

TYPE-LOCALITY.—Annobon Island, 01°25'S, 05°38'E, Gulf of Guinea.

DISPOSITION OF TYPES.—The holotype (Crust. D. 31543), a male specimen with carapace length and width 2.6 mm, is in the Rijksmuseum van Natuurlijke Historie, Leiden. Two paratypes, a male and a female, also are in that collection and a male and two female paratypes (USNM 169534) are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C.

ETYMOLOGY.—It is a great pleasure to dedicate this new species to Dr. Isabella Gordon, British Museum (Natural History), who was the first to make the existence of the genus *Sirpus* known to the world and who exhaustively treated the first two species assigned to it.

DISTRIBUTION.—Our material of *Sirpus gordonae* was obtained at Annobon during a fish poison station at a sandy beach in a rocky cove. *Sirpus zariquieyi* is a Mediterranean species, known from scattered localities between Spain and Israel; it has been found in depths between 1 to about 40 m. *Sirpus monodi* is known from NW Africa, from Mauritania and Senegal, and has been taken in depths between 0 and 12 m. This represents the first find of the genus in the southern hemisphere.

Family CORYSTIDAE Samouelle, 1819

CORYSTIDAE Samouelle, 1819:82 [name 357 on *Official List*].

NAUTILOCORYSTIDAE Ortman, 1893a:26, 28.

EURYALIDAE Rathbun, 1930:10.

EASTERN ATLANTIC GENERA.—Two, only one of which, *Nautilocorystes*, is represented in the tropical fauna. The other genus is *Corystes* Bosc (1802:65). Type-species: *Hippa dentata* Fabricius, 1793, by monotypy; gender: masculine; name 1571 on *Official List*.

EASTERN ATLANTIC SPECIES.—Two, the first of which is the only species of the family occurring in tropical waters:

Nautilocorystes ocellatus, was first discovered there after Monod's account of the tropical species; Monod remarked (1956:155) that it occurred as

far north as 17°S. No representatives of the family were taken by the *Pillsbury*.

Corystes cassivelaunus (Pennant, 1777). Southern Norway and Sweden southward to Gibraltar and the Mediterranean, in depths between 7 and 90 m; both Zariquiey Alvarez (1968) and Christiansen (1969) gave accounts of this species.

Genus *Nautilocorystes* H. Milne Edwards, 1837

Dicera de Haan, 1833:14 [invalid junior homonym of *Dicera* Germar, 1817 (Hymenoptera)]; type-species: *Corystes (Dicera) octodentata* de Haan, 1833, a subjective junior synonym of *Corystes ocellatus* Gray, 1831, by monotypy; gender: feminine].

Nautilocorystes H. Milne Edwards, 1837:149 [type-species: *Nautilocorystes ocellatus* H. Milne Edwards, 1837, an invalid junior homonym of *Corystes ocellatus* Gray, 1831, by monotypy; gender: masculine].

Alyptes Gistel, 1848:ix [substitute name for *Dicera* de Haan, 1833; type-species: *Corystes (Dicera) octodentata* de Haan, 1833, a subjective junior synonym of *Corystes ocellatus* Gray, 1831; gender: masculine].

Nautilocorystes ocellatus (Gray, 1831)

Corystes ocellata Gray, 1831:39.

Nautilocorystes ocellata.—Barnard, 1950:303, figs. 57a–c [South Africa].—Monod, 1956:155 [Great Fish Bay (= Baía dos Tigres), Angola].—Rossignol, 1962:115 [listed].—Crosnier, 1967:324 [Congo].

Nautilocorystes ocellatus.—Capart, 1951:110, fig. 38 [Walvis Bay, Southwest Africa].

SYNONYMS.—*Corystes (Dicera) octodentata* de Haan, 1833; *Nautilocorystes ocellatus* H. Milne Edwards, 1837.

DISTRIBUTION.—South Africa and South-West Africa northward to Angola and off the Congo, in depths between 18 and 82 m.

Family BYTHOGRAEIDAE Williams, 1980

BYTHOGRAEIDAE Williams, 1980:444.

This family, comprising a single genus and species from the Galapagos Rift in the eastern Pacific, is not represented in the study area.

Family PORTUNIDAE Rafinesque, 1815

PORTUNIDIA Rafinesque, 1815:97 [corrected to Portunidae by Samouelle, 1819:83; name 69 on *Official List*].

MEGALOPIDAE Haworth, 1825:184.

CARCINIDAE MacLeay, 1838:59.
 LUPINAE Dana, 1851b:129.
 ARENAEINAE Dana, 1851b:129.
 PLATYONYCHIDAE Dana, 1851b:130.
 PODOPTHALMIDAE Dana, 1851b:130.
 Neptuniden Nauck, 1880:65.
 THALAMITINAE Miers, 1886:170, 193.
 CAPHYRINAE Miers, 1886:170.
 POLYBIIDAE Ortmann, 1893a:66, 68.
 CARUPIDAE Ortmann, 1893a:66, 68.
 LISSOCARCINIDAE Ortmann, 1893a:67, 87.
 LUPOCYCLOIDA Alcock, 1899a:22.
 PORTUMNINAE Ortmann, 1899:1170.
 GONIOCAPHYRINAE Borradaile, 1900:577.
 XAIVIDAE Berg, 1900:224.
 CATOPTRINAE Borradaile, 1902a:200.
 LIOCARCININAE Rathbun, 1930:18.
 MACROPIPINAE Stephenson and Campbell, 1960:75, 76, 88.

EASTERN ATLANTIC GENERA.—Twelve, of which nine, *Bathynectes*, *Callinectes*, *Carcinus*, *Cronius*, *Liocarcinus*, *Macropipus*, *Portunus*, *Thalamita*, and *Xaiva*, are represented by tropical species. Three genera do not occur in the tropical region:

Charybdis de Haan (1833:3, 10). Type-species: *Cancer sexdentatus* Herbst, 1783, a subjective junior synonym of *Cancer ferriatus* Linnaeus, 1758, by subsequent designation by Glaessner (1929:113); gender: feminine; name 1616 on *Official List*.

Polybius Leach (1820, in 1815–1875, pl. 9b: figs. 1–4). Type-species: *Polybius henslowii* Leach, 1820, by monotypy; gender: masculine; name 184 on *Official List*.

Portumnus Leach (1814:391, 429–430). Type-species: *Cancer latipes* Pennant, 1777, by monotypy; gender: masculine; name 185 on *Official List*.

EASTERN ATLANTIC SPECIES.—36, of which 16 occur in tropical waters. The following species were recorded by Monod (1956):

Name in Monod	Current Name
<i>Carcinus maenas</i>	<i>Carcinus maenas</i>
<i>Xaiva biguttata</i>	<i>Xaiva biguttata</i>
<i>Xaiva mcleayi</i>	<i>Xaiva mcleayi</i>
<i>Portunus arcuatus</i>	<i>Liocarcinus arcuatus</i>
<i>Portunus corrugatus</i>	<i>Liocarcinus corrugatus</i>
<i>Portunus tuberculatus</i>	<i>Macropipus rugosus</i> *
<i>Bathynectes superbus</i>	<i>Bathynectes piperitus</i> , new species*
<i>Thalamita africana</i>	<i>Thalamita poissonii</i>

<i>Cronius ruber</i>	<i>Cronius ruber</i> *
<i>Neptunus vocans</i>	<i>Portunus vocans</i>
<i>Neptunus validus</i>	<i>Portunus validus</i> *
<i>Neptunus inaequalis</i>	<i>Portunus inaequalis</i> *
<i>Callinectes gladiator</i>	<i>Callinectes pallidus</i> *
<i>Callinectes marginatus</i>	<i>Callinectes marginatus</i> *
<i>Callinectes latimanus</i>	<i>Callinectes amnicola</i> *

The extralimital species are as follows:

Bathynectes longipes (Risso, 1816). England to Portugal, Madeira, Mediterranean; sublittoral, 20–90 m (Zariquiey Alvarez, 1968; Turkey, 1976b).

Bathynectes maravigna (Prestandrea, 1839). See page 76.

Callinectes sapidus Rathbun, 1896. A. Milne Edwards and Bouvier (1900:71, pl. 4: fig. 5) reported three specimens (2 ♂, 1 ♀) of “*Callinectes diacanthus*, Latr., var. *africanus*, A. M.-Edw.” from Porto da Praia (as Praya), Cape Verde Islands. The colored figure that they published shows definitely *Callinectes sapidus*, having only two frontal teeth. As Monod (1956:204) pointed out, the figure is nothing but a colored copy of the figure that A. Milne Edwards (1861:425, pl. 30: fig. 1) published of “*Neptunus diacanthus*. Individu mâle de grandeur naturelle, rapporté des côtes de l’Amérique septentrionale. (Variété à front quadrilobé).” As to the identity of the three specimens taken by the *Talisman*, Monod (1956:204) stated: “J’ai vu un des ♂ d’*africanus* (M.P.): c’est un *C. marginatus*.” This identification is confirmed by Williams (1974:729), who likewise examined the male specimen in the collection of the Paris museum. The female specimen of the *Talisman* set now forms part of the collection of the Museum of Comparative Zoology, Harvard University (no. 6530) and was likewise examined by Williams (1974:729); it also is *C. marginatus*. The third specimen of the lot, a male (USNM 23950), is now in the collection of the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; it was examined by us, and like the two other specimens belongs to *C. marginatus*. A. Milne Edwards and Bouvier (1900:71) thus did not correctly report *C. sapidus* from West Africa.

A second dubious record of *C. sapidus* from

West Africa is the one by Gruvel (1912, pl. 2: fig. 1), who in an account of the edible Crustacea of West Africa figured as *Callinectes africanus* a specimen that clearly represents *C. sapidus*. The explanation of Gruvel's figure does not give any information about the locality or origin of the specimen figured. As *Callinectes sapidus* otherwise has not been reported from West Africa, notwithstanding intensive collecting, we agree with Monod (1956:204) who thinks that "on est bien obligé de penser qu'ici encore le spécimen représenté est un *sapidus* (américain)."

Although so far there has not been a single reliable record of *Callinectes sapidus* from West Africa, and the species certainly is not native there, the possibility exists that it will be accidentally introduced in West African waters as it was in Europe, the Mediterranean, and Japan; for an enumeration of the European and eastern Mediterranean localities of the species see Holthuis (1969a:34, fig. 1) and Christiansen (1969:72, fig. 29, map 23). Since 1969, introduced specimens have been reported from the North Sea off the English coast (Dr. R. W. Ingle, in litt.), Normandy, France (Maury, 1975:25), possibly from Nice (Türkay, 1971:129), the central Adriatic Sea coast of Italy (Frogliola, 1972:48), Strait of Messina (Cavaliere and Berdar, 1977), and Japan (Dr. T. Sakai, in litt.). In view of what is said in the previous paragraphs, it is unlikely that Rathbun's (1921:384) suggestion that the European species came from a West African population is correct.

Carcinus aestuarii Nardo, 1847. Mediterranean, also in Canary Islands, possibly in Atlantic adjacent to Mediterranean and possibly in portions of the Suez Canal; intertidal (Zariquiey Alvarez, 1968). Until now this species was known as *Carcinus mediterraneus* Czerniavsky, 1884. Nardo's (1847b) account, however, based on material from the lagoon at Venice, clearly provides the oldest available name for the Mediterranean species of *Carcinus*.

Charybdis helleri (A. Milne Edwards, 1867). Eastern Mediterranean, Egypt and Israel (from the Red Sea); sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Charybdis longicollis Leene, 1938. Eastern Mediterranean, Egypt to Turkey (from the Red Sea); sublittoral (Holthuis, 1961; Lewinsohn and Holthuis, 1964; Ramadan and Dowidar, 1976).

