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*Scientific Results of the Danish Expedition to the Coasts of Tropical West Africa
1945-1946*

**A Monograph
of the West African Stomatopod Crustacea**

by

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A Monograph of the West African Stomatopod Crustacea¹

by

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¹ Résultats scientifiques de la campagne Biaçores, contribution No. 21

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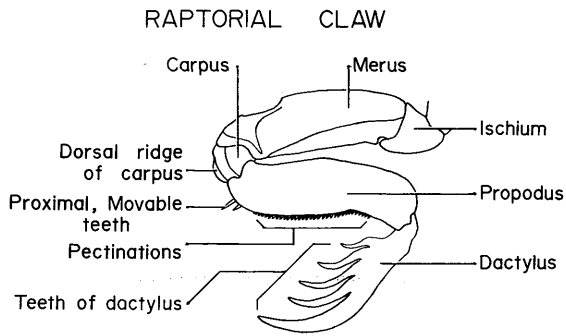
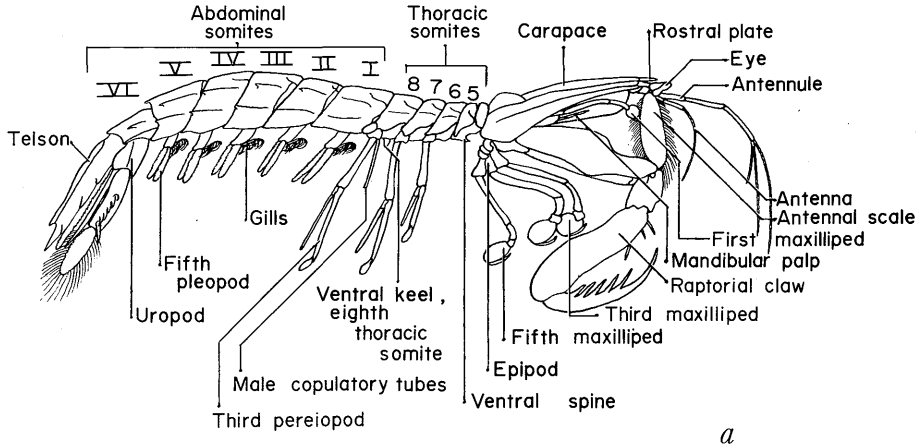
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INTRODUCTION

This report is based on two major collections of stomatopods from West Africa, the Danish Atlantide Expedition, 1945-46, and a larger collection from various sources assembled by J. CADENAT, formerly of the Institut Fondamental d'Afrique Noire, Dakar (IFAN), supplemented by material from several European museums as well as collections donated to the National Museum of Natural History, Smithsonian Institution. The "Atlantide" and the IFAN collections were studied in some detail by J. CADENAT, who had planned to review the stomatopods of West Africa. In 1965 the bulk of the IFAN collections, along with Dr. CADENAT's manuscript notes, a draft manuscript, and numerous illustrations prepared for Dr. CADENAT, were made available to me for preparation of the manuscript. Completion of this review has been delayed for some time, primarily by the assumption of administrative duties, but meanwhile reports on two smaller collections from off West Africa, made by the R/V "Pillsbury" in 1964 and 1965 (MANNING, 1970d) and by the "Calypso" in the Cape Verde Islands (1959) and the Gulf of Guinea (1956) (MANNING, 1974a), have been published.

The present paper includes detailed accounts of all West African species of stomatopods as well as shorter accounts of three Mediterranean species which are not yet known to occur in tropical waters. The eastern Atlantic stomatopod fauna now comprises 29 species representing 17 genera and five families. Two new families, three new genera, and five new species are characterized in this report. A key to the six families recognized within the Stomatopoda is presented, and, for each family reported here, keys to eastern Atlantic genera and species are presented, including where possible, the postlarval stages. In addition, keys to all genera are included for each of the two new families. In the keys, taxa occurring in the Mediterranean are preceded by an asterisk (*), and extra-limital taxa are in



1. Diagrammatic sketches of: *a*, a squillid and *b*, a raptorial claw, illustrating terms used in the descriptive accounts (from MANNING, 1969a).

brackets. In the text, taxa are reported in alphabetical order by family and by genus and species within a family.

In compiling the synonymies, all references dealing with adult West African stomatopods known to me have been included. Extra-limital references are identified by remarks in brackets in the synonymies. I have tried to include references to all names applied to each species, but I have not attempted to give complete references for the species which also occur in the Mediterranean. In general, names applied to larval forms are not cited in the synonymies; these have been compiled in a separate section on larvae which follows the section on adults. The list of larval forms reported off West Africa is followed by a brief section on zoogeography.

In the cases of several genera, I have given detailed definitions which parallel those given for other Atlantic genera in my report on the western Atlantic stomatopods (MANNING, 1969a). Definitions published elsewhere have not been repeated here.

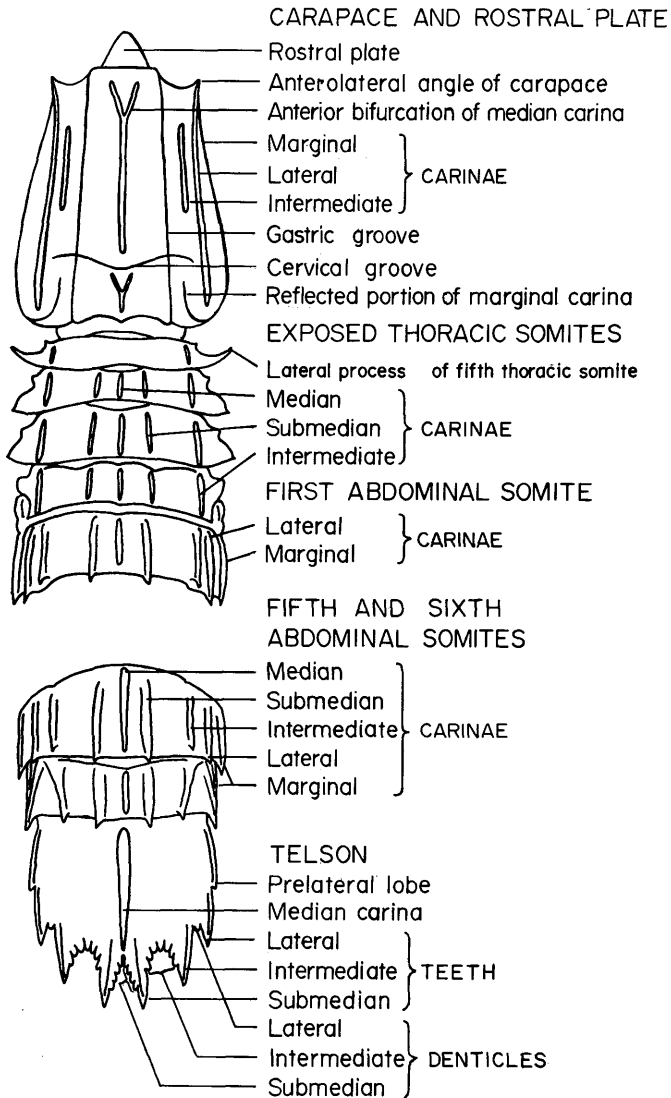


Fig. 2. Terms used in descriptive accounts (from MANNING, 1969a).

Terminology used in the keys and descriptions is shown in Figs 1–3, and follows that used by me in 1969a. Measurements and indices also are explained in some detail in that report. All measurements are in mm. The abbreviation TL has been used for Total Length, CL for Carapace Length. The measurement given with the number of specimens in the lists of material is usually Total Length.

The names of the collectors of the samples treated herein are as follows: J.A.: J. ARNOUX; Am.: AMEGAH; A.B.: A. BOUVIER; A.Bl.: A. BLANC; J. B.: J. BUCHANAN;

R.B.: R. BASSINDALE; B. & R.: BANE and RICHARDS; Bh.: BOEHLER; Bt.: BÜTTIKOFER; A.C.: A. CROSNIER; A.Cm.: A. CREMOUX; J.C.: J. CADENAT; L.C.: A. LE CONTE; M.C.: M. COLLOT; Dp.: DUPARQUET; J.E.: J. VON EITZEN; J.F.: J. FOREST; Fd.: FANDER; Fn.: FURNESTIN; A.G.: A. GRUVEL; A.Gd.: A. I. GOOD; J.G.: J. GREEF; L.G.: LE GOFF; T.G.: T. GAULD; Gm.: GERMAIN; Gt.: GIRARD; C.H.: C. HUPFER; Hg.: HOGBERG; Hm.: HOMIS; A.I.: A. INTES; H.J.: H. JELDEN; D.K.: P. DE KIMPE; A.L.: A. LONGHURST; L.L.: P. LE LOEUFF; C.M.: C. MANGER; G.M.: G. C. MILLER; J.M.: J. MEULENBERGH; M.-M.: I. MARCHE-MARCHAD; T.M.: T. MONOD; Mn.: MENANTAUD; O.N.: O. NUNES; E.P.: E. POSTEL; F.P.: F. PARAISO; F.Pd.: F. POINSARD; Pa.: PASCHEN; Pf.: PARFAIT; Ps.: PAESSLER; C.R.: C. ROUX; R.R.: R. RANCUREL; A.S.: A. SCHULTZE; L.S.: L. SCHULTZE; M.S.: M. SOURIE; Sr.: SAHRHAGE; St.: STEINDACHNER; Su.: SUENSON; A.T.: A. TOTTEN; G.T.: G. THORSON; M.T.: M. TÜRKAY; Tr.: TRAUTMANN; Zl.: ZIELINSKI.

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Many individuals and institutions have contributed to this study. The extensive IFAN collections were made available through J. CADENAT and I. MARCHE MARCHAD, both formerly with the Institut Fondamental d'Afrique Noire, Dakar, and TH. MONOD, formerly Director of IFAN and now with the Laboratoire des Pêches Outre-Mer, Muséum National d'Histoire Naturelle, Paris. Selected lots from the IFAN collections have been deposited in the Muséum National d'Histoire Naturelle, Paris (Mus. Paris). The contributions of J. CADENAT to this manuscript were numerous. Not only did he make available the bulk of the material studied by him for a review of the West African stomatopods which the pressures of other duties kept him from completing, but he also very generously forwarded a copy of his manuscript, including numerous illustrations, and his study notes. Although his manuscript was consulted, the present manuscript is based almost entirely on my observations and the keys, descriptions, conclusions, and omissions are my responsibility.

TORBEN WOLFF, Zoological Museum, Copenhagen, made available the West African collections of the "Atlantide" and "Galathea", most of which had been examined also by CADENAT, as well as other specimens from the collections there. These collections have been deposited in the Zoological Museum, Copenhagen (Mus. Copenhagen). Station data for the "Atlantide" and "Galathea" collections have been published by BRUUN (1950) and WOLFF (1964), respectively.

I wish to thank the following individuals for making collections available or for providing working space during several visits to various museums: P. L. G. BENOIT, Koninklijk Museum voor Midden-Africa, Tervuren (Mus. Tervuren); DOROTHY L. BLISS, American Museum of Natural History, New York (AMNH); A. CAPART, Institut Royal des Sciences Naturelles de Belgique, Brussels (Mus. Brussels); A. CROSNIER, formerly Centre d'Océanographie et des Pêches, Pointe-Noire; H.

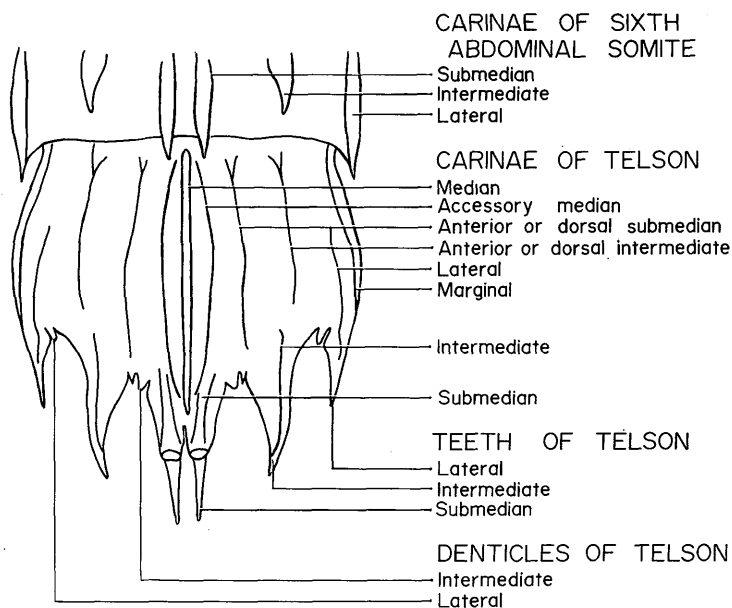


Fig. 3. Terms used in descriptive accounts of eury squillids, gonodactylids, and pseudosquillids (from MANNING, 1969a).

FECHTER, Zoologische Sammlung des Bayerischen Staates, Munich (Mus. Munich); J. FOREST and M. DE SAINT LAURENT, Muséum National d'Histoire Naturelle, Paris (Mus. Paris); G. HARTMANN, Zoologisches Museum, Hamburg (Mus. Hamburg); G. HARTWICH and H.-E. GRUNER, Zoologisches Museum, Berlin (Mus. Berlin); C. HOLMQUIST, Naturhistoriska Riksmuseet, Stockholm (Mus. Stockholm); L. B. HOLTHUIS, Rijksmuseum van Natuurlijke Historie, Leiden (RMNH); R. W. INGLE, British Museum (Natural History), London (BMNH); A. LE LOEUFF and P. INTES, O.R.S.T.O.M. Centre de Recherches Océanographiques, Abidjan, Ivory Coast (CRO, Abidjan); C. LEONARDI, Museo Civico di Storia Naturale, Milan (Mus. Milan); G. PRETZMANN, Naturhistorisches Museum, Wien (Mus. Vienna); and M. TÜRKAY, Natur-Museum und Forschungs-Institut Senckenberg, Frankfurt (Mus. Frankfurt).

All West African stomatopods in the collection of the National Museum of Natural History, Smithsonian Institution, Washington (USNM), are reported in the accounts given below.

I am indebted to FENNER A. CHACE, JR. for taking time to go over the manuscript in his welcome critical manner and for letting me divert time from a joint project to complete this one. My wife LILLY completed the necessary illustrations and prepared all of the illustrations for publication; this report could not have been finished without her help.

Figures used herein were assembled from a variety of sources. Figs 1, 2, and 3 are reprinted from MANNING (1969a) with the permission of the University of Miami Press. Figs 4, 5, 7, 8, 12, 14, 18, 20-22, 30, 32, 35, 37, 40, and 46-48 were prepared for J. CADENAT; most are the work of N. HALLE. Figs 6, 9, 15, 16, 17, 23, 24, 26-29, 34, 36, 41-45, and 49-57 were prepared by my wife LILLY. Figs 10, 13, 31, 33, 38, and 39 are reproduced from MANNING (1974a). Figs 11 and 19 were sent to me by A. CROSNIER. Fig. 24 is reproduced from CADENAT (1957).

HISTORICAL RESUMÉ

The West African stomatopods have received relatively little attention from students of the group and the fauna has remained very poorly known. In the first monograph on stomatopods, MIERS (1880) listed but four species from off West Africa, and, in 1925, MONOD listed but nine species; 25 species are recorded herein from tropical waters.

The earliest records of adult stomatopods from West Africa that I have found are in LATREILLE (1828), who recorded the Indo-West Pacific *Gonodactylus chiragra* and the Mediterranean *Meiosquilla desmaresti* from Sénégal; neither of LATREILLE'S records can be identified with certainty. BRULLÉ (1837) figured *Pseudosquilla oculata* from the Canary Islands and in the accompanying text in the same report listed *Squilla mantis* from the same locality. WHITE (1847) listed *Squilla aculeata calmani* (as *S. mantis*) from Gambia. HERKLOTS (1851) described *Lysiosquilla hoevenii* from Ghana. A. MILNE-EDWARDS described several species from the Cape Verde Islands: *Protosquilla folini* (1867), *Coronida bradyi* (1869), and *Squilla monodactyla* (1878); the latter subsequently proved to be the postlarva of *Pseudosquilla oculata*.

MIERS (1881) described *Acanthosquilla septemspinosa* from Sénégal, and BROOKS (1886b) described *Protosquilla elongata*, a young stage of *P. folini*, from the Cape Verde Islands. CALMAN (1916) was the first to recognize that the West African species then identified with the western Atlantic *Squilla empusa* Say was a distinct species; he named it *Squilla africana*. MONOD (1925) identified a *Lysiosquilla* from Mauritania with the Indo-West Pacific *L. sulcirostris*; it is named for MONOD below. SCHMITT (1926) and MONOD (1951) both recorded the postlarva of *Pseudosquillopsis cerisii* from West Africa; they identified their specimens with *Parasquilla ferussaci*. LONGHURST (1958) was the first to record the widely-distributed *Pseudosquilla ciliata* from West Africa, and he also recorded the *Manningia* described below (as *Pseudosquilla* n.sp.). CADENAT described *Lysiosquilloides aulacorhynchus* from Sénégal and Sao Tomé Island in 1957, and INGLE (1960) described *Squilla labadiensis* (now identified with *Alima hieroglyphica*) and recorded the western Atlantic *Squilla intermedia* from West African waters. MANNING (1970d) described *Allosquilla africana* from off the Niger delta and showed that INGLE'S *S. intermedia* was an undescribed species which was named

Squilla cadenati. In 1974(a) MANNING recorded an adult of the Mediterranean *Parasquilla ferussaci* from Liberia, and named three species from the "Calypso" collections: *Meiosquilla africana*, *M. calypso*, and *Protosquilla calypso*.

In all, 19 species have been recorded from West Africa until now.

SYSTEMATIC ACCOUNT

Key to Families of Stomatopoda

1. Propodi of posterior 3 maxillipeds broad, beaded or ribbed ventrally. Telson lacking sharp median carina (*) Lysiosquillidae (p. 58)
Propodi of posterior 3 maxillipeds slender, not beaded or ribbed ventrally.
Telson with sharp median carina 2
2. All marginal teeth of telson with movable apices [Bathysquillidae]
At most submedian marginal teeth of telson with movable apices 3
3. 4 or more intermediate marginal denticles on telson (*) Squillidae (p. 110)
No more than 2 intermediate marginal denticles on telson 4
4. Ischiomer al articulation of claw subterminal, merus projecting posteriorly beyond articulation. Inferior groove on merus incomplete. Dactylus of claw basally inflated Gonodactylidae (p. 48)
Ischiomer al articulation of claw terminal. Merus grooved inferiorly throughout its length. Dactylus of claw not inflated basally 5
5. Body loosely articulated. Dactylus of claw with 4 or more teeth Eurysquillidae (p. 33)
Body compact. Dactylus of claw with no more than 3 teeth (*) Pseudosquillidae (p. 95)

EURYSQUILLIDAE n. fam.

Definition: Ischiomer al articulation of raptorial claw terminal. Merus of claw with complete inferior groove. Dactylus of claw slender, not inflated basally, armed with 4 or more teeth. Propodi of posterior 3 maxillipeds slender, not beaded or ribbed ventrally. Body loosely-articulated, depressed. Telson broad, with sharp median carina, no more than 2 intermediate marginal denticles present, apices of submedian teeth long, movable.

Type genus: *Eurysquilla* Manning, 1963.

Remarks: The family Eurysquillidae is recognized here for four genera previously assigned to Gonodactylidae. Representatives of the four genera, *Coronidopsis* Hansen, 1895 (3 species), *Eurysquilla* Manning, 1963 (10 species), *Manningia*

Serène, 1962 (8 species), and *Eurysquilloides* Manning, 1963 (1 species), as pointed out by me (1968, 1969a) are much more closely related to each other than to the other groups of genera then placed in the Gonodactylidae. Unlike the gonodactylids as here restricted and the pseudosquillids, the eurysquillids have a depressed, loosely-articulated body and the raptorial claw is armed with four or more teeth. Although the telson structure resembles that of the pseudosquillids, with a sharp median carina and no more than two intermediate marginal denticles, the telson is much broader in the eurysquillids (cf. Figs 4b and 30b). The eurysquillids appear to be an offshoot of the pseudosquillid line.

Representatives of the genera *Coronidopsis* and *Eurysquilloides* occur only in the Indo-West Pacific region. *Manningia* is based on seven species from the Indo-West Pacific region and one from the Gulf of Guinea, described below. *Eurysquilla* includes six American species, two Indo-West Pacific species, and two new species from the Gulf of Guinea, described below.

Key to Genera of Eurysquillidae

1. Rostral plate with 2 apical spines. Ventral surface of telson variously ornamented with spines in addition to marginal denticles [*Coronidopsis* Hansen, 1926; Indo-West Pacific region]
- Rostral plate with at most 1 apical spine. Ventral surface of telson unarmed except for marginal denticles 2
2. Rostral plate subquadrate or pentagonal. Dactylus of claw with 4 teeth *Manningia* Serène
- Rostral plate neither subquadrate nor pentagonal. Dactylus of claw with 5 or more teeth 3
3. Antennular somite greatly elongated. Telson with submedian denticles. [*Eurysquilloides* Manning, 1963; Indo-West Pacific region]
- Antennular somite not elongated. Submedian denticles absent *Eurysquilla* Manning

Key to Eastern Atlantic Genera and Species of Eurysquillidae

1. Dactylus of claw with 4 teeth. Ischial spine present on claw. Cornea strongly bilobed, mesial margin of eye longer than lateral (*Manningia*) *M. posteli*
- Dactylus of claw with 5 or more teeth. Claw lacking ischial spine. Cornea not strongly bilobed, mesial margin of eye not longer than lateral (*Eurysquilla*) 2

2. Basal prolongation of uropod with 2 distal spines and 2 smaller spines on inner margin. Dactylus of claw with 5 teeth *Eurysquilla* sp.
Basal prolongation of uropod with 2 distal spines only, inner margin unarmed. Dactylus of claw with 7–8 teeth 3
3. Rostral plate with apical spine and short dorsal carina. 5 epipods present. Fifth abdominal somite with 6 spined carinae (including marginals). Telson with accessory median rows of tubercles *E. galathea*
Rostral plate lacking apical spine and dorsal carina. 4 epipods present. Fifth abdominal somite with posterolateral spines, lacking spines on other carinae. Telson lacking accessory median rows of tubercles *E. leloeuffi*

***Eurysquilla* Manning, 1963**

Eurysquilla Manning, 1963, p. 314; 1969a, p. 248 [definition].

Type species: *Eurysquilla plumata* (Bigelow, 1901), by original designation.

Remarks: At least two species of *Eurysquilla*, both undescribed, occur off West Africa; they may be distinguished by using the key given above. An unidentifiable postlarva, reported below as *Eurysquilla* sp., probably represents a third species; the only available specimen is too immature to name.

***Eurysquilla galathea* n. sp.**

(Figs 4, 5, 53)

Material:

“Galathea” St. 116, Angola, 12°13'S, 13°27'E, 100 m, clayey sand, 20.12.1950, holotype, 1♀ 31 mm.

“Atlantide” St. 161, off Bathurst, Gambia, 18 m, very fine sand, 24.4.1946, 1♂ 15 mm.

Description: Cornea (Fig. 4a) broadened, faintly bilobed, set very obliquely on stalk; eyes not extending to end of second segment of antennular peduncle; anterior margin of ophthalmic somite unarmed; ocular scales separate medially, flattened or sinuous dorsally, produced laterally into acute but not spiniform processes.

Antennular peduncle longer than carapace; antennular processes produced into slender spines directed anterolaterally.

Antennal scale short, slender, less than half as long as carapace; antennal protopod apparently lacking ventral papillae.

Rostral plate (Fig. 4a) triangular, length and width subequal or length slightly greater, apex spiniform; short median carina present anteriorly.

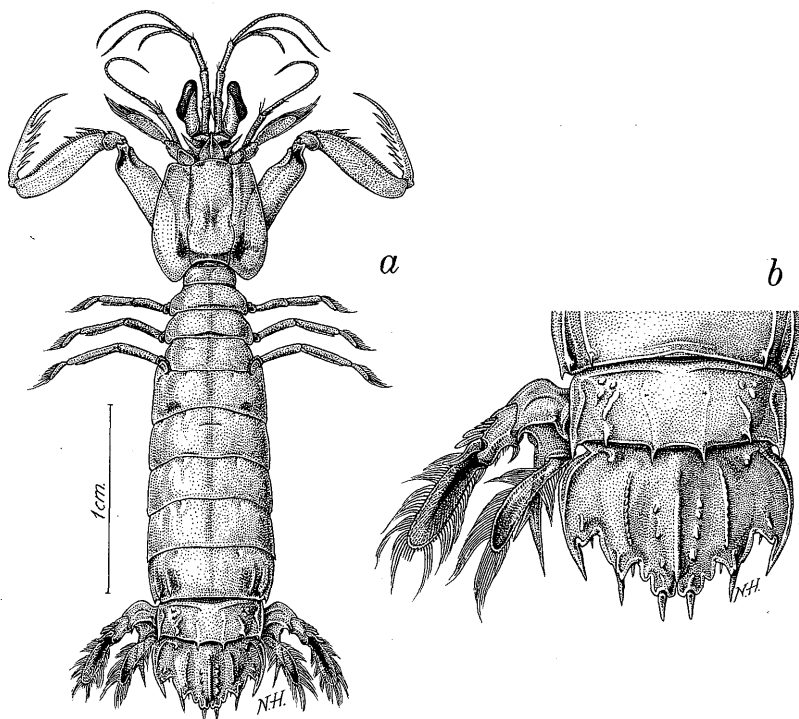


Fig. 4. *Eurysquilla galathea* n. sp., female holotype, TL 31 mm, "Galathea" St. 116, Angola: a, dorsal view; b, posterior portion of body.

Carapace (Fig. 4a) smooth, narrowed anteriorly, anterior portions of lateral plates projecting slightly; low marginal carinae present on posterolateral angles of lateral plates.

Raptorial claw (Fig. 4a) slender, dactylus with 7 teeth, outer margin of dactylus flattened, notched basally; dorsal ridge of carpus terminating in low, acute tooth.

Mandibular palp present; 5 epipods present, posterior 3 very small.

Posterior 3 thoracic somites (Fig. 4a) with low carina on each side above flattened lateral process; fifth thoracic somite lacking distinct lateral process; lateral processes of sixth and seventh thoracic somites flattened laterally, rounded anterolaterally and posterolaterally, posterolateral angles slightly produced posteriorly; basal segments of pereopods unarmed, third leg with blunt posterior projections; endopods of pereopods slender, two-segmented; ventral keel of eighth thoracic somite low, rounded.

Anterior 4 abdominal somites (Fig. 4a) smooth, lacking dorsal carinae or spines, fourth somite with strong posterolateral spine; fifth somite (Fig. 4b) with 2 pairs of longitudinal carinae, both armed posteriorly, and with prominent posterolateral spine; sixth somite with 3 pairs of dorsal carinae, submedians very low, intermediates interrupted, irregular anteriorly, and with 3 pairs of posterior

spines, 1 at end of each carina, submedians and laterals marginal, intermediates submarginal; sixth somite with triangular lobe ventrolaterally in front of articulation of each uropod.

Telson (Fig. 4b) much broader than long, width less than twice median length; dorsal surface with median and 2 pairs of longitudinal uninterrupted carinae, (1) submedians, irregular dorsally and terminating anterior to outer rounded intermediate denticle, and (2) marginals; line of 3–4 accessory median tubercles lateral to, and converging posteriorly toward, median carina; anterior margin of telson with rounded tubercles on each side in line with intermediate carinae of sixth abdominal somite; submedian teeth with bases fused, long, movable apices present; submedian denticles absent in adults, present in juveniles; rounded outer intermediate and lateral denticles each with short dorsal carina; inner intermediate denticle with minute apical spinule, visible only under high magnification; outer intermediate and lateral denticles each with marginal rounded lobe and large ventral denticle; outer margin of intermediate tooth interrupted at level of base of tooth; marginal carina prominent.

Outer margin of proximal segment of uropodal exopod (Fig. 4b) with 6 movable spines, distalmost much the largest, spatulate; rounded distal lobe on inner margin of proximal segment of exopod with 3–4 stiff setae, distal margin with strong ventral spine; endopod slender, slightly curved mesially; basal prolongation slender, with 2 divergent distal spines, inner much the longer, inner margin unarmed, smooth.

Color: Ocular peduncles with diffuse patch of dark chromatophores dorsally. Merus of claw with prominent dark spot distally on outer surface. First abdominal somite with pair of large, dark spots laterally, fifth somite with similar spots posterolaterally. Distal segment of uropodal exopod dark proximally.

By the time this account was prepared the holotype had lost much of its original color pattern. One of the figures originally prepared for J. CADENAT (Fig. 4) shows additional details of the color pattern; apparently the holotype originally had large, paired dark spots on the carapace as well as transverse dark lines on the exposed thoracic somites and abdomen.

Size: Only known male, a juvenile, TL 15 mm; only known female, the holotype, TL 31 mm. Other measurements of female holotype: carapace length 5.4; cornea width 2.3; rostral plate length 1.6, width 1.6; antennal scale length 2.6; antennular peduncle length 6.5; fifth abdominal somite width 6.3; telson length 3.5, width 5.7.

Remarks: *Eurysquilla galathea* shares several features with three American species, *E. plumata* (Bigelow, 1901) (see MANNING, 1969a), *E. veleronis* (Schmitt, 1940), and *E. solari* Manning, 1970(a), as well as *E. leloeuffi* n. sp., described below. All of these species have a slender basal prolongation of the uropod which terminates in two sharp spines, the inner the longer. *E. galathea*, like *E. plumata*,

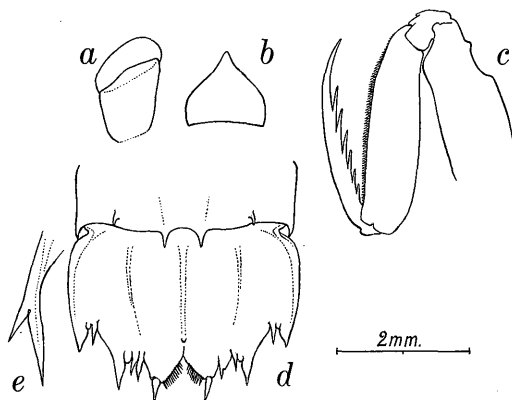


Fig. 5. *Eurysquilla galatheae* n. sp., young male, TL 15 mm, "Atlantide" St. 161, Gambia, outlines of: a, eye; b, rostral plate; c, raptorial claw; d, sixth abdominal somite and telson; e, basal prolongation of uropod, ventral view.

lacks additional spines on the inner margin of the basal prolongation of the uropod, but the eye shape in the two species is very different, for in *E. plumata* the cornea is subglobular whereas in *E. galatheae* it is elongated and bilobed. *E. galatheae* can be separated from *E. veleronis* by the unarmed inner margin of the basal prolongation of the uropod, which in SCHMITT's species is provided with a third spine on its inner margin. The new species most closely resembles *E. solari* Manning, from the eastern Pacific, but differs in having a short rostral carina, lateral carinae on the exposed thoracic somites, and in having a short line of tubercles anterior to the lateral denticle of the telson. In other respects these two species are very similar, sharing an apical spine on the rostral plate, seven teeth on the claw, five epipods, and three pairs of spines on the fifth abdominal somite.

Differences between *E. galatheae* and *E. leloeffi* n. sp. have been summarized in the key given above and will be discussed in more detail in the account of the latter species.

The smaller specimen, a juvenile male (Fig. 5), clearly can be identified with this species, but as it lacks many of the characters of the adult it is not considered a paratype. Although it has five epipods, seven teeth on the claw, and the rostral plate has a short anterior projection as well as a short carina, it differs from the adult in numerous features. The rostral plate is broader than long, the fifth abdominal somite is unarmed, the telson (damaged) lacks the accessory median carinae, there are 9–11 minute submedian denticles, and three stiff setae distally on the inner margin of the proximal segment of the uropodal exopod.

Etymology: The species is named for the vessel "Galathea".

Type locality: Off Angola, 12°13'S, 13°27'E, 100 m. The holotype is in the Zoological Museum, Copenhagen.

Distribution (Fig. 53): Known from only two localities in the Gulf of Guinea, off Gambia (18 m) and off Angola (100 m).

Eurysquilla leloeuffi n. sp.

(Figs 6, 53)

? *Eurysquilla* sp. MANNING, 1974a, p. 7.

Material:

USNM: Grand Bassam, Ivory Coast, 05°13.5'N, 03°54'W, 20 m, fine quartz muddy sand, dredge, L.L. & A.I., 18.2.1966, paratype, 1♀ 13 mm.

Grand Bassam, Ivory Coast, 05°11.2'N, 03°49.5'W, 25 m, fine quartz muddy sand, temp. 22.7°C, sal. 35.64‰, dredge, L.L. & A.I., 6.7.1966, holotype, 1♂ 33 mm.

CRO, Abidjan: Grand Bassam, Ivory Coast, 05°09.3'N, 03°48'W, 30 m, fine sandy mud, temp. 17.9°C, sal. 35.69‰, dredge, L.L. & A.I., 28.9.1966, paratype, 1♂ 14 mm.

Description: Cornea (Fig. 6a, b) broadened, not markedly bilobed, set very obliquely on stalk; eyes extending about to end of second segment of antennular peduncle; anterior margin of ophthalmic somite with median spinule; ocular scales separate mesially, flattened or slightly sinuous dorsally, acute but not sharp laterally.

Antennular peduncle shorter than carapace; antennular processes produced into slender spines directed almost anteriorly.

Antennal scale short, less than half as long as carapace; antennal protopod with 1 ventral papilla.

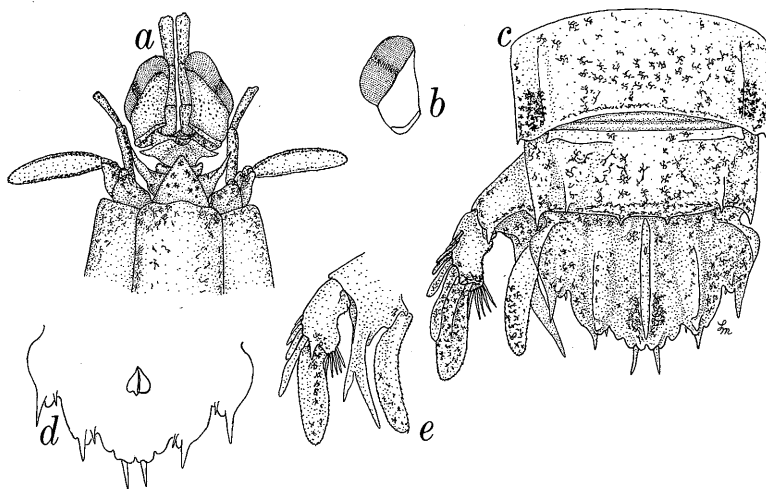


Fig. 6. *Eurysquilla leloeuffi* n. sp., male holotype, TL 33 mm, Ivory Coast: a, anterior portion of body; b, eye; c, posterior two abdominal somites, telson, and uropod; d, telson, ventral view; e, uropod, ventral view. (Setae omitted).

Rostral plate (Fig. 6a) triangular, length and width subequal, lacking apical spine.

Carapace smooth, narrowed anteriorly, anterior portions of lateral plates projecting about to base of rostral plate; low marginal carinae present on posterolateral angles of lateral plates.

Raptorial claw slender, dactylus with 8 teeth, outer margin of dactylus flattened, notched basally; dorsal ridge of carpus terminating in low, acute tooth.

Mandibular palp present; 4 epipods present, posterior 2 very small.

Posterior 3 thoracic somites lacking carinae; fifth thoracic somite lacking distinct lateral process, rounded ventrolateral projection present on each side; lateral processes of sixth and seventh thoracic somites flattened laterally, broadly rounded and produced posterolaterally; basal segments of pereopods unarmed; endopods of pereopods slender, two-segmented; ventral keel of eighth thoracic somite low, rounded.

Anterior 4 abdominal somites smooth dorsally; first somite with low, inconspicuous lateral carina; fourth somite with posterolateral spinule; fifth somite (Fig. 6c) with 2 low, unarmed longitudinal prominences above lateral margin and with strong posterolateral spine; sixth somite with 3 pairs of posterior spines, submedians not markedly carinate dorsally, intermediates and laterals with distinct carinae; sixth somite with blunt ventrolateral projection in front of articulation of each uropod.

Telson (Fig. 6c, d) much broader than long, width about twice median length; dorsal surface of telson with smooth median and submedian carinae, intermediates terminating anterior to bases of intermediate marginal denticle; accessory median tubercles or carinae absent; anterior margin of telson with rounded tubercle on each side in line with intermediate carinae of sixth somite; submedian teeth with bases fused, long, movable apices present, submedian denticles absent in adults, present in juveniles; outer intermediate and lateral denticles each with dorsal tubercle; inner intermediate denticle unarmed apically; outer intermediate and lateral denticles each with marginal rounded lobe and sharp submarginal denticle; outer margin of intermediate tooth interrupted at level of base of teeth; marginal carinae prominent.

Outer margin of proximal segment of uropodal exopod (Fig. 6c, e) with 7-8 movable spines, distal 3 spatulate, distalmost largest, extending slightly beyond midlength of distal segment; rounded distal lobe on proximal segment of exopod with 5 stiff setae (2 in young male), distal margin with strong, fixed spine ventrally; endopod slender, curved mesially; basal prolongation slender, with 2 divergent distal spines, inner much the longer, inner margin unarmed but with angled prominence proximally.

Color: Body light, covered with numerous small black chromatophores; eyestalks speckled; antennal peduncle with dorsal line of black chromatophores; most of antennal scale outlined in black, distal portion not so heavily pigmented as

proximal; merus of claw with numerous black chromatophores dorsally, inner and outer surface of merus with distal dark spot; carapace covered with dark chromatophores, color diffuse over most of surface, but with 3 pairs of dark spots, 1 anterior, mesial to gastric grooves, 1 near midlength on midline, and 1 posterior, lateral to gastric grooves; gastric grooves dark; posterior 3 thoracic and anterior 5 abdominal somites each with dark, diffuse middorsal spot, diffuse pigment in band on dorsum, and dark posterior line; round black spot present posterolaterally on first and fifth abdominal somites; sixth abdominal somite with pigment concentrated on submedian and lateral carinae as well as posterior margin; telson with scattered black chromatophores, submedian carinae outlined in black, diffuse dark patches on lateral surface, and dark posterior spot on median carina; ventral surface of telson with distal median black spot; basal segment of uropod, endopod, and distal segment of exopod covered with scattered black chromatophores.

Size: Males (2), TL 14–33 mm; only known female, a juvenile, TL 13 mm. Other measurements of male holotype, TL 33 mm: carapace length 5.8; cornea width 1.9; rostral plate length 2.5, width 2.6; antennal scale length 2.5; antennular peduncle length 4.5; fifth abdominal somite width 6.7; telson length 2.8, width 5.8.

Remarks: *Eurysquilla leloeffi* rather closely resembles *E. galathea*. It differs in lacking both the apical spine and the dorsal carina on the rostral plate, has eight rather than seven teeth on the claw, has but four epipods, lacks dorsal carinae on the sixth and seventh thoracic somites, lacks spines on the dorsal carinae of the fifth abdominal somite, has no trace of accessory median carinae on the telson, and has an inconspicuous low lobe on the inner margin of the basal prolongation of the uropod. Like *E. galathea*, it also resembles *E. plumata* (Bigelow), *E. veleronis* (Schmitt), and *E. solari* Manning. It differs from *plumata* in having an elongate rather than a subglobular cornea and in lacking the accessory median row of tubercles on the telson. It differs from *veleronis* in lacking the sharp spine on the inner margin of the basal prolongation of the uropod, and from *solari* in lacking armed dorsal carinae on the fifth abdominal somite above the lateral margin as well as the accessory median row of tubercles on the telson.

