

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

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

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

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

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

**BIOLOGY.**—The depth at which this species occurs is usually indicated as sublittoral to about 100 m (Bouvier, 1940:200; Monod, 1956:92). The depth of 952-1038 m off Morocco given by Türkay (1976a) is far in excess of the depths at which

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

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

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

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

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

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

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

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

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

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

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

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

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jac-

queville, and off Grand-Bassam, 15[25?]-100 m (Le Loeuff and Intès, 1968).

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

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

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

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

### Genus *Phyllodorippe*, new genus

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

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

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

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

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

FIGURE 4i-l

?*Dromia* Pechüel-Loesche, 1882:288.

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

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

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

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

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

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

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

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

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

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

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

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

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

**DESCRIPTION.**—Capart, 1951:33.

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

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

*Color*: Some color persisted in one of our speci-

mens from Nigeria. The second and third pereopods are ornamented with red tubercles and the propodi of these legs are banded red and white.

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

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

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

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

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

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

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

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

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

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

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

Crosnier (1964) found this species on mud or sandy mud off Cameroon and characterized it as

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Subfamily ETHUSINAE Guinot, 1977

### Genus *Ethusa* Roux, 1830

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

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

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

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

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

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

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

DESCRIPTION.—Capart, 1951:28.

Figure: Capart, 1951, fig. 5.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Abdomen of 7 somites in female.

*Figures*: Monod, 1956, figs. 99–101.

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

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

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

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

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

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

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

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

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

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

**\* *Ethusa vossi*, new species**

FIGURES 5, 6a-c, 7a,b

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

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

*Ethusa*.—Voss, 1966:19.

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

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

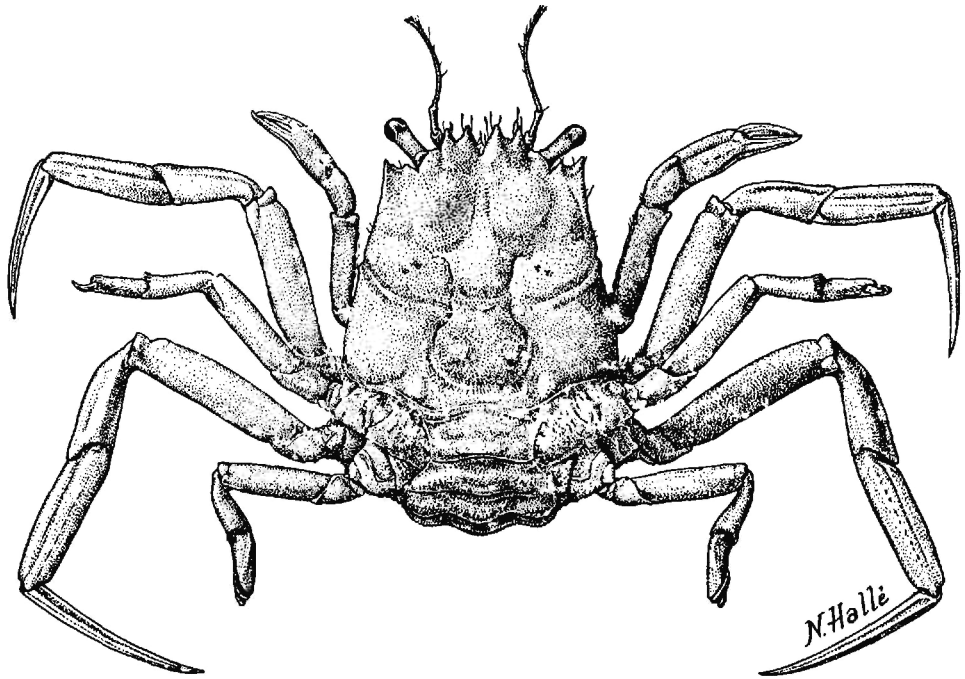


FIGURE 5.—*Ethusa vossi*, new species, dorsal view (from Monod, 1956, fig. 90).

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

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

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

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

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

as long as and narrower than ischium, with angular antero-internal projection; both segments with 2 shallow, longitudinal grooves.