Liocarcinus bolivari (Zariquiey Alvarez, 1948). Mediterranean, 8–60 m (Zariquiey Alvarez, 1968).

Liocarcinus depurator (Linnaeus, 1758). Norway to Spanish Sahara, Mediterranean; in depths to 450 m, usually shallower than 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus holsatus (Fabricius, 1798). Hebrides southward to Portugal, Canary Islands, possibly also Cap Blanc, Mauritania (Monod, 1956, recorded a juvenile 8 × 10 mm from there); in depths to 350 m, generally in less than 100 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus maculatus (Risso, 1827). Mediterranean records of *L. pusillus* are referable to this species, according to a study by Manning and C. Frogliola, Laboratorio di Tecnologia della Pesca, Ancona, to be published in the proceedings of II Colloquium Crustacea Decapoda Mediterranea held in Ancona, Italy, in May 1979.

Liocarcinus marmoratus (Leach, 1814). Southern North Sea and British Isles southward to Spain, Azores, and Madeira; in shallow water to about 85 m (Zariquiey Alvarez, 1968; Christiansen, 1969; Türkay, 1976b).

Liocarcinus puber (Linnaeus, 1767). Norway to Spanish Sahara, Mediterranean; littoral to 70 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Liocarcinus pusillus (Leach, 1815). Norway to Portugal, possibly on northwest African coast (see Christiansen, 1969, for comments); in depths from 6 to 200 m, usually less than 50 m (Zariquiey Alvarez, 1968).

Liocarcinus vernalis (Risso, 1816). Mediterranean, and possibly (doubtfully) off Cabo Blanco, Spanish Sahara (Monod, 1956); shallow water (Zariquiey Alvarez, 1968).

Liocarcinus zariquieyi Gordon, 1968. England to Canary Islands, Mediterranean; 5 to 30 m (Zariquiey Alvarez, 1968).

Macropipus tuberculatus (Roux, 1830). Norway to the Azores, Morocco, Mediterranean; 20–30 to

834 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Polybius henslowii Leach, 1820. North Sea and British Isles southward to Morocco, Mediterranean; pelagic (Zariquiey Alvarez, 1968; Christiansen, 1969).

Portumnus latipes (Pennant, 1777). North Sea and British Isles to northern Morocco (there is one doubtful record from Mauritania), Mediterranean; intertidal and subtidal to a depth of 28 m (Zariquiey Alvarez, 1968; Christiansen, 1969).

Portumnus pestai Forest, 1967. Mediterranean; shallow water (Forest, 1967).

Portunus pelagicus (Linnaeus, 1758). Mediterranean (from the Red Sea, Egypt to Turkey, Italy); sublittoral (Holthuis and Gottlieb, 1958; Ramadan and Dowidar, 1976).

Portunus sayi (Gibbes, 1850). Canary Islands (see *P. hastatus*, p. 101); Cap Spartel, Morocco and Balearic Islands, from drifting *Sargassum* (Bouvier, 1922; Zariquiey Alvarez, 1968). Bouvier (1940) does not refer to his earlier record of this species from the Balearic Islands, so there is some question as to its authenticity. There are no other records of this species from the Mediterranean.

Subfamily CARCININAE MacLeay, 1838

Genus *Carcinus* Leach, 1814

Ligia Weber, 1795:92 [type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by monotypy; gender: feminine; name suppressed by the International Commission on Zoological Nomenclature in Opinion 330, 1955, and placed on the *Official Index* as name 207].

Carcinus Leach, 1814:390 [type-species: *Cancer maenas* Linnaeus, 1758, by monotypy; gender: masculine; name 798 on *Official List*].

Megalopa Leach, 1814:431 [type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by present selection; gender: feminine].

Macropoda Latreille, 1822:9 [type-species: *Megalopa montagui* Leach, 1817, an objective synonym of *Cancer rhomboidalis* Montagu, 1804, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758, by monotypy; gender: feminine].

Megalops H. Milne Edwards, 1837:260 [erroneous spelling of *Megalopa* Leach, 1814].

Sympractor Gistel, 1848:ix [replacement name for *Megalopa*

Leach, 1814 (as *Megalopus*); type-species: *Cancer granarius* Herbst, 1783, a subjective junior synonym of *Cancer maenas* Linnaeus, 1758; gender: masculine].

Carcinides Rathbun, 1897b:164 [replacement name for *Carcinus* Leach, 1814; type-species: *Cancer maenas* Linnaeus, 1758; gender: masculine; name 209 on *Official Index*].

Carcinus maenas (Linnaeus, 1758)

Carcinus maenas.—Monod, 1956:165, fig. 194 [Mauritania; references].—Forest and Gantès, 1960:351 [Morocco].—Guinot, 1967a:253 [Indian Ocean localities; listed].—Monod, 1967:178 [no locality].—Zariquiey Alvarez, 1968:354, figs. 115a, c [Spain; references].—Christiansen, 1969:49, fig. 18, map 12 [Scandinavia].

SYNONYMS.—*Cancer viridis* Herbst, 1783; *Cancer granarius* Herbst, 1783; *Cancer pygmaeus* Fabricius, 1787; *Cancer rhomboidalis* Montagu, 1804; *Megalopa montagui* Leach, 1817; *Portunus menoides* Rafinesque, 1817; *Cancer granulatus* Say, 1817.

DISTRIBUTION.—Eastern Atlantic, from Norway, N of 70° N latitude, S to Mauritania, about 20° S latitude; western Atlantic; eastern Pacific; Australia. In the Mediterranean it is replaced by the allied *C. aestuarii* Nardo, 1847 (= *C. mediterraneus* Czerniavsky, 1884) (see Bacescu, 1967, and Zariquiey Alvarez, 1968, for differences between the two species).

Genus *Xaiva* MacLeay, 1838

Xaiva MacLeay, 1838:62 [type-species: *Xaiva pulchella* MacLeay, 1838 (? = *Portunus biguttatus* Risso, 1816), by monotypy; gender: feminine; name 1649 on *Official List*].

Portumnoides Bohn, 1901:270, 271 [type-species: *Portumnoides garstangi* Bohn, 1901, a subjective junior synonym of *Portunus biguttatus* Risso, 1816, by monotypy; gender: masculine].

Xaiva biguttata (Risso, 1816)

Xaiva biguttata.—Monod, 1956:168, fig. 195 [Cape Verde Islands].—Guinot, 1967a:253 [Indian Ocean; listed].—Zariquiey Alvarez, 1968:359, figs. 8d, 116c, 122b [Spain; references].—Kensley, 1970:182 [South-West Africa].—Penrith and Kensley, 1970b:248, 261 [South-West Africa].

SYNONYMS.—*Platyonichus nasutus* Latreille, 1828; *Portumnoides garstangi* Bohn, 1901.

REMARKS.—Material of this species from the northern and southern parts of its reported range (England to Cape Verde Islands versus South-West Africa and South Africa) should be studied to determine whether or not two species might be recognized. If the southern form proves to be distinct, the name *Xaiva pulchella* MacLeay, 1838, is available.

DISTRIBUTION.—Eastern Atlantic, from England southward to the Cape Verde Islands, South-West Africa, South Africa, and the Mediterranean, in shallow water.

Xaiva mcleayi (Barnard, 1947)

Portunus mcleayi.—Capart, 1951:114, fig. 40, pl. 2: fig. 9 [Angola].—Rossignol, 1957:123 [key].

Xaiva mcleayi.—Monod, 1956:169, 632, figs. 196–201 [Mauritania, Senegal, Sierra Leone; references].—Longhurst, 1958:87 [Sierra Leone].—Guinot and Ribeiro, 1962:31 [Angola].—Forest and Guinot, 1966:59 [Príncipe, São Tomé].—Guinot, 1967a:253 [Indian Ocean; listed].—Crosnier, 1967:324 [Dahomey, Annobon].

?*Xaiva biguttata*.—Gauld, 1960:69 [Ghana] [not *Xaiva biguttata* (Risso, 1816)].

REMARKS.—We suspect that Gauld's record from Ghana of *X. biguttata*, a species not known to occur south of the Cape Verde Islands on the tropical West African Coast, may have been based on this species, now known to occur at least as far north as Mauritania on the West African coast (Monod, 1956).

DISTRIBUTION.—Eastern Atlantic, from scattered localities between Mauritania and Angola, South Africa, in depths between 8–30 and 73 m.

Subfamily POLYBIINAE Ortmann, 1893

Genus *Bathynectes* Stimpson, 1871

Bathynectes Stimpson, 1871a:145 [type-species: *Bathynectes longispina* Stimpson, 1871, by subsequent designation by Rathbun, 1930:27; gender: masculine; name 127 on *Official List*].

Thranites Bovallius, 1876:60, 61 [type-species: *Thranites velox* Bovallius, 1876, a subjective junior synonym of *Portunus maravigna* Prestandrea, 1839, by monotypy; gender: masculine].

Bathynectes maravigna (Prestandrea, 1839), new combination

Portunus Maravigna Prestandrea, 1839:132.

Portunus superbus Costa, in Costa and Costa, 1838–1871: 19, pl. 5 [color].

Bathynectes.—Filhol, 1885a:56.—Maurin, 1968a, fig. 29, 1968b, figs. 1, 4.

Bathynectes superba.—Forest and Gantès, 1960:351 [Morocco].—Pères, 1964:20, 26, 29 [Morocco].

Bathynectes superbus.—Maurin, 1968a:19, 45, 50, 64 [Spain, Spanish Sahara, Mauritania]; 1968b:482, 484, 489, 491, fig. 6 [Spanish Sahara, Mauritania].—Zariquiey Alvarez, 1968:382, fig. 127g [Spain; references].—Christiansen, 1969:70, fig. 28, map 22 [Scandinavia].—Türkay, 1976b: 61 [listed], 64 [Madeira].—Lewis and Haefner, 1978:164 [part; Spain].

SYNONYM.—*Thranites velox* Bovallius, 1876.

MATERIAL EXAMINED.—France: Banc de la Chapelle, off Brittany, 47°58'N, 08°00'W, 9 Sep 1921, L. Fage, 1♂, 1♀ (MP).

Spain: NE of Santander, (43°28'N, 03°48'W), 564 m, sand and shells, 6 Jul 1882, *Travailleur*, 6 juv (MP, W). Off western Galicia, 43°41.2'N, 08°57.6'W, 995 m, rocky bottom, 8 Aug 1967, *Thalassa* Sta T.491, 1 juv (MP).

Madeira: SE of Madeira, 32°43'N, 16°43'W, 420 m, 1♂ (L).

Morocco: Fosse de Rabat (approx. 34°N, 07°W), 300–400 m, N. Pigeault, 1♂ (MP).

REMARKS.—Dr. Carlo Froggia of the Laboratorio di Tecnologia della Pesca, Ancona, Italy, brought to our attention the description of this species by Prestandrea in 1839. Prestandrea described it as new under the name *Portunus Maravigna*, the name having been given in honor of his friend Prof. Maravigna.

This species usually is indicated with the name *Bathynectes superbus* (Costa), sometimes dated 1838, sometimes 1853. The latter date is correct (Sherborn, 1937:39; Erasmo, 1949:10); Costa's name was published on 11 April 1853. The name *maravigna* Prestandrea, 1839, thus has clear priority over *superbus* Costa, 1853, and should be used.