Both *E. galathea* and *E. leloeffi* also resemble one of the two Indo-West Pacific species of the genus, *E. sewelli* (Chopra, 1939) from the Gulf of Aden, but the latter species has an armed carina on the fourth abdominal somite, above the lateral margin, and all of the telson carinae except for the median and marginals are interrupted.

The two juvenile specimens, TL 13 and 14 mm, differ from the adult as follows: the eye is much broader and the cornea is not set so obliquely on the stalk; the carinae and spines of the fifth abdominal somite are absent; on the dorsal surface of the telson only the median and dorsal submedian carinae are present; there are seven minute submedian denticles and the submedian marginal teeth have their bases distinctly separated rather than appressed; the uropodal endopod appears to

be broader; one specimen, the male, has but two stiff setae distally on the proximal segment of the uropodal exopod. The color pattern of the young male is similar to that of the holotype.

The incomplete specimen reported by me (1974a) from off the Ivory Coast in 100–109 m is tentatively identified with this species. Not all of the diagnostic features could be determined, so it cannot be identified with certainty.

Etymology: Named for Dr. P. LE LOEUFF, Centre de Recherches Océanographiques, Abidjan, one of the collectors of the samples reported here. His careful sampling program off the Ivory Coast yielded many small stomatopods of interest and added appreciably to our knowledge of the West African stomatopod fauna.

Type locality: Off Grand Bassam, Ivory Coast, 05°11.2'N, 03°49.5'W, 25 m. The holotype and a paratype are in the Division of Crustacea, USNM, Washington. A paratype is in the Centre de Recherches Océanographiques, Abidjan.

Distribution (Fig. 53): Known only from off the Ivory Coast, 20–30 m, and, possibly, from as deep as 100 m.

***Eurysquilla* sp.**
(Figs 7, 53)

Material:

“Atlantide” St. 52, Monrovia, Liberia, 3.1.1946, 1 postlarva 15 mm.

Diagnosis: Ocular scales rounded; eyes with postlarval facies, cornea trilobed; rostral plate cordiform, broader than long; dactylus of claw with 5 teeth; lateral

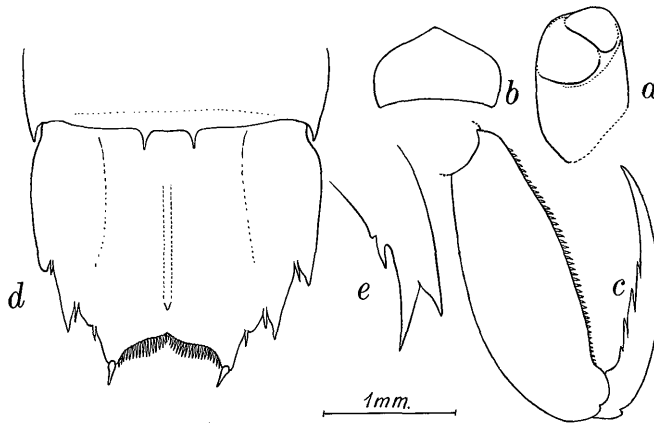


Fig. 7. *Eurysquilla* sp., postlarva, TL 15 mm, “Atlantide” St. 52, Liberia, outlines of: a, eye; b, rostral plate; c, claw; d, sixth abdominal somite and telson; e, basal prolongation of uropod, ventral view.

processes of sixth to eighth thoracic somites rounded anterolaterally and posterolaterally, flattened laterally, unarmed; fifth abdominal somite with posterolateral tubercle; sixth abdominal somite lacking carinae, with submedian and lateral spines only; telson with median carina only, with approximately 20 submedian denticles; proximal segment of uropodal exopod with 7 movable spines; basal prolongation of uropod terminating in 2 spines, inner longer, with 2 additional spines on inner margin.

Remarks: This postlarva is not clearly identifiable with either of the two species of *Eurysquilla* described above, differing primarily in having but five teeth on the claw rather than seven or eight and in having two additional spines on the inner margin of the basal prolongation of the uropod. Unfortunately we know little about ontogenetic changes in stomatopods and nothing about these changes in eurysquillids. This specimen may prove to be the postlarva of either of the two species described above or it may prove to represent a third species in the Gulf of Guinea.

Manningia Serène, 1962

Manningia Serène, 1962, p. 20. — MANNING, 1963, p. 313; 1967a, p. 3 [review of the genus; definition].

Type species: *Manningia pilaensis* (de Man, 1888), by monotypy.

Remarks: *Manningia* now includes eight species, seven of which occur in the Indo-West Pacific region: *M. pilaensis* (de Man, 1888), *M. notialis* Manning, 1966, *M. serenei* Manning, 1967(a), *M. amabilis* Holthuis, 1967, *M. australiensis* Manning, 1970(b), *M. zehntneri* Manning, 1974(b), and *M. andamanensis* Ghosh, 1975. The new species described below is the only representative of the genus to occur outside of the Indo-West Pacific region.

R. MAKAROV has suggested (*in litt.*) that perhaps *Manningia* should be considered a synonym or at most a subgenus of *Coronidopsis* Hansen, 1926. Although I certainly agree that they are very closely related and share many morphological features, none of the species of *Manningia* has a rostral plate with two apical spines and none has ventral armature (other than the sharp, submarginal denticles) on the telson; these two features are shared by all three nominal species of *Coronidopsis*, *C. bicuspis* Hansen, 1926, *C. serenei* Moosa, 1973, and *C. nudus* Blumstein, 1974. I believe that both genera should be recognized.

Manningia posteli n. sp.

(Figs 8, 9, 53)

Pseudosquilla n. sp. LONGHURST, 1958, pp. 42 [discussion], 86.

Manningia n. sp. MANNING, 1970b, p. 78 [in key].

Material:

- IFAN: In front of Matakana, Guinea, 10 m, muddy sand, E.P. & M.-M., 21.1.1953, paratype, 1♀ 37 mm.
- Ile de Los, Guinea, 22.1.1953, paratype, 1♂ 29 mm (Mus. Paris).
- USNM: Grand Bassam, Ivory Coast, 05°09.2'N, 03°54'W, 40 m, fine sandy mud, temp. 23.23°C, sal. 35.34‰, dredge, L.L. & A.I., 2.3.1966, 2 postlarvae 12 mm.
- Grand Lahou, Ivory Coast, 05°07'N, 05°05'W, 22 m, film of mud on medium size sand, temp. 25.64°C, sal. 35.14‰, dredge, L.L. & A.I., 8.3.1966, 1 postlarva 11 mm.
- Grand Bassam, Ivory Coast, 05°12'N, 03°49.5'W, 20 m, in stomach of *Pseudotolithus senegalensis* (Sciaenidae), L.L. & A.I., 24.2.1967, paratype, 1♀ 36 mm.
- Bay of Pointe-Noire, Congo, 04°46.3'S, 11°49.7'E, 12 m, dredge, A.C., 29.10.1969, holotype, 1♂ 39 mm.
- BMNH: Sierra Leone, 08°00'N, 13°21'W, 16 m, shelly mud, transitional *Venus-Amphioplus* community, St. MB2/A3, A.L., 5.4.1956, paratype, 1♂ 24 mm.
- Sierra Leone, 09°22'N, 13°27'W, 14 m, shelly mud, *Amphioplus* community, St. MB6/E2, A.L., 31.12.1956, paratype, 1♂ 22 mm.
- CRO, Abidjan (L.L. & A.I.): Grand Bassam, Ivory Coast, 05°13.5'N, 03°54'W, 20 m, fine quartz muddy sand, dredge, 18.2.1966, 1 young ♀ (damaged).
- Grand Bassam, Ivory Coast, 05°09.2'N, 03°54'W, 40 m, fine sandy mud, temp. 23.23°C, sal. 35.34‰, dredge, 2.3.1966, 1 juvenile (postlarva?) 11.5 mm.
- Grand Bassam, Ivory Coast, 05°13.5'N, 03°54'W, 20 m, fine quartz muddy sand, dredge, 18.2.1966, paratype, 1♀ 14 mm; 1 abdomen of postlarva.
- Grand Lahou, Ivory Coast, 05°07'N, 05°05'W, 22 m, film of mud on medium-size sand, temp. 25.64°C, sal. 35.14‰, dredge, 8.3.1966, paratype 1♀ 17 mm; 1♂ CL 3.6.
- Grand Bassam, Ivory Coast, 05°09.3'N, 03°48'W, 30 m, fine sandy mud, temp. 17.90°C, sal. 35.69‰, dredge, 28.9.1966, paratype, 1♀ 15 mm.

Description: Cornea (Fig. 8a) strongly bilobed, outer margin of eye longer than inner; eyes not extending beyond end of first segment of antennular peduncle; ocular scales low, rounded or obtusely angled, fused medially.

Antennular peduncle elongate, more than 3/4 as long as carapace.

Antennal scale slender, slightly curved, less than half as long as carapace, margin completely lined with setae; antennal protopod with strong mesodorsal spine and with 1 mesial and 1 ventral papilla.

Rostral plate (Fig. 8a) slightly broader than long, basal portion subquadrate, with long apical spine, slightly upturned anteriorly.

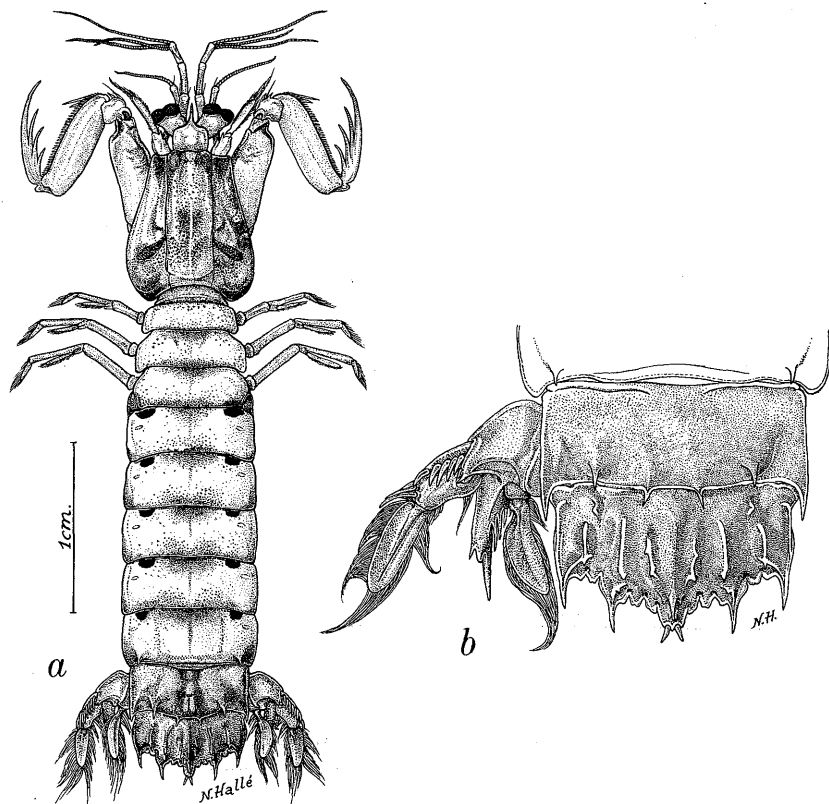


Fig. 8. *Manningia posteli* n. sp., female paratype, TL 37 mm, Guinea: a, dorsal view; b, posterior portion of body.

Carapace (Fig. 8a) smooth, strongly narrowed anteriorly, anterolateral angles rounded, not extending to base of rostral plate; marginal carina present on posterior portion of each lateral plate.

Raptorial claw (Fig. 8a) stout; dactylus with 4 teeth, outer margin with prominent basal notch; propodus broad, superior margin completely pectinate; carpus with 2 teeth on upper margin; merus lacking inferodistal spine on outer margin; basis with prominent, ventrally-projecting spine visible laterally.

Mandibular palp and 5 epipods present.

Lateral process of fifth thoracic somite (Fig. 8a) an inconspicuous rounded lobe, sharp ventral spine also present on each side; sixth thoracic somite with short, curved ridge laterally on anterior margin; lateral processes of sixth and seventh thoracic somites flattened laterally, broadly rounded posteriorly; endopods of pereopods slender, two-segmented; ventral keel of eighth thoracic somite a low, rounded tubercle.

Abdomen smooth, depressed, anterior 4 somites lacking longitudinal carinae or spines; fifth somite broadly rounded posterolaterally, with low, oblique carina

terminating in spine above margin; sixth somite (Fig. 8b) with 3 pairs of spines, submedians marginal, not carinate, intermediates submarginal, on low, broad carina; sixth somite with sharp spine and broad rounded lobe ventrally in front of articulation of each uropod.

Telson (Fig. 8b) less than twice as broad as long; accessory median carinae subdivided into 3–4 bluntly spined lobes, occasionally with low, connecting carinae; submedian, intermediate, and marginal carinae entire, submedians and intermediates inflated in large males; intermediate tooth with short, rounded dorsal carina; submedian teeth in adults with bases fused, apices movable, submedian denticles absent (present in postlarvae and juveniles TL 14 mm or smaller); intermediate and marginal teeth with denticlelike lobe on inner margin; intermediate and lateral denticles blunt, rounded or subrectangular, inner intermediate denticle with minute apical spinule in some specimens, outer intermediate and lateral denticles each with sharp submarginal denticle.

Outer margin of proximal segment of uropodal exopod with 8–10 slender, movable spines, distalmost short, not extending to midlength of distal segment, proximal spines directed dorsally rather than laterally; basal prolongation of uropod with broad, rounded lobe between apical spines, inner spine the longer; inner margin of basal prolongation with 2–4 fixed spinules (2 in postlarvae, 3–4 in larger specimens).

Color: Body light, ornamented with numerous brown chromatophores. Gastric grooves on carapace dark. 2 broad bands of dark pigment on carapace, anterior-most extending laterally onto merus of claw, posteriormost at level of cervical groove, color darkest laterally; posterior margin of lateral plates and marginal carina of carapace dark. Claw with dark patch dorsally on merus and smaller dark spot distally on outer face of merus. Exposed thoracic and anterior 5 abdominal somites with diffuse patch of dark chromatophores anteriorly and posteriorly on midline, some somites with dark pigment laterally. Anterolateral plates of abdomen dark. Anterior 5 abdominal somites each with a pair of black circles, 1 on each side. Sixth abdominal somite with submedian and marginal carinae dark. Telson with dark pigment along accessory median carinae, black median patch below median spine, and area between lateral and marginal carinae black. Outer edge of basal segment of uropod dark.

Size: Males (5), TL 22–39 mm; females (6), TL 14–37 mm; juvenile (1), TL 11.5 mm; postlarvae (4), TL 11–12 mm. Other measurements of male holotype, TL 39 mm: carapace length 7.3; cornea width 1.7; rostral plate length 2.3, width 2.2; antennular peduncle length 6.7; antennal scale length 3.2; telson length 3.6, width 6.1.

Remarks: *Manningia posteli* is a distinctive species which readily can be separated from the other species in the genus. It agrees with *M. australiensis* and *M. serenei*

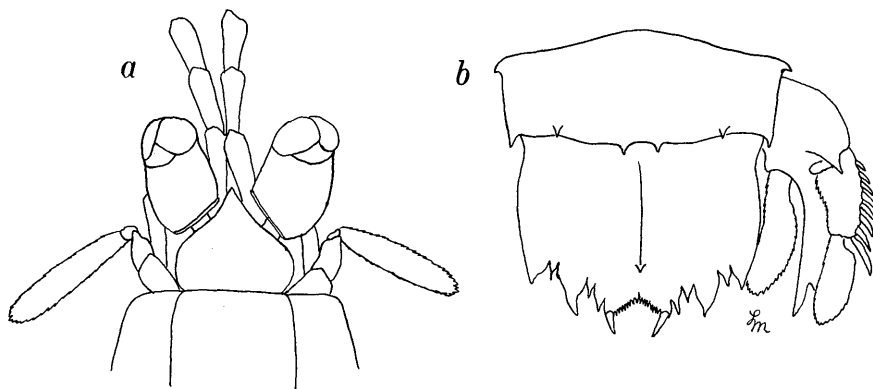


Fig. 9. *Manningia posteli* n. sp., postlarva, TL 12 mm, Ivory Coast, outlines of: a, anterior portion of body; b, sixth abdominal somite, telson, and uropod. (Setae omitted).

and differs from the other five species in having a broad rounded lobe between the spines of the basal prolongation of the uropod; in neither *M. australiensis* nor *M. serenei* is the fifth abdominal somite armed above the posterolateral angle.

In none of the other species have I seen a basal spine on the claws resembling that found in *Squilla aculeata calmani* Holthuis (p. 137), or a sharp spine and a rounded lobe ventrally on the sixth abdominal somite anterior to each uropod.

Young specimens differ from adults in some features, but even the postlarvae can be identified as representatives of *Manningia* without difficulty. Juveniles have a few submedian denticles (7–8 in a specimen 11.5 mm long) which are absent in specimens 15 mm long or longer. The postlarvae and the smallest juvenile examined lacked the rostral spine, but it is present in a female 15 mm long. A specimen 17 mm long lacked the spines on the fifth abdominal somite (as did all smaller specimens), but the spines were visible in a specimen 22 mm long.

Postlarvae (Fig. 9) differ from adults in numerous features: the cornea is not distinctly bilobed, the rostral plate is triangular and lacks the apical spine, the fifth abdominal somite is unarmed, the telson is comparatively longer and has only the median carina on the dorsal surface, the submedian teeth of the telson are separate and there are 7 or 8 submedian denticles, and there are only 2 spinules on the inner margin of the basal prolongation of the uropod. These specimens resemble adults in having 4 teeth on the claw, the dorsal ridge of the carpus obscurely divided, three pairs of spines on the sixth abdominal somite, and the uropod is similar to that found in adults.

There is a little information available on habitat preference in this species. LONGHURST (1958) found it on shelly mud at 10–20 m off Sierra Leone; two of the stations at which this species occurred were characterized as representing *Amphioplus* or transitional *Venus-Amphioplus* communities; it did not enter estuarine water. Samples from the Ivory Coast were taken on fine sandy mud, fine quartzzy sandy mud, or in a film of fine mud on medium-size sand at 14–40 m.

Etymology: J. CADENAT had intended to dedicate this species to his colleague, E. POSTEL, and I have followed him in introducing this name.

Type locality: Bay of Pointe-Noire, Congo. The holotype and paratypes in the Division of Crustacea, USNM, Washington. Paratypes have been deposited at the Institut Fondamental d'Afrique Noire, Dakar; the Rijksmuseum van Natuurlijke Historie, Leiden; the Centre de Recherche Océanographique, Abidjan; and the Muséum National d'Histoire Naturelle, Paris.

Distribution (Fig. 53): Gulf of Guinea, where it is known from off Guinea, Sierra Leone, several localities off the Ivory Coast, and Pointe-Noire, Congo, at 10–40 m.

Family GONODACTYLIDAE Giesbrecht, 1910

Gonodactylinae Giesbrecht, 1910, p. 148.

Definition: Ischiomeral articulation of raptorial claw subterminal, merus extending posteriorly beyond articulation. Merus of claw with incomplete inferior groove. Dactylus of claw inflated basally, usually unarmed. Propodi of posterior 3 maxillipeds slender, not beaded or ribbed ventrally. Body rigid, strongly convex dorsally. Telson with distinct median carina and no more than 2 intermediate marginal denticles.

Type genus: *Gonodactylus* Berthold, 1827.

Remarks: Gonodactylidae is here restricted to those stomatopods in which the ischiomeral articulation of the claw is subterminal, the inferior groove on the merus of the claw is incomplete, and (except for species of *Odontodactylus*) the dactylus of the claw is unarmed. In general, these species have three rounded bosses on the telson, a median and two submedians, the articulation of the propodus and dactylus of the claw is inflated, there are few or no pectinations on the propodus of the claw, and there is a flattened or elongate dorsal plate on the basal segment of the antenna.

MANNING (1968, 1969a) pointed out that the genera then assigned to this family fell into two broad sections, one characterized by *Gonodactylus* and its allies and one by *Pseudosquilla* and its allies; two new families, Eurysquillidae and Pseudosquillidae, are recognized here for this latter group of genera and species.

The family now includes the following genera: *Gonodactylus* Berthold, 1827; *Mesacturus* Miers, 1880; *Protosquilla* Brooks, 1886(a); *Odontodactylus* Bigelow, 1893(b); *Hoplosquilla* Holthuis, 1964; *Chorisquilla* Manning, 1969(b); *Echino-*

squilla Manning, 1969(b); *Gonodactylopsis* Manning, 1969(b); *Haptosquilla* Manning, 1969(b); and *Gonodactylolus* Manning, 1970(c).

Representatives of but one genus, *Protosquilla*, occur in the eastern Atlantic region. That genus is restricted to the eastern Atlantic.

Although no species of *Gonodactylus* is now known to live in either the tropical eastern Atlantic or the Mediterranean, there have been persistent reports of the occurrence of *Gonodactylus falcatus* (Forskål) and perhaps *G. chiragra* (Fabricius) from the Mediterranean and one report of *G. chiragra* (Fabricius) from West Africa; LATREILLE (1828, p. 473) listed Sénégal among several localities given for *Gonodactylus chiragrus*. His record may be referable to *Protosquilla folini* or it may have been based on an erroneously labelled specimen. Otherwise, *G. chiragra* is known only from the Indo-West Pacific region.

H. MILNE-EDWARDS (1837, p. 528, as *G. chiragra*) was the first to report a *Gonodactylus* from the Mediterranean; WHITE (1847, p. 84) listed specimens of *G. chiragra* from the Mediterranean and from Egypt. HERKLOTS (1851, p. 26) listed *G. chiragrus* from Europe; his record may have been based on that of H. MILNE-EDWARDS. HELLER (1863, p. 309, pl. 10 fig. 20) recorded the occurrence of *G. chiragra* from the Mediterranean; his identification was subsequently corrected by STEUER (1911). NARDO (1869, p. 329) recorded *G. chiragra* from the coast of Romagna, Adriatic Sea, and his record may have been the basis for subsequent listings of the species in the Adriatic (STALIO, 1877, p. 986; STOSSICH, 1881, p. 218). MIERS (1880, p. 119) repeated WHITE's record from the Mediterranean and noted that "these specimens have long been in the collection (but no authority is recorded for this habitat) . . ." CARUS (1885, p. 465) also listed this species from the Mediterranean, based on the records of MILNE-EDWARDS and NARDO. VON MARTENS (1881, p. 94) recorded the species from the Mediterranean based on a specimen in the Zoological Museum, Berlin.

STEUER (1911, p. 4, figs A, B, fig. on p. 10) re-examined HELLER's material and identified it as *G. chiragra* var. *mutatus*, at present considered to be a synonym of *G. falcatus* (Forskål). KEMP (1913, p. 162) accepted STEUER's correction, and noted, "This is the only record that can be accepted of the occurrence of the genus *Gonodactylus* in the Mediterranean." PARISI (1922, p. 112, fig. 7) recorded a male and three females from Nice and four dry specimens from the Mediterranean which he identified with *G. glabrous* (Brooks) (now considered to be a synonym of *G. falcatus*). He commented that the four specimens from Nice "sono del massimo interesse, perchè confermano in modo assoluto la presenza nel Mediterraneo di questa specie." His figure clearly shows that he was dealing with *G. falcatus*. MONOD (1925, p. 91) included *G. glabrous* in a key to eastern Atlantic and Mediterranean species, and BACESCU & MAYER (1961) recorded the larvae of *G. falcatus* (as *G. glabrosus*) from the Aegean Sea.

It is not clear from the literature whether all of the Mediterranean records of *G. chiragra* actually were based on material of that species or whether some or all of these records were based on *G. falcatus*. The latter species was not recognized as a

distinct species prior to 1886(b) when Brooks described *G. glabrous*. Neither *G. chiragra* nor *G. falcatus* is known to have an established population in the Mediterranean. It seems unlikely that any of the records based on material collected prior to the opening of the Suez Canal in 1869 are valid. It is possible that since then occasional specimens have come through the canal into the Mediterranean either as adults or as larvae. It is unlikely that either species could become established in the Mediterranean for both are tropical species requiring warm water and both live in burrows in coral reefs or on shallow-water flats with coral, coralline algae, *Phragmatopoma*, or similar kinds of rough bottom. Such habitats are rare in the Mediterranean, and that, coupled with cooler waters in the Mediterranean, would probably preclude the establishment of a population of *Gonodactylus* there. Conditions were better for another Indo-West Pacific species, *O. massavensis* (Kossmann) (see p. 162), which has entered the Mediterranean through the Suez Canal and has become established in the eastern Mediterranean, from Egypt northward to Turkey.

***Protosquilla* Brooks, 1886**

Protosquilla Brooks, 1886a, p. 84; 1886b, p. 65. — MANNING, 1969b, p. 153; 1974, p. 8 [definition].

Type species: *Protosquilla folini* (A. Milne-Edwards, 1867), by subsequent designation by HOLTHUIS, 1967a, p. 36.

Remarks: Two species are known from the eastern Atlantic region. They may be distinguished by the key given below.

Key to Species of *Protosquilla*

Dorsal spines of sixth abdominal somite and telson long, apices clearly visible through sparse, irregular coat of long setae *P. calypso*
 Dorsal spines of sixth abdominal somite and telson short, apices barely discernible through dense, even coat of short setae *P. folini*

***Protosquilla calypso* Manning, 1974**
 (Figs 10, 11, 53)

Gonodactylus Folinii. — OSORIO, 1891, p. 141; 1895, p. 250; 1898, p. 194.

Protosquilla Folini. — BOUVIER, 1906, p. 492.

Gonodactylus Folini. — BALSS, 1914, p. 106; 1916, p. 52 [part]. — MONOD, 1925, p. 92 [part].

Gonodactylus folini. — DARTEVELLE, 1951, p. 1034 [discussion]. — FOREST, 1959, p. 17.

Protosquilla folini. — MANNING, 1969b, figs 4a, b; 1970d, p. 263. — HOLTHUIS & MANNING, 1970, p. 249 [discussion].

Protosquilla calypso Manning, 1974a, p. 8, fig. 1.
not *Protosquilla folini* (A. Milne-Edwards, 1867).

Material:

"Galathea" St. 50, Isla das Rolas, 00°00'N, 06°32'E, 5–8 m, coral, 29.11.1950, 3♂ 17–20 mm, 8♀ 11–23 mm.

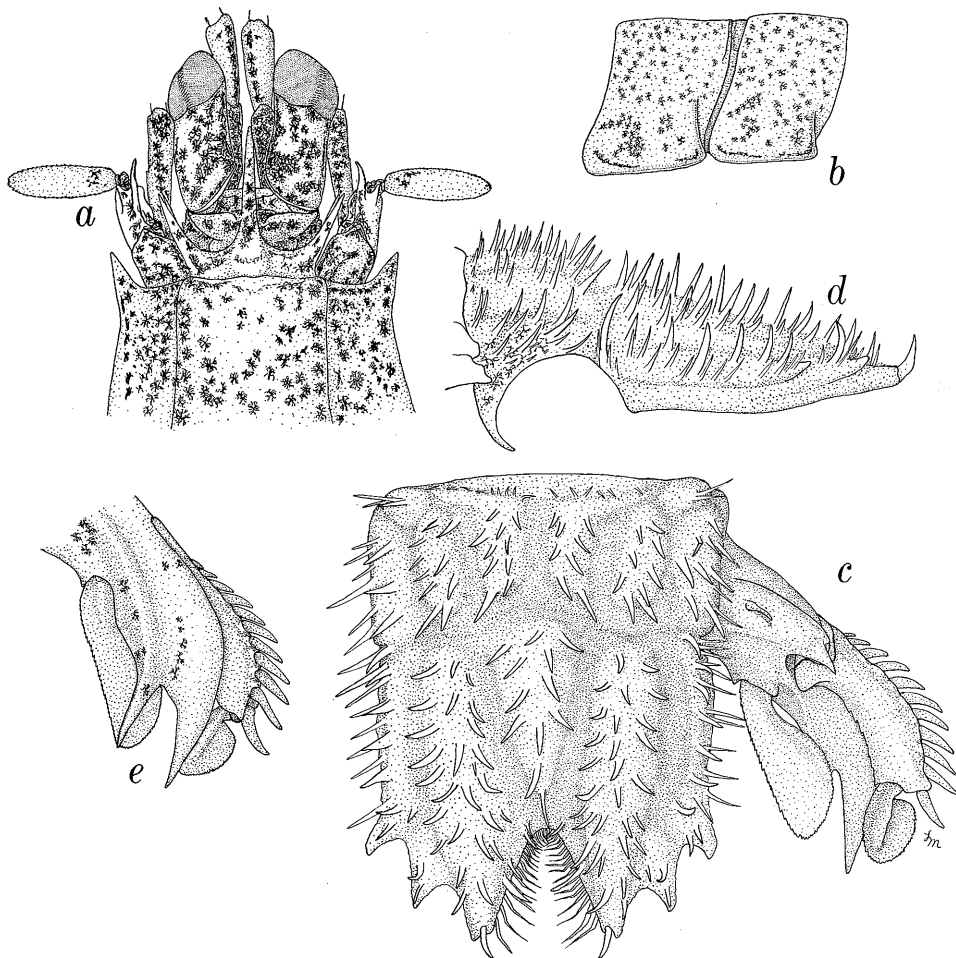


Fig. 10. *Protosquilla calypso* Manning, female paratype, TL 30 mm, Sao Tomé: a, anterior portion of body; b, lateral processes of sixth and seventh thoracic somites, lateral view; c, sixth abdominal somite, telson, and uropod; d, sixth abdominal somite and telson, lateral view; e, uropod, ventral view. (Telson denuded; setae omitted). (From MANNING, 1974a).

USNM: Annobon, 9 m, dredge, A.C., 3♂ 9–12 mm, 1♀ 22 mm.

Near Pte. Palmar, Annobon, intertidal zone, A.C., 29.7.1965, 9♂ 10–22 mm,
4♀ 10–25 mm.

San Pedro, Annobon, intertidal zone, A.C., 30.7.1965, 1♂ 12 mm.

S of Annobon, 01°28.5'S, 05°37.5'E, 35–55 m, trawl, F.Pd., 16.6.1967, 1♀ 15
mm.

Mus. Hamburg: Annobon, Inner-Afrika Exp., A.S., 8.10.1911, 1♂ 29 mm.

Isla das Rolas, J.G., 1879–80, 1♀ 30 mm.

Mus. Vienna: Fernando Póo, 20–30 m, Helgoland Exp., 1♂ 11 mm, 1♀ 22 mm.

Mus. Munich: Annobon, A.S., 1♂ 28 mm.

Isla das Rolas, J.G., 1♂ 18 mm.

Diagnosis (from MANNING, 1974a): Sixth abdominal somite and telson (Figs 10c–d, 11) covered with irregular coat of long setae, apices of dorsal spines of telson visible above setae in dorsal view; apices of dorsal spines often corneous. Dorsal bosses of sixth abdominal somite unarmed posteriorly, surface of bosses ornamented with numerous erect spines. Bosses of sixth somite separated by shallow longitudinal depressions, bosses not markedly inflated. Median boss of telson pyriform, surface ornamented with numerous erect spines; median boss of telson separated from submedians by narrow longitudinal depressions. Submedian bosses of telson narrow, usually not markedly inflated, surfaces ornamented with numerous erect spines. Lateral margin of telson irregular, nodulose, with erect dorsal and lateral spines. Marginal teeth of telson subacute or obtuse, apices separate, with chalky appearance; shape of marginal teeth very variable.

Color (from MANNING, 1974a): Overall pattern similar to that of *P. folini*; body dark, with narrow light band extending across carapace onto merus of claw. Sixth abdominal somite, telson, and uropods white or cream-colored. Shade and pattern of dark pigment on body very variable.

MANNING (1970d, p. 262) gave more detailed information, as follows: "The color pattern of both living and of preserved specimens is very variable. Living specimens were light brown to almost black, with a white band across the carapace and across the sixth abdominal somite and telson.

"In preserved specimens the background is solid or mottled dark brown with the brown pattern on the carapace extending onto the claw; carapace with a broad white band, extending laterally onto the merus of the claw; eyestalks with brown longitudinal stripes, particularly on the ventral surface; white patch present on posteromedian third of eighth thoracic somite; sixth abdominal somite and most of uropods white, anterior margin of uropods with scattered dark chromatophores; dorsal and ventral surfaces of telson white; distal portions of claw and dorsal bosses of telson with bright red patches in some specimens.

"Postlarvae appear to be unpigmented, completely white in preservative. Young specimens have pattern similar to adults."

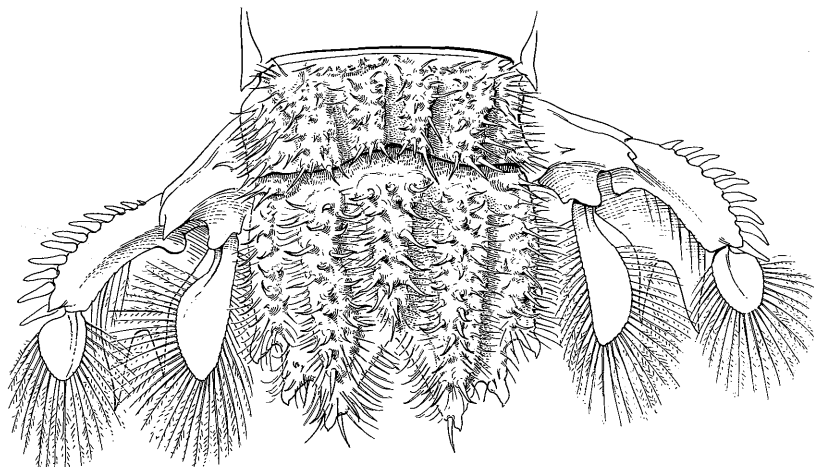


Fig. 11. *Protosquilla calypso* Manning, Annobon. Posterior portion of body. (Received from A. CROSNIER).

BOUVIER (1906, p. 492) provided notes on living specimens: "Coloration assez variable sur le vivant: les deux derniers exemplaires avaient une teinte brun chocolat sur le céphalothorax et la partie suivante de couleur grise; les deux autres spécimens présentaient une teinte jaune d'ambre avec une bande horizontale claire sur le céphalothorax. Cette bande est probablement consistante, car on l'observe encore sur tous les exemplaires, même dans l'alcool."

Size: Males (21), TL 8–29 mm; females (17), TL 8–30 mm. MANNING (1970d) recorded numerous specimens, males, TL 10–29 mm, females, TL 9–33 mm, and juveniles, TL 10–13 mm, and MANNING (1974a) reported on males, TL 10–30 mm, females, TL 9–36 mm, and juveniles, TL 10–11 mm. Some of the smaller specimens recorded here are postlarvae.

Remarks: *Protosquilla calypso* closely resembles *P. folini*, but representatives of the two species can be distinguished by the features pointed out by me in 1974(a). In *P. calypso* the spines on the sixth abdominal somite and telson are much more prominent than in the other species, and the sparse setation of those segments does not obscure the spines or the surface of the segments. Many specimens of *P. calypso* have corneous apices on the dorsal spines, but these may not always be visible. Young specimens of the two species are difficult to distinguish, but, in general, the posterior part of the body is spinier in *P. calypso* than in *P. folini*.

In my original account of *P. calypso*, I assumed, without examining other material, that *P. folini* was restricted to the Cape Verde Is. and that *P. calypso* occurred throughout the Gulf of Guinea. Examination of material from various sources for the present report showed this assumption to have been erroneous. All of the material which I have examined from coastal localities between Sénégal and

the Congo has proved to be *P. folini* rather than *P. calypso*. All the material which I have seen from the offshore islands of the Gulf of Guinea is clearly identifiable with *P. calypso*.

BOUVIER (1906, p. 492), reporting on specimens from Sao Tomé, was the first to note differences between material from that area and from the Cape Verde Is. He commented as follows: "La piece formée par la soudure des deux derniers segments abdominaux est toute couverte d'une pubescence presque laineuse qui n'est pas signalée dans le type, d'ailleurs désseché, qui servit à Milne-Edwards."

Relatively little is known about the biology of this species. It occurs from the intertidal zone to a depth of 69 m, and apparently burrows in rock or coralline algae. FOREST (1959, pl. 2 fig. 3) illustrated the balls of coralline algae which provide a habitat for this and other species in the areas adjacent to the offshore islands of the Gulf of Guinea. HOLTHUIS & MANNING (1970, p. 249) reported that at Annobon Island specimens of this species (as *P. folini*) were often found clinging to the legs of *Hippa*; this was observed at several stations where commercial fish poisons were used to make collections.

Type locality: Morro Peixe, Sao Tomé Island, Gulf of Guinea. The holotype and paratypes are in the Muséum National d'Histoire Naturelle, Paris. Paratypes also are in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 53): Offshore islands of the Gulf of Guinea, where it has been recorded from the littoral zone to 69 m. The following records are in the literature: Fernando Póo, littoral (MANNING 1970d); Principe (MONOD, 1925; MANNING, 1974a); Sao Tomé (OSORIO, 1891, 1898), Praia das Conchas, plage de Fernao Dias, plage Bella Vista (all BOUVIER, 1906), Isla das Rolas (BALSS, 1916), numerous localities (MANNING, 1974a); Annobon (OSORIO, 1898; BALSS, 1914; MONOD, 1925; HOLTHUIS & MANNING, 1970; MANNING, 1970d), S. Antonio, Santa Cruz (OSORIO, 1895), numerous localities (MANNING, 1974a).

Protosquilla folini (A. Milne-Edwards, 1867)

(Figs 12, 13, 53)

Gonodactylus Folini A. Milne-Edwards, 1867, p. 43, pl. 21 bis figs 11–14. — BALSS, 1916, p. 52 [part]. — MONOD, 1925, pp. 91 [key], 92 [part]; 1951, p. 142.

Gonodactylus Folinii. — A. MILNE-EDWARDS, 1868, p. 65, pl. 18 figs 8–11. — MIERS, p. 1880, p. 123 [part]. — HANSEN, 1895, p. 86, pl. 8 figs 6 [adult], 7 [juvenile]. — GRAVIER, 1920, p. 115 [listed]; 1927, p. 36.

Protosquilla folinii. — BROOKS, 1886b, p. 70 [listed].

Protosquilla (Gonodactylus) elongata. — BROOKS, 1886b, p. 22 [listed].

Protosquilla elongata Brooks, 1886b, p. 67, pl. 15 figs. 2, 12, pl. 16 fig. 4.

- Gonodactylus folini*. — KEMP, 1913, pp. 189, 204 [listed]. — PARIS, 1922, p. 114.
 — DARTEVELLE, 1951, p. 1034 [discussion]. — SERÈNE, 1952, pp. 19, 20, 21, pl.
 3 figs 6, 7. — SOURIE, 1954, pp. 187, 267, 294 [listed]. — BUCHANAN, 1958, p.
 18. — MANNING, 1969b, p. 154 [listed].
- Gonodactylus folinii*. — HOLTHUIS, 1967a, p. 36 [designated as type species of
Protosquilla]. — HOLTHUIS & MANNING, 1969, p. 552 [listed].
- Protosquilla folini*. — MANNING, 1969b, p. 155 [discussion; not figured specimen];
 1974a, p. 11, fig. 2.

