax scaber* Costa, 1840.

MATERIAL EXAMINED.—*Pillsbury Material:* Ghana: Sta 22, 51 m, rough bottom, 1♂ (L).

Other Material: Madeira: SE coast, near Canical, 32°44′N, 16°44′W, 0–22 m, shore collecting, snorkeling, and diving, 11 Mar 1976, *Onversaagd* Sta 48, 1♂ (L). S coast Ponta da Garajau, 32°38′N, 16°51′W, 5–26 m, diving, 17 Mar 1976, *Onversaagd* Sta 111, 1♀ (L).

DESCRIPTION.—Carapace (Figure 79*a,c,d*) pyriform, irregular dorsally, ornamented with numerous spines, regions well marked; surface covered with thin coat of low, dark setae. Gastric, cardiac, and intestinal regions each elevated in midline.

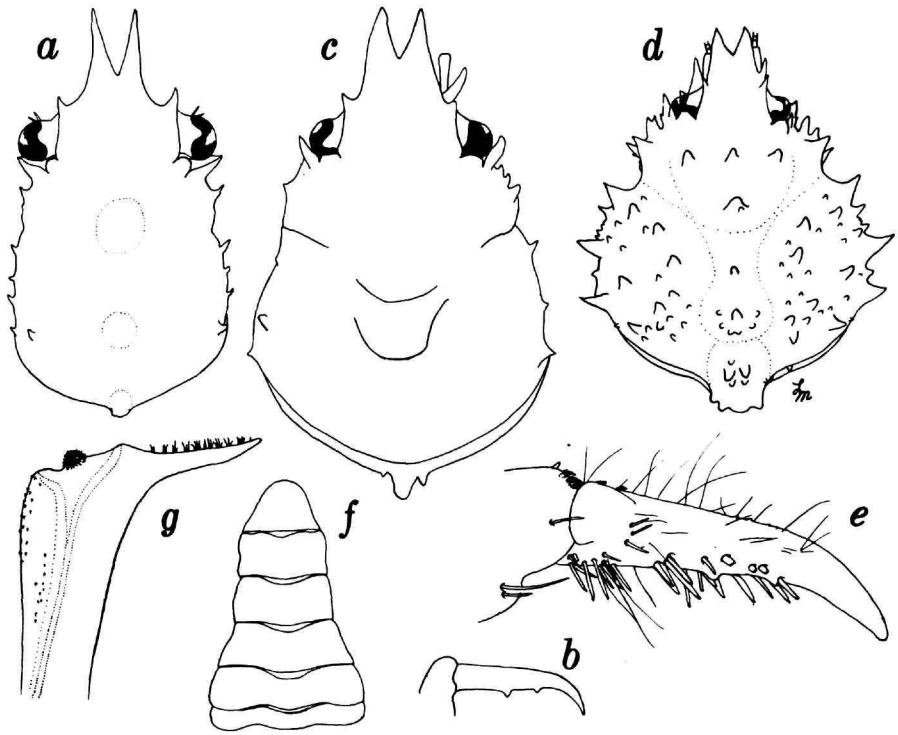

FIGURE 79.—*Herbstia condyliata* (Fabricius). Juvenile, cl 4.2 mm, Sicily: *a*, carapace; *b*, dactylus of fifth pereiopod. Male, cl 10.8 mm, Spain: *c*, carapace. Male, cl 29.6 mm, *Pillsbury* Sta 22: *d*, carapace; *e*, dactylus of fifth pereiopod; *f*, abdomen; *g*, apex of gonopod.

Gastric region with 3 raised protogastric tubercles in transverse line anteriorly (Figure 79*d*), large median mesogastric tubercle posteriorly; posterior tubercle with secondary tubercle(s) on slope. Cardiac region with 2 tubercles in midline, anterior (urogastric?) smaller, posterior ringed with secondary tubercles posteriorly. Intestinal prominence bituberculate in midline, with 2 smaller submedian tubercles posteriorly. Posterior margin of carapace (Figure 79*d*) with well-developed, trilobed, posterior projection, separate from intestinal prominence. Hepatic region with 1 spine in line with lateral branchial spines flanked ventrally by patch of 2 or 3 large spines, subhepatic region with 1 or 2 lines of sharp tubercles. Branchial region with 4 major spines laterally, flanked laterally and dorsally by numerous spines and tubercles. Rostral teeth short but sharp, apices slightly convergent. Preorbital and postorbital spines sharp. Basal antennal article with long anterior spine visible in dorsal view, prominent sharp proximal spine present suborbitally, prominent postorbital spine also present ventrally, ventral border of orbit smooth.

Chelipeds enlarged, much longer than carapace in adult males, variously ornamented with tubercles, spines, and setae. Merus rough, tuberculate, with row of large spines dorsally. Carpus tuberculate, with 1 larger spine on outer margin. Palm inflated in adult males, with row of rough, granulated tubercles dorsally. Fingers shorter than palm, with proximal gape, dactylus with large, blunt tooth in gape.

Walking legs slender, fifth longer than carapace, variously tuberculate, with short setae and corneous bristles. Meri of walking legs with some spines dorsally (usually 1 or 2 proximally, 1 distally), largest distal. Dactylus shorter than pro-

podus, ventral margin with slender spines and usually with 1 or 2 triangular teeth (Figure 79*b,e*), large in juvenile, smaller in adult.

Male gonopod and abdomen as shown (Figure 79*f,g*).

MEASUREMENTS.—Carapace lengths of males 7.8 to 29.6 mm, of female 18 mm.

REMARKS.—*Herbstia condyliata* can readily be distinguished from other West African species of the genus, *H. rubra* and *H. nitida*, new species, by its larger size, much more spinulose carapace, and presence of a trilobed projection on the posterior margin of the carapace (as shown in Monod, 1956, fig. 650, and herein, Figure 79*d*), where it is almost quadrilobed. The chelipeds in adult males of *H. condyliata* are greatly enlarged, being much longer than the carapace; in the two smaller West African species the chelipeds in adult males are subsimilar to those of females. *Herbstia condyliata* agrees with *H. nitida*, new species, and differs from *H. rubra* in having fixed, triangular teeth on the opposable margin of the dactyli of the walking legs.

Because smaller specimens of this species have been confused with the adults of the two smaller West African species, we have sketched the carapace shape in a juvenile, cl. 4.2 mm (W), from Sicily (Figure 79*a*) and a larger specimen from Spain, cl. 10.8 mm (L) (Figure 79*c*), as well as an outline of our adult from Ghana (Figure 79*d*). In the smallest specimen, the carapace is very slender, its dorsal armature is reduced, and there is but one posterior spine. In the specimen from Spain the characteristic three posterior spines of the adult are developed, although the spinulation of the carapace is still reduced. Monod (1956, fig. 650) figured a female 15.5 mm long, in which the carapace is still more slender than in the adult but in which the posterior spines of the carapace are well developed. In Monod's figure, the transverse line of three protogastric tubercles is not shown.

A. Milne Edwards and Bouvier (1900:128) suggested that *H. rubra* might only be a race of *H. condyliata* and Monod (1956:485) more or less agreed with this:

> Il n'est nullement impossible que l'étude de matériaux plus nombreux, et provenant en particulier des régions marocaine ou saharienne, n'oblige à tenir un jour *rubra* pour synonyme de *condyliata*, ou tout au moins comme une forme subordonnée, moins tuberculée, et aussi plus petite.

Monod was working with juveniles of *H. condyliata* as well as adults of both other species, and, in view of the similarities between specimens of similar size of all three species, it is not surprising that they were not separated by him.

Although it is impossible to be certain in view of the relatively small number of *Herbstia* recorded from West Africa and the relatively unreliable literature records, it seems likely that *H. rubra* is restricted to the Cape Verde Islands, *H. nitida*, new species, occurs only on the offshore islands of the Gulf of Guinea, and *H. condyliata* occurs on the continental shelf.

The male pleopod of *H. condyliata*, the type-species of the genus, is shown in Figure 79*g*. It resembles that shown by Garth (1958, pl. S: figs. 7, 8) for the eastern Pacific species *H. pubescens* Stimpson and *H. pyriformis* (Bell) in that there is a subapical rounded, spinulose knob flanked by a distinct notch; this knob is present on the gonopods of all three species reported here. As noted by Garth (1958:300) in his key to West American *Herbstia*, the other western American species lack the subapical notch on the male pleopod. Further study may well indicate that *Herbstia*, as currently recognized, comprises representatives of more than one genus.

BIOLOGY.—Sourie (1954b) found this species on coarse, shelly sand, with mud, bottom with *Arca* and *Pyura*, in 2–7 m, at Anse de Hann, Baie de Dakar, and subsequently included the species as a component of the rocky shore fauna of Senegal. Monod (1933a:212) reported two specimens associated with sponges, and, in 1956, reported a specimen collected during a spring low tide. The single specimen taken by the *Pillsbury* was taken on rough bottom at a depth of 51 m.

DISTRIBUTION.—Mediterranean Sea and adjacent Atlantic south to Ghana. Since 1956 it has been recorded from Morocco: Temara, Skhirat, and David (Forest and Gantès, 1960).

Barrois (1888) recorded the species from the Azores, and also indicated, without citing a reference, that the species occurred in the Canary Islands. The specimens reported from Horta and Pasteleiro, Faial, Azores, by Chapman and Santler (1955) as *H. rubra* may be referable to *H. condyliata*; *H. rubra* is known with certainty only from the Cape Verde Islands.

**Herbstia nitida*, new species

FIGURE 80

?*Herbstia rubra*.—Monod, 1956:482 [part].—Forest and Guinot, 1966:97. [Not *Herbstia rubra* A. Milne-Edwards, 1869.]

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 275, 9–69 m, rubble of coralline algae, 3♂, 3♀ (2 ov), 1 juv (W). Sta 282, 18–37 m, nodular coralline algae, 3♂ (includes holotype), 3♀ (2 ov), 1 juv (L). Sta 283, 51–55 m nodular coralline algae, 1♀ (L).

DESCRIPTION.—Carapace (Figure 80*a,b*) pyriform, appearing smooth dorsally but minutely rugose, regions poorly marked; light coat of short setae present laterally. Gastric and cardiac regions slightly inflated, latter with single low dorsal tubercle, gastric region with 3 low tubercles in transverse line. Intestinal region with low, obtusely rounded prominence, slightly swollen dorsally, and with single posterior projection in larger specimens. Hepatic region with 3 or 4 sharp tubercles, smaller tubercles present on subhepatic region. Branchial region with 4 lateral tubercles or short spines, 2 smaller tubercles present dorsally. Rostral teeth (Figure 80*c,d*) short but sharp, apices recurved mesially; several short, corneous bristles present at base of rostrum. Preorbital and postorbital spines sharp. Basal antennal article with long, smooth anterior spine, visible in dorsal view, and shorter proximal tooth under orbit. Ventral surface of orbit smooth, small postorbital tubercle present.

Chelipeds (Figure 80*e*) not enlarged in adult males, in both sexes about as long as carapace; merus, carpus, and propodus with small corneous bristles and short stiff setae; merus with numerous low tubercles and several larger spines arranged in dorsal and ventral rows, spination variable, absent in some specimens; carpus with numerous tubercles and 1 larger spine on outer margin. Palm not markedly inflated in males, with 1 or 2 (usually 1) posteriorly directed spines on dorsal articular knob, remainder of surface smooth but setose. Fingers shorter than palm, cutting edges crenulate, not strongly toothed or gaping.

Walking legs slender, long, fifth leg longer than carapace, ornamented with corneous bristles and longer simple setae. Merus with row of corneous bristles dorsally, occasionally with dorsal and posterior spines or with irregular tubercles posteriorly, not heavily armed. Dactylus (Figure 80*f*) shorter than propodus, ventral margin with 1–4 prominent, triangular teeth and slender spines. Male abdomen and gonopods as shown (Figure 80*g,h*).

MEASUREMENTS.—Carapace lengths of males, 5.9 to 8.8 mm, of non-ovigerous females, 6.1 to 10.0 mm, of ovigerous females, 9.1 to 10.5 mm, of juveniles, 4.0 to 4.2 mm. Monod (1956) recorded an ovigerous female 7 mm long.

REMARKS.—Like *H. rubra* from the Cape Verde Islands, *H. nitida* is a small, relatively smooth species in which the chelipeds are not greatly enlarged in adult males and in which there is a single median posterior projection on the carapace (Figure 80*b*). These features will distinguish the new species from *H. condyliata*, which also occurs off West Africa. *Herbstia nitida* is a much smoother species than *H. rubra*, and further differs in having the regions of the carapace much less distinct, fewer dorsal tubercles and spines on the carapace, a broader posterior projection on the carapace, fewer spines on more slender pereiopods, no spines on the upper surface of the palm of the chela in males (other than those on the articular condyle), and several triangular, fixed teeth on the opposable margin of the dactylus of the walking legs (Figure 80*f*). The two species can be separated very easily by using this latter character.

TYPE-LOCALITY.—Annobon Island, 01°28′S, 05°36′E.

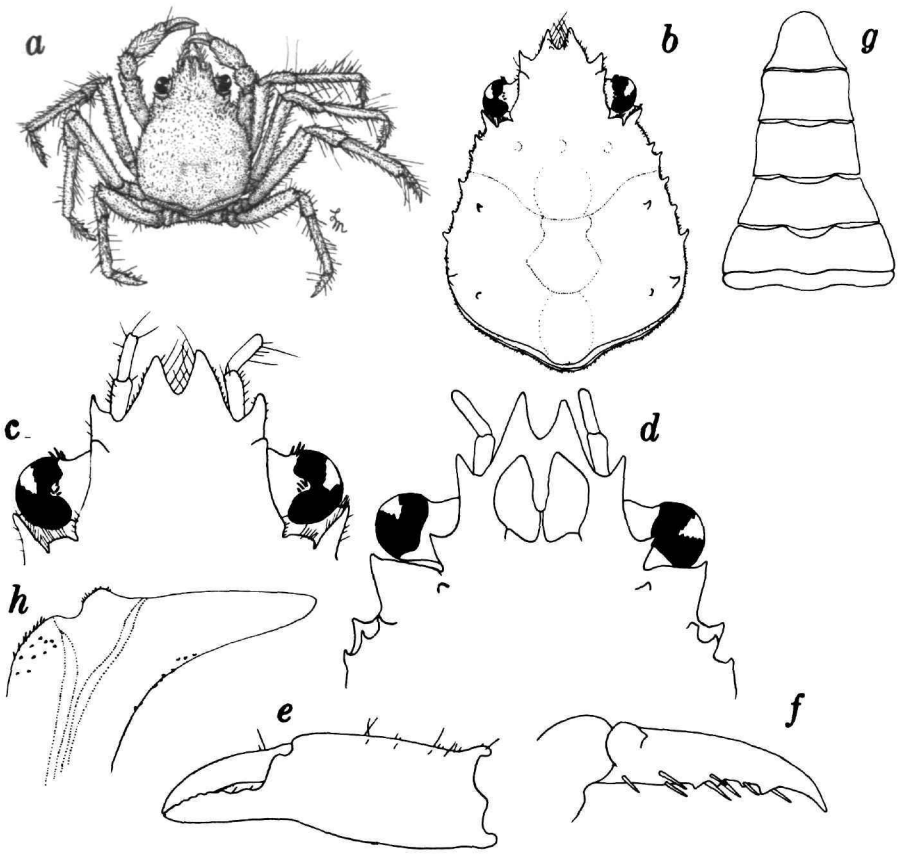

FIGURE 80.—*Herbstia nitida*, new species, paratype, male, cl 9.0 mm, *Pillsbury* Sta 282: *a*, dorsal view; *b*, carapace; *c*, front, dorsal view; *d*, front, ventral view; *e*, chela; *f*, dactylus of fifth pereiopod; *g*, abdomen; *h*, apex of gonopod.

DISPOSITION OF TYPES.—The holotype (Crust. D.31780), a male with a carapace length of 8.9 mm from *Pillsbury* Sta 282, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes have been deposited in the Smithsonian Institution, Washington, D.C., and in Leiden.

BIOLOGY.—All of our material came from Annobon Island, in depths between 9 and 55 m, in the beds of calcareous algae described by Forest (1959) and Voss (1966). If our assumption is correct that the material from the offshore islands of the Gulf of Guinea previously reported as *H. rubra* actually is identifiable with *H. nitida*, the latter species lives on rough bottom in moderate depths on rock, coral, algae, and calcareous algae. Forest and Guinot (1966) recorded the following habitats and depths (all under *H. rubra*): Principe, calcareous algae in 37–73 m; São Tomé (6 localities), in rocks and coral in 0–6 and at 30 m, in calcareous algae in 6 and 10 m, in a sponge from rocks and calcareous algae in 2–6 m; and Annobon (5 localities), in rocks and coral, in calcareous algae, sand, and coral in 7–10 m, and in calcareous algae in 23–60 m.

Ovigerous females have been recorded in May and June (Forest and Guinot, 1966; *Pillsbury*).

ETYMOLOGY.—The specific epithet is from the Latin *nitidus*, shining, neat, referring to the smooth carapace of this species.

DISTRIBUTION.—Gulf of Guinea, where it is known to occur off Annobon in 15–55 m. We

suspect that all of the records of *H. rubra* given below are based on *H. nitida*:

Principe: No specific locality, 15 m (Monod, 1956). 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: Off São Tomé, 8 m; 00°20'N, 06°46'E, 10 m; Ponta Diogo Vaz, 0-6 m and 30 m; in front of Ponta Oquedelrei, 6 m; and Morro Peixe, 2-6 m (all Forest and Guinot, 1966).

Annobon: No specific locality, 12 m (Monod, 1956). 01°24'04"S, 05°36'45"E, 7-10 m; 01°27.5'S, 05°36.5'E, 35 m; N of San Antonio, 23 m; 01°26'15"S, 05°35'40"E, 60 m; and Isla Tortuga, NW coast (all Forest and Guinot, 1966).

Herbstia rubra A. Milne Edwards, 1869

FIGURE 81

Herbstia rubra A. Milne Edwards, 1869:354.—Miers, 1886:49, pl. 7: fig. 1,1a.—Rathbun, 1893a:93 [listed].—A. Milne Edwards and Bouvier, 1900:128, pl. 19: fig. 17 [fig. 16 in text].—Balss, 1922:73 [listed].—Monod, 1956:482, fig. 649 [part, not fig. 650].—Guinot and Ribeiro, 1962:73.—Ribeiro, 1964:19.

MATERIAL EXAMINED.—*Pillsbury Material:* None.

Other Material: Cape Verde Islands: São Vicente, 20 m, 26 Jul 1883, *Talisman*, 1♂, 1♀ (L, W). São Vicente, *Challenger*, BMNH 84.31, 1♂. Harbor of Porto Grande, São Vicente, *Valhalla*, BMNH 1908.11.7.2, 1♂.

DESCRIPTION.—Carapace (Figure 81*a*) pyriform, surface appearing smooth, minutely punctate, regions moderately well marked, short setae present dorsally, heavier laterally. Gastric, cardiac, and intestinal regions each with low, rounded elevation. Gastric region with 3 tubercles in transverse line (Figure 81*a*). Cardiac and intestinal regions each with single tubercle in some specimens. Intestinal region with single, rounded, posteriorly projecting prominence on posterior margin of carapace. Hepatic region with 1 spine and several smaller tubercles; subhepatic region with row of tubercles. Branchial region with 4 lateral spines, flanked laterally by several smaller tubercles, additional low tubercles usually present dorsally. Rostral teeth short but sharp, apices slightly divergent. Preorbital spine blunter than postorbital. Basal antennal article with long anterior spine visible in dorsal view, small but sharp proximal tooth present on inner margin below orbit; 1 or 2 postorbital tubercles also present ventrally.

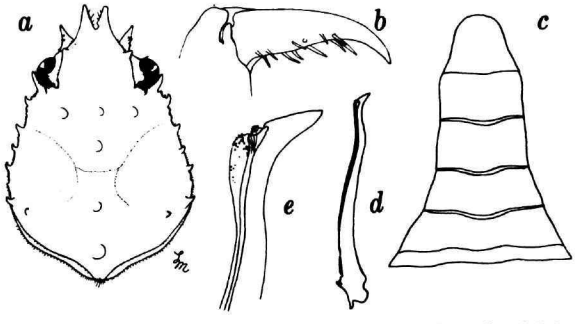

FIGURE 81.—*Herbstia rubra* A. Milne Edwards. Female, cl 9.5 mm, Cape Verde Islands: *a*, carapace; *b*, dactylus of fifth pereiopod. Male, cl 11.5 mm, Cape Verde Islands: *c*, abdomen; *d*, gonopod; *e*, apex of gonopod, enlarged.

Chelipeds enlarged in adult males, slightly shorter than carapace in young of both sexes, longer than carapace in adult male, variously ornamented with bristles and stiff setae. Merus tuberculate, with row of spines on upper and lower margins. Carpus with numerous tubercles and 2 larger spines on outer margin. Palm inflated in males, with 2 spines on dorsal articular knob in juveniles, remainder of surface smooth in female, with irregular row of small dorsal tubercles in male. Fingers shorter than palm, cutting edges more strongly toothed than in *H. nitida*.

Walking legs stout, short, fifth leg as long as or shorter than carapace, ornamented with corneous bristles and longer simple setae. Merus of walking legs with row of spines dorsally and posteroventrally. Dactylus shorter than propodus, ventral margin with slender spines but no triangular teeth (Figure 81*b*).

Male abdomen and gonopod as shown (Figure 81*c-e*).

MEASUREMENTS.—Carapace lengths of male 9.5 to 11.5 mm, of female 9.5 mm. Larger specimens identified with this species by Guinot and Ribeiro (1962: male, 20.6 mm) and Monod (1956: female, 24 mm) may well prove to be *H. condyliata*.

REMARKS.—*Herbstia rubra*, like *H. nitida*, new species, is a relatively small, smooth species, in

which the chelipeds of the male are not greatly enlarged and there is but one posterior projection on the carapace. This species differs from *H. nitida*, new species, in having the regions of the carapace better developed, more dorsal tubercles and spines on the carapace, a narrower posterior projection on the carapace, more spines on stouter walking legs, a row of spines on the upper surface of the palm in males, and no triangular teeth on the opposable margin of the dactylus of the walking legs.

An outline of the carapace and a sketch of the dactylus of a walking leg are shown in Figure 81.