Prestandrea (1839:132, 133) gave the following color notes:

Rosso-corallo chiaro, con alquante macchie bianche raramente sparse sul torace, è il colorito di questo elegantissimo crustaceo. E macchiate parimente di bianco sono l'estremità

delle articolazioni dei piedi camminatori. . . Gli occhi sono sferici nerastri. [The anterolateral teeth] sono tutti del colore del torace con l'estremità color caffè cotto. . . Tutte le spine dei piedi-mani [= chelipeds] sono bianche colla estremità color caffè cotto; pero quella del lato interno del carpo à una banda bianca; quindi una rosso-corallo chiara è la estremità come le altre. [The fingers are] verso l'estremità brunastre.

In listing material of this species that does not occur off tropical West Africa, we have departed from our format. However, the material listed above was used to compare this species with the new species from West Africa described below.

Material from Spanish Sahara and Mauritania identified with this species by Maurin (1968a,b) might well be referable to *B. piperitus*, new species. This cannot be determined without examining his material.

DISTRIBUTION.—Eastern Atlantic, from Norway and the Faroes southward to NW Morocco, possibly to Spanish Sahara and Mauritania, Mediterranean; in moderately deep water, from 100 to 1455 m.

* *Bathynectes piperitus*, new species

FIGURES 16, 17

Bathynectes superba.—A. Milne Edwards and Bouvier, 1899, pl. 2: figs. 16–18 [part, not p. 25, pl. 2: figs. 1–15, 19–24]; 1900:65 [part].—Bouvier, 1922:59 [part, Cape Verde Islands only].—Monod, 1933b:510 [listed].—Capart, 1951:121, fig. 42. [Not *Portunus superbus* Costa, 1853.]

Bathynectes superbus.—Monod, 1956:183, figs. 210–212.—Longhurst, 1958:87.—Guinot and Ribeiro, 1962:45.—Forest, 1963:628.—Monod, 1967, pl. 15: fig. 4 [no records].—Maurin, 1968b:492.—Intès and Le Loeuff, 1976: 103.—Lewis and Haefner, 1978:164, pl. 1a [part]. [Not *Portunus superbus* Costa, 1853.]

Bathynectes superbus.—Gauld, 1960:69 [erroneous spelling].

Bathynectes.—Voss, 1966:19, 25.—Maurin, 1968a, fig. 29; 1968b, fig. 9 [part, Senegal only].

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 73, 311–366 m, 13 ♂, 4 ♀ ov (L, W).

Ivory Coast: Sta 44, 403–586 m, hard dark gray mud, 5 juv (L). Sta 51, 329–494 m, 31 ♂, 16 ♀ (1 ov), 13 juv (L, W).

Geronimo Material: Gabon: Sta 179, 293 m, 1 ♀ (W). Sta 191, 300 m, 2 ♂ (W). Sta 198, 300 m, 3 ♂ (W). Sta 199, 400 m, 1 ♂, 1 ♀ (W). Sta 203, 200 m, 3 ♂, 2 ♀ (W). Sta 206, 455–610 m, 1 ♀, 1 juv (W). Sta 213, 300 m, 1 ♀ (W). Sta 214, 546

m, 3 juv (W). Sta 220, 300 m, 1 carapace (W). Sta 247, 400 m, 1 ♀ (W).

Undaunted Material: Angola: Sta 111, ca. 366 m, 2 ♂ (includes holotype), 3♀ (1 ov) (L).

Other Material: Cape Verde Islands: 16°53'N, 27°30'W to 16°54'N, 27°30'W of Paris [= 25°10'W of Greenwich], 410–460 m, sand and gravel, 29 Jul 1883, *Talisman* Sta 110, 1♂ (MP). 15°14'N, 23°03'45''W, 628 m, muddy sand, fish trap, 14–15 Aug 1901, *Princesse Alice* Sta 1189, 1♀ (MP).

Senegal: NW of Pointe des Almadies (14°45'N, 17°32'W), 250–300 m, 21 Oct 1952, *Gérard Tréca*, 2♂, 1♀ (MP). Off Pointe des Almadies, ca. 300 m, 16 Oct 1952, Cremoux, leg., *Gérard Tréca*, 1♀ (MP).

DESCRIPTION.—Front (Figures 16, 17a) with 4 rounded teeth, inner 2 about half as wide as outer, extending about as far forward as outer. Latter broadly rounded, more semicircular than triangular. Inner orbital teeth low, rectangular, wide, with blunt apex and short dorsal carina. Upper orbital margin with 2 distinct narrow, open fissures. Exorbital tooth triangular, blunt, especially in larger specimens. Lower orbital margin with small, triangular, often blunt, narrow tooth next to exorbital tooth. Third tooth present medially, wider, blunter than second, separated from second by U-shaped incision. Inner, lower orbital tooth triangular, with narrowly rounded apex, latter occasionally curved inward. First 3 anterolateral teeth of carapace, excluding exorbital tooth, sharply triangular, curved anteriorly, third smallest. Fourth (= last) tooth large, spine-like, curved anteriorly, especially apically. Dorsal surface of carapace with 4 transverse ridges: (1) indistinct postfrontal ridge, widely interrupted in midline; (2) mesogastric ridge, divided by median

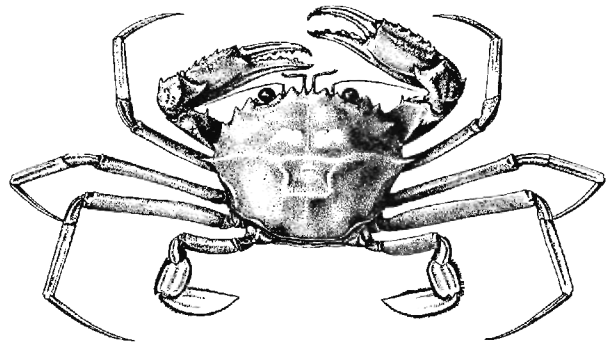


FIGURE 16.—*Bathynectes piperitus*, new species (from Capart, 1951, fig. 42).

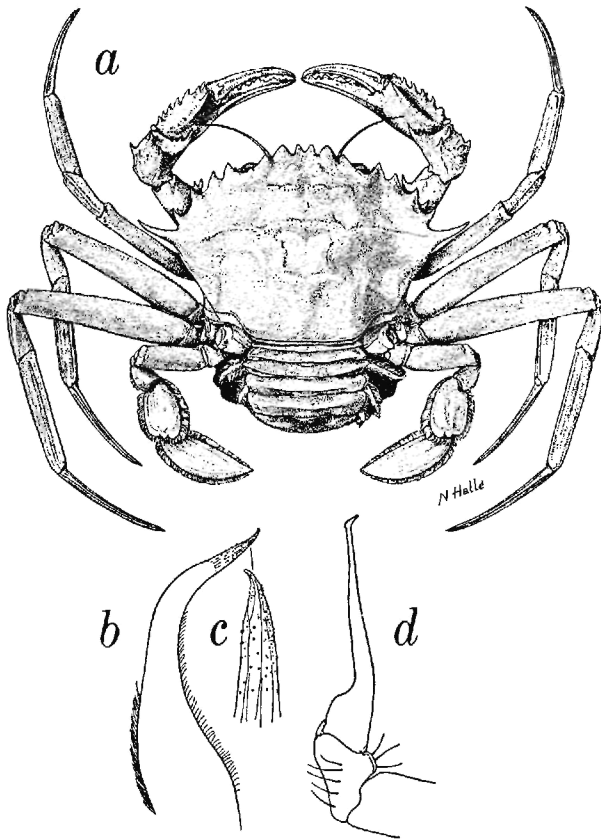


FIGURE 17.—*Bathynectes piperitus*, new species: a, dorsal view; b, c, first pleopod of male and apex; d, second pleopod of male. (All from Monod, 1956, figs. 210-212.)

interruption, each half again divided into 2 short, slightly convex ridges; (3) long lateral spines connected by third transverse ridge, sinuous and tuberculate; third ridge convex anteriorly, with posteriorly directed indentations (incurvations) at branchiocardiac grooves; and (4) short transverse carina placed between ends of branchiocardiac grooves on posterior half of carapace. Carapace finely and closely pubescent.

Mouthparts not significantly different from those of *Bathynectes longispina* Stimpson.

First pereopods unequal, larger chela higher and heavier than smaller, with teeth on cutting edges of fingers larger, blunter. Otherwise chelipeds very similar. Fingers about as long as palm. Dactylus with usual 5 ridges, dorsalmost tuberculated basally. Upper ridge on inner surface of dactylus divided into 2 branches proximally,

branches united distally; upper branch with blunt tubercle. In larger chela, basal tooth of cutting edge of dactylus large, swollen, directed somewhat posteriorly. Opposite tooth of fixed finger molar-like, with 2 small teeth proximally at base. Fixed finger, like dactylus, with laterally compressed teeth, usually alternately large and small. In smaller chela all teeth on cutting edges of compressed type. Fixed finger also with 5 ridges. Upper carina of palm with large, subdistal sharp tooth, lacking spinule adjacent to tooth; carina tuberculate posterior to tooth. Upper outer carina of palm with 6 large, triangular, blunt teeth, several smaller tuberculiform denticles present between larger teeth. Carina below upper, outer carina low, often partly absent, with row of small granules, latter often inconspicuous or absent, especially in middle of carina. Next lower carina strong, high and sharp, granular, terminating before reaching base of fingers; row of granules below distal end of this carina extending to first tooth of fixed finger. Lower part of palm with carina extending onto fixed fingers, more distinct proximally than distally, ornamented with numerous granules. All of lower surface of palm covered by transverse rows of granules; anteriorly this area terminates on ventral carina of fixed finger. Inner surface of palm with high, distinct longitudinal carina terminating somewhat above base of upper carina of inner surface of fixed finger. Carpus with very large, sharply pointed tooth on inner margin, anterior margin of tooth with 1 to 3, rarely 4, spinules, remainder of margin smooth or granular. Upper surface of carpus with 2 spines placed in line with upper articulation of palm, inconspicuous row of tubercles extending from posterior spine towards inner tooth, with more distinct row of tubercles extending obliquely proximally. Some tubercles scattered over remainder of upper surface of carpus. Outer anterior angle of carpus with sharp tooth. Anterior margin of carpus, between sharp tooth and upper articulation with propodus, smooth or evenly granular. Merus slender, more than twice as long as high, with strong spiniform tooth on anterior third of upper margin, second tooth

somewhat before middle of inner, lower margin. Remainder of merus smooth or slightly tuberculate.

Walking legs (pereiopods 2 to 4) very slender. Dactylus narrow, evenly curved, upper and lower surfaces with narrow, longitudinal groove over entire length; lateral surfaces with broad groove, distally divided in two by longitudinal carina. Propodus as long as dactylus, measured dorsally, and more than 5 to more than 6 times as long as high. Upper and lower margins with deep longitudinal groove, flanked by 2 sharp carinae. Outer surfaces with 2 longitudinal carinae separating 3 grooves, middle groove particularly wide; upper carina placed close to outer carina of upper margin. On inner surface of propodus upper carina absent or very reduced, almost entirely covered by pubescence, thus only lower carina visible on surface. Carpus $2/3$ to $4/7$ length of propodus, with blunt longitudinal dorsal ridge, flanked on either side by distinct pubescent groove. Merus 2 to $3\frac{1}{2}$ times as long as carpus and 4-5 times as long as wide, upper part with transverse subdistal groove, occasionally flanked posteriorly by blunt tubercle. Upper surface of merus sometimes slightly tuberculate. Dactylus of last pereiopod 3 times as long as high, oval, with lower margin straight for most of length, merging with distal tooth in straight line. Upper margin regularly curved, merging with distal tooth in concave line. Propodus about $2/3$ as long as dactylus. Carpus less than half as long as dactylus. Merus about as long as propodus and $2\frac{1}{2}$ times as long as high.

