West African Brachyuran Crabs (Crustacea: Decapoda)

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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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Contents

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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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R. W. Ingle, British Museum (Natural History), London, and J. Forest, Muséum national d'Histoire naturelle, Paris, provided working space on several occasions; Ingle also read and commented on part of the manuscript. H. Zibrowius, Station Marine d'Endoume, Marseille, and H.-E. Gruner, Zoologisches Museum, Berlin, sent material to us. C. B. Powell, University of Port Harcourt, Nigeria, collected and donated specimens to the Rijksmuseum van Natuurlijke Historie, Leiden and the National Museum of Natural History, Smithsonian Institution, Washington, D. C.

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.

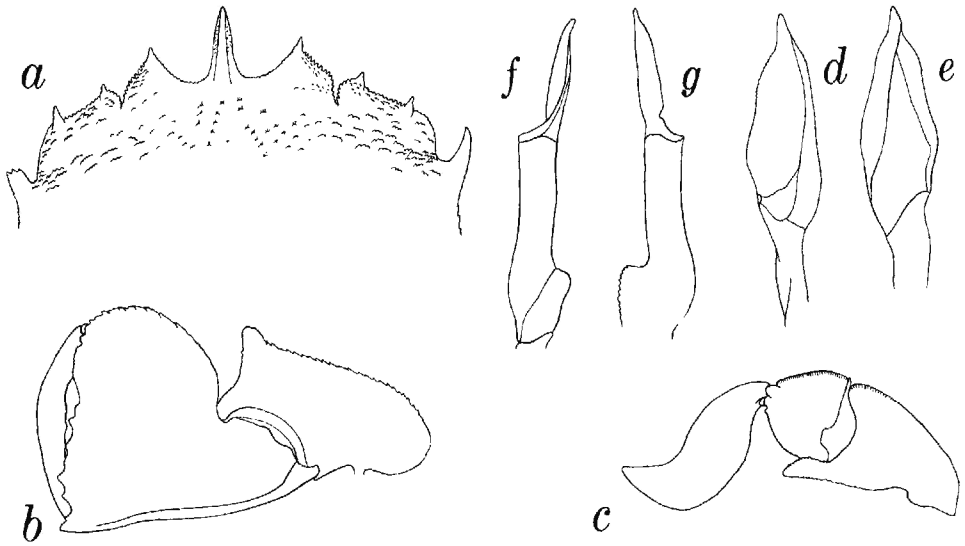

FIGURE 1.—*Ranilia constricta* (A. Milne Edwards), male cl ca. 15 mm, *Pillsbury* Sta 275: *a*, front; *b*, cheliped; *c*, fourth pereiopod; *d*, *e*, first pleopod of male; *f*, *g*, second pleopod of male.

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.

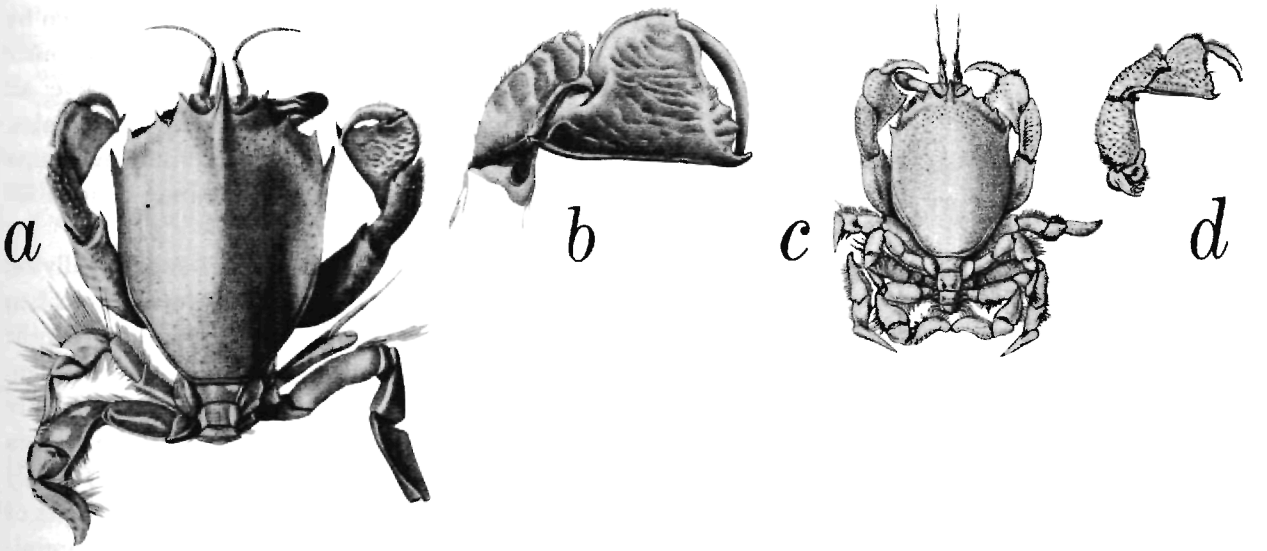

FIGURE 2.—*Ranilia constricta* (A. Milne Edwards): *a*, dorsal view (from A. Milne Edwards and Bouvier, 1923, pl. 3: fig. 2); *b*, cheliped (from A. Milne Edwards and Bouvier, 1923, pl. 1: fig. 11); *c*, dorsal view; *d*, cheliped (from Studer, 1883, pl. 1: fig. 5a,b).

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.*