Material:

- “Atlantide” St. 39, San Pedro Bay, St. Vincent, Cape Verde Is., 16°50'N,
 25°04'W, 41–50 m, Foraminifera and coral, 10.12.1945, 2♂ 8–20 mm, 1♀
 18 mm.
- St. 43, Praia Sao Thiago, Cape Verde Is., 22 m, coral, 15.12.1945, 6♂ 10–18
 mm, 2♀ 9–17 mm.
- IFAN: Baie de Rufisque, Sénégal, 28.1.1941, 1♀.
- Gorée, Sénégal, from stomach of *Diagramma mediterranea*, J. C., 21.1.1953,
 1♀.
- Gorée, Sénégal, lobster nets, F.P., 5.10.1950, 1♀ 8.5 mm.
- Off Dakar, Sénégal, in rock, 100 m, “G. Treca”, 1♂ 19 mm.
- In front of port of Dakar, Sénégal, 10 m, dredge, M.-M., 19.12.1951, 1♂ 25
 mm.
- Gorée, Sénégal, lobster nets, 26.8.1950, 1♀ 17 mm (Mus. Paris).
- Off Gorée, Sénégal, dredge, 29.12.1950, 1♂ broken.
- ?Sénégal, St. 58-2-28A, 32 m, M.-M., 1♂ 20 mm.
- Banc du Séminole, Sénégal, 25–30 m, M.-M., 1♀ 25 mm (Mus. Paris).
- Between Gorée and Dakar, Sénégal, 20–22 m, M.-M., 1♂ 12.5 mm.
- Off Gorée, Dakar, Sénégal, 1♂ 19 mm.
- Gorée, Sénégal, J.C., 13.11.1950, 1♀ 20 mm; 19.12.1950, 1♂ 14 mm.
- USNM: 2 miles out of Densu, Accra, Ghana, 8 fms (15 m), R.B., 8.4.1949, 1♂ 8
 mm, 1♀ 8 mm.
- Pointe Indienne, Pointe-Noire, Congo, rocky platform, intertidal zone, A.C.,
 8.1963, 1♂ 26 mm.
- Mus. Hamburg: St. Vincent, Cape Verde Is., 6 fms (11 m), Ps., 1♂ 17 mm, 1♀ 20
 mm.
- Prampram, Ghana, 5 fms (9 m), C.H., 2♂.
- Setté Cama, Congo, C.H., 1 juv.
- Mus. Berlin: Cape Verde Is., “Planet”, 18.2.1906, 1♀ 25 mm.
- Mus. Milan: St. Vincent, Cape Verde Is., 20 m, “Talisman”, 1♀ 14 mm.
- Mus. Stockholm: Porto Grande, St. Vincent, Cape Verde Is., Hg., 6.3.1890, 2♂
 10–18 mm, 2♀ ca. 11 mm.

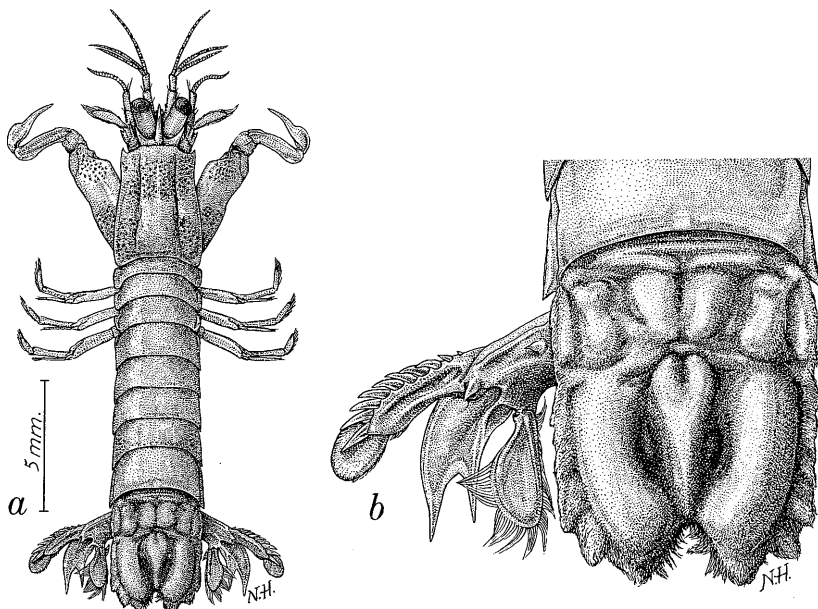


Fig. 12. *Protosquilla folini* (A. Milne-Edwards), male, TL 19 mm, Sénégal: a, dorsal view; b, posterior portion of body (telson not denuded).

Diagnosis (from MANNING, 1974a): Sixth abdominal somite and telson (Figs 12b, 13a-b) covered with dense coat of short setae, with some longer setae scattered on surface, longer setae most abundant along margin of telson; surface of sixth abdominal somite and telson generally not visible through setae, but configuration of bosses and depressions not obscured thereby. Bosses of sixth abdominal somite and telson ornamented with numerous low tubercles or spinules visible only when surface pilosity is removed. Dorsal bosses of sixth abdominal somite unarmed posteriorly, surface ornamented with few, low, inconspicuous tubercles, apices of tubercles usually hidden by setae. Bosses of sixth somite separated by deep longitudinal depressions. Median boss of telson pyriform, usually inflated, separated from submedian bosses by deep longitudinal depressions. Submedian bosses of telson variously inflated, tapering posteriorly toward apex of submedian teeth. Median and submedian bosses of telson ornamented with numerous low tubercles, apices not visible through surface pilosity. Margin of telson inflated, irregular in outline, ornamented with few erect spinules; marginal spinules larger than tubercles on surface bosses. Marginal teeth of telson broad, obtuse, apices widely separated, with chalky appearance; shape of marginal teeth very variable.

Color (from MANNING, 1974a): Body dark with narrow light band across carapace and merus of claw. Sixth abdominal somite, telson, and uropods white or cream-colored. Shade and pattern of dark pigment on body very variable.

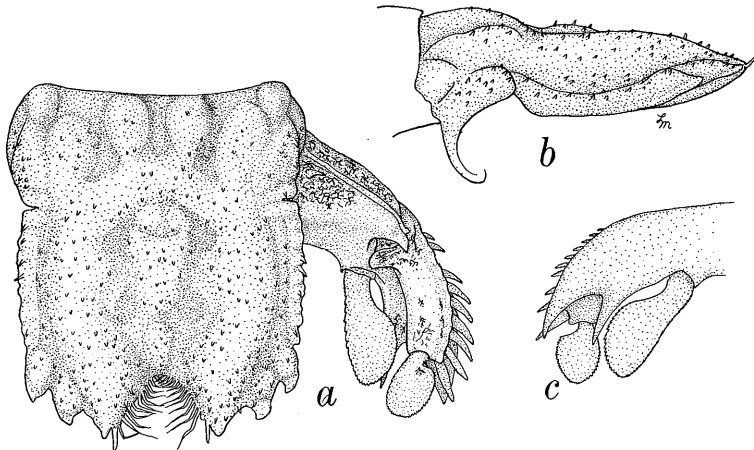


Fig. 13. *Protosquilla folini* (A. Milne-Edwards), female, TL 24 mm, Cape Verde Is.: a, sixth abdominal somite, telson, and uropod; b, sixth abdominal somite and telson, lateral view; c, uropod, ventral view. (Telson denuded; setae omitted). (From MANNING, 1974a).

MILNE-EDWARDS (1868, p. 66) noted "Sur l'exemplaire desséché les parties latérales de la carapace, les antennes et les pattes sont tachées de violet."

Size: Males (20), TL 8–26 mm; females (16), TL 8–25 mm. GRAVIER studied 62 specimens, TL 10–20 mm. A. MILNE-EDWARDS' type is 20 mm long, and the type of *P. elongata* Brooks was 0.767 inches or about 19 mm long. MANNING (1974a) reported numerous specimens from the Cape Verde Is., as follows: males, TL 9–25 mm; females, TL 8–28 mm; juveniles, TL 7–8 mm.

Remarks: As pointed out under the account of *P. calypso*, these two species are very similar in basic facies. *P. folini* does not have the long dorsal spines and thin, long setae on the sixth abdominal somite and telson which are characteristic of *P. calypso*. Rather, the coat of setae is very short and very dense, and the short dorsal spines are almost completely obscured by the setae. In some cases, the apices of the dorsal spines can be seen under high magnification. The coat of setae so obscures the dorsal spines that neither MILNE-EDWARDS nor BROOKS mention the spines in their descriptions; they are shown by HANSEN (1895). BROOKS did note that the posterior part of the body is rough. As I noted in 1974(a), the coat of setae conforms rather closely to the surface of the telson, so that the bosses and depressions are readily discernible.

HANSEN (1895) recorded an intermediate stage between the larval forms and the adult form; it appears to be a postlarva. BROOKS based his *P. elongata* on an adult, and noted (1886b, p. 69): "I am forced to conclude that there are at St. Vincent two closely related species of this minute type, or else that the figures which are given by Milne-Edwards are so inaccurate as to be of no value." BROOKS

had based his new species primarily on differences he observed between his specimen and that shown by MILNE-EDWARDS.

Little is known about the habitat requirements of this species. SOURIE (1954) found it in blocs of vermetids, and endo-pholadobiotic in rock with *Lithophaga*. Specimens were collected by the "Calypso" in rocks, algae, and calcareous algae (MANNING, 1974a).

Several authors, including BROOKS (1886b), BOUVIER (1906), KEMP (1913), GRAVIER (1927), and SERÈNE (1952) state that MIERS (1880) recorded this species from Mauritius. In his account of *P. folini*, MIERS notes (p. 123): "There are in the British-Museum collection a male from the Mauritius (R. Templeton, Esq.) and two small specimens, without definite locality, from the "Herald" collection, which belong to this or a closely allied form. They differ, however . . ." HANSEN (1895, p. 90) identified Miers' specimen with *Haptosquilla ectypa* (Müller).

Type locality: St. Vincent, Cape Verde Is. The holotype of *P. folini* is in the Muséum National d'Histoire Naturelle, Paris. The holotype of *P. elongata* is in the British Museum (Natural History); its type locality is also St. Vincent, Cape Verde Is.

Distribution (Fig. 53): Off West Africa, where it is known from the Cape Verde Is. and several mainland localities between Sénégal and the Congo. Records in the literature include: Cape Verde Is. (HANSEN, 1895); St. Vincent, Cape Verde Is. (A. MILNE-EDWARDS, 1867, 1868; BROOKS, 1886b; PARISI, 1922; MONOD, 1925; GRAVIER, 1927); Ile Fogo and La Praia, Carolines (MONOD, 1925); several localities based on 15 "Calypso" stations (MANNING, 1974a); Sénégal (SOURIE, 1954); Baie de Rufisque, Sénégal (MONOD, 1951); Prampram, Ghana, in 9 m (BALSS, 1916); Accra, Ghana, shore, in rocks (BUCHANAN, 1958); Setté Cama, Congo, in 12 m (BALSS, 1916). PARISI and GRAVIER reported their material from a depth of 20 m, and MANNING (1974a) recorded specimens from 0–25 m.

Family LYSIOSQUILLIDAE Giesbrecht, 1910

Lysiosquillinae Giesbrecht, 1910, p. 148.

Lysiosquillidae. — HOLTHUIS, 1967b, p. 2 [other references]. — MANNING, 1969a, p. 18 [definition].

Type genus: *Lysiosquilla* Dana, 1852.

Remarks: Nine species representing seven genera of lysiosquillids occur in the eastern Atlantic and the Mediterranean. Three new genera, all including species found only in the eastern Atlantic, are recognized here. A brief account of *Platysquilla eusebia* (Risso), the only eastern Atlantic species not occurring off West Africa, also is included here.

**Key to Genera and Species of Lysiosquillidae
from the Mediterranean and the Eastern Atlantic**

1. Dorsal surface of sixth abdominal somite and telson completely covered with long spines. Outer margin of dactylus of claw inflated basally (*Coronida*) *C. bradyi*
Dorsal surface of sixth abdominal somite and telson not completely covered with long spines. Outer margin of dactylus of claw not inflated basally 2
2. Mandibular palp absent 3
Mandibular palp present 6
3. Marginal armature of telson consisting of 4 pairs of fixed spines; 1 intermediate denticle present (*Platysquilla*) [*] *P. eusebia* (Risso, 1816)
Marginal armature of telson consisting of 2 pairs of fixed spines; 4 intermediate denticles present 4
4. Eye elongate, cornea rounded. 5 epipods present. Dorsal surface of telson produced into irregularly lobed eave above marginal armature (*Nannosquilloides*) (*) *N. occulta*
Eye triangular, cornea bilobed. 4 epipods present. Dorsal surface of telson with 1 low, median projection (*Allosquilla*) 5
5. Antennal protopod with 1 mesial and 1 ventral papillae, lacking dorsal spine. Basal segment of pereopods with 1 spine *A. africana*
Antennal protopod with dorsal spine and 1 mesial and 2 ventral papillae. Basal segment of pereopods with 2 spines *A. lillyae*
6. Endopods of walking legs ovate or subcircular. Dorsal surface of telson with 5 spines arranged in fan-shaped row (*Acanthosquilla*) *A. septemspinosa*
Endopods of walking legs slender, elongate. Dorsal surface of telson lacking 5 spines arranged in fan-shaped row 7
7. Telson with movable submedian teeth. Rostral plate not carinate, longitudinally channelled (*Lysiosquilloides*) *L. aulacorhynchus*
Telson lacking movable submedian teeth. Rostral plate longitudinally carinate (*Lysiosquilla*) 8
8. Dorsal surface of telson with numerous tubercles *L. hoevenii*
Dorsal surface of telson smooth, non-tuberculate *L. monodi*

***Acanthosquilla* Manning, 1963**

Acanthosquilla Manning, 1963, p. 319. — HOLTHUIS, 1967b, p. 3 [list of species].
— HOLTHUIS & MANNING, 1969, p. 548. — MANNING, 1969a, p. 61 [definition].

Type species: *Acanthosquilla multifasciata* (Wood-Mason, 1895), by original designation.

Remarks: Only one species of this genus occurs off the West African coast.

Acanthosquilla septemspinosa (Miers, 1881)
(Figs 14, 15, 54)

Lysiosquilla (*Coronis*) *acanthocarpus* var. *septemspinosa* Miers, 1881, p. 368, pl. 16 fig. 7.

Lysiosquilla acanthocarpus var. *septemspinosa*. — BIGELOW, 1894, p. 503 [key]. — KEMP, 1913, p. 122 [discussion].

Lysiosquilla septemspinosa. — KEMP, 1913, p. 204 [listed]. — BALSS, 1916, p. 51 [listed]. — MONOD, 1925, p. 91 [key], p. 92 [listed]. — DARTEVELLE, 1951, p. 1034 [discussion]. — LONGHURST, 1958, pp. 42, 86. — MANNING, 1962a, p. 304 [discussion]; 1963, p. 320 [listed].

Lysiosquilla septemspinosa var. — MONOD, 1951, p. 140, figs 4, 5.

Lysiosquilla. — INGLE, 1960, p. 565.

Lysosquilla septemspinosa. — LONGHURST, 1957, pp. 373, 375, 378 [listed].

Acanthosquilla septemspinosa. — HOLTHUIS, 1967b, p. 5 [with synonymy]. — MANNING, 1970d, p. 260.

not *Acanthosquilla acanthocarpus* Miers (var. *Septemspinosa*). — ALIKUNHI, 1967, p. 925, figs 189–194 [India; ?larvae of *A. acanthocarpus* (Miers)].

Material:

“Atlantide” St. 52, off Monrovia, Liberia, 3.1.1946, 1♀ 12 mm, 1 juv. 11 mm.

St. 53, Port Marshall, Liberia, mangrove, 5.1.1946, 1 juv. 11 mm.

IFAN: Port Etienne, Mauritania, plage de la Pecherie, M. S., 3.1948, 1♂ 55 mm (Mus. Paris).

Region de Joal, Sénégal, ca. 14 km W of Fata, 14°04'N, 16°55'W, 9.5 m, mollusk dredge, J. A., 25.2.1950, 1♀ 42 mm.

Dakar, Sénégal, in front of the entrance to the port, 10 m, M.-M., 19.12.1951, 1♂ 40 mm.

USNM: Baie de Pointe-Noire, Congo, beach, A.C., 1965, 2♂ 49–50 mm.

BMNH: Gorée Island, Dakar, Sénégal, holotype, 1♀ 34 mm (damaged), Reg. No. 81.24.

Off Accra, Ghana, St. 42, A. L., 1♂ 12 mm.

Sierra Leone, off No. 1 buoy, 8 m, dredge, St. D29/A4, 1♂ 31 mm, Reg. No. 1957.5.26.496.

CRO, Abidjan: Grand Bassam, Ivory Coast, 05°12'N, 03°49.5'W, 20 m, slightly muddy fine sand, temp. 24.4°C, sal. 35.13‰, small dredge, L.L. & A.I., 6.7.1966, 1 fragment CL 5.2 mm.

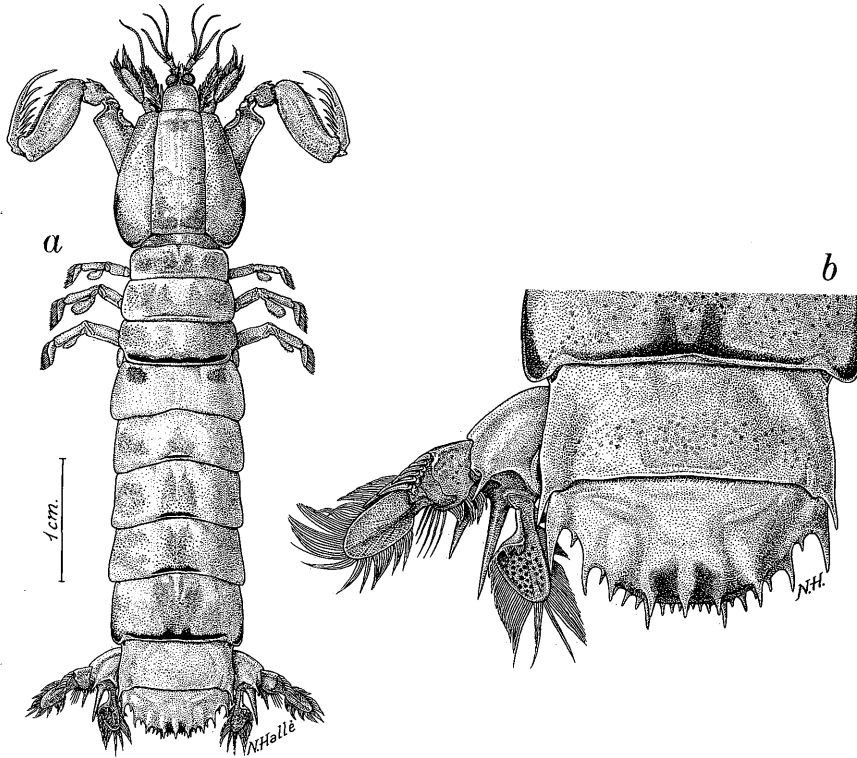


Fig. 14. *Acanthosquilla septemspinosa* (Miers), male, TL 55 mm, Mauritania: a, dorsal view; b, posterior portion of body.

Description: Eye (Fig. 14a) very small; cornea subglobular, set obliquely on and scarcely expanded beyond stalk; cornea with or without dorsal tubercle; ocular scales separate, apices rounded; eyes extending to or beyond end of second segment of antennular peduncle.

Antennular peduncle short, less than half as long as carapace; antennular processes visible lateral to rostral plate as sharp, anteriorly directed spines.

Antennal peduncle with distal segment as long as proximal, extending beyond eye; proximal segment of peduncle very setose; antennal scale less than half as long as carapace; antennal protopod with 1 mesial and 1 ventral papillae.

Rostral plate (Fig. 14a) subquadrate; lateral margins convex, anterolateral angles obtuse; slender median spine present.

Dactylus of raptorial claw (Fig. 14a) with 7 teeth (1 specimen with 8 teeth on 1 claw), proximal smallest, penultimate shorter than antepenultimate; distal lobe on outer margin of dactylus larger and more rounded than proximal.

Mandibular palp and 5 epipods present.

Basal segments of pereopods unarmed.

Abdomen (Fig. 14a) unarmed dorsally except for slender posterolateral spines on sixth somite; sixth somite also with sharp, ventrally-directed process on each side in front of articulation of uropod; ventral surface of sixth somite with rounded median projection on posterior margin in some specimens.

Telson (Fig. 14b) broader than long; dorsal teeth unequal, laterals larger than median or submedians; marginal armature, on either side of midline, consisting of 1 movable submedian tooth and large fixed teeth and denticles as follows: 3-7, usually 4-5, submedian denticles, outer largest, inner slightly higher than outer, 4 fixed intermediate denticles, second and fourth larger than first and third, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth. Juveniles with 8 submedian denticles.

Uropod (Fig. 14b) with 5-6 curved, slender spines on outer margin of proximal segment of exopod, distalmost extending beyond midlength of distal segment; large distal lobe of inner margin of proximal segment with 5-7 stiff setae (3-4 in juveniles); distal segment of exopod longer than proximal; outer margin of distal segment of exopod more heavily setose than inner; inner spine of basal prolongation of uropod the longer.

Color: Body covered with diffuse bands of dark chromatophores; posterolateral angles of carapace black; eighth thoracic somite black posteriorly; anterior 5 abdominal somites with black posterior line increasing in width from first to fifth somites; first abdominal somite with black lateral spot; sixth abdominal somite with some black pigment posterolaterally; telson with pair of submedian black spots set between median and submedian dorsal teeth.

Size: Males (5), TL 31-55 mm; females (2), TL 12-42 mm; juveniles (3), TL 11-12 mm. The total lengths of 3 females, 34, 36, and 42 mm, have been recorded by MIERS (1881), MONOD (1951), and MANNING (1970d). Other measurements of a male, TL 55 mm: carapace length 10.1; cornea width 1.2; rostral plate length 3.4, width 3.2; antennal scale length 3.0; antennular peduncle length 3.8; fifth abdominal somite width 11.4; telson length 4.5, width 8.8.

Remarks: *Acanthosquilla septemspinosa* can be distinguished immediately from all other West African lysiosquillids by the presence of the five dorsal spines on the telson. It is most similar to the American *A. biminiensis* (Bigelow), from which it differs in having the ocular scales separate, a cornea which appears to be larger with the dorsal tubercle less prominent, in having seven rather than six teeth on the claw (both species are somewhat variable in this feature), and in having a different color pattern. The West African species lacks dark rings on the posterolateral angles of the carapace, the short posterolateral bars on the eighth thoracic somite, has rounded anterolateral spots on the first abdominal somite, and has a median dark bar rather than two posterolateral bars on the fifth abdominal somite (cf. Fig. 14a here with fig. 14 in MANNING, 1969b).

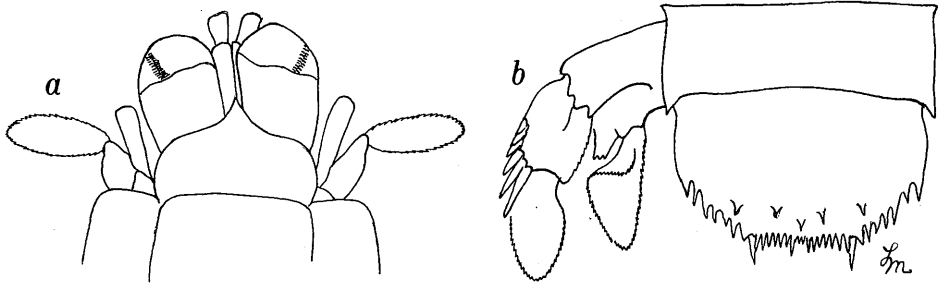


Fig. 15. *Acanthosquilla septemspinosa* (Miers), young female, TL 11 mm, "Atlantide" St. 52, Liberia: a, anterior portion of body; b, sixth abdominal somite, telson, and uropod. (Setae omitted).

MANNING (1962a, p. 304) pointed out differences in the marginal armature of the telson in *A. biminiensis*, *A. septemspinosa*, and in two related species from the Indo-West Pacific region. The reported differences based upon the relative size of the intermediate denticles have proved to be unreliable as specific characters; these were shown by MANNING (1974c) to be variable in *A. biminiensis*, and also have proved to be variable in the material reported here. Apparently the relative size and shape of the intermediate denticles of the telson cannot be used as a specific character in this genus.

Several of the characters displayed by the representatives of *A. septemspinosa* available for study are somewhat variable. Although most specimens have seven teeth on the dactylus of the claw, one has eight on one side. Most specimens have six spines on the outer margin of the uropodal exopod; one has five on one side. There are five to seven stiff setae on the inner distal margin of the proximal segment of the uropodal exopod on all the larger specimens, but in the one juvenile (TL 11 mm) in which they could be counted there were three or four setae. The larger specimens usually have three to five submedian denticles, the holotype has six to seven and juveniles with a total length of 11–12 mm have eight. The tubercle on the cornea is well-developed in some specimens, reduced in some, absent in most. Some specimens show a rounded median projection on the posterior margin of the ventral surface of the sixth abdominal somite; in others the margin is practically straight.

The young specimens with a total length of 11 mm appear to be postlarvae. They differ from adults in the features mentioned above and in having a median spine and four other dorsal projections on the telson and in having a very different marginal armature on the telson: in one specimen the first and third intermediate denticles are rounded and may have an apical spinule, whereas the second and fourth intermediate denticles are spiniform, but in another all four are spiniform. There are also other differences, shown in Fig. 15.

We know very little about the habitat requirements of this species. The specimens reported here were taken on beaches, in mangroves, and in offshore habitats (muddy sand) in 8–20 m. Specimens recorded in the literature have been

taken off Sénégal in 9.5 m on "cailloux et sable coquillier, coquilles, quelques éponges siliceuses, pas d'algue" (MONOD, 1951); off Sierra Leone on muddy sand in estuaries and offshore on sand and shelly sand in 8–63 m in both *Venus* and *Venus-Amphioplus* transitional communities (LONGHURST, 1958); and at the surface with a dipnet in Lagos harbour (MANNING, 1970d). Although it has been recorded from waters as deep as 63 m, it probably occurs in shallower, subtidal waters.

This species was found by LONGHURST (1957) in the stomach contents of three species of fishes from the Sierra Leone River: *Trygon margarita*, *Pomadasys jubelini*, and *Drepane punctata*.

Type locality: Gorée Island, Dakar, Sénégal. The female holotype is in the British Museum (Natural History).

Distribution (Fig. 54): West Africa, where it is known from scattered localities between Mauritania and the Congo, including: Port Etienne, Mauritania, beach; Joal, Sénégal, 9.5 m (MONOD, 1951); Gorée Island, Dakar, Sénégal (MIERS, 1881); Dakar, Sénégal; Sierra Leone River (LONGHURST, 1957); Sierra Leone, 8–63 m (LONGHURST, 1958); Monrovia and Port Marshall, Liberia; Grand Bassam, Ivory Coast, 20 m; Labadi, Accra, Ghana (INGLE, 1960); Lagos harbour, Nigeria, surface (MANNING, 1970d); and Pointe-Noire, Congo, beach.

The new records from Mauritania, Liberia, Ivory Coast and the Congo extend its known range considerably to the north and south.

Allosquilla n. gen.

Definition: Size moderate, maximum length about 60 mm. Body smooth, depressed, compact. Eye triangular, cornea bilobed. Rostral plate cordiform or subquadrate, with apical spine. Antennular somite with 2 dorsal spines. Antennal protopod with mesial or mesial and ventral papillae. Carapace strongly narrowed anteriorly, carinae and spines absent, position of cervical groove indicated on lateral plates only. Exposed thoracic somites lacking longitudinal carinae, eighth thoracic somite lacking prominent ventral keel. Mandibular palp absent; 4 epipods present. Propodus of third and fourth thoracic appendages broader than long, beaded or ribbed ventrally. Claw unknown. Endopods of pereopods two-segmented, distal segment ovate on anterior 2 pereopods, slenderer on third. Abdomen depressed but compact, smooth, usually unarmed dorsally except for posterolateral angles of sixth somite; articulated anterolateral plates present on abdomen; sixth abdominal somite with strong, ventrally-directed process anterior to each uropod. Telson broader than long, with upraised median projection, lobed posteriorly, not produced into false eave obscuring marginal armature; marginal

armature, on either side of midline, including a row of slender submedian denticles, 1 movable submedian tooth, 4 or more intermediate denticles, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth. Uropod flattened, proximal segment with dorsal spine; distal segment of uropodal exopod as long as or longer than proximal segment; proximal segment of exopod with spatulate movable spines on outer margin and stiff setae on rounded lobe of inner, distal margin; endopod with distinct proximal fold on inner margin; spines of basal prolongation of uropod slender, triangular in cross section, inner longer than outer.

Type species: *Allosquilla africana* (Manning, 1970d).

Remarks: *Allosquilla* includes two lysiosquillids known only from West Africa. One, *A. africana*, was originally referred to *Heterosquilla* (*Heterosquilloides*), but *A. africana* and the new species described below both differ from all other members of that subgenus in having only four rather than five epipods and in lacking the mandibular palp.

Unfortunately, both species of *Allosquilla* are known from incomplete specimens. However, both can be separated from all known species of lysiosquillids by the absence of the palp, the number of papillae on the antennal protopod, and the number of epipods.

Etymology: The name is composed of the generic name *Squilla* in combination with the Greek prefix *allo-*. The gender is feminine.

Allosquilla africana (Manning, 1970), n. comb.
(Figs 16, 54)

Heterosquilla n. sp. — Voss, 1966, p. 37.

Heterosquilla (*Heterosquilloides*) *africana* Manning, 1970d, p. 261, fig. 1.

Material:

USNM: Off the Niger delta, 03°50'N, 07°08'E to 03°51'N, 07°12'E, 174–148 m, "Pillsbury" St. 254, 14.5.1965, holotype, 1♀ 39 mm, cat. No. 125007.

Description (from MANNING, 1970d): Eye (Fig. 16a) large; cornea strongly bilobed, set obliquely on stalk; ocular scales erect, fused, with 2 rounded dorsal projections; eyes extending beyond end of first segment of antennular peduncle; corneal index 300.

Antennular peduncle short but more than half as long as carapace; antennular processes spiniform, directed anteriorly, extending past base of each eyestalk.

Antennal scale small, about 1/3 as long as carapace; distal segment of antennal peduncle subequal to proximal, peduncle not extending beyond eye; basal segment of antenna with 1 small mesial and 1 larger ventral papillae.

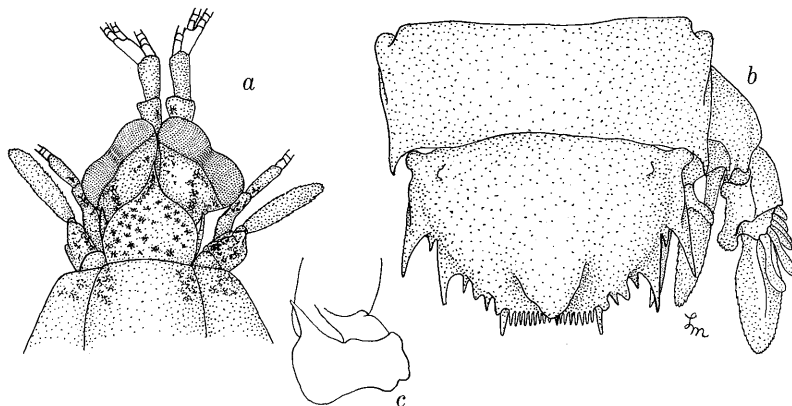


Fig. 16. *Allosquilla africana* (Manning), female holotype, TL 39 mm, off Niger delta: *a*, anterior portion of body; *b*, sixth abdominal somite, telson, and uropod; *c*, basal segment of third pereopod. (Setae omitted).

Rostral plate (Fig. 16*a*) cordiform, about as long as broad, not carinate; rounded anterolateral angles sloping to slender apical spine.

Raptorial claw absent in holotype.

Mandibular palp absent; 4 epipods present.

Lateral process of fifth thoracic somite rounded, inconspicuous; lateral processes of next 2 somites rounded anterolaterally, more truncate posterolaterally; basal segment of each pereopod with prominent posterior spine, directed ventrally, largest on last leg, most triangular on first; eighth thoracic somite lacking noticeable median ventral projection.

Anterior 5 abdominal somites smooth dorsally, unarmed; sixth somite (Fig. 16*b*) with posterolateral spines dorsally and with slender ventral spine on each side in front of articulation of uropod; ventral surface of sixth abdominal somite smooth, unarmed.

Telson (Fig. 16*b*) broader than long, with blunt, rounded, upraised median projection on dorsal surface; 1 pair of anterolateral tubercles present dorsally, mesial to marginal carina; marginal armature on each side of midline, consisting of a transverse, biconvex row of 8–9 slender submedian denticles, 1 movable submedian tooth, and 4 fixed teeth, inner 2 small, broad, triangular, outer 2 much larger, spiniform, with intervening denticles.

Basal segment of uropod with sharp inner and outer carina, inner terminating in slender dorsal spine; proximal segment of exopod with short, curved dorsal carina and 4–5 spatulate, grooved spines, distalmost extending almost to midlength of distal segment; inner margin of proximal segment with prominent, rounded, setose lobe; distal segment of exopod longer than proximal; endopod triangular, with proximal fold on outer margin; spines of basal prolongation triangular in cross section, inner much the longer.

Color (from MANNING, 1970d): Most of pattern faded, body with numerous diffuse, light brown chromatophores scattered on dorsal surface; anterior appendages with numerous dark chromatophores, rostral plate appearing speckled, peduncle of antenna banded; carapace with dark spots anteriorly and posteriorly and along cervical groove.

Size: Only known specimen, female holotype, TL 39 mm: carapace length 6.9; cornea width 2.3; rostral plate length 2.1, width 2.1; antennal scale length 2.3; antennular peduncle length 3.8; fifth abdominal somite width 7.3; telson length 3.9, width 6.0.

Remarks: *Allosquilla africana* is known only from the unique holotype. Differences between it and *A. lillyae* are given below.

Type locality: Off the Niger delta, Gulf of Guinea. The female holotype is in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 54): Known only from the type locality, off the Niger delta, 174–148 m.

***Allosquilla lillyae* n. sp.**
(Figs 17, 54)

Material:

Mus. Paris: S of San Miguel, Azores, 37°39.5'N, 25°36'W, 345 m, sand, gravel, pebbles, rectangular dredge, Bicaçores St. 147, 30.10.1971, paratype, 1♀ CL 9.2 mm.

SW of San Miguel, Azores, 37°47.5'N, 25°52.5'W, 260–225 m, sand, gravel, "lapilli", rocks, rectangular dredge, Bicaçores St. 169, 1.11.1971, holotype, 1♂ CL 9.1 mm.

Diagnosis: Eye (Fig. 17a) with bilobed cornea, corneal indices 344–364. Ocular scales erect, fused, with blunt apices. Antennal protopod with anterodorsal spine and 1 mesial and 2 ventral papillae. Rostral plate subrectangular, broader than long, with median apical spine. Mandibular palp absent; 4 epipods present. Basal segments of pereopods (Fig. 17b) with 2 posterior spines.

Color: Body ornamented with dark chromatophores on light background. Rostral plate with scattered chromatophores and large black spot at base of apical spine. Chromatophores on carapace arranged in 2 rows, with pair of dark spots anteriorly inside of gastric grooves, a pair at level of cervical groove, and indications of a pair at posterior margin; posterolateral margin bordered with dark chromatophores. Posterior 3 thoracic somites with chromatophores arranged in 2 large U's, open anteriorly.

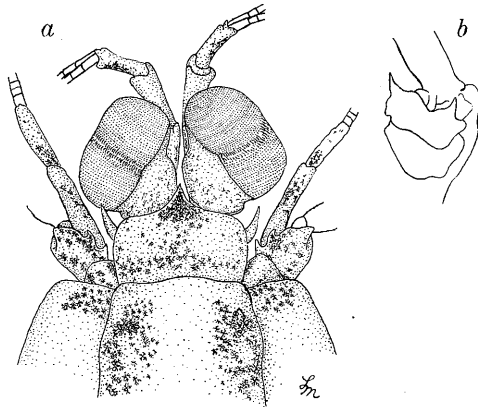


Fig. 17. *Allosquilla lillyae*, n. sp., male holotype, CL 9.1 mm, Azores: *a*, anterior portion of body (setae omitted). Female paratype, CL 9.2 mm, Azores: *b*, basal segment of third pereopod, posterior view.

Size: Only 1 incomplete male, CL 9.1 mm, and 1 incomplete female, CL 9.2 mm, known. The male would probably have a total length of about 55 mm. Other measurements of the male: cornea width 2.5 mm; antennal scale length 3.4 mm; rostral plate length 2.4 mm, width 3.1 mm.

Remarks: It is with great hesitation that I describe this species on the basis of two incomplete specimens. However, the characters afforded by the fragments are adequate to distinguish this species from all other lysiosquillids, and in view of the fact that one other stomatopod is known from off the Azores and few are known from depths of 225–345 m, it seems best to describe this species at this time.

Unfortunately, both species of *Allosquilla* are known from incomplete specimens, but they still can be distinguished without difficulty. *A. lillyae* differs from *A. africana* in having two rather than one ventral papillae as well as an anterodorsal spine on the antennal protopod and in having two rather than one basal spines on the walking legs. In addition, the eyes of *A. lillyae* appear to be narrower (CI 300 in *A. africana*, 344–364 in *A. lillyae*) and the rostral plate is much slenderer.

Etymology: Named for my wife LILLY, who has contributed much to the completion of this report.

Type locality: SW of San Miguel, Azores, in 260–225 m. The holotype and paratype are in the Muséum National d'Histoire Naturelle, Paris.

Distribution (Fig. 54): Known only from two localities off the Azores, 225–345 m.

Coronida Brooks, 1886

Coronida Brooks, 1886a, p. 84; 1886b, p. 79. — MANNING, 1963, p. 322. —
HOLTHUIS, 1967b, p. 6 [list of species]. — HOLTHUIS & MANNING, 1969, p. 548.

Definition: Size small to moderate, maximum length less than 50 mm. Body smooth, depressed, stout. Eye elongate, cornea bilobed. Rostral plate subquadrate or subpentagonal, unarmed. Antennular somite with 2 dorsal spines. Antennal protopod with 1 ventral papilla. Carapace strongly narrowed anteriorly, carinae and spines absent, position of cervical groove scarcely indicated on gastric grooves. Exposed thoracic somites lacking longitudinal carinae; eighth thoracic somite lacking median ventral keel. Mandibular palp present; 5 epipods present. Propodi of third and fourth thoracic appendages broader than long, ventral ribbing obscure, usually restricted to distal portion. Claw stout, dactylus with 4 teeth, outer margin of dactylus inflated basally; propodus stout, superior margin incompletely pectinate, with 3 movable spines proximally; dorsal ridge of carpus undivided, terminating in blunt tubercle; merus stout, unarmed; ischium much shorter than merus, unarmed. Endopods of pereopods two-segmented, slender on all legs. Abdomen depressed but compact, smooth; articulated anterolateral plates small; sixth abdominal somite ornamented with broad, irregular ridges or covered with spines or tubercles, and with ventrally-directed process anterior to each uropod. Telson broader than long, completely covered with spines or raised tubercles; marginal armature of telson variable, movable submedian teeth present. Uropod stout, small, proximal segment with prominent outer ridge and blunt dorsal projection; outer margin of exopod with short, blunt, movable spines, inner margin setose; endopod lacking prominent fold proximally on outer margin; basal prolongation produced into 2 flat spines, inner longer than outer.

