

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

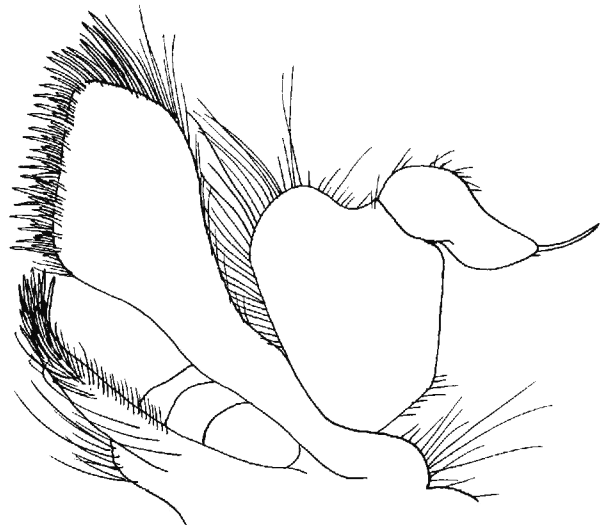


FIGURE 26.—Maxillule of *Geryon maritae*, new species, paratype, female, cb 59.5 mm, Pillsbury Sta 51.

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 alternately 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 pereopod (first walking leg). Lower posterior margin of dactylus of second pereopod with row of closely placed short hairs over proximal two-thirds. Third pereopod with

few scattered tufts of hairs on dactylus, tufts completely absent on fourth and fifth pereopods.

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.

Pereopods 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 pereopod row of hairs visible along either margin of flattened area, rows interrupted on third and fourth pereopods, scarcely discernible on fifth pereopod.

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 pereopods 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 pereopod 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 eingeschlos-

senen 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 auf finden." 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% 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.

DOMOECINAE Ortmann, 1893b:429, 478.

ZOZYMOIDA Alcock, 1898:77, 94.

EUXANTHOIDA Alcock, 1898:77, 109.

HALIMEDOIDA Alcock, 1898:77, 134.

ACTAEINAE Alcock, 1898:78, 137.

XANTHODIIDA Alcock, 1898:78, 156.

CYMOIDA Alcock, 1898:78, 172.

PSEUDOZOIIDA Alcock, 1898:176, 180.

RUPPELLIIDA Alcock, 1898:176, 186.

HETEROPANOPIOIDA Alcock, 1898:177, 207.

MELIIDA 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* Poëppig,

1836, by monotypy; gender: masculine; name 347 on *Official List*.

Rhithropanopeus Rathbun (1898:273). Type-species: *Pilumnus harrisi* 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
<i>Menippe nodifrons</i>	<i>Menippe nodifrons</i>
<i>Globopilumnus africanus</i>	<i>Globopilumnus africanus</i>
<i>Globopilumnus stridulans</i>	<i>Globopilumnus stridulans</i> *
<i>Epixanthus helleri</i>	<i>Epixanthus hellerii</i> *
<i>Pseudozius bouvieri</i>	<i>Euryozius bouvieri</i>
	<i>Euryozius pagalu</i> , new species*
<i>Pilumnus stebbingi</i>	<i>Pilumnus stebbingi</i> *
<i>Pilumnus perrieri</i>	<i>Pilumnus perrieri</i> *
<i>Pilumnus inermis</i>	<i>Pilumnus inermis</i>
<i>Pilumnus spinifer</i>	<i>Pilumnus spinifer</i>
<i>Parapilumnus pisifer</i>	<i>Leopoldius pisifer</i> *
<i>Parapilumnus boletifer</i>	<i>Nanopilumnus boletifer</i> *
<i>Heteropanope (Heteropanope) tuberculidens</i>	<i>Heteropanope tuberculidens</i>
<i>Heteropanope (Pilumnopeus) caparti</i>	<i>Pilumnopeus caparti</i>
<i>Heteropanope (Pilumnopeus) africana</i>	<i>Pilumnopeus africanus</i> *
<i>Domecia hispida</i>	<i>Domecia acanthophora africana</i> *
<i>Xantho (Xantho) incisa</i>	<i>Xantho incisus</i>
<i>Xantho (Xantho) pilipes</i>	<i>Xantho pilipes</i>
<i>Xantho (Xantho) sexdentata</i>	<i>Xantho sexdentatus</i>
<i>Xantho (Xantho) denticulata</i>	<i>Xanthodius denticulatus</i> *
<i>Xantho (Leptodius) inaequalis punctata</i>	<i>Xanthodius inaequalis inaequalis</i> *
<i>Xantho (Leptodius) inaequalis convexa</i>	<i>Xanthodius inaequalis faba</i>
<i>Xantho (Leptodius) floridana</i>	<i>Cataleptodius floridanus</i> *
<i>Actaea (Actaea) rufopunctata</i>	<i>Paractaea rufopunctata africana</i> *
	<i>Paractaea monodi</i>
<i>Actaea (Actaea) margaritaria</i>	<i>Paractaea margaritaria</i> *
<i>Actaea (Glyptoxanthus) angolensis</i>	<i>Glyptoxanthus angolensis</i> *

