

calcareous algae, sand, and Foraminifera; mud, sand, and compacted sand (sable construit); mud; mud with *Arca*; and on calcareous algae. Our specimens were taken on mud, mud with Foraminifera, fine sand and green mud, and on bottom with bryozoans. Sourie (1954b) found it on coarse, shelly sand, bottom with *Arca* and *Pyura*, in 10–12 m in the Baie de Dakar. Longhurst (1958) found it on shelly mud in 60 m, and Le Loeuff and Intès (1968) considered it a eurythermic species, living on muddy sand in 25–40 m.

Ovigerous females have been collected from January through June, and August (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Forest and Guinot, 1966; Crosnier, 1970; herein p. 301).

DISTRIBUTION.—West Africa, from the Cape Verde Islands and at least Senegal on the African mainland S to Angola; sublittoral, in depths between 1 and 126 m, generally in less than 50 m.

Records of *M. rostrata* from areas N of Senegal, such as those by Capart (1951) from Spanish Sahara and Stimpson (1907) from Madeira, especially the latter, may be based on either this species or *M. rostrata* proper. They require verification.

Records in the literature include the following:

Cape Verde Islands: 15°40'N, 23°06'W, 38 fm [70 m] (Studer, 1882, 1883).

Senegal: Off Dakar, 14°40'–41'N, 17°18'30"–20°30"W, 20–25 m; 14°38'–41'N, 17°20'–23'W, 22–34 m; 14°38'–40'N, 17°17'–18'W, 22–27 m; off Dakar; Anse Bernard, 8–10 m; Baie de Hann; between Gorée and Thiaroye-sur-Mer (as Tiaroye), 15 m; and between Dakar and Gorée, 16 m (all Monod, 1956). Baie de Dakar, 10–12 m (Sourie, 1954b). Gorée (the type-locality) (Miers, 1881a; Lenz and Strunck, 1914; Monod, 1956); in 20 m (Balss, 1922). Around Gorée, ca. 1, 5–11, 7–8, 13, 15–20, 19, 20, 25, 40–41, and 46–50 m; between Thiaroye-sur-Mer and Bel-Air, 9 m; Mbaio; SE Île de la Madeleine, 35 and 48 m; and off Joal, 15–17 m (Monod, 1956). 13°01'N, 17°24'W, 51–55 m, and 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

Guinea: Off Île Kassa, Îles de Los (Capart, 1951). 09°–36'N, 13°57'W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 60 m (Longhurst, 1958).

Ivory Coast: Off Grand Bassam, 25–40 m (Le Loeuff and Intès, 1968).

Ghana: Off Accra, 26 and 44 m (Monod, 1956; Gauld, 1960).

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

Principe: 01°43'10"N, 07°28'20"E, 73 m, and 01°43'N, 07°28'55"E, 37m (Forest and Guinot, 1966).

Annobon: 2 mi [3.2 km] off Annobon, 18–20 m (Capart, 1951).

Gabon: Libreville, 60 m (Monod, 1956).

Congo: 11 mi [17.7 km] WSW Pointe-Noire, 04°52'S, 11°39'30"E, 58–60 m (Capart, 1951).

Cabinda: Off the lighthouse (Capart, 1951).

Zaire: Off the mouth of the Congo River, 44 m (Doflein, 1904). 28 mi [32 km] WNW of Banana, 05°54'S, 11°58'–30"E, 50 m, and 05°56'S, 12°E, 50–60 m (Capart, 1951).

Angola: Benguela, 13–26 m; Baía da Caota, 13, 16, and 18 m; and Baía Farta, 5 m (Guinot and Ribeiro, 1962). Porto Alexandre, 72 and 108 m (Odhner, 1923). 18 mi [29 km] WSW Baía dos Tigres, 16°36'S, 11°27'E, 110 m (Capart, 1951). 16°37'S, 11°22'E, 126 m (Crosnier, 1970).

* *Macropodia straeleni* Capart, 1951

Macropodia straeleni Capart, 1951:79, fig. 24, pl. 1: fig. 5.—Monod, 1956:566, fig. 837.—Rossignol, 1957:115 [key].—Forest and Guinot, 1966:117.

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

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 2♂ (L). Sta 60, 79–82 m, coral or rock, 2♂, 2♀ ov (W). Sta 65, 46–49 m, 1♀ ov (L).

Nigeria: Sta 239, 73 m, 1♀ ov (W).

Other Material: Congo: 05°20'S, 11°37'E, 200 m, 10 Dec 1963, A. Crosnier, 3♂, 1♀ ov (W).

DESCRIPTION.—Capart, 1951:79.

Figures: Capart, 1951, fig. 24, pl. 1: fig. 5.

MEASUREMENTS.—Carapace lengths of males 5.1 to 8.7 mm, of ovigerous females 5.2 to 6.5 mm.

BIOLOGY.—*Macropodia straeleni* occurs sublittorally in moderately deep water. Capart (1951) took it in 73 to 140–150 m on sandy mud and it was taken by the *Calypso* in 65–75 m on mud, sand, and compacted sand (sable construit) (Forest and Guinot, 1966). The *Pillsbury* specimens, for which data are available, were taken on mud

with brown, branched Foraminifera in 62–75 m, broken shell in 70 m, and on coral or rock in 79–82 m. The deepest recorded occurrence of the species is in 200 m off the Congo and the Ivory Coast (Forest and Guinot, 1966).

Ovigerous females have been taken in May, June, October, November, and December (Capart, 1951; Forest and Guinot, 1966; present paper).

DISTRIBUTION.—West Africa, from localities between Senegal (12°55.5'N) and Angola (07°39'S), in depths between 46–49 m and 200 m. Capart (1951) based his account on material from off the Congo, Cabinda, and Angola; Monod (1956) added no material. Other records in the literature include the following:

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

Ivory Coast: No specific locality, 200 m (Forest and Guinot, 1966).

Genus *Stenorhynchus* Lamarck, 1818

Pactolus Leach, 1815b:19 [type-species: *Pactolus boscii* Leach, 1815, a subjective junior synonym of *Cancer seticornis* Herbst, 1788, by monotypy; gender: masculine; suppressed by the International Commission on Zoological Nomenclature under its plenary powers (Opinion 763, 1966); name 1778 on *Official Index*].

Stenorhynchus Lamarck, 1818:236 [invalid original spelling of *Stenorhynchus*; name 1779 on *Official Index*].

Stenorhynchus Lamarck, 1818:236 [emendation for *Stenorhynchus* by the International Commission of Zoological Nomenclature under its plenary powers (Opinion 763, 1966); type-species: *Cancer seticornis* Herbst, 1788, by designation by the International Commission on Zoological Nomenclature under its plenary powers (Opinion 763, 1966:19); gender: masculine; name 1700 on *Official List*].

**Stenorhynchus lanceolatus* (Brullé, 1837)

FIGURE 78b

Leptopodia lanceolata Brullé, 1837, unnumbered pl.: fig. 1a,b.
Leptopodia Canariensis Brullé, 1839:15.

Leptopodia sagittaria.—Brullé, 1839:15.—White, 1847a:1 [part].—Stimpson, 1858d:219.—Kingsley, 1880b:383 [part].—Miers, 1886:3, 4.—Osorio, 1887:221; 1888:187, 191.—Koelbel, 1892:114.—Osorio, 1898:187, 192.—A. Milne Edwards and Bouvier, 1900:153.—Stimpson, 1907:

23.—Bass, 1922:72. [Not *Cancer sagittarius* Fabricius, 1793 = *Cancer seticornis* Herbst, 1788.]

“une nouvelle espèce de ce genre” [*Leptopodia*].—Guérin-Méneville, 1844:10.

Leptopodia Sagittarius.—Herklots, 1861:136 [part].

Leptopodia vittata (Guérin MS).—Kingsley, 1880b:384.

Leptopodia sagittaria.—Osorio, 1889:130; 1898:185.

Stenorhynchus sagittarius.—Rathbun, 1900a:293.—Stimpson, 1907:23.

Stenorhynchus sagittarius.—Odhner, 1923:19.

Stenorhynchus seticornis.—Rathbun, 1925:13 [part, not pl. 2, 3]. [Not *Stenorhynchus seticornis* (Herbst, 1788).]

Stenorhynchus seticornis.—Monod, 1933b:503.—Capart, 1951: 81, fig. 25.—Sourie, 1954b:147.—Monod, 1956:567, figs. 838, 839.—Rossignol, 1957:78, 115 [key].—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962: 79.—Rossignol, 1962:123.—Ribeiro, 1964:21.—Crosnier, 1964:38, fig. on pl. A.—Forest and Guinot, 1966:117.—Maurin, 1968b:484, 486.—Le Loeuff and Intès, 1968, table 1; 1969:65.—Uschakov, 1970:455 [listed].

Stenorhynchus.—Voss, 1966:17, 19.

Stenorhynchus lanceolatus.—Yang, 1967:220.—Barr, 1975:47 [discussion].

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 70, 33 m, branched Foraminifera, 1♀ (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂, 1 juv (L). Sta 46, 38–42 m, mud with dense *Jullienella*, 1♂ (W). Sta 65, 46–49 m, 1♂ (W). Sta 48, 22 m, 1♂, 3♀ (W).

Ghana: Sta 22, 51 m, rough bottom, 1♂, 1♀ (L). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂ (W). Sta 24, 35–37 m, dark red bryozoans, 1♂, 2 juv (L). Sta 26, 27 m, shell bottom (scallops), 1♀ (W). Sta 28, 49–53 m, 2♀ (L). Sta 30, 61–64 m, coral, 2♀ (1 ov) (L).

Nigeria: Sta 246, 37 m, 1♂, 2♀ (1 ov) (L). Sta 248, 33 m, 5♂, 2♀ ov (W). Sta 252, 30 m, mud, 1♀ ov (W). Sta 253, 33–40 m, mud, 1♀ (W).

Annobon: Sta 275, 9–69 m, rubble of coralline algae, 2♀ ov (L).

Other Material: Madeira: SE coast, near Canical, 32°44'N, 16°44'W, 0–22 m, shore collecting, snorkeling and diving, 7 Mar 1976, *Onversaagd* Sta 14, 3♀ ov (L). Same, 11 Mar 1976, *Onversaagd* Sta 48, 1♀ ov (L). SE coast, NE of Canical, 32°44'N, 16°43'W, 0–20 m, diving, 11 Mar 1976, *Onversaagd* Sta 47, 1♀ (L). SE coast, Cabo de Santo Amaro near Santa Cruz, 32°41'N, 16°47'W, 0–20 m, rocky coast, diving and shore collecting, 9 Mar 1976, *Onversaagd* Sta 30, 1♀ (L). SE coast, near Agua de Pena, 32°41'N, 16°46'W, 0–25 m, diving, 9 Mar 1976, *Onversaagd* Sta 27, 1♂ (L). S coast, near Ponta do Garajau, 32°38'N, 16°51'W, 25–26 m, diving, 17 Mar 1976, *Onversaagd* Sta 111, 1♂, 1♀ (L).

DESCRIPTION.—Capart (1951:82). Yang (1967: 221), who distinguished three Atlantic species of

Stenorhynchus (*S. seticornis*, *S. lanceolatus*, and *Stenorhynchus* species A), gave the differences between the latter two species in the following tabular form:

<i>Stenorhynchus</i> species A	<i>S. lanceolatus</i>
Propodite of female chela smooth	Propodite of female chela covered by fine spines
Hiatus of female chela narrow	Hiatus of female chela round; similar to <i>S. seticornis</i>
Meropodite of male chela strongly granulated	Meropodite of male chela smooth

The differences between *S. seticornis* (Herbst) and *S. lanceolatus* were discussed by Yang (1967: 221) as follows:

S. seticornis is also different from *S. lanceolatus* in having three spines at the distal margin of the meropodite (rather than two). Also *S. seticornis* is distinguished from *S. lanceolatus* by having smooth propodite of the female chelae, and strongly granulated meropodite of the male chelae. The tip of the male first pleopod of *S. lanceolatus* is round without a tooth-like projection and resembles that of *S. species A* (based on one large specimen). However, the hiatus of the female chela and the spination of pereopod carpodite of *Stenorhynchus lanceolatus* is very similar to that of *S. seticornis*. The future larval study of *S. lanceolatus* will show the affinity of this species to *Stenorhynchus* sp. A or *S. seticornis*.

Figures: Capart, 1951, fig. 25; Monod, 1956, figs. 838, 839.