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

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

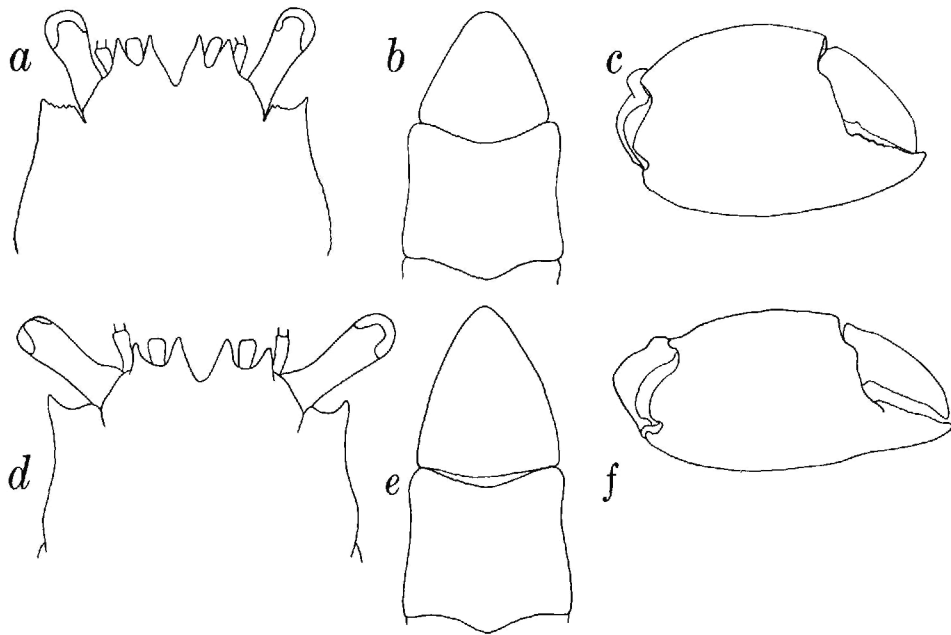


FIGURE 6.—*Ethusa vossi*, new species, male paratype, cl 9 mm, Pillsbury Sta 248: *a*, dorsal view; *b*, terminal two somites of abdomen; *c*, palm of chela. *Ethusa mascarone* (Herbst), male, cl 10 mm, Naples: *d*, dorsal view; *e*, terminal two somites of abdomen; *f*, palm of chela.

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

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

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

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

**REMARKS.**—*Ethusa vossi* closely resembles *E. mascarone* (Herbst) from the Mediterranean and adjacent Atlantic; this new species had been identified with *E. mascarone* in the past, but it differs in several important respects. In *E. vossi* the terminal somite of the male abdomen is shorter than the penultimate somite (Figure 6*b*), whereas in *E. mascarone* the terminal somite is the longer (Figure 6*e*). The male first pleopod of *E. vossi* (Figure 7*a,b*) has an enlarged apex with a subapical patch of

spinules; in *E. mascarone* the male pleopod tapers evenly to its apex (Figure 7*c,d*). The right chela of the male is inflated in both species, but in *E. vossi* the longitudinal grooves on the outer face of the chela become more prominent with increasing size; in *E. mascarone* the upper groove is shallower and the lower groove almost disappears in larger specimens. In both sexes the posterior margin of

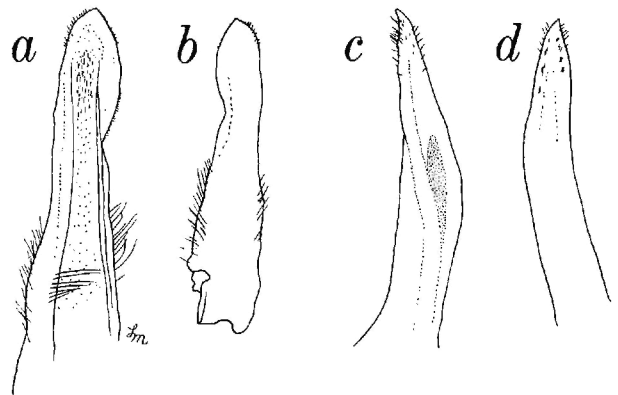


FIGURE 7.—First pleopods: *a,b*, *Ethusa vossi*, new species, holotype, male, cl 8 mm, Pillsbury Sta 248; *c,d*, *Ethusa mascarone* (Herbst), male, cl 10 mm, Naples.