BIOLOGY.—There is little information available on the ecology of this species. It was reported from coralline algae in 75 m (A. Milne Edwards and Bouvier, 1900), and near shore and in 6 to 20 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

DISTRIBUTION.—West Africa, from the Cape Verde Islands (the type-locality) and possibly the Azores; most records in the literature require verification. They include the following:

Cape Verde Islands: No specific locality (A. Milne Edwards, 1869). São Vicente (Miers, 1886). Praia Matiota, São Vicente, shore, and Porta da Furna, Brava, 6–20 m (Guinot and Ribeiro, 1962; Ribeiro, 1964). Between Ilhéu Branco and Ilhéu Raso, 75 m (A. Milne Edwards and Bouvier, 1900). Ponta do Sol, Ilha de Santo Antão (Monod, 1956).

Genus *Micropisa* Stimpson, 1858

Micropisa Stimpson, 1858a:218 [type-species: *Micropisa ovata* Stimpson, 1858, by monotypy; gender: feminine].

Micropisa ovata Stimpson, 1858

Micropisa ovata.—Monod, 1956:495, figs. 669–681 [Cape Verde Islands, Senegal, Gabon(?)].—Guinot and Ribeiro, 1962:74 [Cape Verde Islands].—Ribeiro, 1964:19 [Cape Verde Islands].

DISTRIBUTION.—Off tropical West Africa, from the Cape Verde Islands and Senegal, with one doubtful record from Gabon; sublittoral, from less than 10 to more than 110 m.

Genus *Pisa* Leach, 1814

Arctopsis Lamarck, 1801:155 [type-species: *Arctopsis lanata* Lamarck, 1801, by monotypy; gender: feminine; suppressed for purposes of the Law of Priority but not for those of the Law of Homonymy by the International Commission on Zoological Nomenclature in opinion 708 (1964); name 1701 on *Official Index*].

Pisa Leach, 1814:431 [type-species: *Cancer biaculeatus* Montagu, 1813, a subjective junior synonym of *Maja armata* Latreille, 1803, by monotypy; gender: feminine; name 1597 on *Official List*].

Blastus Leach, 1814:431 [type-species: *Cancer tetraodon* Pennant, 1777, by monotypy; gender: masculine].

**Pisa armata* (Latreille, 1803)

Maja armata Latreille, 1803c:98.

Pisa Gibbsii.—Studer, 1882:335.

Pisa gibbsi.—Capart, 1951:90, fig. 28, pl. 2: fig. 23.—Monod, 1956:486, fig. 654.—Rossignol, 1957:116 [key].—Figueira, 1960:12.—Crosnier, 1964:34.

Pisa armata.—Forest and Gantès, 1960:356.—Forest and Guinot, 1966:98.—Zariquiey Alvarez, 1968:454, figs. 151d, 152e, 154d [Spain; references].—Christiansen, 1969:124, fig. 51, map 44 [North Atlantic].—Crosnier, 1970:1215 [listed], 1218.—Türkay, 1976a:25 [listed], 39 [Portugal].

Pisa.—Voss, 1966:31.

Pisa gibbi.—Maurin, 1968b:486 [erroneous spelling].

SYNONYMS.—*Cancer biaculeata* Montagu, 1813; *Pisa gibbsii* Leach, 1815.

MATERIAL EXAMINED.—*Pillsbury Material:* Nigeria: Sta 230, 82–97 m, hard ground with gorgonians, coral, and rock, 1♂ (W).

Undaunted Material: Angola: Sta 96, 162 m, 1♂ (L).

DESCRIPTION.—Capart, 1951:90; Christiansen, 1969:124.

Figures: Capart, 1951, fig. 28; Christiansen, 1969, fig. 51.

Male Pleopod: Capart, 1951, pl. 2: fig. 23 (Angola); Monod, 1956, fig. 654 (Senegal).

MEASUREMENTS.—The male taken by the *Pillsbury* has a carapace length of 20 mm. Capart (1951) recorded a specimen 53 mm long.

REMARKS.—*Pisa armata* (Latreille, 1803) is now considered to be the oldest name available for the species previously known as *P. gibbsii* Leach, 1815. Zariquiey Alvarez (1968) provided a key, illustrations, and synonymies for the Mediterranean species of the genus *Pisa*.

BIOLOGY.—Off West Africa this species in-

habits moderate depths on rough ground on the shelf. The *Pillsbury* specimen was taken on hard ground with gorgonians, coral, and rock in 82–97 m. Capart (1951) reported material collected at depths from 20–30 to 110 m, on sandy mud, that from 20–30 m being the shallowest record off West Africa. Crosnier (1964) characterized it as a cold-water species, occasionally occurring deeper than 50 m off Cameroon. Forest and Guinot (1966) recorded it from mud, sand, and "sable construit" in 65–75 m off Senegal and on mud, shell, and *Cidaris* in 60–73 m off Guinea-Bissau. Maurin (1968b) found it off Morocco in 40–60 m on bottom with sponge, *Suberites*, and asteroid, *Allopatiria*.

Ovigerous females have been recorded from West African localities in March, May, August, October, November (Capart, 1951; Monod, 1956), and summer (Figueira, 1960).

DISTRIBUTION.—Eastern Atlantic, from the southern North Sea and England to Angola, Mediterranean; sublittoral, to at least 162 m. Monod (1956) reported material from Senegal, Guinea, and Angola; other records include the following localities.

Azores: Horta (Figueira, 1960).

Morocco: Temara (Forest and Gantès, 1960).

Mauritania: Banc d'Arguin, 40–60 and 90–100 m (Maurin, 1968b).

Cape Verde Islands: 15°40′N, 23°06′W, 38 fm [70 m] (Studer, 1882).

Senegal: 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m (Forest and Guinot, 1966).

Nigeria: 06°11′N, 03°36′E to 06°10′N, 03°38′E, 82–97 m (Voss, 1966).

Cameroon: No specific locality, more than 50 m (Crosnier, 1964).

Angola: 16°41′S, 11°21′E, 162 m (Crosnier, 1970).

The latter record appears to be the southernmost as well as the deepest for the species.

**Pisa calva* Forest and Guinot, 1966

FIGURE 82

Pisa carinimana.—Monod, 1956:488 [part] [not *Pisa carinimana* Miers, 1879].

Une espèce nouvelle de *Pisa*.—Forest, 1959, pl. 3: fig. 1. *Pisa* (n. sp.).—Forest, 1959:19.

Pisa calva Forest and Guinot, 1966:99, figs. 10, 11a–f, 13.

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 6♂, 4♀ (3 ov) (L). Sta 282, 18–37 m, nodular coralline algae, 1♂, 7♀ (5 ov), 2 juv (L, W). Sta 283, 51–55 m, nodular coralline algae, 11♂, 8♀ (5 ov), 3 juv (W).

Other Material: Annobon: 01°24′S, 05°37′30″E, 7–8 m, 11 Dec 1965, *Ombango*, A. Crosnier, 2♀ (W).

DESCRIPTION.—Forest and Guinot, 1966:100.

Figures: Forest and Guinot, 1966, figs. 10, 11a–f, 13.

Male Pleopod: Forest and Guinot, 1966, fig. 13.

MEASUREMENTS.—Carapace lengths of males 5 to 11 mm, of females 5 to 8 mm, of ovigerous females 5 to 10 mm, of juveniles 3 to 5 mm. The largest specimens recorded by Forest and Guinot (1966) were a male 14 mm long and a female 10.5 mm long.

REMARKS.—As Chace (1966:653, footnote) pointed out, this species is very close to *Pisa sanctaehelenae* Chace (1966:651, fig. 14) from Saint Helena. However, *P. calva* has less divergent rostral spines and much more slender pereiopods (Figure 82), with 10 or 11 rather than 5–7 fixed, triangular teeth on the flexor margin of the dactylus. In our specimens, the propodus of the sec-

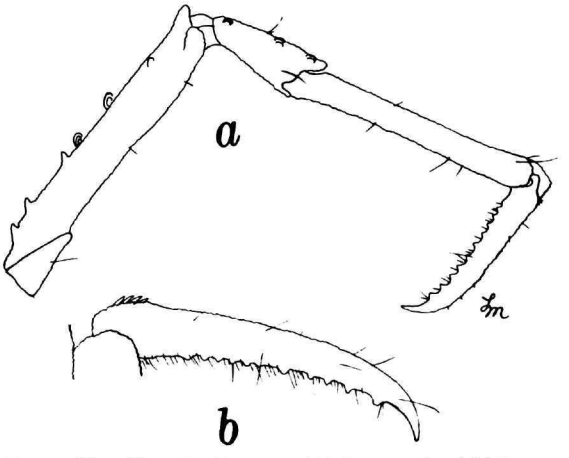

FIGURE 82.—*Pisa calva* Forest and Guinot, male, cl 11.0 mm, *Pillsbury* Sta 283: *a*, second pereiopod; *b*, dactylus of second pereiopod, enlarged.

ond pereiopod in the males is not markedly swollen distally as in *P. sanctaehelenae*.

Apparently Monod's (1956) record of *P. carinimana* from Annobon was based on this species (Forest and Guinot, 1966:104) and his record of *P. carinimana* from Principe may also be based on *P. calva*. However, Forest and Guinot, who reexamined Monod's material from Annobon, could not locate the specimen from Principe and they noted (1966:104) that both species were taken at the same station off Principe by the *Calypso*.

BIOLOGY.—The *Pillsbury* representatives of this species all were taken off Annobon Island in beds of coralline algae in 9–69 m; the *Ombango* specimens were taken at Annobon in 7–8 m. Forest and Guinot (1966) recorded the following habitats for their material: Principe (5 stations): on mud, calcareous algae, shell, rocks, and coral in 31–73 m; São Tomé (12 stations): from a beach seine in 0–4 m and in rocks, coral, calcareous algae, "épave," algae, sand, and mud in 5–50 m; Annobon (6 stations): calcareous algae, sand, coral, algae, and rocks in 7–60 m.

Ovigerous females have been collected in May, June, and July.

DISTRIBUTION.—West Africa, from the offshore islands of the Gulf of Guinea; sublittoral, from 0–4 to 73 m. Records in the literature include the following:

Principe: 01°38′25″N, 07°22′05″E, 31 m; 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; in front of Baía de Santo Antonio, 50 m; Tinhosa Grande Island, 12 mi [19.3 km] SSW of Principe, 01°20′45″N, 07°17′37″E, 25–40 m (all Forest and Guinot, 1966).

São Tomé: In front of São Tomé, 8 m; 00°20′N, 06°46′E, 10 m; N of Ilhéu das Cabras, 32 m; Ponta Diogo Vaz, 30 m; Praia Santa Catarina, 15–18 m; 00°25′40″N, 06°40′10″E, 50 m; 00°25′15″N, 06°43′05″E, 8–30 m; Baía de Ana de Chaves, 5 m; in front of Ponta Oquedelrei, 6 m; Morro Peixe, 0–4 m; in front of Ponta São Sebastião, 11 m (all Forest and Guinot, 1966).

Annobon: No specific locality, 12 m (Monod, 1956).—NW coast, Isla Tortuga, 15–40 m; N of Santo Antonio, 23 m; 01°27.5′S, 05°36.5′E, 35 m; 01°26′15″S, 05°35′40″E, 60 m; 01°25′10″S, 05°36′10″E, 20–25 m; 01°24′04″S, 05°36′45″E, 7–10 m (all Forest and Guinot, 1966).

**Pisa carinimana* Miers, 1879

Pisa carinimana.—Capart, 1951:87, fig. 27, pl. 2: fig. 8.—Sourie, 1954b:147.—Monod, 1956:488, figs. 655–668 [part].—Rossignol, 1957:116 [key].—Longhurst, 1958: 89.—Forest, 1959:19 [discussion].—Gauld, 1960:72.—Rossignol, 1962:122.—Guinot and Ribeiro, 1962:74.—Forest and Guinot, 1966:99, figs. 11g, 12.—Zariquiey Alvarez, 1968:452, fig. 155a [Spain; references].—Uschakov, 1970:439, 455 [listed].—Türkay, 1957a: 71 [listed], 74.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 69, 29 m, coral or rock, 1♀ ov (L). Sta 70, 33 m, branched Foraminifera, 8♂, 8♀ (7 ov) (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂ (W). Sta 46, 38–42 m, mud with dense *Jullienella*, 4♂, 2♀ (1 ov) (L). Sta 47, 37 m, bottom with *Jullienella*, 2♂, 2♀ ov (L). Sta 60, 79–82 m, coral or rock, 3♂, 2♀ (1 ov) (W). Sta 62, 46 m, brown, branched and foliate Foraminifera, 2 juv (L). Sta 64, 68 m, 1♂, 1♀ ov (W).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♀ ov (W). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂, 5♀ (4 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 7♂, 7♀ (3 ov) (W). Sta 27, 33 m, 1♂, 1♀ (L).

Nigeria: Sta 248, 33 m, 2♂, 2♀ (1 ov) (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 24 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 3♂, 2♀ (L).

Congo: Pointe-Noire, bottom with *Antedon*, 19 Jun 1956, A. Crosnier, 5♂, 1♀ (W).

Angola: Santo António do Zaire, mouth of Congo River, H. Lang, 1♀ (W).

DESCRIPTION.—Capart, 1951:88.

Figures: Monod, 1956, figs. 655–668.

Male Pleopod: Capart, 1951, pl. 2: fig. 8 (Angola); Monod, 1956, figs. 667–668 (Senegal); Forest and Guinot, 1966, fig. 12 (Guinea-Bissau).

MEASUREMENTS.—Our specimens have carapace lengths of 3 to 17 mm; the ovigerous females have carapace lengths of 6 to 9 mm. Monod (1956) recorded a male with a carapace length of 23 mm.

REMARKS.—As noted in our discussion of *P. calva*, Monod's record of this species from Annobon Island was based on that species rather than *P. carinimana*.

BIOLOGY.—Apparently this species lives in relatively shallow water, although Capart (1951) reported one collection taken at a depth of 85 m, and Gauld (1960) reported material taken in 14–

100 m off Ghana. The *Pillsbury* collected this species in depths between 29 and 82 m, usually on relatively soft bottom, sand and mud, or mud with bryozoans or Foraminifera; two stations were made on rock and coral. Monod (1956) recorded material collected on bottom with *Palythoa* and *Molgula* and sand in 15–20 m, on sand in 10–45 m, muddy sand in 10–15 m, and on pebbles in 14.5 m. Guinot and Ribeiro (1962) reported material from Angola in depths between 5 and 90 m on sand and muddy sand. Forest and Guinot (1966) noted the following habitats for the species: mud, shell, gorgonians, and ascidians in 43–45 m; mud, sand, and compact sand [sable construit] in 65–75 m; mud and shells in 18–30 m; muddy sand and Foraminifera in 21–27 m; gravel, shells, and Foraminifera in 50 m; mud with *Arca* in 32 m, and mud, calcareous algae, and shells in 31 m. This species was taken with *P. calva* by the *Calypso* at this latter station off Principe Island. Uschakov (1970) found the species in clear water on hard sand in depths greater than 10 m off Guinea. Apparently this species prefers habitats on softer bottoms than does *P. calva*, which the *Pillsbury* took only in coralline algae.

Ovigerous females have been recorded in all months but July (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—*Pisa carinimana* is an eastern Atlantic species, known from localities between the Canary Islands (the type-locality) and Spanish Sahara southward to Angola (12°36′S), including Melilla in the Mediterranean (Zariquiey Alvarez, 1968); littoral and sublittoral to a depth of about 100 m. Monod (1956) recorded it from numerous localities between Mauritania and Gabon; other records include the following:

Spanish Sahara: 21°05′N, 17°14′W, 43–45 m (Forest and Guinot, 1966).

Mauritania: Off Cap Blanc, 20°37.3′N, 17°24.4′W, 57 m (Türkay, 1975a)

Senegal: Baie de Dakar, 10–12 m (Sourie, 1954b). 12°55.5′N, 17°33′W, 65–75 m (Forest and Guinot, 1966).

Guinea: No specific locality, depth greater than 20 m (Uschakov, 1970). 09°40′N, 14°05′W, 18 m, and 09°36′N, 13°57′W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 12–34 m (Longhurst, 1958).

Ivory Coast: 05°02.5′N, 05°25′W, 21–27 m (Forest and Guinot, 1966)

Ghana: Off Accra, 14–100 m (Gauld, 1960). 04°36.5′N, 01°31′W, 50 m (Forest and Guinot, 1966).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Principe: No specific locality (Forest, 1959). 01°38′25″N, 07°22′05″E, 31 m (Forest and Guinot, 1966).

Gabon: W of Pointe Claire (as Pointe Clara) and mouth of Gabon River, 20–40 m (Rossignol, 1962).

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

Cabinda: No specific locality, in 38–39 m (Guinot and Ribeiro, 1962).

Angola: Baía da Caota, Benguela, 11–12 m, 13 m, 16 m, 18 m, and 30 m; Baía Farta, 22 m, 22–28 m, and 90 m; Sombreiro, 5 m; between Sombreiro and Ponta da Caruíta, 23 m (all Guinot and Ribeiro, 1962).

Pisa nodipes (Leach, 1815)

Pisa nodipes.—Monod, 1956:486 [references].—Forest and Gantès, 1960:356 [Morocco].—Zariquiey Alvarez, 1968: 454, figs. 151e, 152f, 154e, [Spain; references].—Maurin, 1968a:59, 107 [Mauritania, Mediterranean]; 1968b:486, 489 [Mauritania].

SYNONYM.—*Inachus musivus* Otto, 1821.

DISTRIBUTION.—Eastern Atlantic, from the Canary Islands, the Cape Verde Islands, Morocco, Mauritania, and the Mediterranean; sublittoral, to about 75 m.

Pisa tetraodon (Pennant, 1777)

Pisa tetraodon.—Capart, 1951:92, fig. 29, pl. 2: fig. 16 [Mauritania].—Monod, 1956:485 [references].—Forest and Gantès, 1960:356 [Morocco].—Zariquiey Alvarez, 1968: 452, figs. 6d, 151a, 152a, 154a [Spain; references].

SYNONYMS.—*Cancer hircus* Fabricius, 1781 (see Rathbun, 1925:195); *Cancer praedo* Herbst, 1796; *Pisa convexa* Brandt, 1880.

DISTRIBUTION.—Eastern Atlantic, from England to Cabo Blanco, Mauritania, Mediterranean; sublittoral, shallow water to about 50 m (100 m in Monod, 1956).

Family MIMILAMBRIDAE Williams, 1979

MIMILAMBRIDAE Williams, 1979:399.

This family, comprising one genus and species, does not occur within the study area.

Family PARTHENOPIDAE MacLeay, 1838

PARTHENOPINA MacLeay, 1838:55, 58 [corrected to Parthenopidae by Bell, 1844:45; name 362 on *Official List*].
AETHRINAE Dana, 1851b:127 [originally cited as Oethrinae].
CRYPTOPODIINAE Stimpson, 1871a:137.
HEPATINAE Stimpson, 1871a:154 [see p. 325].
EUMEDONINAE Neumann, 1878:17.
LAMBRINAE Neumann, 1878:17.

EASTERN ATLANTIC GENERA.—Five, *Daldorfia*, *Heterocrypta*, *Parthenope*, *Sakaila*, new genus, and *Solenolambrus*, each represented by species occurring off tropical West Africa.

EASTERN ATLANTIC SPECIES.—Eleven, of which eight occur off West Africa. Several name changes have been made since this family was studied by Monod (1956), as follows:

Name in Monod	Current Name
Osachila stimpsoni (Calappidae)	*Sakaila africana*, new genus, new species* (Parthenopidae)
Lambrus massena (including various forms)	*Parthenope massena**
Lambrus miersi	*Parthenope miersii**
Lambrus macrochelos	*Parthenope notialis*, new species*
Lambrus expansus	*Parthenope expansa**
Heterocrypta maltzani	*Heterocrypta maltzami**
Solenolambrus noordendei	*Solenolambrus noordendei**
Parthenope bouvieri	*Daldorfia bouvieri*

Three nominal species occur to the north of the tropical region:

Heterocrypta marionis A. Milne Edwards, 1881. In deep water off the Azores, Toulon, France, and the Bay of Biscay (Bouvier, 1940).

Parthenope angulifrons Latreille, 1828. Mediterranean (Zariquiey Alvarez, 1968), with one questionable record from Senegal (Monod, 1956:587).

Parthenope macrochelos (Herbst, 1790). Mediterranean and adjacent Atlantic (Zariquiey Alvarez, 1968). See under *P. notialis*, new species (p. 335), for possible records along the NW African coast.

The status of *Lambrus spinosissimus* Osorio, 1923 (see Nobre, 1936:85) remains to be determined. One specimen originated from the latitude of Lisbon, the other from Morocco. Osorio's account is not available to us. According to Nobre's quote of the original, *L. spinosissimus* (cl 33 mm, cb 37 mm) is a larger species than the West African *P. notialis* (cl 5–21 mm, cb 11–23 m) (see p. 334). Osorio described the upper surface of the palm of the cheliped as follows (our translation): "The upper surface of the hand also shows spines, rather widely spaced one from the other, and the lower surface is covered with granules, which do not stop at the base of the fingers, but, on the contrary, are widely distributed on them." This description applies well to *P. macrochelos*; in *P. notialis* the upper surface of the palm of the cheliped is almost smooth. We believe that *L. spinosissimus* Osorio, 1923 should be identified with the northern *Parthenope macrochelos* (Herbst, 1790) rather than the smaller tropical species, *P. notialis*.

Subfamily AETHRINAE Dana, 1851

Genus *Heterocrypta* Stimpson, 1871

Heterocrypta Stimpson, 1871b:102 [type-species: *Cryptopodia granulata* Gibbes, 1850, by original designation; gender: feminine; name 1626 on *Official List*].

**Heterocrypta maltzami* Miers, 1881

Heterocrypta Maltzami Miers, 1881a:209, pl.13: fig.1.
Heterocrypta Maltzani.—Miers, 1881a:364, 374.—A. Milne Edwards and Bouvier, 1900:121, pl.19: fig.6 [part ?].—Balss, 1921:54.—Bouvier, 1940:315 [part ?].
Heterocrypta maltzani.—Ortmann, 1893b:417.—Rathbun, 1900a:296.—Sourie, 1954b:150.—Monod, 1956:589, figs. 862–867.—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962:80.—Rossignol, 1962:123.—Ribeiro, 1964:21.—Forest and Guinot, 1966:120.—Zariquiey Alvarez, 1968:442 [Spain; references].—Maurin, 1968b:486.—Türkay, 1975a:71 [listed], 74, fig. 6.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 1♂, 2♀ (1 ov) (L).

Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 2♀ (1 ov) (L).

Ghana: Sta 23, 42 m, foliate brown to orange bryozoans, 1♂ (L). Sta 24, 35–37 m, dark red bryozoans, 3♂, 4♀ ov (W). Sta "22-26," 1♀ (L).

Nigeria: Sta 248, 33 m, 1♂, 3♀ (1 ov) (W).