Type species: *Coronida bradyi* (A. Milne-Edwards, 1869), by subsequent designation by BALSS (1938).

Remarks: One species of this genus occurs off the West African coast.

Coronida bradyi (A. Milne-Edwards, 1869)

(Figs 18, 19, 52)

Squilla bradyi A. Milne-Edwards, 1869, p. 137, pl. 17 fig. 11. — MANNING, 1963, p. 322 [listed]. — HOLTHUIS & MANNING, 1964, pp. 141, 142 [discussion]. — EVANS & CHINA, 1966, p. 204 [nomenclature].

Gonodactylus ? Bradyi. — MIERS, 1880, p. 117.

Gonodactylus bradyi. — MIERS, 1884, p. 16 [discussion].

- Coronida bradyi*. — BROOKS, 1886b, p. 80 [listed]. — KEMP, 1913, pp. 130 [key], 204 [listed]. — HOLTHUIS & MANNING, 1964, p. 139 [discussion]; 1969, fig. 351.
Coronida Bradyi. — GRAVIER, 1920, p. 115. — MONOD, 1925, p. 92. — GRAVIER, 1927, p. 32, pl. 1. — MONOD, 1951, p. 143 [key].
Coronida bradya. — MONOD, 1925, p. 91 [key]. — DARTEVELLE, 1951, p. 1034 [discussion] [erroneous spelling].
Coronida armata. — HOLTHUIS, 1967, p. 6 [other references, including larvae]. — MANNING, 1970d, p. 260; 1974a, p. 15.

Material:

“Atlantide“ St. 39, San Pedro Bay, St. Vincent, Cape Verde Is., 50–41 m, Foraminifera, 10.12.1945, 1♀ 16 mm.

USNM: Annobon, 01°27'S, 05°35'48"E, 50–60 m, A.C., 11.12.1965, 2♂ 26–30 mm, 1♀ 26 mm, cat. No. 125030.

S of Annobon, 01°28.5'S, 05°37.5'E, 35–55 m, F.Pd., 16.6.1967, 1♀ 34 mm.

Description: Eye (Fig. 18*a*) elongate; cornea bilobed, slightly broader than stalk and set obliquely on it; eyes extending beyond end of second segment of antennular peduncle; ocular scales low, rounded, fused into bilobed plate.

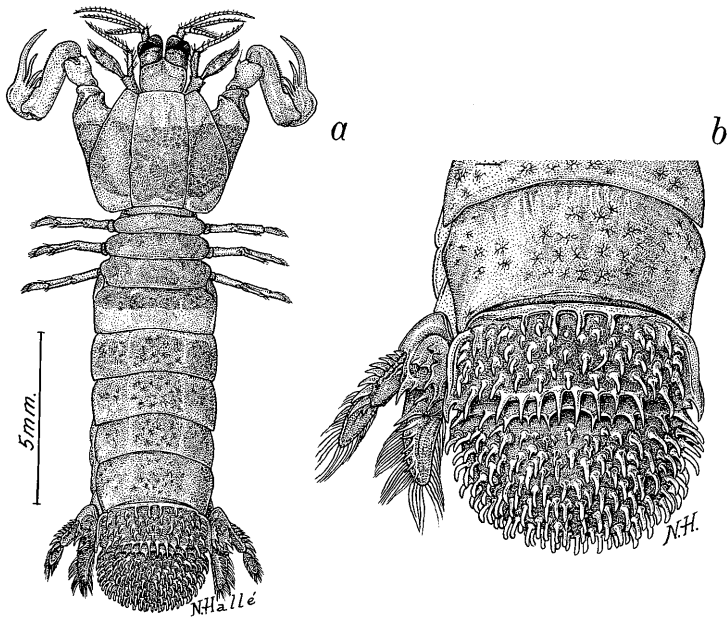


Fig. 18. *Coronida bradyi* (A. Milne-Edwards), female, TL 16 mm, “Atlantide” St. 39, Cape Verde Is.: *a*, dorsal view; *b*, posterior portion of body.

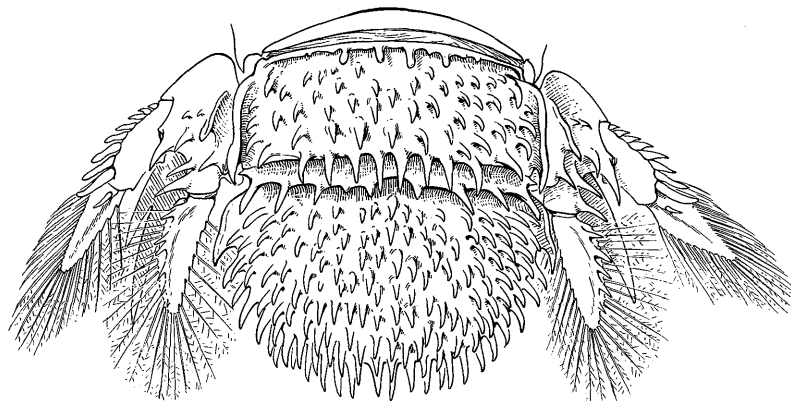


Fig. 19. *Coronida bradyi* (A. Milne-Edwards), Annobon, posterior portion of body (received from A. CROSNIER).

Antennular peduncle short, less than half as long as carapace; antennular processes produced into slender, anteriorly directed spines usually concealed by rostral plate. Shorter ramus of antennular flagellum with 6–17 segments in adults, 4–9 in small specimens.

Antennal scale small, about one-third as long as carapace; antennal peduncle not extending beyond eye, proximal segment of peduncle longer than distal; distal segment of antennal protopod with small, sharp anterointernal spine; protopod with 1 ventral papilla.

Rostral plate (Fig. 18a) subquadrate, broader than long; lateral margins convex, anterolateral angles obtuse, rounded, concave anterior margins converge on obtusely-angled apex.

Dactylus of claw (Fig. 18a) with 4 teeth; outer margin of dactylus inflated, flattened or notched; dorsal ridge of carpus terminating in blunt angle.

Mandibular palp and 5 epipods present.

Lateral process of fifth thoracic somite obscure, poorly developed; lateral processes of sixth and seventh somites subtruncate, rounded anterolaterally and posterolaterally; endopods of pereopods small, ovate, two-segmented; eighth thoracic somite lacking distinct median ventral keel.

Anterior 5 abdominal somites smooth, unarmed except for 2–3 posterolateral spinules on fifth somite. Sixth somite (Figs 18b, 19) completely covered with slender, posteriorly-inclined spines, posterolateral spines strongest; anterior margin with large submedian pair of spines; lateral margin longitudinally carinate; sixth somite also with ventrolateral spine in front of articulation of each uropod.

Telson (Figs 18b, 19) broader than long, lateral and posterior margins convex, completely covered with dorsal spines, apices curved posteriorly; dorsal surface convex laterally and posteriorly, slightly flattened medially; posterior margin with median spine, and, on either side of midline, 1–3 (usually 2–3) submedian

denticles, 1 movable submedian tooth, 4 subequal intermediate denticles, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth; ventral surface with scattered lateral spinules on either side of anal pore.

Uropod (Figs 18*b*, 19) broad, flattened, anterior margin of basal segment carinate, produced anteriorly into an obtuse lobe; dorsal surface of basal segment with numerous erect spinules, largest anterior to articulation of exopod and endopod; proximal segment of exopod with 1 or more dorsal spinules, outer margin with 7–9 movable spines, distalmost not extending to midlength of distal segment; distal segment of exopod triangular, shorter than proximal, with at least 1 dorsal spinule; posteroventral lobe on proximal segment of exopod low, not markedly projecting, with 2–3 setae; endopod triangular, curved, with curved dorsal carina on outer half ornamented with row of dorsal spines; proximal portion of outer margin not folded; spines of basal prolongation slender, flattened but triangular in cross section, not strongly divergent, inner much the longer, inner margin smooth, unarmed.

Color: "Live specimens were pastel orange, darker anteriorly and posteriorly, with a lighter band across the carapace" (MANNING, 1970d, p. 260).

Preserved specimens show two phases, one light, one dark, each with basically the same color pattern. Body covered with dense coat of brown chromatophores, less concentrated on the light form and on the anterior appendages and rostral plate of the dark form. Carapace with anterior and posterior light bands, almost completely lacking dark chromatophores. First abdominal somite with a similar light band near posterior margin. Exposed thoracic and anterior 5 abdominal somites with similar patterns dorsally, each with a pair of submedian patches of lighter color. Sixth abdominal somite and telson with dark chromatophores scattered on surface between spines, pigment extending onto spines. Dark chromatophores scattered over ventral surface of body and over appendages.

Size: Males (2), TL 26–30 mm; females (3), TL 16–26 mm. GRAVIER (1920) reported 3 specimens, TL 11, 17, and 31 mm; they are probably females as he observed no copulatory appendages. MANNING (1970d) reported 1 male, TL 21 mm, 2 females, TL 31–34 mm, and 1 juvenile, TL 10 mm, and MANNING (1974a) 4 males, TL 14–30 mm, and 10 females, TL 16–44 mm. The size of the holotype was not given.

Other measurements of a male, TL 26 mm: carapace length 4.5; cornea width 1.1; rostral plate length 1.5, width 1.8; antennal scale length 1.9; antennular peduncle length 3.0; fifth abdominal somite width 4.9; telson length 3.3, width 5.0.

Remarks: Although in two previous papers (1970d, 1974a) I followed HOLTHUIS (1967b) in using the specific name *C. armata* for this species, I now believe that the name based on the adult form, *C. bradyi*, should be used. *Smerdis armata* Leach was based on a larval form from the Gulf of Guinea which had four teeth on the

dactylus of the claw. HANSEN (1895) identified *Smerdis* as the larva of *Coronida*. Inasmuch as *C. bradyi* is the only known lysiosquillid in the region with but four teeth on the claw, it seemed safe to identify Leach's larva with *C. bradyi* and use the older name, *C. armata*. However, another Atlantic lysiosquillid, *Heterosquilla mccullochae* (Schmitt) (see MANNING, 1969a) also has but four teeth on the claw, and unreported collections available to me as well as its recently recorded occurrence in the Indian Ocean (SHANBHOUE, 1971, as *Heterosquilla jonesi*) indicate that its distribution is much wider than previously believed. Until the adult form of *Smerdis armata* can be identified through rearing experiments and proved to be a *Coronida*, I believe this species should be known as *C. bradyi*.

Coronida bradyi is the only Atlantic species of the genus. It is most similar to the species from the eastern Pacific region identified with it by SCHMITT (1940). However, as I indicated in 1970(d) (p. 260) there are numerous differences between representatives of the two populations, and I believe they should be considered as distinct species. A description of that species is in preparation.

Apparently members of this genus prefer rough bottom, and, in the eastern Atlantic region, *C. bradyi* occurs in two widely separate areas in which these habitats are found: the Cape Verde Islands, where it is known at 20–25 m, and the offshore islands of the Gulf of Guinea, Principe (11–45 m) and Annobon (9–69 m). I can find no morphological differences between members of the two populations.

Although the holotype is reported to be in the collections of the Muséum National d'Histoire Naturelle, Paris (HOLTHUIS, 1967b), it was not mentioned by GRAVIER (1920) who listed all of the material of this species then available to him: three specimens taken by the "Talisman" and two collected by BOUVIER in the Cape Verde Is. as well as one specimen from Annobon. MONOD (1925) noted seeing five specimens from the Cape Verde Is.; the type would have been the sixth. It seems likely that the type has been lost.

The figure of this species given by A. MILNE-EDWARDS (1869) is somewhat inaccurate and misleading. It depicts the species as having four antennular flagellae, no exopods on the pereopods, and omits the enlarged submedian spines on the sixth abdominal somite. This figure may have misled SCHMITT into identifying his material with this species.

Type locality: "Rade de Saint Vincent", Cape Verde Is. The type may be lost (see above).

Distribution (Fig. 52): Eastern Atlantic region, where it has been recorded from off the Cape Verde Is. and Principe and Annobon in the Gulf of Guinea, from 9–69 m. Records in the literature include: Cape Verde Is. (GRAVIER, 1920, 1927; MONOD, 1925); Saint Vincent, Cape Verde Is. (A. MILNE-EDWARDS, 1869; GRAVIER, 1920, 1927); Fogo, SW of Sta. da Encarnação, Cape Verde Is. (MANNING, 1974a); Annobon (GRAVIER, 1920, 1927; MANNING, 1970d); Principe (MANNING, 1974a).

Lysiosquilla Dana, 1852

Lysiosquilla Dana, 1852, p. 616. — MANNING, 1963, p. 317. — HOLTHUIS, 1967b, p. 14 [synonymy and list of species]. — MANNING, 1969a, p. 21 [definition].

Type species: *Lysiosquilla inornata* Dana, 1852 [= *L. scabricauda* (Lamarck, 1818)], by subsequent designation by FOWLER (1912, p. 539).

Remarks: Two species of *Lysiosquilla* occur in the eastern Atlantic.

Lysiosquilla hoevenii (Herklots, 1851)
(Figs 20, 21, 26a-c, 54)

Squilla Hoevenii Herklots, 1851, pp. 17, 26 [listed], pl. 1 fig. 11. — OSORIO, 1887, pp. 223, 231; 1888, p. 189; 1889, p. 130.

Squilla Hoeveni. — MIERS, 1880, p. 7 [synonymized with *Lysiosquilla scabricauda* (Lamarck, 1818)].

Lysiosquilla scabricauda. — OSORIO, 1889, p. 138; 1898, pp. 186 [listed], 194. — BALSS, 1916, p. 51. — MONOD, 1925, pp. 91 [key], 92. — HOLTHUIS, 1941, p. 36. — DARTEVELLE, 1951, p. 1034 [discussion]. — MONOD, 1951, p. 139, figs 1-3. — CADENAT, 1957, pp. 126 [discussion], 133 [key]. — BUCHANAN, 1958, p. 20. — LONGHURST, 1958, p. 86 [not *Lysiosquilla scabricauda* (Lamarck, 1818)].

Lysiosquilla hoeveni. — BÜTTIKOFER, 1890, pp. 466 [discussion], 487 [listed]. — JOHNSTON, 1906, p. 862 [listed].

Squilla Haevenii. — OSORIO, 1898, p. 194 [listed].

Lysiosquilla maculata. — VILELA, 1949, p. 67, fig. 17 [not *Lysiosquilla maculata* (Fabricius, 1793)].

Lyosquilla maculata. — FRADE, 1950, pp. 11, 26 [erroneous spelling; discussion] [not *Lysiosquilla maculata* (Fabricius, 1793)].

Lysiosquilla sp. — DARTEVELLE, 1951, p. 1033, fig. 7.

Lysiosquilla hoevenii. — HOLTHUIS, 1967b, p. 17 [complete synonymy]. — MANNING, 1974a, p. 15.

Material:

"Galathea" St. 48, anchorage, Sao Tomé, 00°22'N, 06°46'E, 28.11.1950, 3♂
106-118 mm.

IFAN: Gorée, Sénégal, J.C., 8.9.1964, 1♂ 109.5 mm.

Rufisque, Sénégal, L.G., 1♂ 220 mm.

Yèn, Sénégal, 1.7.1952, 1♂ 240 mm; 9.1957, 1♂ 235 mm; 12.1960, 1♂ CL
45.1 mm; 24.11.1958, 1♂ 265 mm.

Between M'Bodiene and N'Gazobil, Sénégal, ca. 5 m, 14.2.1953, 1♂ 258 mm.

TABLE 1. Corneal indices of West African species of *Lysiosquilla* and *Lysiosquilloides*

Carapace length, in mm		<i>Lysiosquilla hoevenii</i>	<i>Lysiosquilla monodi</i>	<i>Lysiosquilloides aulacorhynchus</i>
11-15	range	243-244	300-310	-
	mean (no.)	243.5(2)	305 (2)	-
16-20	range	254-281	-	-
	mean (no.)	274 (5)	-	-
21-25	range	291-295	-	-
	mean (no.)	293 (2)	368 (1)	-
26-30	range	313-354	-	-
	mean (no.)	337 (3)	-	-
31-35	range	312-392	-	-
	mean (no.)	348 (4)	-	343 (1)
36-40	range	350-359	-	-
	mean (no.)	377 (8)	-	-
41-45	range	370-396 ¹	-	-
	mean (no.)	384 (3)	-	406 (1)
46-50	range	-	-	-
	mean (no.)	-	-	458 (1)

¹) Males only. CI = 514 in only large ♀ examined.

Caton, Casamance River, Sénégal, 9.1962, 1♂ CL 37.9 mm (Mus. Paris);
4.1962, 1♂ 178 mm; lobster nets, J. C., 4♂ 143-254 mm.

Caton, Sénégal-Gambia border, 1♀ 225 mm.

Mouth of the Casamance River, Sénégal, 4.5 m, rocky, shark net, 7.1948, 1♂.
Gambia, 3.1954, 1♂ 221 mm.

USNM: Coast of the Congo, 1.1961, 1♂ 167 mm.

Between Pointe-Noire and the mouth of the Congo, trawl, 26.6.1961, 4♂
98-223 mm.

BMNH: Sierra Leone, 29 m, trawl, A.L., 15.7.1952, 1♂ 176 mm, Reg. No.
1957.5.26.495.

Chorkora, Semi, Accra, Ghana, R.B., 1949-50, 4♂ (3 broken) 243 mm, Reg.
No. 1952.11.27.3-4.

RMNH: Boutry (Butre), Ghana, Pel, holotype, 1♂ 224 mm, Reg. No. 13.

Sierra Leone, A.L., 9.1952, 1♂ CL 28.2 mm, Reg. No. 340.

Liberia, Bt., 1♂ 187 mm, Reg. No. 43.

Mus. Paris: Cape Verde Is., A. B., 1869, 1♂ 155 mm.

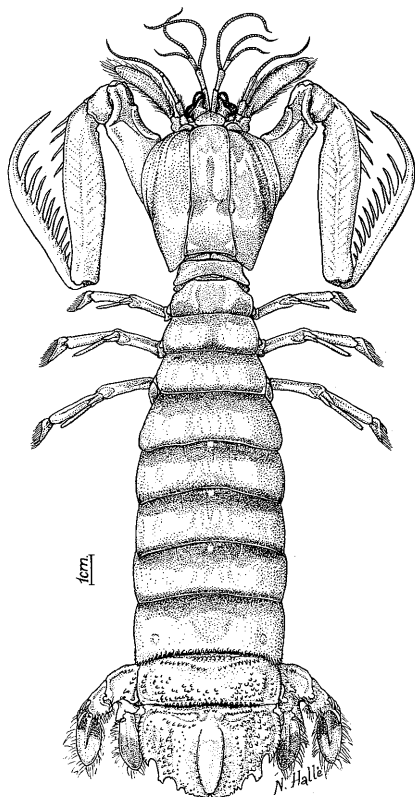
Santiago, Cape Verde Is., "Talisman", 1883, 1♂.

Boulbinet, Conakry, Guinea, A.G., 1910, 1♂ CL 30.2 mm.

Mus. Hamburg: Lomé, Togo, Bh., 1.1914, 1♂ 195 mm.

Sangatanga, near Port Gentil, Gabon, Zl., 1♂ 100 mm.

Fig. 20. *Lysiosquilla hoevenii* (Herklots), female, TL 226 mm, Sénégal.



Mus. Tervuren: Baie de Cotonou, near Porto Novo, Dahomey, D.K., 7.1963, 1♀ 73 mm.

CRO, Abidjan: Grand Bassam, Ivory Coast, 05°09.4'N, 03°49.5'W, 30 m, vase finement sableuse, oolithique, coquilliere, shrimp trawl, L.L. & A.I., 10.10.1967, temp. 17.72°C, sal. 35.7‰, 1♀ 74 mm.

Mus. Brussels: Nigeria, 04°25'N, 08°14'E, 16 m, Guinean Trawling Survey II, Tr. 45, St. 1, "Thierry", 14.4.1964, 1♂ 131 mm.

Description: Eye (Fig. 20) large; cornea bilobed, set slightly obliquely on stalk; eyes not extending beyond end of second segment of antennular peduncle; ocular scales low, triangular, apices curved anteriorly; corneal indices: 243–514, index highest in adult females (Table 1).

Antennular peduncle short, less than half as long as carapace; dorsal processes of antennular somite visible lateral to rostral plate as broad, triangular projections.

Antennal scale (Fig. 26b) slender, about 3 (2.91–3.86) times as long as broad; antennal peduncle extending beyond eye, distal segment longer than proximal; antennal protopod with anterodorsal projection and 1 mesial and 2 ventral papillae.

Rostral plate (Fig. 26a) cordiform, broader than long; low median carina present on anterior third, anterior portion of plate not grooved lateral to carina.

Dactylus of claw (Fig. 20) large, with 11–12 teeth (10 teeth in only adult female), outer margin faintly sinuate; dorsal ridge of carpus terminating in a single spine, apex not deflexed. Propodal indices 060–116, highest in adult females (Table 2).

Mandibular palp and 5 epipods present.

Ventral keel of eighth thoracic somite (Fig. 26c) triangular, inclined posteriorly, apex blunt.

Anterior 4 abdominal somites smooth; fifth somite (Figs 20, 21) with posterior row of spinules increasing in size laterally; sixth somite almost completely covered with rough tubercles, with anterior and posterior rows of spines, anterior row diverging mesially, forming two rows at midline; lateral longitudinal boss separated from oval raised area by deep depression; sixth somite with sharp ventrolateral projection in front of articulation of each uropod.

Telson (Figs 20, 21) broader than long, posterior margin very convex, dorsal surface almost completely covered with large, coarse tubercles; raised, elongate median boss smooth dorsally, tuberculate laterally; anterior and lateral margins tuberculate; curved row of submedian denticles present; 2 pairs of lateral spines present, outer usually the sharper.

TABLE 2. Propodal indices of West African species of *Lysiosquilla* and *Lysiosquilloides*

Carapace length, in mm		<i>Lysiosquilla hoevenii</i>	<i>Lysiosquilla monodi</i>	<i>Lysiosquilloides aulacorhynchus</i>
11–15	range	–	080–088	–
	mean (no.)	075 (1)	084 (2)	–
16–20	range	064–071	–	–
	mean (no.)	068 (5)	–	–
21–25	range	067	–	–
	mean (no.)	067 (2)	071 (1)	–
26–30	range	060–071	–	–
	mean (no.)	067 (3)	–	–
31–35	range	061–070	–	–
	mean (no.)	064 (4)	–	070 (1)
36–40	range	060–072	–	–
	mean (no.)	065 (9)	–	–
41–45	range	061–079 ¹	–	–
	mean (no.)	067 (7)	–	077 (1)
46–50	range	–	–	–
	mean (no.)	–	–	071 (1)

¹) PI = 116 in only large ♀ examined.

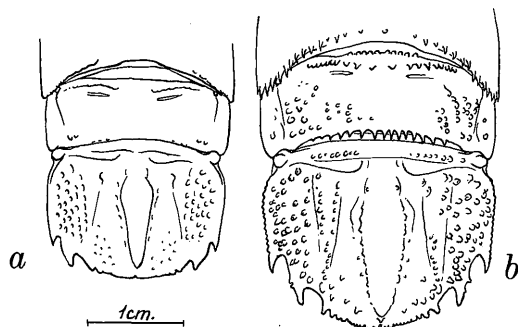
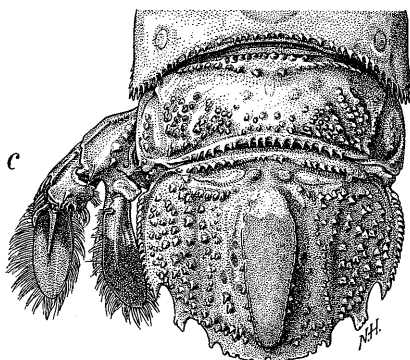


Fig. 21. *Lysiosquilla hoevenii* (Herklots), telsons of: *a*, female, TL 95 mm, and *b*, female, TL 127 mm, both "Galathea" St. 18, Liberia (not seen); *c*, female, TL 226 mm, Sénégal.



Basal segment of uropod with proximal, dorsal spinules and usual dorsal spine; proximal segment of exopod with dorsal patch of spinules and 8 movable spines on outer margin, distalmost short, not extending to midlength of distal segment; distal segment of exopod longer than proximal; endopod elongate, 2.17–2.79 times as long as broad; basal prolongation comprising 2 spines, trefoil in cross section, inner longer; basal segment usually with spinule or denticle on inner ventral surface at articulation of endopod.

Color: Body conspicuously banded with dark pigment on light background. Three dark bars present on carapace. Antennal scale outlined in dark pigment. Claw lacking conspicuous bars on merus and propodus. Pereopods with dark spot anteriorly on protopods. Sixth thoracic somite almost entirely black in some specimens, otherwise with 2 dark bands, anteriormost diffuse, broad, posteriormost narrow, as on seventh and eighth thoracic somites and anterior 5 abdominal somites. Sixth abdominal somite color variable, almost entirely black in some specimens. Telson with median and submedian dark patches. Uropod dark basally, with dark spot at articulation of segments of exopod, distal 3/4 of endopod black.

Manuscript notes by J. CADENAT included the following color description: "La carapace est violet sombre coupé au premier tiers par une bande transversale claire

intéressant la moitié environ des parties de la carapace à droite et à gauche des sillons gastriques ainsi que la partie médiane de la carapace, cette bande est discontinue: elle est coupée par les sillons gastriques bordés eux-mêmes d'une petite bande claire longitudinale de chaque côté.

Une deuxième bande transversale coupe la totalité de la carapace vers son deuxième tiers.

Enfin une tache claire plus ou moins régulièrement arrondie existe au bord postérieur de chaque côté de la carapace.

Chaque segment présente une large bande foncée au bord antérieur suivie d'une bande claire de même largeur environ et est bordé postérieurement d'une bande étroite plus foncée que la première. La bande claire n'est pas continue sur le 6^o segment thoracique libre (le premier portant des pattes ambulatoires).

Les uropodes et le telson sont également fortement marqués de taches claires et sombres: le bord antérieur du telson est clair, de même que deux zones triangulaires au bord postérieur (une de part et d'autre de la zone en relief)."

Size: Males (37), TL 98–265 mm; females (3), TL 73–225 mm. Few measurements have been given in the literature: a specimen TL 210 mm from Joal, Sénégal (MONOD, 1951), a male TL 126 mm from Portuguese Guinea (VILELA, 1949), and a male TL 84 mm and 3 females TL 73–97 mm from Principe Island (MANNING 1974a). Other measurements of a male, TL 254 mm: carapace length 42.4; cornea width 10.7; rostral plate length 8.7, width 10.7; antennular peduncle length 22.4; antennal scale length 27.4, width 7.1; propodus of claw length 53.6; fifth abdominal somite width 53.3; telson length 37.2, width 49.4.

Remarks: The presence of spinules on the posterior part of the body in this species allows its separation from the only other species of the genus in the area, *L. monodi*. The spinules, although reduced in number, are present even in the smallest specimens examined. The small specimens differ from the largest ones (Fig. 21a) in having the surface of the sixth abdominal somite and telson corrugated rather than spinulose, in having spinules restricted to the posterolateral margin of the fifth abdominal somite, the lateral area of the sixth somite, and the basal segment of the uropod, in having rounded projections rather than spines on the posterior margin of the sixth somite, and in having fewer and less conspicuous dorsal projections on the uropod.

L. hoevenii is very similar to the western Atlantic *L. scabricauda* (Lamarck), and was identified with it by several earlier workers. I tentatively synonymized the two species (1969a, p. 25), before I was able to compare directly material of the two. The present species also resembles *L. desaussurei* Stimpson from the eastern Pacific. These three species are the only ones in the genus in which the posterior part of the body is ornamented with spinules.

L. hoevenii differs from *L. scabricauda* in ornamentation and shape of the telson. The median boss of the telson is raised much higher than in *L. scabricauda*,

and its margin is always tuberculate. The tubercles on the sixth abdominal somite and telson are larger, coarser, and fewer in number than those found on *L. scabricauda*. In *L. hoevenii* most of the submedian area of the telson, adjacent to the submedian boss, is bare and smooth (a few denticles may be present anteriorly and posteriorly), and lateral to the smooth area there is a submedian line of tubercles. No such line occurs in *L. scabricauda*, and in that species the submedian area is completely covered with spinules and tubercles. In addition, the anterior projection of the antennal protopod is almost spiniform and the eye is smaller in *L. hoevenii* (compare corneal indices for *L. hoevenii* with those given for *L. scabricauda* in MANNING, 1969a, p. 29).

L. hoevenii differs from *L. desaussurei* in having fewer, larger tubercles on the sixth abdominal somite and telson. The lateral margin of the telson is tuberculate in *L. hoevenii*, lined with erect spinules in *L. desaussurei*. The submedian marginal denticles of the telson are more distinct in *L. desaussurei*, and it has more erect spinules on the uropod. The West African species lacks a distal dark bar on the merus of the claw. MANNING (1974a, p. 15) noted that *L. desaussurei* and *L. hoevenii* seem to be more closely related to each other than either is to *L. scabricauda*.

The characteristic spine on the inner margin of the uropod is generally well-developed in smaller specimens, obsolete in the largest specimens. In general, the spine is better developed in *L. hoevenii* and *L. desaussurei* than in *L. scabricauda*.

Although VILELA (1949) identified his material from Portuguese Guinea with *L. maculata*, he clearly shows in fig. 17 the posterior spinules on the last abdominal somite, a characteristic feature of *L. hoevenii*.

Type locality: Boutry (Butre), Ghana. The holotype is in the Rijksmuseum van Natuurlijke Historie, Leiden.

Distribution (Fig. 54): This species is widely distributed off West Africa, where it has been recorded from the following localities: Cape Verde Is. (OSORIO, 1898; MONOD, 1925); Joal, Sénégal (MONOD, 1951); mouth of the Casamance, Sénégal, 4.5 m (MONOD, 1951); several localities between Gorée and the Casamance, Sénégal (see material, above); Gambia; Ilha de Bubaque, Portuguese Guinea (VILELA, 1949); Ile de Santiago, Bissau, Portuguese Guinea (OSORIO, 1888); Boulbinet, Conakry, Guinea (MONOD, 1925); Sierra Leone, on shelly sand in 25 m (LONGHURST, 1958); Liberia (BÜTTIKOFER, 1890; JOHNSTON, 1906; HOLTHUIS, 1941); Grand Bassam, Ivory Coast; Accra, Ghana, inshore fine sandy community in 3–8 fathoms (5.5–15 m) (BUCHANAN, 1958); Chokora, Ghana; Boutry (Butre), Ghana (HERKLOTS, 1851; HOLTHUIS, 1941); Lomé, Togo (BALSS, 1916); Baie de Cotonou, Dahomey; Nigeria, 16 m; S. Antonio Bay, Principe Island (MANNING, 1974a); Sao Tomé (MONOD, 1925, 1951, p. 143; OSORIO 1887, 1889, 1898); Praia das Conchas, Sao Tomé (OSORIO, 1889); off the Congo; Angola (OSORIO, 1887, 1898); Plage de Bellas, S of Luanda, Angola (DARTEVELLE, 1951). It occurs in shallow water to a depth of 30 m.

Lysiosquilla monodi n. sp.

(Figs 22, 23, 26d-f, 54)

? *Lysiosquilla maculata*. — OSORIO, 1888, p. 189. — BOUVIER & LESNE, 1901, p. 14 [not *Lysiosquilla maculata* (Fabricius, 1793)].

Lysiosquilla maculata. — MONOD, 1925, pp. 91 [key], 92 [listed]. — CADENAT, 1950, p. 192. — DARTEVELLE, 1951, p. 1034 [discussion] [not *Lysiosquilla maculata* (Fabricius, 1793)].

Lysiosquilla maculata var. *sulcirostris*. — MONOD, 1925, p. 88, pl. 21 figs B-C, E-F; 1933, p. 540 [p. 84 on separate; listed]. — CADENAT, 1950, pp. 192, 193 [discussion] [not *Lysiosquilla sulcirostris* Kemp, 1913].

Lysiosquilla maculata var. *typica*. — CADENAT, 1950, p. 192 [not *Lysiosquilla maculata* (Fabricius, 1793)].

Lysiosquilla Monodi Monod, 1963, p. 124 [*nomen nudum*].

Material:

IFAN: Off Cap Blanc, Mauritania, first cruise of "Boula", 4.1923, paratype, 1♂ 135 mm.

Gorée, Dakar, Sénégal, beach, J.C., 29.11.1962, holotype, 1♂ 91 mm (Mus. Paris); paratype, 1♀ 79 mm.

Description: Eye (Fig. 23b) large; cornea bilobed, set slightly obliquely on stalk; eyes extending about to end of second segment of antennular peduncle; ocular scales sharp, slender, separate, apices curved anteriorly; corneal indices 300–368 (Table 1).

Antennular peduncle short, more than half as long as carapace; dorsal processes of antennular somite visible lateral to rostral plate as sharp, anteriorly-directed spines.

Antennal scale (Fig. 26e) slender, about 3 (2.96–3.56) times as long as broad; antennal peduncle extending slightly beyond eye, distal segment longer than proximal; antennal protopod with triangular anterodorsal projection and 1 mesial and 2 ventral papillae.

Rostral plate (Figs 23a, 26d) cordiform, length greater than width in largest specimen, length and width subequal or width greater in smaller specimens; sharp median carina present on anterior half, carina flanked laterally on each side by shallow groove.

Dactylus of raptorial claw (Fig. 22a) with 9–10 teeth, outer margin of dactylus faintly sinuate or flattened; dorsal ridge of carpus terminating in a single spine, apex not deflexed, propodal indices 071–088 (Table 2).

Mandibular palp and 5 epipods present.

Ventral keel of eighth thoracic somite (Fig. 26f) subrectangular, inclined posteriorly, apex acute, sharp.

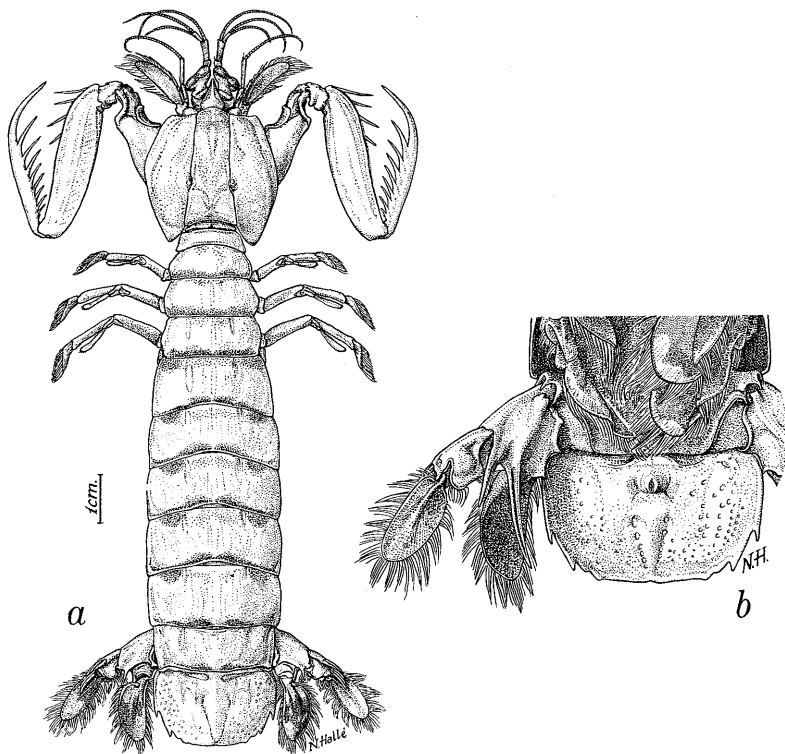


Fig. 22. *Lysiosquilla monodi*, n. sp., male paratype, TL 135 mm, Mauritania: a, dorsal view; b, posterior portion of body, ventral view.

Abdomen (Fig. 22a) smooth, unarmed; sixth abdominal somite smooth medially, with smooth lateral ridge flanked mesially by shallow groove; sixth somite with triangular, ventral projection in front of articulation of each uropod.

Telson (Fig. 22b) much broader than long, smooth dorsally except for raised triangular median boss and 2 very faint submedian bosses; posterior margin with 4 pairs of fixed projections, inner obtuse, rounded, outer 2 more acute, sharper, and larger; movable submedian teeth absent.

Basal segment of uropod (Fig. 22b) with dorsal spine; proximal segment of exopod with 7–8 movable spines on outer margin, distalmost short, not extending to midlength of distal segment; distal segment of exopod longer than proximal; endopod triangular, about twice (1.76–2.03) as long as broad; basal prolongation comprising 2 spines, trefoil in cross section, inner longer; basal segment with small, fixed spine on inner ventral surface at articulation of endopod.

Color: Body with dark bands on light background; carapace with 3 dark bands, body segments with anterior band of diffuse chromatophores and posterior band of darker pigment; most of sixth thoracic somite dark; antennal scale outlined in

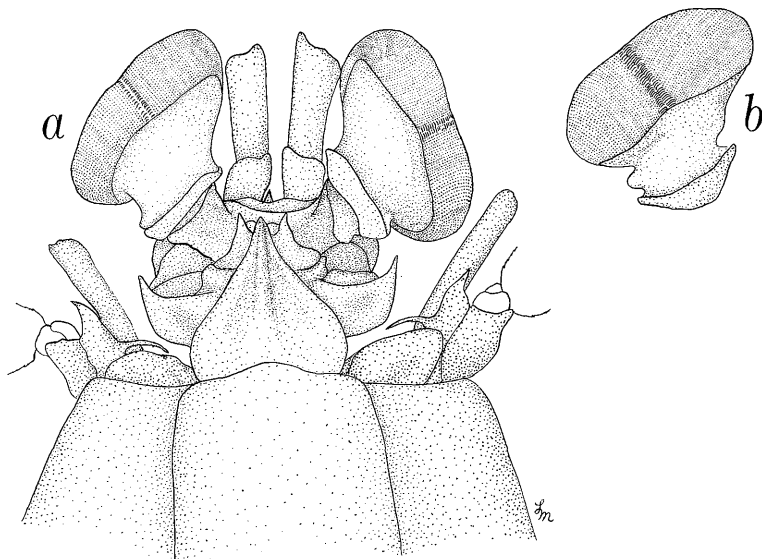


Fig. 23. *Lysiosquilla monodi*, n. sp., female paratype, TL 79 mm, Sénégal: a, anterior portion of body; b, eye.

black, surface patch of dark chromatophores also present; merus and propodus of claw with dark bar; anterior surface of pereopods dark, third with more pigment than anterior two; telson with dark median and submedian patches; uropodal exopod with distal half of proximal segment and inner distal portions of distal segment dark, apex and most of outer margin of distal segment light; most of endopod black.

Size: Males (2), TL 91–135 mm; only female examined, TL 79 mm. CADENAT (1950) recorded a specimen 87 mm long; according to his manuscript notes, it was a male which has been lost. Other measurements of the male holotype, TL 91 mm: carapace length 15.2; cornea width 4.9; rostral plate length 3.8, width 3.8; antennular peduncle length 9.3; antennal scale length 8.2, width 2.3; propodus of claw length 19.0; fifth abdominal somite width 17.8; telson length 11.2, width 16.2.

Remarks: *L. monodi* can easily be distinguished from the other large lysiosquillids known to occur off the West African coast. The more triangular rostral plate and the smooth sixth abdominal somite and telson will distinguish it from *L. hoevenii* which has a more cordiform rostral plate, numerous erect spinules on the posterior portion of the body, and is a much larger species. The carinate rostral plate, presence of 9–10 teeth on the claw, and telson lacking movable submedian teeth are among the many features that will serve to distinguish *L. monodi* from *Lysiosquilloides aulacorhynchus*.

