

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

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

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

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

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

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

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

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

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

**DESCRIPTION.**—Capart, 1951:40.

*Figures*: Monod, 1956, figs. 117–121.

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

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

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

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

Inasmuch as young specimens of *Calappa* may be difficult to identify, we include here sketches of the carapace of juveniles of *C. pelii* (Figure 12a)

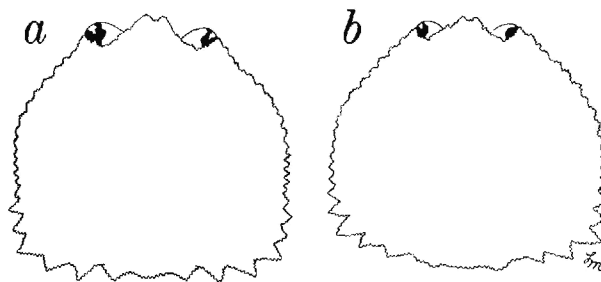


FIGURE 12.—Outlines of carapace of juveniles: a, *Calappa pelii* Herklots, cb 10 mm, Pillsbury Sta 46; b, *Calappa rubroguttata* Herklots, cb 14 mm, Pillsbury Sta 248.

and *C. rubroguttata* (Figure 12b). The characteristic posterior spines on the carapace of *C. pelii* are well developed even in the smallest specimens we examined.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### \**Calappa rubroguttata* Herklots, 1851

FIGURES 12b, 13

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

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

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

*Calappa*.—Bassindale, 1961:499.

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

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

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

Ghana: Sta 24, 35–37 m, dark red bryozoans, 2 juv (W). Nigeria: Sta 248, 33 m, 2 juv (W).

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

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

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

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

**DESCRIPTION.**—Capart, 1951:44.

*Figures*: Monod, 1956, figs. 122–124.

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

*Color*: Capart (1951:44) observed the following

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

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

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

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

**BIOLOGY.**—This species lives in shallower water than does *C. pelii*, from shore to a maximum depth of about 90 m. It apparently can live on all level substrates, but may prefer sand. Gauld (1960:69) reported that off Ghana this species was "very common on sand from shallow water to 30 m. Catches of up to 250 have been taken in a single net; large catches have been taken only beyond 10 m." Crosnier (1964) characterized this species as a warm water crustacean, living in 0–30 m off Cameroon; there it replaces *C. pelii* in

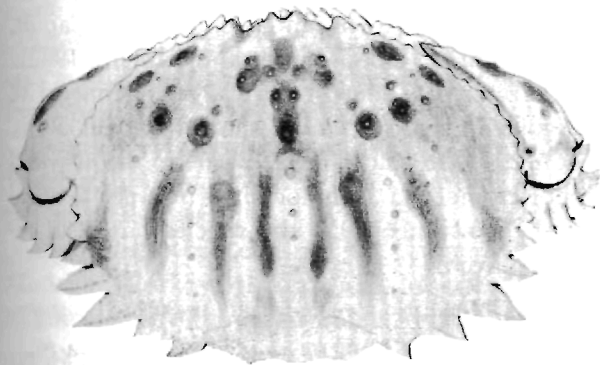


FIGURE 13.—*Calappa ruboguttata* Herklots (sketch by J. A. Herklots).

shallow water. Off the Ivory Coast, Le Loeuff and Intès (1968:40) found this species to be very abundant all year on all sediments in depths less than 40 m, usually between 20 and 35 m. In depths between 30 and 40 m it occurred together with *C. pelii*. In 1969 they noted that it appeared to be indifferent to the nature of the substrate and that it was eurythermic.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### Genus *Cycloes* de Haan, 1837

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

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

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

#### *Cycloes cristata* (Brullé, 1837)

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

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

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

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

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

SYNONYM.—*Cryptosoma dentatum* Brullé, 1839.

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

### Subfamily MATUTINAE de Haan, 1835

#### Genus *Matuta* Weber, 1795

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

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

#### *Matuta michaelsoni* Bals, 1921

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

MATERIAL EXAMINED.—*Pillsbury Material*: None.

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

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

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

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

DESCRIPTION.—Capart, 1951:46.

Figures: Monod, 1956, figs. 108–114.

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

Color: “Blanc-rosé uniforme” (Rossignol, 1957: 77).

MEASUREMENTS.—Our specimens have carapace lengths of 9 to 14 mm.

BIOLOGY.—This species inhabits primarily sandy bottoms in shallow water, from the shore to a depth of about 30 m. Buchanan (1958) found it in the inshore fine sand community, in 3–8 m (5–15 m) off Accra, Ghana, and Longhurst (1958) found it on sand and muddy sand, but noted that it occurred mostly on shelly sand in 5–30 m off Sierra Leone. Guinot and Ribeiro (1962) reported material collected on a beach at low tide.

Ovigerous females have been collected in January, March, April, and September (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962).

DISTRIBUTION.—West Africa, from Senegal to Angola, in shallow water, shore to about 30 m. Monod (1956) summarized earlier records and reported material from localities between Senegal and Togo. Since 1956 the species has been recorded from:

Sierra Leone: No specific locality, 5–30 m (Longhurst, 1958).

Ivory Coast: Off Sassandra, 15 m (Le Loeuff and Intès, 1968). 05°03'N, 05°25'W, 20–25 m (Forest and Guinot, 1966).

Ghana: No specific locality, shore to 15 m (Gauld, 1960). Accra, 3–8 fm (5–15 m) (Buchanan, 1958).

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

Angola: Baía de Benguela, beach at low tide (Guinot and Ribeiro, 1962).

### Family LEUCOSIIDAE Samouelle, 1819

LEUCOSIIDAE Samouelle, 1819:91 [corrected to Leucosiidae by Miers, 1879a:671; name 374 on *Official List*].

LIINAE Stimpson, 1871a:155 [name 372 on *Official List*].

EBALIINAE Stimpson, 1871a:159.

MYRODINAE Miers, 1886:297.

OREOPHORINAE Miers, 1886:297.

MYROIDA Alcock, 1896:167.

IPHICULOIDA Alcock, 1896:167.

NURSILIOIDA Alcock, 1896:167.

NURSIOIDA Alcock, 1896:166.

NUCIOIDA Alcock, 1896:167.

CRYPTOCNEMIDAE Stimpson, 1907:161.

PHILYRINAE Rathbun, 1937:151.

EASTERN ATLANTIC GENERA.—Nine, of which six, *Atlantotlos*, *Ebalia*, *Ilia*, *Merocryptus*, *Philyra*, and *Pseudomyra*, are represented by tropical species occurring off West Africa. Indo-West Pacific species belonging to three genera have become established in the eastern Mediterranean, having colonized that area via the Suez Canal. These genera are as follows:

*Ixa* Leach (1815a:334). Type-species: *Cancer cylindricus* Fabricius, 1777, by monotypy; gender: feminine; name 161 on *Official List*.

*Leucosia* Weber (1795:92). Type-species: *Cancer craniolaris* Linnaeus, 1758, by subsequent designation by Holthuis, 1959a:106; gender: feminine; name 1631 on *Official List*.

*Myra* Leach (1817:19, 23). Type-species: *Leucosia fugax* Fabricius, 1798, by monotypy; gender: feminine; name 1635 on *Official List*.

EASTERN ATLANTIC SPECIES.—Twenty, of which 12 occur in tropical waters. The extralimital species are as follows.

*Ebalia deshayesi* Lucas, 1846. Canary Islands, Madeira (Türkay, 1976b), and Mediterranean; sublittoral, to 100 m (Zariquiey Alvarez, 1968).

*Ebalia edwardsii* Costa, 1838. Mediterranean; littoral and sublittoral, to about 200 m (Zariquiey Alvarez, 1968).

*Ebalia granulosa* H. Milne Edwards, 1837. Eastern Atlantic, from England to the Mediterranean; littoral and sublittoral, to 445 m (Zariquiey Alvarez, 1968).

*Ebalia tumefacta* (Montagu, 1808). Norway and Shetland Islands to Spanish Sahara; sublittoral, to 130 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

*Ixa monodi* Holthuis and Gottlieb, 1956. An Indo-West Pacific immigrant into the eastern Mediterranean, Turkey; Red Sea (Holthuis and Gottlieb, 1956, 1958).

*Leucosia signata* Paulson, 1875. An Indo-West Pacific immigrant into the eastern Mediterranean; Israel and Egypt (Holthuis and Gottlieb, 1958; Lewinsohn and Holthuis, 1964; Ramadan and Dowidar, 1976).

*Merocryptus boletifer* A. Milne Edwards and Bouvier, 1894. Azores, Seine Seamount, Mediterranean; sublittoral, 100–600 m (Zariquiey Alvarez, 1968).

*Myra fugax* (Fabricius, 1798). An Indo-West Pacific immigrant into the eastern Mediterranean; Egypt, Israel, and possibly Turkey (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

The status of *Ebalia fragifera* Miers (1881a:268) from the Canary Islands, which Monod (1956:131) considered to be distinct from *E. tuberculata*, remains to be determined.