<i>Actaea (Glyptoxanthus) cavernosa</i>	<i>Glyptoxanthus cavernosus</i>
<i>Actaea (Glyptoxanthus) corrosa</i>	<i>Glyptoxanthus corrosus</i>
<i>Platypodia picta</i>	<i>Platypodiella picta</i>
<i>Cycloxanthops occidentalis</i>	<i>Cycloxanthops occidentalis</i>
<i>Paraxanthias eriphioides</i>	<i>Paraxanthias eriphioides</i>
<i>Medaeus africanus</i>	<i>Pseudomedaeus africanus</i> *
<i>Medaeus couchi</i>	<i>Monodaeus couchii</i>
<i>Medaeus (?) rouxi</i>	<i>Monodaeus rouxi</i> *
<i>Micropanope rufopunctata</i>	<i>Microcassiope minor</i> *
<i>Micropanope parvula</i>	<i>Coralliope parvula</i>
<i>Micropanope melanodactyla</i>	<i>Nanocassiope melanodactyla</i> *
<i>Panopeus africanus</i>	<i>Panopeus africanus</i> *
<i>Panopeus parvulus</i>	<i>Eurypanopeus blanchardi</i> *
<i>Panopeus sp.</i>	<i>Panopeus africanus</i> *

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 (Poëppig, 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 accommodate 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 petite 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 ambulatories 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; Iógoiôgo (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).

Príncipe: Tinhosa Grande (as Hermano Grande) island, 12 mi [19 km] SSW of Príncipe, 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. Poinard, 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 Carçoço, 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; Iógoiôgo; 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].—Türkyay, 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 bowieri* 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 bowieri* (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 *bowieri* 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. bowieri*, 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. bowieri* (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 27a

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].

Pseudorzius 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 pereopods 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 gegrifferten 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 Capelinhos [= Rochas dos Capelinhos], 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.