Color: Koelbel (1892:115) mentioned "tief purpurbraunen, manchmal auch lauchgrünen Rückenstreifen" and noted in a footnote "Vermöge eines ausgeprägt grünlichen Schimmers entspricht die Färbung derartiger Streifen vollständig jener der Flügeldecken der Männchen von *Dyticus marginalis*." He described the background of the stripes as "Elfenbeinweiss." A. Milne Edwards and Bouvier (1900: 154) described the color of the species as follows:

Les couleurs de ce Crabe sont disposées d'une façon très remarquable. Une série de bandes brunes, jaunâtres ou presque blanches, s'étendent longitudinalement; elles se réunissent en avant sur la ligne médiane, puis se dirigent en arrière en suivant les contours de la carapace, les plus longues étant en dehors, les plus courtes au centre et la région cardiaque pouvant être considérée comme le centre de ces lignes concentriques. Les pattes sont brunes, relevées

de taches et de bandes longitudinales d'un jaune vif. Les doigts des pinces sont d'un bleu violacé.

Capart (1951:82) described the color as follows: "La carapace de couleur orange, avec bande longitudinale violette, les pattes et pinces marquées de bandes de mêmes couleurs."

Male Pleopod: Monod, 1956, fig. 839 (Sierra Leone).

MEASUREMENTS.—The carapace lengths of the present male specimens ranged from 18 to 24 mm, in the females from 19 to 28 mm (the same range was shown by the ovigerous females). In the literature males have been reported with cl 18.2–54.5 mm (Guinot and Ribeiro, 1962), 62.5 mm (Miers, 1886), 71 and 75 mm (Rossignol, 1957) and 72 mm (Capart, 1951); A. Milne Edwards and Bouvier (1900) gave the span of their males as 200 to 250 mm. Non-ovigerous females with cl 14.4–49.5 mm and ovigerous females with cl 36.9, 40.2, and 44.2 mm were listed by Guinot and Ribeiro (1962). Monod (1956) gave the diameter of the eggs as 0.6 to 0.7 mm.

REMARKS.—Brullé (1837) gave a figure of the present species and on the plate used the name *Leptopodia lanceolata* for it. Later the same author (Brullé, 1839), now using the name *Leptopodia canariensis* sank it as a synonym of *Leptopodia sagittaria* (Fabricius, 1793) [= *Stenorhynchus seticornis* (Herbst, 1788)]. Practically all later authors accepted this synonymy. Only recently Yang (1967) showed that not one but three distinct species of the present genus have to be distinguished in the Atlantic region, one West African and two western Atlantic. Yang showed that the correct name for the West African species is *Stenorhynchus lanceolatus* (Brullé, 1837) and he indicated the differences between the three species. He based the West African form largely on part of the Pillsbury material listed above. Dr. Won Tack Yang intends to publish a more extensive paper on this problem, for which reason we only deal briefly with it here.

BIOLOGY.—The species has been collected at depths between 6 and 96 m (extremes 2–6 m, 5–7 m, 80 m, 75–90 m, and 96 m); more than 85% of the catches were from between 20 and 80 m.

The bottom on which the species was found was variously reported: sand and rock; sand and shells (A. Milne Edwards and Bouvier, 1900). Mud; green mud; brown and green mud; sand, mud, and rock (Capart, 1951). Coarse shelly sand, bottom with *Arca* and *Pyura* (Sourie, 1954b). Mud and sand; shell and sand (Longhurst, 1958). Stones; rock (Guinot and Ribeiro, 1962). Mud; mud and sand; mud and shells; sand and rock; sand, rock, coral, and calcareous algae; calcareous algae; calcareous and other algae; sand, calcareous and other algae; rock (Forest and Guinot, 1966).

Ovigerous females have been reported from all months except February (Capart, 1951; Monod, 1956; Guinot and Ribeiro, 1962; Forest and Guinot, 1966; present paper).

Monod (1956) reported upon a specimen carrying a branchial isopod parasite.

DISTRIBUTION.—*Stenorhynchus lanceolatus* is an eastern Atlantic species, known from Madeira, the Canary Islands, the Cape Verde Islands, and from numerous localities on the African mainland between Spanish Sahara and Angola. The following records are in the literature:

Madeira: No specific locality (White, 1847a; Miers, 1886). Off the S side of Madeira 15 fm [27 m] (Stimpson, 1858d, 1907).

Canary Islands: E coast of Isla de Gran Canaria and near the harbor of Puerto de Cabras, Isla de Fuerteventura (Koelbel, 1892). Near Isla de Tenerife, 28°28'N, 18°32'W [of Paris, 16°12'W of Greenwich], 80 m, and Estrecho de la Bocaina, 28°49'N, 16°13'W [of Paris, 13°53'W of Greenwich], 30 m (A. Milne Edwards and Bouvier, 1900).

Cape Verde Islands: No specific locality (Osorio, 1898). São Vicente (Miers, 1886; Osorio, 1888). Channel between Santo Antão and São Vicente, 75–90 m (A. Milne Edwards and Bouvier, 1900). Fajã di Agua, Brava, 8 and 50 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

Spanish Sahara: 21°05'N, 17°14'W, 43–45 m (Forest and Guinot, 1966). Between Cabo Barbas and Cabo Blanco and between Cabo Corbeiro and Cabo Blanco, 200 m (Maurin, 1968b).

Mauritania: Banc d'Arguin, 50 m (Maurin, 1968b).

Senegal: No specific locality (Herklots, 1861; Kingsley, 1880b). S of Ile de la Madeleine, 40 m; near Dakar, 14°41'30"–41"N, 17°18'30"–20'30"W, 20–25 m; 14°39'30"–40'30"N, 17°16'–18°30'W, 18–19 m; 14°38'–39'N, 17°16.5'–17.5'W, 26 m; between Gorée and Dakar, 16 m; area around

Gorée, 33–35 and 41 m; Banc du Séminole, Baie de Gorée, ca. 38 m; between Cap Manuel and S point of Gorée, 24–27 m; and off Ngaparou (all Monod, 1956). Baie de Dakar, 10–12 m (Sourie, 1954b). Rufisque, 14°30'N, 17°25'W, 24 m (Capart, 1951). 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

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

Guinea: No specific locality (Uschakov, 1970). 09°44'N, 13°56'W, 10 m; 09°40'N, 14°21'W, 25 m; 09°16'N, 13°42'W, 20 m; 09°16'N, 13°34'W, 10 m; 09°07'N, 13°41'W, 25 m; and 09°N, 13°50'W, 30 m (Monod, 1956). 09°36'N, 13°57'W, 18–30 m (Forest and Guinot, 1966). Off Conakry, 10 m; Matakong, ca. 15 m (Monod, 1956). Between Île Tamara and Île Roume, Îles de Los, 10–12 m (Capart, 1951).

Sierra Leone: No specific locality, in 25 m (Longhurst, 1958). 08°38'–08°42'N, 8–12 m (Monod, 1956).

Ivory Coast: 05°05'N, 04°59.5'W, 22 m (Voss, 1966; Yang, 1967). Lagoon at Abidjan, 05°16'N, 04°01'20"W (Forest and Guinot, 1966). Off Port-Bouët (Monod, 1956). Off Grand-Bassam, 15–60 m (Le Loeuff and Intès, 1968). Over all of the continental shelf (Le Loeuff and Intès, 1969).

Ghana: 04°46'N, 02°30'W to 04°45'N, 02°33'W, 61–64 m (Voss, 1966; Yang, 1967). Off Takoradi (Gauld, 1960). Off Accra, 32–51 m (Monod, 1956; Gauld, 1960).

Nigeria: No specific locality (Monod, 1956). Off the mouths of the Niger River, 04°03'N, 06°12'E, 32 m (Forest and Guinot, 1966). Off the Niger delta, 04°03'N, 05°41'E to 04°07'N, 05°40'E, 33 m, and 04°04'N, 06°18'E to 04°05'N, 06°22'E, 30 m (Yang, 1967).

Cameroon: No specific locality, in 30–50 m (Crosnier, 1964).

Principe: 01°43'10"N, 07°28'20"E, 73 m; 01°43'N, 07°28'55"E, 37 m; 01°38'35"N, 07°21'35"E, 35 m; 01°35'N, 07°28'E, 45 m (Forest and Guinot, 1966).

São Tomé: No specific locality (Osorio, 1887, 1889, 1898; Balss, 1922). Praia da Fernão Dias (Osorio, 1888). 00°25'40"N, 06°40'10"E, 50 m; 00°25'15"N, 06°43'05"E, 8–30 m; Morro Peixe, 2–6 m (Forest and Guinot, 1966).

Annobon: No specific locality, 18–20 m (Capart, 1951). N of San Antonio, 23 m (Forest and Guinot, 1966).

Congo: Off Pointe-Noire (Monod, 1956; Rossignol, 1957). W of Pointe-Noire, 40 m (Rossignol, 1962). 32 mi [51.5 km] W of Pointe-Noire, 04°48'S, 11°30'E, 50 m; 11 mi [17.7 km] WSW of Pointe-Noire, 04°52'S, 11°39'30"E, 58–60 m; 8 mi [12.9 km] WSW of Pointe-Noire, 04°53'S, 11°53'E, 50–70 m (Capart, 1951).

Cabinda: 05°03'S, 11°24'E, 36–48 m (Capart, 1951).

Angola: No specific locality (Miers, 1886; Guinot and Ribeiro, 1962). 11 mi [17.7 km] W of Cabo Ledo, Luanda, 09°40'S, 13°02'E, 80 m (Capart, 1951). Benguela, 13–26 m; Baía Farta, 30 m; Baía da Caota, 13.5 and 30 m (Guinot

and Ribeiro, 1962). Porto Alexandre, Moçâmedes (Odhner, 1923).

Subfamily MAJINAE Samouelle, 1819

Genus *Maja* Lamarck, 1801

Maja Lamarck, 1801:154 [type-species: *Cancer squinado* Herbst, 1788, by subsequent designation under the plenary powers of the International Commission on Zoological Nomenclature in Opinion 511; gender: feminine; name 1260 on *Official List*].

Meria Griffith and Pidgeon, 1833:165 [erroneous spelling of *Maja*].

Paramya de Haan, 1837, pl. 24 [type-species: *Pisa (Paramya) spinigera* de Haan, 1837, by monotypy; gender: feminine].

Mamaia Stebbing, 1905:23 [substitute name for *Maja*; type-species: *Cancer squinado* Herbst, 1788; gender: feminine].

REMARKS.—Guinot and Ribeiro (1962:76, footnote), in their account of *M. squinado*, remarked on the status of West African species of *Maja* as follows: "Nous identifions provisoirement ces spécimens à *Maja squinado*, mais la systématique des *Maja* ouest-africaines n'est pas entièrement satisfaisante et fera l'objet d'une mise au point ultérieure." To our knowledge these authors have not pursued this problem, and, inasmuch as we lack material of *Maja* from tropical localities, we have not been able to investigate it ourselves. Those working with West African *Maja* in the future should take this into account.

Maja crispata Risso, 1827

Maia crispata Risso, 1827:23.

Maja verrucosa.—Monod, 1956:477 [references].—Zariquiey Alvarez, 1968:447, figs. 149b, 150a-f, 156a [Spain; references].

SYNONYMS.—*Maia verrucosa* H. Milne Edwards, 1834 (see Holthuis, 1977b:72); *Cancer majodes* Nardo, 1847.

DISTRIBUTION.—Eastern Atlantic, from Portugal to Cabo Blanco and the Cape Verde Islands, Mediterranean; shallow water, littoral and sublittoral.

Maja goltziana d'Oliveira, 1888

Maja goltziana.—Capart, 1951:100, fig. 33 [Gabon].—Monod, 1956:478, 632, figs. 644, 645 [Guinea, Sierra Leone, Nigeria, Principe].—Rossignol, 1957:116 [key]; 1962:121 [Congo].—Crosnier, 1967:339, figs. 31, 32 [Congo, Annobon].—Longhurst, 1958:88 [Sierra Leone].—Zariquiey Alvarez, 1968:447 [Portugal; references].—Massuti, 1970:127 [Rio Muni].

Maia goltziana.—Le Loeuff and Intès, 1968, table 1 [Ivory Coast].

Maia goltziana.—Maurin, 1968a:30, 48 [Morocco, Spanish Sahara]; 1968b:484 [Spanish Sahara].

DISTRIBUTION.—Eastern Atlantic, from the Mediterranean and Portugal S to the Congo, including Annobon and Principe islands in the Gulf of Guinea; sublittoral, in 15–200 m.