Male abdomen triangular, third to fifth somites fused, sixth and seventh somites free, latter triangular, apex broadly rounded, appearing broader than that of *B. longispina*.

Male gonopods similar to those of *B. longispina*, with apex less slender, less strongly curved laterally, as illustrated by Monod (1956, fig. 211) (Figure 17b-d).

Color: The first color note published of this species is the one by Capart (1951:122): "Couleur rouge orangé, les épines généralement plus rouges; les pattes marquées de zones rouges et orange alternées." Monod (1956:185) described

the color as follows: "gris à rouge-brique, parfois rose vif; chélipèdes en partie rouges, un anneau rouge sur les mérus, carpe, propode et base du dactyle des pattes." The following color description is made after notes and photographs taken of specimens of Pillsbury Station 73, immediately after they came aboard: The carapace is orange-red with a white spot at the front, one such spot just behind either of the large lateral teeth, one in each posterolateral angle, and one in the middle of the posterior margin. The apex of the lateral spine is very dark, almost black. The chelipeds are orange with the main spines and teeth white. Also the distal part of the palm and the fingers are white, except for an orange spot at the base of the dactylus. The tips of the fingers and a large part of the cutting edges are of a dark, almost black color. The walking legs have a broad orange band over the distal part of the merus, one over the carpus and one over the proximal half of the propodus, sometimes the proximal part of the dactylus also is orange. All the rest of the leg is white, viz., the base of the merus, all the articulations, the distal part of the propodus and the entire dactylus or the larger part of it. In the fifth leg the orange color is somewhat more extensive than in the other legs, here the basal part of the merus is white, from there on the leg is orange up to the middle of the propodus or slightly beyond (with the exception of small white articulations), and also the basal part of the dactylus is orange, the distal part white. The lower surfaces of body and chelipeds are white, that of the second to fifth pereiopods is of the same color as the dorsal surface. The eggs are carmine.

MEASUREMENTS.—The specimens examined had the carapace width from 15 to 86 mm (inclusive of the lateral spine); the largest specimen is a male. The ovigerous females have carapace widths between 55 and 72 mm; the largest of the females is ovigerous. In the literature, male specimens with carapace lengths from 17 to 57 mm and carapace widths 32 to 80 mm (including the lateral spines) are recorded; for the non-ovigerous females these values are 22 to 49 mm and 38 to 68 mm, respectively, and for the ovigerous fe-

males 40 to 54 mm and 62 to 78 mm. The diameter of the eggs is 0.42 mm (Monod, 1956).

REMARKS.—Most authors have considered all Atlantic *Bathynectes*, other than *Bathynectes longipes* (Risso, 1816), to belong to a single species, *B. superbus* (Costa, 1853), the type-locality for which is Naples, Italy. As stated (p. 76), that species should be known as *Bathynectes maravigna* (Prestandrea, 1839), type-locality "Mare di Messina," Sicily, Italy. However, a comparison of the present West African material with West Atlantic specimens and with material from the Mediterranean, European, and NW African waters, showed constant differences between the three groups, which leads to the conclusion that three species are involved. For the West Atlantic species the name *Bathynectes longispina* Stimpson, 1871, is available (*B. brevispina* Stimpson, 1871, is a synonym). The name *Bathynectes maravigna* (Prestandrea, 1839) has to be used for the species from the Mediterranean and NE Atlantic. A new name, *Bathynectes piperitus*, is proposed here for the West African species. *Bathynectes piperitus* differs from *B. maravigna* in the following respects:

1. The frontal teeth of the carapace in *B. piperitus* are always blunt, even in the large specimens, and the median teeth are always distinctly narrower than the outer. In *B. maravigna* the large specimens have the frontal teeth sharply pointed and triangular, while the median teeth are hardly narrower than the outer. In juveniles of *B. maravigna* the situation is much like in the large *B. piperitus*.

2. The lateral spine of the carapace in *B. maravigna* is long and straight, in *B. piperitus* it is much shorter than in *B. maravigna* and is curved forward in the adults. Although in juveniles of *B. piperitus* the lateral spines are straighter and relatively longer than in the adults, they are still shorter than in the corresponding stages of *B. maravigna*.

3. The postfrontal ridges in *B. maravigna* as a rule are more distinct than in *B. piperitus*, and each of the two mesogastric carinae is mostly entire and not divided in two short ridges.

4. The last somite of the male abdomen is

wider and flatter in *B. piperitus*, being relatively longer and narrower, with a convex upper surface, in *B. maravigna*. The fourth and fifth abdominal somites in males of *B. piperitus* each show a distinct transverse carina, which are absent or very vague in *B. maravigna*.

5. The outer half of the anterior margin of the carpus of the cheliped (between the outer spine and the upper articulation with the palm) in *B. piperitus* usually is straight or finely granular; in *B. maravigna* it carries some spinules.

6. The inner surface of the propodus of the second pereopod in *B. maravigna* shows two distinct longitudinal carinae separating three longitudinal pubescent grooves. In *B. piperitus* the upper of these carinae is absent or hardly indicated, so that the lower carina is separated from the upper margin of the propodus by a pubescent area that is much wider than the area separating it from the lower margin.

7. The merus of the fifth pereopod is longer and more slender in *B. maravigna* than in *B. piperitus*. The dactylus of this leg in *B. maravigna* is slightly more slender than in *B. piperitus* and has the lower margin somewhat convex and joining the distal tooth under a concave curve.

8. The coloration of living *B. maravigna* is quite different from that of *B. piperitus*. The colored plate of *B. maravigna* published by A. Milne Edwards and Bouvier (1899, pl. 2: fig. 19) shows a uniformly orange red crab. Costa's figure (in Costa and Costa, 1838-1871, pl. 7) of the species has the carapace irregularly mottled with reddish brown and yellowish, the pereopods 1 to 4 are uniformly reddish brown, only the dactyli of the walking legs and a few spines being yellowish; the fifth pereopods are shown entirely yellowish. A male specimen of *B. maravigna* (cl 61 mm, cb 73 mm without lateral spines, 96 mm with lateral spines) from east of Madeira (11-12 Mar 1976, L) was examined rather soon after capture, when the colors were still visible and a color photograph of the living specimen was made. This specimen showed the following color pattern: The animal is dark brownish orange dorsally. The margins of the frontal teeth are white. A very short median

line extends from between the bases of the median frontal teeth backward. The tips of the three short anterolateral spines of the carapace (not the outer orbital angle) have the tips white. One to three small white dots are seen on the middle of the large lateral spine. A few very small white spots are placed in the cervical groove. A large lateral white spot stands at each side of the carapace about halfway between the lateral spine and the posterior margin of the carapace. A narrow white line extends along the posterior carina and a small median spot is placed somewhat before this line. The chelipeds have dorsally the same color as the carapace, with a small white spot near the tips of many of the spines. The tips of the fingers and the teeth on their cutting edges are black. Also the tips of various of the spines are black. The lower surface of the chelipeds is lighter than the upper. The following legs are of the same brownish orange color as the carapace. The second and third legs have the basal part slightly lighter than the rest. There may be some small white spots at the articulations and at the tips of the second to fourth pereopods, but otherwise the legs are of a uniform brownish orange color. The dactyli of the fifth leg show two very small spots: one just before the tip, the other near the middle of the lower margin, otherwise the leg is of a uniform dark brownish orange color. At first view *B. maravigna* seems to be uniformly brownish orange, and the white spots are rather small and inconspicuous. They evidently have been overlooked by the artist of A. Milne Edwards and Bouvier's colored plate. Costa's specimen may have been made after a specimen that was preserved or dead for a considerable time. The most important color difference between *B. maravigna* and *B. piperitus* seems to be the less striking color pattern of the carapace and the absence of white and orange bands on the pereopods in the former species.

9. The range of *B. maravigna* is in the N Atlantic Ocean between Iceland and Norway south to the Mediterranean (as far as Greece), Madeira, the Azores, and NW Morocco. We have examined specimens of this species from several localities

between France and Morocco, as noted above. *Bathynectes piperitus* is a West African species, known from the Cape Verde Islands and Senegal to Angola.

The differences between *B. piperitus* and *B. longispina* are as follows:

1. In *B. longispina* the outer frontal teeth are more acute and are more triangular in shape; the inner teeth are narrowly triangular.

2. The anterolateral teeth of *B. longispina* are longer, more robust, and relatively narrower than in *B. piperitus*. The length of the second tooth after the exorbital angle is greater than half the distance between it and the first tooth; in *B. piperitus* it is narrower than half that distance.

3. The lateral spine of the carapace is straight in *B. longispina* and is longer than in *B. piperitus*.

4. The transverse ridge that connects the lateral spines of the carapace in *B. longispina* is practically straight and does not show the posterior incurvations at the level of the branchiocardiac grooves.

5. The two mesogastric ridges are each divided in two smaller ridges like in *B. piperitus*, but they are usually shorter, less distinct (sometimes hardly visible), and lie in one line.

6. The last somite of the male abdomen in *B. longispina* is more triangular than in *B. piperitus*, and has the distal margin less broadly rounded.

7. The fourth and fifth abdominal somites in *B. longispina* do not show a sharp transverse carina.

8. The first male gonopod of *B. longispina* is more slender distally and more strongly curved than in *B. piperitus*.

9. In *B. longispina* the chelae are relatively shorter and higher: the height of the palm (inclusive of the dorsal spine) is more than its dorsal length. In *B. piperitus* the dorsal length of the palm is definitely greater than the height.

10. In *B. longispina* the subdistal tooth on the upper margin of the palm is much higher, being large, compressed, almost wing-like, reaching practically to the base of the dactylus. Before this large tooth a small but distinct spine is present on the dorsal margin. In *B. piperitus* the dorsal

tooth is much shorter and less wide and does not reach the base of the dactylus; the dorsal margin bears no distal spine.

11. The inner surface of the propodus of the second pereopod in *B. longispina* shows a single deep longitudinal groove in the middle, and the two other grooves are inconspicuous. The legs have hardly any pubescence. Also the upper groove on the inner surface of the carpus is very obscure.

12. The fifth legs in *B. longispina* have the merus more slender and the propodus less slender than in *B. piperitus*.

13. Also in the color there are marked differences between the two species. In *B. longispina* the carapace is reddish because all or practically all the tubercles are of that color; the lateral spine is dark red in the larger distal part, the anterolateral teeth are whitish with a red tip or with a red ring. The front is pale and the orbital margin is often darker red than the surroundings. A median white line extends from the transverse ridge of the carapace forwards reaching to the postfrontal ridges. The mesogastric ridges, at least the inner two, are white and form a more or less distinct cross with the median white line. The chelipeds are pink; the large teeth on the inner margin of the carpus and the upper margin of the palm are white at the base and dark red distally. The dactylus is red with a white base and a light spot in the middle of the dorsal margin; the tip of the finger and practically the entire cutting edge (in the large chela) or the distal part of it (in the smaller) are black. The fixed finger has the distal part and the lower surface red, the tip black. The legs are pink because of the presence of scattered red spots; the articulations are pale or white. Very striking is the presence of a solid deep red color on the propodus and dactylus of the second to fourth leg; this color, which persists long in alcohol-preserved specimens, occupies practically the entire segments with the exception of a very narrow area near the articulation. The carpus sometimes shows a narrow red band over its middle. In the fifth leg the dactylus, but not the propodus, has this same strikingly deep red, al-

most lacquer-like, color. The presence of these deep red bands on the legs distinguishes this species immediately from the others belonging to this genus. The lower surface of the body is white.