DESCRIPTION.—Miers, 1881a:209; Pesta, 1918: 374; Bouvier, 1940:315.

Figures: Monod, 1956, figs. 862–865.

Male Pleopod: Monod, 1956, figs. 866, 867 (Senegal).

MEASUREMENTS.—The specimens in the present collection have the carapace length between 4 and 8 mm; in ovigerous females this length varies between 5 and 8 mm. In the literature the following measurements have been given for ovigerous females: cl 6 to 10 mm, cb 6 to 13 mm (Monod, 1956, based on 6 specimens), cl 6 to 8 mm, cb 6.4 to 9.8 mm (Guinot and Ribeiro, 1962, based on 4 specimens). Guinot and Ribeiro (1962) also gave the following measurements: males cl 6 to 7.7 mm, cb 6.4 to 8.5 mm (7 specimens), non-ovigerous females cl 4.9 and 5 mm, cb 5.5 mm (2 specimens), juvenile cl 4.3 mm, cb 4.6 mm.

REMARKS.—Within a single year (1881) two species of *Heterocrypta* were described: *H. maltzami* Miers from Gorée, Senegal, collected in 18 to 28 m depth and *H. marionis* A. Milne Edwards from off Toulon, southern France, in 445 m. Miers (1886:103) was the first to synonymize these two species and there can be little doubt that they are closely related. Miers' name, *H. maltzami*, was published in September 1881, and thus takes precedence over *H. marionis*, the description of which appeared in December of that year (see Monod, 1956:589). A. Milne Edwards and Bouvier (1900) treated the two forms as subspecies of *H. maltzami*, but later authors generally accepted Miers' synonymy, although Bouvier (1940:315) listed differences between the two in a tabular form. The fact that the northern form lives in far deeper water (100-550 m) than the southern (0–70) might be an indication that they are specifically or subspecifically distinct, but lack of material of the northern form makes it impossible for us to express a definite opinion.

Miers (1881a:209), in the first part of his paper on Crustacea from Gorée, described the present species under the name "*Heterocrypta Maltzami*," the ending of the specific epithet spelled *–mi*. Miers (1881a:210) gave the following derivation of the name: "I have much pleasure in dedicating it to Baron Hermann-Maltzam, its discoverer." In the third part of the same paper (Miers, 1881a: 364), which was published later in the same year, Miers, in a footnote, remarked: "By an unfortunate oversight on my part, which I regret extremely, Baron Maltzan's name has been misspelled in the earlier parts of this paper. Instead of "Maltzam" read "Maltzan," and instead of "*Heterocrypta Maltzami*" read "*Heterocrypta Maltzani*." Article 32(a)(ii) of the *International Code of Zoological Nomenclature* states that "the original spelling of a name is to be retained as the "correct original spelling," unless there is in the original publication clear evidence of an inadvertent error, such as a lapsus calami, or a copyist's or printer's error." Miers' use of the spelling *Maltzami* clearly is a lapsus calami, but as in the original publication (part 1 of Miers' paper) there is no clear evidence that this was a lapsus (Miers dedicated it specifically to Baron Maltzam, and there was no indication that this was an incorrect spelling until in the later publication), the original spelling "*maltzami*" has to be retained for the epithet of the specific name. The fact that the author of the name himself later corrected this spelling is of no influence here.

Odhner (1923:20) reported a female (cb 10 mm) of what he considered to be *Heterocrypta maltzami* from Porto Alexandre, Angola, depth 108 m, bottom sand and broken shell mixed with clayey sand. Odhner remarked here "Die nahen Beziehungen dieser Art zu *Solenolambrus* Stimps. scheinen mir auf der Hand zu liegen," and otherwise only discussed the horizontal and vertical distribution of Miers' species. No morphological details of his specimen, apart from the size, were given by Odhner. It is not quite clear, therefore, why Capart (1951:110) thought these remarks by Odhner (which pertain only to the species and not to his particular specimen) sufficient indica-

tion to consider that "le spécimen de *H. maltzani* Miers signalé par T. Odhner (1923 p. 20) de Port Alexandre (Angola), appartient vraisemblablement à cette espèce nouvelle [= *Solenolambrus noordendei*]." Monod (1956:590, 595) seemed to accept Capart's conclusions. Guinot and Ribeiro (1962: 80, 81) showed that *H. maltzami* does occur rather commonly in Angola and concluded that "on peut donc supposer que l'échantillon d'Odhner appartient bien à *H. maltzani*." This conclusion seems to be accepted by Crosnier (1967:340, 1970: 1219). As long as Odhner's specimen has not been reexamined, speculation on its identity is futile: The size of the specimen may fit either species, the locality of it lies within the known range of *H. maltzami*, but outside that of *Solenolambrus noordendei*, while the depth at which Odhner's specimen was collected lies well within the depth range of *S. noordendei*, but is much greater than at present known for tropical West African *H. maltzami*.

BIOLOGY.—Monod (1956:593) gave the depth range of the species as "sublittoral, jusqu'à 400 mètres." Our specimens were obtained at depths of 33 to 70 m. All previous West African records also are from far less than 100 m depth: 18–28 m (Miers, 1881a: type-locality), 10 m, 20–22 m (Balss, 1921), 10, 14–15, 15, 15, 15–20, 15–20, 16–18, 19, 19, 20, 20, 20, 22, 23–24, 25, 25, 27–28, 30, 30, 31, 32, 32, 35, 36, 37, 38, 38, 40–41, 41, 46–50, 50 m (Monod, 1956), 0–10, 3–17 m (Sourie, 1954b), 18–60 m (Longhurst, 1958), 19–37 m (Gauld, 1960), 5, 8, 11–12, 13, 16, 22 m (Guinot and Ribeiro, 1962), 6–8 m (Rossignol, 1962), 8 m (Ribeiro, 1964), 18 m (Forest and Guinot, 1966), 30–40 m (Maurin, 1968b), 40, 57 m (Türkay, 1975a). On the other hand all the records of the species from the Mediterranean, the Bay of Biscay, the Azores, and north of the Cape Verde Islands are much deeper: 100 to 550 m. The West African specimens were found on the following types of bottom: shelly and muddy (Miers, 1881a), sand with *Palythoa* and *Molgula* (Monod, 1956), coarse shelly sand with *Arca* and *Pyura* (Sourie, 1954b), muddy sand, shelly sand, and shelly mud (Longhurst, 1958), sand (Guinot and Ribeiro, 1962), mud and shells (Forest and Guinot, 1966), and sand or shelly sand (Maurin, 1968b).

DISTRIBUTION.—*Heterocrypta maltzami* has been reported from the Bay of Biscay, the Mediterranean (as far as the Adriatic Sea), the Azores, N of the Cape Verde Islands (16°55′–16°51′N, 27°27′–27°29′W of Paris = 25°07′–25°09′W of Greenwich), and from tropical West Africa. Monod (1956) summarized earlier records and reported material from Senegal, Ghana, and Gabon; records not in Monod include the following:

Spanish Sahara: Off Cabo Blanco, 20°43.5′N, 17°10.8′W, 40 m, and 20°37.3′N, 17°24.4′W, 57 m (Türkay, 1975a).

Mauritania: Banc d'Arguin, 30–40 m (Maurin, 1968b).

Cape Verde Islands: Baía de Porto Grande, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Senegal: Anse de Hann and Anse Bernard near Dakar (Sourie, 1954b).

Guinea: 09°40′N, 14°05′W, 18 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 18–60 m (Longhurst, 1958).

Ghana: Off Accra, 18–37 m (Gauld, 1960).

Congo: Baie de Pointe-Noire, 6–8 m (Rossignol, 1962).

Angola: Baía da Caota, 11–12, 13, and 16 m; Sombreiro, 5 m; and Baía Farta, 22 m (all Benguela) (Guinot and Ribeiro, 1962).

Genus *Sakaila*, new genus

TYPE-SPECIES.—*Sakaila africana*, new species.

ETYMOLOGY.—It is with great pleasure that we dedicate this genus to Professor Tune Sakai, the eminent Japanese carcinologist, who pointed out the differences between the species assigned here to the new genus and the species of *Osachila* sensu stricto, here restricted to the American and central Atlantic species (Rathbun, 1937:248). The gender of the generic name is feminine.

DEFINITION.—Carapace broad, suboval in shape, narrowing anteriorly, regularly arcuate laterally, margins thin, scalloped or lobed. Front narrow, produced anteriorly, bilobed. Orbits small. Eyes scarcely or not at all visible in dorsal view. Antennules oblique. Antennae at inner angle of orbit. Buccal cavity broad anteriorly. Efferent branchial orifices separated, not meeting at midline. Merus of third maxilliped shorter than

ischium, anterior margin of merus divided into 2 lobes. Chelipeds symmetrical. Walking legs compressed, dorsally toothed or with large, irregular tubercles.

REMARKS.—*Sakaila* can readily be distinguished from *Osachila* Stimpson, 1871, by the position of the orbits, the distinctly separated efferent branchial channels, by the ischium of the third maxillipeds being shorter than the merus and being notched anteriorly, and by the spined or tuberculate walking legs.

Guinot (1966:754) noted "pour des raisons d'ordre taxonomique, la séparation d'*O. stimpsoni*, *O. japonica*, et *O. imperialis* dans un genre ou sous-genre nouveau pourrait se justifier car plusieurs caractères concomitants les distinguent des autres *Osachila*." Guinot (1968b) referred to *O. stimpsoni* [sensu Monod, 1956] as a primitive *Osachila*. As a result of her study of the affinities of *Osachila* sensu lato, she assigned it, *Aethra*, *Hepatus*, *Hepatella*, and *Actaeomorpha* to a group that she called "parthénoxystomienne," and tentatively assigned this group to the Parthenopinae (Guinot, 1967b: 841). This group was retained in the parthenopids by Sakai (1976). Pending further studies, we retain *Sakaila* in the Parthenopidae, subfamily Aethrinae, following Sakai (1976:288).

In addition to the type-species, *Sakaila africana*, new species, we assign two other species to this genus, both from Japanese waters: *Osachila imperialis* Sakai, 1963, and *Osachila japonica* Sakai, 1963 (Sakai, 1963, 1965). *Osachila expansa* Takeda (1977), from the Ogasawara Islands, in which the maxillipeds are strongly narrowed anteriorly, may be retained in *Osachila* sensu stricto.

**Sakaila africana*, new species

FIGURE 83

Osachila stimpsoni.—Monod, 1956:100, 624, figs. 874–876.—Forest, 1959:15.—Forest and Guinot, 1966:51.—Guinot, 1966:747, 750, 752–755, figs. 2, 6, 14; 1967b:828–830, 832–838, figs. 26, 29, 32, 33; 1968b:165, fig. 15 [discussion]. [Not *Osachila stimpsonii* Studer, 1883.]

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 284, 73 m, black basaltic rocks, 1♂ (holotype) (L).

Geronimo Material: Gabon: Sta 235, 100 m, 1♂ (W).

DIAGNOSIS.—Carapace (Figure 83*a*) with 6 major dorsal protuberances, protogastric very inflated, rounded anteriorly, pitted and eroded dorsally. Branchial protuberances oblique, narrowing anteromesially, extending to and fusing with protogastric. Median protuberances much less prominent than protogastric or branchial. Lateral margins very thin, upturned, appearing serrated, subdivided into distinct teeth posterolaterally, sutures visible ventrally indicating presence of 8 distinct teeth. Inner surface of propodus of cheliped tuberculate, with line of enlarged tubercles near midline. Walking legs (Figure 83*d*) strongly sculptured with irregular, rounded tubercles, especially on carpus and propodus.

DESCRIPTION.—Monod, 1956:624–627.

Male Pleopod: Guinot, 1967b, figs. 32, 33 (Senegal).

MEASUREMENTS.—The male holotype has a carapace length of 23 mm and a carapace width of 30 mm. The carapace length of the smaller male paratype is 11.5 mm, the width is 15 mm. Monod's (1956) male measured 15 × 20 mm, his ovigerous females 12 × 14 and 12 × 16 mm. The male from southern Senegal reported by Forest and Guinot (1966) measured 22 × 30 mm (see figure legends in Guinot, 1966, 1967b).

REMARKS.—Our two male specimens agree very well with Monod's description and with the descriptive data and illustrations provided by Guinot (1966, 1967b). We have added a diagnosis to distinguish *S. africana* from the other two species of the genus, *S. imperialis* (Sakai), and *S. japonica* (Sakai)(see Sakai, 1963, 1965, 1976 for accounts and illustrations of these species). Monod's description is so complete that we see no need to duplicate it here; the following notes are given to supplement published accounts of the species.

The cornea (Figure 83*b*) is small and occupies only a section of the distal surface of the opthalmic peduncle. Near the anterior part of the base of the cornea the peduncle bears a distinct tubercle.

The figure by Guinot (1966, fig. 6) of the

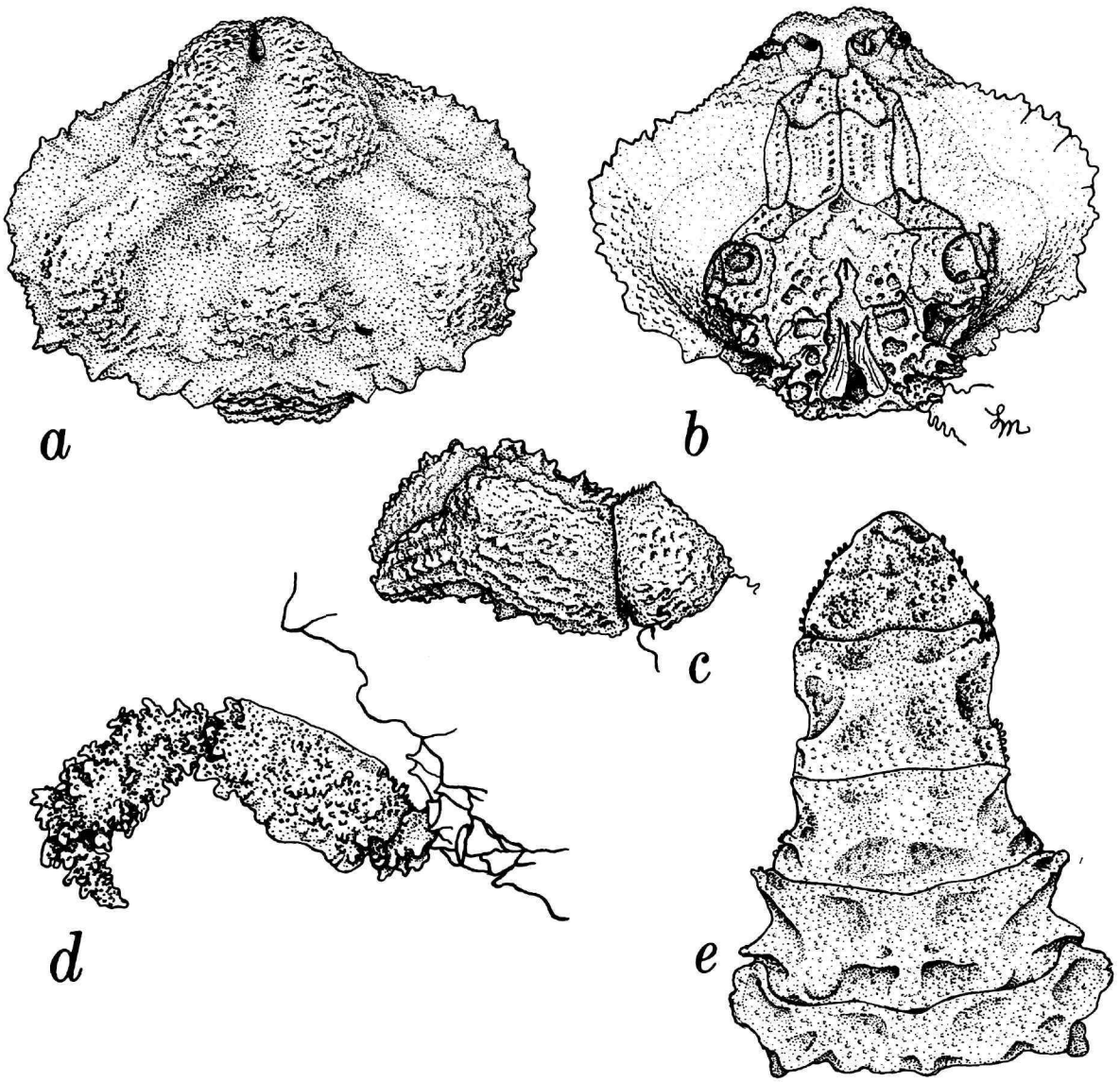

FIGURE 83.—*Sakaila africana*, new genus, new species, holotype, male cl 23 mm, *Pillsbury* Sta 284: *a*, carapace, dorsal view; *b*, carapace, ventral view; *c*, chela; *d*, fifth pereiopod; *e*, abdomen.

buccal area shows correctly that the infraorbital tooth, which lies against the outer margin of the antennal peduncle, continues posteriorly and medially as a flattened lobe, which partly overlaps the area along the anterolateral margin of the mouthfield. In our specimen this lobe ends in the anterior and largest of the three deep pits in the subhepatic region. These pits are not shown in Guinot's figure.

The outer surface of the merus of the cheliped (Figure 83*c*) is reticulate by the presence of shorter and longer ridges and tubercles, rather than being "granuleuse" as described by Monod. The upper surface of the merus, not described by Monod, is

very narrow, widening somewhat anteriorly. The inner margin shows three high teeth, which are anteroposteriorly compressed; the outer margin shows a sharp high rim-like crest, the anterior part of which is highest and is fused with the anterior inner tooth to a high screen-like structure on the anterodorsal margin of the merus. The inner surface of the carpus has an anterodorsal and an anteroventral tooth connected with a ridge-like row of smaller teeth. The ridge on the inner surface of the palm bears a row of tubercles, one near the middle being high and sharp. The fingers have some of the tubercles rather strong, especially near the upper margin (in the dactylus), the lower margin (in the fixed finger), and near the base. The fingers of both chelae are inflected downward (Figure 83*c*), making a blunt angle with the longitudinal axis of the palm. In Monod's (1956) figure 875 the fingers are shown directed straight forward.

Through the kindness of H.-E. Gruner, Zoologisches Museum, Berlin, we were able to compare our specimens with syntypes of *Osachila stimpsonii* Studer, 1883, from Ascension Island. Studer's species is correctly placed in *Osachila*. A redescription of *O. stimpsonii* is in preparation by Manning in collaboration with Fenner A. Chace, Jr., in a report on the marine decapods of Ascension Island.

TYPE-LOCALITY.—Annobon Island, 01°30'S, 05°36'E, in 73 m.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31541), a male taken at *Pillsbury* Sta 284, is in the Rijksmuseum van Natuurlijke Historie, Leiden. The male paratype (USNM 139766) taken at *Geronimo* Sta 235 is in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

BIOLOGY.—*Sakaila africana* has been collected in depths between 65–75 and 132 m. The type of bottom on which it was found has been indicated as mud and sand, 65 to 75 m (Forest and Guinot, 1966) and black basaltic rocks, 73 m (*Pillsbury*).

Ovigerous females were collected in July (Monod, 1956).

ETYMOLOGY.—The specific epithet is derived from Latin and refers to the occurrence of the species off the West African coast.

DISTRIBUTION.—Off tropical West Africa. It has not previously been recorded from either Gabon or Annobon. Records in the literature include the following:

Senegal: S of Gorée, 96 m; off Gorée, 132 m (Monod, 1956). 12°55.5'N, 17°33'W, 65–75 m (Forest, 1959; Forest and Guinot, 1966; Guinot, 1966, 1967b, 1968b).

Subfamily PARTHENOPINAE MacLeay, 1838

Genus *Daldorfia* Rathbun, 1904

Parthenope Fabricius, 1798:315, 352 [type-species: *Cancer horridus* Linnaeus, 1758, by selection by H. Milne Edwards, 1838, in 1836–1844, pl. 26: fig. 2; a junior homonym of *Parthenope* Weber, 1795; gender: feminine; name 1679 on *Official Index*].

Daldorfia Rathbun, 1904:171 [type-species: *Cancer horridus* Linnaeus, 1758, by monotypy; gender: feminine; name 1582 on *Official List*].

Daldorfia bouvieri (A. Milne Edwards, 1869)

Parthenope bouvieri A. Milne Edwards, 1869:350.—Capart, 1951:106, fig. 36 [Cape Verde Islands].—Monod, 1956: 595, figs. 871, 872 [Cape Verde Islands; references].—Forest and Guinot, 1966:121 [Principe, São Tomé].—Crosnier, 1967:340 [Congo]; 1969:535 [Congo].

DISTRIBUTION.—West Africa, from the Cape Verde Islands and the Gulf of Guinea at the localities listed above, in 4–5 to 91 m.

Genus *Parthenope* Weber, 1795

Parthenope Weber, 1795:92 [type-species: *Cancer longimanus* Linnaeus, 1758, by subsequent designation by Rathbun, 1904:171; gender: feminine; name 1581 on *Official List*].

Lambrus Leach, 1815a:308 [type-species: *Cancer longimanus* Linnaeus, 1758, by monotypy; gender: masculine; name 1678 on *Official Index*].

Platylambrus Stimpson, 1871a:129 [type-species: *Lambrus crenulatus* Saussure, 1858, a subjective junior synonym of *Lambrus serratus* H. Milne Edwards, 1834, by subsequent designation by Rathbun, 1925:516; gender: masculine].

Aulacolambrus Paulson, 1875:9 [type-species: *Lambrus pisoides* Adams and White, 1848, by monotypy; gender: masculine].

Pseudolambrus Paulson, 1875:9 [type-species: *Parthenope calap-*

poides Adams and White, 1848, by monotypy; gender: masculine].

Enoplolambrus A. Milne Edwards, 1878, in 1873–1881:147 [type-species: *Lambrus carenatus* H. Milne Edwards, 1834, by monotypy; gender: masculine].

Parthenolambrus A. Milne Edwards, 1878, in 1873–1881:148 [type-species: *Parthenope tarpeius* Adams and White, 1849, by subsequent designation by Rathbun, 1925:528; gender: masculine].

Rhinolambrus A. Milne Edwards, 1878, in 1873–1881:148 [type-species: *Cancer contrarius* Herbst, 1804, by original designation; gender: masculine].

Parthenopoides Miers, 1879a:672 [type-species: *Lambrus massena* Roux, 1830, by monotypy; gender: masculine].

Oncodolambrus De Man, 1906:400 [type-species: *Lambrus* (*Oncodolambrus*) *praedator* De Man, 1906, by monotypy; gender: masculine].

**Parthenope expansa* (Miers, 1879)

FIGURE 84

Lambrus (*Parthenopoides*) *expansus* Miers, 1879b:25, pl. 5: fig. 9.