Maja squinado (Herbst, 1788)

Maja squinado.—Capart, 1951:98, fig. 32 [Spanish Sahara, Mauritania].—Monod, 1956:474, figs. 638–643 [Spanish Sahara, Mauritania, Senegal, Guinea].—Figueira, 1960:11 [Azores].—Guinot and Ribeiro, 1962:75 [Cape Verde Islands, Angola].—Ribeiro, 1964:18 [Cape Verde Islands].—Forest and Guinot, 1966:95 [Guinea-Bissau].—Crosnier, 1967:339 [Gabon; Congo or Gabon].—Monod, 1967:182, pl. 16: fig. 2 [no localities].—Zariquiey Alvarez, 1968:446, figs. 149a, 150g,h [Spain; references].—Christiansen, 1969:131, fig. 54, map 47 [North Atlantic].—Kensley, 1970:180 [South-West Africa].—Ribeiro, 1973:6 [Cape Verde Islands].

Maia squinado.—Sourie, 1954b:147 [Senegal].

Maia squinado.—Chapman and Santler, 1955:375 [Azores].—Forest and Gantès, 1960:356 [Morocco].—Gauld, 1960:72 [Ghana].—Maurin, 1968a:48; 1968b:484 [both Spanish Sahara].—Bas, Arias, and Guerra, 1976:169 [Spanish Sahara].

Maja squinada.—Massuti, 1970:127 [Rio Muni].

SYNONYM.—*Maia squinado* var. *brachydactyla* Balss, 1922.

DISTRIBUTION.—Eastern Atlantic, from the North Sea southward to South-West Africa, including the Mediterranean; sublittoral to about 75 m.

Subfamily PISINAE Dana, 1851

Genus *Apiomithrax* Rathbun, 1897

Phycodes A. Milne Edwards, 1869:374 [invalid junior homonym of *Phycodes* Guenée, 1852 (Lepidoptera); type-

species: *Phycodes antennarius* A. Milne Edwards, 1869, a subjective junior synonym of *Micropisa violacea* A. Milne Edwards, 1867, by monotypy; gender: masculine].

Apiomithrax Rathbun, 1897b:164 [substitute name for *Phycodes* A. Milne Edwards, 1869; type-species: *Phycodes antennarius* A. Milne Edwards, 1869, by monotypy; gender: masculine].

Apiomithrax bocagei (Osorio, 1887)

Micropisa violacea.—A. Milne Edwards and Bouvier, 1900: 130 [part].—Rathbun, 1925:303, pl. 241: figs. 5–8 [part].—Capart, 1951:93, fig. 30, pl. 2: figs. 12, 13 [part, all but one specimen from Dakar (Monod, 1956:509)]. [Not *Micropisa violacea* A. Milne Edwards, 1867.]

Apiomithrax bocagei.—Monod, 1956:508, figs. 692–702.—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962:76.—Forest and Guinot, 1966:105.—Le Loeuff and Intès, 1968:46, 70, table 1, figs. 52, 61; 1969:63, 64, 65.

Micropisa bocagei.—Rossignol, 1957:78, 116 [key], pl. 1: figs. 6–9, pl. 3: fig. 2.

Micropisa (Apiomithras) bocagei.—Rossignol, 1962:122.

Micropisa spinosa Forest and Guinot, 1966:105 [nomen nudum; discussion of manuscript name].

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: West Africa: 1906, F. P. Vermeulen, 1♂ (L).

Spanish Sahara: Off Cabo Blanco, 21°47'N, 19°47'W of Paris (17°27'W of Greenwich), 140 m, green sandy mud, 1883, *Talisman*, 1♂ (W).

Liberia: Off Saint Paul River mouth, 4–11 fm [11–20 m], G. C. Miller, 6 Jan 1953, 2♂, 1♀ (W).

Cameroon: Kribi, caught by fisherman with beach seine, 9 Aug 1964, B. de Wilde-Duyfjes, 1♂, 1♀ (some ov) (L).

Congo: Near Pointe-Noire, 04°45'S, 11°48'E, 15–18 m, 18 Jan 1966, *Ombango*, A. Crosnier, 2♂, 7♀ (5 ov) (W).

DESCRIPTION.—Capart, 1951:93; Monod, 1956: 500–501 (comparison with *A. violaceus*).

Figures: Monod, 1956, figs. 692–702.

Male Pleopod: Monod, 1956, figs. 701, 702 (Ghana); Rossignol, 1967, pl. 3: fig. 2 (Congo).

MEASUREMENTS.—Carapace lengths of males 26.2 to 33.0 mm, of non-ovigerous females 26.3 to 29.5 mm, of ovigerous females 27.8 to 34.1 mm. Monod (1956) recorded specimens as large as 48 mm.

REMARKS.—Monod (1956) transferred this species and *A. violaceus* from *Micropisa* to *Apiomithrax*.

The male specimen from Spanish Sahara cited

above, collected by the *Talisman* in 1883, had been identified with *A. violaceus* by A. Milne Edwards and Bouvier (1900) and Rathbun (1925). As suggested by Monod (1956:504, footnote), it appears to be a typical *A. bocagei*.

BIOLOGY.—This species occurs off West Africa from the shore to a depth of 140 m; most specimens have been collected in shallower water, 20 m or less. Monod (1956) included material collected at a beach, on bottom with *Palythoa* and *Molgula* on sand in 15 to 20 m, and on muddy sand in 10 m. Gauld (1960) noted that off Ghana it was occasionally taken in shore seines and was common in tangle nets in depths to 20 m. Guinot and Ribeiro (1962) reported material taken off Angola in a beach seine, by hand at low tide, and in mud at a depth of 40 m. It was taken off Principe by the *Calypso* in calcareous algae, sand, and mud at a depth of 6 m (Forest and Guinot, 1966). Our specimen from the *Talisman* collection was taken on green sandy mud in 140 m.

Le Loeuff and Intès (1968) took it off the Ivory Coast in depths of 8 to 40 m, usually between 15 and 30 m, in all types of sediment. They recorded only *A. bocagei* there and commented (1968:46):

Il semble que ce phénomène d'exclusion d'une espèce par l'autre soit la règle. Il y aurait des régions à *A. bocagei* (Ghana - Côte d'Ivoire), d'autre à *A. violaceus* (Sénégal, Iles Principe et San Tomé). Les données sont encore insuffisantes pour suivre la distribution des deux espèces dans l'espace, du Sénégal à l'Angola, et bien sûr dans le temps: mais il serait intéressant de savoir s'il existe des alternances dans la dominance d'une espèce sur l'autre, en un lieu donné.

They later commented (1969:64): "Il se peut donc que *A. violaceus* ait été éliminé [off the Ivory Coast] par *A. bocagei* ou qu'il n'ait jamais pu s'installer." In this paper they described *A. bocagei* as a mud-dwelling species.

Ovigerous females have been collected in January, February, March, April, May, August, November, and December (Capart, 1951; Monod, 1956; present paper).

DISTRIBUTION.—West Africa, where it has been recorded from numerous localities between Cabo Blanco and southern Angola, from the shore to 140 m, generally in 50 m or less. Monod (1956)

recorded many specimens from localities between Senegal and the Congo. Since 1956 it has been reported from the following:

Sierra Leone: No specific locality, 8–25 m (Longhurst, 1958).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Sassandra, off Fresco, off Grand-Lahou, off Jacqueline, off Grand-Bassam, 8–40 m (Le Loeuff and Intès, 1968).

Ghana: No specific locality, shore to 20 m (Gauld, 1960).

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

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

Angola: No specific locality; Benguela (Forest and Guinot, 1966). Luanda, beach seine; Porto Amboim, 40 m; Baía de Benguela, shore (Guinot and Ribeiro, 1962).

****Apiomithrax violaceus***
(A. Milne Edwards, 1867)

Micropisa eryophora De Rochebrune, 1883:167.—Rathbun, 1900a:294 [listed].—Balss, 1922:73 [listed].—Monod, 1956:513.

Herbstia eryophora.—Miers, 1886:49 [listed].—Rathbun, 1893a:93 [listed].

Micropisa violacea.—Capart, 1951:93 [part, not illustrated specimen].—Sourie, 1954b:147, 152.—Rossignol, 1957:78, 116 [key], fig. 2, pl. 1: figs. 2–5, pl. 3: fig. 1.—Buchanan, 1958:20, 24.—Crosnier, 1964:31, 32.

Apiomithrax violaceus.—Monod, 1956:502, figs. 682–691.—Longhurst, 1958:89.—Gauld, 1960:72.—Monod, 1963, fig. 41 [no material].—Forest and Guinot, 1966:104.—Le Loeuff and Intès, 1969:64 [discussion].

Micropisa (Apiomithrax) violacea.—Rossignol, 1962:122 [erroneous spelling].

SYNONYMS.—*Phycodes antennarius* A. Milne Edwards, 1869; *Micropisa eryophora* De Rochebrune, 1883.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 70, 33 m, branched Foraminifera, 1♂ (L).

Other Material: Dahomey: Harbor of Cotonou, 26 Mar 1964, H. Hoestlandt, 1 juv ♀ (L).

Congo: Off Pointe-Noire, 04°46'15"S, 11°48'15"E, 18 m, 25 Jan 1966, Ombango, A. Crosnier, 1♂ (W).

DESCRIPTION.—Monod, 1956:500–501 (comparison with *A. violaceus*).

Figures: Monod, 1956, figs. 682–691.

Male Pleopod: Monod, 1956, figs. 687–689 (Senegal); Rossignol, 1957, pl. 3: fig. 1 (Congo).

MEASUREMENTS.—Our specimens are all quite small, having carapace lengths of 10.5 mm or less. Monod (1956) recorded a specimen 50 mm long.

REMARKS.—The identity of the species described by De Rochebrune (1883) as *Micropisa eryophora*, from the mouths of the Casamance and Gambia rivers, has remained unsolved until now. Miers (1886) placed it in *Herbstia* and Balss (1922) retained it in *Micropisa* but suggested it could be identified with *A. violaceus*. Monod (1956) listed it as "*Micropisa eryophora*" and discussed it after his account of *Apiomithrax*, but did not identify it with any West African species then known.

De Rochebrune's longer French account (1883: 167, 168), based on a small specimen, 18 mm long, 15 mm wide, is as follows:

Carapace plus longue que large, couverte ainsi que les pattes de longs poils grisâtres enchevêtrés; les parties [p. 168] inférieures garnies de poils courts, rigides; front bifide, à cornes courtes et obtuses; bord externe de l'orbite armé d'une dent obtuse, dirigée en dehors; bords latéraux garnis d'épines assez longues, molles; trois tubercules saillants disposés sur une ligne transversale au niveau de la région gastrique; quatre autres épines au centre de la carapace; régions branchiales et hépatiques supportant des épines assez fortes, terminées par une étranglement surmonté d'un bouton de consistance molle; pinces faibles, à doigts écartés, se touchant seulement à leur extrémité; pattes ambulatoires assez fortes, laineuses.

Couleur générale brun rougeâtre, visibles à travers le feutrage des poils; pointe des épines rose, pattes rosées.

The body proportions of *M. eryophora*, length 6/5 width, suggest that it is based upon an *Apiomithrax* rather than a *Herbstia* or *Micropisa*; small specimens of *Herbstia* are relatively slender (Monod, 1956, figs. 649, 650) and *Micropisa ovata* (Monod, 1956, fig. 669) lacks dorsal spines on the midline of the carapace. That the branchial and hepatic spines were described as terminating in spongy buttons suggests that the specimen was covered with a sponge, not that the spines were enlarged distally. The mention of long setae on the carapace and legs suggests that De Rochebrune was dealing with the relatively hairy *A. violaceus* rather than *A. bocagei*. Finally, the de-

scription of three prominent tubercles arranged in a transverse row across the level of the gastric region plus four other spines in the center of the carapace (not described by De Rochebrune as being in a longitudinal row) is precisely the condition figured by Monod (1956, fig. 682) for *A. violaceus*. We have no hesitation in identifying *Micropisa eryophora* De Rochebrune, 1883, with *Micropisa violacea* A. Milne Edwards, 1867.