TYPE-LOCALITY.—Angola, 10°36'S, 13°12'E, ca 366 m (*Undaunted* Sta 111).

DISPOSITION OF TYPES.—The holotype (Crust. D.31505) is a male, carapace width 79 mm, in the collection of the Rijksmuseum van Natuurlijke Historie, Leiden. The remainder of the specimens examined are paratypes, which have been deposited in the Rijksmuseum and in the Division of Crustacea, National Museum of Natural History, Smithsonian Institution.

ETYMOLOGY.—The Latin name *piperitus* is given in allusion to the bright red and white color, resembling that of a peppermint cane.

BIOLOGY.—The species has been reported from depths between 200 and 628 m, and has been taken most often between 300 and 450 m. The bottom on which it was found was described as mud (Guinot and Ribeiro, 1962; Forest, 1963), hard, dark gray mud (Voss, 1966), muddy sand (Bouvier, 1922), mud and sand, brown mud and sand, green mud and sand (Capart, 1951), sand and gravel (A. Milne Edwards and Bouvier, 1899, 1900), corals (Guinot and Ribeiro, 1962), green muddy sand (Maurin, 1968b). A. Milne Edwards and Bouvier (1900) mentioned the bottom at *Talisman* Sta 113 as "Sable, roche," but in the official list of stations of the expedition it is indicated as "Sable. Gravier," exactly as in Sta 110 of the same expedition.

Ovigerous females of this species have been collected in February (Monod, 1956), March, April, and May (Capart, 1951), May and June (p. 77). Several specimens carry Lepadidae on the dorsal surface of the carapace and on the legs. A male from *Geronimo* Sta 198 carries a number of hydroid colonies on the merus of the last pereopod.

DISTRIBUTION.—*Bathynectes piperitus* is a West African species, known from the Cape Verde Islands and the coast of Africa from Senegal to Angola. Records of *B. superbus* (= *B. maravigna*) from Spanish Sahara and Mauritania given by

Maurin (1968a,b) and of *Bathynectes* given by Filhol (1885a) may be referable to this species. Records in the literature include the following:

Cape Verde Islands: No specific locality (Filhol, 1885a). 16°53'N, 27°30'W of Paris [= 25°10'W of Greenwich] to 16°54'N, 27°30'W of Paris [= 25°10'W of Greenwich], 410–460 m (A. Milne Edwards and Bouvier, 1899, 1900). 16°52'N, 27°30'W of Paris [= 25°10'W of Greenwich] to 16°52'N, 27°32'W of Paris [= 25°12'W of Greenwich], 550–760 m (A. Milne Edwards and Bouvier, 1900). 15°14'N, 23°03'45"W, 628 m (Bouvier, 1922).

Senegal: Off Saint-Louis, 300 m (Maurin, 1968b). Fosse de Kayar, 85–660 m (Monod, 1956), 300–350 to 600 m (Maurin, 1968b). Off Pointe des Almadies, 150–245 m, 250–300 m, ±300 m, and 270–500 m (Monod, 1956).

Guinea-Bissau: 10°05'N, 17°00'W, 320–360 m (Capart, 1951).

Guinea: 09°05'N, 15°10'W, 310–380 m (Monod, 1956).

Liberia: 04°40'N, 09°20'W, 311–366 m (Voss, 1966; Lewis and Haefner, 1978).

Ivory Coast: No specific locality (Intès and Le Loeff, 1976). 05°05'N, 04°00'W to 05°04'N, 04°02'W, 403–586 m (Voss, 1966). 04°32.5'N, 06°31'W, 300–455 m, and 04°54'N, 03°23'W, 380–400 m (Forest, 1963).

Ghana: 04°39'N, 02°46'W, 300–400 m (Forest, 1963). Off Accra, 200 m (Longhurst, 1958; Gauld, 1960).

Gabon: Off Port-Gentil, 00°15'S, 08°47'E, 290–390 m (Capart, 1951). 00°02.2'S, 08°50.2'E, 293 m (cited as Liberia); 01°26.4'S, 08°24'E, 400 m (cited as 01°6.4'S, 08°44'E, 396 m); 01°28'S, 08°24.5'E, 300 m (as 297 m); 02°01'S, 08°50.5'E, 200 m; 02°31'S, 08°51'E, 300 m (as 288 m); 04°38.4'S, 11°01.2'E, 400 m (all Lewis and Haefner, 1978).

Cabinda: 05°23'S, 11°32'E, 290–350 m, and 05°39'S, 11°25'E, 470 m (Capart, 1951).

Angola: Off Ponta da Moita Seca, 06°08'S, 11°24'E, 350–380 m, and 06°23'S, 11°29'E, 400–430 m; off Ambrizete, 07°16'S, 12°02'E, 380–420 m; off Ponta do Morro (as Cap Morro), 10°45'S, 13°07'E, 400–500 m; off Egito [Praia], 11°53'S, 13°28'E, 300 m, 11°53'S, 13°20'E, 480–510 m, and 11°53'S, 12°23'E, 400–500 m (all Capart, 1951). Off Benguela, 405–505 m; off Baía dos Tigres, 320–400 m (Guinot and Ribeiro, 1962).

Genus *Liocarcinus* Stimpson, 1871

Liocarcinus Stimpson, 1871a:145 [type-species: *Portunus holsatus* Fabricius, 1798, by original designation; gender: masculine].

DEFINITION.—Carapace broader than long, with 5 anterolateral teeth, lacking iridescent patches on surface. Front with 3 lobes, 7–10 irreg-

ular teeth or tubercles, or entire. Dorsal margin of orbit with 2 closed incisions, ventral margin (Figure 18a) with narrow, V-shaped, incision. Basal antennal article touching front, scarcely or not at all movable. Chelipeds unequal, generally shorter than pereopods; merus without distal ventral tooth; carpus with strong inner tooth, generally lacking outer tooth; dactylus (Figure 18c) usually with 3 dorsal ridges. Propodus of second to fourth pereopods each with 1 ventral ridge (Figure 18e,g). Third to fifth abdominal somites fused in male.

REMARKS.—It is with some hesitation that we separate *Liocarcinus*, including most of the European species assigned to *Macropipus* for the last 20 years or so, from *Macropipus*; but as Guinot (1961: 7) pointed out, the species of *Macropipus* sensu stricto, restricted to three species, share certain features that serve to distinguish them readily from those species here assigned to *Liocarcinus*. Indeed, 50 years ago Palmer (1927, fig. 1) came to the conclusion that "*Portunus*" *tuberculatus* [the type-species of *Macropipus*] occupied an isolated position from the remainder of the British species of "*Portunus*" [here assigned to *Liocarcinus*]. *Liocarcinus* has not been used by European zoologists but was used by Bennett (1964:65) for *L. corrugatus* from New Zealand.

Liocarcinus differs from *Macropipus* as follows: (1) The ventral margin of the orbit has one narrow, V-shaped incision (Figure 18a); in *Macropipus* (Figure 18b) the ventral margin is open and deeply U-shaped (see also Guinot and Ribeiro, 1962, fig. 8). (2) *Liocarcinus* lacks iridescent patches on the carapace and pereopods. (3) The ornamentation of the cheliped is different: *Liocarcinus* lacks a distal ventral spine on the merus, generally lacks a well-developed outer tooth on the carpus (such as in *L. marmoreus* and *L. corrugatus*), and usually has three rather than two longitudinal ridges on the dactylus (there may be only two in the highly ornamented *L. corrugatus*). (4) The propodi of the second to fourth pereopods are ornamented with a single ventral ridge in *Liocarcinus* (Figure 18g), two distinct ridges in *Macropipus* (Figure 18h). (5) The walking legs are distinctly

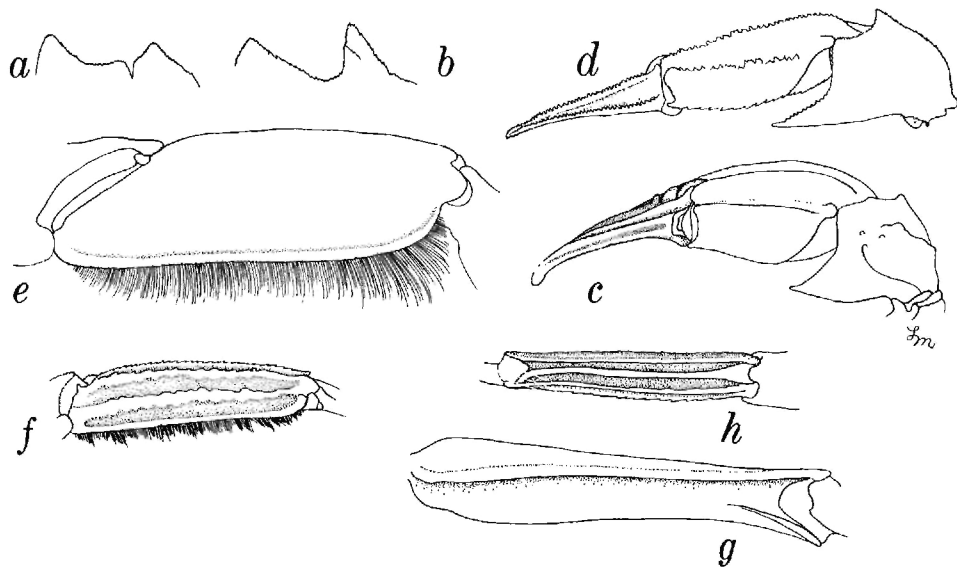


FIGURE 18.—Comparison of morphological features. *Liocarcinus holsatus* (Fabricius), male, cb 36.5 mm, England: *a*, orbit, ventral view; *c*, chela; *e*, propodus of second pereopod, lateral view; *g*, propodus of second pereopod, ventral view. *Macropipus rugosus* (Doflein), male, cb 36.7 mm, Guinea-Bissau: *b*, orbit, ventral view; *d*, chela; *f*, propodus of second pereopod, lateral view; *h*, propodus of second pereopod, ventral view.

longer in *Macropipus* (compare figure 26 (*Macropipus tuberculatus*) with figures 20–25 (*Liocarcinus* spp.) in Christiansen, 1969).

Liocarcinus, *Macropipus*, and *Bathynectes* form a progression from generally shallow-water, short-legged species to deep-water, long-legged species.

One species of *Liocarcinus*, *L. bolivari* (Zariquiey Alvarez, 1968) apparently is endemic in the Mediterranean. Two species, *L. holsatus* (Fabricius, 1798) and *L. marmoreus* (Leach, 1814), are not known to occur in the Mediterranean; records of these species in the latter area probably are referable to *L. vernalis* (Risso, 1816).

As Christiansen (1969:60) pointed out, there has been some confusion regarding identity of *Liocarcinus* spp. off the northwest African coast, due to similarities between *Xaiva mcleayi* and *L. pusillus*.

Eleven species of *Liocarcinus* occur in European-Mediterranean waters; Zariquiey Alvarez (1968:367) provided a key to the species then known.

***Liocarcinus arcuatus* (Leach, 1814),
new combination**

Portunus arcuatus.—Capart, 1951:115 [Mauritania].—Monod, 1956:173 [references].

Macropipus arcuatus.—Zariquiey Alvarez, 1968:369, figs. 116d–h, 120a, 122c, 123a [Spain; references].—Christiansen, 1969:57, fig. 21, map 15 [Scandinavia].

SYNONYMS.—*Portunus emarginatus* Leach, 1814; *Portunus guttatus* Risso, 1816; *Portunus rondeleti* Risso, 1816; *Portunus infractus* Otto, 1828.