The names used by Monod (1956) have not been changed, so the species therein are not listed here.

REMARKS.—Glaessner's (1969:R496) observation that "this family is commonly divided into subfamilies which are constituted and defined differently by different authors (Miers, Alcock, Ihle, Rathbun, Balss) and are not considered helpful to paleontologists at the present stage of our knowledge of the family" is still quite pertinent. Of the four subfamilies currently recognized within the Leucosiidae, two, Ebalinae and Cryptocneminae, do not offer too many difficulties and most authors agree in the limits of the two. The confusion that exists concerning the size and

composition of the two other subfamilies, however, is very great.

The root of all the difficulties in the subfamily classification of the Leucosiidae is to be found in a nomenclatural mix-up concerning the type genus of the family, *Leucosia*. Until 1897 the name *Leucosia* Fabricius, 1798, was used for a genus of Indo-West Pacific crabs, the type of which is *Cancer craniolaris* Linnaeus, 1758. In 1897(b), however, Rathbun showed this usage to be incorrect as the first type selection for *Leucosia* Fabricius, 1798, is that by Latreille (1810:97, 422), who selected *Cancer nucleus* Linnaeus, 1758, as the type of the genus. As *Cancer nucleus* Linnaeus is also the type-species of the genus *Ilia* Leach, 1817, the name *Leucosia* Fabricius, 1798, had to be substituted for *Ilia* Leach, a name until then generally accepted by carcinologists. For the genus *Leucosia* auctt. (non Fabricius, 1798), Rathbun (1897b: 160) proposed the new name *Leucosides*. There was considerable opposition to Rathbun's action, although this action was nomenclaturally entirely justified; most non-American authors ignored the changes proposed. In 1959 Holthuis (1959a:106) showed that *Leucosia* Fabricius, 1798, is a junior homonym of *Leucosia* Weber, 1795, and thus is invalid. For *Leucosia* Weber, 1795, Holthuis selected as type-species *Cancer craniolaris* Linnaeus, 1758, thereby making this name a senior synonym of *Leucosides* Rathbun, 1897, and *Leucosia* auctt. (non Fabricius, 1798). In this way the former, pre-1897, usage of *Leucosia* was restored, albeit with a different author's name. In 1964 the situation was further consolidated by the International Commission on Zoological Nomenclature (1964, in Opinion 712, *Bulletin of Zoological Nomenclature*, 21(4): 336-351), who placed both names *Leucosia* Weber, 1795, and *Ilia* Leach, 1817, on the Official List of Generic Names in Zoology.

At the generic level Rathbun's action had caused hardly any disturbance because (1) non-American authors had, incorrectly, ignored her changes, and (2) the genera *Ilia* Leach, 1817, and *Leucosia* Weber, 1795, do not occur in American waters, the former being restricted to the eastern Atlantic, the latter to the Indo-West Pacific (ex-

cept for *L. signata* which has entered the Mediterranean via the Suez Canal).

Rathbun's (1937:194) record of "*Leucosia planata* (Fabricius)" from Tierra del Fuego rests upon an uncharacteristic mistake on her part. Fabricius' species is not a leucosiid but is *Halicarcinus planatus* (Fabricius), a species of Hymenosomatidae, already dealt with by Rathbun (1925:563) in an earlier work.

At the subfamily level Rathbun's (1897b) transfer of the name *Leucosia* from one genus (*Leucosia* Weber, 1795) to another (*Ilia* Leach, 1817) caused much confusion as these two genera were generally considered to form part of two different subfamilies. These subfamilies were indicated by Rathbun (1937:122, 151, and 123, 183) with the names Philyrinae and Leucosiinae, respectively, while most other authors used the names Leucosiinae and Iliinae, respectively, for them. The fact that the name Leucosiinae could stand for two entirely different groups was not realized by several authors.

A year before Rathbun (1897b) published her controversial paper, Alcock (1896) gave an important classification of the Leucosiidae, which he divided into two subfamilies: Leucosiinae (containing 5 subdivisions, named by him Alliances I-V) and Iliinae (with Alliances I-IV).

Ihle (1918) recognized three subfamilies within the Leucosiidae: Ebalinae (with 12 genera, most of which were placed in Alcock's Alliances I-III of his Leucosiinae), Iliinae (with 19 genera including all of those placed by Alcock in his Iliinae, those of his Alliance IV of Leucosiinae and part of those of Alliances II and III of the latter subfamily), and Leucosiinae (with 7 genera including all those of Alcock's Alliance V of the Leucosiinae and the genera *Cryptocnemus* and *Carcinaspis* which Alcock had placed (the latter with some doubt) in Alliance I).

Rathbun (1937) followed Ihle in recognizing three subfamilies of Leucosiidae, and in his delimitation of the subfamily Ebalinae. Rathbun's Philyrinae contained all the genera that Ihle assigned to the Leucosiinae plus several that he considered to belong to the Iliinae (viz., all those

of Alcock's Leucosiinae Alliance iv, plus *Randallia* of Alliance iii). Rathbun's Leucosiinae consisted of the other Iliinae sensu Ihle. As Rathbun dealt only with the American representatives, it is difficult to know the exact limits of her subfamilies.

Balss (1957:1612-1615), in his authoritative treatment of the Decapoda in Bronn's *Klassen und Ordnungen des Tierreichs*, which of necessity is mostly based on study of the literature, evidently became severely confused. He recognized, like Rathbun, the two subfamilies Philyrinae and Leucosiinae, but unlike Rathbun used the generic names *Leucosia* and *Iliia* for the genera that she named *Leucosides* and *Leucosia*, respectively. In the subfamily Philyrinae Balss placed all the genera that Ihle had assigned to the Iliinae with the exception of two, viz., *Callidactylus* and *Iliacantha*, the only two that Rathbun (1937) mentioned by name and which she placed in the Leucosiinae. Balss' Leucosiinae contained all genera placed by Ihle in that subfamily with the exception of *Philyra* (which Rathbun, 1937, had placed in the Philyrinae) and *Pseudophilyra*. Balss' definition of the Philyrinae is based almost exclusively on that by Rathbun (1937), but his definition of the Leucosiinae has the first five sentences adapted from Ihle's (1918:207) account of the Leucosiinae (sometimes in the identical wording), while the last sentence (dealing with the third maxilliped) is taken from Rathbun's (1937:183) definition of her Leucosiinae. Balss' action was taken in spite of the fact that Rathbun (1937:151, 183) made clear that her subfamily Philyrinae corresponds with all of Ihle's Leucosiinae plus part of his Iliinae, while her Leucosiinae are formed by the rest of Ihle's Iliinae. Unfortunately Balss's (1957:1612-1615) garbled version of the classification of the Leucosiinae provides the most recent complete list of all the genera of the family and has been accepted as the basis for the work of several subsequent authors (Guinot, 1967a:246-251; Serène, 1968:41-48; Sakai, 1976:76-126). Serène (1965:11-17) separated the subfamily Cryptocneminae from the Leucosiinae, placing the genera *Cryptocnemus*, *Leucisca* (= *Carcinaspis*), *Onychomorpha* and *Lissomorpha* in the former subfamily,

leaving only *Leucosia* in the latter (probably *Callidactylus* and *Iliacantha* are also left in the Leucosiinae by Serène, but as these genera do not occur in the Indo-West Pacific region they are not mentioned by him). For the time being we follow the system of Ihle (1918), which seems to be more logical than the one by Rathbun (1937) or than the garbled version of the latter produced by Balss (1957). A closer comparative study of the various genera of Leucosiidae is, however, badly needed.

### Subfamily EBALIINAE Stimpson, 1871

#### Genus *Atlantotlos* Doflein, 1904

*Atlantotlos* Doflein, 1904:49 [type-species: *Atlantotlos rhombifer* Doflein, 1904, by monotypy; gender: masculine].

#### \**Atlantotlos rhombifer* Doflein, 1904

*Atlantotlos rhombifer*.—Capart, 1951:57, fig. 16, pl. 2: fig. 1.—  
Monod, 1956:134, figs. 162, 163.—Longhurst, 1958:87.—  
Gauld, 1960:69.

*Atlantotlos rhombifer*.—Rossignol, 1962:114 [erroneous spelling].

*Atlantotlos*.—Voss, 1966:35.

*Merocryptus rhombifer*.—Forest and Guinot, 1966:54.

**MATERIAL EXAMINED.**—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 5♂, 4♀ (W).

Ivory Coast: Sta 42, 62-75 m, mud with brown, branched Foraminifera, 1♂ (L). Sta 63, 64 m, sandy mud with shells, 1♀ (L).

Nigeria: Sta 239, 73 m, 1♀ (L). Sta 241, 59-63 m, mud and shell, 1♂, 1♀ ov (L). Sta 248, 33 m, 2♀ (W).