Parthenolambrus expansus.—Adensamer, 1898:611 [Mediterranean].

Lambrus expansus.—Monod, 1956:588 [references].—Holthuis and Gottlieb, 1958:119 [listed].—Forest and Guinot, 1966: 120.

Parthenope expansus.—Pastore, 1975:145, 147, figs. 1–3 [Mediterranean].

MATERIAL EXAMINED.—*Pillsbury Material:* Annobon: Sta 283, 51–55 m, nodular coralline algae, 2♀ (L, W).

DESCRIPTION.—Carapace triangular in outline. Front bluntly rounded, its sides forming a straight line with sides of carapace. Orbits visible above as small cavities in lateral margin of carapace, but eyes, when retracted, exactly fill cavity and lateral margin appears unbroken. In posterior half, lateral margin slightly widened and showing 3 shallow teeth just before posterolateral angle. Posterior margin slightly and evenly convex, showing few broad, inconspicuous lobes in median part. Dorsal surface of carapace uneven, but showing hardly any tubercles. Front somewhat concave, sunk in middle. Transverse broad ridge or elevated area present in metagastric region behind sunken area. Cervical groove indicated by wide depression. Oblique ridge present over each branchial region ending in posterolateral angle and running parallel to lateral margin of carapace. Posterior part of carapace, between branchial ridges, bearing median and 2 submedian elevations, median strongest. Surface of carapace rather uniformly and finely pitted, with few tubercles visible on elevated portions, but not very distinct. General shape of carapace in many respects resembling more that of *Heterocrypta* than that of *Parthenope*.

Eyes small, completely retractable in their orbits, visible in dorsal view.

Antennules with basal segment very wide, reaching beyond antennal peduncle and forming greater part of the lower inner margin of orbit. Antennular sockets not sharply delimited distally, ending in wide groove in ventral surface of front, groove reaching margin of front, but less distinct distally than proximally.

Basal antennal segment (Figure 84*a*) short, distinctly failing to reach orbit and separated from orbit by almost entire length of second segment.

Outer angle of merus of third maxilliped somewhat triangularly produced laterally.

Chelipeds markedly different, resembling those of *Parthenope massena*. Right cheliped heaviest, somewhat swollen. Upper surface of palm slightly convex, almost smooth; outer margin bearing ridge with 3 large blunt teeth, more pronounced in smaller than in larger cheliped. Inner margin of the upper surface of palm bearing about 5

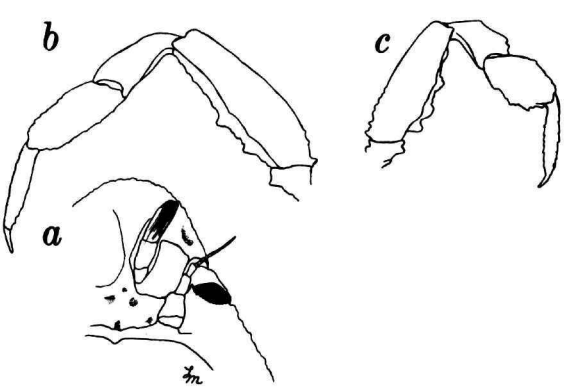

FIGURE 84.—*Parthenope expansa* (Miers), female, cl 7.5 mm, *Pillsbury* Sta 283: *a*, basal antennal segment; *b*, second pereiopod; *c*, fifth pereiopod.

blunt teeth, middle largest. Outer surface of palm with some longitudinal rows of tubercles. Inner surface of palm smooth, slightly concave. Fingers somewhat more than half as long as palm, upper surface of dactylus bearing few large and several smaller tubercles proximally. Cutting edge of fixed finger of large cheliped with single large molariform tooth, occupying greater part of edge, flanked by small denticle distally. Cutting edge of fixed finger in small chela with 3 large distal and 3 small proximal teeth. Edges of dactylus of both chelipeds bearing 3 or 4 low small teeth. Carpus short, cup-shaped, with small irregular tubercles, forming more or less distinct longitudinal rows. Merus short and wide, inner margin bearing distinct larger and smaller teeth, on outer margin teeth less conspicuous. Lower margin of merus with longitudinal row of large tubercles, inner surface bearing some scattered tubercles, outer surface almost smooth.

In following legs (Figure 84*b*,*c*) lower surface of merus bearing 2 rows of granules, 1 on either margin; upper margin of merus armed with tubercles in extreme proximal part only. Carpus with lower surface unarmed, upper carrying angular tubercle; in addition, last leg with few distal tubercles on upper margin. Propodus with some ventral and dorsal denticles; denticles and tubercles far more distinct in posterior than in anterior legs. Dactylus of second pereiopod (= first walking leg) about as long as, but narrower than, propodus, somewhat longer than carpus; merus about twice as long as, and broader than, carpus. Third and fourth pereiopods similar to second. Fifth pereiopod (Figure 84*c*) shortest of all legs. Dactylus longer than, but half as high as, propodus; carpus about as long as propodus, and half or less than half as long as merus.

Female abdomen with all somites free.

MEASUREMENTS.—The two examined females have cl 6 and 7.5 mm and cb 7 and 10 mm. The holotype had cb 11 mm (Miers, 1879b). The measurements given in the literature are: cl 10 mm, cb 11 mm (Miers, 1886); cl 8 mm, cb 10 mm (A. Milne Edwards and Bouvier, 1894); for 12♂ cl 4.0–9.5 mm, cb 5.0–12.0 mm, for 2 ovigerous ♀ cl 5.0 and 6.0 mm, cb 5.5 and 7.5 mm, and 2 non-ovigerous ♀ cl 5.0 and 6.5 mm, cb 5.8 and 7.5 mm (Pastore, 1975:150; in Pastore's table, length and width have evidently been interchanged by accident). The known size range for the species thus is cl 4–10 mm, cb 5–12 mm.

REMARKS.—Capart (1951:106, fig. 36) described and figured a female of what he considered to be a juvenile *Daldorfia bouvieri* (A. Milne Edwards). This specimen (cl 9 mm, cb 12 mm) originated from Boa Vista, Cape Verde Islands. The description and figure given by Capart show a great similarity to the present species, and a reexamination of Capart's specimen might be of interest. Our specimens differ from that described by Capart in having the carapace uniformly and evenly minutely pitted and not eroded. Capart's specimen might be abnormal in having two equal chelipeds, both corresponding with the smaller cheliped in the present species.

BIOLOGY.—The species has been found in depths between 30 and 185 m. The bottom at the localities where it was found was noted in some instances: gravel, sand and broken shell (A. Milne Edwards and Bouvier, 1894, 1899); coral, rock and sand, sand and rock, sand, shell and coral, sand and shell (A. Milne Edwards and Bouvier, 1900); calcareous and other algae (Forest and Guinot, 1966); nullipores and coarse sand (Adensamer, 1898).

Ovigerous females have been collected in June and August (Monod, 1956; Pastore, 1975).

DISTRIBUTION.—Eastern Atlantic, from the Mediterranean, Madeira, Seine Seamount, the Azores, the Canary Islands, and West Africa from Spanish Sahara to São Tomé and Annobon islands in the Gulf of Guinea. This species has not been recorded previously from Annobon. The Mediterranean records are: NW of Crete, 36°-03′N, 23°06′E (Adensamer, 1898; Pastore, 1975) and Acitrezza, Bay of Catania, Sicily (Pastore, 1975). Monod (1956) summarized earlier records and reported material from Madeira, the Canary Islands, and the Cape Verde Islands. West African records since 1956 include the following:

Canary Islands: No specific locality (Pastore, 1975).

São Tomé: 00°25′40″N, 06°40′10″E, 50 m (Forest and Guinot, 1966).

* *Parthenope massena* (Roux, 1830)

?*Lambrus massena*.—Capart, 1951:105, fig. 35.

Lambrus massena.—Sourie, 1954b:147, 150.—Monod, 1956: 572, 632, figs. 840–856.—Gauld, 1960:72.—Rossignol, 1962:123.—Crosnier, 1964:31.—Forest and Guinot, 1966: 118.—Zariquiey Alvarez, 1968:441, fig. 147 [Spain; references].

Lambrus sp.—Monod, 1956:583, figs. 857, 858.

Lambrus massenae.—Longhurst, 1958:89 [erroneous spelling].

SYNONYMS.—?*Parthenope contracta* Costa, 1840; ?*Parthenope hexacantha* Costa, 1840; *Lambrus pumilus* Costa, 1851; *Lambrus rugosus* Stimpson, 1857; *Lambrus setubalensis* De Brito Capello, 1866; *Lambrus pulchellus* A. Milne Edwards, 1868; *Lambrus massena* var. *atlanticus* Miers, 1881; *Lambrus massena* var. *spinifer* Miers, 1881; *Lambrus massena* var. *goreensis* Miers, 1881; *Lambrus bicarinatus* Miers, 1881.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 70, 33 m, branched Foraminifera, 2♀ (L).

Ghana: Sta 22, 51 m, rough bottom, 2♂, 1 juv (L). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂, 4♀ (1 ov) (W). Sta 24, 35–37 m, dark red bryozoans, 14♂, 14♀ (6 ov) (L). Sta 26, 27 m, shell bottom (scallops), 2♂, 1♀ (W).

Nigeria: Sta 248, 33 m, 30♂, 22♀ (4 ov) (W). Sta 250, 24 m, brackish water, mud, 2♂ (L). Sta 253, 33–40 m, mud, 1♀ ov (L).

Annobon: Sta 283, 51–55 m, nodular coralline algae, 1♂ (W).

Other Material: Madeira: S of Madeira, 32°38′N, 16°50′W, 98–105 m, triangular dredge, 16 Mar 1976, *Onversaagd* Sta 93, 1♂ (L).

Dahomey: Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 1♂ (L).

DESCRIPTION.—Bouvier, 1940:312; Zariquiey Alvarez, 1968:441.

Figures: Monod, 1956, figs. 840–856.

Male Pleopod: Monod, 1956, figs. 846–856 (Senegal).

MEASUREMENTS.—The carapace length in the material examined by us varies between 6 and 14 mm, that of the ovigerous females between 9 and 12 mm.

REMARKS.—The great variability of the various characters of this species have been commented upon by many authors. Monod (1956) provided good figures of the various forms of this species, and so did Zariquiey Alvarez (1968). Monod distinguished several forms or varieties, but admitted that these could not be sharply separated. We prefer just to use the specific name and have not attempted to assign our specimens to Monod's various forms.

It seems very likely that the specimens which Bouvier (1922:76, pl. 2: fig. 3, pl. 6: fig. 8) reported upon as "*Lambrus Miersi*" (= *Parthenope miersii* (A. Milne Edwards and Bouvier, 1898)), at least partly belong to the present species. The specimen from Sta 1242 (Seine Seamount, NE of Madeira), which is figured on Bouvier's plate 2: figure 3, shows the characters of *P. massena*: the rostrum is not toothed, the chelipeds are asymmetrical and the rest of the figure checks well with the present species; also the brown color of the finger tips is found in *P. massena*. Whether Bouvier's plate 6: figure 8 belongs here is not certain, as the rostrum shows traces of two lateral teeth. Unfortunately, Bouvier did not indicate after which specimen this figure was made; it even might have been the holotype of *P. miersii*. It is possible that Bouvier later recognized his mistake, because in his later discussion of "*Lambrus Miersi*" (1940:311) he only mentioned the type material and not his own specimens of 1922, a fact to which Monod (1956:583) already has drawn attention. This all goes to show that the eastern Atlantic *Parthenope* species are still extremely poorly known and that a revision of them is urgently needed.

BIOLOGY.—Monod (1956) gave as the depth range of the species 5 to 500 m; however, his West African specimens came from depths of 5 to 110 m, and 95% of these from depths between 5 and 48 m. Later authors reported it from the following depths off West Africa: 0–17 m (Sourie, 1954b), 10–106 m (Longhurst, 1958; about 90% of these from 10–40 m), 20–44 m (Gauld, 1960), 10–50 m (Crosnier, 1964), 5–90 m (Forest and Guinot, 1966; about 90% between 5 and 37 m). The

material reported upon here was taken between 24 and 51 m. The species was taken on the following types of bottom: sand with *Palythoa* and *Molgula* (Monod, 1956); coarse shelly sand, bottom with *Arca* and *Pyura* (Sourie, 1954b); sand and shells, sand and mud (Longhurst, 1958); mud and shells (Longhurst, 1958; Forest and Guinot, 1966); sand with Foraminifera on rocky bottom with gorgonians (Crosnier, 1964); rock and shells, mud, calcareous algae and shells, calcareous algae, calcareous algae, sand and shells, sand and calcareous and other algae, mud and calcareous algae (Forest and Guinot, 1966).

Ovigerous females have been recorded in all months but January, April, and August, suggesting that off West Africa the species spawns all year (Monod, 1956; Forest and Guinot, 1966; *Pillsbury*).

DISTRIBUTION.—Eastern Atlantic, from Brittany, Atlantic coast of France, southward to the Congo, including the Mediterranean. Monod (1956) summarized the literature and reported material from Senegal, Guinea, Sierra Leone, Ghana and Principe. Other records in the literature include the following:

Senegal: Anse Bernard and Anse de Hann, Baie de Dakar, 0–17 m (Sourie, 1954b).

Sierra Leone: No specific locality, in 10–106 m (Longhurst, 1958).

Ghana: Off Accra, 20–40 m (Gauld, 1960). 04°37′N, 00°50′W, 90–100 m (Forest and Guinot, 1966).

Nigeria: Off the mouths of the Niger River, 04°03′N, 06°12′E, 32 m (Forest and Guinot, 1966).

Cameroon: No specific locality, in 10–50 m (Crosnier, 1964).

Principe: 01°38′25″N, 07°22′05″E, 31 m; 01°43′10″N, 07°28′20″E, 73 m; 01°43′N, 07°28′55″E, 37 m; [Cais de] Santana, 11 m; Praia Grande, 3–12 m (all Forest and Guinot, 1966).

São Tomé: 00°25′15″N, 06°43′05″E, 8–30 m; Baía de Ana de Chaves, 5 m (Forest and Guinot, 1966).

Annobon: 01°27.5′S, 05°36.5′E, 35 m (Forest and Guinot, 1966).

Gabon: W of Pointe Gombé, 40 m (Rossignol, 1962).

Congo: W of Pointe-Noire, 10 m (Rossignol, 1962).

Parthenope miersii (A. Milne Edwards and Bouvier, 1898)

Lambrus miersi.—Capart, 1951:105 [discussion].—Monod, 1956:583 [references].

Parthenope miersi.—Zariquiey Alvarez, 1968:439 [Spain; references].

DISTRIBUTION.—Eastern Atlantic, from Portugal, the Bay of Cadiz, Seine Seamount, and the Cape Verde Islands; sublittoral, in depths between 91 and 240 m.

**Parthenope notialis*, new species

FIGURES 85, 86*a,b*

Lambrus mediterraneus.—Studer, 1882:335 [not *Lambrus mediterraneus* Roux, 1828 = *Cancer macrochelos* Herbst, 1790].

Lambrus Mediterraneus.—Studer, 1883:9.

Lambrus macrochelos.—Rathbun, 1900a:295.—Monod, 1956: 585, figs. 859–861.—Longhurst, 1958:89.—Gauld, 1960: 72.—Guinot and Ribeiro, 1962:80.—Rossignol, 1962: 123.—Crosnier, 1964:34. [Not *Cancer macrochelos* Herbst, 1790.]

Lambrus macrocheles.—Doflein, 1904:87 [part], pl. 32: fig. 5.—Balss, 1921:54.—Odhner, 1923:20.—Capart, 1951:102, fig. 34, pl. 2: figs. 5, 6.—Forest and Guinot, 1966:119.—?Maurin, 1968a:59, 62; 1968b:480, 486, 489.—Crosnier, 1970:1215 [listed], 1219. [Not *Cancer macrochelos* Herbst, 1790.]

Lambrus (*Lambrus*) *macrocheles.*—Monod, 1933b:498 [not *Cancer macrochelos* Herbst, 1790].

Parthenope.—Voss, 1966:19, 22.

Lambrus.—?Maurin, 1968b, fig. 9.

MATERIAL EXAMINED.—*Pillsbury Material:* Liberia: Sta 68, 70 m, broken shell, 6♂, 12♀ (2 ov) (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown branched Foraminifera, 6♂, 4♀ (W). Sta 46, 38–42 m, mud with dense *Jullienella*, 1♂, 2♀ (W). Sta 50, 128–192 m, 1♀ ov (L). Sta 59, 55–64 m, mud with dense branched Foraminifera, 1♂, 1♀ (W). Sta 60, 79–82 m, coral or rock, 1 carapace, 2♀, 1 juv (W). Sta 62, 46 m, brown, branched and foliate Foraminifera, 4♂ (L). Sta 63, 64 m, sandy mud with shells, 1♂, 2♀ (L). Sta 64, 68 m, 5♂, 3♀ (1 ov) (W).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♂, 1♀ (L). Sta 22, 51 m, rough bottom, 4♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 3♂, 5♀ (4 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 1♂, 2♀ (1 ov) (L).

Cameroon: Sta 260, 46 m, 5♂ (largest is holotype), 5♀ (L).

Geronimo Material: Gabon: Sta 235, 100 m, 1♂ (W).

Undaunted Material: Angola: Sta 95, 126 m, 2♂, 2♀ ov (L). Sta 96, 162 m, 11♂, 11♀ (7 ov) (L).

Other Material: Guinea-Bissau: 10°19′N, 16°34′W, 60–73 m, mud, shells and *Cidaris*, *Calypso* Sta 6, 1♀ (W).

DESCRIPTION.—The present new species is very close to *Parthenope macrochelos* (Herbst), from which

it was not distinguished by the authors that have dealt with it. We found, however, a number of characters that made it impossible to consider the present West African specimens and typical Mediterranean specimens of *P. macrochelos* as belonging to the same species or subspecies.

The shape of the carapace (Figure 85), which in adult specimens is distinctly wider than long (proportion length:width being about 5:6), has the same general shape as in *P. macrochelos*. The rostrum is narrow and bears a tooth at either side. The inner orbital angle bears two teeth and a strong tubercle. The upper margin of the orbit is provided with a strong tubercle (Figure 86*a*), behind which sometimes a trace of a smaller tubercle may be visible; in *P. macrochelos* (Figure 86*c*) this second tubercle is quite distinct. Some distance behind the orbits, in the median area of the mesogastric region, there are four tubercles placed in a quadrangle. The anterior pair stands close to the posterior pair and its tubercles are placed slightly wider apart than those of the posterior pair. The four tubercles thus form a trapezium with the widest margin anteriorly. In *P. macrochelos*, the posterior tubercles are wider apart than the anterior, so that the trapezium formed by the four tubercles has the narrowest margin anteriorly; in *P. macrochelos* the two pairs of tubercles are separated from each other by a greater distance than in *P. notialis*. Behind the group of four tubercles there is a strong median gastric spine. Behind the cervical groove there is a median row of 3 strong spines (1 urogastric and 2 cardiac); the posterior of these is the largest. In *P. notialis* these spines are relatively longer than in *P. macrochelos*; the arrangement of the spines is the same in the two species. The median gastric region is swollen and so is the branchial region. In the depressed area between these two swollen regions there is a row of three blunt tubercles close to and parallel with the median row of spines. The branchial region ends posterolaterally in three large teeth, between which there are small tubercles. In *P. macrochelos*, instead of these tubercles, there are teeth that often are only slightly smaller than the large teeth. The middle of the three large teeth is placed at the posterior end of a blunt oblique ridge, which carries another spine more anteriorly. The anterolateral margin of the carapace bears a row of about 7 teeth, which are distinctly shorter and narrower than the outer posterolateral tooth; in *P. macrochelos* these anterolateral teeth are much larger, reaching almost the size of the outer posterolat-

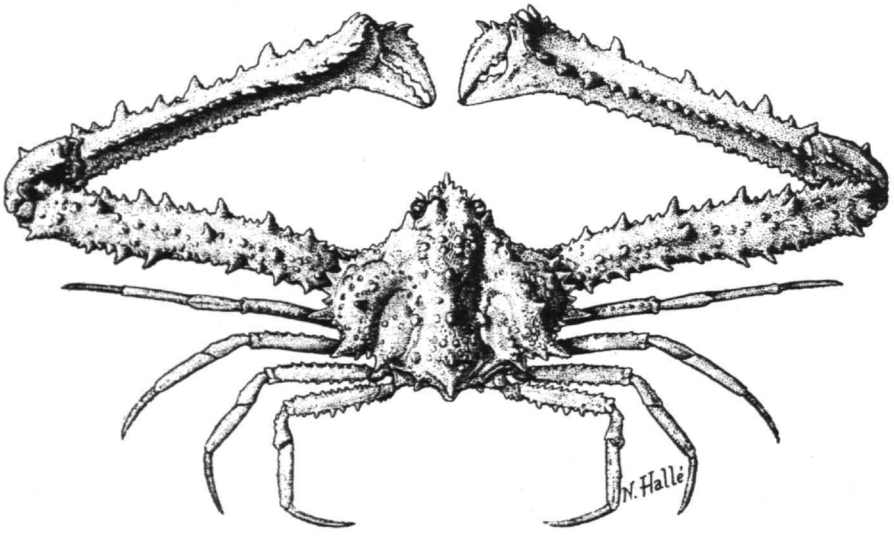

FIGURE 85.—*Parthenope notialis*, new species (from Monod, 1956, fig. 859).