DISTRIBUTION.—Eastern Atlantic from the North Sea and the British Isles to Mauritania, Mediterranean, in depths to 108 m, usually between 10 and 50 m.

***Liocarcinus corrugatus* (Pennant, 1777),
new combination**

Portunus corrugatus.—Bouvier, 1911:226 [Mauritania].—Capart, 1951:120 [Spanish Sahara].—Monod, 1956:174, fig. 202 [Senegal, Guinea, Gabon, Angola; references].—Maurin, 1968b:484 [Spanish Sahara].

Macropipus corrugatus.—Guinot and Ribeiro, 1962:31 [Cape Verde Islands, Angola].—Ribeiro, 1964:5 [Cape Verde Islands].—Forest and Guinot, 1966:59 [Senegal].—Maurin, 1968b:484 [Spanish Sahara].—Zariquiey Alvarez, 1968:372, figs. 13e, 118c–e, 120c, 122d, 123c, 124c [Spain; references].—Bas, Arias, and Guerra, 1976, table 3 [Spanish Sahara].—Türkay, 1976b:61 [listed], 66 [Madeira].

SYNONYM.—*Portunus leachi* Risso, 1827.

DISTRIBUTION.—Eastern Atlantic, from England to Senegal, Angola, including the Azores, Canary Islands and Cape Verde Islands, Mediterranean; also Indo-West Pacific (Stephenson, 1972:23); littoral to 60 m.

Genus *Macropipus* Prestandrea, 1833

Macropipus Prestandrea, 1833:5 [type-species: *Portunus macropipus* Prestandrea, 1833, a subjective junior synonym of *Portunus tuberculatus* Roux, 1830, by tautonymy; gender: masculine; name 987 on *Official List*].

Elliptodactylus Doflein, 1904:93 [type-species: *Elliptodactylus rugosus* Doflein, 1904, by monotypy; gender: masculine].

DEFINITION.—Carapace broader than long, with 5 anterolateral teeth, iridescent patches present on surface and on pereopods. Front with 3 lobes. Dorsal margin of orbit with 2 closed incisions, ventral margin (Figure 18*b*) deeply U-shaped. Basal antennal article touching front, usually freely movable. Chelipeds unequal, shorter than pereopods 2 to 5; merus with distal ventral tooth; carpus with strong inner tooth and smaller outer tooth; dactylus (Figure 18*d*) with 2 dorsal ridges. Propodus of second to fourth pereopods each with 2 ventral ridges (Figure 18*f,h*). Third to fifth abdominal somites fused in male.

REMARKS.—As noted above (p. 83), we are extremely reluctant to separate the genus *Liocarcinus*, from *Macropipus* sensu stricto. However, as Guinot (1961:7) pointed out in her account of the three species of *Macropipus*, "Ce trois espèces ont en commun [in contrast with other species then assigned to *Macropipus*] certains caractères, en particulier l'ornementation de la face dorsale de la carapace et des appendices, la disposition des épines sur le chélicèpe, la forme du maxillipède externe, la présence de zones iridescentes nacrées sur la carapace et les appendices." These features, and those discussed under *Liocarcinus*, warrant the recognition of two genera: *Liocarcinus*, including 11 relatively short-legged, shallow water species, and *Macropipus*, including 3 relatively long-legged, deep-water species from the Mediterranean and West Africa.

Macropipus australis Guinot, 1961

Elliptodactylus rugosus.—Barnard, 1950:817 [not *Elliptodactylus rugosus* Doflein, 1904 = *Macropipus rugosus*].

Portunus tuberculatus.—Capart, 1951:117, fig. 41 [part, specimens from Angola (Sta A.S. 110) and South-West Africa (Sta A.S. 108) only].—Barnard, 1954:123 [listed]; 1955:3 [listed]. [Not *Portunus tuberculatus* Roux, 1830 = *Macropipus tuberculatus*.]

Macropipus australis Guinot, 1961:5, figs. 1, 2, 5, pl. 1, pl. 2: fig. 1.—Crosnier, 1970:1216.

Macropipus sp.—Guinot and Ribeiro, 1962:44, 45, figs. 13–15, 24*a,b*, pl. 2: fig. 3, pl. 3: fig. 3.

MATERIAL EXAMINED.—*Pillsbury Material*: None.

Undaunted Material: Angola: Sta 94, 90 m, 1♂ (L). Sta 95, 126 m, 5♂, 6♀ (W). Sta 96, 162 m, 1♀ (L). Sta 103, 90 m, 20♂, 6♀ (L). Sta 104, 126 m, 1♂, 1♀ (L). Sta 105, 155 m, 3♂ (L).

South-West Africa: Sta 106, 225 m, 1♀ (L).

DESCRIPTION.—Capart, 1951:117; Guinot, 1961:5.

Figures: Capart, 1951, fig. 41; Guinot, 1961, figs. 2, 5, pl. 1, pl. 2: fig. 1; Guinot and Ribeiro, 1962, figs. 13–15, 24*a,b*, pl. 2: fig. 3, pl. 3: fig. 3.

Male Pleopod: Guinot and Ribeiro, 1962, fig. 24*a,b* (South-West Africa).

Color: "Brick-red, under surface greyish; bright iridescent patches as follows: on antero-lateral margin between each pair of teeth, and a larger crescentic patch behind the last lateral tooth, in the smooth grooves between the regions of the carapace, anterior surface of the palp of mxp. 3, on the smooth distal portion of upper surface of arm of cheliped, the spine and other smooth areas on wrist, the smooth areas on upper surface of hand, and in the groove on upper margin of finger" (Barnard, 1950:818).

BIOLOGY.—*Macropipus australis* is a sublittoral species living on the outer shelf and upper slope in depths between 90 and 238 m. Of ten depth records available, two are from less than 100 m (both 90 m), five are from between 100 and 200 m (110, 126, 126, 155, and 162 m), and three are from depths greater than 200 m (220, 225, and 238 m). The only information on the nature of bottom on which the species has been found is given by Capart (1951); both of the lots he re-

ported were taken on muddy sand in 110 and 220 m. Oviparous females have not been collected.

DISTRIBUTION.—Off West Africa, from the coasts of Angola and South-West Africa, in depths between 90 and 238 m. Records in the literature include:

Angola: 16°27'S, 11°35'E, 90 m (Crosnier, 1970). 18 mi [29 km] WSW of Baía dos Tigres, 16°36'S, 11°27'E, 110 m (Capart, 1951; Guinot, 1961). 16°37'S, 11°22'E, 126 m; 16°41'S, 11°21'E, 162 m; 17°06'S, 11°35'E, 90 m; 17°09'S, 11°30'E, 126 m; 17°13'S, 11°27'E, 155 m (all Crosnier, 1970).

South-West Africa: 17°18'S, 11°24'E, 225 m (Crosnier, 1970). 52 mi [84 km] SxW Fort Rock Point, 19°52'S, 12°20'E, 220 m (Capart, 1951; Guinot, 1961). 26°36'S, 14°37'E, 130 fm (238 m) (Barnard, 1950; Guinot, 1961; Guinot and Ribeiro, 1962).

* *Macropipus rugosus* (Doflein, 1904)

Portunus sp.—Leach, 1818, in 1817–1818:413.—Monod, 1970:66.

Elliptodactylus rugosus Doflein, 1904:94, figs. 7, 8, pl. 30: figs. 1–3, pl. 32: fig. 7.

Portunus tuberculatus.—Capart, 1951:117 [part, not fig. 41, not specimens from A.S. 108, 110].—Monod, 1956:180, 632, figs. 207–209.—Rossignol, 1957:80, 123 [key].—Longhurst, 1958:87.—Rossignol, 1962:115.—Maurin, 1968b:484, fig. 5.—Le Loeuff and Intès, 1968:44, table 1, figs. 49, 63. [Not *Portunus tuberculatus* Roux, 1830.]

Macropipus rugosus.—Guinot, 1961:2, 9, figs. 1, 4, 7, pl. 2: fig. 3 [synonymy].—Guinot and Ribeiro, 1962:32–34, 35, figs. 7–9, 17, 19, 20, 22a,b, pl. 2: fig. 1, pl. 3: fig. 1.—Crosnier, 1964:34.—Forest and Guinot, 1966:60.—Le Loeuff and Intès, 1969:63, 65.—Türkay, 1976a:25 [listed], 37.

Macropipus.—Voss, 1966:27.

Portunus.—Maurin, 1968b, fig. 4.

Portunus (Macropipus) tuberculatus.—Maurin, 1968b:486, 489, 491 [not *Portunus tuberculatus* Roux, 1830].

Macropipus tuberculatus.—Maurin, 1968b:491.—Bas, Arias and Guerra, 1976, table 3. [Not *Portunus tuberculatus* Roux, 1830.]

MATERIAL EXAMINED.—*Pillsbury Material*: Liberia: Sta 68, 70 m, broken shell, 3 juv (W). Sta 83, 156–220 m, 2♀ ov (L).

Ivory Coast: Sta 42, 62–75 m, mud with brown, branched Foraminifera, 1 juv (W). Sta 64, 68 m, 1 carapace (L). Sta 65, 46–49 m, 1♀ ov (dry) (L).

Ghana: Sta 23, 42 m, foliate brown to orange bryozoans, 2♀ (L). Sta 24, 35–37 m, dark red bryozoans, 1♀ (W).

Nigeria: Sta 241, 59–63 m, mud and shell, 5♂, 6♀, 9 juv (W).

Cameroon: Sta 259, 59 m, mud and broken shell, 9♂, 9♀ (L). Sta 260, 46 m, 1♂, 1♀ (L).

Geronimo Material: Gabon: Sta 202, 100 m, 36♂, 30♀ (W). Sta 211, 100 m, 3♂, 7♀ (W). Sta 213, 300 m, 1♂, 2♀ (W). Sta 228, 300 m, 1♂, 2♀ (W).

Other Material: Guinea-Bissau: 10°19'N, 16°34'W, 174 m, mud, sand, 16 May 1956, *Calypto* Sta 5, 1♂ (W).

Liberia: Off Monrovia, 400 m, 27 Apr 1964, Guinean Trawling Survey 14/8, 1 specimen (L).

Gulf of Guinea: Between Ghana and Sierra Leone, Feb and Apr 1964, Guinean Trawling Survey, 1♂ (L).

DESCRIPTION.—Guinot, 1961, table 1 (comparison with *M. tuberculatus* (Roux, 1830) and *M. australis* Guinot, 1961; Guinot and Ribeiro, 1962: 37–42 (comparison with *M. tuberculatus*).

Figures: Monod, 1956, figs. 207–209.

Male Pleopod: Monod, 1956, fig. 209 (Senegal); Guinot and Ribeiro, 1962, fig. 22a,b (Guinea-Bissau).

Color: According to Capart (1951:118), this species is “gris-jaune avec taches roses, prenant un aspect nacré après fixation.” His color notes may have been based on *M. australis*, for part of his material is referable to that species (see p. 85).

MEASUREMENTS.—Our specimens have carapace widths of 8 to 39 mm; oviparous females have carapace widths of 32 to 39 mm.

BIOLOGY.—*Macropipus rugosus* inhabits moderate depths and seems to prefer depths of less than 100 m; the shallowest record is of 5 m and the deepest is 400 m. 78% of the records for which depth is given are from depths of less than 100 m, and, in those depths, records are equally divided between those in 50 m or less and those in 51–100 m. All but two of the *Pillsbury* specimens came from depths of less than 100 m and the species was found on bottoms with bryozoans, Foraminifera, broken shell, and mud and shell or mud and broken shell. Guinot (1961:10) noted that “Son habitat le plus commun semble être le sable ou la vase.” Forest and Guinot (1966) reported it from mud, rocks and calcareous algae, mud, mud and sand or broken shell, mud and calcareous algae and shells, sand, and algae and calcareous algae. Maurin (1968b) found it on mud in 40–

60 m, on detrital mud in 50–90 and 200 m, on fine detrital muddy sand in 200–400 m, and on fluid mud with fine sand or mud and very muddy fine sand in 35–40 m.