Material of this species reported by MONOD (1925) and CADENAT (1950) as *L. maculata* (Fabricius) or *L. maculata* var. *sulcirostris* Kemp formed the bases for

reports of the occurrence of these two Indo-West Pacific species off West Africa. *L. monodi* can be distinguished from those species by several features. Although the general facies of *L. monodi* is very similar to that of *L. maculata*, the former differs in having an anterior projection on the dorsal surface of the antennal protopod, in having a slender antennal scale, and in having a spine on the basal segment of the uropod at the articulation of the endopod. The new species closely resembles *L. sulcirostris* which, however, has but eight teeth on the dactylus of the claw and lacks the spine on the basal segment of the uropod at the articulation of the endopod.

Although MONOD (1925, pl. 21 fig. E) showed but three spines on the inner margin of the propodus of the claw and CADENAT (1950, p. 193) used this to distinguish *sulcirostris* from *maculata* s.s., all three specimens examined have four distinct spines on the propodus of the claw.

The rostral plate of the larger male is comparatively longer than those of the two smaller specimens; in all three specimens the rostral plate appears to be elongate and is definitely more triangular in shape than the plate of *L. hoevenii*.

I suspect that the specimen of *L. maculata* from Sao Tomé island in the Gulf of Guinea reported by BOUVIER & LESNE (1901) should be identified with this species. Their account is too brief to provide details and I could not locate the specimen in the Paris collections to verify its identification. Their specimen, however, was reported to have but seven teeth on the claw. Since OSORIO (1888) reported both *L. maculata* and *L. hoevenii* from Ile de Santiago, Bissau, it is possible that his *L. maculata* should be referred to *L. monodi*.

Etymology: It is a pleasure to dedicate this species to Prof. Dr. TH. MONOD, formerly Director of the Institut Français d'Afrique Noire, Dakar, and now with the Muséum National d'Histoire Naturelle, Paris. He was instrumental in making available for study the entire collection reported here and his broad research interests have done much to advance our knowledge of West African crustaceans.

Type locality: Gorée, Dakar, Sénégal. The holotype is in the Muséum National d'Histoire Naturelle, Paris, the paratypes in the Institut Fondamental d'Afrique Noire, Dakar.

Distribution (Fig. 54): Off Cap Blanc, Mauritania and Dakar, Sénégal. No depth records are available.

Lysiosquilloides n. gen.

Definition: Size large, TL in excess of 250 mm as adults. Body smooth, depressed, loosely articulated. Eyes large, T-shaped, cornea bilobed, mesial lobe conical, lateral lobe rounded. Rostral plate triangular, with median apical groove rather than carina. Dorsal processes of antennular somite unarmed, broadly

rounded. Antennal protopod with 1 mesial and 2 ventral papillae. Carapace narrowed anteriorly, without carinae or spines, cervical groove present laterally but not medially; thoracic somites without dorsal carinae, lateral margins rounded; eighth thoracic somite with low median ventral keel. Mandibular palp and 5 epipods present. Propodi of third and fourth maxillipeds broader than long, beaded or ribbed ventrally. Claw slender, large, dactylus with 8 teeth; propodus slender, opposable margin completely pectinate, with 4 movable spines proximally; dorsal ridge of carpus undivided, terminating in rounded lobe; merus unarmed, longer than ischium; ischium unarmed. Endopods of pereopods two-segmented, strap-shaped. Abdomen depressed, smooth, loosely articulated, unarmed dorsally, sixth somite lacking posterolateral spines; articulated anterolateral plates present; sixth somite with obtuse projection ventrolaterally in front of articulation of each uropod. Telson broad, with low, triangular median boss; submedian teeth with minute movable apices, fixed intermediate and lateral teeth also present; row of minute submedian denticles, 2 intermediate, and 1 lateral denticle present. Uropod flattened, proximal segment with minute dorsal spine; distal segment of uropodal exopod longer than proximal; proximal segment of exopod with small, spatulate spines on outer margin and with normal setae on rounded distal lobe of inner, distal margin; endopod lacking prominent, proximal fold on inner margin; spines of basal prolongation of uropod slender, triangular in cross section, inner longer than outer.

Type species: *Lysiosquilloides aulacorhynchus* (Cadenat, 1957).

Remarks: *Lysiosquilloides* includes only the type species, a species until now assigned to *Lysiosquilla*. Of the lysiosquillids now known, the new genus most closely resembles *Lysiosquilla*: the large size, large claw, conspicuously-banded body, mandibular palp, five epipods, antennal papillae, slender endopods on the pereopods, broad flat telson, uropodal endopod without a strong proximal fold, all are characters shared by members of the two genera. *Lysiosquilloides* differs in that the mesial lobe of the eye is conical (Fig. 25a), the dorsal processes of the antennular somite are unarmed (Fig. 25a), and movable apices are present on the submedian teeth of the telson (Fig. 25b). The latter is the most fundamental difference between members of the two genera.

Although the rostral plate of *Lysiosquilloides aulacorhynchus* is longitudinally channelled rather than carinate and thus differs from all described species of *Lysiosquilla*, the plate is similar to that of a new species of *Lysiosquilla* from the Indo-West Pacific region which I have examined.

Etymology: The name is composed of the generic name *Lysiosquilla* and the Latin suffix "-oides". The gender is feminine.

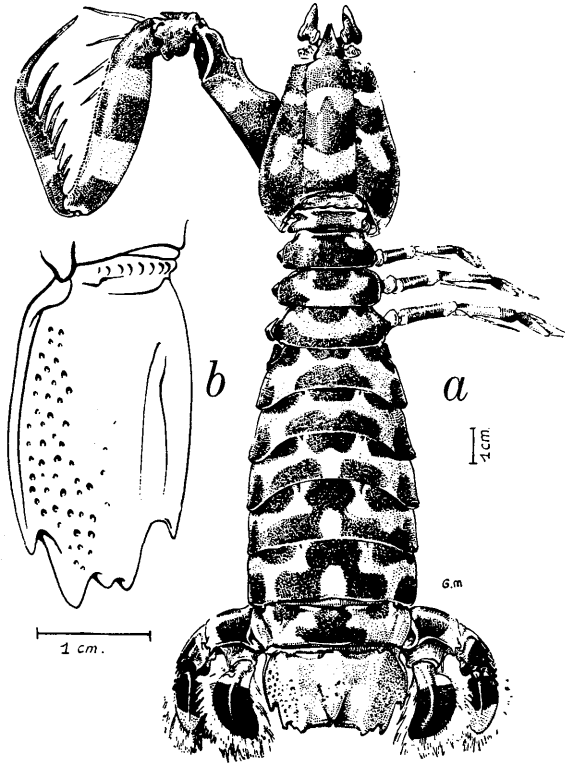


Fig. 24. *Lysiosquilloides aulacorhynchus* (Cadenat), lectotype, Sao Tomé: *a*, dorsal view; *b*, lateral view of telson. (From CADENAT, 1957, figs 1-2; sex not given).

Lysiosquilloides aulacorhynchus (Cadenat, 1957), n. comb.
(Figs 24, 25, 26g-i, 54)

Les squilles ou stomatopodes FOREST, 1955, fig. on p. 53.

The stomatopods or squillas FOREST, 1957, fig. on p. 53.

Lysiosquilla aulacorhynchus Cadenat, 1957, p. 127, figs 1-8. — MANNING, 1963, p. 317 [listed]. — HOLTHUIS, 1967b, p. 15 [complete synonymy].

Lysiosquilla maculata sulcirostris. — LONGHURST, 1958, p. 86 [not *Lysiosquilla sulcirostris* Kemp, 1913].

Lysiosquilla maculata. — LONGHURST, 1958, p. 37 [discussion] [not *Lysiosquilla maculata* (Fabricius, 1793)].

Material:

IFAN: Yèn, Sénégal, lobster nets, 3.1956, paralectotype, 1♂ 249 mm.

BMNH: Rokupa fish fence, Sierra Leone, A.L., 1♂ 266 mm, Reg. No. 1957.5.26.494.

RMNH: Sierra Leone River, A.L., 28.9.1954, 1♂ 161 mm, Reg. No. 341.

Description: Eye (Fig. 24a) large; cornea bilobed, set very obliquely on stalk; mesial lobe of cornea conical, not subglobular; eyes not extending beyond end of second segment of antennular peduncle; ocular scales very low, triangular; corneal indices 343–458 in specimens examined (Table 1).

Antennular peduncle short, about half as long as carapace; dorsal processes of antennular somite unarmed, with flattened, convex lateral lobe, anterior margin irregular.

Antennal scale (Fig. 26h) large, length about 3 (2.90–3.14) times greatest width; antennal peduncle extending beyond eye, distal segment longer than proximal; antennal protopod with triangular projection on anterior margin armed with small anteromesial spinule and with 1 mesial and 2 ventral papillae.

Rostral plate (Fig. 26g) triangular, longer than broad, lacking median carina; anterior third longitudinally channelled, margin upturned.

Claw (Fig. 24a) large, dactylus armed with 8 teeth, outer margin sinuate; dorsal ridge of carpus terminating in blunt, angular projection; propodal indices 070–077 (Table 2).

Mandibular palp and 5 epipods present.

Ventral keel of eighth thoracic somite (Fig. 26i) low, rounded ventrally.

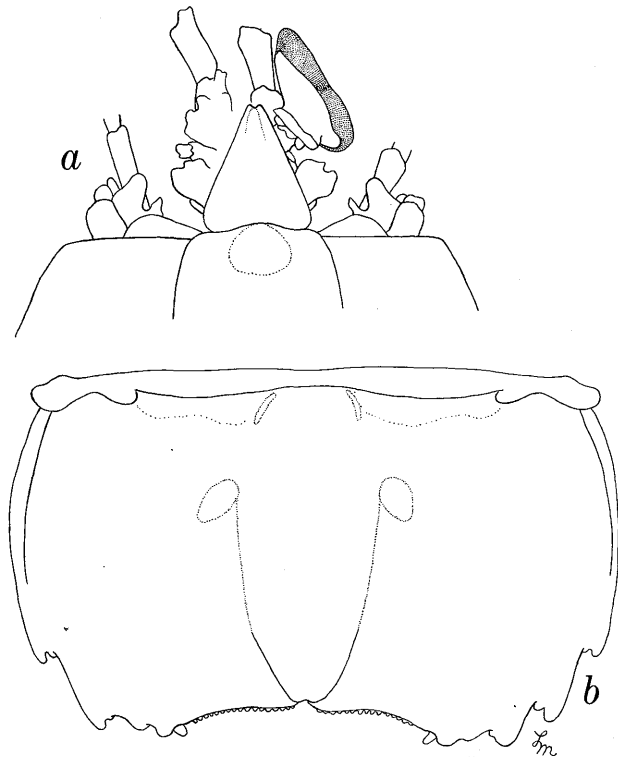


Fig. 25. *Lysiosquilloides aulacorhynchus* (Cadenat), male paralectotype, TL 249 mm, Sénégal: a, anterior portion of body; b, telson (low submedian elevations of telson not shown).

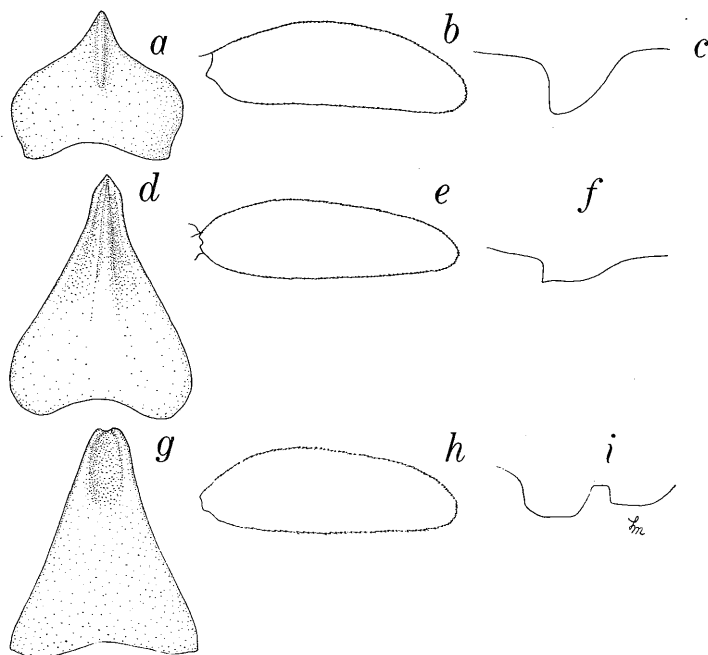


Fig. 26. Rostral plate, antennal scale, and ventral keel of eighth thoracic somite, lateral view: *a-c*, *Lysiosquilla hoevenii* (Herklots), male, TL 109.5 mm, Sénégal; *d-f*, *Lysiosquilla monodi*, n. sp., female paratype, TL 79 mm, Sénégal; *g-i*, *Lysiosquilloides aulacorhynchus* (Cadenat), male paralectotype, TL 249 mm, Sénégal.

Anterior 5 abdominal somites (Fig. 24*a*) smooth, unarmed; sixth somite with 2 low lateral bosses separated by shallow groove; obtuse projections present ventrolaterally on sixth somite in front of articulation of each uropod.

Telson (Figs 24*b*, 25*b*) broader than long, posterior median margin concave; raised elongate median boss, apex bilobed, and 2 much lower submedian bosses present; posterior margin with tuberculate submedian denticles and 4 pairs of obtuse marginal projections, submedians movable; inner side of outer 2 projections each with blunt, rounded denticle; lateral margin with rounded carina.

Basal segment of uropod (Fig. 24*b*) with very small distal, dorsal spine; proximal segment of exopod with 7 short, blunt movable spines on outer margin, distalmost not extending to midlength of distal segment; distal segment of exopod longer than proximal; endopod broad, less than 2 times as long as broad; ventral surface of basal segment of uropod with at most a mesial tubercle at articulation of endopod.

Color: Body conspicuously banded; antennal scale with medial dark patch, scale not outlined by continuous line of dark pigment. Carapace with 3 broad bands, diffuse laterally. Claw marked with alternating dark and light bars; body segments

with anterior and posterior dark bands broken into spots. Pereopods with dark spot at base of proximal segment and at articulation of distal segment. Telson with median and submedian black patches, submedians extending to anterior margin. Proximal segment of uropod with dark spot; most of uropodal exopod dark, proximal fourth and apex lighter; distal three-fourths of endopod dark.

CADENAT (1957, p. 130) described the color of a fresh specimen as follows: "brun violet tres foncé (presque noir) dans la région posterieure, un peu plus clair dans la région céphalique et sur les pattes ravisseuses; - et jaune crème".

Size: Males (3), TL 161–266 mm. The sex was not given for the lectotype, a specimen 226 mm long. Other measurements of a male, TL 161 mm: carapace length 32.9; cornea width 9.6; rostral plate length 8.5, width 7.9; antennular peduncle length 15.1; antennal scale length 20.4, width 6.5; propodus of claw length 47.0; fifth abdominal somite width 41.0; telson length 21.2, width 35.4.

Remarks: *Lysiosquilloides aulacorhynchus* can easily be distinguished from the two West African species of *Lysiosquilla* by the unarmed antennular processes, the longitudinally-channelled rather than carinate rostral plate, the color pattern (compare color notes for the three species), and the presence of movable submedian teeth on the telson.

The specimen from the IFAN collection examined by me has three fixed lateral teeth on one side of the telson, two on the other.

In general, the marginal teeth and denticles of this species are more distinct in adults (see Fig. 25*b*) than they are in adults of *Lysiosquilla* where they tend to become more or less fused.

LONGHURST (1958) found this species in a shallow, soft deposit community (*Venus-Amphioplus* transitional community) at 25 m on muddy shell.

Type locality: Sao Tomé Island, Gulf of Guinea. The lectotype, selected by HOLTHUIS (1967*b*, p. 15), is in the Muséum National d'Histoire Naturelle, Paris. A paralectotype is in the Institut Fondamental d'Afrique Noire, Dakar, Sénégal.

Distribution (Fig. 54): Known only from localities off West Africa. Records in the literature include Yèn, Sénégal (CADENAT, 1957); Sierra Leone, 25 m (LONGHURST, 1958); and Sao Tomé Island (FOREST, 1955; CADENAT, 1957).

Nannosquilloides n. gen.

Definition: Size moderate, maximum length about 50 mm. Body smooth, depressed, loosely articulated. Eye elongate, cornea broadened, set obliquely on stalk. Rostral plate subquadrate, with median apical spine.

Antennular somite with 2 dorsal spines. Antennal protopod with mesial and ventral papillae. Carapace strongly narrowed anteriorly, carinae and spines absent,

position of cervical groove indicated on lateral plates only. Exposed thoracic somites lacking longitudinal carinae, eighth somite with low, rounded, median ventral keel. Mandibular palp absent; 5 epipods present. Propodi of third and fourth thoracic appendages broader than long, beaded or ribbed ventrally. Claw slender, dactylus with 9–10 teeth; propodus slender, opposable margin completely pectinate, with 4 movable spines proximally; dorsal ridge of carpus undivided, terminating in spine; merus unarmed, longer than ischium; ischium unarmed. Endopods of pereopods two-segmented, distal segment ovate or subcircular on anterior two pereopods, slenderer on third. Abdomen depressed, smooth, loosely articulated, unarmed dorsally, sixth somite lacking posterolateral spines; articulated anterolateral plates present on abdomen; sixth abdominal somite with strong, curved, ventrally-directed process anterior to each uropod. Telson broader than long, posterior margin produced into irregularly lobed dorsal eave overhanging true marginal armature, all of marginal armature visible in dorsal view; marginal armature, on either side of midline consisting of a row of slender submedian denticles, a movable submedian tooth, 4 intermediate denticles, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth. Uropod flattened, proximal segment with dorsal spine; distal segment of uropodal exopod longer than proximal segment; proximal segment of exopod with slender, movable spines on outer margin and stiff setae on rounded lobe of inner, distal margin; endopod with distinct proximal fold on inner margin; spines of basal prolongation of uropod slender, triangular in cross section, inner longer than outer.

Type species: *Nannosquilloides occulta* (Giesbrecht, 1910).

Remarks: *Nannosquilloides* includes only the type species, assigned to *Nannosquilla* by me in 1963 primarily because of the similarity between the false eave of the telson in *N. occulta* and the species then placed in *Nannosquilla*. At that time I had not had an opportunity of examining any material of *N. occulta*. Study of the West African specimens as well as other material from the Mediterranean suggest that this species must be placed in a separate genus.

Nannosquilloides resembles both *Acanthosquilla* and *Nannosquilla* in many features. It agrees with both in eye shape, in the elongate, loosely articulated body, and in having a strong fold on the uropodal endopod. It further agrees with *Nannosquilla* in lacking a palp, but differs in having papillae on the antennal protopod, five rather than four epipods, and sharp rather than spatulate spines on the uropodal exopod. The false eave of the telson in *N. occulta* superficially resembles that found in two eastern Pacific species of *Nannosquilla*, *N. californiensis* (Manning) and *N. anomala* Manning. It differs from that found in *Nannosquilla* in that it projects less posteriorly, thus leaving the marginal armature almost completely visible in dorsal view; the marginal armature in species of *Nannosquilla* is usually completely covered by the false eave.

Nannosquilloides differs from *Acanthosquilla* in having two rather than one

ventral papillae on the antennal protopod, in lacking posterolateral spines on the sixth abdominal somite, and in having a different type of dorsal armature on the telson. In *Acanthosquilla* there are five or more slender dorsal spines arranged in a semicircle, and there is no trace of a posterior eave on the margin of the telson.

Etymology: The name is composed of the generic name *Nannosquilla* with the Latin suffix “-oides”. The gender is feminine.

Nannosquilloides occulta (Giesbrecht, 1910), n. comb.

(Figs 27, 54)

Lysiosquilla occulta Giesbrecht, 1910, pp. 3, 45, pp. 52, 58–75 [larvae], pp. 125, 127, 131 [juveniles], pl. 6 figs 1–3, 14, 17–20, 22–29, 33–35, 38–39, pl. 7 [larvae], pl. 8 figs 1–39 [larvae] [Gulf of Naples]. — MANNING, 1963, p. 319 [listed].

Nannosquilla occulta. — HOLTHUIS, 1967b, p. 25 [other references].

Material:

“Atlantide” St. 49, off Sierra Leone, 07°29'N, 13°38'W, 74–79 m, 30.12.1945, 1♂ 20 mm.

“Galathea” St. 89, off Congo River, 06°26'S, 11°56'E, 100 m, 9.12.1950, 1♂ 15.5 mm.

St. 115, Luanda-Lobito, Angola, 12°14'S, 13°25'E, 200 m, clayey sand, 20.12.1950, 1♀ 15 mm.

IFAN: Cap de Naze, Sénégal, 30–35 m, from stomach of *Trygon marmorata*, “Denise”, 1♀ CL 3.4 mm (broken).

Description: Eye (Fig. 27a) small, elongate; cornea broadened but not bilobed, set very obliquely on stalk; cornea with strong mesial tubercle; ocular scales erect, separate, apices rounded; eyes extending to end of second segment of antennular peduncle.

Antennular peduncle short, less than half as long as carapace; antennular processes visible lateral to rostral plate as sharp, anteriorly-directed spines.

Antennal peduncle with distal segment shorter than proximal, not extending to anterior border of eye; antennal scale less than half as long as carapace; antennal protopod with 2 mesial and 2 ventral papillae.

Rostral plate (Fig. 27a) subquadrate, basal portion wider than long; lateral margins convex, anterolateral angles obtusely rounded; slender median spine present.

Dactylus of raptorial claw with 8–9 teeth, proximal smallest, penultimate not reduced in size; distal lobe on outer margin of dactylus slightly larger and more obtuse than proximal.

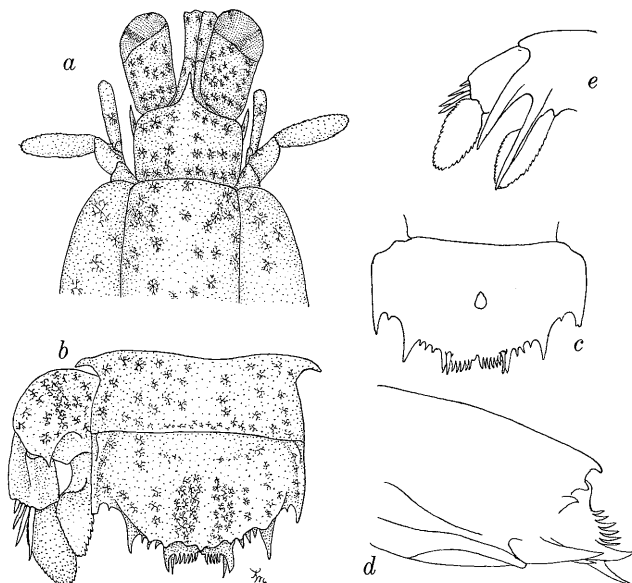


Fig. 27. *Nannosquilloides occulta* (Giesbrecht), female, TL 15 mm, "Galathea" St. 115, Angola: a, anterior portion of body; b, sixth abdominal somite, telson, and uropod; c, telson, ventral view; d, telson, lateral view; e, uropod, ventral view. (Setae omitted).

Mandibular palp absent; 5 epipods present, fifth much reduced in size.

Basal segment of each pereopod with 2 posterior spines.

Abdomen unarmed dorsally, lacking posterolateral spines on sixth somite; sixth somite (Fig. 27b) with sharp, ventrally-directed process on each side in front of articulation of uropod.

Telson (Fig. 27b-d) broader than long; dorsal surface with obtuse median and 3-5 rounded lateral projections on eave above marginal armature; marginal armature, on either side of midline, consisting of 4-6 slender submedian denticles, innermost highest, outermost largest, 1 movable submedian tooth, 4 intermediate denticles, innermost largest, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth; ventral surface of telson unarmed.

Uropod (Fig. 27b, e) with 4 slender spines on outer margin of proximal segment of exopod, distalmost not extending beyond midlength of distal segment; distal lobe of inner margin of proximal segment of exopod with 2-3 stiff setae; distal segment of exopod slightly longer than proximal; spines of basal prolongation of uropod very slender, inner the longer.

Color: Faded on most specimens, but the female from "Galathea" St. 115 has large, dark chromatophores scattered over the entire body. The telson also has traces of darker patches on the posterior midline as well as laterally.

Size: Males (2), TL 15.5–20 mm; only intact female, TL 15 mm. Other measurements of male, TL 20 mm: carapace length 3.8; cornea width 0.7; rostral plate length 1.5, width 1.5; antennular peduncle length 1.7; antennal scale length 1.0; fifth abdominal somite width 3.6; telson length 1.8, width 3.1.

Remarks: Although this species has not previously been recorded from outside the Mediterranean, its occurrence off West Africa is not too surprising. In both areas it occurs in moderate depths and this, in combination with its supposed burrowing habits, makes it difficult to collect.

This species can be distinguished from all other lysiosquillids in the eastern Atlantic by the shape of the telson with its lobed eave above the marginal armature. I can find no differences between these specimens and representatives of this species from Naples in the collections of the Smithsonian Institution.

The West African specimens, which appear to be mature (the male TL 20 mm has a well-developed copulatory appendage), are considerably smaller than representatives from the Mediterranean. STEUER (1933), for example, reported a female with a total length of 36 mm from the Adriatic, and there is a male 26 mm long and a female 32.5 mm long from Naples in the collections of the Smithsonian Institution. HOLTHUIS (1951) noted that caridean shrimps which occurred in the Mediterranean and off West Africa tended to be smaller in the latter area.

Type locality: Mergellina, Gulf of Naples, Italy, 30 m. The type may not be extant.

Distribution (Fig. 54): Mediterranean Sea, from off Naples and in the Adriatic, 10–150 m (HOLTHUIS, 1967b) and now for the first time also from West Africa, off Sénégal, Sierra Leone, the Congo, and Angola, 30–200 m.

Platysquilla Manning, 1967

Platysquilla Manning, 1967b, p. 238; 1969a, p. 90 [definition]. — CAMP, 1971, p. 120.

Type species: *Platysquilla eusebia* (Risso, 1816), by original designation.

Remarks: One species of *Platysquilla* occurs in the eastern Atlantic; it has not yet been recorded from the West African coast.

Platysquilla eusebia (Risso, 1816)
(Figs 28, 54)

Squilla crocea Rafinesque, 1814, p. 25 [Sicily] [name suppressed by ICZN; see HOLTHUIS, 1954].

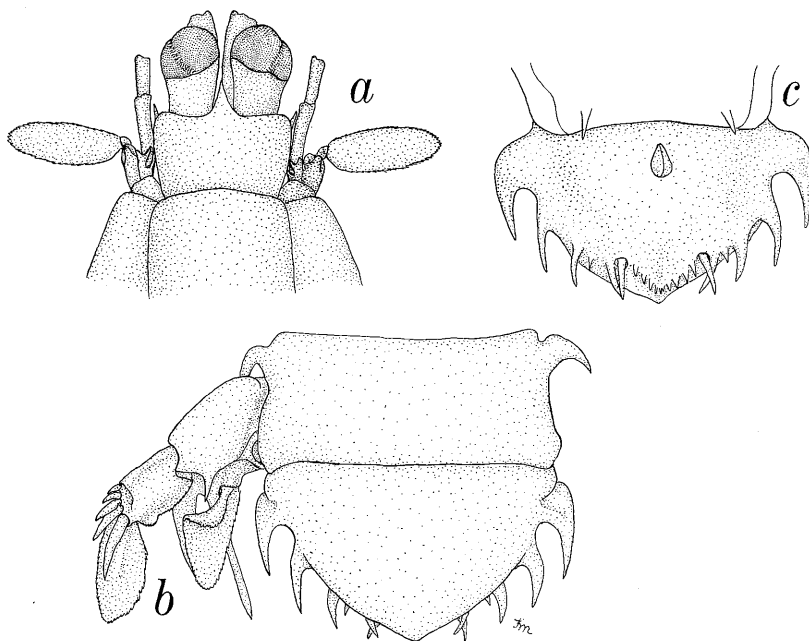


Fig. 28. *Platysquilla eusebia* (Risso), female, TL 44.5 mm, Italy (USNM 23207): a, anterior portion of body; b, sixth abdominal somite, telson, and uropod; c, telson, ventral view. (Setae omitted).

Squilla Eusebia Risso, 1816, p. 115 [Nice].

Cancer mantissilus Nardo, 1847, p. 7 [Venice].

Lysiosquilla eusebia. — GIESBRECHT, 1910, pp. 5, 40, 45, 222, pp. 125, 127, 131 [juveniles], pp. 52, 76–80 [larvae], pl. 1 figs 4, 10 [color], pl. 5 figs 1–42, pl. 6 figs 4–13, 15–16, 21, 30–32, 36–37, 40–42 [juveniles], pl. 8 figs 40–90 [larvae] [Gulf of Naples].

Platysquilla eusebia. — HOLTHUIS, 1967b, p. 26 [complete synonymy].

Diagnosis: Cornea (Fig. 28a) expanded but not bilobed, set obliquely on stalk. Rostral plate (Fig. 28a) rounded anterolaterally, with apical spine. Antennal protopod with 2 mesial and 2 ventral papillae. Dactylus of claw with 12–15 teeth. Mandibular palp absent, 5 epipods present. Sixth abdominal somite (Fig. 28b, c) unarmed dorsally, with 2 strong spines on posterior margin ventrally. Telson (Fig. 28b, c) with obtuse median prominence dorsally, 5–6 submedian denticles, and 4 sharp, fixed marginal spines.

Color: GIESBRECHT (1910) gave a colored figure of this species.

Distribution (Fig. 54): Mediterranean Sea and Atlantic coast of Portugal and France (HOLTHUIS, 1967b), west coast of Ireland (O'CEIDIGH, 1970).

PSEUDOSQUILLIDAE n. fam.

Definition: Ischiomeral articulation of raptorial claw terminal. Merus of claw with complete inferior groove. Dactylus of claw not inflated basally, armed with no more than 3 teeth. Propodi of posterior 3 maxillipeds usually slender, not beaded or ribbed ventrally. Body rigid, strongly convex dorsally. Telson appearing elongate, with distinct median carina, no more than 2 intermediate marginal denticles present, apices of submedian teeth short or long, movable.

Type genus: *Pseudosquilla* Dana, 1852.

Remarks: Pseudosquillidae is recognized here for four genera previously assigned to Gonodactylidae. The genera are *Hemisquilla* Hansen, 1895 (2 species), *Parasquilla* Manning, 1961 (6 species), *Pseudosquilla* Dana, 1852 (10 species), and *Pseudosquillopsis* Serène, 1962 (4 species). In earlier papers (1968, 1969a), I pointed out that these genera were more closely related to each other than to the other groups of genera then placed in the Gonodactylidae.

The pseudosquillids include moderately large, compactly built stomatopods, with a rigid, strongly convex body; in this feature they resemble the gonodactylids rather than the eurysquillids. The dactylus of the claw is armed with three teeth in all but *Hemisquilla*, a probable offshoot in which the dactylus is unarmed. Like the eurysquillids and gonodactylids, the telson is slender and armed with no more than two intermediate marginal denticles. The telson appears to be slenderer than that of the eurysquillids and usually is provided with a sharp median carina; it is bluntest in *Hemisquilla*.

Representatives of the genus *Hemisquilla* occur in the Americas and off Australia. Representatives of the other genera occur in all oceans.

A key to the genera of the Pseudosquillidae and a key to the adults and postlarvae of eastern Atlantic pseudosquillids are presented below. The second key should be particularly helpful, for the identification of postlarvae in this family continues to be somewhat difficult.

Key to Genera of Pseudosquillidae

1. Dactylus of claw unarmed. Sixth abdominal somite unarmed posteriorly [*Hemisquilla* Hansen, 1895]
Dactylus of claw with 3 teeth. Sixth abdominal somite with armed carinae or with posterior spines 2
2. Basal prolongation of uropod with 2 spines, inner margin unarmed. Carapace without carinae *Pseudosquilla* Dana
Basal prolongation of uropod with 3 spines, proximal smallest. Carapace with portion of marginal carina on posterior portion of each lateral plate 3

3. Anterior 5 abdominal somites each with prominent longitudinal carinae.
 Rostral plate lacking apical spine (*) *Parasquilla* Manning
 Anterior 5 abdominal somites not carinate. Rostral plate with long apical
 spine (*) *Pseudosquillopsis* Serène

**Key to Species of Adult and Postlarval Pseudosquillidae
 from the Mediterranean and the Eastern Atlantic**

1. Basal prolongation of uropod terminating in 2 spines, subequal in length or
 outer longer 2
 Basal prolongation of uropod terminating in 2 or 3 spines, if 2, inner longer . 5
2. Dactylus of claw unarmed. Sixth abdominal somite with 2 pairs of spines.
 Telson with submedian denticles (*Pseudosquilla* postlarvae) 3
 Dactylus of claw with 3 teeth. Sixth abdominal somite with 3 pairs of spines.
 Telson lacking submedian denticles (*Pseudosquilla* adults) 4
3. TL 17–24 mm. Outer margin of proximal segment of uropodal exopod with
 8–10 spines, proximal segment less than 2 times length distal segment *P. ciliata*
 TL 24–33 mm. Outer margin of proximal segment of uropodal exopod with
 10–11 spines, proximal segment more than 3 times length distal segment ...
 *P. oculata*
4. Rostral plate without apical spine. Cornea subcylindrical. Telson with
 median and 3 pairs of dorsal carinae *P. ciliata*
 Rostral plate with apical spine. Cornea broadened. Telson with median and 4
 pairs of dorsal carinae *P. oculata*
5. Median and 5 pairs of dorsal carinae present on telson, submedian denticles
 usually absent (*Pseudosquillopsis* adults) (*) *P. cerisii*
 Less than 5 pairs of dorsal carinae on telson in addition to median carina,
 submedian denticles always present 6
6. Thoracic somites and anterior 5 abdominal somites with longitudinal carinae.
 Intermediate carinae present on sixth abdominal somite (*Parasquilla* adults)
 (*) *P. ferussaci*
 Thoracic and anterior 5 abdominal somites lacking longitudinal carinae.
 Sixth abdominal somite lacking intermediate carinae 7
7. Rostral plate broadly rounded anteriorly, lacking anterior projection. Telson
 appearing broader than long (*Parasquilla* postlarvae; from Giesbrecht, 1910)
 (*) *P. ferussaci*
 Rostral plate pentagonal, with anterior projection. Telson appearing longer
 than broad (*Pseudosquillopsis* postlarvae) (*) *P. cerisii*

***Parasquilla* Manning, 1961**

Parasquilla Manning, 1961, p. 7; 1963, p. 312; 1969a, p. 278 [definition].

Type species: *Parasquilla meridionalis* Manning, 1961, by original designation.

Remarks: One species of *Parasquilla*, *P. ferussaci* (Roux, 1830), occurs in the eastern Atlantic.

SERÈNE (1962) introduced the subgenus *Faughnia* for the Indo-West Pacific *P. haani* (Holthuis, 1959), which lacks submedian carinae on the abdomen. The single eastern Atlantic species belongs to the nominate subgenus.

***Parasquilla (Parasquilla) ferussaci* (Roux, 1830)**

(Figs 29, 50)

Squilla triodona Rafinesque, 1814, p. 24 [Sicily]. — HOLTHUIS, 1954, p. 39 [see for discussion of names by RAFINESQUE] [name suppressed by ICZN].

Squilla ferussaci Roux, 1830, unnumbered page, pl. 28 [*Ferussaci* on plate; figure in color; Sicily].

Squilla bruno Prestandrea, 1833, p. 7 [Messina].

Pseudosquilla ferussaci. — GIESBRECHT, 1910, pp. 15, 34–39, pp. 125–142 [juvenile], pp. 57, 120, 162+ [larvae], pl. 1 fig. 8 [color], pl. 4 figs 37–48, 49–56 [postlarva], pl. 11 figs 65–85 [larvae] [Gulf of Naples]. — DARTEVELLE, 1951, p. 1034 [discussion]. — FIGUEIREDO, 1962, p. 5, pls 1–5 [Portugal].

Parasquilla ferussaci. — MANNING, 1962b, p. 184, fig. 2 [other references]; 1974a, p. 7.

Material:

BMNH: Bissagos Bank, Portuguese Guinea, 183 m, trawl, A.L., 1♀ 112 mm, Reg. No. 1957.5.26.508.

CRO, Abidjan: Vridi, Ivory Coast, 05°08.5'N, 04°04'W, 100 m, very fine mud, fish trawl, L.L. & A.I., 7.5.1967, 1♂ CL 26.1 mm.

Description: Eye (Fig. 29a) not extending past midlength of first segment of antennular peduncle; cornea broad, bilobed, set very obliquely on stalk, outer margin of eye longer than inner; ocular scales low, inconspicuous, fused.

Antennular peduncle more than half as long as carapace.

Antennal scale slender, curved, more than half as long as carapace, first segment of antennal peduncle extending beyond eye; antennal protopod with 1 ventral papilla.

Rostral plate (Fig. 29a) broader than long, rounded anterolaterally; rounded

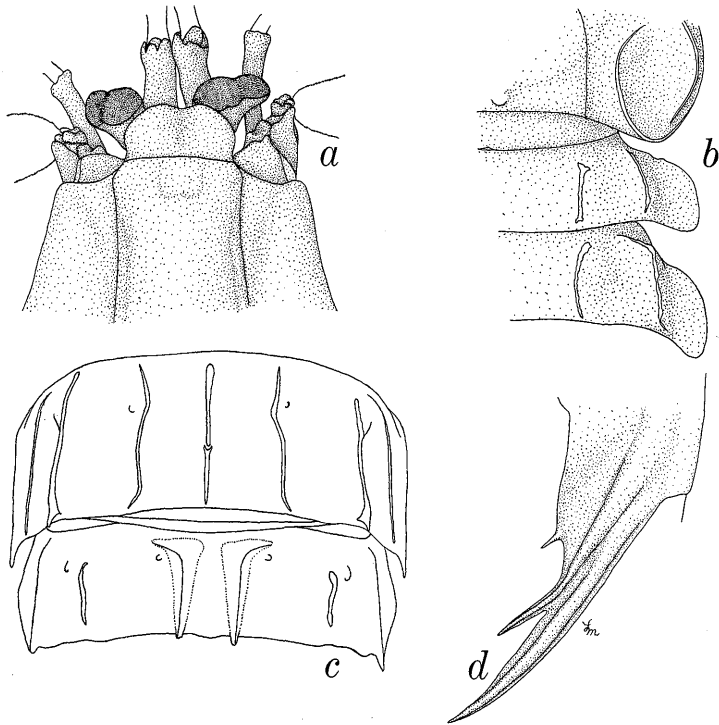


Fig. 29. *Parasquilla (Parasquilla) ferussaci* (Roux), female, TL 112 mm, Portuguese Guinea: *a*, anterior portion of body; *b*, lateral processes of sixth and seventh thoracic somites; *c*, fifth and sixth abdominal somites, dorsal view; *d*, basal prolongation of uropod, ventral view. (Setae omitted).

apex deflexed ventrally, appearing notched in dorsal view; lateral portions of plate arched dorsally; plate completely covering base of eyes.

Carapace strongly narrowed anteriorly, lacking carinae except for reflected marginals and short, irregular posterior portion of each lateral carina.

Raptorial claw stout; dactylus with 3 teeth; opposable margin of propodus pectinate, 3 movable spines present proximally; carpus with 2 projections on dorsal ridge; inferodistal angle of merus unarmed.

Mandibular palp and 5 epipods present.

Dorsal surface of body pitted, roughened, surface and carinae irregular.