Although Monod (1956:502, synonymy) indicated that the type-locality of *Micropisa violacea* was "St. Vincent du Cap Vert," A. Milne Edwards (1867a:33-35) actually had material from two localities, São Vicente and "la côte d'Angola," and specimens from these two localities are syntypes. Monod (1933b:506 and 1956:508) examined the specimen from Angola and, like A. Milne Edwards, considered it to be conspecific with the material from the Cape Verde Islands. However, the type-locality of *M. bocagei* also is Angola. In order to insure that the name *Micropisa violacea* will continue to be used in the sense originally employed by A. Milne Edwards (1867a), we select the specimen figured by him on the plate (pl. 21: fig. 1) that accompanied his account of the species in volume 1 of *Les Fonds de la Mer*. Apparently the plates that accompanied this volume were not issued with it but were issued after livraison 24 of volume 2, published in 1872, i.e., with one of the livraisons of that volume issued between 1873 and 1876 (see Rehder, 1946:74, for an account of the dates of publication of the individual livraisons and some of the figures).

BIOLOGY.—Like *A. bocagei*, this species apparently prefers soft bottoms in relatively shallow water. Although it has been recorded from a depth of 110-180 m from the *Talisman* collections, it usually occurs in depths of 35 m or less. The single specimen taken by the *Pillsbury* was collected from branched Foraminifera in 33 m. Sourie (1954b) in a study of sand habitats, found it in Senegal in 10-12 m on bottom with *Arca* and *Pyura*, in coarse shelly sand and on fine shelly sand with mud and with *Molgula hannensis* (Pérès), 2-7 m. In a study of the rocky shore fauna of Senegal, Sourie (1954a) included it with the "hy-

pobioties lapidicoles mobiles," the "hypobioses detricicoles" where it was associated with *Sidonops senegalensis* (Topsent) and *Eurythoe complanata* (Pallas), and as a representative of the "horizons moyens et inférieurs" on rocky shores. Buchanan (1958) reported that it was abundant in the sandy silt community in 8-20 fm (15-36 m) and also in the inshore fine sand community in 3-8 fm (6-15 m) off Accra, Ghana. Monod (1956) recorded a few notes on habitat: bottom with *Palythoa* and *Molgula* on sand in 15-20 m, muddy sand in 10 m, and specimens collected at the shore, beach, or reef. Longhurst (1958) found the species off Sierra Leone in sandy mud in estuaries or on shelly sand offshore, in depths between 6 and 25 m. Crosnier (1964) found it off Cameroon in 0-32 m, in sand with Foraminifera on rocky bottom with gorgonians, and characterized it as a warm water crustacean. Gauld (1960) noted that it was common on rocky shores throughout Ghana and was occasionally taken sublittorally. Forest and Guinot (1966) recorded the following habitats: from mud with *Arca* in 32 m off the Niger delta; from rocks, coral, sand, and calcareous algae in 3-10 to 35 m off Principe; from rocks on shore and from calcareous algae, rocks, coral, sand, on an anchor and in a sponge, in 2 to 10 m off São Tomé; and from similar bottoms in 7 to 60 m off Annobon.

Ovigerous females have been taken in January through June and July through September (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—This species, like *A. bocagei*, occurs off West Africa from numerous localities between Cabo Blanco and Angola; in depths to 110-180 m, generally in less than 35 m; unlike *A. bocagei*, it also occurs off Brazil (Rathbun, 1925). Monod (1956) reported on many specimens from localities between Mauritania and Gabon; in addition to Monod's records, *A. violaceus* has been recorded from the following:

Senegal: Dakar (Sourie, 1954b). Mouth of the Casamance River (De Rochebrune, 1883).

Gambia: Mouth of the Gambia River (De Rochebrune, 1883).

Sierra Leone: No specific locality, in 6–25 m (Longhurst, 1958).

Ghana: Off Accra, 6–36 m (Buchanan, 1958). No specific locality (rocky shores throughout Ghana) (Gauld, 1960).

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

Cameroon: No specific locality, 0–32 m (Crosnier, 1964).

Principe: Baía das Agulhas, 4–8 m; 01°38'35"N, 07°21'35"E, 35 m; Ilhéus dos Mosteiros, 3–10 m (Forest and Guinot, 1966).

São Tomé: In front of São Tomé, 8 m; 00°20'N, 06°46'E, 10 m; Ponta Diogo Vaz; Praia Santa Catarina; Ilhéu Macaco; off Ponta Diogo Nunes, shore and 4–5 m; in front of Ponta Oquedelrei; Morro Peixe; and Ilhéu das Cabras, shore (all Forest and Guinot, 1966).

Annobon: 01°24'04"S, 05°36'45"E, 7–10 m; 01°26'15"S, 05°35'40"E, 60 m; NW coast, Isla Tortuga, 15–40 m (all Forest and Guinot, 1966).

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

Genus *Eurynome* Leach, 1814

Eurynome Leach, 1814:431 [type-species: *Cancer asper* Pennant, 1777, by monotypy; gender: feminine; name 1623 on *Official List*].

**Eurynome aspera* (Pennant, 1777)

Eurynome aspera.—Capart, 1951:86, pl. 2: fig. 4.—Chapman and Santler, 1955:375.—Monod, 1956:480, figs. 646–648.—Longhurst, 1958:89.—Forest and Guinot, 1966:95.—Zariquiey Alvarez, 1968:462, figs. 14g, 153a, 154f [Spain; references].—Christiansen, 1969:126, fig. 52, map 45 [North Atlantic].—Crosnier, 1970:1217, pl. 1: figs. 1–4 [Mediterranean in part].—Türkay, 1976a:25 [listed], 39 [Portugal in part].

SYNONYMS.—*Eurynome scutellata* Risso, 1827; *Eurynome boletifera* Costa, 1838; ?*Eurynome longimana* Stimpson, 1858; *Eurynome aspera* var. *acuta* A. Milne Edwards and Bouvier, 1900.

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

Undaunted Material: Angola: Sta 96, 162 m, 1♂ (L).

DESCRIPTION.—Hartnoll, 1961:173; Christiansen, 1969:126.

Figures: Monod, 1956, figs. 646–648.

Male Pleopod: Hartnoll, 1961, fig. 4a,b (Isle of Man); Capart, 1951, pl. 2: fig. 4 (Spanish Sahara); Monod, 1956, figs. 647, 648 (Senegal).

REMARKS.—Apparently this species is rare off West Africa. Monod (1956) recorded six specimens and only two were taken by the *Pillsbury*.

Barnard (1950) has recorded this species from South Africa and suggested that *E. longimana* Stimpson, 1858, should be considered a synonym of *E. aspera*. Capart (1951) considered *E. longimana* to be a distinct species, but Griffin (1964, 1974) left it in synonymy. Crosnier (1970) agreed with Barnard and Griffin and pointed out additional similarities between material available to him and that reported by Barnard. If those considering *E. longimana* to be a synonym of *E. aspera* are correct, the latter species occurs from Norway southward to South Africa.

BIOLOGY.—Little information is available for West African specimens of *E. aspera*, but apparently it prefers a firm substrate with relatively large particles in it. Chapman and Santler (1955) reported it from rocks in a harbor. Longhurst (1958) took one specimen on shelly sand in 100 m and Forest and Guinot (1966) also reported one specimen from algae and calcareous algae in 60 m. Our specimens were taken on broken shell in 70 m. The overall depth range is wide, from 10 m or less to 550 m (Monod, 1956).

DISTRIBUTION.—*Eurynome aspera* is widely distributed in the eastern Atlantic, from Norway to Angola, including the Mediterranean, and, possibly, from South Africa, in depths between 10 and 550 m. Monod (1956) reported on material from Senegal and Principe Island; in addition to Monod's records the species has been recorded from the following:

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

Morocco: 33°27.7'N, 08°50.8'W, 161–168 m; and 33°10.5'N, 09°17.5'W, 170–345 m (Türkay, 1976a).

Mauritania: Banc d'Arguin, 21°31'N, 19°48'W of Paris (17°28'W of Greenwich), 235 m (Crosnier, 1970).

Sierra Leone: No specific locality, 100 m (Longhurst, 1958).

Annobon: 01°26'15"S, 05°35'40"E, 60 m (Forest and Guinot, 1966).

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

**Eurynome parvirostris* Forest and Guinot,
1966

Eurynome parvirostris Forest and Guinot, 1966:95, fig. 9.

MATERIAL EXAMINED.—*Pillsbury Material*: Ghana: Sta 16, 46 m, mud with Foraminifera, shells, 1♀ (W). Sta 23, 42 m, foliate brown to orange bryozoans, 1♀ ov (L).

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

DESCRIPTION.—Forest and Guinot, 1966:95.

Figure: Forest and Guinot, 1966, fig. 9.

MEASUREMENTS.—Our specimens have carapace lengths of 6 mm. The two type-specimens had carapace lengths of 6.3 mm each.

BIOLOGY.—This species may have different habitat requirements than *E. aspera*, for most specimens have been taken on soft bottoms: mud with *Arca* in 32 m (Forest and Guinot, 1966), and mud with Foraminifera and shells in 46 m, or

mud with foliate bryozoans in 42 m. The known depth range is relatively narrow, from 30 to 46 m.

DISTRIBUTION.—Off tropical West Africa, where it has been recorded from off Dahomey, Ghana, and off the mouths of the Niger River, 04°03'N, 06°12'E, 32 m (Forest and Guinot, 1966).

Genus *Herbstia* H. Milne Edwards, 1834

Herbstia H. Milne Edwards, 1834:301 [type-species: *Cancer condyliatus* Fabricius, 1787, by monotypy; gender: feminine; name 1625 on *Official List*].

Rhodia Bell, 1835:169 [type-species: *Rhodia pyriformis* Bell, 1835, by monotypy; gender: feminine].

Herbstiella Stimpson, 1871b:93 [type-species: *Herbstia depressa* Stimpson, 1860, by original designation; gender: feminine].

Fisheria Lockington, 1877:72 [type-species: *Fisheria depressa* Lockington, 1877, a subjective junior synonym of *Herbstiella camptacantha* Stimpson, 1871, by monotypy; gender: feminine].

Key to Species of Adult *Herbstia* from West Africa

1. Posterior median margin of carapace with trilobed projection. [Opposable margins of dactyli of walking legs with fixed, triangular teeth] *H. condyliata*
- Posterior median margin of carapace with single projection 2
2. Carapace, smooth, regions poorly defined. Upper surface of palm in males smooth. Opposable margins of dactyli of walking legs with fixed triangular teeth *H. nitida*, new species
- Carapace rugose, regions well defined. Upper surface of palm in males with row of tubercles. Opposable margins of dactyli of walking legs lacking fixed triangular teeth *H. rubra*

**Herbstia condyliata* (Fabricius, 1787)

FIGURE 79

Cancer condyliatus Fabricius, 1787:324.

Herbstia condyliata.—Monod, 1933a:212.—Forest and Gantès, 1960:356.—Zariquiey Alvarez, 1968:455, fig. 153c,d [Spain; references].

Herbstia rubra.—Sourie, 1954a:113, 254, 256, 294; 1954b:147.—Chapman and Santler, 1955:375.—Monod, 1956:482, figs. 650–653 [part, not fig. 649]. [Not *Herbstia rubra* A. Milne Edwards, 1869.]

SYNONYMS.—*Mithrax herbsti* Risso, 1827; *Mithrax scaber* Costa, 1840.

MATERIAL EXAMINED.—*Pillsbury Material*: Ghana: Sta 22, 51 m, rough bottom, 1♂ (L).

Other Material: Madeira: SE coast, near Canical, 32°44'N, 16°44'W, 0–22 m, shore collecting, snorkeling, and diving, 11 Mar 1976, *Onversaagd* Sta 48, 1♂ (L). S coast Ponta da Garajau, 32°38'N, 16°51'W, 5–26 m, diving, 17 Mar 1976, *Onversaagd* Sta 111, 1♀ (L).

DESCRIPTION.—Carapace (Figure 79a,c,d) pyriform, irregular dorsally, ornamented with numerous spines, regions well marked; surface covered with thin coat of low, dark setae. Gastric, cardiac, and intestinal regions each elevated in midline.