Cameroon: Sta 260, 46 m, 3♂, 1♀, 1 juv (L).

*Other Material*: Ghana: 05°13'42"N, 03°59'48"W, 50-55 m, dredge, Guinean Trawling Survey, *La Rafale*, Tr 12, 1♂ (W).

**DESCRIPTION.**—Capart, 1951:57.

*Figures*: Capart, 1951, fig. 16, pl. 2: fig. 1.

*Male Pleopod*: Capart, 1951, pl. 2: fig. 1 (Gambon); Monod, 1956, fig. 163 (Senegal).

*Color*: According to Capart (1951:58), in this species "Les mâles et les femelles sont orangé rose, mais les sillons entre les saillies sont bruns avec des tubercules presque blancs."

**MEASUREMENTS.**—Our specimens have cara-

pace widths of 7 to 16 mm. The carapace width of the ovigerous female is 15 mm.

REMARKS.—Forest and Guinot (1966) synonymized *Atlantollos* Doflein, 1904 with *Merocryptus* A. Milne Edwards, 1873, noting Monod's (1956: 136) comment: "Je ne suis pas certain du tout que le genre *Atlantollos* soit distinct de *Merocryptus*." However, the male pleopod of *A. rhombifer*, figured in Monod, differs from that of two species of *Merocryptus* figured in Guinot and Ribeiro (1962, fig. 5a, b (*M. obsoletus*), and fig. 6 (*M. boletifer*)), in having a subterminal bulbous enlargement rather than tapering evenly to the apex. Until all the representatives of these genera can be studied in more detail, we prefer to retain *Atlantollos* for Doflein's species.

BIOLOGY.—This species occurs in depths between 44 and 115 m, but most specimens were taken in depths between 70 and 100 m. The Pillsbury specimens were collected on mud with brown, branched Foraminifera in 62–75 m, sandy mud with shells in 64 m, and on mud and shell in 59–63 m. The material reported by Capart (1951) was taken on brown muddy sand and coral, brown sandy mud and sandy brown mud, and on muddy sand or muddy sand and rock in 85 to 100 m. Longhurst (1958) found it on shelly mud in 106 m, and Rossignol (1962:114) found it in 115 m, "en bordure des affleurements rocheux." Forest and Guinot (1966) found the species on mud, rocks, calcareous algae, sand and Foraminifera in 51–55 m and on mud and shell in 73–80 m.

Ovigerous females have been recorded in February, May, September, and December (Capart, 1951; Pillsbury).

DISTRIBUTION.—West Africa, where it has been recorded from a few localities between Senegal and Angola, in depths between 44 and 115 m. Monod (1956) summarized earlier records and recorded the species from Senegal. Since 1956 it has been recorded from the following localities.

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

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

Sierra Leone: No specific locality, 106 m (Longhurst, 1958).

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

Nigeria: 04°56'N, 05°00'E, to 04°54'N, 05°05'E, 73 m (Voss, 1966).

Congo: W of Pointe-Noire, 115 m (Rossignol, 1962).

### Genus *Ebalia* Leach, 1817

*Ebalia* Leach, 1817, in 1815–1875, pl. 25 [type-species: *Ebalia bryerii* Leach, 1817, a subjective junior synonym of *Cancer tunefactus* Montagu, 1808, by subsequent designation by H. Milne Edwards, 1837, in 1836–1844, pl. 24: fig. 3 (as *Ebalia brayerii*); gender: feminine; name 145 on *Official List*, type-species there given as *Cancer tuberosus* Pennant, 1777, in error].

*Phlyxia* Bell, 1855:303 [type-species: *Phlyxia crassipes* Bell, 1855, by selection by Bell, 1855:304; gender: feminine].

*Bellidilia* Kinahan, 1856:115, 117, 128 [type-species: *Bellidilia undecimspinosa* Kinahan, 1856, by present designation; gender: feminine].

### \* *Ebalia affinis* Miers, 1881

*Ebalia atlantica*.—Capart, 1951:54.

*Ebalia affinis*.—Monod, 1956:117, figs. 134–144.—Longhurst, 1958:87.—Gauld, 1960:69.—Forest and Guinot, 1966:53.

SYNONYM.—*Ebalia atlantica* A. Milne Edwards and Bouvier, 1898.

MATERIAL EXAMINED.—Pillsbury Material: Liberia: Sta 68, 70 m, broken shell, 3♂ (W).

Ivory Coast: Sta 47, 37 m, bottom with *Jullienella*, 3♂, 1♀ (L).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♂ (W).

Sta 23, 42 m, foliate brown to orange bryozoans, 1♂, 1♀ (L).

Sta 24, 35–37 m, dark red bryozoans, 1♂, 3♀ (W).

Nigeria: Sta 248, 33 m, 1♂ (W).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 23 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 4♂, 3♀ (L).

DESCRIPTION.—Capart, 1951:54.

Figures: Monod, 1956, figs. 134–144.

Male Pleopod: Monod, 1956, figs. 141–144 (Guinea; Senegal).

Color: Capart (1951:54) reported that in this species the color is "orange avec quatre taches blanches en avant de l'aire cardiaque."

MEASUREMENTS.—Our specimens have carapace lengths ranging from 4 to 9 mm.



**BIOLOGY.**—This species has been recorded from depths between 4 and 140 m, but more than 85% of the records are between 4 and 45 m. Capart (1951) reported it on brown muddy sand in 100 m. Longhurst (1958) found it on muddy sand, shelly sand, and shelly mud in depths between 8 and 140 m. Forest and Guinot (1966) reported it from mud or shelly mud in 18–30 m, mud, calcareous algae, and shell in 31 m, rocks and coral in 3–10 m, sand, algae, and calcareous algae in 8–30 m, and mud and calcareous algae in 4–5 m. The *Pillsbury* specimens were taken on fine sand and green mud in 48 m, on bottom with bryozoans in 35–37 and 42 m, on bottom with *Jullienella* in 37 m, and on broken shell in 70 m. Apparently the species prefers soft bottom mixed with shell or other hard substances.

Ovigerous females have been collected in January, February, March, April, May, and June (Monod, 1956; Forest and Guinot, 1966).

**DISTRIBUTION.**—Off West Africa, from localities between Senegal and Angola; it also has been reported from the Seine Seamount north of Madeira. Monod (1956) summarized earlier records and reported material from Senegal, Guinea, Sierra Leone, and Ghana. Since 1956 the species has been reported from the following localities.

Guinea: 09°40'N, 14°05'W, 18 m, and 09°36'N, 13°57'W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 8–140 m (Longhurst, 1958).

Ghana: Accra, 32 m (Gauld, 1960).

Príncipe: 01°37'N, 07°22'E, 30 m, and 01°38'25"N, 07°22'05"E, 31 m (Forest and Guinot, 1966).

São Tomé: Praia de Santa Catarina, W coast, 3–10 m; 00°25'15"N, 06°43'05"E, 8–30 m; Baía de Ana de Chaves, 5 m; and in front of Ponta Diogo Nunes, 4 m (Forest and Guinot, 1966).

### *Ebalia cranchii* Leach, 1817

*Ebalia cranchii*.—Monod, 1956:122, figs. 145, 146 [Senegal; references].—Zariquiey Alvarez, 1968:329, figs. 108a,b, 111b,d, 111Aa, 111Cb [Spain; references].—Türkay, 1976a:25 [listed], 37, fig. 19 [Morocco].

*Ebalia cranchii*.—Christiansen, 1969:31, fig. 11, map 5 [Scandinavia].

**DISTRIBUTION.**—Eastern Atlantic, from Norway

to Senegal, Mediterranean, in depths between 20 and 550 m (Zariquiey Alvarez, 1968).

### *Ebalia nux* A. Milne Edwards, 1883

*Ebalia nux* A. Milne Edwards, 1883, pl. 5.—Monod, 1956: 121 [references].—Zariquiey Alvarez, 1968:328, figs. 108c, 111Ab [Spain; references].—Türkay, 1976a:25 [listed], 37, fig. 18 [Morocco].

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

*Other Material*: Morocco: Off Cap de Mazagan, 33°38'N, 08°45'W, 420 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 150, 1♂ (L). Same area, 33°40'N, 08°45'W, 570 m, Agassiz trawl, 2 Mar 1976, *Onversaagd* Sta 154, 1♀ ov (L). Same area, 33°39'N, 08°46'W, 500 m, Agassiz trawl, 28 Mar 1976, *Onversaagd* Sta 151, 2♀ (L).

**DESCRIPTION.**—Zariquiey Alvarez, 1968:329.

*Figures*: Zariquiey Alvarez, 1968, figs. 108c, 111Ab.

*Male Pleopod*: Zariquiey Alvarez, 1968, fig. 111Ab (locality not stated); Türkay, 1976a, fig. 18 (Morocco).

**MEASUREMENTS.**—Our specimens have carapace widths of 7 to 10 mm; the carapace width of the single ovigerous female is 10 mm.