Posterior 3 thoracic somites with submedian and intermediate carinae, median carina present on posterior portion of eighth somite only; fifth somite lacking dorsal ornamentation and well-developed lateral processes; sixth and seventh somites (Fig. 29*b*) with rounded lateral processes; ventral keel of eighth somite low, rounded, more prominent in male than in female.

Anterior 5 abdominal somites with median carina and 4 other pairs of dorsal carinae (Fig. 29*c*); sixth somite with 3 pairs of carinae, median absent, submedians very irregular in shape; abdominal carinae spined as follows: submedian 6, intermediate 5 (6), lateral (5) 6, marginal 4–5; sixth somite with at most a ventrolateral tubercle in front of articulation of each uropod.

Telson broader than long, with 3 pairs of marginal teeth, submedians with movable apices; dorsal surface with sharp median carina, and, on each side, an oblique, sharp carina extending toward base of intermediate tooth; dorsal carinae of marginal teeth short, low; denticles 10–12, 2, 1; ventral surface lacking postanal keel.

Outer margin of proximal segment of uropodal exopod with 8 movable spines, distalmost short, not extending to midlength of distal segment; outer spine of basal prolongation (Fig. 29*d*) with 2 smaller spines on inner margin.

Color: No marked color pattern was visible in either of the two specimens examined. ROUX (1830) gave some color notes as well as a colored figure, and GIESBRECHT (1910) added some notes on color and also published a colored figure.

Size: Only male examined broken, CL 26.1. Only female examined, TL 112 mm. MANNING (1974a) recorded a female, TL 118 mm, from off Liberia, and FIGUEIREDO (1962) recorded 3 males, 105–115 mm long, and 2 females, 110–120 mm long, from off Portugal. Other measurements of female, TL 112 mm: carapace length 26.7; cornea width 4.2; antennular peduncle length 19.1; antennal scale length 20.7; fifth abdominal somite width 25.2; telson length 19.0, width 20.5.

Remarks: The specimens reported here constitute only the second and third specimens of this rare species to be recorded from West African waters. Few specimens have been recorded from the Mediterranean (MANNING, 1962b), and the species only recently has been recorded from the Atlantic off Portugal (FIGUEIREDO, 1962).

The specimen from Vridi lacks spines on the intermediate carinae of the sixth abdominal somite, and on the specimen from Bissagos Bank the spine is broken on one side, completely absent on the other. In the latter specimen the submedian carinae of the telson are well-developed, that on the right side interrupted, that on the left entire.

The postlarval specimens identified with this species by SCHMITT (1926) and MONOD (1951) have proved to be the postlarvae of *Pseudosquillaopsis cerisii* (Roux); they are discussed in more detail in the account of that species given below. I have seen no postlarvae of *P. ferussaci*. The characters used in the key given above were taken from the illustrations provided by GIESBRECHT (1910).

Type locality: Sicily. The type was not traced; it may not be extant.

Distribution (Fig. 50): Mediterranean (MANNING, 1962b); Sesimbra, Portugal, 252–550 m (FIGUEIREDO, 1962); three localities in the Gulf of Guinea: off Liberia, 190–220 m (MANNING, 1974a), Bissagos Bank, Portuguese Guinea, 180 m, and off Vridi, Ivory Coast, 100 m.

Pseudosquilla Dana, 1852

Pseudosquilla Dana, 1952, p. 615. — MANNING, 1963a, p. 311; 1969a, p. 262 [definition].

Type species: *Pseudosquilla ciliata* (Fabricius, 1787).

Remarks: Two species of *Pseudosquilla*, both widely distributed in the Indo-West Pacific region and the western Atlantic, occur in the eastern Atlantic.

Pseudosquilla ciliata (Fabricius, 1787)
(Figs 30, 31, 55)

Squilla ciliata Fabricius, 1787, p. 333 [Oceano Indico].

Squilla styliifera. — MELLIS, 1875, p. 204 [St. Helena].

Pseudosquilla ciliata. — LONGHURST, 1958, pp. 37 [discussion], 86. — MANNING, 1969a, p. 264, fig. 74 [western Atlantic]; 1970d, p. 264; 1974a, p. 13, fig. 3.

Material:

"Atlantide" St. 40, off San Pedro Bay, St. Vincent, Cape Verde Is., 40 m, 11.12.1945, 1♀ 19 mm.

IFAN: Gorée, Sénégal, from stomach of *Aries mercatoris*, F.P., 26.6.1957, 5♂ 39–43 mm, 5♀ 43–61 mm.

4 miles S of Gorée Island, Dakar, Sénégal, 33–35 m, M.-M., 13.11.1953, 1♂ 36 mm (Mus. Paris).

Cambarène, near Dakar, Sénégal, 50 m, from stomach of *Raja miraletus*, 15.5.1953, 1 postlarva 18.5 mm.

Rufisque, Sénégal, L.G., 2 postlarvae 17.5 and 18 mm.

Cap de Naze, Sénégal, 20 m, from stomach of *Trygon marmorata*, 5.2.1954, 1♀ 33 mm.

Guinea, 09°25'N, 13°55'W, 15 m, "Gerard Treca" St. 9A, E.P., 12.3.1953, 1♂ 17.5 mm.

1 mile W of Tamara, Iles de Los, Guinea, 15 m, "Gerard Treca" St. 15A, 16.3.1953, 1♀ 22 mm.

Diagnosis: Adult (Fig. 30): Cornea subcylindrical, not expanded laterally. Rostral plate broader than long, lacking apical spine. Carapace lacking pair of large, dark circles surrounded by light ring. Antennal protopod with slender, channelled process dorsally. Claw slender, dactylus with 3 teeth. Sixth abdominal somite with 3 pairs of posterior spines. Telson with median carina and 3 pairs of dorsal carinae, accessory medians, submedians, and marginals; submedian teeth of telson with long, movable apices, bases fused, submedian denticles absent.

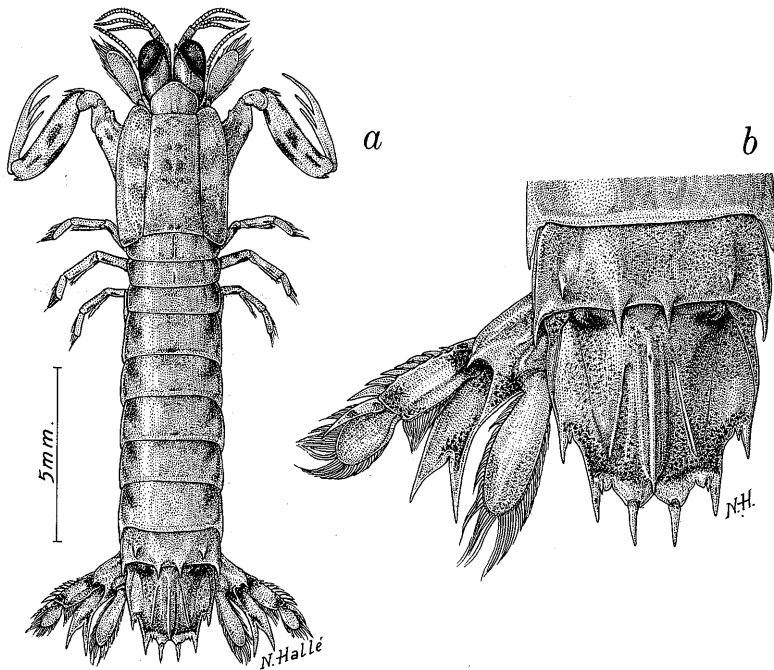


Fig. 30. *Pseudosquilla ciliata* (Fabricius), male, TL 17.5 mm, Guinea: a, dorsal view; b, posterior portion of body.

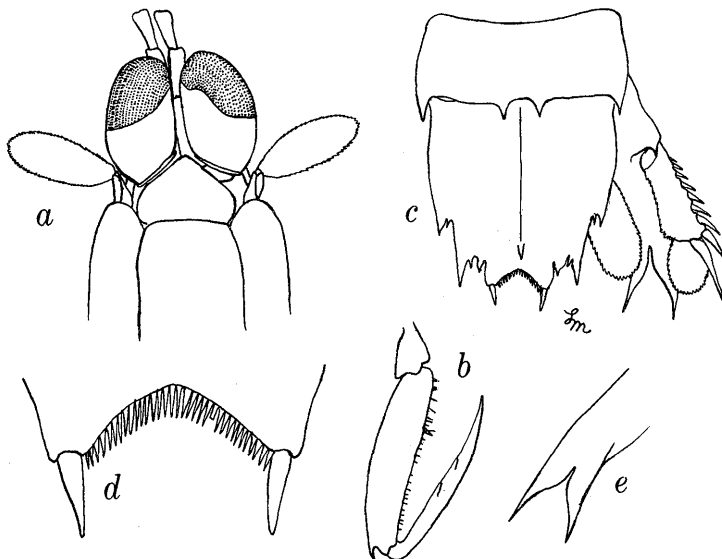


Fig. 31. *Pseudosquilla ciliata* (Fabricius), postlarva, TL 19 mm, Sao Tomé: a, anterior portion of body; b, raptorial claw; c, sixth abdominal somite, telson, and uropod; d, submedian margin of telson, enlarged; e, basal prolongation of uropod, ventral view. (Setae omitted). (From MANNING, 1974a).

Postlarva (monodactyla stage, Fig. 31): TL 17–24 mm. Cornea subcylindrical, appearing broader than in adult. Rostral plate broader than long, lacking apical spine. Claw slender, dactylus unarmed (2 teeth often visible through cuticle). Sixth abdominal somite lacking intermediate spines. Telson appearing longer than broad, with median carina only dorsally; submedian teeth with movable apices, bases separate, submedian denticles present. Proximal segment of uropodal exopod with 8–10 movable spines, segment less than twice length distal segment.

Color: Almost completely faded in the present material. On some specimens the lateral margin of the body and the surface of the claws is mottled with lighter spots. The sixth thoracic and first abdominal somites have a dark spot laterally, and there may be a pair of dark spots anteriorly on the telson.

J. CADENAT made the following notes on fresher specimens from Guinea: "La coloration de ces deux individus est un blanc grisâtre ou gris bleuâtre clair avec quelques taches plus foncées disposées de la manière suivante: 2 ou 3 taches allongées sur les propodus des pattes raviseuses, taches irrégulières sur la carapace; une tache de chaque côté de chaque somite thoracique libre ou abdominal; une tache de chaque côté du bord antérieur du telson entre les épines submédianes et intermédiaires du 6^{ème} somite abdominal. Bord postérieur du telson foncé de part et d'autre de la carène médiane. Uropodes présentant des zones sombres aux deux extrémités de l'exopodite, celle de la base s'étendant sur le processus du basipodite qui présente une autre tache foncée à la base de la dent interne."

Size: Males (7), TL 17.5–43 mm; females (7), TL 22–61 mm; postlarvae (3), TL 17.5–18.5 mm. Other specimens from West Africa measured as follows: males, TL 18–19 mm; females, TL 38–41 mm; postlarva, TL 19 mm. The West African specimens appear to be slightly smaller than those recorded from the western Atlantic by me (1969a), as follows: males, TL 17–80 mm; females, TL 16–89 mm; postlarvae, TL 18–24 mm. Other measurements of a female, TL 61 mm: carapace length 13.5; cornea width 2.3; rostral plate length 2.8, width 4.2; antennal scale length 7.4; fifth abdominal somite width 11.9; telson length 7.7, width 9.5.

Remarks: *Pseudosquilla ciliata* is a very widely distributed and distinctive species which can be separated from the only other Atlantic species, *P. oculata*, by the characters given in the key, above.

This species generally occurs in different habitats than does *P. oculata* which apparently prefers a rougher bottom. LONGHURST (1958) noted that it occurred in the *Venus* and *Venus-Amphioplus* transitional communities on shelly sand in 12–15 m off Sierra Leone. Specimens taken by the "Calypso" (MANNING, 1974a) occurred on sand, algae, calcareous algae, and coral at 8–73 m. Elsewhere the species generally occurs in shallower waters.

Larvae identified with this species have been recorded from the North

Equatorial Current by HANSEN (1895) as *Pseuderichthus communis*. GURNEY (1946) summarized records for the larvae.

Type locality: Oceano Indico. Type not extant.

Distribution (Fig. 55): This species occurs in all tropical oceans with the exception of the eastern Pacific. In the eastern Atlantic it has been recorded from: St. Helena (MELLIS, 1875; MANNING, 1969a); Cape Verde Is., 40 m; Sénégal, 20–50 m; Guinea, 15 m; Sierra Leone, 12–15 m (LONGHURST, 1958); and the offshore islands of the Gulf of Guinea: Annobon, 20–37 m (MANNING, 1970d, 1974a), Sao Tomé, beach to 30 m, and Principe, 73 m (MANNING, 1974a). It has not been recorded previously from the Cape Verde Is., Sénégal, or Guinea.

Pseudosquilla oculata (Brullé, 1837)
(Figs 32, 33, 55)

Squilla oculata Brullé, 1837, plate unique fig. 3 [color; atlas]; 1839, p. 18 [text].

Squilla monodactyla A. Milne-Edwards, 1878, p. 232 [postlarva].

Squilla bisulcata A. Milne-Edwards, 1878, p. 232 [*nomen nudum*].

Pseudosquilla oculata. — MIERS, 1880, p. 110, pl. 3 figs 3–4. — KOELBEL, 1892, p. 109. — MONOD, 1925, pp. 91 [key], 92 [listed]; 1933, p. 540 [p. 85 on separate; listed]; 1951, pp. 142, 143 [key]. — DARTEVELLE 1951, p. 1032 [discussion]. — MANNING, 1969a, p. 271, figs 75, 76 [western Atlantic]; 1970d, p. 264; 1974a, p. 13, fig. 14.

Material:

IFAN: Ponta do Sol, Ile de Santao Antao, Cape Verde Is., J.C., 5.1950, 3♂ 47–65 mm (1♂ Mus. Paris).

USNM: S of Annobon Island, 01°28.5'S, 05°37.5'E, 35–55 m, F.Pd., 16.6.1967, 1♀ 35 mm.

Mus. Copenhagen: Playa reef, Puerto Cruz, Canary Is., G.T., 25.4.1967, 1♀ 29 mm.

Guinea, Su., 1♀ 78 mm.

Mus. Stockholm: Madeira, Fd., 1882, 1 postlarva 30 mm.

Mus. Paris: Ponta Delgada, Azores, M.C., 1892, 1 postlarva 26.5 mm.

St. Vincent, Cape Verde Is., 4♂ ca. 29 mm, 1♀ 31.5 mm, 2 postlarvae 26–29 mm.

Carolines, St. Vincent, Cape Verde Is., 20 m, "Talisman" St. 104, 26.7.1883, 1♂ 29 mm, 2♀ 29–30 mm.

Cape Verde Is., 1♀ 36 mm.

Annobon, 60 m, Pf., 2 specimens.

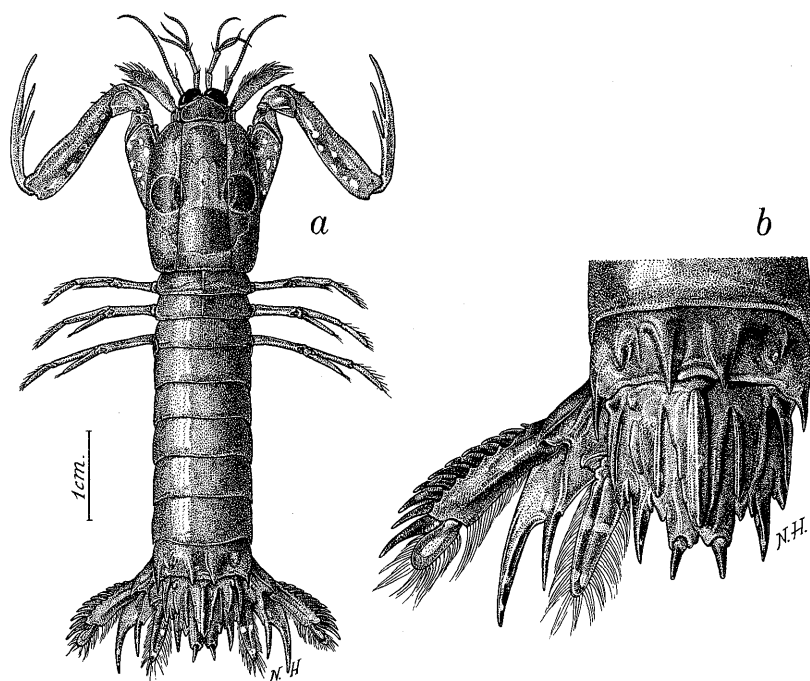


Fig. 32. *Pseudosquilla oculata* (Brullé), male, TL 65 mm, Cape Verde Is.: a, dorsal view; b, posterior portion of body.

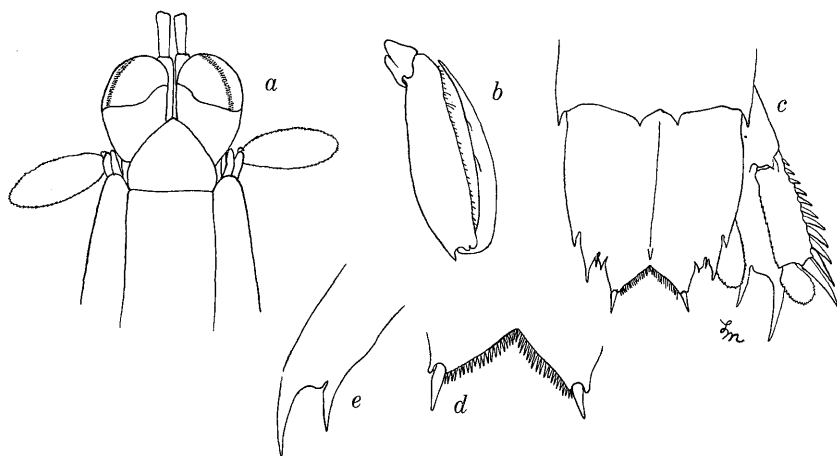


Fig. 33. *Pseudosquilla oculata* (Brullé), postlarva, TL 25 mm, Cape Verde Is.: a, anterior portion of body; b, raptorial claw; c, sixth abdominal somite, telson, and uropod; d, submedian margin of telson, enlarged; e, basal prolongation of uropod, ventral view. (Setae omitted). (From MANNING, 1974a).

BMNH: Arrecife, Lanzarote Island, Canary Is., A.T., 1♂ 62 mm, Reg. No. 1956.5.2.131.

Funchal, Madeira, O.N., 2♂ 28 mm, CL 15.8 mm, Reg. No. 1927.8.12.2.

Madeira, 1♀ 33 mm, Reg. No. 76.2.

Porto Grande Harbour, Cape Verde Is., "Valhalla", 1♂ 27 mm, 2♀ 26–35.5 mm, Reg. No. 1907.2.7.5–7.

Diagnosis: Adult (Fig. 32): Cornea broadened anteriorly. Rostral plate broader than long, with apical spine. Carapace ornamented with pair of large dark circles surrounded by lighter-colored ring. Antennal protopod with slender channelled process dorsally. Claw slender, dactylus armed with 3 teeth. Sixth abdominal somite with 3 pairs of posterior spines. Telson with median and 4 pairs of dorsal carinae, accessory medians, submedians, intermediates, and marginals; submedian teeth of telson with long movable apices, bases fused, submedian denticles absent.

Postlarva (monodactyla stage, Fig. 33): TL 24–34 mm. Cornea slightly broadened. Rostral plate longer than broad, cordiform, lacking apical spine. Claw slender, dactylus unarmed (2 teeth often visible through cuticle). Sixth abdominal somite lacking intermediate spines. Telson with median carina only; submedian teeth of telson separate, with movable apices, submedian denticles present. Proximal segment of uropodal exopod with 10–11 movable spines, over 3 times as long as distal segment.

Color: The color pattern of all of these specimens has largely faded, but in most the characteristic black circles surrounded by a lighter ring are visible on the carapace (Fig. 32a). Some specimens show large, light spots on the claw, a black patch on the ventral surface of the basal prolongation of the uropod, and dark pigment on the thoracic sterna.

J. CADENAT made the following notes from fresher specimens: "La coloration sur le vivant est vert olive plus ou moins foncé; la bordure postérieure de chaque somite étant soulignée de rose; les grands ocelles de la carapace sont presque noirs et finement bordés de crème, de nombreuses petites taches crème, arrondies, sont également réparties sur la carapace surtout en avant des ocelles, et sur les bords chez 2 individus; elles n'existent pas chez le 3°; par contre sur tous on remarque une série de taches crèmes arrondies disposées sur le propodus, le carpus et le merus des pattes raviseuses, le dactylus est d'un rose tirant sur le rouge, les épines du 6° somite abdominal sont rouges à leur extrémité, celle du telson et du basipodite des uropodes sont alternativement, de la pointe vers la base: cerclées d'abord de rouge, puis de brun verdâtre, puis de blanc, enfin de la couleur vert olive foncé de la carapace. Les épines mobiles de l'exopodite des uropodes sont également roses à leur extrémité, puis blanches, puis vert olive. Des taches claires plus ou moins arrondies sont visibles sur les divers articles des uropodes. Il existe une tache du côté ventral, à la base de chacune des pattes ambulatoires, de même une tache sombre arrondie existe à la face interne du carpus des pattes raviseuses."

BRULLÉ (1837–1839) gave a colored figure in the original description of this species.

Size: Males (12), TL 27–65 mm; females (10), TL 26–78 mm; postlarvae (4), TL 26–30 mm. Males, TL 24–106 mm, females, TL 25–125 mm, and postlarvae, TL 25–33 mm, have been recorded from the eastern Atlantic. Other measurements of a male, TL 65 mm: carapace length 16.8; cornea width 3.2; rostral plate length 3.3, width 5.4; antennal scale length 8.0; fifth abdominal somite width 11.7; telson length 8.1, width 9.2.

Remarks: Like *P. ciliata*, *P. oculata* is a widely distributed and distinctive species which can readily be recognized. The dark circles on the carapace, the broad eyes, rostral spine, and intermediate carinae on the telson all are characteristic for the species.

Little information is available on the habitat; in the western Atlantic (MANNING, 1969a) it prefers rougher bottom than does *P. ciliata*. Off Annobon, it has been taken in rocks, algae, calcareous algae, and coral, and off Sao Tomé on sand, rocks, and calcareous algae (MANNING, 1974a). It is a sublittoral species, occurring off West Africa in depths greater than 6 m.

It seems likely that the postlarva from an unknown locality identified with this species by MIERS (1880, p. 110, pl. 3 figs 1–2; as *Pseudosquilla monodactyla*) is not the postlarval stage of this species. MIERS reported that his specimen had three pairs of spines on the sixth abdominal somite, and the postlarvae of both *P. ciliata* and *P. oculata* have but two pairs of spines on that somite.

Larvae identified with this species were described as *Pseuderichthus distinguendus* by HANSEN (1895); JURICH (1904) gave additional Atlantic localities. GURNEY (1946) summarized references to the larvae.

Type locality: Canary Is. The type was not traced; it may be in the Muséum National d'Histoire Naturelle, Paris. The type locality of *Squilla monodactyla* is the Cape Verde Is. The type was not traced; it also may be in the Paris Museum.

Distribution (Fig. 55): Like *P. ciliata*, *P. oculata* occurs in all tropical oceans except the eastern Pacific. In the eastern Atlantic *P. oculata* has been recorded from: St. Helena (MANNING, 1969a); Ponta Delgada, Azores; Madeira (MIERS, 1880; MANNING, 1969a); Funchal, Madeira; Canary Is. (BRULLÉ, 1837–1839); Puerto de Cabras, Canary Is., 20–40 m (KOELBEL, 1892); Aircife, Lanzarote, Canary Is.; Cape Verde Is. (A. MILNE-EDWARDS, 1878), including Ponto do Sol, Santo Antao (MONOD, 1951), St. Vincent, and Porto Grande Harbour; Guinea; and the Gulf of Guinea (MONOD, 1951), Annobon, 9–69 m, and Sao Tomé, 6–10 m (MANNING, 1970d, 1974a).

Pseudosquillaopsis Serène, 1962

Pseudosquillaopsis Serène, 1962, p. 12. — MANNING, 1963, p. 311.

Pseudosquillaopsis (*Pseudosquillaopsis*) Serène, 1962, p. 16.

Definon: Body compact, semicylindrical, surface smooth. Cornea strongly bilobed. Rostral plate triangular, with strong apical spine. Antennal protopod with ventral papilla, lacking keeled dorsal process. Carapace narrowed anteriorly, rounded anterolaterally and posterolaterally, without longitudinal carinae or spines; cervical groove not distinct across dorsum of carapace. Exposed thoracic somites without longitudinal carinae, with curved ridge above lateral processes. Eighth thoracic somite with prominent, subtriangular, longitudinal ventral keel. 5 epipods present. Mandibular palp present. Raptorial claw stout, dactylus with 3 teeth; opposable margin of propodus pectinate throughout its length; carpus with well-defined dorsal ridge which may terminate in tooth; merus grooved inferiorly throughout its length for reception of propodus; ischiomeral articulation terminal. Endopods of pereopods two-segmented, slender. Abdomen subcylindrical, lacking longitudinal carinae on anterior 5 somites, articulated anterolateral plates present; sixth somite with 3 pairs of spined carinae, submedians, intermediates, and laterals. Telson with sharp median and 5 pairs of dorsal carinae; posterior margin of telson with 3 pairs of sharp teeth, submedians with bases appressed in adults and with movable apices; submedian denticles usually absent in adults, 2 intermediate and 1 lateral denticles present. Basal segment of uropod with distal, dorsal spine; basal prolongation of uropod produced into long spine with 2 smaller spines on inner margin.

Type species: *Pseudosquillaopsis cerisii* (Roux, 1828), by original designation.

Remarks: Only one species of *Pseudosquillaopsis*, *P. cerisii*, occurs in the eastern Atlantic region.

Pseudosquillaopsis cerisii (Roux, 1828)

(Figs 34, 35, 50)

Squilla cerisii Roux, 1828, unnumbered page, pl. 5 [color] [Corsica and Toulon].

Squilla broadbenti Cocco, 1833, p. 110, pl. 3 fig. 2 [Messina].

Pseudosquilla cerisii. — GIESBRECHT, 1910, pp. 34–39, pl. 1 fig. 3 [color], pl. 4 figs 1–36 [Gulf of Naples].

?*Pseudosquilla ferussaci*. — SCHMITT, 1926, p. 57, fig. 75 [not *Parasquilla ferussaci* (Roux, 1830)].

Pseudosquilla ferussaci. — MONOD, 1951, pp. 142, 144 [key] [not *Parasquilla ferussaci* (Roux, 1830)].

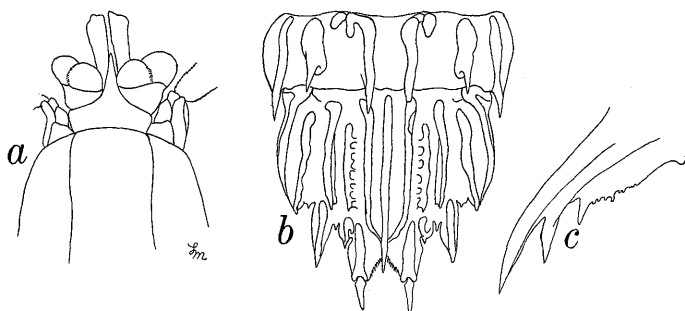


Fig. 34. *Pseudosquilla cerisii* (Roux), male, TL 84 mm, Italy (USNM 23183): a, anterior portion of body; b, sixth abdominal somite and telson; c, uropod, ventral view. (Setae omitted).

Parasquilla ferussaci. — MANNING, 1969c, p. 525 [discussion] [not *Parasquilla ferussaci* (Roux, 1830)].

Pseudosquilla cerisii. — MANNING, 1969c, pp. 534 [discussion], 536 [key to species].

Material:

IFAN: Gorée, Dakar, Sénégal, 30.3.1948, 1 postlarva 30 mm.

AMNH: Banana, Zaire, Amer. Mus. Congo Exp., 8.1915, 1 postlarva 33 mm, cat. No. 4786.

Diagnosis: Adult (male, TL 84 mm, Naples, USNM, Fig. 34): Cornea strongly bilobed, outer margin of eye longer than inner. Rostral plate about as long as broad, appearing elongate, basal portion short, rounded laterally, long, sharp apical spine present. Carapace lacking carinae except for marginals on posterior portion of lateral plates. Claw stout, dactylus with 3 teeth. Abdomen lacking longitudinal carinae except for 3 pairs of armed carinae on sixth somite. Telson with median and 5 pairs of dorsal carinae, accessory medians, submedians, intermediates, laterals, and marginals; submedian and intermediate marginal teeth of telson also with short dorsal carina; submedian teeth with long movable apices, submedian denticles absent in large specimens (some denticles present at TL 84 mm). Basal prolongation of uropod with outer spine the longest, 2 smaller spines and some denticles present on inner margin.

Postlarva (Fig. 35): Cornea broadened, appearing trilobed (postlarval facies). Rostral plate subpentagonal, with broad, blunt apical spine. Claw stout, dactylus with 3 teeth. Sixth abdominal somite with 2 pairs of posterior spines, submedians and laterals. Telson with length and width subequal or width greater, with median carina only dorsally; submedian teeth widely separate, with movable apices, submedian denticles present. Basal prolongation of uropod with outer spine the longest, 2 smaller spines on inner margin, proximal denticles absent.

Color: Completely faded in both specimens examined. ROUX (1828) gave some color notes and he and GIESBRECHT (1910) each published a colored figure, both of adults.

Size: Postlarvae only examined, TL 30–33 mm. The specimen from Gorée is a male, that from Banana a female. Other measurements of the female: carapace length ca. 6.0; cornea width 1.5; rostral plate length 1.7, width 1.8; antennular peduncle length 4.1; fifth abdominal somite width 4.5; telson length 3.7, width 4.1.

Remarks: These two postlarvae, the only representatives of this species to be collected off West Africa so far, were both originally identified as the postlarva of *Parasquilla ferussaci*. As a result of the study of the postlarvae of two West American species of *Pseudosquillaopsis* (see MANNING, 1969c), I identified the West African specimens with *P. cerisii*. I have seen no postlarvae of *Parasquilla ferussaci*, but if the account given by GIESBRECHT (1910) is correct, postlarvae of that species have a broad, rounded rostral plate, lacking an anterior spine or projection.

Although SERÈNE (1962) pointed out that species of *Pseudosquillaopsis* may have submedian denticles on the telson as adults, the specimens which I had examined lacked them and this is reflected in the generic diagnosis I presented in 1963. The

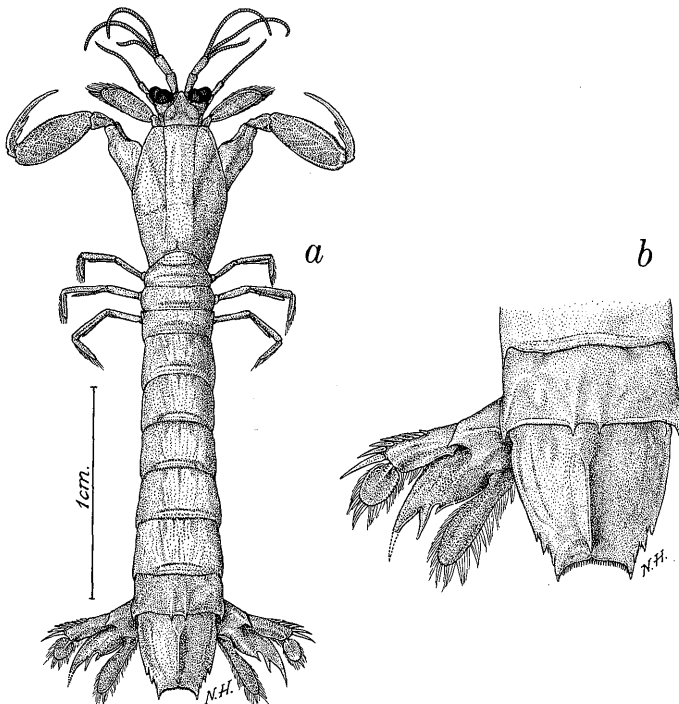


Fig. 35. *Pseudosquillaopsis cerisii* (Roux), postlarva, TL 30 mm, Sénégal: a, dorsal view; b, posterior portion of body.

specimen from Naples on which the diagnosis of adults given above is based has a few submedian denticles.

Type locality: Corsica and Toulon. The types were not traced.

Distribution (Fig. 50): Mediterranean and off West Africa, where it has been recorded from Gorée, Sénégal and Banana, Zaire. Its depth range off West Africa has not been recorded.

Family SQUILLIDAE Latreille, 1803

Squillares Latreille, 1803, p. 36.

Squillidae. — MANNING, 1969a, p. 99 [definition].

Type genus: *Squilla* Fabricius, 1787.

Remarks: Eight species of squillids representing three genera, *Alima*, *Meiosquilla*, and *Squilla*, occur in the tropical waters off West Africa. Three other species occur in the eastern Atlantic and the Mediterranean, but their ranges are not known to extend into tropical waters. They are: *Meiosquilla desmaresti*, Mediterranean and adjacent North Atlantic; *Oratosquilla massavensis*, an immigrant from the Red Sea into the eastern Mediterranean; and *Pterygosquilla armata capensis*, a cold water species which occurs off South Africa northward to SW Africa. The key given below can be used to distinguish all 11 eastern Atlantic and Mediterranean squillids. Abbreviated species accounts and sketches are included for the three species which do not occur off tropical West Africa.

Key to Genera and Species of Squillidae from the Mediterranean and the Eastern Atlantic

1. Lateral process of fifth thoracic somite bilobed 2
 Lateral process of fifth thoracic somite not bilobed, a rounded lobe or single
 curved spine 4
2. Posterior lobe of lateral process of fifth thoracic somite slender, acute.
 Lateral processes of sixth and seventh thoracic somites bilobed (dactylus of
 claw with 6 teeth) (*Oratosquilla*) (*) [*O. massavensis* (Kossmann, 1880)]
 Posterior lobe of lateral process of fifth thoracic somite broadly rounded.
 Lateral processes of sixth and seventh thoracic somites not markedly
 bilobed (*Alima*) 3
3. Dactylus of claw with 6 teeth. Lobes of lateral process of fifth thoracic

- somite on same plane. 2 rounded lobes between spines of basal prolongation of uropod *A. hyalina*
- Dactylus of claw with 5 teeth. Anterior lobe of lateral process of fifth thoracic somite lower than posterior. 1 rounded lobe between spines of basal prolongation of uropod *A. hieroglyphica*
4. Ocular scales produced into erect spines. Lateral processes of sixth and seventh thoracic somites rounded laterally, each produced into posteriorly-directed spine (dactylus of claw with 6-8 teeth) (*Pterygosquilla*) *P. armata capensis*
- Ocular scales not produced into erect spines. Lateral processes of sixth and seventh thoracic somites not produced into posteriorly-directed spines 5
5. Anterolateral angles of carapace spined. Dactylus of claw with 6 teeth. Apices of submedian teeth of telson fixed (*Squilla*) 6
- Anterolateral angles of carapace unarmed. Dactylus of claw with 5 teeth. Apices of submedian teeth of telson movable (*Meiosquilla*) 8
6. Basis of claw with ventrally-directed spine. 4 epipods present. On abdomen, submedian carinae of sixth somite only with spines *S. aculeata calmani*
- Basis of claw unarmed. 5 epipods present. Submedian carinae of at least fifth and sixth abdominal somites armed 7
7. Lateral process of fifth thoracic somite directed laterally. Intermediate carinae of first abdominal somite armed. Lateral and marginal carinae of abdomen simple (*) *S. mantis*
- Lateral process of fifth thoracic somite curved anteriorly. Intermediate carinae of first abdominal somite unarmed. Lateral and marginal carinae of abdomen bicarinate *S. cadenati*
8. Basal prolongation of uropod with erect spinules on inner margin 9
- Basal prolongation of uropod unarmed on inner margin 10
9. Antennular peduncle longer than carapace and rostral plate combined. Lateral process of fifth thoracic somite flattened dorsoventrally, sharp laterally. Lateral carinae of fourth abdominal somite spined. Telson with postanal keel. Propodus of claw with greatest depth at midlength (*) *M. pallida*
- Antennular peduncle subequal to or shorter than carapace. Lateral process of fifth thoracic somite obliquely flattened, rounded or acute laterally, not sharp. Lateral carinae of fourth abdominal somite unarmed. Telson lacking postanal keel. Propodus of claw with greatest depth distally *M. africana*
10. Antennular peduncle longer than carapace and rostral plate combined. Uropod with 8 movable spines on outer margin *M. calypso*
- Antennular peduncle subequal to or shorter than carapace in length. Uropod with 5-7 movable spines on outer margin (*) [*M. desmaresti* (Risso, 1816)]

Alima Leach, 1817

Alima Leach, in TUCKEY, 1817, fig. on unnumbered plate. — MANNING, 1968, p. 136; 1969a, p. 127 [definition].

Type species: *Alima hyalina* Leach, 1817, by monotypy.

Remarks: This genus includes two of the most widely distributed stomatopods, *Alima hieroglyphica* (Kemp) and *A. hyalina* Leach. Both species occur on both sides of the Atlantic as well as in the Indo-West Pacific.

***Alima hieroglyphica* (Kemp, 1911)**
(Figs 36, 51)

Squilla hieroglyphica Kemp, 1911, p. 96; 1913, p. 51, pl. 3 figs 38–41 [locality unknown].

Squilla empusa. — BALSS, 1916, p. 50 [part] [not *Squilla empusa* Say, 1818].

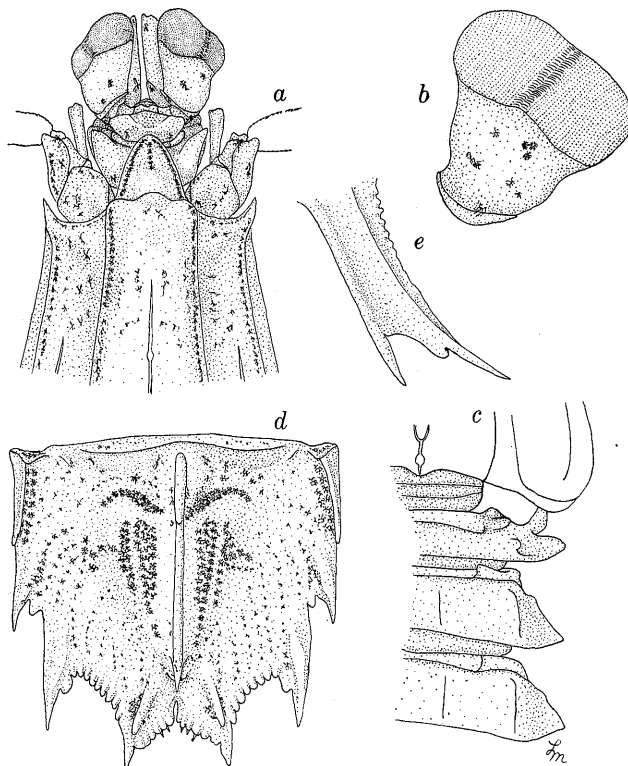


Fig. 36. *Alima hieroglyphica* (Kemp), female, TL 58 mm, Congo: a, anterior portion of body; b, eye; c, lateral processes of fifth, sixth, and seventh thoracic somites; d, telson; e, basal prolongation of uropod, ventral view. (Setae omitted).

Squilla hildebrandi Schmitt, 1940, p. 152, fig. 6 [Atlantic Panama].

Squilla labadiensis Ingle, 1960, p. 566, figs 1-10.