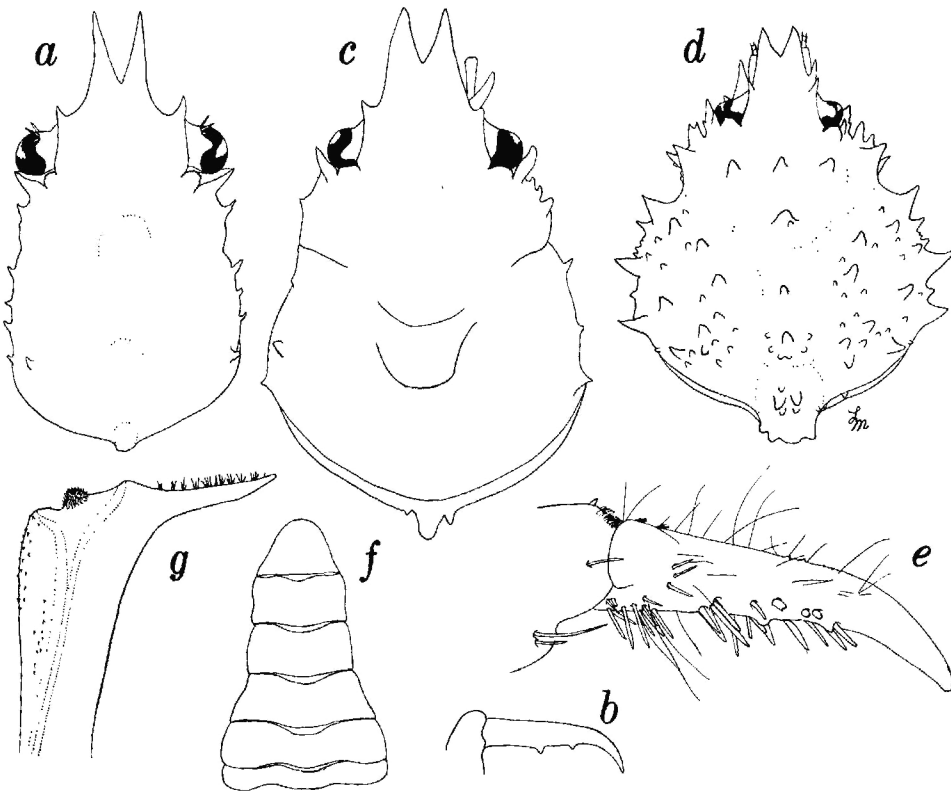


FIGURE 79.—*Herbstia condyliata* (Fabricius). Juvenile, cl 4.2 mm, Sicily: *a*, carapace; *b*, dactylus of fifth pereiopod. Male, cl 10.8 mm, Spain: *c*, carapace. Male, cl 29.6 mm, Pillsbury Sta 22: *d*, carapace; *e*, dactylus of fifth pereiopod; *f*, abdomen; *g*, apex of gonopod.

Gastric region with 3 raised protogastric tubercles in transverse line anteriorly (Figure 79*d*), large median mesogastric tubercle posteriorly; posterior tubercle with secondary tubercle(s) on slope. Cardiac region with 2 tubercles in midline, anterior (urogastric?) smaller, posterior ringed with secondary tubercles posteriorly. Intestinal prominence bituberculate in midline, with 2 smaller submedian tubercles posteriorly. Posterior margin of carapace (Figure 79*d*) with well-developed, trilobed, posterior projection, separate from intestinal prominence. Hepatic region with 1 spine in line with lateral branchial spines flanked ventrally by patch of 2 or 3 large spines, subhepatic region with 1 or 2 lines of sharp tubercles. Branchial region with 4 major spines laterally, flanked laterally and dorsally by numerous spines and tubercles. Rostral teeth short but sharp, apices slightly convergent. Preorbital and postorbital

spines sharp. Basal antennal article with long anterior spine visible in dorsal view, prominent sharp proximal spine present suborbitally, prominent postorbital spine also present ventrally, ventral border of orbit smooth.

Chelipeds enlarged, much longer than carapace in adult males, variously ornamented with tubercles, spines, and setae. Merus rough, tuberculate, with row of large spines dorsally. Carpus tuberculate, with 1 larger spine on outer margin. Palm inflated in adult males, with row of rough, granulated tubercles dorsally. Fingers shorter than palm, with proximal gape, dactylus with large, blunt tooth in gape.

Walking legs slender, fifth longer than carapace, variously tuberculate, with short setae and corneous bristles. Meri of walking legs with some spines dorsally (usually 1 or 2 proximally, 1 distally), largest distal. Dactylus shorter than pro-

podus, ventral margin with slender spines and usually with 1 or 2 triangular teeth (Figure 79*b,e*), large in juvenile, smaller in adult.

Male gonopod and abdomen as shown (Figure 79*f,g*).

MEASUREMENTS.—Carapace lengths of males 7.8 to 29.6 mm, of female 18 mm.

REMARKS.—*Herbstia condyliata* can readily be distinguished from other West African species of the genus, *H. rubra* and *H. nitida*, new species, by its larger size, much more spinulose carapace, and presence of a trilobed projection on the posterior margin of the carapace (as shown in Monod, 1956, fig. 650, and herein, Figure 79*d*), where it is almost quadrilobed. The chelipeds in adult males of *H. condyliata* are greatly enlarged, being much longer than the carapace; in the two smaller West African species the chelipeds in adult males are subsimilar to those of females. *Herbstia condyliata* agrees with *H. nitida*, new species, and differs from *H. rubra* in having fixed, triangular teeth on the opposable margin of the dactyli of the walking legs.

Because smaller specimens of this species have been confused with the adults of the two smaller West African species, we have sketched the carapace shape in a juvenile, cl. 4.2 mm (W), from Sicily (Figure 79*a*) and a larger specimen from Spain, cl. 10.8 mm (L) (Figure 79*c*), as well as an outline of our adult from Ghana (Figure 79*d*). In the smallest specimen, the carapace is very slender, its dorsal armature is reduced, and there is but one posterior spine. In the specimen from Spain the characteristic three posterior spines of the adult are developed, although the spinulation of the carapace is still reduced. Monod (1956, fig. 650) figured a female 15.5 mm long, in which the carapace is still more slender than in the adult but in which the posterior spines of the carapace are well developed. In Monod's figure, the transverse line of three protogastric tubercles is not shown.

A. Milne Edwards and Bouvier (1900:128) suggested that *H. rubra* might only be a race of *H. condyliata* and Monod (1956:485) more or less agreed with this:

Il n'est nullement impossible que l'étude de matériaux plus nombreux, et provenant en particulier des régions marocaine ou saharienne, n'oblige à tenir un jour *rubra* pour synonyme de *condyliata*, ou tout au moins comme une forme subordonnée, moins tuberculée, et aussi plus petite.

Monod was working with juveniles of *H. condyliata* as well as adults of both other species, and, in view of the similarities between specimens of similar size of all three species, it is not surprising that they were not separated by him.

Although it is impossible to be certain in view of the relatively small number of *Herbstia* recorded from West Africa and the relatively unreliable literature records, it seems likely that *H. rubra* is restricted to the Cape Verde Islands, *H. nitida*, new species, occurs only on the offshore islands of the Gulf of Guinea, and *H. condyliata* occurs on the continental shelf.

The male pleopod of *H. condyliata*, the type-species of the genus, is shown in Figure 79*g*. It resembles that shown by Garth (1958, pl. S: figs. 7, 8) for the eastern Pacific species *H. pubescens* Stimpson and *H. pyriformis* (Bell) in that there is a subapical rounded, spinulose knob flanked by a distinct notch; this knob is present on the gonopods of all three species reported here. As noted by Garth (1958:300) in his key to West American *Herbstia*, the other western American species lack the subapical notch on the male pleopod. Further study may well indicate that *Herbstia*, as currently recognized, comprises representatives of more than one genus.

BIOLOGY.—Sourie (1954b) found this species on coarse, shelly sand, with mud, bottom with *Arca* and *Pyura*, in 2-7 m, at Anse de Hann, Baie de Dakar, and subsequently included the species as a component of the rocky shore fauna of Senegal. Monod (1933a:212) reported two specimens associated with sponges, and, in 1956, reported a specimen collected during a spring low tide. The single specimen taken by the Pillsbury was taken on rough bottom at a depth of 51 m.

DISTRIBUTION.—Mediterranean Sea and adjacent Atlantic south to Ghana. Since 1956 it has been recorded from Morocco: Temara, Skhirat, and David (Forest and Gantès, 1960).

Barrois (1888) recorded the species from the Azores, and also indicated, without citing a reference, that the species occurred in the Canary Islands. The specimens reported from Horta and Pasteleiro, Faial, Azores, by Chapman and Santler (1955) as *H. rubra* may be referable to *H. condyliata*; *H. rubra* is known with certainty only from the Cape Verde Islands.

****Herbstia nitida*, new species**

FIGURE 80

?*Herbstia rubra*.—Monod, 1956:482 [part].—Forest and Guinot, 1966:97. [Not *Herbstia rubra* A. Milne-Edwards, 1869.]

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 3♂, 3♀ (2 ov), 1 juv (W). Sta 282, 18–37 m, nodular coralline algae, 3♂ (includes holotype), 3♀ (2 ov), 1 juv (L). Sta 283, 51–55 m nodular coralline algae, 1♀ (L).

DESCRIPTION.—Carapace (Figure 80*a,b*) pyriform, appearing smooth dorsally but minutely rugose, regions poorly marked; light coat of short setae present laterally. Gastric and cardiac regions slightly inflated, latter with single low dorsal tubercle, gastric region with 3 low tubercles in transverse line. Intestinal region with low, obtusely rounded prominence, slightly swollen dorsally, and with single posterior projection in larger specimens. Hepatic region with 3 or 4 sharp tubercles, smaller tubercles present on subhepatic region. Branchial region with 4 lateral tubercles or short spines, 2 smaller tubercles present dorsally. Rostral teeth (Figure 80*c,d*) short but sharp, apices recurved mesially; several short, corneous bristles present at base of rostrum. Preorbital and postorbital spines sharp. Basal antennal article with long, smooth anterior spine, visible in dorsal view, and shorter proximal tooth under orbit. Ventral surface of orbit smooth, small postorbital tubercle present.

Chelipeds (Figure 80*e*) not enlarged in adult males, in both sexes about as long as carapace; merus, carpus, and propodus with small corneous bristles and short stiff setae; merus with numerous

low tubercles and several larger spines arranged in dorsal and ventral rows, spination variable, absent in some specimens; carpus with numerous tubercles and 1 larger spine on outer margin. Palm not markedly inflated in males, with 1 or 2 (usually 1) posteriorly directed spines on dorsal articular knob, remainder of surface smooth but setose. Fingers shorter than palm, cutting edges crenulate, not strongly toothed or gaping.

Walking legs slender, long, fifth leg longer than carapace, ornamented with corneous bristles and longer simple setae. Merus with row of corneous bristles dorsally, occasionally with dorsal and posterior spines or with irregular tubercles posteriorly, not heavily armed. Dactylus (Figure 80*f*) shorter than propodus, ventral margin with 1–4 prominent, triangular teeth and slender spines. Male abdomen and gonopods as shown (Figure 80*g,h*).

MEASUREMENTS.—Carapace lengths of males, 5.9 to 8.8 mm, of non-ovigerous females, 6.1 to 10.0 mm, of ovigerous females, 9.1 to 10.5 mm, of juveniles, 4.0 to 4.2 mm. Monod (1956) recorded an ovigerous female 7 mm long.

REMARKS.—Like *H. rubra* from the Cape Verde Islands, *H. nitida* is a small, relatively smooth species in which the chelipeds are not greatly enlarged in adult males and in which there is a single median posterior projection on the carapace (Figure 80*b*). These features will distinguish the new species from *H. condyliata*, which also occurs off West Africa. *Herbstia nitida* is a much smoother species than *H. rubra*, and further differs in having the regions of the carapace much less distinct, fewer dorsal tubercles and spines on the carapace, a broader posterior projection on the carapace, fewer spines on more slender pereopods, no spines on the upper surface of the palm of the chela in males (other than those on the articular condyle), and several triangular, fixed teeth on the opposable margin of the dactylus of the walking legs (Figure 80*f*). The two species can be separated very easily by using this latter character.

TYPE-LOCALITY.—Annobon Island, 01°28'S, 05°36'E.