**BIOLOGY.**—*Ebalia nux* is a deep water species which has been taken in depths between 80 and 2400–2500 m. In the southern part of its range it has been taken in depths between 161–168 and 875 m (A. Milne Edwards and Bouvier, 1900; Bouvier, 1922; Türkay, 1976a).

The only ovigerous female reported from African localities is that listed above; it was collected in March.

**DISTRIBUTION.**—Eastern Atlantic, from the British Isles to the Cape Verde Islands, Mediterranean, in depths between 80 and 2400–2500 m. Monod (1956) summarized the literature but reported no material. Since 1956 the species has been recorded from the following localities.

Morocco: 33°27.7'N, 08°50.8'W, 161–168 m, and 31°01'N, 10°16'W, 360–375 m (Türkay, 1976a).

### \**Ebalia tuberculata* Miers, 1881

FIGURE 14

*Ebalia tuberculata*.—Capart, 1951:56, pl 2: fig. 2.—Monod, 1956:127, figs. 152–158.—Gauld, 1960:69.—Forest and Guinot, 1966:54.

SYNONYM.—*Lithadia barnardi* Stebbing, 1920.

MATERIAL EXAMINED.—*Pillsbury Material*: Ghana: Sta 22, 51 m, rough bottom, 2♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 1♂ (L). Sta 24, 35–37 m, dark red bryozoans, 7♂, 3♀ (W). Sta 27, 33 m, 1 gynandromorph (L).

Nigeria: Sta 248, 33 m, 2♂, 2♀ ov (L).

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

DESCRIPTION.—Capart, 1951:56.

Figures: Monod, 1956, figs. 152–158.

Male Pleopod: Capart, 1951, pl. 2: fig. 2 (Spanish Sahara); Monod, 1956, figs. 154–158 (Morocco; Ghana).

MEASUREMENTS.—Our specimens have carapace lengths of 6 to 10 mm; the gynandromorph measures  $7.6 \times 8.5$  mm.

REMARKS.—The specimen from *Pillsbury* Sta 27 is remarkable in that it is a bilateral gynandromorph. In dorsal view the specimen shows nothing extraordinary, but in ventral view the abdomen is most peculiar (Figure 14). The right half of the abdomen is wide and almost semicircular as in the adult female, while the left half is very

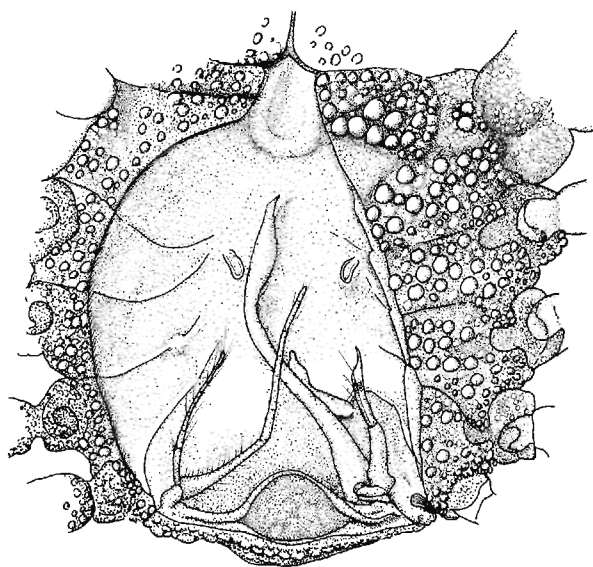


FIGURE 14.—*Ebalia tuberculata* Miers, sternal view of gynandromorph, cl 7.6 mm, *Pillsbury* Sta 27.

narrow as in the adult male. The margin of the female half of the abdomen touches the thoracic sternum close to the bases of the pereopods so that very little is exposed of the thoracic sternites of the first to fifth pereopods. In the male half of the body a much larger part of the thoracic sternum is exposed and tuberculate. The right half of the thoracic sternum that is covered by the abdomen is therefore far deeper and wider than the left half. In both halves a distinct female opening is visible on the sternite of the third pereopod (= second walking leg). The first abdominal sternite shows no pleopod on the right (= female) side, but a large male gonopod is present on the left side. This gonopod is well developed and reaches to the base of the cheliped. Its distal half is curved outward, much more strongly so than in normal specimens as shown in Capart's (1951, pl. 2: fig. 2) and Monod's (1956, figs. 154–158) figures of this organ in normal males. This difference may be caused by the abnormal condition of the present specimen. The second abdominal sternite of the gynandromorph shows a normal female pleopod on the right side and a male gonopod on the left. The second male gonopod is less than half as long as the first, but is well developed and broad. The third, fourth, and fifth abdominal somites each have a well-developed pair of female type pleopods, those on the male half of the abdomen having the same shape and practically the same size as the ones on the female half. Evidently the female characters in this specimen dominate: in the male half several female characters (female sexual opening, pleopods on the third to fifth abdominal somites) can be seen, but no male characters are noticeable in the female half. Apart from the abdomen and thoracic sternum, the specimen is perfectly symmetrical exteriorly. The internal anatomy has not been studied in our specimen. The phenomenon of gynandromorphism seems to be rather rare in Decapod Crustacea. Chace and Moore (1959: 226–231, figs. 1–4) described a case of gynandromorphism in the American lobster, and cited several previous records of similar abnormalities in that species and in the European lobster.

Bürger (1902, 1904) described a gynandromorph specimen of *Jasus frontalis* (H. Milne Edwards), and Hay (1905) mentioned the case of such a specimen in the freshwater crayfish *Orconectes propinquus* (Girard). According to Balss (1944:634, 635), apart from a case in *Lucifer*, no gynandromorphs have been reported in Decapoda other than the *Macrura* Reptantia. However, a gynandromorph of the Mediterranean crab, *Brachynotus gemmellari* (Rizza), was reported by Frogliani and Manning (1978:700, fig. 5). In *Homarus* and *Jasus* the body of the gynandromorph usually is skewed because of the different longitudinal proportions of males and females.

Nothing irregular was found in the shape of the carapace or the thoracic appendages of this specimen of *E. tuberculata*, which in this case may be an indication that in this species the sexes are not different in size.

Both Capart (1951:56) and Guinot (1967a:247, footnote) suggest that material from South Africa referred to this species by Barnard (1950) probably belongs to a distinct species. Barnard (1955:4) proposed *Ebalia pondoensis* for South African specimens previously identified with *E. tuberculata*.

COMMENSALS AND PARASITES.—The carapace of the gynandromorph is covered dorsally and ventrally by Bryozoa, but the appendages, sternum, and abdomen are entirely free from this growth. In the space enclosed by the abdomen and the thoracic sternum a number of sausage-shaped organisms, resembling Rhizocephala of the genus *Thompsonia*, can be seen. One such organism is fastened to the male half of the thoracic sternite of the fifth pereopod, whereas on the female half of the abdomen seven similar organisms are present, two attached to a pleopod, the other five to the abdominal sternites.

BIOLOGY.—The depths at which this species has been taken range from 10–12 m to 135–250 m. Of the known depth records, more than 85% are from depths of less than 75 m, the optimal depth apparently being between 30 and 50 m.

Little is known of the habitat preferences of the species. The Pillsbury specimens were taken on rough bottom in 51 m, on bottom with bryozoans

in 35–37 and 42 m, and on bottom with nodular coralline algae in 51–55 m. The species was reported from mud, sand, and compacted sand [sable construit] in 65–75 m and on mud with *Arca* in 32 m by Forest and Guinot (1966).

Apparently the species spawns all year. Oviparous females have been recorded in January, March, April, May, and September through December (Monod, 1956; Pillsbury).

DISTRIBUTION.—Off West Africa, where it occurs from localities between Morocco and Angola and possibly South Africa. Monod (1956), who recorded material from Morocco, the Cape Verde Islands, Senegal, Ghana, and Angola, summarized the earlier literature. Since 1956 this species has been recorded from the following localities.

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

Ghana: Accra, 37–51 m (Gauld, 1960).

Nigeria: Off the mouths of the Niger River, 04°03'N, 06°12'E, 32 m (Forest and Guinot, 1966).

This species has not been recorded previously from Annobon.

### *Ebalia tuberosa* (Pennant, 1777)

*Ebalia tuberosa*.—Lebour, 1954:236.—Monod, 1956:124, figs. 150, 151 [England, Algeria, Bonifacio, Ilhas Desertas, Canary Islands, Mauritania; references].—Zariquiey Alvarez, 1968:326, figs. 109d, 110a–c, 111a [Spain; references].—Christiansen, 1969:27, fig. 9, map 3 [Scandinavia].—Türkay, 1976a:25 [listed], 37, fig. 20 [Morocco]; 1976b:61 [listed], 63 [Madeira, Ilhas Desertas].

SYNONYMS.—*Ebalia pennantii* Leach, 1817; *Ebalia insignis* Lucas, 1849; ?*Ebalia madeirensis* Stimpson, 1858.