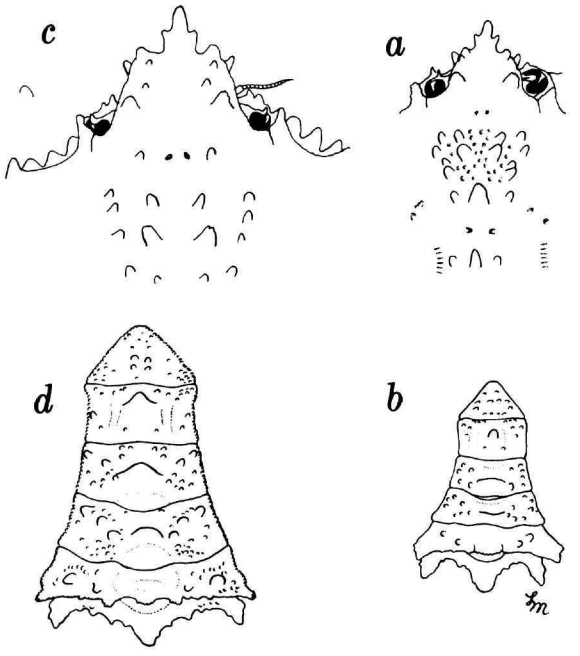

FIGURE 86.—*Parthenope notialis*, new species, paratype, male, cl 17.5 mm, *Pillsbury* Sta 260: *a*, front; *b*, abdomen. *Parthenope macrochelos* (Herbst), male, cl 32.8 mm, Naples: *c*, front; *d*, abdomen.

eral. The general shape and tuberculation of the carapace of *P. notialis* is very similar to that of *P. macrochelos.*

The epistome, oral field, and third maxilliped are like in *P. macrochelos*, only the spines are sharper and more distinct. The subhepatic region just lateral of the oral cavity is smooth in *P. notialis*, uniformly tuberculated in *P. macrochelos.*

In *P. notialis* the chelipeds of the adult males are relatively distinctly longer than in *P. macrochelos.* The second pereiopod in *P. notialis* does not attain the end of the merus of the chela, while in *P. macrochelos* it reaches beyond. The fingers of the chelipeds in *P. notialis* are more laterally compressed than in *P. macrochelos*, where they are more cylindrical. The teeth on the palm in *P. notialis* also are more compressed and have the margins with small serrations, sometimes small tubercles may be seen on the lateral surfaces of these teeth. In *P. macrochelos* the teeth on the palm are more conical and have spinules on all sides. The upper surface of the palm of the chelipeds in *P. notialis* is almost smooth, only a few indistinct tubercles are seen; in *P. macrochelos* this surface is very rough with many spines and tubercles. The lower outer surface of the palm is slightly convex with a few rows of small tubercles, of which the median is the most conspicuous. In *P. macrochelos* this surface is more convex and the tubercles are larger. In *P. notialis* the merus of the cheliped has the slightly convex upper surface almost smooth, except for a median row of spinules; in *P. macrochelos* the surface is more uniformly spinuliferous. The spines on the margins of the upper surface of the merus are more flattened and less numerous in *P. notialis* than in *P. macrochelos.*

The following pereiopods are very similar in *P. notialis* and *P. macrochelos.* The dactylus is covered with a very short felt-like pubescence; it is practically as long as the propodus in the second pereiopod, becoming gradually relatively longer in the following legs. The carpus also is about as long as the propodus in pereiopod 2, but it becomes gradually shorter in the following legs. The merus is the longest segment and is as long as propodus and carpus combined. A row of spinules is present on the upper and the lower margins of the merus, and on the upper margin of the carpus and propodus of all legs. The spinules are distinct on the merus, faint to very faint on the carpus and propodus; in the posterior legs they are more distinct than in the anterior.

The shape and armament of the male thoracic sternum and abdomen is about the same in the two species. The second abdominal segment shows one median and two lateral teeth with tubercles in between; in *P. notialis* (Figure 86*b*) these teeth are large and bluntly lobiform, flattened and higher than wide, the tubercles are few, small and inconspicuous; in *P. macrochelos* (Figure 86*d*) the teeth are placed wider apart, are less flattened, lower and more triangular, while the tubercles are distinct and rather large. The general shape of the abdomen is the same in the two species, but the last somite is narrower in *P. notialis.* The third to fifth somites of the abdomen

are fused: sutures rather than articulations indicate the lines between the somites.

Figures: Figures of the whole animal were published by Doflein (1904, pl. 32: fig. 5), Capart (1951, fig. 34), and Monod (1956, fig. 859).

Male Pleopod: Figures of the male pleopods are provided by Capart (1951, pl. 2: figs. 5, 6) (Zaire) and Monod (1956, figs. 860–861) (Senegal). They do not essentially differ from those of *P. macrochelos.*

MEASUREMENTS.—The carapace length of the specimens seen by us varies between 5 and 21 mm, that of the ovigerous females between 14 and 18 mm. Odhner's (1923) specimen had the carapace width between 11 and 19 mm. Both Capart's (1951) largest male and largest female had the carapace 18.5 mm long and 21 mm wide. Monod (1956:585, 586) gave the following measurements for six of his males: cl 12 to 18 mm, cb 13 to 23 mm; and for three ovigerous females: cl 10 to 14 mm, cb 11 to 16 mm. The single specimen reported upon by Guinot and Ribeiro (1962:80) was a male with the carapace length and width both 5 mm. It is clear that the present species is a small one compared to *P. macrochelos*, which may attain a carapace length of 39 mm. The eggs of *P. notialis* are numerous and small, they are spherical and are 0.3 to 0.35 mm in diameter. Zariquiey Alvarez (1968:441), in citing ovigerous females of *P. macrochelos* with cl 10 mm, based his information on Monod's (1956) data of the present new species.

REMARKS.—*Parthenope notialis* very strongly resembles *P. macrochelos*, and it is not surprising that the two species have always been confused. They may finally prove to be only subspecifically distinct. Our extensive material of the present species, however, differs consistently from the specimens of *P. macrochelos*, with which we could compare it.

So far as we could ascertain all previous records of *P. macrochelos* from tropical West Africa pertain to the present species.

Studer (1883), in discussing his Liberian specimens (males and females), described the upper surface of the palm of the cheliped (which he inadvertently named "Carpus") as "fast glatt, nur mit wenig Höckern besetzt" and also described the outer lower surface of the palm with its median row of tubercles, and remarked that in these features his specimens differed from Mediterranean *P. macrochelos.* This clearly proves the identity of his material with the present species.

Doflein (1904:87) mentioned two lots of "*Lambrus macrocheles*" from West Africa. One of these consisted of a single damaged male from Seine Seamount, NE of Madeira at 33°43.8'N, 14° 20'W, ca. 150 m deep. This male might well belong to *Parthenope massena* (Roux). Doflein remarked that it had "auffallend kürzere Scheren mit dunkel-rotbraunen Fingerenden," which would fit *P. massena* quite well, as we examined numerous specimens of that species which, after long preservation, still showed distinct reddish brown finger tips. Bouvier (1922:76, pl. 2: fig. 3), under the name *Lambrus Miersi*, described and figured (in color) *P. massena*, remarking that "le bout des doigts des pinces [sont] d'un brun noirâtre," which color also is clearly shown on the figure. Doflein's specimen had the rostrum broken ("dessen Rostrum abgebrochen ist"), and thus lacked a character that undoubtedly would have made Doflein recognize the true identity of the species.

Doflein's second lot came from off the mouth of the Congo River and the male figured by him (1904, pl. 32: fig. 5) clearly belongs to the present species.

Odhner (1923) considered his specimens to be juveniles of *P. macrochelos* as none had a carapace width of more than 19 mm; it is more probable that his specimens are *P. notialis.*

Capart's (1951:102, fig. 34) illustration of a female from off Angola identified as "*Lambrus macrocheles*" clearly shows that it belongs to *P. notialis* as probably does also Capart's other material, since he remarked that the specimens in his collection "ne montrent pas entre eux de variations notables." As shown above the measurements of Capart's specimens fall entirely within the range that we found for the present species.

Monod (1956:585, figs. 859–861) gave excellent

figures of the present species, while the measurements given by him check well with those of *P. notialis* (p. 334). Of one of his lots (from S of Cap Vert) Monod stated specially "petite forme, face supérieure des chélipèdes plus ou moins lisses entre les crêtes." There is thus no indication that any of his specimens do not belong to *P. notialis*. Longhurst's (1958) and Gauld's (1960) specimens were identified by Monod.

We examined a specimen from Guinea-Bissau reported upon by Forest and Guinot (1966) as *P. macrochelos* and found that it belongs to *P. notialis*.

The characters used in various keys (Bouvier, 1940:309, 310; Monod, 1956:572; Zariquiey Alvarez, 1968:437, 438) to distinguish between *P. macrochelos* and *P. miersii* (A. Milne Edwards and Bouvier), also serve to distinguish *P. macrochelos* from *P. notialis*. This notwithstanding, we believe that *P. notialis* is closer to *P. macrochelos* than to *P. miersii*. *Parthenope miersii* has the carapace narrower than in either *P. macrochelos* or *P. notialis* and the chelipeds are shorter. *Parthenope verrucosa* (Studer, 1883) from Ascension has the rostrum similar to that of *P. macrochelos* and *P. notialis*, but its chelipeds are shorter than in these two species, and the tuberculation of the carapace seems to be different. Additional information on both *P. miersii* and *P. verrucosa* is badly needed; material of neither species was available to us.

TYPE-LOCALITY.—The male holotype was collected at *Pillsbury* Sta 260, off Cameroon, 03°45′N, 09°05′E to 03°43′N, 09°10′E, depth 46 m.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31545) is deposited in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden. Some of the paratypes are in the Leiden Museum and some in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

ETYMOLOGY.—The specific epithet is from the Latin *notialis* (southern).

BIOLOGY.—The species has been reported from depths between 18 and 162 m (one of Maurin's uncertain records is from 300 to 500 m); however, more than 80% of the records are from depths between 30 and 110 m. The species usually is found on bottoms of mud, sandy mud or sand, almost always mixed with broken shells, bryozoans, branched or foliate Foraminifera, corals or rocks. The records in the literature are the following: shelly mud (Longhurst, 1958; Forest and Guinot, 1966); sand, mud, coral and rock; sand, brown mud and coral; sand, mud and rock (Capart, 1951); sand, mud and shells; mud, shells and *Cidaris*; mud, stones, calcareous algae, sand and Foraminifera; gravel, shells and Foraminifera (Forest and Guinot, 1966); sandy mud with shells; mud with dense *Jullienella* (Voss, 1966); bottom with *Jullienella foetida* Schlumberger (Monod, 1956); sand and broken shells; sand, clayish sand and broken shells (Odhner, 1923); rock and shells (Forest and Guinot, 1966); sand and mud or sandy mud (Capart, 1951; Guinot and Ribeiro, 1962; Forest and Guinot, 1966); and mud (Capart, 1951; Forest and Guinot, 1966). The present material has been taken on similar types of bottom.

Ovigerous females were observed in February, May, July, and September (Monod, 1956), March (Crosnier, 1970), May (Forest and Guinot, 1966), May and June (present paper), November (Capart, 1951).

DISTRIBUTION.—Most of the records of *P. macrochelos* from tropical West Africa are based on the present species. Whether Maurin's (1968a, 1968b) material from off Spanish Sahara and Mauritania belongs here, to *P. macrochelos*, or to *P. miersii* is not clear; this can only be decided after reexamination of his material. The range of the present species extends at least from Senegal to Angola, but it might go north as far as the Spanish Sahara. If we include Maurin's material in the present species, the published records for it are the following:

Spanish Sahara: Médano de Aaiún and W of Cabo Bojador, 300–500 m (Maurin, 1968b).

Mauritania: Banc d'Arguin, 40–60 m (Maurin, 1968b), and 90–100 m (Maurin, 1968a,b). Tamzak, 70–75 m (Maurin, 1968a, 1968b).

Senegal: Off Saint-Louis, 100–300 m; off Kayar; S of Cap Vert, 97–98 m; SE of Île de la Madeleine, 48 m; off Dakar, 140 m; near Gorée, 40–41 m, 50 m, 96 m, 132 m (all

Monod, 1956). 13°01'N, 17°24'W, 51–55 m; 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

Guinea-Bissau: 10°19'N, 16°34'W, 60–73 m (Forest and Guinot, 1966).

Guinea: 09°40'N, 14°05'W, 18 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 54–106 m (Longhurst, 1958).

Liberia: 04°40'N, 09°40.6'W, 90 m (Studer, 1882, 1883). 04°34.5'N, 08°31'W, 64 m (Forest and Guinot, 1966).

Ivory Coast: 05°07'N, 04°32'W to 05°07'N, 04°36'W, 38–42 m, and 04°35'N, 06°40'W to 04°35'N, 06°41'W, 64 m (Voss, 1966).

Ghana: 04°40'N, 02°08'W to 04°39'N, 02°05'W, 50 m; 04°36.5'N, 01°31'W, 50 m; 04°37'N, 00°50'W, 90–100 m (Forest and Guinot, 1966). Accra, 43 m, 44 m, 65 m (Monod, 1956; Gauld, 1960).

Cameroon: No specific locality, depth more than 50 m (Crosnier, 1964).

Gabon: 00°25'N, 09°00'E, 73 m (Forest and Guinot, 1966). Off Pointe Banda, 03°57.5'S, 10°36.5'E, 85 m (Capart, 1951).

Cabinda: West of Landana, 50–65 m (Rossignol, 1962).

Angola: Off Moita Seca, 06°16'S, 12°07'E, 50 m; 06°21'S, 11°53'12"E, 100 m (Capart, 1951). Off the mouth of the Congo River, 06°18.7'S, 12°02.1'E, 44 m (Doflein, 1904). 09°47'S, 13°11'E, 30–35 m; 09°40'S, 13°02'E, 80 m (Capart, 1951). Baía Farta, Benguela, 22–28 m (Guinot and Ribeiro, 1962). Baía dos Elefantes, 13°05'S, 12°46'E, 100–110 m; 13°05'S, 12°45'E, 100–110 m; Baía de Salinas, 14°05'S, 12°17'E, 110 m (Capart, 1951). Off Porto Alexandre, 72 m, 108 m (Odhner, 1923). 16°37'S, 11°22'E, 126 m; 16°41'S, 11°21'E, 162 m (Crosnier, 1970).

Genus *Solenolambrus* Stimpson, 1871

Solenolambrus Stimpson, 1871a:132 [type-species: *Solenolambrus typicus* Stimpson, 1871, by use of *typicus*; gender: masculine].

Pisolambrus A. Milne Edwards, 1878, in 1873–1881:157 [type-species: *Pisolambrus nitidus* A. Milne Edwards, 1878, by monotypy; gender: masculine].

**Solenolambrus noordendei* (Capart, 1951)

Heterocrypta noordendei Capart, 1951:108, fig. 37, pl. 2: figs. 14, 15.

Solenolambrus noordendei.—Monod, 1956:593, figs. 868–870.—Longhurst, 1958:89.—Gauld, 1960:72.—Crosnier, 1967: 340; 1970:1215 [listed], 1219.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 1♂ (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 5♂, 5♀ (3 ov) (W). Sta 45, 73–97 m, 2♂, 1♀ ov (L). Sta 49, 73–77 m, 2♂, 5♀ (4 ov) (L). Sta 50, 128–192 m, 2♂, 1♀ (W). Sta 59, 55–64 m, mud with dense branched Foraminifera, 1♂ (L). Sta 60, 79–82 m, coral or rock, 1♂ (L).

Nigeria: Sta 237, 101 m, 4♀ (1 ov) (W).

Undaunted Material: Angola: Sta 96, 162 m, 1♀ ov (L).

Other Material: Congo: Off Pointe-Noire, 04°56'S, 11°-31'E, 95 m, muddy sand, 3 Sep 1965, A. Crosnier, 1♂ (W).

DESCRIPTION.—Capart, 1951:108.

Figures: Capart, 1951, fig. 37; Monod, 1956, 593, figs. 868–870.

Male Pleopod: Capart, 1951, pl. 2: figs. 14, 15 (Zaire).

MEASUREMENTS.—The ovigerous females in the present collection had the carapace length 6 to 9 mm. Capart (1951) mentioned ovigerous females with cl 7 and 10 mm, cb 7 and 11 mm; Monod's (1956) ovigerous females had cl 7 to 9 mm and cb 8 to 10 mm. The carapace length in the rest of our material varies between 6 and 12 mm. Capart's (1951) largest specimen had cl 11 and cb 11.5 mm; Monod's (1956) smallest and largest male had cl 5 and 11.5 and cb 4.5 and 12 mm, respectively, while Crosnier's (1967) males had cl 6.6 to 8.7 mm and cb 7.0 to 9.1 mm.

BIOLOGY.—The species is known from depths between 64 and 215 m; the shallowest record is 55–64 m (present material), the deepest 215–220 m (Capart, 1951; Monod, 1956). Of the records 90% are from between 70 and 140 m. It has been reported from mud (Capart, 1951; Crosnier, 1967), sandy mud (Capart, 1951; Crosnier, 1967), and shelly mud (Longhurst, 1958).

Ovigerous females have been found in the months of February, March, May, July, and November (Capart, 1951; Monod, 1956; Crosnier, 1970; present paper).

DISTRIBUTION.—Tropical West Africa, from localities between Senegal and Angola. It has not been recorded previously from Liberia or Nigeria, but these records are well within its known range. Records since Monod's (1956) include the following:

Sierra Leone: No specific locality, 72 m (Longhurst, 1958).

Ivory Coast: No specific locality (Crosnier, 1967).

Ghana: Off Accra, 80 m (Gauld, 1960).

Congo: 04°52'S, 11°39'E, 70 m, and 04°56'S, 11°31'E, 95 m (Crosnier, 1967).

Angola: 16°41'S, 11°21'E, 162 m (Crosnier, 1970).

Appendix I: Station Data

RV *Pillsbury* Collections

Collections made in the Gulf of Guinea in 1964 and 1965 (data from Bayer, 1966; OT = otter trawl).

1. Nigeria. Lagos harbor, 06°28′N, 03°23′E, shore collecting, 23 May 1964: *Callinectes marginatus, Cyclograpsus integer, Geograpsus lividus, Goniopsis pelii, Metagrapsus curvatus, Pachygrapsus gracilis, Panopeus africanus, Sesarma (Chiromantes) buettikoferi, Uca tangeri*
2. Nigeria. Lagos harbor, 06°28′N, 03°23′E, dipnet at surface, outgoing tide, 23 May 1964: *Callinectes amnicola, Callinectes pallidus*
16. Ghana. 05°40′N, 00°30′E to 05°40′N, 00°17′E, 46 m, mud with Foraminifera, shells, 6′ OT, 26 May 1964: *Capartiella longipes, Eurynome parvirostris, Ilia spinosa, Inachus angolensis, Inachus nanus, Machaerus oxyacantha, Macropodia gilsoni, Macropodia spinulosa, Medorippe lanata*
17. Ghana. 05°35′N, 00°10′E to 05°36′N, 00°11.5′E, 48 m, fine sand and green mud, 40′ OT, 26 May 1964: *Achaeus buderes, Achaeus foresti, Calappa pelii, Calypsachaeus calypso, Ebalia affinis, Inachus biceps, Macropodia spinulosa, Parthenope notialis, Pisa carinimana*
18. Ghana. [05°04′N, 00°12′E] to 05°01′N, 00°12′E, 3047–3129 m, soft dark gray clay, Blake Trawl, 26 May 1964: *Ethusina beninia*
22. Ghana. 05°25′N, 00°01′W to 05°22′N, 00°02′W, 51 m, rough bottom, 6′ OT, 27 May 1964: *Achaeus buderes, Calappa pelii, Calypsachaeus calypso, Ebalia tuberculata, Ethusa vossi, Herbstia condyliata, Ilia spinosa, Inachus angolensis, Inachus nanus, Macropodia hesperiae, Nanocassiope melanodactyla, Parthenope massena, Parthenope notialis, Stenorhynchus lanceolatus, Sternodromia spinirostris*
23. Ghana. 05°10′N, 00°25′W to 05°08′N, 00°28′W, 42 m, foliate brown to orange bryozoans, 6′ OT, 28 May 1964: *Achaeus buderes, Calappa pelii, Capartiella longipes, Ebalia affinis, Ebalia tuberculata, Ethusa vossi, Eurynome parvirostris, Heterocrypta maltzami, Ilia spinosa, Inachus biceps, Inachus nanus, Macropipus rugosus, Macropodia gilsoni, Macropodia spinulosa, Medorippe lanata, Nanocassiope melanodactyla, Parthenope massena, Parthenope notialis, Pilumnus perrieri, Pisa carinimana, Stenorhynchus lanceolatus*
24. Ghana. 04°56′N, 00°47.5′W to 04°56′N, 00°50′W, 35–37 m, dark red bryozoans, 6′ OT, 28 May 1964:

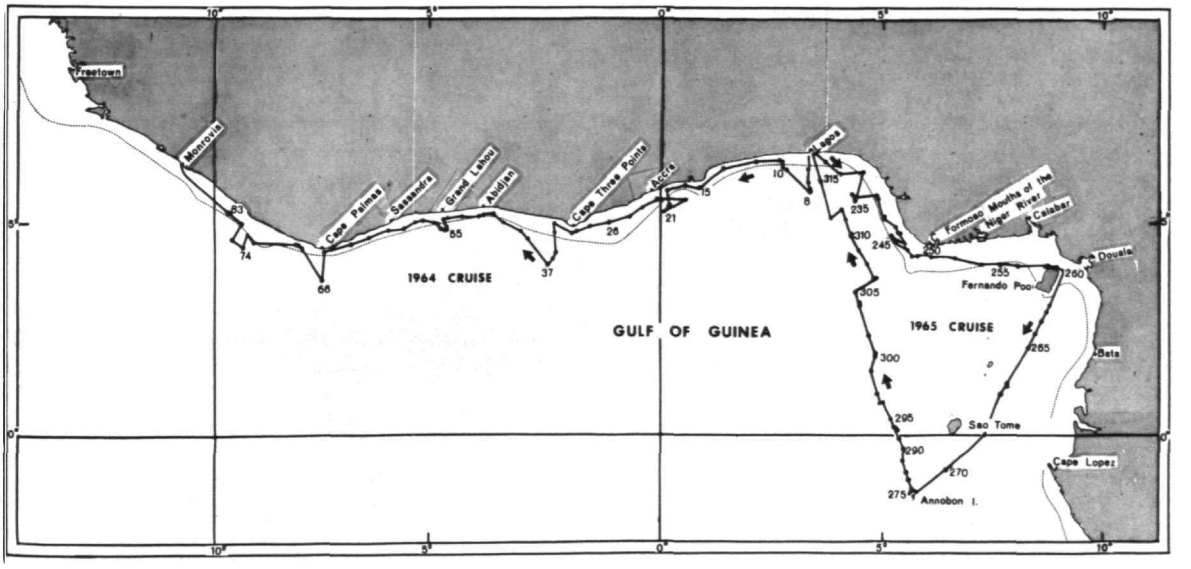

FIGURE 87.—Cruise track of the R/V *Pillsbury* in the Gulf of Guinea, 1964 and 1965 (from Voss, 1966, fig. 2).