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

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

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

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

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

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

**BIOLOGY.**—This species has been recorded from depths between 6 and 96 m, but 80% of the records are from depths of less than 45 m, and somewhat more than half from between 30 and 45 m. The bottoms on which the species has been found have been described as mud with shells (Miers, 1881a); coarse shelly sand, bottom with *Arca* and *Pyura* (Sourie, 1954b); partly shelly and partly muddy and shelly sand (Longhurst, 1958); mud and shells, mud, calcareous algae and shells,

algae and calcareous algae, gravel, shells and Foraminifera, and mud, calcareous algae and shells (all Forest and Guinot, 1966). The *Pillsbury* specimens were taken on bottoms with *Jullienella* (Sta 46, 47) (Voss, 1966), broken shell (Sta 68), and branched Foraminifera (Sta 70). It seems, therefore, that the species prefers a muddy bottom on which solid particles (shells, Foraminifera, etc.) occur.

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

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

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

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

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

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

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

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

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

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

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

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

### Genus *Ethusina* Smith, 1884

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

Key to Eastern Atlantic Species of *Ethusina*

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

*Ethusina alba* (Filhol, 1884)FIGURES 8, 9*d*, 10

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

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

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

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

*Other Material*: North Atlantic: Azores to France, 42°15'N, 23°37'W (of Paris, = 21°17'W of Greenwich), 3975 m, to 42°19'N, 23°36'W (of Paris, = 21°16'W of Greenwich), 4060 m, soft white mud, *Talisman* Sta 133, 134, 24 Aug 1883, 1♂, (holotype) 1♀ (L,W).

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

antenna short, not extending to front. Antennal flagellum elongate, extending to posterior third of carapace. Ventral surface of body less granular but more pubescent than dorsal.

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

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

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

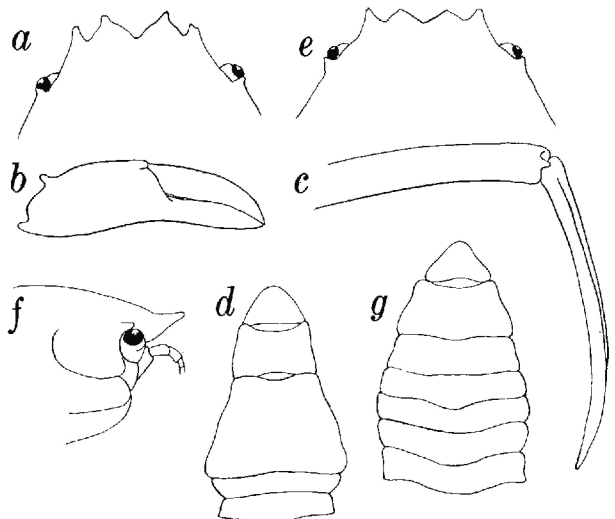


FIGURE 8.—*Ethusina alba* (Filhol). Male, cl 10.4 mm, North Atlantic: *a*, front, dorsal view; *b*, chela; *c*, propodus and dactylus of third pereopod, posterior view; *d*, abdomen. Female, cl 9.3 mm, North Atlantic: *e*, front, dorsal view; *f*, front, lateral view; *g*, abdomen.

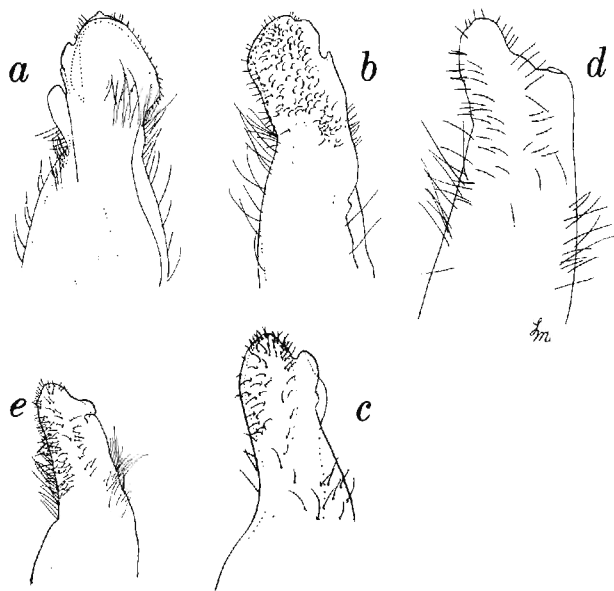


FIGURE 9.—Male pleopods: *a*, *Ethusina benima*, new species, holotype, cl 14.0 mm, Pillsbury Sta 18; *b*, *Ethusina robusta* (Miers), cl 13.9 mm, Galapagos Islands; *c*, *Ethusina talismani* A. Milne Edwards and Bouvier, syntype, carapace broken, Morocco; *d*, *Ethusina alba* (Filhol), cl 10.4 mm, North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