REMARKS.—This species is included in this list of tropical species on the basis of the single juvenile female reported by Monod (1956:126) from the Banc d'Arguin, Mauritania, 21°51'N, 19°48'W. Other specimens from the same station off the Banc d'Arguin were referred to *E. tuberculata* by A. Milne Edwards and Bouvier (1900:50). Its occurrence northward, off Spanish Sahara and Morocco, is not questioned. Christiansen (1969) did not accept Monod's record, noting

that the species occurred southward to Spanish Sahara. Lebour (1954:236) reported on some larval and postlarval specimens of *Ebalia* from the Benguela Current that she believed might be identified with this species.

DISTRIBUTION.—Eastern Atlantic, from Norway and the Hebrides southward to Mauritania (?), including the Azores and the Canary Islands, Mediterranean; sublittoral to about 138 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

### Genus *Merocryptus* A. Milne Edwards, 1873

*Merocryptus* A. Milne Edwards, 1873a:78 [type-species: *Merocryptus lambriformis* A. Milne Edwards, 1873, by monotypy; gender: masculine; name 166 on *Official List*].

### *Merocryptus obsoletus* A. Milne Edwards and Bouvier, 1898

*Merocryptus obsoletus*.—Monod, 1956:132, figs. 161, 161 bis [Morocco; Senegal].—Guinot and Ribeiro, 1962:28, figs. 5a, b, pl. 1: figs. 1, 2, 4 [Cape Verde Islands, Senegal, Angola].

DISTRIBUTION.—Eastern Atlantic, from Morocco, the Cape Verde Islands, Senegal, and Angola, in depths between 75 and 132 m.

## Subfamily ILIINAE Stimpson, 1871

### Genus *Ilia* Leach, 1817

*Leucosia* Fabricius, 1798:313, 349 [an invalid junior homonym of *Leucosia* Weber, 1795 (Decapoda); type-species: *Cancer nucleus* Linnaeus, 1758, by subsequent designation by Latreille, 1810:97, 422; gender: feminine; name 1732 on *Official Index*].

*Ilia* Leach, 1817:19, 24 [type-species: *Cancer nucleus* Linnaeus, 1758, by monotypy; gender: feminine; name 1628 on *Official List*].

*Thaumasta* Gistel, 1848:ix [substitute name for *Leucosia* Fabricius, 1798; type-species: *Cancer nucleus* Linnaeus, 1758; gender: feminine].

### *Ilia nucleus* (Linnaeus, 1758)

*Ilia nucleus*.—Monod, 1956:139 [references].—Guinot and Ribeiro, 1962:30 [Cape Verde Islands].—Zariquiey Alvarez, 1968:322, figs. 11c, 94f [Spain; references].

*Ilia nucleus spinosa*.—Türkay, 1975a:71 [listed], 72 [Spanish Sahara]. [Not *Ilia spinosa* Miers, 1881.]

SYNONYMS.—*Cancer orbicularis* Olivi, 1792; *Leucosia leachii* Risso, 1822; *Ilia laevigata* Risso, 1827; *Ilia rugulosa* Risso, 1827; *Ilia parvicauda* Costa, 1853.

REMARKS.—Türkay's (1975a) record of *Ilia* from off Cabo Blanco, Spanish Sahara, may be referable to this species rather than to *I. spinosa*. Monod (1933b) recorded *I. nucleus* from the same locality, and this apparently is the southernmost limit of the species along the African mainland. *Ilia spinosa* is not known with certainty to occur north of Mauritania.

DISTRIBUTION.—Eastern Atlantic, from the Cape Verde Islands (where it occurs together with *I. spinosa*), Spanish Sahara, and from the Mediterranean, in depths between 4 and 162 m (Zariquiey Alvarez, 1968).

### \* *Ilia spinosa* Miers, 1881

*Ilia nucleus*.—Bouvier, 1911:226 [not *Ilia nucleus* (Linnaeus, 1758)].

*Leucosia spinosa*.—Capart, 1951:52, fig. 15.

*Ilia spinosa*.—Monod, 1956:136, 632, figs. 164–166.—Buchanan, 1958:28, 54.—Longhurst, 1958:87.—Lebour, 1959:133, 135, 136, 137, fig. 21 [larvae].—Gauld, 1960:69.—Rossignol, 1962:114.—Guinot and Ribeiro, 1962:30, pl. 4: fig. 1.—Crosnier, 1964:38.—Ribeiro, 1964:4.—Forest and Guinot, 1966:55.—Crosnier, 1967:323.—Le Loeuff and Intès, 1968:31, table 1.

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

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂, 1 juv (W). Sta 46, 38–42 m, mud bottom with dense *Jullienella*, 2♂, 1♀ (W). Sta 48, 22 m, 1♂ (W). Sta 62, 46 m, brown, branching and foliate Foraminifera, 3♂, 1♀ (L). Sta 63, 64 m, sandy mud with shells, 5♂ (L).

Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♂, 4♀ (L). Sta 22, 51 m, rough bottom, 4♂, 1♀ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 7♂, 1♀, 1 juv (W). Sta 24, 35–37 m, dark red bryozoans, 10♂, 10♀ (L). Sta 26, 27 m, shell bottom (scallops), 2♀ (L).

Nigeria: Sta 246, 37 m, 1♂ (W). Sta 248, 33 m, 12♂, 14♀ (11 ov) (W). Sta 252, 30 m, mud: 1♀ ov (L).

Cameroon: Sta 260, 46 m, 2♀, 1 juv (L).

*Other Material*: Senegal: 13°01'N, 17°24'W, 51–55 m,

mud, stones, calcareous algae, sand, Foraminifera, 15 May 1956, *Calypto* Sta 3, 1♀ ov (W).

Cameroon: 02°39'N, 09°40'E, 50–65 m, mud, 22 Aug 1963, A. Crosnier, 2♀ (1 ov) (W).

DESCRIPTION.—Capart, 1951:52.

Figures: Monod, 1956, figs. 164–166.

Male Pleopod: Monod, 1956, figs. 165, 166 (Senegal).

Color: Capart (1951:53) noted that in this species "Le carapace est orangé clair, les épines et appendices presque blancs."

MEASUREMENTS.—Our specimens have carapace lengths of 5 to 17 mm; the carapace lengths of ovigerous females are 10 to 16 mm.

REMARKS.—In none of our specimens are the posterolateral spines of the carapace so well developed as shown for a specimen from Angola by Guinot and Ribeiro (1962, pl. 4: fig. 1).

It seems likely that Türkay's (1975a) record of *Ilia nucleus spinosa* from Spanish Sahara is based on material of *I. nucleus* (Linnaeus) rather than *I. spinosa*. For that reason we have placed it in the synonymy of the latter species.

Guinot and Ribeiro (1962) noted that one of their specimens from the Cape Verde Islands was similar to *I. nucleus* in having relatively short posterolateral spines on the carapace. Apparently both species occur in the Cape Verde Islands. Bouvier (1911:226) reported *I. nucleus* from Baie de l'Ouest, Mauritania, and noted "avec passage à la *spinosa*, Miers."

BIOLOGY.—This species lives in relatively shallow water, in depths between 6 and 132 m. Of 49 depth records in Monod (1956), 1 was at 132 m, 1 at 96 m, 1 at 75 m, and 46 were at 50 m or less. Apparently, like many of the leucosiids, it prefers soft bottoms with harder (larger?) substances in it. Sourie (1954b) found it on coarse shelly sand, bottom with *Arca* and *Pyura*, in 10–12 m in the Baie de Dakar, and Buchanan (1958) took it in the silty sand community with *Jullienella* off Ghana. Crosnier (1964) reported that it was found on mud or sandy mud in cold water off Cameroon. Forest and Guinot (1966) reported it from a variety of substrates in depths between 18 and 90–100 m. Most of the *Pillsbury* specimens

were taken on bottom with shell, bryozoans, or Foraminifera.

Ovigerous females have been collected in May, June, July, August, October, November, and December (Capart, 1951; Monod, 1956; Forest and Guinot, 1966; Crosnier, 1967; *Pillsbury*).

DISTRIBUTION.—Off West Africa, from the Canary Islands, the Cape Verde Islands, and Mauritania southward to Angola, in depths between 4 and 132 m, generally in less than 50 m. Monod (1956) reported material from Mauritania, Senegal, Guinea, Sierra Leone, Ghana, and Principe. In addition, the species has been recorded from the following localities.

Cape Verde Islands: Baía de Porto Grande, São Vicente, 8 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Mauritania: Baie de l'Ouest (Bouvier, 1911).

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

Guinea-Bissau: 10°19'N, 16°34'W, 18 m (Forest and Guinot, 1966).

Guinea: 09°36'N, 13°57'W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, in 8–32 m (Longhurst, 1958).

Ivory Coast: Off Jacquville and Grand-Bassam, 40–100 m (Le Loeuff and Intès, 1968).