Achaeus buderes, *Calappa rubroguttata*, *Capartiella longipes*, *Ebalia affinis*, *Ebalia tuberculata*, *Ethusa vossi*, *Heterocrypta maltzami*, *Ilia spinosa*, *Inachus biceps*, *Machaerus atlanticus*, *Macropipus rugosus*, *Macropodia spinulosa*, *Medorippe lanata*, *Nanocassiope melanodactyla*, *Palicus caronii*, *Parthenope massena*, *Parthenope notialis*, *Pilumnus stebbingi*, *Pisa carinimana*, *Portunus inaequalis*, *Stenorhynchus lanceolatus*, *Sternodromia spinirostris*, *Typhlocarcinodes integrifrons*

26. Ghana. 04°57′N, 01°16′W to 04°59′N, 01°16.5′W, 27 m, shell bottom (scallops), 6′ OT, 28 May 1964: *Dromia monodi*, *Ethusa vossi*, *Ilia spinosa*, *Inachus biceps*, *Parthenope massena*, *Portunus inaequalis*, *Stenorhynchus lanceolatus*
27. Ghana. 04°48′N, 01°42′W to 04°49′N, 01°47′W, 33 m, 6′ OT, 28 May 1964: *Ebalia tuberculata*, *Pilumnus perrieri*, *Pisa carinimana*, *Portunus inaequalis*
28. Ghana. 04°40′N, 02°00′W to [04°39′N, 02′02′W], 49–53 m, 6′ OT, 28 May 1964: *Capartiella longipes*, *Inachus angolensis*, *Machaerus oxyacantha*, *Macropodia gilsoni*, *Macropodia spinulosa*, *Medorippe lanata*, *Pseudomyra mbizi*, *Raninoides bouvieri*, *Stenorhynchus lanceolatus*, *Sternodromia spinirostris*
29. Ghana. [04°38′N, 02°02′W to 04°36′N, 02°00′W], 58–60 m, 40′ OT, 28 May 1964: *Inachus nanus*, *Pseudomyra mbizi*.
30. Ghana. 04°46′N, 02°30′W to 04°45′N, 02°33′W, 61–64 m, coral, 40′ OT, 28 May 1964: *Macropodia gilsoni*, *Medorippe lanata*, *Stenorhynchus lanceolatus*
32. Ghana. 04°37′N, 02°32′W to 04°38′N, 02°35′W, 110 m, 40′ OT, 28 May 1964: *Macropodia gilsoni*, *Pseudomyra mbizi*
34. Ghana. 03°53′N, 02°33′W to [03°47′N, 02°33′W], 1948–1984 m, mud, Blake Trawl, 29 May 1964: *Ethusina beninia*
41. Ivory Coast. 04°47′N, 03°33′W to 04°47′N, 03°35′W, 641–842 m, 6′ OT, 30 May 1964: *Ethusa rosacea*, *Geryon maritae*
42. Ivory Coast. 05°02.5′N, 03°49.5′W to 05°05′N, 03°-52′W, 62–75 m, mud with brown, branched Foraminifera, 6′ OT, 30 May 1964: *Atlantotlos rhombifer*, *Calappa pelii*, *Capartiella longipes*, *Ilia spinosa*, *Inachus angolensis*, *Inachus nanus*, *Macropipus rugosus*, *Macropodia gilsoni*, *Macropodia straeleni*, *Medorippe lanata*, *Nanocassiope melanodactyla*, *Parthenope notialis*, *Pisa carinimana*, *Pseudomyra mbizi*, *Solenolambrus noordendei*, *Stenorhynchus lanceolatus*
43. Ivory Coast. Surface tow during Sta. 42, 0.5 m net, 30 May 1964: *Callinectes pallidus*
44. Ivory Coast. 05°05′N, 04°00′W to 05°04′N, 04°02′W, 403–586 m, hard dark gray mud, 6′ OT, 30 May 1964: *Bathynectes piperitus*, *Carcinoplax barnardi*, *Ethusa rosacea*, *Geryon maritae*
45. Ivory Coast. 05°05′N, 04°04.5′W to 05°06′N, 04°-06′W, 73–97 m, 40′ OT, 30 May 1964: *Macropodia gilsoni*, *Monodaeus rouxi*, *Pseudomyra mbizi*, *Solenolambrus noordendei*
46. Ivory Coast. 05°07′N, 04°32′W to 05°07′N, 04°36′W, 38–42 m, mud with dense *Jullienella*, 6′ OT, 30 May 1964: *Calappa pelii*, *Capartiella longipes*, *Cronius ruber*, *Ethusa vossi*, *Heterocrypta maltzami*, *Ilia spinosa*, *Leopoldius pisifer*, *Machaerus atlanticus*, *Machaerus oxyacantha*, *Macropodia spinulosa*, *Medorippe lanata*, *Nanocassiope melanodactyla*, *Parthenope notialis*, *Phyllodorippe armata*, *Pisa carinimana*, *Stenorhynchus lanceolatus*, *Sternodromia spinirostris*
47. Ivory Coast. 05°04.5′N, 04°51.5′W, 37 m, bottom with *Jullienella*, 6′ OT, 31 May 1964: *Calappa pelii*, *Calappa rubroguttata*, *Ebalia affinis*, *Ethusa vossi*, *Leopoldius pisifer*, *Machaerus oxyacantha*, *Macropodia gilsoni*, *Macropodia spinulosa*, *Medorippe lanata*, *Nanocassiope melanodactyla*, *Neodorippe armata*, *Philyra laevidorsalis*, *Phyllodorippe armata*, *Pisa carinimana*, *Portunus inaequalis*, *Sternodromia spinirostris*
48. Ivory Coast. [05°05′N, 04°59.5′W], 22 m, 6′ OT, 31 May 1964: *Cronius ruber*, *Ilia spinosa*, *Machaerus oxyacantha*, *Macropodia spinulosa*, *Phyllodorippe armata*, *Stenorhynchus lanceolatus*
49. Ivory Coast. 05°00′N, 05°00′W to 04°59′N, 05°00′W, 73–77 m, 6′ OT, 31 May 1964: *Calappa pelii*, *Ethusa rugulosa*, *Inachus angolensis*, *Inachus nanus*, *Monodaeus rouxi*, *Phyllodorippe armata*, *Pseudomyra mbizi*, *Solenolambrus noordendei*
50. Ivory Coast. 04°58′N, 05°00′W to 04°57′N, 05°01′W, 128–192 m, 6′ OT, 3 May 1964: *Ethusa rugulosa*, *Inachus angolensis*, *Macropodia gilsoni*, *Monodaeus rouxi*, *Parthenope notialis*, *Pseudomyra mbizi*, *Solenolambrus noordendei*
51. Ivory Coast. 04°56′N, 05°01′W to 04°56.6′N, 05°-03′W, 329–494 m, 6′ OT, 31 May 1964: *Acanthocarpus brevispinis*, *Bathynectes piperitus*, *Carcinoplax barnardi*, *Geryon maritae*
59. Ivory Coast. 04°57.5′N, 05°- 22′W to 04°57′N, 05°-30′W, 55–64 m, mud with dense branched Foraminifera, 6′ OT, 1 Jun 1964: *Macropodia gilsoni*, *Parthenope notialis*, *Pseudomyra mbizi*, *Solenolambrus noordendei*
60. Ivory Coast. 04°55′N, 05°34.5′W to 04°- 54′N, 05°-37′W, 79–82 m, coral or rock, 6′ OT, 1 Jun 1964: *Capartiella longipes*, *Ethusa rugulosa*, *Inachus nanus*, *Macropodia hesperiae*, *Macropodia straeleni*, *Medorippe lanata*, *Parthenope notialis*, *Pisa carinimana*, *Pseudomyra mbizi*, *Solenolambrus noordendei*
62. Ivory Coast. 04°45′N, 06°13.5′W to 04°44′N, 06°16′W, 46 m, brown, branched and foliate Foraminifera, 6′ OT, 1 Jun 1964: *Calappa pelii*, *Ilia spinosa*, *Inachus angolensis*, *Machaerus atlanticus*, *Macropodia gilsoni*, *Medorippe lanata*, *Monodaeus rouxi*, *Parthenope notialis*, *Pisa carinimana*, *Pseudomyra mbizi*, *Raninoides bouvieri*, *Sternodromia spinirostris*
63. Ivory Coast. 04°35′N, 06°40′W to 04°35′N, 06°41′W, 64 m, sandy mud with shells, 6′ OT, 2 Jun 1964:

Atlantotlos rhombifer, Ilia spinosa, Inachus angolensis, Macropodia gilsoni, Parthenope notialis, Pseudomyra mbizi, Sternodromia spinirostris

64. Ivory Coast. 04°23′N, 07°06.5′W to 04°22′N, 07°08.5′W, 68 m, 6′ OT, 2 Jun 1964: *Calappa pelii, Inachus angolensis, Inachus nanus, Macropipus rugosus, Macropodia gilsoni, Medorippe lanata, Parthenope notialis, Pisa carinimana, Pseudomedaeus africanus, Raninoides bouvieri*
65. Ivory Coast. 04°15′N, 07°32′W to 04°12′N, 07°35.5′W, 46–49 m, 40′ OT, 2 Jun 1964: *Macropipus rugosus, Macropodia hesperiae, Macropodia spinulosa, Macropodia straeleni, Medorippe lanata, Stenorhynchus lanceolatus*
68. Liberia. 04°23′N, 08°05.5′W to 04°24′N, 08°07.5′W, 70 m, broken shell, 6′ OT, 3 Jun 1964: *Achaeus foresti, Atlantotlos rhombifer, Calappa pelii, Calypsachaeus calypso, Capartiella longipes, Ebalia affinis, Ethusa vossi, Eurynome aspera, Heterocrypta maltzami, Homola barbata, Ilia spinosa, Inachus nanus, Macropipus rugosus, Macropodia gilsoni, Macropodia straeleni, Medorippe lanata, Monodaeus rouxi, Parthenope notialis, Pseudomyra mbizi, Raninoides bouvieri, Solenolambrus noordendei, Sternodromia spinirostris*
69. Liberia. 04°29.5′N, 08°06′W to 04°29.5′N, 08°07.5′W, 29 m, coral or rock, 6′ OT, 3 Jun 1964: *Inachus nanus, Pisa carinimana, Pseudomyra mbizi*
70. Liberia. 04°30′N, 08°09′W to 04°29.5′N, 08°09′W, 33 m, branched Foraminifera, 6′ OT, 3 Jun 1964: *Apiomithrax violaceus, Ethusa vossi, Nanocassiope melanodactyla, Paractaea margaritaria, Parthenope massena, Pisa carinimana, Stenorhynchus lanceolatus*
73. Liberia. ?04°38′N, ?09°20′W to 04°40′N, 09°20′W, 311–366 m, 40′ OT, 4 Jun 1964: *Bathynectes piperitus*
74. Liberia. 04°20′N, 09°26′W to 04°30′N, 09°22′W, 641–733 m, 40′ OT, 4 Jun 1964: *Ethusa rosacea, Geryon maritae*
82. Liberia. 04°57′N, 09°30′W to 04°58′N, 09°32′W, 146–150 m, 40′ OT, 5 Jun 1964: *Macropodia macrocheles*
83. Liberia. 04°59′N, 09°37′W to 04°57.5′N, 09°33′W, 156–220 m, 40′ OT, 5 Jun 1964: *Macropipus rugosus*
224. Nigeria. Lagos, 06°28′N, 03°23′E, shore, sand beach, ichthyocide, 9 May 1965: *Ocypode cursor, Pilumnopeus africanus*
225. Nigeria. Lagos harbor, 06°28′N, 03°23′E, shore at dock, 9 May 1965: *Plagusia depressa*
226. Nigeria. Lagos harbor, 06°28′N, 03°23′E, surface at dock, night light, 9 May 1965: *Callinectes pallidus*
227. Nigeria. Lagos harbor, 06°28′N, 03°23′E, shore, on rocks and seawall, by hand, 10 May 1965: *Goniopsis pelii, Pachygrapsus gracilis*
228. Nigeria. Lagos harbor, 06°28′N, 03°23′E, surface at dock, 10 May 1965: *Callinectes pallidus*
229. Nigeria. Lagos harbor, 06°28′N, 03°23′E, surface at dock, dip net, 10 May 1965: *Callinectes amnicola, Callinectes pallidus*
230. Nigeria. 06°11′N, 03°36′E to 06°10′N, 03°38′E, 82–97 m, hard ground, with gorgonians, coral, rock, 40′ OT, 11 May 1965: *Macropodia hesperiae, Pisa armata*
232. Nigeria. 05°56′N, 04°27′E to 05°54′N, 04°27′E, 101–132 m, green mud, 40′ OT, 11 May 1965: *Pseudomyra mbizi*
236. Nigeria. 05°20′N, 04°45′E to 05°19′N, 04°48′E, 101–128 m, coral ground, rough, 40′ OT, 12 May 1965: *Pseudomyra mbizi*
237. Nigeria. 05°19′N, 04°48′E to 05°07′N, 04°55′E, 101 m, 10′ OT, 12 May 1965: *Calappa pelii, Macropodia gilsoni, Monodaeus rouxi, Pseudomyra mbizi, Solenolambrus noordendei*
239. Nigeria. 04°56′N, 05°00′E to 04°54′N, 05°05′E, 73 m, 10′ OT, 13 May 1965: *Atlantotlos rhombifer, Capartiella longipes, Inachus angolensis, Inachus nanus, Macropodia gilsoni, Macropodia straeleni, Monodaeus rouxi, Pseudomyra mbizi*
240. Nigeria. 04°44′N, 05°17′E to 04°41′N, 05°19′E, 37 m, 10′ OT, 13 May 1965: *Capartiella longipes*
241. Nigeria. 04°35′N, 05°18′E to 04°34′N, 05°19′E, 59–63 m, mud and shell, 10′ OT, 13 May 1965: *Atlantotlos rhombifer, Calappa pelii, Capartiella longipes, Homola barbata, Inachus angolensis, Machaerus oxyacantha, Macropipus rugosus, Macropodia gilsoni, Medorippe lanata, Portunus validus, Pseudomyra mbizi, Raninoides bouvieri*
245. Nigeria. 04°32′N, 05°07′E to °31′N, 05°13′E, 64–119 m, mud, 40′ OT, 13 May 1965: *Pseudomyra mbizi*
246. Nigeria. 04°13′N, 05°30′E to 04°10′N, 05°33′E, 37 m, 40′ OT, 13 May 1965; *Ilia spinosa, Portunus inaequalis, Pseudomyra mbizi, Stenorhynchus lanceolatus*
248. Nigeria. 04°03′N, 05°41′E to 04°07′N, 05°40′E, 33 m, 10′ OT, 13 May 1965: *Achaeus turbator, Atlantotlos rhombifer, Calappa rubroguttata, Calypsachaeus calypso, Capartiella longipes, Dromia monodi, Ebalia affinis, Ebalia tuberculata, Ethusa vossi, Heterocrypta maltzami, Ilia spinosa, Inachus biceps, Leopoldius pisifer, Macropodia spinulosa, Medorippe lanata, Parthenope massena, Phyllodorippe armata, Pilumnus perrieri, Pisa carinimana, Portunus inaequalis, Stenorhynchus lanceolatus*
250. Nigeria. 04°06′N, 05°58′E to 04°02′N, 06°04′E, 24 m, brackish water, mud, 10′ OT, 14 May 1965: *Callinectes pallidus, Dromia monodi, Machaerus oxyacantha, Nanocassiope melanodactyla, Phyllodorippe armata, Parthenope massena, Portunus inaequalis*
251. Nigeria. 04°03′N, 06°03′E to 04°04′N, 06°04′E, 27 m, mud, 10′ OT, 14 May 1965: *Callinectes pallidus, Machaerus oxyacantha, Phyllodorippe armata*
252. Nigeria. 04°04′N, 06°18′E to 04°05′N, 06°22′E, 30 m, mud, 10′ OT, 14 May 1965: *Callinectes pallidus, Ilia spinosa, Machaerus oxyacantha, Phyllodorippe armata, Portunus inaequalis, Portunus validus, Stenorhynchus lanceolatus*
253. Nigeria. 04°04′N, 06°35′E to 04°03′N, 06°38′E, 33–40 m, mud, 10′ OT, 14 May 1965: *Calappa pelii,*

Leopoldius pisifer, Parthenope massena, Phyllodorippe armata, Stenorhynchus lanceolatus

254. Nigeria. 03°50′N, 07°08′E to 03°51′N, 07°12′E, 148–174 m, 40′ OT, 14 May 1965: *Pseudomyra mbizi*

255. Nigeria. 03°49′N, 07°38′E to 03°48′N, 07°42′E, 264–269 m, 40′ OT, 14 May 1965: *Acanthocarpus brevispinis, Carcinoplax barnardi, Inachus grallator, Macropodia macrocheles*

256. Nigeria. 03°45′N, 08°03′E to 03°45′N, 08°02′E, 409–485 m, 40′ OT, 14 May 1965: *Acanthocarpus brevispinis, Carcinoplax barnardi*

257. Fernando Poo. 03°45′N, 08°48′E, shore, ichthyocide, 15 May 1965: *Callinectes marginatus, Callinectes pallidus, Eurypanopeus blanchardi, Pachygrapsus transversus, Xanthodius inaequalis inaequalis*

258. Fernando Poo. 03°45′N, 08°48′E, shore, ichthyocide, 15 May 1965: *Callinectes pallidus, Epixanthus hellerii, Eurypanopeus blanchardi, Grapsus grapsus, Pachygrapsus transversus, Percnon gibbesi, Xanthodius denticulatus, Xanthodius inaequalis inaequalis*

259. Cameroon. 03°53′N, 08°53′E to 03°51′N, 08°54′E, 59 m, mud and broken shell, 10′ OT, 16 May 1965: *Calappa pelii, Inachus angolensis, Macropipus rugosus, Macropodia gilsoni, Pseudomyra mbizi, Raninoides bouvieri*

260. Cameroon. 03°45′N, 09°05′E to 03°43′N, 09°10′E, 46 m, 10′ OT, 16 May 1965: *Atlantotlos rhombifer, Calappa pelii, Calypsachaeus calypso, Ilia spinosa, Inachus nanus, Macropipus rugosus, Macropodia gilsoni, Medorippe lanata, Parthenope notialis, Raninoides bouvieri*

271. Annobon. 01°25′S, 05°38′E, NE coast between Punta Yoyo and Punta Pedrinha, shore, ichthyocide, 19 May 1965: *Acanthonyx minor, Grapsus grapsus, Nanocassiope melanodactyla, Pachygrapsus transversus, Percnon gibbesi, Plagusia depressa, Sirpus gordonae, Xanthodius denticulatus, Xanthodius inaequalis inaequalis*

273. Annobon. 01°24′S, 05°37′E, N coast, near Islote Pirámide, shore, ichthyocide, 19 May 1965: *Acanthonyx minor, Domecia acanthophora africana, Grapsus grapsus, Ocypode cursor, Pachygrapsus transversus, Plagusia depressa*

275. Annobon. 01°24′S, 05°37′E to 01°24′S, 05°38′E, 9–69 m, rubble of coralline algae, dredge, 20 May 1965: *Cataleptodius floridanus, Cronius ruber, Dynomene filholi, Euryozius pagalu, Globopilumnus stridulans, Herbstia nitida, Nanocassiope melanodactyla, Nanopilumnus boletifer, Paractaea margaritaria, Paractaea rufopunctata africana, Pisa calva, Ranilia constricta, Stenorhynchus lanceolatus, Xanthodius denticulatus*

278. Annobon. 01°24′S, 05°37′E, shore [collection made in transit to Crater Lake], 20 May 1965: *Ocypode cursor*

281. Annobon. 01°24′S, 05°37′E, shore, ichthyocide, 20 May 1965: *Callinectes marginatus, Grapsus grapsus, Ocypode cursor*

282. Annobon. 01°28′S, 05°36′–37′E to 01°29′S, 05°36′E, 18–37 m, nodular coralline algae, dredge, 21 May 1965: *Domecia acanthophora africana, Dynomene filholi, Euryozius pagalu, Globopilumnus stridulans, Glyptoxanthus angolensis, Herbstia nitida, Microcassiope rufopunctata, Nanocassiope melanodactyla, Paractaea margaritaria, Paractaea rufopunctata africana, Pisa calva*

283. Annobon. 01°29′S, 05°35′E, 51–55 m, nodular coralline algae, dredge, 21 May 1965: *Dynomene filholi, Ebalia tuberculata, Euryozius pagalu, Herbstia nitida, Homola barbata, Nanocassiope melanodactyla, Paractaea margaritaria, Parthenope expansa, Parthenope massena, Pilumnus stebbingi, Pisa calva*

284. Annobon. 01°30′S, 05°36′E, 73 m, black basaltic rocks, dredge, 21 May 1965: *Nanocassiope melanodactyla, Pilumnus stebbingi, Sakaila africana*

316. Nigeria. Lagos, 06°28′N, 03°23′E, shore, sand beach, ichthyocide, 28 May 1965: *Ocypode cursor, Pachygrapsus transversus*

Geronimo Collections

Collections made by National Marine Fisheries Service vessel *Geronimo* off Gabon in 1963.

179. Off Gabon River, 00°02.2′S, 08°50.2′E, 161 fm (293 m), 31 Aug 1963: *Acanthocarpus brevispinis, Bathynectes piperitus, Carcinoplax barnardi*

185. 00°32′S, 08°42′E, 110 fm (200 m), 1 Sep 1963: *Pseudomyra mbizi*

187. 00°32′S, 08°40′E, 165 fm (300 m), 1 Sep 1963: *Pseudomyra mbizi*

191. 01°28′S, 08°24.5′E, 165 fm (300 m), 3 Sep 1963: *Bathynectes piperitus, Geryon maritae*

197. 01°30′S, 08°27.5′E, 110 fm (200 m), Sep 1963: *Macropodia macrocheles*

198. 01°28′S, 08°24.5′E, 165 fm (300 m), 3 Sep 1963: *Acanthocarpus brevispinis, Bathynectes piperitus, Carcinoplax barnardi, Geryon maritae*

199. 01°26.4′S, 08°24′E, 220 fm (400 m), 3 Sep 1963: *Bathynectes piperitus*

202. 02°00′S, 08°55′E, 55 fm (100 m), 4 Sep 1963: *Acanthocarpus brevispinis, Macropipus rugosus*

203. 02°01′S, 08°50.5′E, 110 fm (200 m), 4 Sep 1963: *Acanthocarpus brevispinis, Bathynectes piperitus, Carcinoplax barnardi, Geryon maritae*

206. 02°00′S, 08°46.5′E, 250–335 fm (455–610 m), 4 Sep 1963: *Bathynectes piperitus*

211. 02°32′S, 09°05′E, 55 fm (100 m), 5 Sep 1963: *Atelecyclus rotundatus, Euchirograpsus liguricus, Macropipus rugosus, Pseudomedaeus africanus*

212. 02°30′S, 08°58′E, 110 fm (200 m), 5 Sep 1963: *Calappa pelii*

213. 02°31′S, 08°51′E, 165 fm (300 m), 5 Sep 1963: *Bathynectes piperitus, Macropipus rugosus*

214. 02°30′S, 08°52′E, 300 fm (546 m), 5 Sep 1963: *Bathynectes piperitus*
220. 03°02′S, 09°21′E, 165 fm (300 m), 6 Sep 1963: *Bathynectes piperitus*
228. 03°31′S, 09°53′E, 165 fm (300 m), 7 Sep 1963: *Macropipus rugosus*
235. 04°01′S, 10°35′E, 55 fm (100 m), 8 Sep 1963: *Calappa pelii*, *Macropodia gilsoni*, *Parthenope notialis*, *Sakaila africana*
247. 04°38.4′S, 11°01.2′E, 220 fm (400 m), 9 Sep 1963: *Bathynectes piperitus*

Undaunted Collections

Collections made by National Marine Fisheries Service vessel *Undaunted* off Angola and South-West Africa (below 17°15′S) in 1968.