Le Loeuff and Intès (1968:44) studied this species (as *Portunus tuberculatus*) off the Ivory Coast and commented:

La zone des 50 m constitue l'habitat privilégié de l'espèce qui accompagne cependant les eaux froides jusqu'à 35 m quand elles remontent le long du plateau continental en Mai, puis Août-Septembre-Octobre et même Janvier-Février. En fait *P. tuberculatus* vit dans des eaux bien déterminées (22°C–16°C de température, 35,55‰ à 35,75‰ de salinité) qui, en Côte d'Ivoire correspondent à l'eau subtropicale. C'est sans doute, parmi tous les organismes benthiques littoraux de cette étude, l'espèce la plus sténotherme et la plus inféodée à une masse d'eau.

Türky's (1976a) record of this species from off Morocco seems questionable to us, not only because it is from so far north (33°37.5'N) but also because of the relatively great depth, 952–1038 m, at which his material is supposed to have been collected. That depth is more than twice as great as the deepest record otherwise observed for this species.

Ovigerous females have been collected in June and September (Monod, 1956; Forest and Guinot, 1966; Pillsbury).

DISTRIBUTION.—Off West Africa, from Mauritania to Angola, in moderate depths, from 5 to 400 m. Monod (1956) identified this species with the Mediterranean *M. tuberculatus* (Roux) and reported material from Mauritania, Senegal, Sierra Leone, and Guinea. Guinot (1961) differentiated earlier records and provided synonymies for each of the three nominal species: *M. australis*, *M. rugosus*, and *M. tuberculatus*. Subsequent records include:

West Africa: Gulf of Guinea (Leach, 1818, in 1817–1818; Monod, 1970).

Morocco: 33°37.5'N, 09°02.2'W, 952–1038 m (?) (Türky, 1976a).

Spanish Sahara: No specific locality (Guinot and Ribeiro, 1962). Between Cabo Barbas and Cabo Blanco, 59–90 m; between Cabo Corbeiro and Cabo Blanco, 200 m (Maurin, 1968b). 25°37.5'N, 14°52'W to 25°39.2'N, 14°51.5'W, 72–78 m, and 24°06.3'N, 16°20.2'W to 24°06'N, 16°24.8'W, 61–68 m (Bas, Arias, and Guerra, 1976).

Mauritania: Banc d'Arguin, 40–60 and 90–100 m; off Tamzak (as Tamxat), 200–400 m (Maurin, 1968b).

Senegal: Off Saint-Louis, 35–40 m; 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 (Guinot and Ribeiro, 1962; Forest and Guinot, 1966). SE of Île de la Madeleine, 48 m; S border, Fosse de Kayar, 300 m; off Cambérène, 50 m (all Guinot and Ribeiro, 1962).

Guinea-Bissau: 10°32'N, 16°53.5'W, 174 m, and 10°19'N, 16°34'W, 60–73 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

Sierra Leone: No specific locality, 15–236 m (Longhurst, 1958).

Liberia: 04°59'N, 09°37'W, to 04°57.5'N, 09°33'W, 156–220 m (Voss, 1966).

Ivory Coast: No specific locality (Le Loeuff and Intès, 1969). Off Grand-Lahou, off Grand-Bassam, 35–100 m (Le Loeuff and Intès, 1968).

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

Principe: 01°38'25"N, 07°22'05"E, 31 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

São Tomé: 00°25'40"N, 06°40'10"E, 50 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966).

Gabon: 00°38'25"S, 08°46'E, 5 m; 00°38'20"S, 08°48'30"E, 35 m (Guinot and Ribeiro, 1962; Forest and Guinot, 1966). W of Pointe Panga, 70 m (Rossignol, 1962).

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

Zaire: 06°16'S, 12°07'E, 50 m; 06°28'S, 12°05'03"E (Guinot, 1961).

Angola: 10°S, 13°30'E, 60–70 m (Guinot, 1961). Baía Farta, Benguela, 90 m; Baía da Caota, Benguela, 13 m (both Guinot and Ribeiro, 1962).

Subfamily PORTUNINAE Rafinesque, 1815

REMARKS.—This subfamily is characterized by the presence of a strong tooth on the upper, outer surface of the palm of the cheliped near the upper articulation of the carpus.

Genus *Callinectes* Stimpson, 1860

Callinectes Stimpson, 1860:220 [type-species: *Callinectes sapidus* Rathbun, 1896, by designation under the plenary powers of the International Commission on Zoological Nomenclature, Opinion 712 in *Bulletin of Zoological Nomenclature*, 21(5):337, 1964; gender: masculine; name 1613 on *Official List*].

REMARKS.—The genus *Callinectes* has been reviewed recently in detail by Williams (1974); not all of his distribution records are duplicated here.

Key to West African Species of *Callinectes**

(modified from Williams, 1974)

1. Granules of carapace (Figure 19a) anterior to epibranchial ridges larger and placed wider apart than those posterior to ridges. Epibranchial ridges without distinct inflection in middle, almost straight. Submedian pair of frontal teeth well developed, usually half or more than half as long as lateral pair (measuring from base of lateral notch between teeth). First abdominal somite laterally ending in triangular, rather blunt point, not sharply pointed nor curved upward. Tips of male gonopods reaching beyond suture between thoracic sternite vi and mesially expanded sternite vii *C. annicola*, new combination
- Granulation of carapace not different anterior and posterior to epibranchial ridges. Frontal teeth decidedly unequal in size, submedian pair no more than half as long as the lateral pair. Tips of male gonopods falling well short of suture between thoracic sternite vi and mesially expanded sternite vii 2
2. Carapace (Figure 19b) coarsely granulated. Epibranchial ridges with a distinct deflection in the middle. First abdominal somite ending laterally in a triangular point, which is neither sharply drawn out nor curved up. Male gonopods well separated from each other, not touching or crossed *C. marginatus*
- Carapace (Figure 19c) finely granulated. Epibranchial ridges not deflected in the middle, at most slightly sinuous. First abdominal segment ending laterally in narrow upturned points. Male gonopods overlapping each other, often crossed *C. pallidus*, new combination

* Excluding juveniles.

* *Callinectes annicola* (De Rochebrune, 1883), new combination

FIGURE 19a

- Amphitrite diacantha*.—Herklots, 1851:5 [not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896].
- Neptunus annicola* De Rochebrune, 1883:168.—Miers, 1886:175.—Monod, 1956:215.
- Neptunus Edwardsi* De Rochebrune, 1883:169.—Monod, 1956:215.
- Neptunus diacanthus*.—De Man, 1883:150 [part].—Büttikofer, 1890:466, 487 [part].—Johnston, 1906:862. [Not *Portunus diacantha* Latreille, 1825 = *Callinectes sapidus* Rathbun, 1896.]
- Neptunus edwardsii*.—Miers, 1886:175.
- Portunus edwardsi*.—Rathbun, 1900a:290.
- Callinectes diacanthus africanus*.—Gruvel, 1912:5, 6, 11 [not pl. 2: fig. 1 = *Callinectes sapidus* Rathbun, 1896].
- Neptunus Edwardsii*.—Balss, 1921:58 [listed].
- Callinectes latimanus*.—Capart, 1951:132, fig. 47.—Bruce-

Chwatt and Fitz-John, 1951:117.—Sourie, 1954a:24, 84, 112 [listed].—Monod, 1956:211, figs. 240–243.—Rossignol 1957:82.—Longhurst, 1957:375, 380.—Sourie, 1957:13, 51.—Longhurst, 1958:87.—Gauld, 1960:69.—Guinot and Ribeiro, 1962:50.—Rossignol, 1962:116.—Crosnier, 1964:32.—Ribeiro, 1964:7.—Forest and Guinot, 1966:65.—Monod, 1967:180, pl. 15: fig. 2 [no material].—Le Loeuff and Intès, 1968:44; 1969:63.—Williams, 1974:775, figs. 15, 19c, 20p, 23a, 27 [review of genus].—Pauly, 1975:57.—Powell, 1979:127.

Not *Callinectes latimanus*.—Irvine, 1947:297, fig. 203 [= *Portunus validus* Herklots, 1851], fig. 202 [= *Callinectes pallidus* (De Rochebrune, 1883)].

SYNONYMS.—*Neptunus edwardsi* De Rochebrune, 1883; *Callinectes latimanus* Rathbun, 1897; *Neptunus marginatus* var. *truncata* Aurivillius, 1898.

MATERIAL EXAMINED.—*Pillsbury Material*: Nigeria: Sta 2, Lagos harbor, surface, 1♀ ov (L). Sta 229, Lagos harbor, surface, 1♀ (W).

Other Material: Senegal: No specific data, 1 juv ♂ (W).

Liberia: Robertsport, Grand Cape Mount County, 28 Dec 1947, J. T. Baldwin, Jr., 1♀ (W). Junk River, Habel, T. C. Rutherford, 20 Jul 1968, 1♂ (W). Fisherman's Lake [Lake Piso], 1881, J. Büttikofer and J. A. Sala, 2♂, 2♀ (L). Grand Cape Mount, 1881, J. Büttikofer and J. A. Sala, 1♂ (L).

Ghana: Elmina (as St. George d'Elmina), 1840–1855, H. S. Pel, 1♂ (L). Takoradi Airport stream, 28 Aug 1961, Banes and Amegah, 1♂, 2♀, 2 juvs (W). Data same, Amegah, 1♂, 1♀ (W). Takoradi swimming pool, 10 Aug 1961, Amegah, 2♂ (W).

Togo: No specific locality, 1♀ (W).

Nigeria: Lagos, A. Molony, syntype of *Callinectes latimanus* Rathbun, 1♂ (52 × 114 mm) (W). South bank of mouth of Escravos River near Ajudaibo, Niger delta, 18 Jul 1975, C. B. Powell, 1♀ (L). Between Brass and Port Harcourt, Niger delta, May–Aug 1960, H. J. G. Beets, 6 spec (L).

Zaire: Banana, mouth of Congo River, American Museum Congo Expedition 1909–1915, July–Aug 1915, H. Lang, 5♂, 2♀ (W).

Angola: "Congo," 1880, P. Kamerman, 6 specimens (L).

DESCRIPTION.—Carapace (Figure 19a) moderately convex, twice or slightly more than twice (2.0–2.3 times) as wide as long (spines included), dorsal surface rather roughly granular. Posterior to epibranchial ridges granules generally smaller and placed closer together than anteriorly, where coarser, more widely spaced. Epibranchial ridge forming an almost straight line from cervical groove to lateral marginal spine of carapace,

showing no inflection as in *C. marginatus*. Length of metagastric area of carapace equal to or slightly greater than posterior width, latter half anterior width. Submedian teeth of front triangular, usually half or slightly more than half as long as outer frontal teeth; latter triangularly rounded, distinctly narrower than inner orbital angles, extending beyond them for some distance. Epistomial spine, in dorsal view, rarely extending beyond frontal teeth. Anterolateral margins of carapace not strongly arched, less so than in *C. marginatus*. Anterolateral teeth rather wide, anterior teeth blunt to acute, directed outward, posterior teeth more acute, curved more anteriorly. Lateral spine stout, varying from twice to somewhat more than twice as long as preceding tooth.