Ghana: 04°40'N, 02°08'W to 04°39'N, 02°05'W, 50 m; 04°36.5'N, 01°31'W, 50 m; 04°37'N, 00°50'W, 90–100 m (all Forest and Guinot, 1966). Off Accra (Buchanan, 1958); in 20–55 m (Gauld, 1960).

Cameroon: No specific locality (Crosnier, 1964).

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

Annobon: 01°25'30"S, 05°39'E, 52 m (Crosnier, 1967).

Gabon: 00°40'S, 08°46'25"E, 18 m, and 00°38'20"S, 08°48'30"E, 35 m (Forest and Guinot, 1966).—W of Mayumba, 20 m (Rossignol, 1962).

Congo: W of Pointe-Noire, 20–30 m (Rossignol, 1962).

Angola: Baía Farta, Benguela, 40 m (Guinot and Ribeiro, 1962).

Lebour (1959) recorded larvae of this species from the following localities: Guinea, 10°22'N, 16°34'W; Sierra Leone, 08°22'N, 14°08'W; Ghana, 05°44'N, 01°02'E; Cameroon, 04°01'N, 07°23'E; and Angola, 07°35'S, 12°46'E.

### Subfamily LEUCOSIINAE Samouelle, 1819

#### Genus *Philyra* Leach, 1817

*Philyra* Leach, 1817:18, 22 [type-species: *Leucosia globulosus*

Bosc, 1802, a subjective junior synonym of *Cancer globus* Fabricius, 1775, by subsequent designation by H. Milne Edwards, 1837, in 1836-1844, pl. 24: fig. 4 (as *Philyra globulosa*); gender: feminine; name 1642 on *Official List.*

### *Philyra cristata* Miers, 1881

*Philyra cristata*.—Monod, 1956:144, figs. 177-183 [Senegal, Guinea, Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].—Rossignol, 1962:115 [Congo].—Forest and Guinot, 1966:56 [Guinea; São Tomé].

DISTRIBUTION.—West Africa, from Senegal to the Congo, in depths between 4 and 25 m.

### \* *Philyra laevidorsalis* Miers, 1881

*Philyra laevidorsalis*.—Capart, 1951:47, fig. 13.—Monod, 1956:141, figs. 169-176.—Rossignol, 1957:77.—Longhurst, 1958:87.—Buchanan, 1958:20.—Gauld, 1960:69.—Rossignol, 1962:115.—Forest and Guinot, 1966:56.

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

*Other Material*: Liberia: Off St. Paul River, Monrovia, 22-29 m, trawl, 4 Nov 1953, G. C. Miller, 1♂ (W).

Ivory Coast: Off Sassandra, 11 m, 3 Apr 1964, Guinean Trawling Survey, Tr 22, Sta 1, 4♂, 6♀ (L).

DESCRIPTION.—Capart, 1951:47.

Figures. Monod, 1956, figs. 169-176.

Male Pleopod: Monod, 1956, figs. 173-176 (Senegal).

Color: Rossignol (1957) noted that this species is a uniform gray beige, with the ventral surface lighter. Capart (1951:47) reported that this species has "couleur uniforme gris brunâtre, plus claire sur la face inférieure; telson blanc ivoire."

MEASUREMENTS.—Our specimens have carapace lengths of 6 to 11 mm.

BIOLOGY.—*Philyra laevidorsalis* is a coastal species, generally found in shallow water, in depths between 4 and 18-30 m. Longhurst (1958) found it in 9-86 m off Sierra Leone, but all other depth records in the literature are from 20-25 m or less. Sourie (1954b) found it on coarse shelly sand, bottom with *Arca* and *Pyura*, in the Baie de Dakar, and Buchanan (1958) characterized it as a member of the active epifauna, inshore fine sand community, in 3-8 fm (5-15 m) off Ghana. Off

Sierra Leone, Longhurst (1958) found it on shelly sand. Forest and Guinot (1966) reported it from mud in 18-30 m, shells in 20-25 m, calcareous algae in 10-12 m, and calcareous algae, sand and mud or shells in 6 to 11 m.

Ovigerous females have been collected in April and May (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—West coast of Africa, from Cap Blanc, Mauritania, southward to Angola, including the Cape Verde Islands and Principe, in shallow water, from a depth of 4 m to about 30 m. Monod (1956), who summarized the earlier literature, reported material from Senegal and Ghana. Since 1956 it has been recorded from the following localities.

Guinea: 09°36'N, 13°57'W, 18-30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 9-86 m (Longhurst, 1958).

Ivory Coast: 05°03'N, 05°25'W, 20-25 m (Forest and Guinot, 1966).

Ghana: Accra, 3-8 fm (5-15 m) (Buchanan, 1958). Off Accra and Takoradi, 15-20 m (Gauld, 1960).

Principe: Between Ponta da Mina and Ilhéu Santana, 10-12 m; in front of (Cais de) Santana, 11 m; and between Ponta da Mina and Ponta Novo Destino, 6 m (all Forest and Guinot, 1966).

Congo: Pointe-Noire, beach (Rossignol, 1957). Baie de Pointe-Noire, 7-15 m (Rossignol, 1962).

### Genus *Pseudomyra* Capart, 1951

*Pseudomyra* Capart, 1951:48 [type-species: *Pseudomyra mbizi* Capart, 1951, by original designation and monotypy; gender: feminine].

### \* *Pseudomyra mbizi* Capart, 1951

*Pseudomyra mbizi* Capart, 1951:49, fig. 14, pl. 2: fig. 24.—Monod, 1956:140, figs. 167, 168.—Rossignol, 1962:115.—Guinot and Ribeiro, 1962:30.—Crosnier, 1964:35.—Forest and Guinot, 1966:56.—Voss, 1966:35.—Le Loeuff and Intès, 1968:40.—Maurin, 1968b:491, 492.—Crosnier, 1970:1215, 1216.

*Pseudomyra*.—Voss, 1966:33, 36.

*Pseudomyra m'bizi*.—Le Loeuff and Intès, 1968, table 1 [erroneous spelling]; 1969:66.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia:

Sta 68, 70 m, broken shell, 19♂, 32♀ (23 ov), 7 juv (W). Sta 69, 29 m, coral or rock, 1♂ (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 174♂, ♀, juv (L,W). Sta 45, 73–97 m, 9♂, 3♀ (W). Sta 49, 73–77 m, 11♂, 3♀, 7 juv (L). Sta 50, 128–192 m, 1♂, 2♀ (W). Sta 59, 55–64 m, mud with dense, branched Foraminifera, 5♂, 4♀ (W). Sta 60, 79–82 m, coral or rock, 3♂ (L). Sta 62, 46 m, brown, branching and foliate Foraminifera, 45♂, 26♀ (L). Sta 63, 64 m, sandy mud with shells, 11♂, 6♀ (1 ov), 2 juv (L).

Ghana: Sta 28, 49–53 m, 1♂, 1♀ (W). Sta 29, 58–60 m, 1♂ (L). Sta 32, 110 m, 2♂, 1♀ (L).

Nigeria: Sta 232, 100–132 m, green mud, 2♂ (W). Sta 236, 101–128 m, coral ground, rough, 3♂ (L). Sta 237, 101 m, 13♂, 7♀ (4 ov), 7 juv (W). Sta 239, 73 m; 20♂, 7♀ (5 ov), 4 juv (L,W). Sta 241, 59–63 m, mud and shell: 9♂, 6♀ (5 ov) (L). Sta 245, 64–119 m, mud, 4♂, 2♀ (1 ov) (W). Sta 246, 37 m, 3♂ (L). Sta 254, 148–174 m, 3♂, 3♀ (2 ov), 2 juv (L).

Cameroon: Sta 259, 59 m, mud and broken shell, 4♂ (L).

*Geronimo Material*: Gabon: Sta 185, 200 m, 3♂, 5♀ (W). Sta 187, 300 m, 8♂, 6♀ (W).

*Undaunted Material*: Angola: Sta 103, 90 m, 1♀ (L).

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

**DESCRIPTION.**—Capart, 1951:50.

*Figures*: Monod, 1956, figs. 167, 168.

*Male Pleopod*: Capart, 1951, pl. 2: fig 24 (Congo); Monod, 1956, fig. 167 (Senegal).

*Color*: Capart (1951:51) noted that the color was “rose orangé avec extrémités des pinces et pattes plus claires.”

**MEASUREMENTS.**—Our specimens have carapace lengths of 4 to 19 mm; carapace lengths of ovigerous females range from 10 to 17 mm.

**BIOLOGY.**—This species inhabits moderate depths, between 12–15 and 300 m, occurring most frequently between 50 and 100 m; 57% of the material reported by Capart (1951) and 54% of our material occurred in depths between 50 and 100 m. Crosnier (1964) noted that the species was eurythermic, occurring over most of the continental shelf off Cameroon. It apparently prefers mud or muddy sand. Maurin (1968b) found it on mud or very muddy fine sand in 40–50 m, and Forest and Guinot (1966) took it on sand, mud and shell in 64 m and on rocks and mud in 90–105 m. Our specimens were taken on a variety of bottoms,

including mud with Foraminifera, sandy mud with shells, broken shell, coral or rock, or on plain mud or green mud.