Alima hieroglyphica. — MANNING, 1969a, p. 135, fig. 40 [western Atlantic; other references].

Material:

IFAN: Gorée, Sénégal, beach, 11.11.1953, 1♂ 17 mm, 1 postlarva 15 mm.

USNM: Baie de Pointe-Noire, Congo, beach seine, 2.6.1964, 1♀ 58 mm;
14.6.1964, 1♀ 41 mm.

BMNH: Off Labadi, Ghana, 8 m, Agassiz trawl, T.G., 5.12.1955, holotype of *S. labadiensis*, 1♂ 40 mm, Reg. No. 1958.12.1.12.

Off Accra, Ghana, St. 30, grab, J.B., paratype of *S. labadiensis*, 1♀ 16 mm, Reg. No. 1958.12.1.15.

Off Accra, Ghana, 13 m, St. 88, Agassiz trawl, R.B., allotype and paratypes of *S. labadiensis*, 2♀ 50-53 mm, Reg. No. 1958.13.1.13-14.

Mus. Hamburg: Luango, Congo, 9 m, C.H., 4.6.1888, 1♀ 37 mm.

CRO, Abidjan: Grand Bassam, Ivory Coast, 05°11.4'N, 03°48'W, 20 m, slightly muddy fine quartz sand, temp. 18.3°C, sal. 35.57‰, small dredge, L.L. & A. I., 28.9.1966, 1♀ CL 3.3 mm.

Description: Eye (Fig. 36a-b) large, triangular, length and greatest width subequal; cornea bilobed, set transversely on stalk; ocular scales rounded, inclined laterally; anterior margin of ophthalmic somite obtusely angled. Corneal indices 426-485 in specimens with CL 8.1-13.1 mm, 300 in specimen with CL 3.3 mm.

Antennular peduncle not so long as carapace; apices of antennular processes bluntly rounded.

Antennal scale not half as long as carapace; antennal peduncle not extending beyond eye.

Rostral plate (Fig. 36a) subtriangular; median carina usually present on anterior third, absent or inconspicuous in small specimens.

Median carina of carapace (Fig. 36a), anterior to cervical groove, not bifurcate at either end; posterior portion of median carina, behind cervical groove, bifurcate anteriorly; intermediate carinae present, not extending to anterior margins; anterior margins of lateral plates concave; anterolateral spines of carapace strong, extending to base of rostral plate; posterolateral angles evenly rounded, lacking anterior angled prominence.

Raptorial claw large; dactylus with 5 teeth, outer margin of dactylus sinuate; dorsal ridge of carpus undivided, ending in blunt lobe.

Mandibular palp absent; 4 epipods present.

Exposed thoracic somites (Fig. 36c) with unarmed submedian and intermediate carinae on posterior 3 somites; lateral process of fifth somite bilobed, anterior lobe spinous, set below obliquely truncate posterior lobe; lateral processes of sixth and

seventh somites triangular, apices blunt, rounded anterolateral prominence better developed on sixth somite; ventral keel of eighth somite low, rounded.

Abdomen depressed; submedian carinae low, divergent on posterior somites; abdominal carinae spined as follows: submedian (4-5) 6, intermediate 4-6, lateral 3-6, marginal 1-5; sixth somite with at most an inconspicuous lobe ventrolaterally anterior to articulation of each uropod.

Telson (Fig. 36d) longer than broad, with 6 sharp marginal teeth, prelateral lobes present; denticles 4-6, 7-11, 1, outer submedian and outer intermediate largest; ventral surface with postanal keel.

Penultimate segment of uropodal exopod with 8-9 movable spines, distalmost extending to midlength of ultimate segment; basal prolongation of uropod (Fig. 36e) with prominent lobe, outer margin concave, on outer margin of inner spine.

Color: Body covered with scattered dark chromatophores; eyestalk with 3-5 dark spots on outer surface; carinae and grooves of carapace and carina and margin of rostral plate outlined in dark pigment; longitudinal line of dark chromatophores on dorsal surface of merus of claw; posterior 3 thoracic and anterior 5 abdominal somites with dark posterior line, submedian and intermediate carinae outlined with dark chromatophores; telson with triangular dorsal patch of dark chromatophores, clear along median carina, with anterior and lateral dark bars separated from triangle by clear area; midline of proximal segment and inner half of distal segment of uropodal exopod dark; distal two-thirds of uropodal endopod outlined in dark pigment.

Size: Males (2), TL 17-40 mm; females (7), TL 16-58 mm; postlarva (1), TL 15 mm. MANNING (1969a) recorded males 16-75 mm long and females 16-53 mm long. Other measurements of female, TL 58 mm: carapace length 13.0; cornea width 2.9; rostral plate length 1.7, width 2.0; telson length 10.7, width 10.1.

Remarks: *Alima hieroglyphica* is a well-marked species which is easily distinguished from *A. hyalina*: there are five rather than six teeth on the claw (one specimen had four on one side, five on the other), and there is one rather than two rounded lobes between the spines of the basal prolongation of the uropod. There are other differences as well, including color pattern, but the two species can be separated by using these characters alone.

Even the smallest specimens examined, a postlarva 15 mm long and a juvenile 17 mm long, were clearly identifiable with this species. The rostral carina usually is present at this size and the color pattern is similar to that of adults. The juvenile lacked anterolateral spines on the carapace, and, although the carinae of the carapace were not well-developed, their location was marked with pigment. The apices of the submedian teeth of the telson were movable in the postlarva, fixed in the juvenile.

Little is known about the habitat preference of this species. One specimen

reported here was taken on fine, quartzzy, muddy sand, others with a beach seine or in slightly deeper water, 8–20 m.

Type locality: unknown; the holotype is in the Indian Museum, Calcutta. The type locality of *Squilla hildebrandi* is Fort Sherman, Canal Zone, Atlantic coast of Panama; the holotype is in the Division of Crustacea, USNM, Washington. The type locality of *Squilla labadiensis* is off Labadi, Ghana; the holotype, allotype, and paratypes are in the British Museum (Nat. Hist.), London.

Distribution (Fig. 51): Indo-West Pacific, from Japan, the Philippines, and the coasts of India (MANNING, 1969a); western Atlantic, from Panama, Cuba, and Brazil (MANNING, 1969a); and off West Africa, from Gorée, Sénégal, Ivory Coast, Ghana, and the Congo, from the beach to 20 m. BALSS (1916) reported the specimen from Luango, and INGLE (1960) and MANNING (1969a) examined the material from Ghana.

Alima hyalina Leach, 1817
(Figs 37, 51)

Alima hyalina Leach, in TUCKEY, 1817, fig. on unnumbered plate [in Appendix 4 to TUCKEY; larva]; in TUCKEY, 1818, p. 416. — MANNING, 1969a, p. 128, figs 37–39a [western Atlantic]. — MONOD, 1970, p. 66.

Squilla alba Bigelow, 1893a, p. 103 [Bimini, Bahama Is.]. — INGLE, 1958, p. 49, figs 1–6 [St. Helena and Mozambique].

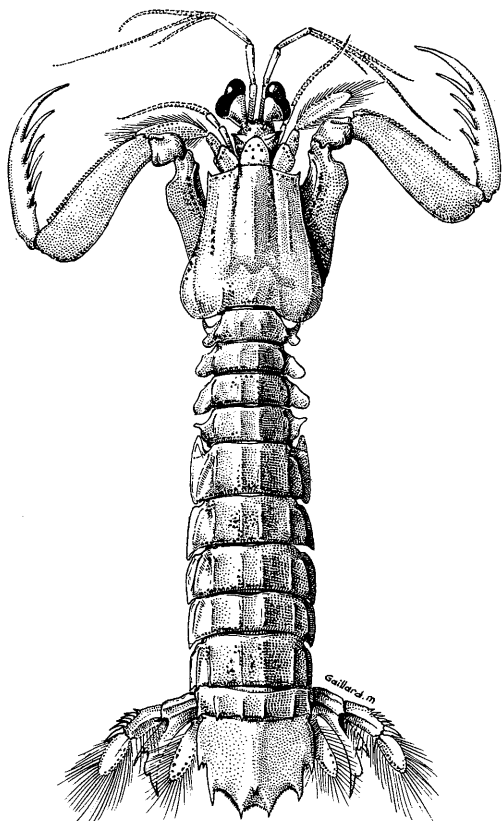
Material: None.

Diagnosis: Rostral plate (Fig. 37) lacking dorsal carina. Carapace with short anterolateral spines, median carina lacking anterior bifurcation. Dactylus of claw with 6 teeth. Mandibular palp absent. 4 epipods present. Both lobes of lateral process of fifth thoracic somite in same plane. Abdominal carinae spined as follows: submedian 6, intermediate 5–6, lateral (3–4)5–6, marginal (1–4)5. Telson denticles all sharp, 5–7, 11–14, 1. Basal prolongation of uropod with 2 rounded lobes between distal spines.

Remarks: Although I have seen no adult specimens of this species from West Africa, one specimen (Fig. 37), a male TL 32 mm from Pointe-Noire, Congo, was studied by J. CADENAT. The figure clearly shows the diagnostic features of the species, a rostral plate without a median carina, six teeth on the claw, a bilobed lateral process on the fifth thoracic somite, and two rounded lobes between the spines of the basal prolongation of the uropod.

Alima hyalina was described by LEACH from a pelagic larva which MANNING

Fig. 37. *Alima hyalina* Leach, male, TL 32 mm, Congo (not seen).



(1962c) subsequently showed to be the larva of the species then known as *Squilla alba* Bigelow.

The name *Alima hyalina* first appeared on a plate in the appendix to TUCKEY'S "Narrative of an expedition to explore the River Zaire . . ." Although the text is dated 1818, the plate bears the date 1 November 1817. MONOD (1970, p. 67) believes that the species should date from 1818: "Est-il certain qu'une espèce décrite dans un texte paru dans un volume bien daté (1818) figuré sur une planche appartenant à ce volume mais imprimée à l'avance (1817) doit porter cette dernière date plutôt que celle du volume?" In the absence of other evidence, I believe that the date of publication shown on the plate must be accepted.

Type locality: Off Porto Praya, Cape Verde Is. (restricted by MANNING, 1969a, p. 135). The syntypes of *A. hyalina*, larvae, are in the British Museum (Nat. Hist.). The type locality of *Squilla alba* is Bimini, Bahamas. The lectotype and a paralectotype are in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 51): Adults have been taken from all tropical oceans with the exception of the eastern Pacific. In the Indo-West Pacific, *A. hyalina* has been

recorded from Hawaii and Mozambique, and in the western Atlantic it is known from a few localities from Bermuda and the Bahamas to Curaçao (MANNING, 1969a). INGLE (1958) reported material from St. Helena. The illustrated specimen from Pointe-Noire, Congo, is the first adult to be recorded from the Eastern Atlantic.

***Meiosquilla* Manning, 1968**

Meiosquilla Manning, 1968, p. 125; 1969a, p. 100 [definition].

Type species: *Meiosquilla quadridens* (Bigelow, 1893), by original designation.

Remarks: Four species of *Meiosquilla* occur in the eastern Atlantic region. These four and *M. barnardi* Manning, 1975b, a fifth species from South Africa identified with *M. desmaresti* by BARNARD (1950) and MANNING (1969d), differ from American representatives of the genus in having 5 rather than 4 teeth on the claw. Two of the four eastern Atlantic species, *M. africana* and *M. calypso*, occur only in West African waters; the third, *M. pallida*, occurs also in the Mediterranean, and the fourth, *M. desmaresti*, occurs in the Mediterranean and the adjacent North Atlantic north to southern England.

***Meiosquilla africana* Manning, 1974**

(Figs 38, 56)

Squilla desmaresti. — ?LATREILLE, 1828, p. 472 [part] [not *Meiosquilla desmaresti* (Risso, 1816)].

Squilla pallida. — MONOD, 1925, p. 87 [part; not figured specimen]; 1933, p. 540 [p. 85 on separate; listed]. — DARTEVELLE, 1951, p. 1032 [discussion]. — BUCHANAN, 1958, p. 59. — LONGHURST, 1958, pp. 37, 45, 86 [not *Meiosquilla pallida* (Giesbrecht, 1910)].

Squilla Desmaresti. — GRAVIER, 1927, p. 32 [part] [not *Meiosquilla desmaresti* (Risso, 1816)].

?*Meiosquilla pallida*. — MANNING, 1970d, p. 264 [not *Meiosquilla pallida* (Giesbrecht, 1910)].

Meiosquilla africana Manning, 1974a, p. 16, fig. 5.

Material:

"Atlantide" St. 73, off Ghana, 04°50'N, 01°40'W, 33 m, sand, little mud, 23.1.1946, 1♀ (fragments).

St. 85, off Ghana, 05°37'N, 00°38'E, 28–40 m, greyish mud, 30.1.1946, 1♀ 13 mm.

- St. 136, off Angola, 08°30'S, 13°14'E, 45 m, 18.3.1946, 2♀ 24–27 mm.
 “Galathea” St. 122, off Lobito, Angola, 12°20'S, 13°40'E, 20 m, mud with sand and clay, 20.12.1950, 1♀ 27 mm.
 IFAN (all from stomachs of *Trygon marmorata*): Gorée, Sénégal, “Denise”, 1♂ 32.5 mm.
 Off Dakar, Sénégal, 1♂ 27 mm; 19.1.1954, 1♂ CL 2.3 mm, 1♀ 31 mm.
 Cap de Naze, Sénégal, 30–40 m, 2♂ 26–32 mm, 2♀ 30–35 mm.
 Cap de Naze, Sénégal, 20 m, 5.2.1954, 18♂ 20–32 mm, 17♀ 24–33 mm, fragments.
 Cap de Naze, Sénégal, 20 m, “Gerard Treca”, 9.2.1954, 1♂ 27 mm, 3♀ 26 mm (Mus. Paris).
 Cap de Naze, Sénégal, 20 m, “Denise”, 23.3.1954, 1♂ broken.
 Cap de Naze, Sénégal, ca. 30 m, 25.4.1954, 1♂ 18.5 mm, 1♀ 18 mm (Mus. Paris).
 Cap de Naze, Sénégal, “Denise”, 13.5.1954, 3♂ 29–34.5 mm, 7♀ 28–34 mm.
 Cap de Naze, Sénégal, “Denise”, 18.5.1954, 2♂ 31–35 mm.
 Between M'Bon and Cap de Naze, Sénégal, ca. 20 m, 27.4.1954, 2♂ 32–36 mm, 2♀ 28 mm, fragments.
 USNM (L.L. & A.I.): Sassandra, Ivory Coast, 04°41.7'N, 06°01.5'W, 100 m, green oolitic mud, temp. 15.72°C, sal. 35.61‰, dredge, 11.5.1966, 1♂ CL 4.8 mm.
 Grand Bassam, Ivory Coast, 05°10.3'N, 03°54'W, 35 m, slightly muddy fine sand, temp. 22.2°C, sal. 35.47‰, small dredge, 2.3.1966, 1♀ 19 mm.

TABLE 3. Summary of corneal indices for eastern Atlantic species of *Meiosquilla*

Carapace length, in mm		<i>M. africana</i>	<i>M. calypso</i>	<i>M. desmaresti</i>	<i>M. pallida</i>
3–4	range	–	–	–	–
	mean (no.)	364 (2)	–	–	–
5–6	range	343–436	–	–	–
	mean (no.)	397 (7)	–	–	387 (1)
7–8	range	406–471	–	–	–
	mean (no.)	434(14)	379 (1)	–	–
9–10	range	453–500	–	408–426	392–467
	mean (no.)	477 (2)	–	417 (3)	428 (3)
11–12	range	–	–	440–479	470–500
	mean (no.)	–	–	462 (3)	485 (2)
13–14	range	–	–	–	–
	mean (no.)	–	–	538 (1)	548 (1)
15–16	range	–	–	496–510	–
	mean (no.)	–	–	503 (2)	544 (1)

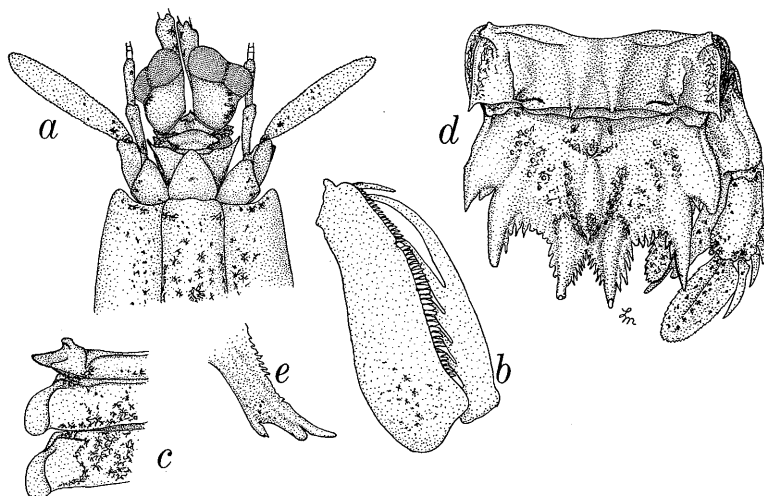


Fig. 38. *Meiosquilla africana* Manning, male paratype, TL 33 mm, off Niger delta: a, anterior portion of body; b, propodus and dactylus of claw; c, lateral processes of fifth, sixth, and seventh thoracic somites; d, sixth abdominal somite, telson, and uropod; e, basal prolongation of uropod, ventral view. (Setae omitted). (From MANNING, 1974a).

Sassandra, Ivory Coast, 04°47.2'N, 06°01.3'E, 70 m, oolitic mud, temp 17.7°C, sal. 35.74‰, small dredge, 11.3.1966, 1♂ 15 mm.

CRO, Abidjan (L.L. & A.I.): Tabou, Ivory Coast, 04°28.5'N, 07°10.8'W, 41 m, fine shelly green mud, temp. 18.63°C, sal. 35.67‰, dredge, 12.5.1966, 1♀ 17 mm.

Between Tabou and San Pedro, Ivory Coast, 04°36.4'N, 06°50.8'W, 48 m, fine green mud, temp 19.41°C, sal. 35.68‰, dredge, 12.5.1966, 1♂ CL 3.2 mm.

Grand Lahou, Ivory Coast, 05°07'N, 05°05'W, 22 m, film of fine mud on medium size sand, temp 25.64°C, sal. 35.14‰, small dredge, 8.3.1966, 1 abdomen.

Sassandra, Ivory Coast, 04°53.1'N, 06°01.3'W, 30 m, surface mud on medium size sand, temp. 22.42°C, sal. 35.53‰, small dredge, 10.3.1966, 1 fragment CL 3.8 mm.

Mus. Paris: Off Cap Blanc, Mauritania, in stomach of *Trygon* and *Rhinobates*, 7♂ 20–34 mm, 5♀ 20–31 mm, 1 abdomen.

Off Cap Blanc, Mauritania, 1♀ 28 mm; T.M., 1♂ 32.5 mm.

Description (from MANNING, 1974a): Eye (Fig. 38a) large, triangular; cornea bilobed, set obliquely on stalk. Ocular scales rounded laterally. Anterior margin of ophthalmic somite with median tubercle. Corneal indices 343–500 (Table 3). Antennular peduncle shorter than carapace. Rostral plate cordiform, length and width subequal, apex rounded. Carapace smooth, lacking spines or carinae except for laterals and reflected marginals on posterior fourth. Dactylus of claw (Fig. 38b)

with 5 teeth; propodus of claw shorter than carapace, greatest width well beyond midlength; dorsal ridge of carpus of claw undivided, terminating in rounded lobe. Mandibular palp absent; 4 epipods present. Exposed thoracic somites (Fig. 38c) lacking submedian carinae, unarmed intermediates present on sixth, seventh, and eighth somites. Lateral process of fifth thoracic somite a subacute but rounded lobe, oblique to body line; sharp ventral spine also present on each side. Lateral processes of sixth and seventh thoracic somites broadly rounded. Ventral keel of eighth thoracic somite erect, apex rounded. Abdomen lacking submedian carinae on anterior 5 somites, abdominal carinae spined as follows: submedian 6, intermediate 5–6, lateral 5–6, marginal (4–)5; carinae of sixth somite noticeably inflated in adult male (TL 33 mm). Telson (Fig. 38d) with 3 pairs of marginal teeth, submedians with movable apices; carinae of marginal teeth short, dorsal surface of telson lacking supplementary carinae; denticles sharp, 4–7, 9–14, 1; ventral surface of telson lacking postanal keel. Median carina and bases of marginal teeth of telson inflated in adult male (TL 33 mm). Uropodal exopod (Fig. 38d–e) with 4–6 (usually 5) movable spines on outer margin of proximal segment of exopod; basal prolongation of uropod with 9–17 fixed spinules on inner margin.

Color (from MANNING, 1974a): Background light. Carapace with dark, curved spot on each lateral plate posterior to cervical groove. Propodus of claw with dark distal spot. Posterior 3 thoracic and anterior 5 abdominal somites with dark median spot flanked on each side by short dark line. Dark spot present laterally at articulation of eighth thoracic and first abdominal somites. Anterior 5 abdominal somites with dark posterior line and dark spot lateral to median spot. Second abdominal somite with middorsal dark bar, broader than spots on other somites. Sixth abdominal somite dark posterolaterally. Anterior portion and apex of median carina of telson each with dark spot, posteriormost extending onto submedian teeth of telson. Basal segment of uropod dark laterally, proximal segment of exopod with proximal and distal dark spots. Distal segment of exopod with most of inner half dark, color not extending to margin. Distal half of uropodal endopod dark.

Size: Males (44), TL 15–36 mm; females (46), TL 13–35 mm. MONOD (1925) recorded 8 males, 22–35 mm long, and 8 females, 28–31 mm long, and MANNING (1974a) recorded males 17–33 mm long and a female 20 mm long. Other measurements of a female, TL 27 mm: carapace length 6.1; cornea width 1.5; antennular peduncle length 6.4; rostral plate length 1.0, width 1.0; telson length 3.7, width 4.8.

Remarks: *Meiosquilla africana*, by far the most abundant member of the genus in West Africa, is also a very distinctive species. It is surprising that it was described as late as 1974. Apparently because of the presence of spinules on the inner margin of the basal prolongation of the uropod and its small size, J. CADENAT had identified all of the specimens from the IFAN collection with *M. pallida*, and MONOD (1925)

had identified his material from Mauritania with the same species.

This species differs from the other three eastern Atlantic species in having the propodus of the claw deepest distally, rather than at midlength, and in lacking the postanal keel. It further differs from *M. calypso* and *M. pallida* in having a short antennular peduncle. It resembles *M. desmaresti* and *M. calypso* in having an oblique, rounded lateral process on the fifth thoracic somite, and it differs from *M. pallida* in this feature. It resembles *M. pallida* in having spinules on the inner margin of the basal prolongation of the uropod as well as in basic color pattern.

Only two of the specimens reported here have spines on the lateral carinae of the fourth abdominal somite. One of these, a male from Sassandra, Ivory Coast, lacks the telson and thus may prove to be identifiable with *M. pallida*. The other specimen has this carina armed on one side only and otherwise is clearly referable to *M. africana*.

This species has a very slender ventral keel on the eighth thoracic somite. The keel is broader than that of *M. pallida* but much slenderer than that of *M. desmaresti*.

The dark color pattern, which resembles that shown by GIESBRECHT (1910) for *M. pallida*, is very persistent in preservative. The posterolateral circles on the carapace, dark, distal spot on the propodus of the claw, dark anterolateral patches on the abdomen, median patch on the second abdominal somite, paired dorsal spots on the fifth abdominal somite, posterolateral spots on the sixth abdominal somite, and dark patch at the distal end of the median carina of the telson, all are visible in most of the specimens examined.

M. africana is a small species, much smaller than Mediterranean specimens of either *M. desmaresti* or *M. pallida*; the largest specimen is only 36 mm long.

I assume that LATREILLE'S record in 1828 of *M. desmaresti* from Sénégal actually was based on *M. africana*. I have not examined his material.

BUCHANAN (1958) found this species in a silty sand community in 37–46 m, and LONGHURST (1958) found it in *Venus* and *Venus-Amphioplus* transitional communities on shelly sand and shelly mud in 15–56 m. The "Atlantide" specimens were taken on greyish mud, 28–40 m, or on sand with little mud, 33 m, and the "Galathea" specimen on mud with sand and clay, 20 m. Most of the specimens from the IFAN collection were from the stomach contents of *Trygon marmorata*. Material from the Ivory Coast was taken on green oolitic mud, slightly muddy fine sand, fine green mud, fine shelly green mud, and mud on medium-size sand, 22–100 m.

Type locality: Off Sierra Leone, 07°15.5'N, 12°51'W, in 64 m. The holotype and paratypes are in the Muséum National d'Histoire Naturelle, Paris. Paratypes are in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 56): Off tropical West Africa, from scattered localities between Cap Blanc, Mauritania and Angola, including numerous localities off

Sénégal, and off the Ivory Coast, in 15–100 m. Records in the literature include Cap Blanc, Mauritania (MONOD, 1925); (?)Sénégal (LATREILLE, 1828); Sierra Leone, 15–56 m (LONGHURST, 1958); Sierra Leone, 64 m (MANNING, 1974a); off Accra, Ghana, 37–46 m (BUCHANAN, 1958); off Ghana, 90–100 m and Principe, 30 m (MANNING, 1974a); and off the Niger delta, 33 m (MANNING, 1970d, 1974a).

***Meiosquilla calypso* Manning, 1974**
(Figs 39, 56)

Meiosquilla calypso Manning, 1974a, p. 18, fig. 6.

Material: None.

Description (from MANNING, 1974a): Eye (Fig. 39*a, b*) large, triangular; cornea bilobed, set transversely on stalk. Ocular scales rounded laterally. Anterior margin of ophthalmic somite with median tubercle. Corneal index 379 (Table 3). Antennular peduncle longer than carapace. Rostral plate cordiform, length and width subequal, apex rounded. Carapace smooth, lacking spines or carinae except for reflected marginals on posterior fourth. Dactylus of claw (Fig. 39*c*) with 5 teeth; propodus of claw shorter than carapace, greatest width near midlength; dorsal ridge of carpus of claw undivided, terminating in rounded lobe. Mandibular palp absent; 4 epipods present. Exposed thoracic somites (Fig. 39*d*) lacking submedian carinae, unarmed intermediates present on sixth, seventh, and eighth somites. Lateral process of fifth thoracic somite a broad, rounded lobe, oblique to body line; sharp ventral spine also present on each side. Lateral processes of sixth and seventh thoracic somites broadly rounded. Ventral keel of eighth thoracic somite erect,

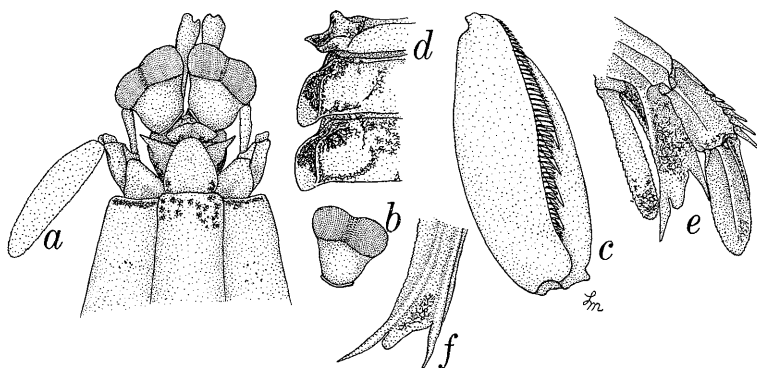


Fig. 39. *Meiosquilla calypso* Manning, female holotype, TL 35 mm, Cape Verde Is.: *a*, anterior portion of body; *b*, eye; *c*, propodus and dactylus of claw; *d*, lateral processes of fifth, sixth, and seventh thoracic somites; *e*, uropod; *f*, basal prolongation of uropod, ventral view. (Setae omitted). (From MANNING, 1974a).

triangular, apex rounded. Abdomen lacking submedian carinae on anterior 5 somites, abdominal carinae spined as follows: submedian 6, intermediate 5–6, lateral 5–6, marginal 5. Telson with 3 pairs of marginal teeth, submedians with movable apices; carinae of marginal teeth short, dorsal surface of telson lacking supplementary carinae; denticles sharp, 4–5, 11, 1; ventral surface of telson with postanal keel. Uropodal exopod (Fig. 39e) with 8 movable spines on outer margin of proximal segment; basal prolongation of uropod (Fig. 39f) denticulate on inner margin.

Color (from MANNING, 1974a): Background light. Carapace with dark line along anterior margins of lateral plates and with broad, dark arc posteriorly on lateral plates, arc with darker anterior spot. Merus of claw with dark distal bar on dorsal surface, propodus with trace of dark, distal spot. Posterior 3 thoracic somites with irregular dark spot middorsally, submedian margin an irregular dark line. Lateral processes of exposed thoracic somites dark, processes of sixth and seventh thoracic somites lighter posterolaterally. Anterior 5 abdominal somites with short, dark posterior bar interrupted along midline. Second somite with broad dark patch medially. Fifth somite dark medially, patch less distinct than that on second. All abdominal somites dark laterally. Most of posterior surface of telson dark, posterior margin, including apices of teeth and denticles, lighter. Uropod with trace of dark spot at articulation of segments of exopod.

Size: Unique female holotype, total length 35 mm. Other measurements: carapace length 7.2; cornea width 1.9; antennular peduncle length 8.6; fifth abdominal somite width 6.7; telson length 4.5, width 5.7.

Remarks: I have seen no material in addition to the single female taken by the "Calypso" in the Cape Verde Islands. It differs from the other eastern Atlantic representatives of the genus in having eight rather than five, six, or seven movable spines on the outer margin of the uropodal exopod. The propodus of the claw is slender, tapering distally, and the antennular peduncle is longer than the carapace and rostral plate combined, as in *M. pallida*. The inner margin of the basal prolongation of the uropod is smooth and the postanal keel is absent, as in *M. desmaresti*.

Type locality: Off western coast of Brava, Cape Verde Is., 20 m. The unique holotype is in the Muséum National d'Histoire Naturelle, Paris.

Distribution (Fig. 56): Known only from the type locality.

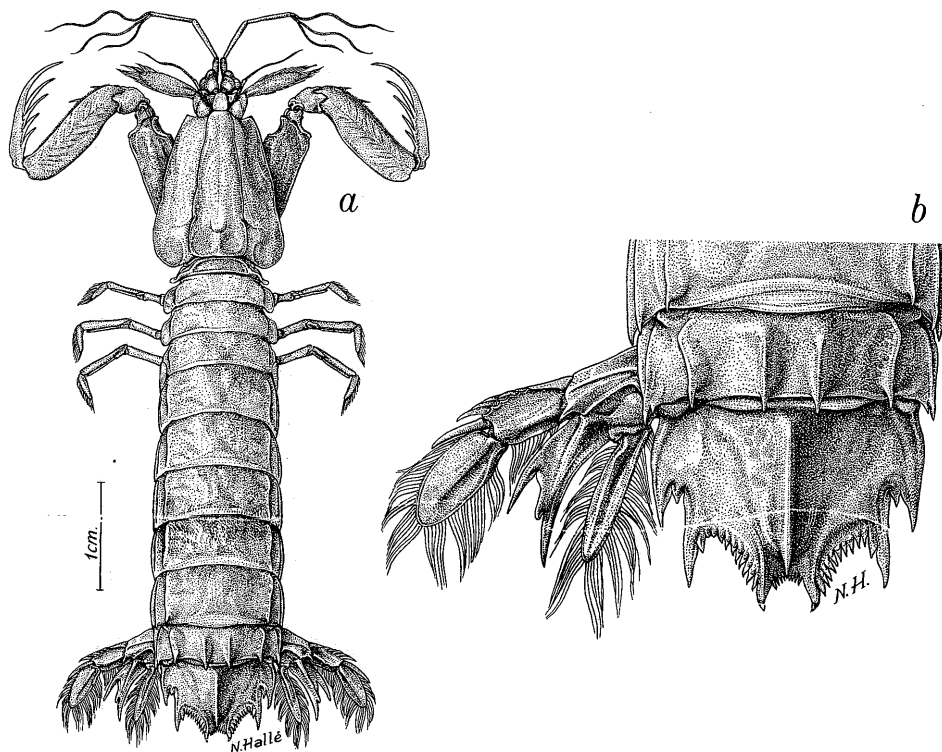


Fig. 40. *Meiosquilla desmaresti* (Risso), female, Mediterranean (not seen): a, dorsal view; b, posterior portion of body.

***Meiosquilla desmaresti* (Risso, 1816)**

(Figs 40, 41, 56)

Squilla Desmaresti Risso, 1816, p. 114, pl. 2 fig. 8 [Nice].

Squilla desmaresti. — GIESBRECHT, 1910, pp. 5, 25–34 [adults], 125, 138 [juveniles], 56, 87–108 [larvae], pl. 1 figs 6–7 [color], pl. 3 figs 1–6, 9, 11–12, 14–25, 29, 31–32, 34–37 [adults], pl. 6 figs 59–68 [juveniles], pl. 10 figs 1–99 [larvae] [Gulf of Naples].

Description: Eye (Fig. 40a, 41a) large, triangular; cornea bilobed, set almost transversely on stalk. Ocular scales rounded laterally. Anterior margin of ophthalmic somite unarmed, rounded, or with median tubercle. Corneal indices 408–538 (Table 3). Antennular peduncle shorter than carapace. Rostral plate (Fig. 40a) subcordiform, length and width subequal or length slightly greater, apex rounded. Carapace smooth, lacking spines or carinae except for laterals and reflected marginals on posterior fourth. Dactylus of claw (Figs 40a, 41b) with 5 teeth; propodus of claw shorter than carapace, greatest depth at midlength; dorsal ridge

of carpus of claw undivided, terminating in blunt lobe. Mandibular palp absent; 4 epipods present. Exposed thoracic somites (Figs 40a, 41c-e) lacking submedian carinae, unarmed intermediate carinae present on posterior 3 somites. Lateral process of fifth thoracic somite a broadly rounded lobe, oblique to body line, flattened anteroposteriorly; sharp ventral spine also present on each side. Ventral keel of eighth thoracic somite erect, slender, apex rounded. Abdomen lacking submedian carinae on anterior 5 somites, abdominal carinae spined as follows: submedian 6, intermediate 5-6, lateral 5-6, marginal (4-)5. Carinae of sixth abdominal somite inflated in adult male (TL 64 mm). Telson (Fig. 40b) with 3 pairs of marginal teeth, submedians with movable apices; carinae of marginal teeth short, dorsal surface of telson lacking supplementary carinae; denticles sharp, 3-5, 10-12, 1; ventral surface lacking postanal keel. Median carina and bases of marginal teeth inflated in adult males (TL 48 mm or more). Uropodal exopod (Fig. 40b) with 5-7 movable spines on outer margin of proximal segment; basal prolongation at most crenulate or tuberculate on inner margin, lacking fixed spinules.

Color: Body very dark, appearing mottled brown in preservative. Dark bar across posterior fourth of carapace, with faint indications of dark ring at each

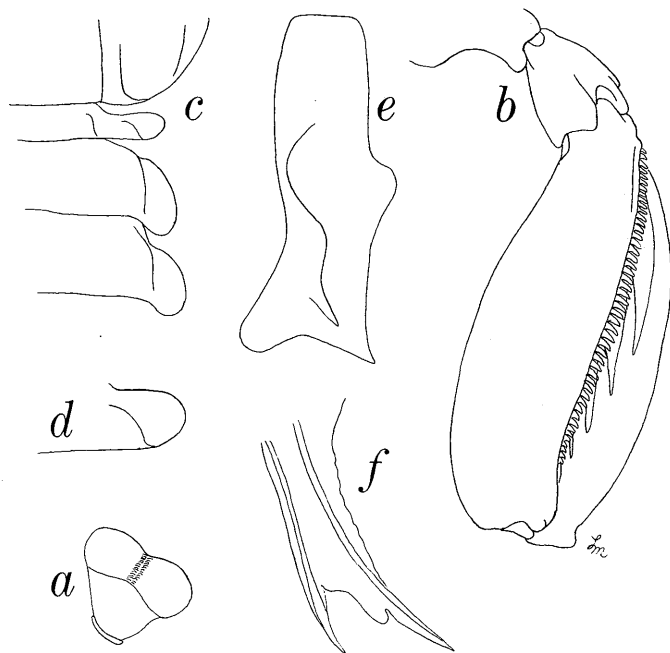


Fig. 41. *Meiosquilla desmaresti* (Risso), male, TL 41 mm, Italy (USNM 113720): a, eye; b, carpus, propodus, and dactylus of claw; c, lateral processes of fifth, sixth, and seventh thoracic somites; d, lateral process of fifth thoracic somite, dorsal view, enlarged; e, same, lateral view, enlarged; f, basal prolongation of uropod, ventral view.

posterolateral angle. Posterior 3 thoracic and anterior 5 abdominal somites dark medially with adjacent light submedian areas, pleura much darker (body appearing striped). Lateral processes of sixth and seventh thoracic somites dark. Abdomen lacking paired submedian spots on fifth somite. Most of posterior margin of telson dark (based on 2 specimens from Monaco). GIESBRECHT (1910) has given color figures of both male and female, and ROUX (1830) also gave a colored figure.

Remarks: Apparently *M. desmaresti*, a common Mediterranean species, does not occur on the West African coast, although it is known from Atlantic localities along the European coast north to southern England and the southern North Sea. It could be expected to occur off northern Morocco, but I know of no substantiated records of its occurrence there.

Inasmuch as the eastern Atlantic species of *Meiosquilla* are very difficult to distinguish without comparative material, I have included a comparatively complete account of this species, based on Mediterranean specimens.

M. desmaresti resembles *M. africana* and differs from both *M. calypso* and *M.*

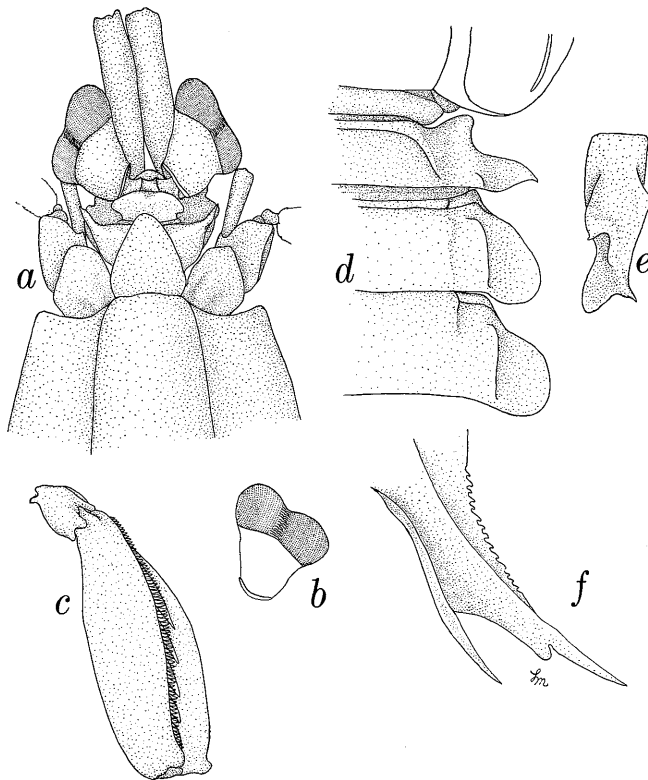


Fig. 42. *Meiosquilla pallida* (Giesbrecht), female, TL 63 mm, Italy (USNM 76358): a, anterior portion of body; b, eye; c, carpus, propodus, and dactylus of claw; d, exposed thoracic somites, dorsal view; e, fifth thoracic somite, lateral view; f, basal prolongation of uropod, ventral view. (Setae omitted).

pallida in having an antennular peduncle which is shorter than the carapace. It further agrees with *M. africana* and differs from *M. pallida* in having an oblique, rounded lateral process on the fifth thoracic somite, unarmed intermediate carinae on the fourth abdominal somite, and in lacking a postanal keel. It differs from *M. africana* in having a slender raptorial claw and in lacking spinules on the inner margin of the basal prolongation of the uropod. There may also be a difference in eye size (see corneal indices, Table 3), but this is difficult to evaluate because no small specimens of *M. desmaresti* are available for comparison. *M. desmaresti* matures at and attains a much larger size than does *M. africana*. The telson margin of the latter species may be swollen in males 27 mm long, and the species is not known to exceed 36 mm. In *M. desmaresti* the telson margin is not swollen in males smaller than 48 mm, and adults may attain 68 mm or more in length.