Carpus and chela with usual distinct, granular ridges. Adults with larger chela often high and swollen in basal part of fingers, with lower margin of fixed finger convex basally, fingers gaping, dactylus with enlarged molariform tooth basally on cutting edge.

First somite of abdomen in both sexes bluntly triangular laterally, not ending in sharp, up-curved point as in *C. pallidus*.

Male first gonopods very long, reaching almost to end of abdomen, distally curved inward, tips crossing. Length of gonopods characteristic of this

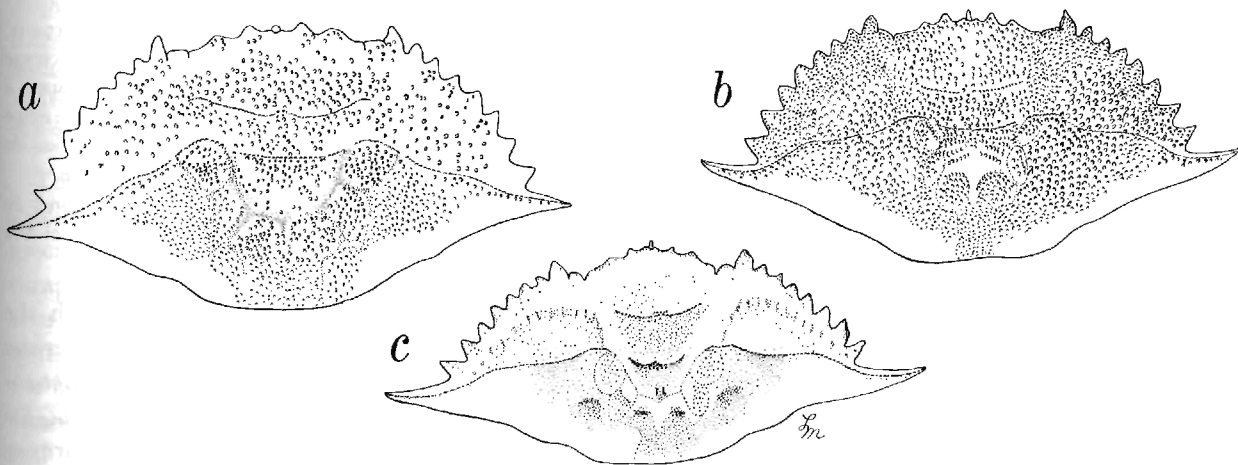


FIGURE 19.—Carapace ornamentation in West African species of *Callinectes*: a, *C. amnicola* (De Rochebrune), male, cb 119.5 mm, Liberia; b, *C. marginatus* (A. Milne Edwards), male, cb 90 mm, Congo; c, *C. pallidus* (De Rochebrune), male, cb 95 mm, Liberia.

species, distinguishing it from other African species of the genus.

An excellent account of the species has been given by Williams (1974:775).

Figures: Rathbun, 1921, fig. 4, pl. 15: fig. 2, pl. 21, pl. 22: fig. 1; Capart, 1951, fig. 47; Monod, 1956, figs. 240–243; Williams, 1974, figs. 15, 19c, 20p, 23a, 27.

Male Pleopod: Rathbun, 1921, fig. 4e (Zaire); Williams, 1974, figs. 19c, 20p (Congo).

Color: Williams (1974:776) summarized some earlier observations on color and noted that “a mottled olive coloration persists at least as long as 20 yr in some preserved specimens.” Capart (1951:133) noted that in his material the color was “uniforme bleuâtre (exemplaires fixés, orangé clair).” Gauld (1960:69) observed that off Accra material of this species is “olive-brown with pale legs.” De Rochebrune’s (1883) color descriptions of the adult and juvenile are cited on p. 91.

MEASUREMENTS.—Our specimens have carapace widths of 15 to 126.5 mm; the ovigerous female has a carapace width of 120 mm.

REMARKS.—In the recent literature this species has usually been given the name *Callinectes latimanus* Rathbun, 1897, but there is an older name (or actually two older names) available for it. De Rochebrune (1883:168–171) described three new species of swimming crabs from Senegal: *Neptunus amnicola* (p. 168), *N. edwardsi* (p. 169), and *N. pallidus* (p. 170). The identity of these species has puzzled many authors. Miers (1886:175) listed them in the subgenus *Amphitrite* de Haan, 1833 [= *Monomia* Gistel, 1848] of the genus *Neptunus* de Haan, 1833 [= *Portunus* Weber, 1795], without any comment other than that *amnicola* perhaps should be placed in the subgenus *Neptunus*. Rathbun (1900a:290) placed *amnicola* with some doubt in the synonymy of *Callinectes bocourti* A. Milne Edwards, and treated *edwardsi* (p. 289) and *pallidus* (p. 290) as good species of *Portunus*. Later Rathbun (1921:398) reassigned the West African specimens that she at first had thought to be *C. bocourti* to *C. latimanus*, but at that occasion she did not deal with *amnicola*. Monod (1956:215) listed all three species of De Rochebrune as “spe-

cies inquirendae” under *Callinectes* and stated that he had not been able to locate De Rochebrune’s type material in the Paris Museum. So far as we know all later authors ignored De Rochebrune’s species.

A study of De Rochebrune’s descriptions makes clear that Monod was right in considering all to belong to the genus *Callinectes*. The species *N. amnicola* was described from a fullgrown specimen (cb 141 mm, cl 76 mm), the other two species after juveniles, which makes their identification especially difficult. *Neptunus amnicola* was described by De Rochebrune (1883:168–169) as follows (only the French description is cited and the abbreviated Latin diagnosis is omitted).

Carapace beaucoup plus large que haute, faiblement bombée, fortement granuleuse, à granulations plus grosses et plus espacées dans la région antérieure; lignes épigastriques et hypogastriques bien marquées, les épibranchiales peu indiquées; bords latéro-antérieurs plus courts que les latéro-postérieurs; première dent de forme trapézoïdale, obtuse au sommet; les suivantes épaisses, brusquement terminées en pointe courte et aiguë; la neuvième très longue, étroite, acérée, faiblement incurvée en dehors; front découpé en six dents, les deux médianes petites et obtuses, les mitoyennes plus longues, subaiguës, les externes très larges courtes arrondies au sommet; apophyse épistomienne grosse, atteignant le niveau du front; pattes antérieures très robustes, celles de droite plus volumineuses que celles de gauche; bras armé à la partie antérieure de trois dents en forme d’épine de Rosier, la première faible, les deux suivantes très fortes; partie postérieure du bras aplatie, carénée, à carène obtusement denticulée et terminée en haut par une épine courte; avant-bras tricaréné en dessous et en côté, chaque carène terminée par une dent obtuse; mains quadrangulaires, à angles fortement granuleux, armées en dessous d’une épine courte, en côté de deux tubercules et à l’articulation de l’avant-bras, d’une dent triangulaire robuste et aiguë.

Teinte générale d’un beau bleu d’outre-mer nuancé de rose, deux taches arrondies, rouges, de chaque côté et à la base de la carapace.

This description agrees quite well with the present species, especially the very characteristic granulation of the carapace shows that *Neptunus amnicola* is a synonym of *Callinectes latimanus*. De Rochebrune’s remark that the chelae are “armées en dessous d’une épine courte” evidently is a misprint for “armées en dessus. . . .” The fact that *Callinectes latimanus* is a common species in

fresh and brackish waters of Senegal makes the identification even more likely. Rathbun's (1900a) tentative identification of De Rochebrune's *Neptunus amnicola* with what she at that time considered *C. bocourti* A. Milne Edwards thus proves to have been correct. The epithet *amnicola* De Rochebrune, 1883, being older than *latimanus* Rathbun, 1897, has priority and thus must be used for the species.

De Rochebrune's second species, *Neptunus edwardsi*, is based on a very small specimen (cb 26 mm, cl 14 mm), much smaller than *N. amnicola* which measured 141 mm in carapace width and 76 mm in carapace length. De Rochebrune's (1883:169-170) description of *N. edwardsi* runs as follows.

Carapace plus large que haute, aplatie, subhexagonale, très faiblement granuleuse à la partie antérieure; lignes épigastriques et hypogastriques à peine indiquées, lignes épibranchiales fortement accusées; bords latéro-antérieurs plus longs que les latéro-postérieurs; première dent droite épaisse, les suivantes très obtuses à bords libres très finement crénelés; la neuvième aiguë un peu incurvée en haut, relativement courte; front découpé en six dents, les deux médianes très petites, les moyennes et les externes égales et obtuses; apophyse épistomienne courte, ne dépassant pas le front; pattes antérieures faibles; bras armé sur le bord antérieur de trois épines, et de deux autres épines plus faibles à l'extrémité articulaire; avant-bras portant sur la face externe une crête saillante limitée en dehors par une épine courte et accompagnée en dedans d'un tubercule obtus; mains anguleuses, à crêtes longitudinales assez saillantes faiblement rugueuses, et armées de deux petites épines en dessus de l'articulation du pouce.

Teinte générale d'un roux canelle marbré de bleuâtre et de blanc.

The description of *Neptunus edwardsi* fits juvenile specimens of *Callinectes latimanus* very well. In specimens of the size of that of Rochebrune's the carapace is smooth with a few granules in the area before the epibranchial ridge. The lateral spine is short, being only somewhat longer than the last anterolateral tooth, which gives the carapace indeed a "subhexagonal" shape. The lateral frontal and inner orbital teeth are rounded and similar, while the epistomial spine does not show in dorsal view. In juvenile *Callinectes gladiator* the lateral spines are well developed and long. It

seems quite safe to consider *Neptunus edwardsi* De Rochebrune a synonym of *N. amnicola* De Rochebrune, being based only on a juvenile specimen of that species.

De Rochebrune's third species, *Neptunus pallidus*, proves to belong to the species that is generally known as *Callinectes gladiator*, and as De Rochebrune's name is older it has to be known as *Callinectes pallidus* (De Rochebrune) (p. 95).

The material that Irvine (1947:297) referred to *Callinectes latimanus* proves to belong to *Portunus validus* (p. 103); his figure 202, however, represents *Callinectes pallidus* (p. 95).

The specimens recorded by Herklots (1851), De Man (1883), and Büttikofer (1890) are in the collections of the Rijksmuseum van Natuurlijke Historie in Leiden. Herklots' specimen, from Elmina (as St. George del Mina), Gold Coast (Ghana), is a male *C. amnicola* (Crust. D. 376). De Man's material included a specimen of *C. amnicola* from the Congo (Crust. D. 1863), and Büttikofer's material included a *C. amnicola* from Grand Cape Mount (Crust. D. 1873), as well as from Lake Piso (as Fisherman's Lake), Liberia (Crust. D. 1864). Monod (1956:214) had listed the records by Herklots and De Man as unidentifiable.

There is a syntype of *C. latimanus* Rathbun (USNM 19877), a female 52 × 114 mm, from Lagos, in the collection of the National Museum of Natural History, Smithsonian Institution.

Pauly (1957:75) noted that in the Sakumo lagoon, Ghana, this species was common enough to support a subsistence trap fishery.

BIOLOGY.—As pointed out by Williams (1974) and earlier authors, this species is primarily estuarine, although it is not restricted to estuaries. De Rochebrune (1883:171) commented on the "habitat exclusivement fluviatile" of this species, and said that it is common in the Senegal River and disappears when the water becomes salt, to reappear when it turns again completely fresh. Actually the species can stand brackish water and Monod (1956:214) classified it as occurring in marine, brackish, and freshwater habitats. Generally it is considered to be more characteristic of estuaries than *C. pallidus*, but in the Pillsbury