Le Loeuff and Intès (1968:40) noted: “Rarement pêché au-dessus de 50 mètres, *P. mbizi* fréquente les fonds de toute la partie profonde du plateau continental [of the Ivory Coast], c'est-à-dire des eaux froides et salées—température inférieure à 20°C, salinité supérieure à 35,4 o/oo—et des sédiments sablo-vaseux.”

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

**DISTRIBUTION.**—Off West Africa, from scattered localities between northern Senegal and Angola, in depths between 12–15 and 300 m, usually between 50 and 100 m. Judging from records in the literature, it is most abundant in the central part of its range, from the Ivory Coast to the Congo. Monod (1956) recorded material from Senegal. Since 1956 it has been recorded from the following localities.

Senegal: Off Saint-Louis, 75–85 m, and off Mboro, 40–50 m (Maurin, 1968b).

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

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Grand-Lahou, off Grand-Bassam, 50–200 m (Le Loeuff and Intès, 1968).

Nigeria: Off the mouths of the Niger River, 04°05'N, 05°28'E, 90–105 m (Forest and Guinot, 1966). 05°56'N, 04°27'E to 05°54'N, 04°27'E, 101–132 m; 04°56'N, 05°00'E to 04°54'N, 05°05'E, 73 m; 04°32'N, 05°07'E to 04°31'N, 05°13'E, 64–119 m (Voss, 1966).

Cameroon: No specific locality (Crosnier, 1964).

Gabon: W of Mayumba, 20 m (Rossignol, 1962).

Congo: W of Pointe-Noire, 100 m (Rossignol, 1962).

Angola: 2 miles [3.2 km] S of Luanda lighthouse, Luanda, 50 m; Luanda, 80 m; and Baía Farta, Benguela (Guinot and Ribeiro, 1962). 17°06'S, 11°35'E, 90 m (Crosnier, 1970).

### Family BELLIDAE Dana, 1852

CYCLINEA Dana, 1851b:122, 131.

BELLIDEA Dana, 1852a:119 [corrected to Bellidae by Guinot, 1976:15.]

ACANTHOCYCLIDAE Dana, 1852b:145.

**REMARKS.**—This family is not represented in

the eastern Atlantic. Guinot (1976) provided a recent review of the family.

### Family ATELECYCLIDAE Ortman, 1893

ATELECYCLIDAE Ortman, 1893a:27 [name 369 on *Official List*].

CHEIRAGONIDAE Ortman, 1893b:413, 419.

EASTERN ATLANTIC GENERA.—One, *Atelecyclus*, represented in the tropical fauna of West Africa.

EASTERN ATLANTIC SPECIES.—Two, both occurring in Europe as well as off tropical West Africa. Monod (1956) included accounts of both species, as follows, but had material of only one:

Name in Monod	Current Name
<i>Atelecyclus septemdentatus</i>	<i>Atelecyclus rotundatus</i>
<i>Atelecyclus undecimdentatus</i>	<i>Atelecyclus undecimdentatus</i>

REMARKS.—Neither species was taken by the Pillsbury.

### Genus *Atelecyclus* Leach, 1814

*Atelecyclus* Leach, 1814:430 [type-species: *Cancer (Hippra) septemdentatus* Montagu, 1813, a subjective junior synonym of *Cancer rotundatus* Olivi, 1792, by monotypy; gender: masculine; name 1608 on *Official List*].

### *Atelecyclus rotundatus* (Olivi, 1792)

*Cancer rotundatus* Olivi, 1792, pl. 2: fig. 2.

*Atelecyclus rotundatus*.—Sourie, 1954b:150.—Forest, 1958:472, fig. 2 [references].—Pérès, 1964:20.—Forest and Guinot, 1966:57.—Maurin, 1968a:30.—Zariquiey Alvarez, 1968:342, figs. 1d, 112b [Spain; references].—Christiansen, 1969:37, fig. 13, map 7 [Scandinavia].—Türkay, 1976a:25 [listed], 37, fig. 21 [Portugal].

*Atelecyclus septemdentatus*.—Bouvier, 1911:236.—Monod, 1956:148.—Longhurst, 1958:87.

*Atelecyclus*.—Maurin, 1968a, fig. 13.

SYNONYMS.—*Cancer septemdentatus* Montagu, 1813; *Atelecyclus heterodon* Leach, 1815.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

*Geronimo Material*: Gabon: Sta 211, 100 m, 1♀ (W).

DESCRIPTION.—Christiansen, 1969:37.

*Figure*: Christiansen, 1969, fig. 13.

MEASUREMENTS.—Our specimen, a non-oviger-

ous female, has a carapace length and a carapace width of 15 mm.

REMARKS.—Our specimen agrees well with the accounts of this species given by Christiansen (1969) and Forest (1958). The latter author established the identity of *A. rotundatus* (Olivi, 1792) with *A. septemdentatus* (Montagu, 1813).

A comparison of our young specimen with material of this species from the Mediterranean shows that the West African specimen has a considerably rougher carapace; no other differences were observed.

BIOLOGY.—Little is known about the habitat requirements of this species, which, as Forest (1958) noted, lives from shallow water to a depth of 200–300 m; Forest questioned the validity of some early records from very deep water. Off Scandinavia, Christiansen (1969) found it on sand and soft bottom, often with gravel and small stones, in depths between 15–40 and 190–324 m. Longhurst (1958) collected it on shelly sand in 121–160 m. Pérès (1964) recorded it from reddish gravel with shell debris in 210 m off the Banc de Spartel, and Maurin (1968a) reported it from muddy sand and sandy detritus in 10–30 m. It was collected on mud, rocks, calcareous algae, sand, and Foraminifera by the *Calypso* (Forest and Guinot, 1966).

DISTRIBUTION.—Eastern Atlantic, from Scandinavia and the Hebrides southward to South Africa, including the Mediterranean, and, off the African Coast, a few localities between Morocco and Gabon, as well as the Cape Verde Islands; littoral to about 300 m. Monod (1956) summarized the literature but recorded no material of this species. In addition, the species has been recorded from the following localities.

Morocco: Banc de Spartel, 35°54'N, 06°14'W, 210 m (Pérès, 1964). Between Cap Rhir (as Cap Ghir) and Cap Drâa (as Cap Noun), 10–30 m (Maurin, 1968a).

Mauritania: Baie de l'Ouest (Bouvier, 1911).

Senegal: Baie de Dakar, 0–17 m (Sourie, 1954b). 13°01'N, 17°24'W, 51–55 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 121–160 m (Longhurst, 1958).

Although Gabon is well within the known



range of the species, it is the southernmost locality on the tropical mainland.

### *Atelecyclus undecimdentatus* (Herbst, 1783)

*Atelecyclus cruentatus*.—Capart, 1951:136, pl. 2: fig. 7 [Spanish Sahara].

*Atelecyclus undecimdentatus*.—Monod, 1956:148, figs. 184–186 [Mauritania, Senegal, Gambia, Gabon; references].—Forest, 1958:472, fig. 1 [references].—Longhurst, 1958:87 [Sierra Leone].—Forest and Gantès, 1960:350 [Morocco].—Zariquiey Alvarez, 1968:342, fig. 112d [Spain; references].—Maurin, 1968b:486, 489, fig. 4 [Mauritania].—Bas, Arias, and Guerra, 1976, table 3 [Spanish Sahara].

SYNONYMS.—*Atelecyclus cruentatus* Desmarest, 1825; *Atelecyclus omiodon* Risso, 1827.

DISTRIBUTION.—Eastern Atlantic, from France to Gabon, Mediterranean, from shore to about 30 m.

### Family THIIDAE Dana, 1852

THIIDAE Dana, 1852a:120 [name 361 on *Official List*, dated 1862 in error].

EASTERN ATLANTIC GENERA.—One, *Thia*, represented in the fauna of tropical West Africa.

EASTERN ATLANTIC SPECIES.—One (possibly two), occurring off tropical West Africa. The species reported as *Thia residua* by Monod (1956) is now known as *Thia scutellata*.

REMARKS.—This family was not represented in the Pillsbury collections.

### Genus *Thia* Leach, 1815

*Thia* Leach, 1815a:312 [type-species: *Thia polita* Leach, 1815, a subjective junior synonym of *Hippa scutellatus* Fabricius, 1793, by monotypy; gender: feminine; name 1577 on *Official List*].

### *Thia scutellata* (Fabricius, 1793)

*Hippa scutellata* Fabricius, 1793:474.

*Thia residua*.—Monod, 1956:153, figs. 186 *bis*, 186 *ter* [Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].