94. 16°27′S, 11°35′E, 90 m, 18 Mar 1968: *Goneplax rhomboides*, *Inachus angolensis*, *Macropipus australis*
95. 16°37′S, 11°22′E, 126 m, 18 Mar 1968: *Calappa pelii*, *Goneplax rhomboides*, *Macropipus australis*, *Macropodia gilsoni*, *Macropodia spinulosa*, *Parthenope notialis*
96. 16°41′S, 11°21′E, 162 m, 18 Mar 1968: *Calappa pelii*, *Eurynome aspera*, *Inachus angolensis*, *Inachus grallator*, *Macropipus australis*, *Parthenope notialis*, *Pisa armata*, *Solenolambrus noordendei*
102. 17°02′S, 11°40′E, 54 m, 24 Mar 1968: *Calappa pelii*, *Medorippe lanata*
103. 17°06′S, 11°35′E, 90 m, 24 Mar 1968: *Calappa pelii*, *Inachus angolensis*, *Macropipus australis*, *Medorippe lanata*, *Pseudomyra mbizi*
104. 17°09′S, 11°30′E, 126 m, 24 Mar 1968: *Macropipus australis*
105. 17°13′S, 11°27′E, 155 m, 24 Mar 1968: *Macropipus australis*
106. 17°18′S, 11°24′E, 225 m, 24 March 1968: *Euchirograpsus liguricus*, *Macropipus australis*, *Monodaeus couchii*
107. 17°23′S, 11°20′E, 359 m, 24 Mar 1968: *Euchirograpsus liguricus*, *Geryon maritae*
111. 10°36′S, 13°12′E, ca 366 m, 12 Apr 1968: *Bathynectes piperitus*

Appendix II: Gazetteer

Localities from the literature or from specimen-associated data cited in the species accounts are listed here, alphabetically by country, along with coordinates. Spellings and coordinates are from gazetteers of the United States Board on Geographic Names. Alternate spellings and coordinates from sources other than those gazetteers are given in brackets. Localities that we have not been able to locate are identified in the text by a question-mark in brackets, [?], and are cross-referenced in this gazetteer by species name. Specific localities identified in the text as "near" another locality (e.g., Boulbinet, near Conakry) or as in another locality, (e.g., Samba, Luanda) are not listed separately here if they could not be located in the Board on Geographic Names gazetteers. Localities in the literature or from specimen labels originally accompanied by coordinates are not repeated here; in the list, coordinates added by us are set off in brackets. We have anglicized country names but not names for localities within countries. We have used older names for two of the offshore islands of the Gulf of Guinea, now part of Equatorial Guinea: Annobon, instead of Pagalu, and Fernando Poo, instead of Macias Nguema Biyogo.

Other sources, which have been helpful in identifying West African localities either by listing coordinates or by giving maps, include: Forest and Gantès, 1960 (Morocco); Guinot and Ribeiro, 1962 (Cape Verde Islands, Angola); Longhurst, 1958 (Sierra Leone and Guinea Shelf); Rathbun, 1921 (a list of West African localities, mostly in the Congo and Zaire); Rossignol, 1962 (localities between Nigeria and southern Angola); Sourie, 1954a (Senegal, especially around Dakar); and Türkay, 1976b (Madeira).

Angola	
Baía do Ambriz	07°50′S, 13°06′E
Baía de Ambrizete	07°13′S, 12°51′E
Baía de Benguela	12°35′S, 13°21′E
Baía da Caota, Benguela	12°36′S, 13°16′E
Baía dos Elefantes	13°13′S, 12°44′E
Baía Farta, Benguela	12°36′S, 13°13′E
Baía do Lobito	12°20′S, 13°34′E
Baía de Luanda	08°47′S, 13°16′E
Baía de Moçâmedes	15°10′S, 12°08′E
Baía de Porto Amboim	10°42′S, 13°45′E
Baía de Santa Marta	13°51′S, 12°28′E
Baía dos Tigres	16°38′S, 11°46′E
Baía das Vacas [Ponta das Vacas]	12°37′S, 13°14′E
Benguela	12°35′S, 13°25′E
Cacuaco	08°47′S, 13°22′E
Chiloango	05°12′S, 12°08′E
Egito Praia	11°59′S, 13°46′E
Ilha de Luanda	08°48′S, 13°13′E
Luanda [St. Paul do Loanda]	08°48′S, 13°14′E
Lucira	13°51′S, 12°31′E
Moçâmedes	15°10′S, 12°09′E
Morro da Cruz	08°57′S, 13°04′E
Musserra [Mussera, Massera]	07°29′S, 12°58′E
Mussulo Grande	08°11′S, 13°17′E
Ponta da Caruíta	12°35′S, 13°16′E
Ponta da Moita Seca	06°07′S, 12°16′E
Ponta do Morro [Cap Morro?]	10°45′S, 13°43′E
Ponta de São José	12°36′S, 13°12′E
Ponta do Sombreiro	12°35′S, 13°18′E
Porto Alexandre	15°49′S, 11°53′E
Porto Amboim	10°44′S, 13°44′E
Praia Amélia, Moçâmedes	15°12′S, 12°06′E
Praia das Conchas, Moçâmedes	15°07′S, 12°07′E
Quicembo [Kinsembo]	07°44′S, 13°03′E
Rio Chiloango	05°12′S, 12°07′E
Rio Cuanza	09°19′S, 13°08′E
Rio Cunene [Kunene River]	17°20′S, 11°50′E
Santo António do Zaire [San António, Saint-Antoine]	06°07′S, 12°18′E

Annobon [Pagalu, Equatorial Guinea]	01°25′S, 05°36′E
Isla Tortuga	01°24′S, 05°38′E
Islote Pirámide	01°24′S, 05°37′E
Punta Pedrinha	[01°24′35″S, 05°37′25″E]
Punta Yoyo	[01°24′45″S, 05°37′35″E]
San Antonio	01°27′S, 05°37′E
Santa Cruz	01°27′S, 05°37′E
Ascension Island	07°57′S, 14°22′W
Azores	38°30′N, 28°00′W
Ilha do Corvo	39°42′N, 31°06′W
Ilha do Faial [Fayal]	38°34′N, 28°42′W
Almoxarife. See *Acanthonyx brevifrons*	
Caldeirinhas [Caldeira Inferno]	38°30′N, 28°37′W
Feteira	38°31′N, 28°41′W
Horta	38°32′N, 28°38′W
Pasteleiro	38°31′N, 28°38′W
Ilha das Flores	39°26′N, 31°13′W
Ilha da Muda. See *Dromia marmorea*	
Ilha do Pico	38°28′N, 28°20′W
Madalena	38°32′N, 28°32′W
Ilha de São Miguel	37°47′N, 25°30′W
Caloura	37°42′N, 25°30′W
Ponta Delgada	37°44′N, 25°40′W
Ponta da Galera	37°42′N, 25°31′W
Ilha Terceira	38°43′N, 27°13′W
Ponta São Diego. See *Dromia marmorea*	
Ilhéu da Praia	39°03′N, 27°57′W
Rochas dos Capelinhos [Volcano Capelinhos]	38°36′N, 28°50′W
Cabinda	
Cabinda	05°33′S, 12°12′E
Chinchoxo [Tschintschotscho, Quinchoxo]	[05°09.24′S, 12°03.75′E]
Landana	05°13′S, 12°08′E
Quila [River]	05°58′S, 14°47′E
Cameroon	
Batanga	[ca 02°54′N, 09°55′E]
Bibundi	04°13′N, 08°59′E
Douala	04°03′N, 09°42′E
Kribi	02°57′N, 09°55′E
Souellaba [Souelaba]	03°49′N, 09°33′E
Wouri River	04°06′N, 09°43′E
Yaoundé	03°52′N, 11°31′E
Canary Islands	28°00′N, 15°30′W
Estrecho de la Bocaina	28°47′N, 13°50′W
Isla de Fuertaventura	28°20′N, 14°00′W
Puerto Cabras	28°29′N, 13°51′W
Punta Morro Jable [Ponta da Matorra, Punta del Mattorral]	28°02′N, 14°20′W
Isla de la Gomera	28°06′N, 17°08′W
Isla de Gran Canaria	28°00′N, 15°36′W
Isla de Lanzarote	29°00′N, 13°40′W
Arrecife	28°57′N, 13°32′W
Playa Quemada	28°54′N, 13°43′W
Isla de La Palma	28°40′N, 17°52′W
Santa Cruz de La Palma	28°41′N, 17°45′W
Isla de Tenerife	28°19′N, 16°34′W
Ensenada de Cristianos	28°02′N, 16°42′W
Playa de los Abrigos	28°01′N, 16°35′W
Puerto de la Cruz	28°24′N, 16°33′W
Puerto de Orotava	28°46′N, 17°45′W
Cape Verde Islands	16°00′N, 24°00′W
Baixo João Leitão	15°48′N, 23°11′W
Boa Vista, Ilha da	16°05′N, 22°50′W
Ilhéu de Sal Rei	16°10′N, 22°56′W
Ponta Rodrigo	16°12′N, 22°43′W
Porto de Sal Rei	16°10′N, 22°56′W
Ribeira do Rabil	16°09′N, 22°59′W
Branco, Ilhéu	16°39′N, 24°41′W
Brava, Ilha	14°52′N, 24°43′W
Baía de Fajã di Agua [Porto da Fajã]	14°52′N, 24°45′W
Ponta Garbeiro. See *Domecia acanthophora africana*	
Porto da Furna	14°53′N, 24°41′W
Fogo, Ilha do	14°55′N, 24°25′W
Ponta da Areia	14°53′N, 24°31′W
Ilhéu Luis Carneiro	14°58′N, 24°40′W
Maio, Ilha de	15°15′N, 23°10′W
Porto Inglês	15°08′N, 23°13′W
Sal, Ilha do	16°45′N, 22°55′W
Baía da Murdeira [Mordeira]	16°41′N, 22°57′W
Pedra Lume	16°46′N, 22°54′W
Santo Antão, Ilha de	17°05′N, 25°10′W
Baía do Monte Trigo	17°01′N, 25°20′W
Ponta do Esbarradeiro	16°55′N, 25°14′W
Ponta da Praia Formosa	16°55′N, 25°13′W
Ponta do Sol	17°12′N, 25°06′W
Porto dos Carvoeiros [Baio do Porto Novo]	17°02′N, 25°04′W
Santa Luzia, Ilha de	16°46′N, 24°45′W
São Nicolau, Ilha de	16°35′N, 24°15′W
Tarrafal	16°34′N, 24°22′W
São Tiago, Ilha de [Santiago]	15°05′N, 23°40′W
Baía de Santa Clara	15°01′N, 23°45′W
Porto da Praia [La Praya, Praia]	14°54′N, 23°31′W
Porto de São Francisco	14°58′N, 23°28′W
Tarrafal	15°17′N, 23°46′W
São Vicente, Ilha de	16°50′N, 25°00′W

Baía da Fateixa	16°52′N, 25°04′W
Baía das Gatas	16°12′N, 22°43′W
Ilhéu Raso	16°37′N, 24°36′W
Ponta da Calheta [Baía de Calheta]	16°47′N, 24°58′W
Porto Grande	16°53′N, 25°01′W
Praia da Matiota [Baía da Matiota]	16°53′N, 25°00′W
Conception Bank	29°30′N, 12°45′W
Congo	
Bahua, See *Cardisoma armatum*	
Baie de Loango	04°36′S, 11°44′E
Baie de Pointe-Noire	04°47′S, 11°51′E
Banga [Banda]	04°34′S, 12°23′E
Djeno	04°55′S, 11°57′E
Loango	04°39′S, 11°48′E
Loya River	04°49′S, 12°52′E
Pointe Indienne	04°40′S, 11°47′E
Pointe Kounda	04°11′S, 11°23′E
Pointe-Noire	04°48′S, 11°51′E
Songololo River [Songolo River]	04°45′S, 11°51′E
Dahomey	
Cotonou	06°21′N, 02°26′E
Grand-Popo	06°17′N, 01°50′E
Lac Nokoué	06°26′N, 02°27′E
Zogbo, NW of Cotonou on Lac Nokoué	[06°24′N, 02°25′E]
Fernando Poo [Macias Nguema Biyogo, Equatorial Guinea]	03°30′N, 08°42′E
Mongola	03°46′N, 08°44′E
San Carlos	03°27′N, 08°33′E
Gabon	
Baie du Cap Lopez	00°40′S, 08°50′E
Barre des Portugais	01°16′S, 09°00′E
Cap Lopez	00°37′S, 08°43′E
Cap Santa Clara [Pointe Santa Clara]	00°30′N, 09°19′E
Crique Banjia [Banya]	00°14′N, 09°40′E
Ivindo River	00°09′S, 12°09′E
Libreville	00°23′N, 09°27′E
Mayumba [Mayoumba]	03°25′S, 10°39′E
Nyanga	02°59′S, 10°17′E
Ogooué [stream]	00°49′S, 09°00′E
Owendo	00°17′N, 09°30′E
Pointe Banda	03°46′S, 11°00′E
Pointe Claire	01°08′S, 09°26′E
Pointe Gombé	00°18′N, 09°18′E
Pointe Panga	03°15′S, 10°32′E
Port-Gentil	00°43′S, 08°47′E
Sette Cama	02°32′S, 09°45′E
Gambia	
Bathurst	13°27′N, 16°35′W
Gambia River	13°28′N, 16°34′W
Gunjur	13°11′N, 16°46′W
Ghana	
Accra	05°33′N, 00°13′W
Ada	05°46′N, 00°37′E
Angaw Lagoon	05°48′N, 00°47′E
Ankobra River [Ancobra]	04°53′N, 02°17′W
Apam	05°17′N, 00°44′W
Axim	04°52′N, 02°14′W
Baya River	[05°05′N, 01°22′W]
Butre [Boutry, Butry]	04°49′N, 01°55′W
Chorkor, near Accra	[05°33′N, 00°15′W]
Christiansborg	05°33′N, 00°11′W
Densu	05°31′N, 00°19′W
Denu	06°05′N, 01°08′E
Dixcove	04°48′N, 01°57′W
Elmina [St. George d'Elmina]	05°05′N, 01°21′W
Hwini River	04°53′N, 01°47′W
Komenda	05°03′N, 01°29′W
Kumasi	06°41′N, 01°37′W
Labadi	05°33′N, 00°09′W
Ningo	06°03′N, 00°11′W
Prampram	05°42′N, 00°07′E
Sakumo Lagoon	05°31′N, 00°19′W
Sekondi	04°56′N, 01°42′W
Shama Bay	05°00′N, 01°36′W
Takoradi	04°53′N, 01°45′W
Tema harbor	05°38′N, 00°01′E
Tenkpobo [Tenpobo]	05°43′N, 00°08′W
Teshi [Teshie]	05°35′N, 00°06′W
Volta River delta	05°55′N, 01°00′E
Winneba	05°20′N, 00°37′W
Guinea	
Conakry	09°31′N, 13°43′W
Fotoba	09°30′N, 13°48′W
Île Blanche	09°26′N, 13°46′W
Île de Corail	09°26′N, 13°49′W
Île Kassa [Cassa]	09°29′N, 13°45′W
Îles de Los	09°30′N, 13°48′W
Île Marara	10°02′N, 14°02′W
Île Roume	09°28′N, 13°48′W
Île Tamara	09°29′N, 13°49′W
Matakong	09°16′N, 13°25′W
Rio Pongo	10°03′N, 14°04′W
Tanéné	10°03′N, 13°54′W
Guinea-Bissau [Portuguese Guinea]	
Arquipélago dos Bijagós [Bissagos Islands]	11°15′N, 16°05′W
Bissau	11°51′N, 15°35′W
Ilha de Bissau	11°52′N, 15°46′W
Ilha de Bubaque	11°15′N, 15°52′W
Ilha Caravela	11°32′N, 16°20′W
Ilha de Rubane [Rouban]	11°20′N, 15°49′W

Ilha de Sogá [Sojá]	11°21′N, 15°52′W
Ivory Coast	
Fresco	05°05′N, 05°34′W
Grand-Bassam	05°12′N, 03°44′W
Grand-Lahou	05°08′N, 05°01′W
Jacqueville	05°12′N, 04°25′W
Lagune Ébrié	05°14′N, 04°26′W
Port-Bouët	05°15′N, 03°58′W
San-Pedro	04°44′N, 06°37′W
Sassandra	04°57′N, 06°05′W
Tabou	04°24′N, 07°21′W
Vridi	05°15′N, 04°02′W
Josephine Seamount	36°52′N, 14°20′W
La Chapelle Bank [Banc de la Chapelle]	47°37′N, 07°18′W
Liberia	
Bromley. See *Sesarma (Chiromantes) buettikoferi*	
Bushrod Island	06°21′N, 10°47′W
Cape Mesurado	06°19′N, 10°49′W
Farmington River	06°08′N, 10°22′W
Grand Cape Mount, near Robertsport	[06°44′N, 11°24′W]
Harbel [Habel]	06°16′N, 10°21′W
Junk River	06°09′N, 10°23′W
Lake Piso [Fisherman's Lake]	06°45′N, 11°16′W
Mesurado River	06°20′N, 10°48′W
Monrovia	06°19′N, 10°48′W
Robertsport	06°45′N, 11°22′W
St. Paul River	06°23′N, 10°48′W
Upper Buchanan	05°56′N, 10°04′W
Madeira Islands	32°44′N, 17°00′W
Água de Pena	32°42′N, 16°46′W
Canical	32°44′N, 16°44′W
Enseada da Abra	32°44′N, 16°42′W
Funchal	32°38′N, 16°54′W
Ilha de Porto Santo	33°04′N, 16°20′W
Ilhas Desertas	32°30′N, 16°30′W
Deserta Grande	32°30′N, 16°30′W
Ilhéu do Bugio	32°26′N, 16°29′W
Ilhéu do Gorgulho	32°37′N, 16°56′W
Machico Bay	32°42′N, 16°46′W
Ponta da Garajau	32°38′N, 16°51′W
Ponta da Oliveira	32°38′N, 16°50′W
Ponta dos Reis Magos	32°38′N, 16°49′W
Ponta de São Lourenço	32°44′N, 16°41′W
Prainha. See *Portunus hastatus*	
Ribeira Brava	32°39′N, 17°04′W
Mauritania	
Baie de Cansado	20°53′N, 17°01′W
Baie de l'Ouest [on Cap Blanc peninsula]	[ca. 20°47′N, 19°24′W]
Baie du Repos	20°55′N, 17°02′W
Baie de Saint-Jean	19°27′N, 16°22′W
Banc d'Arguin	20°10′N, 16°45′W
Bilaouakh. See *Eurypanopeus blanchardi*	
Cansado	20°51′N, 17°02′W
Cap Blanc	20°46′N, 17°03′W
Cap Timiris	19°23′N, 16°32′W
Nouakchott	18°06′N, 15°57′W
Pointe de Cansado	20°51′N, 17°02′W
Portendick [Portendic]	18°35′N, 16°07′W
Port-Étienne	20°54′N, 17°04′W
Tamzak [Tamxat]	17°26′N, 16°02′W
Morocco	
Agadir	30°24′N, 09°36′W
Asilah [Arzila]	35°28′N, 06°02′W
Banc de Spartel [off Cap Spartel]	[ca. 35°54′N, 06°14′W]
Cap Drâa [Cap Noun]	28°44′N, 11°05′W
Cap Juby	27°57′N, 12°55′W
Cap Rhir [Cap Ghir]	30°38′N, 09°54′W
Cap Spartel	35°48′N, 05°56′W
David	[33°50′N, 07°07′W]
El Hank. See *Pachygrapsus transversus*	
Essaouira	31°31′N, 09°46′W
Fosse de Rabat	[ca. 34°N, 07°W]
Foum Agouitir [Puerto-Cansado]	28°04′N, 12°14′W
Foum Assaka	29°08′N, 10°24′W
Larache	35°12′N, 06°09′W
Lucien Saint. See *Percnon gibbesi*	
Mannesman	[33°37′N, 07°33′W]
Oued Bou Regreg	34°03′N, 06°50′W
Oued Cherrat	33°50′N, 07°07′W
Plage David	[33°50′N, 07°07′W]
Pointe d'El Hank	33°37′N, 07°40′W
Rabat	34°02′N, 06°50′W
Sidi Bou Knadel [Boukknadel]	34°08′N, 06°44′W
Sidi Moussa	32°53′N, 08°51′W
Skhirat	33°52′N, 07°03′W
Tangier	35°48′N, 05°48′W
Temara	33°55′N, 06°55′W
Temara—plage	33°56′N, 06°58′W
Tillet [?Tillelt]. See *Acanthonyx lunulatus*	
Nigeria	
Adu River	07°38′N, 10°05′E
Ajudaibo	[05°34.5′N, 05°11.75′E]
Bonny River	04°23′N, 07°06′E
Brass	04°19′N, 06°14′E
Forcados	05°22′N, 05°26′E