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

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

*Male Pleopod*: Illustrated in Figure 9*d*.

*Color*: “Céphalothorax bleuâtre sur le vivant, avec une légère teinte violacée; pattes et abdomen d’un blanc jaunâtre, avec les doigts de couleur rose” (A. Milne Edwards and Bouvier, 1900:30). Bouvier (1922:53) noted that material from the Cape Verde Islands was “jaune d’ocre pâle avec

les doigts et les antennules roses” and that in material collected earlier by the *Talisman* the carapace was “uniformément bleuâtre.” The color of this species has been illustrated by A. Milne Edwards and Bouvier (1900, pl. 1: fig. 6) and Bouvier (1922, pl. 2: fig. 1).

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

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



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

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

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

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

Apart from the fact that the species has eyes, the only information on it provided by Filhol is that it was taken by the *Talisman* at 5000 m (Filhol, 1884:199, 232; 1885b:129) or "entre quatre et cinq mille mètres" (Filhol, 1884:230). A. Milne Edwards and Bouvier (1900) in their account of the *Talisman* and *Travailleur* Brachyura, listed the following Ethusinae collected by the *Talisman*: *Ethusa mascarone* (Herbst) in 38 and 60

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

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

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

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

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

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

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

BIOLOGY.—*Ethusina alba*, like *E. abyssicola*, is a

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

Ovigerous females have not been recorded.