*Thia scutellata*.—Zariquiey Alvarez, 1968:343, fig. 111f [Spain; references].—Christiansen, 1969:40, fig. 14, map 8 [Scandinavia].

*Thia* sp. aff. *residua*.—Forest and Guinot, 1966:57, fig. 3 [São Tomé].

SYNONYMS.—*Cancer residuus* Herbst, 1799; *Thia polita* Leach, 1815; *Thia blainvillii* Risso, 1822.

REMARKS.—Forest and Guinot (1966) pointed out several differences between Monod's and their specimens from West Africa and European specimens and suggested that a direct comparison of material from the two areas might result in the recognition of a small, distinct West African species.

DISTRIBUTION.—Eastern Atlantic, from the British Isles and Sweden southward to Portugal, Mediterranean, and off Sierra Leone and São Tomé in the Gulf of Guinea; usually in depths between 10 and 25 m.

### Family CANCRIDAE Latreille, 1803

Cancerides Latreille, 1803b:350 [corrected to Cancridae by MacLeay, 1838:59].

TRICHO CERIDAE Dana, 1852a:120.

EASTERN ATLANTIC GENERA.—One, not represented in the tropical fauna, is *Cancer* Linnaeus, 1758:625. Type-species: *Cancer pagurus* Linnaeus, 1758, by subsequent designation by Latreille, 1810:422; gender: masculine; name 491 on *Official List*.

EASTERN ATLANTIC SPECIES.—Two, both extralimital:

*Cancer bellianus* Johnson, 1861. Shetland Islands and Iceland southward to Canary Islands, Madeira (Türkay, 1976b), and Spanish Sahara (Maurin, 1968b); sublittoral, to 620 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

*Cancer pagurus* Linnaeus, 1758. Northern Norway to the Mediterranean; sublittoral, between 6 and 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

### Family PRIMELIDAE Alcock, 1899

Pirimélides A. Milne Edwards, 1862a:41; 1865:181, 204.

PRIMELINAE Alcock, 1899a:5, 95. [Elevated to Primelidae by Bouvier, 1940:217.]

PERIMELIDAE Monod, 1956:147, 157. [Unjustified emendation.]

EASTERN ATLANTIC GENERA.—Two, *Pirimela* and *Sirpus*, both represented in the fauna of tropical West Africa.

EASTERN ATLANTIC SPECIES.—Four, three of which occur in tropical waters. The extralimital species, *Sirpus zariquieyi* Gordon, 1953, occurs in the Mediterranean (Lewinsohn and Holthuis, 1964; Zariquiey Alvarez, 1968).

REMARKS.—Monod (1956) recorded two species from West Africa, as listed below, and we add a previously undescribed species of *Sirpus* (*S. gordonae*), the only representative of the family collected by the *Pillsbury*:

Name in Monod	Current Name
<i>Perimela denticulata</i>	<i>Pirimela denticulata</i>
<i>Sirpus monodi</i>	<i>Sirpus monodi</i>

### Genus *Pirimela* Leach, 1816

*Pirimela* Leach, 1816, in 1815–1875, pl. 3 [type-species: *Cancer denticulatus* Montagu, 1808, by monotypy; gender: feminine; name 181 on *Official List*].

*Pirimela* Agassiz, 1846:280, 293 [unjustified emendation of *Pirimela* Leach, 1816; type-species: *Cancer denticulatus* Montagu, 1808; gender: feminine].

#### *Pirimela denticulata* (Montagu, 1808)

*Pirimela denticulata*.—Bouvier, 1911:226 [?Mauritania; listed].—Zariquiey Alvarez, 1968:350, figs. 7a, 11d, 112a, 113a [Spain; references].—Christiansen, 1969:46, fig. 17, map 11 [Scandinavia].—Türkyay, 1976b:61 [listed], 64 [Madeira].

*Pirimela denticulata*.—Capart, 1951:137 [Spanish Sahara].—Monod, 1956:157, figs. 187–190 [Mauritania, Senegal, Gabon(?)].

SYNONYM.—*Pirimela princeps* Hope, 1851.

DISTRIBUTION.—Eastern Atlantic, from Norway to Senegal, Mediterranean, usually in shallow water, intertidal to 40–50 m. There is one questionable record from Gabon (Monod, 1956); Bouvier (1940) recorded material to a depth of 200 m.

### Genus *Sirpus* Gordon, 1953

*Sirpus* Gordon, 1953a:304 [type-species: *Sirpus zariquieyi* Gordon, 1953, by original designation and monotypy; gender: masculine].

#### *Sirpus monodi* Gordon, 1953

*Sirpus monodi*.—Monod, 1956:159, figs. 191–193 [Mauritania, Senegal; references].—Rossignol, 1962:115 [Congo].—Monod, 1963, fig. 33 [no locality].

*Zirpus Monodi*.—Monod, 1963:124 [erroneous spelling].

DISTRIBUTION.—Off West Africa, from Mauritania, Senegal, and the Congo, intertidal to a depth of 12 m.

#### \**Sirpus gordonae*, new species

FIGURE 15

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 271, shore, 3♂ (includes holotype), 3♀ (L,W).

DESCRIPTION.—Carapace (Figure 15a,b) about as long as wide, greatest width behind postorbital tooth, at level of first anterolateral tooth. Front (Figure 15a,b) 3-lobed rather than 3-toothed as in *Sirpus monodi* Gordon and *S. zariquieyi* Gordon, median lobe bluntly triangular, extending farthest anteriorly, submedian lobes shorter, rounded triangular in shape, pointed or with small, sharp, almost granuliform apex. Anterior supraorbital angle triangularly pointed or rounded, with small granuliform apex. Dorsal orbital margin straight, sloping posteriorly, terminating in distinct incision. Posterior orbital margin, between incision and postorbital tooth, rounded or angular. Postorbital tooth large, sharply pointed, curved anteriorly. Lateral margin (Figure 15a,b), posterior to postorbital tooth, with 3 spiniform teeth, anteriormost larger than postorbital, with margins, particularly anterior, crenulate. Posterior 2 lateral teeth short, small, contrasting greatly with anterior tooth, terminating in sharp apices, often dorsally directed or twisted. Surface of carapace strongly areolated, in this resembling other *Sirpus* species, with elevations as follows: 2 protogastric, 1 mesogastric,



FIGURE 15.—*Sirpus gordonae*, new species, paratypes. Female, cl 2.8 mm, Pillsbury Sta 271: a, carapace. Male, cl 2.8 mm, Pillsbury Sta 271: b, carapace; c, abdomen; d, first pleopod; e, apex of first pleopod; f, second pleopod.

1 on each branchial region, and 2 submedian on cardiac region. No elevation present at base of posterior lateral tooth, but small spinule or tooth there on dorsal surface of carapace in some specimens. Posterior part of carapace rugose, with short transverse striae, as in other species of genus.

Lower border of orbit terminating in blunt tooth. Antepenultimate segment of antennular peduncle, forming part of orbital floor, terminating in distinct anterior spine and spinules. Antennal peduncle extending beyond front.

Male abdomen (Figure 15c) broader than that of *S. zariquieyi*, with third to fifth somites fused, longer than sixth somite and telson combined. Sixth somite distinctly wider than long. Female abdomen with 6 free somites.

First pleopod of male (Figure 15d,e) strongly resembling that of *S. zariquieyi*, apex blunter. Second pleopod of male (Figure 15f) with apex divided into blunt and sharply triangular lobes.

MEASUREMENTS.—Carapace lengths of males 2.5 to 2.8 mm, of females 2.8 to 3.1 mm. Adult specimens of *S. zariquieyi* have carapace lengths of 3.4 to 5.1 mm, and whereas in *S. monodi* ovigerous females with carapace lengths of 4.5 to 7.0 mm are known, the smallest representative of that

species, with a carapace length of 3.9 mm, probably is immature. Sexually mature specimens of *S. gordonae* are smaller than any of the known specimens of the other two species.

REMARKS.—*Sirpus gordonae* can immediately be distinguished from the two other species of the genus by the shape of the front. In *Sirpus zariquieyi* (Gordon, 1953a, 1953b) the front consists of three sharp teeth, which are fused only in their extreme basal portion and of which the central one is distinctly shorter than the two lateral. In *S. monodi* Gordon (1953b) the three teeth are likewise separated for almost their entire length, and also are sharp, but here the median tooth is of about the same length as the others. In *S. gordonae* the front is a broad plate-like projection which only at the top bears three short broad teeth, the median of which is blunt and reaches distinctly beyond the lateral. The last of the anterolateral teeth of the carapace in *S. zariquieyi* and *S. monodi* is large, being about as large or larger than the postorbital tooth. In *S. gordonae* this posterior anterolateral tooth is much smaller than the postorbital tooth. The large blunt tubercle that is present on the dorsal surface of the carapace at the base of the last anterolateral tooth in *S. zariquieyi* and *S. monodi* is absent in *S. gordonae*.