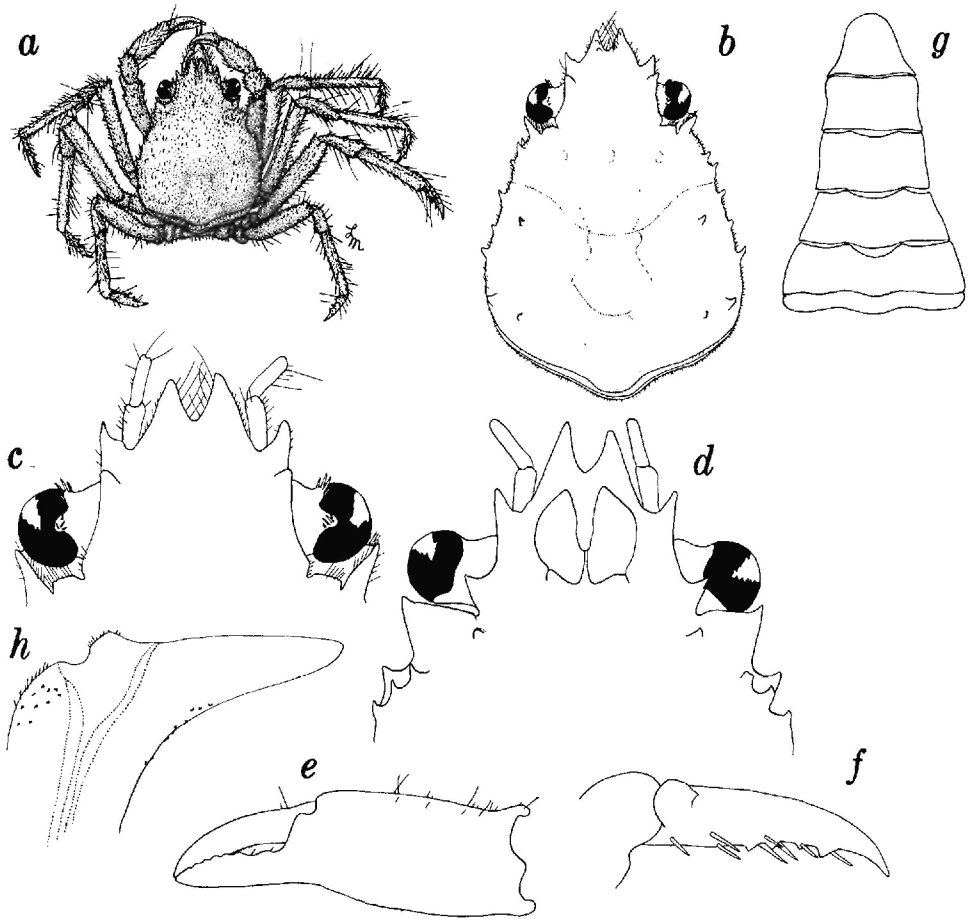


FIGURE 80.—*Herbstia nitida*, new species, paratype, male, cl 9.0 mm, Pillsbury Sta 282: a, dorsal view; b, carapace; c, front, dorsal view; d, front, ventral view; e, chela; f, dactylus of fifth pereiopod; g, abdomen; h, apex of gonopod.

DISPOSITION OF TYPES.—The holotype (Crust. D.31780), a male with a carapace length of 8.9 mm from Pillsbury Sta 282, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Paratypes have been deposited in the Smithsonian Institution, Washington, D.C., and in Leiden.

BIOLOGY.—All of our material came from Annobon Island, in depths between 9 and 55 m, in the beds of calcareous algae described by Forest (1959) and Voss (1966). If our assumption is correct that the material from the offshore islands of the Gulf of Guinea previously reported as *H. rubra* actually is identifiable with *H. nitida*, the latter species lives on rough bottom in moderate depths on rock, coral, algae, and calcareous algae. Forest and Guinot (1966) recorded the following

habitats and depths (all under *H. rubra*): Principe, calcareous algae in 37–73 m; São Tomé (6 localities), in rocks and coral in 0–6 and at 30 m, in calcareous algae in 6 and 10 m, in a sponge from rocks and calcareous algae in 2–6 m; and Annobon (5 localities), in rocks and coral, in calcareous algae, sand, and coral in 7–10 m, and in calcareous algae in 23–60 m.

Ovigerous females have been recorded in May and June (Forest and Guinot, 1966; Pillsbury).

ETYMOLOGY.—The specific epithet is from the Latin *nitidus*, shining, neat, referring to the smooth carapace of this species.

DISTRIBUTION.—Gulf of Guinea, where it is known to occur off Annobon in 15–55 m. We

suspect that all of the records of *H. rubra* given below are based on *H. nitida*:

Principe: No specific locality, 15 m (Monod, 1956). 01°43'10"N, 07°28'20"E, 73 m, and 01°43'N, 07°28'55"E, 37 m (Forest and Guinot, 1966).

São Tomé: Off São Tomé, 8 m; 00°20'N, 06°46'E, 10 m; Ponta Diogo Vaz, 0-6 m and 30 m; in front of Ponta Oquedelrei, 6 m; and Morro Peixe, 2-6 m (all Forest and Guinot, 1966).

Annobon: No specific locality, 12 m (Monod, 1956). 01°24'04"S, 05°36'45"E, 7-10 m; 01°27.5'S, 05°36.5'E, 35 m; N of San Antonio, 23 m; 01°26'15"S, 05°35'40"E, 60 m; and Isla Tortuga, NW coast (all Forest and Guinot, 1966).

Herbstia rubra A. Milne Edwards, 1869

FIGURE 81

Herbstia rubra A. Milne Edwards, 1869:354.—Miers, 1886:49, pl. 7: fig. 1, 1a.—Rathbun, 1893a:93 [listed].—A. Milne Edwards and Bouvier, 1900:128, pl. 19: fig. 17 [fig. 16 in text].—Balss, 1922:73 [listed].—Monod, 1956:482, fig. 649 [part, not fig. 650].—Guinot and Ribeiro, 1962:73.—Ribeiro, 1964:19.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Other Material: Cape Verde Islands: São Vicente, 20 m, 26 Jul 1883, *Talisman*, 1♂, 1♀ (L, W). São Vicente, *Challenger*, BMNH 84.31, 1♂. Harbor of Porto Grande, São Vicente, *Valhalla*, BMNH 1908.11.7.2, 1♂.

DESCRIPTION.—Carapace (Figure 81a) pyriform, surface appearing smooth, minutely punctate, regions moderately well marked, short setae present dorsally, heavier laterally. Gastric, car-

diac, and intestinal regions each with low, rounded elevation. Gastric region with 3 tubercles in transverse line (Figure 81a). Cardiac and intestinal regions each with single tubercle in some specimens. Intestinal region with single, rounded, posteriorly projecting prominence on posterior margin of carapace. Hepatic region with 1 spine and several smaller tubercles; subhepatic region with row of tubercles. Branchial region with 4 lateral spines, flanked laterally by several smaller tubercles, additional low tubercles usually present dorsally. Rostral teeth short but sharp, apices slightly divergent. Preorbital spine blunter than postorbital. Basal antennal article with long anterior spine visible in dorsal view, small but sharp proximal tooth present on inner margin below orbit; 1 or 2 postorbital tubercles also present ventrally.

Chelipeds enlarged in adult males, slightly shorter than carapace in young of both sexes, longer than carapace in adult male, variously ornamented with bristles and stiff setae. Merus tuberculate, with row of spines on upper and lower margins. Carpus with numerous tubercles and 2 larger spines on outer margin. Palm inflated in males, with 2 spines on dorsal articular knob in juveniles, remainder of surface smooth in female, with irregular row of small dorsal tubercles in male. Fingers shorter than palm, cutting edges more strongly toothed than in *H. nitida*.

Walking legs stout, short, fifth leg as long as or shorter than carapace, ornamented with corneous bristles and longer simple setae. Merus of walking legs with row of spines dorsally and posteroventrally. Dactylus shorter than propodus, ventral margin with slender spines but no triangular teeth (Figure 81b).

Male abdomen and gonopod as shown (Figure 81c-e).

MEASUREMENTS.—Carapace lengths of male 9.5 to 11.5 mm, of female 9.5 mm. Larger specimens identified with this species by Guinot and Ribeiro (1962: male, 20.6 mm) and Monod (1956: female, 24 mm) may well prove to be *H. condyliata*.

REMARKS.—*Herbstia rubra*, like *H. nitida*, new species, is a relatively small, smooth species, in

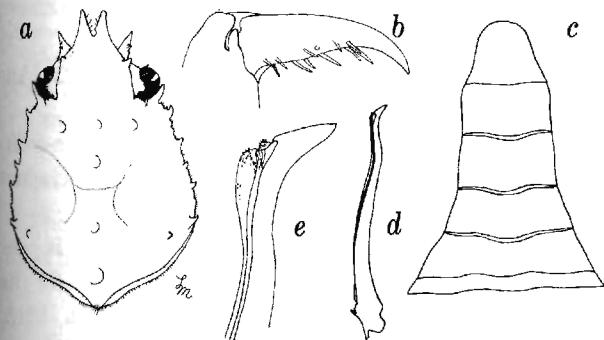


FIGURE 81.—*Herbstia rubra* A. Milne Edwards. Female, cl 9.5 mm, Cape Verde Islands: a, carapace; b, dactylus of fifth pereopod. Male, cl 11.5 mm, Cape Verde Islands: c, abdomen; d, gonopod; e, apex of gonopod, enlarged.

which the chelipeds of the male are not greatly enlarged and there is but one posterior projection on the carapace. This species differs from *H. nitida*, new species, in having the regions of the carapace better developed, more dorsal tubercles and spines on the carapace, a narrower posterior projection on the carapace, more spines on stouter walking legs, a row of spines on the upper surface of the palm in males, and no triangular teeth on the opposable margin of the dactylus of the walking legs.

An outline of the carapace and a sketch of the dactylus of a walking leg are shown in Figure 81.

BIOLOGY.—There is little information available on the ecology of this species. It was reported from coralline algae in 75 m (A. Milne Edwards and Bouvier, 1900), and near shore and in 6 to 20 m (Guinot and Ribeiro, 1962; Ribeiro, 1964).

DISTRIBUTION.—West Africa, from the Cape Verde Islands (the type-locality) and possibly the Azores; most records in the literature require verification. They include the following:

Cape Verde Islands: No specific locality (A. Milne Edwards, 1869). São Vicente (Miers, 1886). Praia Matiota, São Vicente, shore, and Porta da Furna, Brava, 6–20 m (Guinot and Ribeiro, 1962; Ribeiro, 1964). Between Ilhéu Branco and Ilhéu Raso, 75 m (A. Milne Edwards and Bouvier, 1900). Ponta do Sol, Ilha de Santo Antão (Monod, 1956).

Genus *Micropisa* Stimpson, 1858

Micropisa Stimpson, 1858a:218 [type-species: *Micropisa ovata* Stimpson, 1858, by monotypy; gender: feminine].

Micropisa ovata Stimpson, 1858

Micropisa ovata.—Monod, 1956:495, figs. 669–681 [Cape Verde Islands, Senegal, Gabon(?)].—Guinot and Ribeiro, 1962:74 [Cape Verde Islands].—Ribeiro, 1964:19 [Cape Verde Islands].

DISTRIBUTION.—Off tropical West Africa, from the Cape Verde Islands and Senegal, with one doubtful record from Gabon; sublittoral, from less than 10 to more than 110 m.

Genus *Pisa* Leach, 1814

Arctopsis Lamarck, 1801:155 [type-species: *Arctopsis lanata* Lamarck, 1801, by monotypy; gender: feminine; sup-

pressed for purposes of the Law of Priority but not for those of the Law of Homonymy by the International Commission on Zoological Nomenclature in opinion 708 (1964); name 1701 on *Official Index*].

Pisa Leach, 1814:431 [type-species: *Cancer biaculeatus* Montagu, 1813, a subjective junior synonym of *Maja armata* Latreille, 1803, by monotypy; gender: feminine; name 1597 on *Official List*].

Blastus Leach, 1814:431 [type-species: *Cancer tetraodon* Pennant, 1777, by monotypy; gender: masculine].

**Pisa armata* (Latreille, 1803)

Maja armata Latreille, 1803c:98.

Pisa gibbsii.—Studer, 1882:335.

Pisa gibbsii.—Capart, 1951:90, fig. 28, pl. 2: fig. 23.—Monod, 1956:486, fig. 654.—Rossignol, 1957:116 [key].—Figueira, 1960:12.—Crosnier, 1964:34.

Pisa armata.—Forest and Gantès, 1960:356.—Forest and Guinot, 1966:98.—Zariquiey Alvarez, 1968:454, figs. 151d, 152c, 154d [Spain; references].—Christiansen, 1969:124, fig. 51, map 44 [North Atlantic].—Crosnier, 1970:1215 [listed], 1218.—Türkyay, 1976a:25 [listed], 39 [Portugal].

Pisa.—Voss, 1966:31.