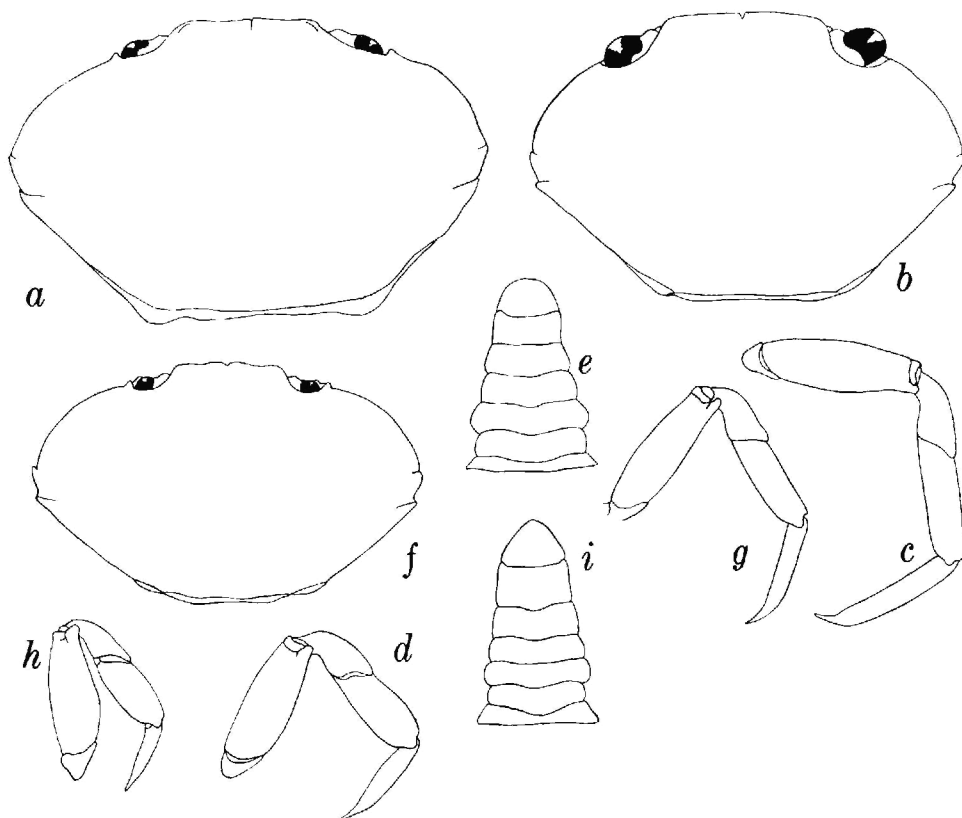


FIGURE 27.—Atlantic species of *Euryozius*. *Euryozius bowieri* (A. Milne Edwards), dry syntype, cl 7.4 mm: *a*, carapace. *Euryozius pagalu*, new species, paratype, male, cl 9.0 mm, Pillsbury Sta 275: *b*, carapace; *c*, second pereiopod; *d*, fifth pereiopod; *e*, abdomen. *Euryozius sanguineus* (Linnaeus), 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

Pseudozium Bowieri.—Balss, 1921:63 [not *Xantho bowieri* A. Milne Edwards, 1869].

Pseudozium caystrus.—Capart, 1951:19 [error for *bowieri*] [not *Panopeus caystrus* Adams and White, 1848].

Pseudozium bowieri.—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].

Euryozium bowieri.—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,

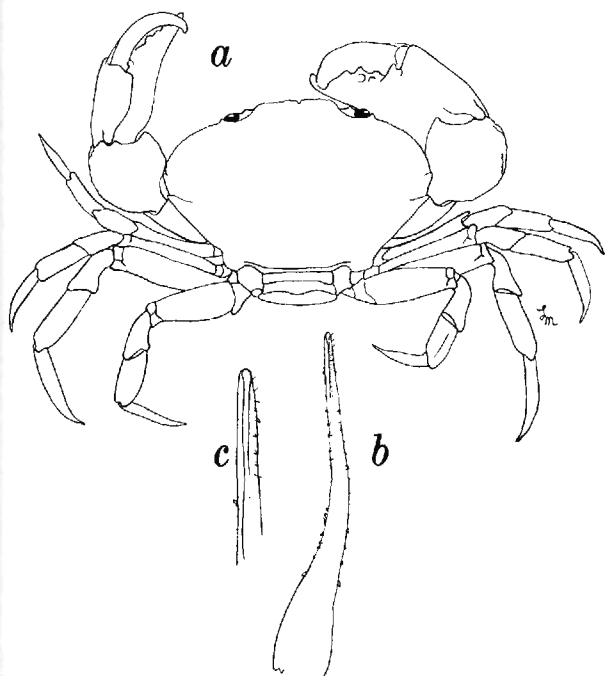


FIGURE 28.—*Euryozius pagalu*, new species, paratypes. Female, cb 13.5 mm, Pillsbury Sta 282: *a*, dorsal view. Male, cb 14.4 mm, Pillsbury Sta 275: *b*, gonopod; *c*, apex of gonopod.