Lagos	06°27′N, 03°23′E
Ogudu River [creek]	06°34′N, 03°24′E
Port Harcourt	04°46′N, 07°01′E
Tarkwa Bay	06°24′N, 03°24′E
Victoria Beach	06°25′N, 03°24′E
Yaba	06°32′N, 03°23′E
Princesse Alice Bank	38°00′N, 29°15′W
Principe, Ilha do	01°37′N, 07°25′E
Baía das Agulhas	01°37′N, 07°21′E
Baía de Santo António	01°39′N, 07°27′E
Ilhéu Caroço	01°31′N, 07°26′E
Ilhéu Santana [Sta. Ana]	01°40′N, 07°27′E
Ilhéus dos Mosteiros	01°41′N, 07°29′E
Morro de Praia Grande	01°41′N, 07°27′E
Ponta Capitão	01°40′N, 07°28′E
Ponta da Mina	01°39′N, 07°26′E
Ponta Novo Destino	01°39′N, 07°26′E
Ponta do Pico Negro	01°32′N, 07°24′E
Ponta da Praia Salgada	01°39′N, 07°27′E
Praia Pequena	01°38′N, 07°27′E
Rio Papagaio	01°39′N, 07°25′E
Santana	01°40′N, 07°26′E
Santo António	01°39′N, 07°26′E
Tinhosa Grande [Hermano Grande]	01°21′N, 07°18′E
Rio Muni [Equatorial Guinea]	
Cabo San Juan	01°10′N, 09°21′E
Corisco Bay	00°55′N, 09°25′E
Isla de Corisco	00°55′N, 09°19′E
Islas de Elobey	00°59′N, 09°30′E
Rio Muni mouth	01°01′N, 09°36′E
Saint Helena	15°57′S, 05°42′W
James Bay	15°55′S, 05°43′W
Ruperts Bay	15°55′S, 05°43′W
São Tomé, Ilha de	00°12′N, 06°39′E
Angra de São João dos Angolares	00°07′N, 06°39′E
Baía do Almoxarife	00°17′N, 06°45′E
Baía de Ana de Chaves	00°21′N, 06°44′E
Baía de Iógoiógo	00°02′N, 06°33′E
Baía de São Miguel	00°08′N, 06°30′E
Bindá	00°13′N, 06°28′E
Ilhéu das Cabras	00°24′N, 06°43′E
Ilhéu Gago Coutinho [Ilhéu das Rolas]	00°01′S, 06°32′E
Ilhéu Macaco [îlot dos Cocos]	00°06′N, 06°31′E
Ilhéu de Sant'Ana	00°15′N, 06°46′E
Morro Peixe	00°24′N, 06°39′E
Oquedelrei	00°22′N, 06°44′E
Ponta Diogo Nunes	00°23′N, 06°43′E
Ponta Diogo Vaz	00°19′N, 06°30′E
Ponta Furada	00°15′N, 06°28′E
Ponta de São Sebastião	00°21′N, 06°44′E
Praia das Conchas	00°24′N, 06°37′E
Praia de Fernão Dias	00°25′N, 06°41′E
Praia Lagarto	00°22′N, 06°43′E
Praia Melão	00°19′N, 06°45′E
Praia Pantufo	00°19′N, 06°45′E
Praia de Santa Catarina	00°16′N, 06°29′E
Ribeira Peixe	00°05′N, 06°37′E
Sant'Ana	00°16′N, 06°45′E
Seine Seamount [Banc de la Seine]	33°45′N, 14°25′W
Senegal	
Anse Bernard	14°40′N, 17°26′W
Anse de Hann	14°43′N, 17°25′W
Baie de Dakar	14°41′N, 17°25′W
Baie de Gorée	14°40′N, 17°20′W
Bakoy [?=Bako or Bakor River]	14°00′N, 15°16′W
	12°55′N, 14°44′W
Baling [?=Bafing]	14°23′N, 16°57′W
Banc du Séminole	14°36′N, 17°28′W
Bargny Gouddou	14°42′N, 17°14′W
Bel-Air	14°42′N, 17°25′W
Cambérène	14°46′N, 17°26′W
Cap Manuel	14°39′N, 17°26′W
Cap Vert	14°43′N, 17°28′W
Casamance River	12°33′N, 16°46′W
Dakar	14°40′N, 17°26′W
Falémé	14°46′N, 12°14′W
Falémé River. See *Callinectes amnicola*	
Fosse de Kayar [Cayar]	14°57′N, 17°14′W
Gorée	14°40′N, 17°24′W
Île de Gorée	14°40′N, 17°24′W
Île de la Madeleine	14°39′N, 17°28′W
Joal	14°10′N, 16°51′W
Lac de Nguèr [N'Guer]	14°52′N, 14°53′W
Lagoba. See *Dromia monodi*	
Leybar	15°58′N, 16°30′W
Mbao	14°44′N, 17°19′W
Mboro	15°09′N, 16°54′W
Mbour	14°24′N, 16°58′W
Ngaparou	14°28′N, 17°04′W
Ngazobil	14°12′N, 16°52′W
Ngor	14°45′N, 17°31′W
Pointe des Almadies [?Les Almadies]	14°45′N, 17°32′W
Pointe de Sangomar	13°50′N, 16°46′W
Pointe Thionk	12°40′N, 16°40′W
Presqu'île du Cap Vert	14°43′N, 17°28′W
Rosso	16°30′N, 15°49′W
Rtombo. See *Cardisoma armatum*	
Rufisque	14°43′N, 17°17′W
Saint-Louis	16°02′N, 16°30′W
Saloum	13°50′N, 16°45′W

Sénégal River	15°48′N, 16°32′W
Soumb-Dioun	[14°41′N, 17°28′W]
Thiaroye-sur-Mer [Tiaroye]	14°44′N, 17°23′W
Sierra Leone	
Aberdeen	08°30′N, 13°17′W
Bullom Shore	[08°34′N, 13°12′W]
Cline Bay [Kline]	08°29′N, 13°12′W
Freetown	08°30′N, 13°15′W
Great Scarcies River	08°55′N, 13°08′W
Kissy	08°28′N, 13°12′W
Murray Town	08°30′N, 13°16′W
Robene Point	[08°29′N, 13°06′W]
Rokupr	08°40′N, 12°23′W
Sierra Leone River	08°30′N, 13°15′W
Spanish Sahara	
Angra da Cintra (Bay)	23°00′N, 16°15′W
Cabo Barbas	22°18′N, 16°41′W
Cabo Blanco	20°46′N, 17°03′W
Cabo Bojador	26°08′N, 14°30′W
Cabo Corbeiro [Corveiro]	21°48′N, 16°58′W
Islote Virginia	22°09′N, 16°50′W
Médano de Aaiún	27°07′N, 13°25′W
Morro Garnet [Cabo Garnet]	24°45′N, 14°55′W
Pulpito Bay [?Buen Jardin]	[24°41′N, 14°51′W]
Villa Cisneros	23°42′N, 15°56′W
Togo	
Lomé	06°08′N, 01°13′E
Zaire	
Banana	06°01′S, 12°24′E
Boma	05°51′S, 13°03′E
Congo River	06°04′S, 12°24′E
Île de Mateba	05°54′S, 12°50′E
Katala	05°58′S, 12°44′E
Kunga	[ca. 05°55′S, 12°35′E]
Maléla	05°59′S, 12°37′E
Moanda	[05°55′S, 12°25′E]
Shiloango River [Loango R. (Congo), Chiloango R. (Angola)]	05°12′S, 12°07′E
Tumuna. See *Sesarma (Chiromantes) angolense*	
Vista	05°52′S, 12°17′E
Zambi	[ca. 05°52′S, 12°50′E]

Addendum

After this manuscript went to the printer, Mr. C. B. Powell forwarded to us representatives of what proved to be a fourth new genus and species of camptandriine crab from West Africa; it is described here. This species raises the number of East Atlantic Ocypodidae to six genera and seven species; six of the species occur off tropical West Africa.

Genus *Lillyanella*, new genus

TYPE-SPECIES.—*Lillyanella plumipes*, new species.

ETYMOLOGY.—The name *Lillyanella* is chosen in recognition of the important contribution to the present study made by Lilly King Manning, to whom we are indebted for preparation of the illustrations. Gender is feminine.

DIAGNOSIS.—A genus of Camptandriinae. Carapace slightly convex, subhexagonal, broader than long, widest in the middle. Regions poorly indicated, surface even, with sparse, scattered, very short, stiff, dark pubescence; in posterolateral part some small granules. Front wide, anterior margin broadly truncate, slightly sinuous. Epigastric lobes barely visible. H-shaped groove distinct.

Anterolateral margins with two large and one or more small to very small teeth far behind outer orbital angle. Posterior margins of the orbits slightly curved, almost in one line, outer half somewhat granular.

Cornea well developed, slightly narrower than eyestalk. Antennules obliquely folded. Antennae short, flagellum consisting of a single segment with a long apical seta. Lower orbital margin distinct, with several distinct denticles and granules. Suborbital ridge and pterygostomian region with granules.

Epistome deeply concave with raised anterior and posterior margins. Third maxilliped not filling oral field. Merus slightly longer than ischium and partly covering exopod; anteromedian part of merus with quadrangular excision. Anterior margin of ischium oblique.

Chelipeds equal. Those of adult male much larger and more robust than those of female, and with molariform tooth on dactylus. Walking legs short and robust. Merus with dorsal row of teeth, of which distal and subdistal large, the following smaller but still distinct; lower surface of merus with teeth or tubercles. The other segments without teeth or denticles, some with a few granules. All legs covered with dense short dark pubescence, especially dorsally. Propodus of third leg of adult male with conspicuous tuft of long soft hairs.

Male abdomen elongate triangular, only slightly constricted at fifth somite, but entirely covering the pleopods; second to fourth somites of male abdomen fused. First somite not wider than second and failing to reach the coxae of the fifth pereiopods. Male gonopods strongly recurved, slightly swollen apically with some distinct recurved spines.

REMARKS.—*Lillyanella* differs from all other genera of Camptandriinae in the shape and armament of the ambulatory legs. In this respect it resembles the genus *Leipocten* most closely, in which the meri likewise have spines on the lower surface. However, in *Leipocten* the large distal and subdistal dorsal teeth of the merus are absent, and the other segments of the legs are different.

Lillyanella plumipes, new species

FIGURE 88

MATERIAL EXAMINED.—*Pillsbury Material:* None. *Other Material:* Nigeria: New Calabar River at Choba bridge, 04° 54′N, 06°54′E, intertidal zone, boundary of freshwater and oligohaline area, under bark of large sticks, 5 February 1980, C. B. Powell, 1♂ holotype (L), 8♂, 9♀ ov, 4 non-ovigerous ♀, 1 juv, paratypes (L); 7♂, 16♀ (8 ov), 3 juv, paratypes(W).

DESCRIPTION.—Carapace subhexagonal to al-

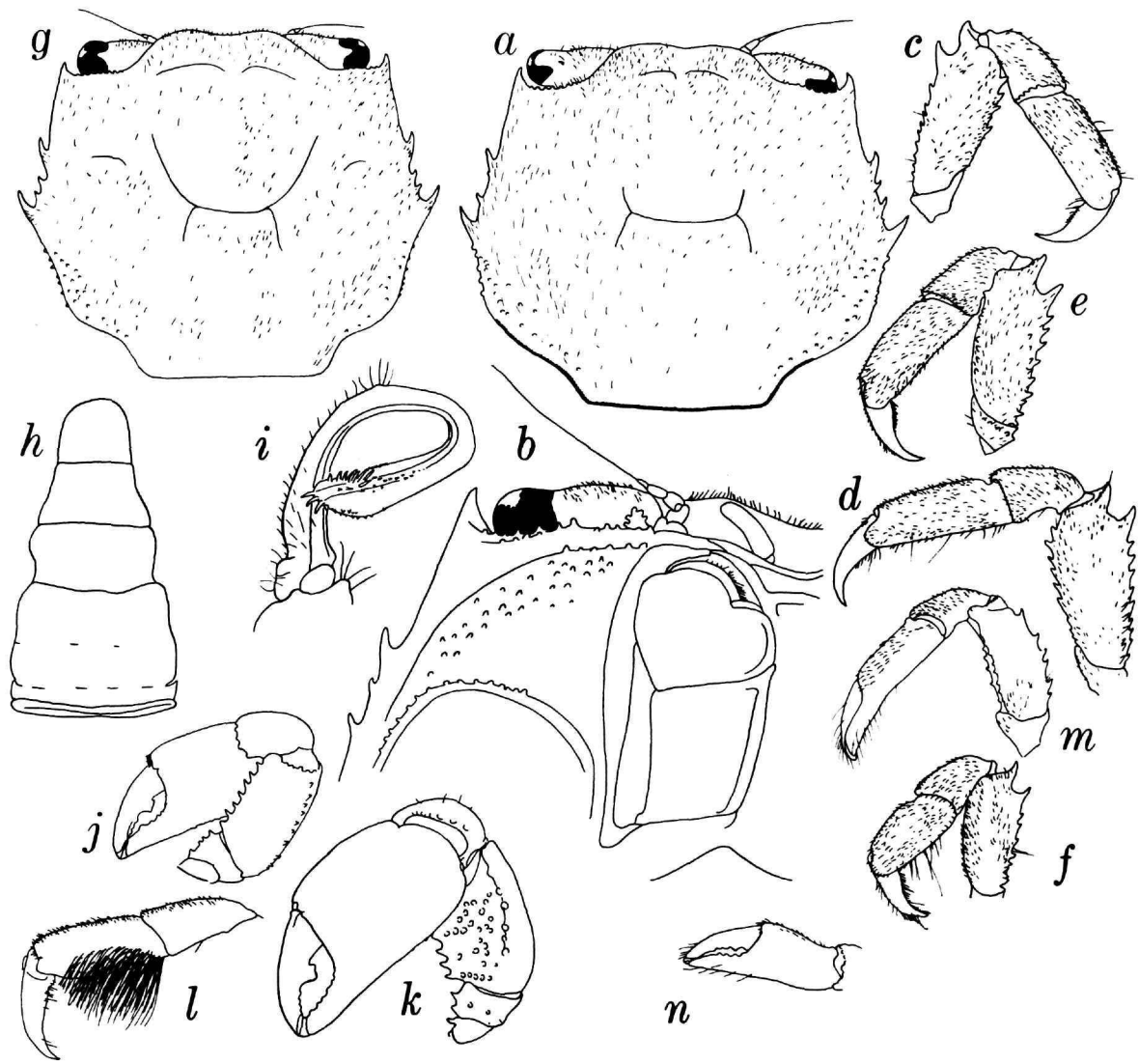

FIGURE 88.—*Lillyanella plumipes*, new genus, new species. Ovigerous female: *a*, carapace, dorsal view; *b*, pterygostomian region, orbit, and third maxilliped, ventral view; *c*, second leg, *d*, third leg; *e*, fourth leg; *f*, fifth leg. Male: *g*, carapace, dorsal view; *h*, abdomen; *i*, first pleopod. Smaller male: *j*, first leg. Male holotype: *k*, first leg, *l*, propodus and dactylus of third leg. Non-ovigerous female: *m*, first leg; *n*, chela.

most quadrangular, somewhat (about 1.2 times) broader than long. Surface slightly convex but even, without conspicuous elevations. H-shaped groove distinct, but not very deep. Epigastric lobes low and inconspicuous. Posterior half of anterolateral margin with two large teeth, between which 1 to 3 very small. Outer orbital angle sharp, about as large as the larger anterolateral teeth. Posterolateral margins with several small granules. Posterior margin almost straight, about as wide as the base of front. Front wide and not very prominent, anterior margin broad and somewhat sinuous: slightly concave in the middle, slightly convex laterally; anterolateral angle widely rounded; lateral margin evenly merging, under a broad curve, with the posterior orbital margin. Posterior orbital margins almost straight, the two lying in a practically single line; no incisions on this margin, but granules are present in its greater part. Dorsal surface of carapace with a sparse pubescence of short, stiff, curved, black hairs. The posterolateral portions of carapace sparsely granulated.

Eyes almost filling the orbits, with the cornea well developed, rounded, slightly narrower than the eyestalk. Eyestalk with short, curved, stiff, dark hairs on anterior surface. Lower margin of orbit with distinct denticles and granules over its full length, and with a denticulated process near the base of the antenna. A short suborbital row of granules below outer half of orbit. Pterygostomian region granulate.

Antennules covered by front, folding obliquely. Antennae short, entering orbit, the latter widely open at base. Antennal flagellum consisting of a single segment with a very long apical seta.

Epistome wide, deeply concave, with anterior and posterior margins elevated.

Third maxillipeds not filling oral cavity. Merus rectangularly excavated anteromedially; outer anterior angle broadly rounded. Ischium longer than merus, inner anterior angle somewhat produced forward. Exopod at base about 1/3 as wide as ischium; distal part, including multi-articulated flagellum, hidden behind merus.

First pereiopods equal left and right, in adult males much larger and more robust than in females. Fingers of adult male cheliped somewhat shorter than palm, curved and gaping, tips ending in horn-colored hoofs; cutting edges with small denticles, in addition to which a large molar-like tooth in the dactylus. Palm in adult males almost as high as long. Surface of palm and fingers smooth, except for some minute granules on lower surface of palm. Carpus short, cup-shaped, upper anterior margin with tubercles. Merus about twice as long as carpus, but still short and robust; lower surface with granulae, both inner and outer lower margin with a longitudinal row of teeth; also dorsal margin with a row of teeth; upper part of anterior margin granulate. Ischium short, lower margin with teeth. First leg of female more slender than that of male, palm more than twice as long as high; fingers as long as palm, slightly gaping with denticles along cutting edge, but no molariform tooth, tips of fingers hooved; rest of leg as in male, but more slender.

First three walking legs of about the same size, the third leg (P3) slightly longer than the other two; the fifth leg shortest of all legs. Dactylus of walking legs simple with sharp, curved tip; about 3/4 of length of propodus. Propodus two to three times as long as high (relatively longest in third leg), unarmed. Carpus short, about as long as dactylus, narrowing proximally, upper anterior margin sometimes with granules. Merus with dorsal margin ending in a large distal tooth and a subdistal tooth of about same size. Behind subdistal tooth a longitudinal row of up to 10 rather small but quite distinct teeth. Lower surface of merus with teeth or tubercles. Sometimes tubercles on outer surface near upper or lower margin. In adult males propodus of third pereiopod with a conspicuous large brush of very long soft hairs. In all specimens a distinct pubescence of short, curved, stiff, dark hairs on all segments of the legs, especially dorsally; here and there a few longer and softer hairs may be present.

Female abdomen wide, reaching the coxae of the pereiopods; all segments free; distal segment widely triangular with broadly rounded slightly protruding top.

Male abdomen elongate triangular. First som-

ite about as wide as second, failing to reach coxae of fifth pereiopods. Second, third, and fourth somites fused; indentation in lateral margin marking separation between second and third somites. Second somite very short, only slightly longer than first. Third and fourth somites of the same length, about twice as long as second and as wide; fourth segment narrowing slightly distally. Fifth and sixth somites free. Fifth longer than fourth, constricted in the basal half, but not strongly enough to expose the gonopods. Sixth somite about as long as fifth, narrowing distally. Seventh somite as long as sixth, but much narrower, broadly rounded at apex.

Male gonopod with the recurved shape characteristic of Camptandriinae, narrowing distally, but widening slightly just before the tip. Apex broadly rounded, provided with three large spines; inner part of widened subapical portion with a group of recurved spines; further numerous very small spinules in distal part of gonopod. Second pleopod of male very small, L-shaped.

MEASUREMENTS.—In the adult male holotype cl is 4.2, cb 5.2 mm. The carapace width in the ovigerous females is 4.3 to 6.3 mm, in the non-ovigerous females 4.0 to 6.5 mm, in the males 3.7 to 6.5 mm, and in the juveniles 1.3 to 4.5 mm. The eggs are about 0.2 mm in diameter.

REMARKS.—*Lillyanella plumipes* differs from all other West African Camptandriinae by the presence of a row of teeth on the dorsal margin of the merus of the walking legs, and by having teeth or tubercles on the lower surface of that segment. Also the peculiar brush of long setae on the propodus of the third leg of the adult males is quite characteristic. In the presence of anterolateral teeth on the carapace, *Lillyanella* differs from *Ecphantor* and resembles the two other West African genera. The wide and broadly truncated front it has in common with *Telmatothrix*; in *Calabarium* the front is produced in two broadly triangular teeth separated by a V-shaped incision. The gonopods also are different from those of the other genera.

TYPE-LOCALITY.—New Calabar River, slightly NW of Port Harcourt at Choba bridge, Nigeria, 4°54′N 6°54′E.

DISPOSITION OF TYPES.—The holotype male (Crust. D 32752) is placed in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden. The paratypes are in the same museum and in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

ETYMOLOGY.—The name *plumipes* is inspired by the presence of a brush of long hairs on the propodus of the third leg of adult males.

BIOLOGY.—The site at which the species was collected was described by Mr. Powell (in litt., 5 February 1980) as follows:

> Its proper habitat is under the bark of dead tree branches etc., in the intertidal zone. The same site has *Telmatothrix* (common or abundant), *Calabarium*, *Sesarma buettikoferi* (abundant) and juveniles of *S. angolense* and *S. alberti*. The main vegetation is *Pandanus* and freshwater swamp trees, with the aquatic *Crinum* (subtidal) and *Nymphaea* (intertidal); a few specimens of *Rhizophora* occur, but these are small individuals which probably will not flower—there is no mature *Rhizophora* within sight of the bridge. The two other invertebrates occurring under the bark of the same branches are *Potamalpheops monodi* (Sollaud) (Alpheidae) and the large burrowing and filter-feeding mayfly nymph *Povilla*. The site is slightly beyond the upstream limit of isopods, amphipods and snails and bivalves. The New Calabar River is a soft-water river, lacking a freshwater mollusc fauna. Once I did find a single specimen of the oligohaline (?) snail *Potamopyrgus ciliatus* (Gould) at the collecting site, but have not been able to find any more. Occasionally the small and very thin specimen of the polychaete *Namalycastis* is found; also a red nemertean. The shrimps present are *Potamalpheops monodi* (Sollaud), an undescribed species of *Potamalpheops*, juveniles of *Macrobrachium felicinum* Holthuis (uncommon), *M. vollenhovenii* (Herklots), *M. macrobrachion* (Herklots) (most common) and *Caridina*, but no *Palaemonetes*.

Mr. Powell remarked that the species "has the same distinctive odor as does *Telmatothrix*, when preserved in formalin. Also it sheds its legs much more readily than any other crab I've met."

Ovigerous females were collected in February.

DISTRIBUTION.—Known only from the type locality.

Addendum to Key

Our key to the genera of Camptandriinae (p. 193) can be altered to include this additional new genus by substituting the following two couplets for couplet 8 and changing couplets 9–11 to 10–12.

8. Merus of pereiopods with blunt spines or teeth on lower (flexor) surface 9
   Merus of pereiopods without ventral spines or teeth 10
9. Upper margin of merus of pereiopods granular, without large distal or subdistal teeth; lower margin of propodus of these legs ending in a tooth. Carapace granular all over, without large anterolateral teeth ..... ***Leipocten***
   Upper margin of merus of pereiopods ending in a large distal tooth and a subdistal tooth of the same size; lower margin of propodus without a distal tooth. Carapace smooth for the larger part, only granular in the posterolateral area; anterolateral margin with 2 large and some small teeth ..... ***Lillyanella***, new genus

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names proposed in it are given precedence over those published in the previous paper (H. Milne Edwards, 1853). Apart from the fact that H. Milne Edwards in his 1853 paper cited the pages of his 1854 paper, we cannot find any evidence that the latter was published earlier than indicated both on the volume and on the reprint. H. Milne Edwards in 1853 may have had page proofs of the article that was published in 1854 and cited page numbers from those proofs.]

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