Pisa gibbsii.—Maurin, 1968b:486 [erroneous spelling].

SYNONYMS.—*Cancer biaculeata* Montagu, 1813; *Pisa gibbsii* Leach, 1815.

MATERIAL EXAMINED.—*Pillsbury Material*: Nigeria: Sta 230, 82–97 m, hard ground with gorgonians, coral, and rock, 1♂ (W).

Undaunted Material: Angola: Sta 96, 162 m, 1♂ (L).

DESCRIPTION.—Capart, 1951:90; Christiansen, 1969:124.

Figures: Capart, 1951, fig. 28; Christiansen, 1969, fig. 51.

Male Pleopod: Capart, 1951, pl. 2: fig. 23 (Angola); Monod, 1956, fig. 654 (Senegal).

MEASUREMENTS.—The male taken by the *Pillsbury* has a carapace length of 20 mm. Capart (1951) recorded a specimen 53 mm long.

REMARKS.—*Pisa armata* (Latreille, 1803) is now considered to be the oldest name available for the species previously known as *P. gibbsii* Leach, 1815. Zariquiey Alvarez (1968) provided a key, illustrations, and synonymies for the Mediterranean species of the genus *Pisa*.

BIOLOGY.—Off West Africa this species in-

habits moderate depths on rough ground on the shelf. The *Pillsbury* specimen was taken on hard ground with gorgonians, coral, and rock in 82–97 m. Capart (1951) reported material collected at depths from 20–30 to 110 m, on sandy mud, that from 20–30 m being the shallowest record off West Africa. Crosnier (1964) characterized it as a cold-water species, occasionally occurring deeper than 50 m off Cameroon. Forest and Guinot (1966) recorded it from mud, sand, and “sable construit” in 65–75 m off Senegal and on mud, shell, and *Cidaris* in 60–73 m off Guinea-Bissau. Maurin (1968b) found it off Morocco in 40–60 m on bottom with sponge, *Suberites*, and asteroid, *Allopatiria*.

Ovigerous females have been recorded from West African localities in March, May, August, October, November (Capart, 1951; Monod, 1956), and summer (Figueira, 1960).

DISTRIBUTION.—Eastern Atlantic, from the southern North Sea and England to Angola, Mediterranean; sublittoral, to at least 162 m. Monod (1956) reported material from Senegal, Guinea, and Angola; other records include the following localities.

Azores: Horta (Figueira, 1960).

Morocco: Temara (Forest and Gantès, 1960).

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

Cape Verde Islands: 15°40'N, 23°06'W, 38 fm [70 m] (Studer, 1882).

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

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

Nigeria: 06°11'N, 03°36'E to 06°10'N, 03°38'E, 82–97 m (Voss, 1966).

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

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

The latter record appears to be the southernmost as well as the deepest for the species.

****Pisa calva* Forest and Guinot, 1966**

FIGURE 82

Pisa carinimana.—Monod, 1956:488 [part] [not *Pisa carinimana* Miers, 1879].

Une espèce nouvelle de *Pisa*.—Forest, 1959, pl. 3: fig. 1. *Pisa* (n. sp.).—Forest, 1959:19.

Pisa calva Forest and Guinot, 1966:99, figs. 10, 11a–f, 13.

MATERIAL EXAMINED.—*Pillsbury Material*: Annobon: Sta 275, 9–69 m, rubble of coralline algae, 6♂, 4♀ (3 ov) (L). Sta 282, 18–37 m, nodular coralline algae, 1♂, 7♀ (5 ov), 2 juv (L, W). Sta 283, 51–55 m, nodular coralline algae, 11♂, 8♀ (5 ov), 3 juv (W).

Other Material: Annobon: 01°24'S, 05°37'30"E, 7–8 m, 11 Dec 1965, Ombango, A. Crosnier, 2♀ (W).

DESCRIPTION.—Forest and Guinot, 1966:100.

Figures: Forest and Guinot, 1966, figs. 10, 11a–f, 13.

Male Pleopod: Forest and Guinot, 1966, fig. 13.

MEASUREMENTS.—Carapace lengths of males 5 to 11 mm, of females 5 to 8 mm, of ovigerous females 5 to 10 mm, of juveniles 3 to 5 mm. The largest specimens recorded by Forest and Guinot (1966) were a male 14 mm long and a female 10.5 mm long.

REMARKS.—As Chace (1966:653, footnote) pointed out, this species is very close to *Pisa sanctaehelenae* Chace (1966:651, fig. 14) from Saint Helena. However, *P. calva* has less divergent rostral spines and much more slender pereopods (Figure 82), with 10 or 11 rather than 5–7 fixed, triangular teeth on the flexor margin of the dactylus. In our specimens, the propodus of the sec-

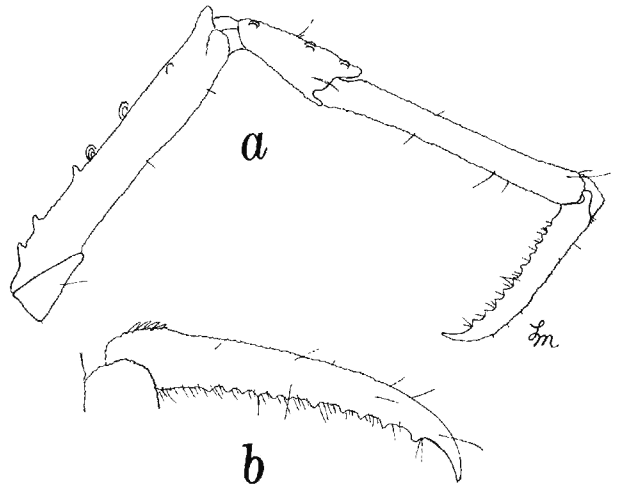


FIGURE 82.—*Pisa calva* Forest and Guinot, male, cl 11.0 mm, *Pillsbury* Sta 283: a, second pereopod; b, dactylus of second pereopod, enlarged.

ond pereopod in the males is not markedly swollen distally as in *P. sanctaehelenae*.

Apparently Monod's (1956) record of *P. carinimana* from Annobon was based on this species (Forest and Guinot, 1966:104) and his record of *P. carinimana* from Principe may also be based on *P. calva*. However, Forest and Guinot, who reexamined Monod's material from Annobon, could not locate the specimen from Principe and they noted (1966:104) that both species were taken at the same station off Principe by the *Calypto*.

BIOLOGY.—The *Pillsbury* representatives of this species all were taken off Annobon Island in beds of coralline algae in 9–69 m; the *Ombango* specimens were taken at Annobon in 7–8 m. Forest and Guinot (1966) recorded the following habitats for their material: Principe (5 stations): on mud, calcareous algae, shell, rocks, and coral in 31–73 m; São Tomé (12 stations): from a beach seine in 0–4 m and in rocks, coral, calcareous algae, “épave,” algae, sand, and mud in 5–50 m; Annobon (6 stations): calcareous algae, sand, coral, algae, and rocks in 7–60 m.

Ovigerous females have been collected in May, June, and July.

DISTRIBUTION.—West Africa, from the offshore islands of the Gulf of Guinea; sublittoral, from 0–4 to 73 m. Records in the literature include the following:

Principe: 01°38'25"N, 07°22'05"E, 31 m; 01°43'10"N, 07°28'20"E, 73 m; 01°43'N, 07°28'55"E, 37 m; in front of Baía de Santo Antonio, 50 m; Tinhosa Grande Island, 12 mi [19.3 km] SSW of Principe, 01°20'45"N, 07°17'37"E, 25–40 m (all Forest and Guinot, 1966).

São Tomé: In front of São Tomé, 8 m; 00°20'N, 06°46'E, 10 m; N of Ilhéu das Cabras, 32 m; Ponta Diogo Vaz, 30 m; Praia Santa Catarina, 15–18 m; 00°25'40"N, 06°40'10"E, 50 m; 00°25'15"N, 06°43'05"E, 8–30 m; Baía de Ana de Chaves, 5 m; in front of Ponta Oquedelrei, 6 m; Morro Peixe, 0–4 m; in front of Ponta São Sebastião, 11 m (all Forest and Guinot, 1966).

Annobon: No specific locality, 12 m (Monod, 1956).—NW coast, Isla Tortuga, 15–40 m; N of Santo Antonio, 23 m; 01°27.5'S, 05°36.5'E, 35 m; 01°26'15"S, 05°35'40"E, 60 m; 01°25'10"S, 05°36'10"E, 20–25 m; 01°24'04"S, 05°36'45"E, 7–10 m (all Forest and Guinot, 1966).

* *Pisa carinimana* Miers, 1879

Pisa carinimana.—Capart, 1951:87, fig. 27, pl. 2: fig. 8.—Sourie, 1954b:147.—Monod, 1956:488, figs. 655–668 [part].—Rossignol, 1957:116 [key].—Longhurst, 1958:89.—Forest, 1959:19 [discussion].—Gauld, 1960:72.—Rossignol, 1962:122.—Guinot and Ribeiro, 1962:74.—Forest and Guinot, 1966:99, figs. 11g, 12.—Zariquiey Alvarez, 1968:452, fig. 155a [Spain; references].—Uschakov, 1970:439, 455 [listed].—Türkyay, 1957a: 71 [listed], 74.

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 69, 29 m, coral or rock, 1♀ ov (L). Sta 70, 33 m, branched Foraminifera, 8♂, 8♀ (7 ov) (W).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1♂ (W). Sta 46, 38–42 m, mud with dense *Jullienella*, 4♂, 2♀ (1 ov) (L). Sta 47, 37 m, bottom with *Jullienella*, 2♂, 2♀ ov (L). Sta 60, 79–82 m, coral or rock, 3♂, 2♀ (1 ov) (W). Sta 62, 46 m, brown, branched and foliate Foraminifera, 2 juv (L). Sta 64, 68 m, 1♂, 1♀ ov (W).

Ghana: Sta 17, 48 m, fine sand and green mud, 1♀ ov (W). Sta 23, 42 m, foliate brown to orange bryozoans, 2♂, 5♀ (4 ov) (L). Sta 24, 35–37 m, dark red bryozoans, 7♂, 7♀ (3 ov) (W). Sta 27, 33 m, 1♂, 1♀ (L).

Nigeria: Sta 248, 33 m, 2♂, 2♀ (1 ov) (L).

Other Material: Dahomey: Off Grand-Popo, 30 m, Petersen grab, 24 Feb 1964, Guinean Trawling Survey, Tr 34, Sta 2, 3♂, 2♀ (L).

Congo: Pointe-Noire, bottom with *Antedon*, 19 Jun 1956, A. Crosnier, 5♂, 1♀ (W).

Angola: Santo António do Zaire, mouth of Congo River, H. Lang, 1♀ (W).

DESCRIPTION.—Capart, 1951:88.

Figures: Monod, 1956, figs. 655–668.

Male Pleopod: Capart, 1951, pl. 2: fig. 8 (Angola); Monod, 1956, figs. 667–668 (Senegal); Forest and Guinot, 1966, fig. 12 (Guinea-Bissau).

MEASUREMENTS.—Our specimens have carapace lengths of 3 to 17 mm; the ovigerous females have carapace lengths of 6 to 9 mm. Monod (1956) recorded a male with a carapace length of 23 mm.

REMARKS.—As noted in our discussion of *P. calva*, Monod's record of this species from Annobon Island was based on that species rather than *P. carinimana*.

BIOLOGY.—Apparently this species lives in relatively shallow water, although Capart (1951) reported one collection taken at a depth of 85 m, and Gauld (1960) reported material taken in 14–

100 m off Ghana. The *Pillsbury* collected this species in depths between 29 and 82 m, usually on relatively soft bottom, sand and mud, or mud with bryozoans or Foraminifera; two stations were made on rock and coral. Monod (1956) recorded material collected on bottom with *Palythoa* and *Molgula* and sand in 15–20 m, on sand in 10–45 m, muddy sand in 10–15 m, and on pebbles in 14.5 m. Guinot and Ribeiro (1962) reported material from Angola in depths between 5 and 90 m on sand and muddy sand. Forest and Guinot (1966) noted the following habitats for the species: mud, shell, gorgonians, and ascidians in 43–45 m; mud, sand, and compact sand [sable construit] in 65–75 m; mud and shells in 18–30 m; muddy sand and Foraminifera in 21–27 m; gravel, shells, and Foraminifera in 50 m; mud with *Arca* in 32 m, and mud, calcareous algae, and shells in 31 m. This species was taken with *P. calva* by the *Calypto* at this latter station off Principe Island. Uschakov (1970) found the species in clear water on hard sand in depths greater than 10 m off Guinea. Apparently this species prefers habitats on softer bottoms than does *P. calva*, which the *Pillsbury* took only in coralline algae.