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

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

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

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

### \* *Ethusina beninia*, new species

FIGURES 9*a*, 11

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

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

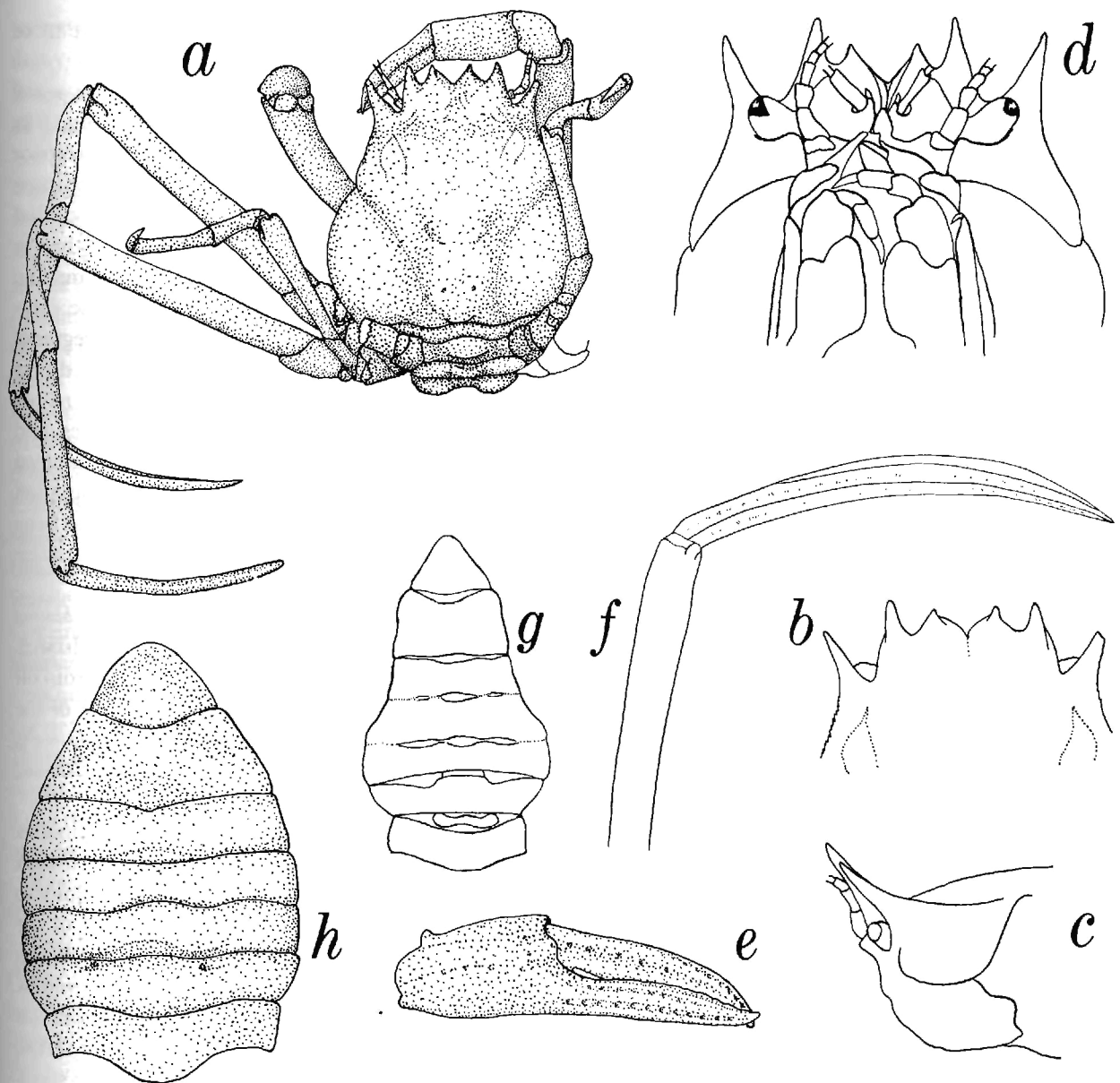


FIGURE 11.—*Ethusina beninia*, new species. Holotype, male, cl 14.0 mm, Pillsbury Sta 18: *a*, dorsal view; *b*, front, dorsal view; *c*, front, lateral view; *g*, abdomen. Paratype, female, cl 16.1 mm, Pillsbury Sta 18: *d*, front, ventral view; *e*, chela; *f*, dactylus of third pereiopod; *h*, abdomen.

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

elongate, extending to posterior fourth of carapace. Ventral surface of body more granular than dorsal.

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

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

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

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

Abdomen with 7 somites in female, 5 in male.

*Male Pleopod:* Illustrated in Figure 9*a*.

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

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

eastern Pacific population may well prove to be a distinct species.

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

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

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

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

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

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

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

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

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

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

DISTRIBUTION.—This species is known only

from the Bight of Benin, off Ghana, at 05°01'N, 00°12'E and 03°53'N, 02°33'W.

### Family CALAPPIDAE de Haan, 1833

CALAPPIDEA de Haan, 1833:ix [corrected to Calappidae by White, 1847a:44; name 371 on *Official List*].

MATUTOIDEA de Haan, 1835:36.

ORITHYINAE Dana, 1852b:391.

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

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

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

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

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

### Subfamily CALAPPINAE de Haan, 1833

#### Genus *Acanthocarpus* Stimpson, 1871

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



\* *Acanthocarpus brevispinis* Monod, 1946

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

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

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

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

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

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

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

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

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

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

**DESCRIPTION.**—Capart, 1951:36.

*Figures*: Monod, 1956, figs. 125–132.

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

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

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

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

In 1951, Capart described *A. africanus* from a

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

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

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

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

Ovigerous females have been recorded in

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

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

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

Mauritania: Banc d'Arguin, 200–300 m (Maurin, 1968b).

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

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

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

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

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

### Genus *Calappa* Weber, 1795

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

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

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

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

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

### *Calappa gallus* (Herbst, 1803)

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

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

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

### *Calappa granulata* (Linnaeus, 1758)

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

*Calappa*.—Maurin, 1968b, fig. 1.

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

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

**DESCRIPTION.**—Zariquiey Alvarez, 1968:315.

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

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

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

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

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

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

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

as well as on bathyal mud with funiculines and *Isidella* in 350–450 m off Morocco.

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

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

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

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

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

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

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

### \**Calappa pelii* Herklots, 1851

FIGURE 12a

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

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

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

**SYNONYM**.—*Calappa piscatorum* Calman, 1914.

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

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