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 (1968*c*, 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 pereopods 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 (1968*c*) figured a male, 9.7 × 14.5 mm, from the *Calypso* collection.

REMARKS.—Specimens from different geographic areas identified with *Euryozius bowieri* in the past have exhibited an order of magnitude difference in size. For example, a syntype of *Xantho bowieri* 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, 1968*c*). 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, pereopod length and color, suggested to us that the species now known as *E. bowieri* actually might consist of a complex of species. *Euryozius bowieri* 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. bowieri* 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 bowieri*, the front is comparatively quite broad and is produced into two transverse or sinuous lobes.

In his original account of *Xantho bowieri* from the Cape Verde Islands, A. Milne Edwards (1869: 378) remarked that in his specimens the fourth pereopods 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 bowieri* 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 bowieri*, 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 pereopods 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 bowieri* 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 bowieri* 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. bowieri* 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 27f-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 pereopod 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 pereopods 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 pereopods 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, $01^{\circ}24'S$, $05^{\circ}37'E$ to $01^{\circ}24'S$, $05^{\circ}38'E$, 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 (Rosignol, 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 29b

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 material 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 29b) does appear to be less oval in shape than that of *E. abbreviatus* (Figure 29a) 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 $5 \times 7\frac{2}{3}$ 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

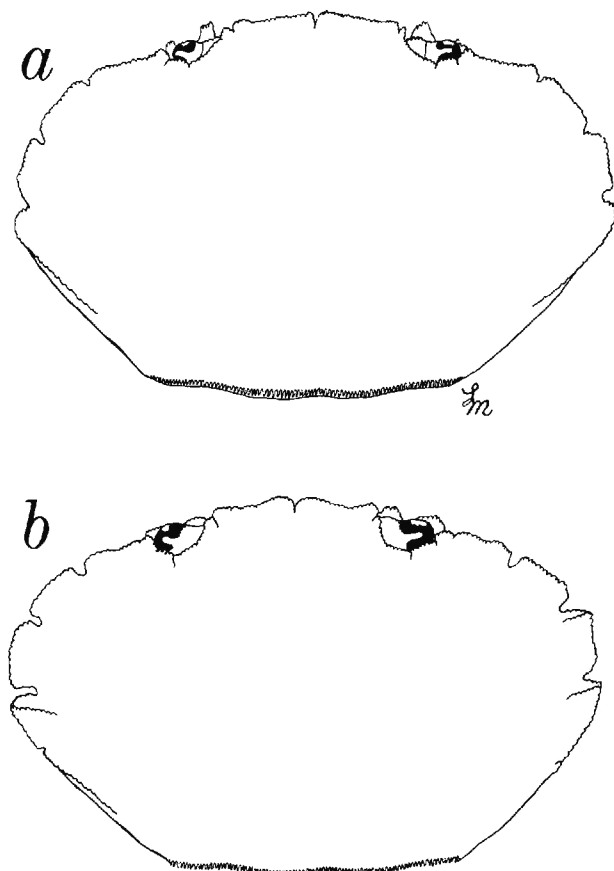


FIGURE 29.—Carapaces: *a*, *Eurypanopeus abbreviatus* (Stimpson), male, cb 20.0 mm, Brazil; *b*, *Eurypanopeus blanchardi* (A. Milne Edwards), male, cb 19.1 mm, Pillsbury Sta 257.

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 (Ushakov, 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).

Príncipe: 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].—Türkyay, 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); Türkyay, 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)) (Türkyay, 1976b).

Cape Verde Islands: Matiota, São Vicente (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Príncipe: Ilhéu Caroço (as ilot 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 ilot 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: Príncipe: 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. Poinard, 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 Príncipe, 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).

Príncipe: 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 Príncipe, 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).