Ovigerous females have been recorded in all months but July (Monod, 1956; Forest and Guinot, 1966).

DISTRIBUTION.—*Pisa carinimana* is an eastern Atlantic species, known from localities between the Canary Islands (the type-locality) and Spanish Sahara southward to Angola (12°36'S), including Melilla in the Mediterranean (Zariquiey Alvarez, 1968); littoral and sublittoral to a depth of about 100 m. Monod (1956) recorded it from numerous localities between Mauritania and Gabon; other records include the following:

Spanish Sahara: 21°05'N, 17°14'W, 43–45 m (Forest and Guinot, 1966).

Mauritania: Off Cap Blanc, 20°37.3'N, 17°24.4'W, 57 m (Türkay, 1975a)

Senegal: Baie de Dakar, 10–12 m (Sourie, 1954b). 12°55.5'N, 17°33'W, 65–75 m (Forest and Guinot, 1966).

Guinea: No specific locality, depth greater than 20 m (Uschakov, 1970). 09°40'N, 14°05'W, 18 m, and 09°36'N, 13°57'W, 18–30 m (Forest and Guinot, 1966).

Sierra Leone: No specific locality, 12–34 m (Longhurst, 1958).

Ivory Coast: 05°02.5'N, 05°25'W, 21–27 m (Forest and Guinot, 1966)

Ghana: Off Accra, 14–100 m (Gauld, 1960). 04°36.5'N, 01°31'W, 50 m (Forest and Guinot, 1966).

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

Principe: No specific locality (Forest, 1959). 01°38'25"N, 07°22'05"E, 31 m (Forest and Guinot, 1966).

Gabon: W of Pointe Claire (as Pointe Clara) and mouth of Gabon River, 20–40 m (Rossignol, 1962).

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

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

Angola: Baía da Caota, Benguela, 11–12 m, 13 m, 16 m, 18 m, and 30 m; Baía Farta, 22 m, 22–28 m, and 90 m; Sombreiro, 5 m; between Sombreiro and Ponta da Caruítá, 23 m (all Guinot and Ribeiro, 1962).

Pisa nodipes (Leach, 1815)

Pisa nodipes.—Monod, 1956:486 [references].—Forest and Gantès, 1960:356 [Morocco].—Zariquiey Alvarez, 1968: 454, figs. 151e, 152f, 154e, [Spain; references].—Maurin, 1968a:59, 107 [Mauritania, Mediterranean]; 1968b:486, 489 [Mauritania].

SYNONYM.—*Inachus musivus* Otto, 1821.

DISTRIBUTION.—Eastern Atlantic, from the Canary Islands, the Cape Verde Islands, Morocco, Mauritania, and the Mediterranean; sublittoral, to about 75 m.

Pisa tetraodon (Pennant, 1777)

Pisa tetraodon.—Capart, 1951:92, fig. 29, pl. 2: fig. 16 [Mauritania].—Monod, 1956:485 [references].—Forest and Gantès, 1960:356 [Morocco].—Zariquiey Alvarez, 1968: 452, figs. 6d, 151a, 152a, 154a [Spain; references].

SYNONYMS.—*Cancer hircus* Fabricius, 1781 (see Rathbun, 1925:195); *Cancer praedo* Herbst, 1796; *Pisa convexa* Brandt, 1880.

DISTRIBUTION.—Eastern Atlantic, from England to Cabo Blanco, Mauritania, Mediterranean; sublittoral, shallow water to about 50 m (100 m in Monod, 1956).

Family MIMILAMBRIDAE Williams, 1979

MIMILAMBRIDAE Williams, 1979:399.

This family, comprising one genus and species, does not occur within the study area.

Family PARTHENOPIDAE MacLeay, 1838PARTHENOPINA MacLeay, 1838:55, 58 [corrected to Parthenopidae by Bell, 1844:45; name 362 on *Official List*].

AETHRINAE Dana, 1851b:127 [originally cited as Oethrinae].

CRYPTOPODIINAE Stimpson, 1871a:137.

HEPATINAE Stimpson, 1871a:154 [see p. 325].

EUMEDONINAE Neumann, 1878:17.

LAMBRINAE Neumann, 1878:17.

EASTERN ATLANTIC GENERA.—Five, *Daldorfia*, *Heterocrypta*, *Parthenope*, *Sakaila*, new genus, and *Solenolambrus*, each represented by species occurring off tropical West Africa.

EASTERN ATLANTIC SPECIES.—Eleven, of which eight occur off West Africa. Several name changes have been made since this family was studied by Monod (1956), as follows:

Name in Monod	Current Name
<i>Osachila stimpsoni</i> (Calappidae)	<i>Sakaila africana</i> , new genus, new species* (Parthenopidae)
<i>Lambrus massena</i> (including various forms)	<i>Parthenope massena</i> *
<i>Lambrus miersi</i>	<i>Parthenope miersii</i> *
<i>Lambrus macrochelos</i>	<i>Parthenope notialis</i> , new species*
<i>Lambrus expansus</i>	<i>Parthenope expansa</i> *
<i>Heterocrypta maltzani</i>	<i>Heterocrypta maltzami</i> *
<i>Solenolambrus noordendei</i>	<i>Solenolambrus noordendei</i> *
<i>Parthenope bouvieri</i>	<i>Daldorfia bouvieri</i>

Three nominal species occur to the north of the tropical region:

Heterocrypta marionis A. Milne Edwards, 1881. In deep water off the Azores, Toulon, France, and the Bay of Biscay (Bouvier, 1940).

Parthenope angulifrons Latreille, 1828. Mediterranean (Zariquiey Alvarez, 1968), with one questionable record from Senegal (Monod, 1956:587).

Parthenope macrochelos (Herbst, 1790). Mediterranean and adjacent Atlantic (Zariquiey Alvarez,

1968). See under *P. notialis*, new species (p. 335), for possible records along the NW African coast.

The status of *Lambrus spinosissimus* Osorio, 1923 (see Nobre, 1936:85) remains to be determined. One specimen originated from the latitude of Lisbon, the other from Morocco. Osorio's account is not available to us. According to Nobre's quote of the original, *L. spinosissimus* (cl 33 mm, cb 37 mm) is a larger species than the West African *P. notialis* (cl 5–21 mm, cb 11–23 m) (see p. 334). Osorio described the upper surface of the palm of the cheliped as follows (our translation): "The upper surface of the hand also shows spines, rather widely spaced one from the other, and the lower surface is covered with granules, which do not stop at the base of the fingers, but, on the contrary, are widely distributed on them." This description applies well to *P. macrochelos*; in *P. notialis* the upper surface of the palm of the cheliped is almost smooth. We believe that *L. spinosissimus* Osorio, 1923 should be identified with the northern *Parthenope macrochelos* (Herbst, 1790) rather than the smaller tropical species, *P. notialis*.

Subfamily AETHRINAE Dana, 1851**Genus *Heterocrypta* Stimpson, 1871**

Heterocrypta Stimpson, 1871b:102 [type-species: *Cryptopodia granulata* Gibbes, 1850, by original designation; gender: feminine; name 1626 on *Official List*].

*** *Heterocrypta maltzami* Miers, 1881**

Heterocrypta Maltzami Miers, 1881a:209, pl.13: fig.1.

Heterocrypta Maltzani.—Miers, 1881a:364, 374.—A. Milne Edwards and Bouvier, 1900:121, pl.19: fig.6 [part ?].—Balss, 1921:54.—Bouvier, 1940:315 [part ?].

Heterocrypta maltzani.—Ortmann, 1893b:417.—Rathbun, 1900a:296.—Sourie, 1954b:150.—Monod, 1956:589, figs. 862–867.—Longhurst, 1958:89.—Gauld, 1960:72.—Guinot and Ribeiro, 1962:80.—Rossignol, 1962:123.—Ribeiro, 1964:21.—Forest and Guinot, 1966:120.—Zariquiey Alvarez, 1968:442 [Spain; references].—Maurin, 1968b:486.—Türkay, 1975a:71 [listed], 74, fig. 6.

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

Ivory Coast: Sta 46, 38–42 m, mud with dense *Jullienella*, 2♀ (1 ov) (L).

Ghana: Sta 23, 42 m, foliate brown to orange bryozoans, 1♂ (L). Sta 24, 35–37 m, dark red bryozoans, 3♂, 4♀ ov (W). Sta "22–26," 1♀ (L).

Nigeria: Sta 248, 33 m, 1♂, 3♀ (1 ov) (W).

DESCRIPTION.—Miers, 1881a:209; Pesta, 1918:374; Bouvier, 1940:315.

Figures: Monod, 1956, figs. 862–865.

Male Pleopod: Monod, 1956, figs. 866, 867 (Senegal).

MEASUREMENTS.—The specimens in the present collection have the carapace length between 4 and 8 mm; in ovigerous females this length varies between 5 and 8 mm. In the literature the following measurements have been given for ovigerous females: cl 6 to 10 mm, cb 6 to 13 mm (Monod, 1956, based on 6 specimens), cl 6 to 8 mm, cb 6.4 to 9.8 mm (Guinot and Ribeiro, 1962, based on 4 specimens). Guinot and Ribeiro (1962) also gave the following measurements: males cl 6 to 7.7 mm, cb 6.4 to 8.5 mm (7 specimens), non-ovigerous females cl 4.9 and 5 mm, cb 5.5 mm (2 specimens), juvenile cl 4.3 mm, cb 4.6 mm.

REMARKS.—Within a single year (1881) two species of *Heterocrypta* were described: *H. maltzami* Miers from Gorée, Senegal, collected in 18 to 28 m depth and *H. marionis* A. Milne Edwards from off Toulon, southern France, in 445 m. Miers (1886:103) was the first to synonymize these two species and there can be little doubt that they are closely related. Miers' name, *H. maltzami*, was published in September 1881, and thus takes precedence over *H. marionis*, the description of which appeared in December of that year (see Monod, 1956:589). A. Milne Edwards and Bouvier (1900) treated the two forms as subspecies of *H. maltzami*, but later authors generally accepted Miers' synonymy, although Bouvier (1940:315) listed differences between the two in a tabular form. The fact that the northern form lives in far deeper water (100–550 m) than the southern (0–70) might be an indication that they are specifically or subspecifically distinct, but lack of material of the northern form makes it impossible for us to express a definite opinion.

Miers (1881a:209), in the first part of his paper on Crustacea from Gorée, described the present species under the name "*Heterocrypta Maltzami*," the ending of the specific epithet spelled *—mi*. Miers (1881a:210) gave the following derivation of the name: "I have much pleasure in dedicating it to Baron Hermann-Maltzam, its discoverer." In the third part of the same paper (Miers, 1881a:364), which was published later in the same year, Miers, in a footnote, remarked: "By an unfortunate oversight on my part, which I regret extremely, Baron Maltzan's name has been misspelled in the earlier parts of this paper. Instead of "Maltzam" read "Maltzan," and instead of "*Heterocrypta Maltzami*" read "*Heterocrypta Maltzani*." Article 32(a)(ii) of the *International Code of Zoological Nomenclature* states that "the original spelling of a name is to be retained as the "correct original spelling," unless there is in the original publication clear evidence of an inadvertent error, such as a lapsus calami, or a copyist's or printer's error." Miers' use of the spelling *Maltzami* clearly is a lapsus calami, but as in the original publication (part 1 of Miers' paper) there is no clear evidence that this was a lapsus (Miers dedicated it specifically to Baron Maltzam, and there was no indication that this was an incorrect spelling until in the later publication), the original spelling "*maltzami*" has to be retained for the epithet of the specific name. The fact that the author of the name himself later corrected this spelling is of no influence here.

Odhner (1923:20) reported a female (cb 10 mm) of what he considered to be *Heterocrypta maltzami* from Porto Alexandre, Angola, depth 108 m, bottom sand and broken shell mixed with clayey sand. Odhner remarked here "Die nahen Beziehungen dieser Art zu *Solenolambrus* Stimps. scheinen mir auf der Hand zu liegen," and otherwise only discussed the horizontal and vertical distribution of Miers' species. No morphological details of his specimen, apart from the size, were given by Odhner. It is not quite clear, therefore, why Capart (1951:110) thought these remarks by Odhner (which pertain only to the species and not to his particular specimen) sufficient indica-