Specimens from South Africa identified with *M. desmaresti* by BARNARD (1950) and MANNING (1969d) represent a distinct species, *M. barnardi* Manning, 1975b.

Type locality: Mediterranean, off Nice. The type was not traced; it may not be extant.

Distribution (Fig. 56): Western Mediterranean and adjacent North Atlantic north to southern England and the southern North Sea. VAN DER BAAN & HOLTHUIS (1966) summarized North Sea records for this species.

Meiosquilla pallida (Giesbrecht, 1910)
(Figs 42, 43, 56)

Squilla pallida Giesbrecht, 1910, pp. 25–34, pl. 1 fig. 5 [color], pl. 3 figs 7–8, 10, 13, 26–28, 30, 33, 38–39, text-figs 9–10 [Gulf of Naples]. — MONOD, 1925, pp. 87, 90 [key], pl. 20 figs A–C [part].

Meiosquilla pallida. — MANNING, 1974a, p. 19.

Material:

IFAN: Fishing grounds off Mamelles, Sénégal, 200–400 m, from stomach of *Lepidotrigla cadmani*, “Gerard Treca”, 15.4.1953, 1 fragmented ♀ CL 5.0 mm.

Mus. Paris: Off Morocco, 33°59'N, 07°50'W, 155 m, fine gray-yellow muddy sand, “Vanneau” St. 37, 7.6.1924, 1 ♀ 40 mm.

Ivory Coast, 04°33'N, 06°36'W, 100–109 m, sand, mud, shell, rocks, dredge, “Calypso” St. 16, 19.5.1956, 1 ♀ 21 mm.

Description: Eye (Fig. 42a–b) large, triangular; cornea bilobed, set obliquely on stalk. Ocular scales rounded laterally. Anterior margin of ophthalmic somite rounded. Corneal indices 387–548 (Table 3). Antennular peduncle longer than

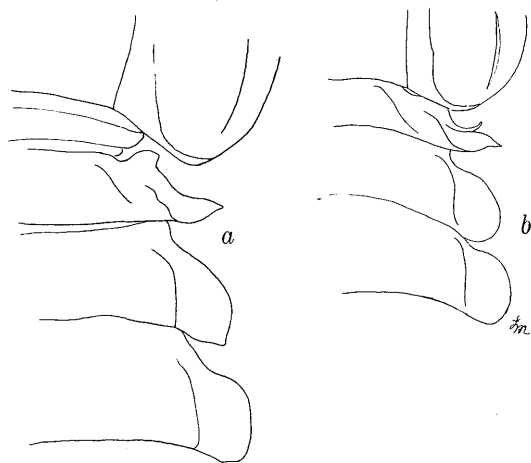


Fig. 43. *Meiosquilla pallida* (Giesbrecht), lateral processes of fifth, sixth, and seventh thoracic somites of: *a*, female, TL 21 mm, Ivory Coast; *b*, female, TL 40 mm, Morocco.

carapace and rostral plate combined. Rostral plate (Fig. 42*a*) subcordiform, length slightly greater than width, apex rounded. Carapace smooth, lacking spines or carinae except for laterals and reflected marginals on posterior fourth. Dactylus of claw (Fig. 42*c*) with 5 teeth; propodus of claw as long as or slightly longer than carapace in adults, greatest depth at midlength; dorsal ridge of carpus of claw undivided, terminating in blunt lobe. Mandibular palp absent; 4 epipods present. Exposed thoracic somites (Figs 42*d-e*, 43*a-b*) lacking submedian carinae, unarmed intermediate carinae present on posterior 3 somites. Lateral process of fifth thoracic somite a sharp, dorsoventrally flattened lobe, anterior margin convex; sharp ventral spine also present on each side. Lateral processes of sixth and seventh thoracic somites broadly rounded. Ventral keel of eighth thoracic somite triangular, broad, apex rounded. Abdomen lacking submedian carinae on anterior 5 somites, abdominal carinae spined as follows: submedian 6, intermediate 5-6, lateral 4-6, marginal 4-5. Telson with 3 pairs of marginal teeth, submedians with movable apices; carinae of marginal teeth short, dorsal surface of telson lacking supplementary carinae; denticles sharp, 3-7, 11-13, 1; ventral surface of telson with postanal keel. Uropodal exopod with 5-6 movable spines on outer margin of proximal segment, distalmost extending almost to midlength of distal segment. Basal prolongation of uropod (Fig. 42*f*) with row of sharp denticles or short spinules on inner margin.

Color: Completely faded in most specimens examined. The following notes were made from the young female taken off the Ivory Coast. Carapace with trace of dark posterolateral ring; lateral processes of exposed thoracic somites light, sixth to eighth somites with pair of submedian dark spots, carinae also dark; dark spot laterally overlapping eighth thoracic and first abdominal somites; second to fifth abdominal somites with dark patch middorsally, traces of darker pigment laterally, not concentrated as in *M. calypso*; fifth somite with submedian pair of dark spots;

sixth abdominal somite dark laterally, below lateral carinae; telson with dark spot at posterior end of median carina and at bases of marginal teeth, most of dorsal surface light; uropod with dark spot at each articulation of exopod segments.

GIESBRECHT (1910, pl. 1 fig. 5) gave a colored figure of a specimen from Naples.

Size: Females only examined, TL 21 and 40 mm. Part of the material reported by MONOD (1925: 1 ♀, TL 40 mm) and the small female, TL 21 mm, reported by me in 1974a, were examined; two other specimens mentioned by MONOD, including a male 30 mm long, could not be located. Other measurements of a female, TL 21 mm: carapace length 5.7; cornea width 1.4; antennular peduncle length 6.8; rostral plate length 1.0, width 0.9; telson length 3.7, width 4.5.

Remarks: *M. pallida* apparently is a very rare species off the West African coast. Examination of the large series of *Meiosquilla* from the IFAN collections yielded but one specimen, and only part of the material referred to the species by MONOD (1925, p. 87), three specimens from Morocco, actually belong to that species; his specimens from Mauritania are referable to *M. africana*.

In order to make certain that my original identification of the small female from the Ivory Coast was correct, I re-examined the specimen. Even at this small size, TL 21 mm, the lateral process of the fifth thoracic somite, shown in Fig. 43a, has its characteristic shape. The lateral processes of the exposed thoracic somites also are shown for the Moroccan specimen, a female 40 mm long (Fig. 43b).

Corneal indices for the two intact West African specimens as well as for all Mediterranean specimens examined by me are summarized in Table 3. The index for this species is very similar to that of *M. desmaresti*.

The length of the antennular peduncle may change with age. It is shorter than the carapace in the specimen from Sénégal, longer than the carapace and rostral plate combined in the other two specimens.

Adults of *M. pallida* are readily identifiable by the long antennular peduncle, the flattened, sharp lateral process of the fifth thoracic somite, the armed lateral carina of the fourth abdominal somite, and the postanal keel. As in *M. calypso* and *M. desmaresti*, the propodus of the claw is deepest at midlength rather than distally.

The color pattern (GIESBRECHT, 1910, pl. 1 fig. 5) is very similar to that of *M. africana*.

Type locality: Gulf of Naples (auf dem Schlammgrunde der Ammontatura bis 110 m tiefe). The type was not traced; it may not be extant.

Distribution (Fig. 56): Gulf of Naples, Mediterranean (GIESBRECHT, 1910) and from four localities off West Africa: off Morocco, in 155 and 160 m (MONOD, 1925); off Sénégal, in 200–400 m; and off the Ivory Coast, in 100–109 m (MANNING, 1974a). Apparently *M. pallida* occurs in deeper water off West Africa than does *M. africana*.

***Oratosquilla* Manning, 1968**

Oratosquilla Manning, 1968, p. 133 [definition].

Type species: *Oratosquilla oratoria* (De Haan, 1844), by original designation.

Remarks: Only one species of this Indo-West Pacific genus, *O. massavensis* (Kossmann), an immigrant from the Red Sea, occurs in the eastern Atlantic.

***Oratosquilla massavensis* (Kossmann, 1880)**
(Figs 44, 51)

Squilla massavensis Kossmann, 1880, p. 99 [Red Sea]. — HOLTHUIS, 1961, p. 63 [Turkey].

Squilla africana. — STEUER, 1936, p. 13, figs 10–15 [Egypt] [not *Squilla africana* Calman, 1916 = *Squilla aculeata calmani* Holthuis, 1959].

Diagnosis: Ocular scales subtruncate, unarmed. Rostral plate (Fig. 44*a*) subrectangular, lacking median carina. Carapace with short anterolateral spines, median carina lacking distinct anterior bifurcation. Dactylus of claw with 6 teeth. Mandibular palp present. 4 epipods present. Lateral process of fifth thoracic somite (Fig. 44*c*) bilobed, posterior lobe slender, acute, anterior lobe a spine. Lateral processes of sixth and seventh thoracic somites bilobed, pointed but not spined posterolaterally. Submedian carinae distinct on all abdominal somites. Abdominal carinae spined as follows: submedian 5–6, intermediate 3–6, lateral 2–6, marginal 1–5. Telson with prelateral lobe. Median carina of telson flanked by double row of tubercles converging under apical spine. Submedian teeth of telson with fixed apices. Basal prolongation of uropod (Fig. 44*d*) with spinule on outer margin of inner spine in juveniles, rounded lobe in adults.

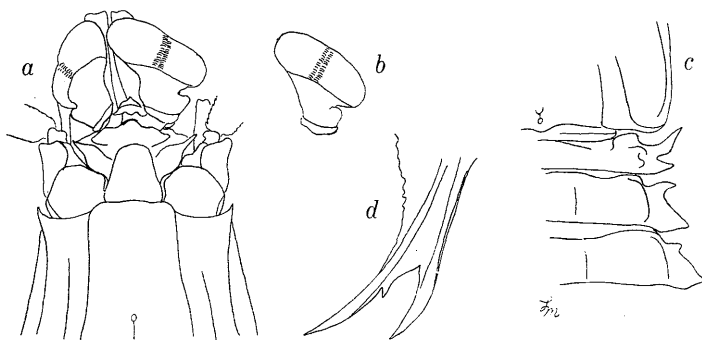


Fig. 44. *Oratosquilla massavensis* (Kossmann), male, TL 69.5 mm, Lebanon (USNM): a, anterior portion of body; b, eye; c, lateral processes of fifth, sixth, and seventh thoracic somites; d, basal prolongation of uropod, ventral view.

Distribution (Fig. 51): Indo-West Pacific, where it occurs in the Red Sea, and eastern Mediterranean, from Egypt, Israel, Lebanon, and Turkey (HOLTHUIS, 1961).

***Pterygosquilla* Hilgendorf, 1890**

Pterygosquilla Hilgendorf, 1890, p. 172. — MANNING, 1968, p. 123; 1969a, p. 122 [definition].

Type species: *Pterygosquilla laticauda* Hilgendorf, 1890, by monotypy.

Remarks: One species, *P. armata capensis* Manning, occurs off SW Africa.

***Pterygosquilla armata capensis* Manning, 1969**
(Figs 45, 49)

Squilla armata. — BALSS, 1916, p. 51. — BARNARD, 1950, p. 845, fig. 1*d, f*. — DARTEVELLE, 1951, p. 1032 [discussion]. — LEBOUR, 1954, p. 231, fig. 6 [larvae figured].

Pterygosquilla armata capensis Manning, 1969d, p. 8, figs 2, 3.

Material:

Mus. Munich: Walvis Bay, SW Africa, 1932, 1♀ 69 mm.

Mus. Hamburg: Lüderitz, SW Africa, C.M., 1911, 1♀ 68 mm.

Walvis Bay, SW Africa, H.J., 1♀ 62 mm.

Mus. Berlin: Lüderitz, SW Africa, L.S., 1903, 1♀ 63 mm.

Off SW Africa, 26°24'S, 13°54'E, 370–380 m, "E. Haeckel" St. 213, 2♂
65.5–97.5 mm, 2♀ 84–87 mm (1♂, 1♀ USNM).

Diagnosis: Ocular scales produced into erect spines (Fig. 45*a*). Rostral plate (Fig. 45*a*) triangular, without dorsal carina. Carapace with short anterolateral spines, lacking median carina. Dactylus of claw with 6–8 teeth. 4 epipods present. Lateral process of fifth thoracic somite (Fig. 45*c*) a slender spine directed laterally. Lateral processes of sixth and seventh thoracic somites rounded laterally, spined posterolaterally, not bilobed. Submedian carinae of abdomen indistinct in adults. Abdominal carinae spined as follows: submedian 6, intermediate (3)4–6, lateral (3)4–6, marginal 1–5. Telson lacking prelateral lobe and double row of tubercles lateral to median carina. Submedian teeth of telson with movable apices. Basal prolongation of uropod (Fig. 45*d*) with low, rounded lobe on outer margin of inner spine.

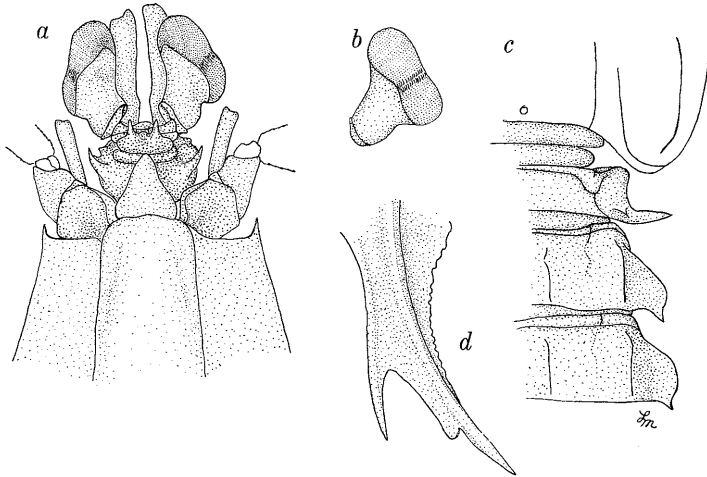


Fig. 45. *Pterygosquilla armata capensis* Manning, female, TL 87 mm, South-West Africa: a, anterior portion of body; b, eye; c, lateral processes of fifth, sixth, and seventh thoracic somites; d, basal prolongation of uropod, ventral view.

Color: Body covered with many small, dark chromatophores, appearing dusky brown. Anterior margin of antennular somite with dark line. Anterior and posterior margins and gastric grooves of carapace dark. Posterior 3 thoracic and anterior 5 abdominal somites with dark posterior line, broader, more diffuse, on midline. Second abdominal somite with short, dark, transverse bar medially. Telson with faint dark triangle over median carina, apex directed posteriorly.

Measurements: Males (2), TL 65.5–97.5 mm; females (6), TL 62–87 mm. MANNING (1969d) recorded males 24–168 mm long, females 22–135 mm long, and postlarvae ranging in length from 12–22 mm. Other measurements of a female, TL 87 mm: carapace length 17.8; cornea width 4.7; rostral plate length 2.4, width 2.7; telson length 13.4, width 16.4.

Remarks: This is the only large squillid to occur off SW Africa. It can be recognized immediately by the spined ocular scales and the spined lateral processes of the sixth and seventh thoracic somites.

This species does not overlap in range with any other West African species. It occurs in cold, deep water, so a northward extension of range would not be surprising.

LEBOUR (1954) recorded larvae which she identified with this species from a station at 25° S.

Type locality: Off SW Africa, 26°30'S, 14°43'E, 180 m. The holotype and paratypes are in the University of Cape Town; paratypes also are in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 49): This subspecies has been reported off the coasts of SW and S Africa, between 26 and 183 m (MANNING, 1969d). Off SW Africa it has been recorded from Lüderitz (BALSS, 1916; BARNARD, 1950); at 25°35'–25°36'S, 14°24'–14°27'E, 128 m (LEBOUR, 1954); at 26°30'S, 14°43'E, 180 m on rock (!), and off the Orange River mouth, 170 m on mud (MANNING, 1969d); and now from Lüderitz, Walvis Bay, and from 26°24'S, 13°54'E, 370–380 m, which extends the known depth range considerably.

***Squilla* Fabricius, 1787**

Squilla Fabricius, 1787, p. 333. — MANNING, 1968, p. 129 [list of species]; 1969a, p. 146 [definition].

Type species: *Squilla mantis* (Linnaeus, 1758), by subsequent designation by LATREILLE, 1810, p. 422.

Remarks: Three species of this Atlanto-East Pacific genus occur in the eastern Atlantic region, and all three are found off West Africa. One, *S. mantis* (Linnaeus), also occurs in the Mediterranean.

Apparently the West African populations do not mix to any great degree. LE LOEUFF & INTES (1968, p. 38) commented: "Il est remarquable de constater que ces populations de trois *Squilla* ne se mélangent que très peu, même en période d'upwellings, quand il y a homothermie de toute la couche d'eau. Le milieu intervient certainement comme facteur de distribution mais la compétition interspécifique doit aussi jouer un rôle important."

***Squilla aculeata calmani* Holthuis, 1959**

(Figs 46, 52)

Squilla mantis. — WHITE, 1847, p. 83. — OSORIO, 1887, p. 231 [not *Squilla mantis* (Linnaeus, 1758)].

Squilla empusa. — MIERS, 1880, p. 23 [part]. — OSORIO, 1889, p. 138; 1898, p. 194. — BÜTTIKOFER, 1890, pp. 466 [discussion], 487 [listed]. — JURICH, 1904, p. 8, pl. 1 fig. 3. — JOHNSTON, 1906, p. 862 [listed]. — BALSS, 1916, p. 15 [part]. — HOLTHUIS, 1941, p. 31. — IRVINE, 1947, p. 309, fig. 214 [not *Squilla empusa* Say, 1818].

Squilla africana Calman, 1916, p. 373, figs 1–2. — MONOD, 1925, pp. 90 [key], 92 [listed]. — VILELA, 1949, p. 67, figs 15–16. — CADENAT, 1950, p. 192. — DARTEVELLE, 1951, p. 1021, figs 1–6, figs 1–4 on unnumbered pl. — MONOD, 1951, pp. 142 [discussion], 143 [key]. — LONGHURST, 1957, pp. 373, 374, 375, 377, 378, 379, 380, 382; 1958, pp. 42, 46, 48, 49, 64, 86. — BUCHANAN, 1958,

- p. 20. — CROSNIER, 1964, pp. 34, 35, 38 [preoccupied by *Squilla raphidea africana* Balss, 1910 = *Harpisquilla raphidea* (Fabricius, 1798)].
- Squilla mantis* var. *empusa*. — GRAVIER, 1927, p. 31 [not *Squilla empusa* Say, 1818].
- Quilla empusa*. — MONOD, 1951, p. 142 [erroneous spelling] [not *Squilla empusa* Say, 1818].
- Squilla calmani* Holthuis, 1959, p. 179. — MANNING, 1968, p. 129 [listed] [replacement name for *Squilla africana* Calman, 1916, preoccupied].
- Squilla aculeata calmani*. — LE LOEUFF & INTES, 1968, pp. 36, 38, 67, 68, 70, figs 46, 61, tables 1–3. — MANNING, 1970d, p. 265, fig. 2; 1974a, p. 19.
- Squilla*. — VOSS, 1969, p. 19 [part]. — USCHAKOV, 1970, p. 439.

Material:

- “Atlantide” St. 109, Dowes Island, Niger Delta, 21.2.1946, 1♀ 57 mm.
- St. 110, creek, Bonny River, opposite Opobo, Niger Delta, 16 m, 21.2.1946, 1♂ 20.5 mm.
- St. 111, off Bonny River, Niger Delta, 20 m, 22.2.1946, 1 postlarva 12.5 mm.
- IFAN: Off M’Bour, Sénégal, ca. 30 m, trawl, A.Cm., 3♀ 113–131 mm (1♀ Mus. Paris).
- Joal, Sénégal, littoral, A.BI., 1♀ 145 mm.
- Karabane, Sénégal, 12 m, F.P., 13.4.1957, 1♀ 128 mm; 5–6 m, F.P., 4.4.1957, 1♀ 141 mm.
- Ziguinchor, Sénégal, F.P., 25.3.1957, 1♀ 63.5 mm.
- Caton, Sénégal, 4.1962, 2♀ 133–136 mm; 9.1962, 1♀ 129 mm.
- Off Guinea, 10 m, J.F., “Gerard Treca”, 14.3.1953, 1♀ 137 mm.
- Conakry, Guinea, J.C., 15.4.1947, 1♀ 35 mm.
- Conakry, Guinea, 10–12 m, E.P. & M.-M., “Gerard Treca”, 1953, 2♂ 132–134 mm.
- Off Conakry, Guinea, E.P., “Gerard Treca”, 3.1953, 3♀ 134–144 mm (1♀ Mus. Paris).
- Dixinn, 15 km from Conakry, Guinea, Hm., 1♀ 97 mm.
- Sobané, Guinea, in lateritic blocks covered with oysters, J.C. & F.P., 1947, 4♂ 100.5–133 mm, 6♀ 34–121 mm (1♂, 1♀ Mus. Paris).
- Jui, Freetown, Sierra Leone, in mud in mangroves, 29.2.1948, 1 postlarva 13 mm.
- Off Freetown, Sierra Leone, 8–12 m, trawl, J.C., 1948, 8♂ 102.5–128 mm, 3♀ 79.5–134.5 mm (2♂ Mus. Paris).
- Bonthe Island, Sierra Leone, coast, J.C., 13.3.1948, 1♀ 35 mm.
- Off Gonzagueville, Ivory Coast, 27.1.1954, 1♀ 118 mm (Mus. Paris).
- Off Grand Bassam, Ivory Coast, R.R., 3.1952, 1♀ 114 mm.
- Lagoon, Grand Bassam, Ivory Coast, R.R., 5.1952, 1♂ 122 mm.
- Cotonou, Dahomey, Tr., 11.1919, 1♀ 145 mm.
- Douala, Cameroon, Mn., 1950, 1♀ 75 mm.

- Pointe-Noire, Congo, C.R., 19.9.1953, 1♂ 147 mm.
 USNM: Portuguese Guinea, 11°46'N, 16°58'W, 12 m, Guinean Trawling Survey I, Tr. 2, St. 1A, "La Rafale", 9.12.1963, 1♂ 143.5 mm.
 Off St. Paul River mouth, Monrovia, Liberia, 5.5–15 m, trawl, G.M., 29.12.1952, 1♀ ca. 140 mm.
 Off harbor mouth, Monrovia, Liberia, 16–26 m, trawl, G.M., 11.11.1953, 1♂ 113 mm.
 Liberia, 05°59'N, 10°09'W, 20 m, Guinean Trawling Survey I, Tr. 15, St. 1, 5.11.1963, 1♀ 119 mm.
 Shama Bay, Ghana, Am., 26.1.1961, 5♂ 116–146 mm, 1♀ 101 mm; 8.2.1961, 1 broken ♀.
 Tema Nungua, Ghana, Am., 18.5.1962, 1♂ 126 mm.
 Mouth of Volta River, Ghana, B. & R., 23.7.1961, 1♂ 110 mm.
 Lagos, Nigeria, paratypes of *Squilla africana* Calman, 1♂ 62 mm, 1♀ 114 mm.
 Cameroon, 04°17'N, 08°40.2'E, 10 m, black mud, A.C., 1♂ 111 mm.
 Cameroon, 03°47'N, 09°18'E, 11 m, black mud, A.C., 5.1.1963, 2♂ 112–138 mm.
 Cameroon, 03°32'N, 09°35'E, 9 m, mud, trawl, A.C., 1♂ 123 mm, 1♀ 74 mm.
 Batanga, Cameroon, A.Gd., 7.10.1930, 1♀ 133 mm.
 Lagoon, Olindé, Cap Lopez, Gabon, 25 m, trawl, "Ombango", 14.7.1960, 4♂ 127–150 mm, 3♀ 139–145 mm.
 Off Pointe-Noire, Congo, 20 m, mud, A.C., 5.1963, 2♂ 114–119 mm.
 Bay of Pointe-Noire, Congo, beach seine, 3.6.1964, 2♀ 40–104 mm; 14.6.1964, 2♀ 53–64 mm; A.C., 24.6.1964, 1♂ 54 mm.
 Pointe-Noire, Congo, A.C., 1♀ 103 mm.
 Off Kipundji, Congo, 05°08'S, 12°12'E, 10–12 m, sandy mud, trawl, A.C., 25.8.1965, 1♂ 72 mm.
 Mus. Paris: Gorée, Sénégal, M.-M., 20.4.1967, 1♂ 41.5 mm.
 Iles de Los, Guinea, A.G., 15.12.1909, 1♂ CL 19.7 mm.
 Ile Roume, Iles de Los, Guinea, Gr., 30.9.1913, 1♂ 113 mm; A.G., 15.12.1909, 1♂ 113 mm.
 Cotonou, Dahomey, Gm., 10.1897, 1♂ 117 mm, 2♀ 115–145 mm.
 Gabon, Dp., 1♀ 118 mm; L.C., 1 specimen.
 CRO, Abidjan: Grand Bassam, Ivory Coast, 05°09.4'N, 03°49.5'W, 30 m, fine oolitic shelly sandy mud, temp. 17.72°C, sal. 35.70‰, shrimp trawl, L.L. & A.I., 10.10.1967, 2♀ 66–124 mm.
 Mus. Berlin: Mouth of the Congo River, purchased from fishermen, Tiefsee-Exp., 1♀ 85 mm.
 Longji, Cameroon, Pa., 1♀ 147 mm.
 Mus. Hamburg: Monrovia, Liberia, 11 m, C.H., 1889, 1♂ CL 3.8 mm.
 Guinea, Sr., 1♂ 130 mm.
 Boguma, Nigeria, C.H., 1♂ 68 mm.
 Douala, Cameroon, J.E., 2♀ 126–133 mm.

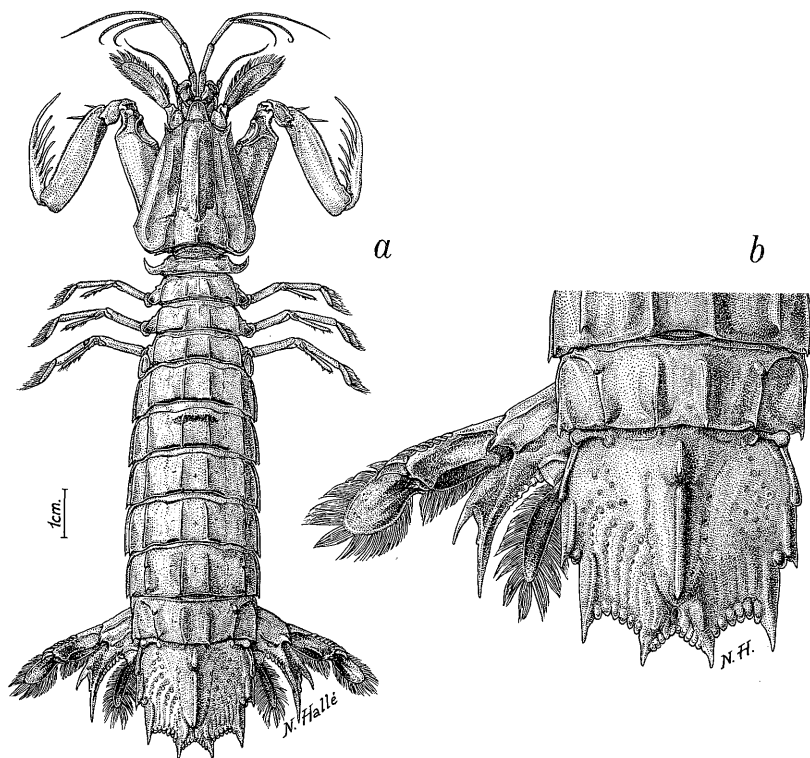


Fig. 46. *Squilla aculeata calmani* Holthuis, Guinea (not seen): a, dorsal view; b, posterior portion of body.

Isla Elobey, Rio Muni, C.H., 1884, 1♀ 65 mm.

Mus. Munich: Gabon, 1♂.

Mus. Milan: Lagos, Nigeria, 3♂ 83–115 mm.

Mus. Brussels: Dahomey, 06°11'N, 02°14'E, 40 m, Guinean Trawling Survey II, "Thierry", Tr. 35, St. 3, 18.3.1964, 1♂ 132 mm.

Nigeria, 04°09'N, 06°03'E, 15 m, Guinean Trawling Survey II, "Thierry", Tr. 42, St. 1, 3.4.1964, 2♂ 112.5–113 mm.

Description: Eye (Fig. 46a) large; cornea bilobed, set obliquely on stalk; eyes extending about to end of first segment of antennular peduncle; ocular scales rounded or subtruncate, inclined laterally; anterior margin of ophthalmic somite with median emargination; corneal indices 394–608 (Table 4).

Antennular peduncle almost as long as carapace; antennular processes produced into blunt, rounded lobes, curved laterally.

Antennal scale about half as long as carapace; antennal peduncle not extending beyond eye.

Rostral plate (Fig. 46a) subquadrate, usually slightly longer than broad,

TABLE 4. Summary of corneal indices for West African species of *Squilla*

Carapace length, in mm		<i>S. aculeata calmani</i>	<i>S. cadenati</i>	<i>S. mantis</i>
0-5	range	-	-	-
	mean (no.)	-	-	-
6-10	range	394-429	-	-
	mean (no.)	412 (2)	352 (1)	-
11-15	range	414-532	333-386	381-400
	mean (no.)	456(10)	358(13)	391 (2)
16-20	range	500-524	300-408	395-409
	mean (no.)	512 (2)	376(18)	403 (5)
21-25	range	470-568	318-428	362-442
	mean (no.)	523(29)	404(24)	403(10)
26-30	range	476-590	329-454	388-403
	mean (no.)	541(36)	419(30)	419(14)
31-35	range	552-608	409-471	412-451
	mean (no.)	580 (2)	445(10)	433 (4)
36-40	range	-	-	-
	mean (no.)	-	468 (1)	-

upturned lateral margins converging on truncate apex; short median carina present, not extending to anterior margin.

Median carina of carapace with well-marked anterior bifurcation, interrupted basally, branches often indistinct; on median carina, distance from dorsal pit to anterior bifurcation shorter than distance from bifurcation to anterior margin; intermediate carinae extending anteriorly to level of anterior bifurcation of median carina; anterior margins of lateral plates concave; anterolateral spines strong but not extending to base of rostral plate; posterolateral margin with well-marked, obtusely-angled projection anteriorly.

Raptorial claw (Fig. 46a) large; dactylus with 6 teeth, outer margin of dactylus sinuate; dorsal ridge of carpus undivided, terminating in obtuse, angular projection; basis of claw with sharp, ventrally-directed spine on posterior surface.

Mandibular palp and 4 epipods present.

Lateral process of fifth thoracic somite a broad, sharp spine, directed anterolaterally; lateral processes of next 2 somites bilobed, anterior lobes much smaller than posterior, acute on sixth somite, more rounded on seventh; posterior lobes of lateral processes of both somites large, triangular, apices acute, sharp, posterior margins convex; fifth somite with short, irregular carinae on dorsal surface; posterior 3 thoracic somites with prominent, unarmed submedian and intermediate carinae; ventral keel of eighth thoracic somite prominent, oval, inclined posteriorly.

Abdomen strongly carinate, submedians divergent on each somite; second to fifth somites with interrupted median carinule; abdominal carinae spined as follows: submedian 6, intermediate (2)3–6, lateral 1–6, marginal 1–5; sixth somite with sharp spine anterior to articulation of each uropod.

Telson (Fig. 46*b*) with length and width subequal or width slightly greater, with 3 pairs of marginal teeth, prelateral lobes present; dorsal surface of telson smooth, marked by curved rows of pits; denticles rounded, (1)3–5, 6–8, 1, usually 4–5, 7–8, 1, outer submedians largest; ventral surface lacking postanal keel.

Proximal segment of uropodal exopod (Fig. 46*b*) with 7–9, usually 8, movable spines, distalmost short, not extending to midlength of distal segment; basal prolongation of uropod with rounded lobe, margin concave, on outer margin of longer inner spine; inner margin of basal prolongation irregularly tuberculate, with blunt spine mesially at articulation of endopod.

Color: Body dusky; carinae and grooves of carapace dark; posterior 3 thoracic and anterior 5 abdominal somites with dark posterior line; abdomen with dark rectangular patch on second somite, less conspicuous patches present on third to fifth somites; telson without well-marked pattern, median carina and carinae of marginal teeth dark; proximal segment of uropodal exopod dark, distal segment mostly light, dark proximally on inner margin; most of uropodal endopod dark, midline and distal fifth lighter.

IRVINE (1947) noted that this species is greenish khaki in color. MANNING (1970d, p. 267) noted, "In freshly preserved specimens dorsal carinae of body green, dorsal display patch on merus of claw yellow, distal segment of the uropodal exopod bright yellow, and apices of spines of telson and uropods pink."

In his manuscript notes, J. CADENAT provided the following observations on color: "La coloration générale sur le vivant est un gris verdâtre plus ou moins lavé ou ressortent en vert bouteille brillant toutes les carènes et bordures de la carapace, du corps et du telson; les extrémités des épines en particulier celle du telson et des uropodes sont d'un rose brillant, il existe un petite bande de pigment noir au bord postérieur de chaque somite libre et une autre bande transversale plus courte et plus large dans la région médiane du second somite abdominal. Aucune tache sombre ne parait sur le telson; par contre la coloration des uropodes est caractéristique: une tache sombre occupe toute la partie distale du premier article de l'exopodite et le bord interne du second; l'endopodite est également sombre sur toute sa longueur ne laissant apparaître qu'une nervure médiane longitudinale claire."

Size: Males (54), TL 20.5–150 mm; females (56), TL 34–147 mm; postlarvae (2), TL 12.5–13 mm. Males 45–134 mm long and females 41–140 mm long have been recorded in the literature. Other measurements of a male, TL 113.5 mm: carapace length 23.4; cornea width 4.1; antennular peduncle length 20.0; antennal scale length 13.0; rostral plate length 3.4, width 3.9; telson length 22.5, width 22.8.

Remarks: *S. aculeata calmani* readily can be distinguished from the other two species of *Squilla* from the Gulf of Guinea, *S. cadenati* and *S. mantis*, by its smaller eyes (cf. corneal indices, Table 4), the presence of a spine on the basis of the claw, submedian carinae armed only on the sixth abdominal somite, the lack of the fifth epipod, and the lack of paired dark spots on the telson. As pointed out by me (1970d, p. 267), *S. aculeata calmani* is very similar to the eastern Pacific *S. a. aculeata* Bigelow, 1893(b). The nominate subspecies has a slenderer rostral plate, a shorter and blunter lateral process on the fifth thoracic somite, and the lateral carinae of the first abdominal somite are unarmed. Also, in the West African population the basal spine tends to be bifurcated apically whereas in the eastern Pacific form this spine usually is simple. Because of the close affinities between populations of *S. aculeata* in the eastern Atlantic and eastern Pacific, I prefer to recognize them as subspecies rather than as distinct species.

The postlarvae are much smaller than those of *S. mantis* (see below), being only 12.5–13 mm long. They differ from adults in having the body carinae poorly developed, lacking the anterolateral spines of the carapace, having a shorter lateral process on the fifth thoracic somite, with that process directed laterally rather than curved anteriorly, and in having movable apices on the submedian teeth of the telson. The basal spine is distinct in the larger postlarva examined, but it could not be detected in the smaller.

The spination pattern of the abdominal carinae given in the description above is that found in adults, specimens 75 mm long or larger. In specimens less than 21 mm long, the carinae are spined as follows: submedian 6, intermediate 5–6, lateral 5–6. Specimens 35–40 mm long had a spine formula of 6, 5–6, 3–6, and those 57–64 mm long had a spine formula of 6, 4–6, 2–6.

S. a. calmani is a coastal species, generally occurring in shallower water than either *S. cadenati* or *S. mantis*; it is known to penetrate rivers and estuaries and can tolerate reduced salinities. BALSS (1916) reported a specimen from a stream in Nigeria. IRVINE (1947, p. 309) noted that in Ghana "It lives near the coast on sandy ground in which it makes burrows", and that its local name in the Ga dialect was "adena". LONGHURST (1957) found it in the estuary of the Sierra Leone River, and BUCHANAN (1958) in the inshore fine sandy community in 5–15 m off Ghana. LONGHURST (1958) recorded it in depths to 44 m on mud, shelly mud, and shelly sand in the *Venus* and *Venus-Amphioplus* transitional communities; it occurred offshore, but was more common in estuaries, including that of the Scarcies River, Sierra Leone. USCHAKOV (1970) found it in the muddy bottom of the coastal zone off Guinea. LE LOEUFF & INTES (1968) classed it as a coastal species, in 20–35 m off the Ivory Coast. They note (p. 38) that "*S. aculeata calmani* est la plus côtière des trois (species of *Squilla* encountered there); elle supporte, sans effectuer de migrations, toutes les variations des facteurs climatiques (sic), très importantes à faible profondeur; ce Stomatopode fréquente les substrats les plus divers, des sables fins au vases (Gd-Lahou). Il évite cependant le sable moyen jaune-roux . . .". MANNING (1970d, 1974a) reported it from 0–30 m on mud, shells and sand.

This species was found by LONGHURST (1957) in the stomach contents of the following fishes from the Sierra Leone River: *Trygon margarita*, *Arius latiscutatus*, *Pomadasyd jubelini*, *Pseudotolithus elongatus*, *P. senegalla*, *Drepane punctata*, *Polydactyla quadrifilis*, *Galeoides decadactylus*, and *Cynoglossis senegalensis*.

In compiling the literature records given below, I found that OSORIO (1887) reported *S. mantis* from Angola and Dahomey; in 1898 he listed only *S. empusa* from these two localities. I have assumed that his earlier record for *S. mantis* was based on *S. aculeata calmani*. This latter species was identified with the western Atlantic *S. empusa* Say until CALMAN described *Squilla africana* in 1916. HOLTHUIS (1959) introduced *calmani*, as CALMAN's name was preoccupied.

Type locality: Lagos, Nigeria. The holotype and paratypes are in the British Museum (Nat. Hist.). Two paratypes also are in the Division of Crustacea, USNM, Washington.

Distribution (Fig. 52): Widely distributed off tropical West Africa from Sénégal to Angola, from shore, beaches, and estuaries to 44 m; it usually occurs in waters less than 30 m deep. Records in the literature include: West Africa (MIERS, 1880; CALMAN, 1916); Joal, Sénégal, 4 m (CADENAT, 1950); Diogane, Sénégal (CADENAT, 1950); Casamance (Sénégal?) (OSORIO, 1889); Gambia (WHITE, 1847; MIERS, 1880; CALMAN, 1916; MONOD, 1925); Portuguese Guinea (OSORIO, 1889); Bissau, Portuguese Guinea (OSORIO, 1898); Ilha de Bissau, porto de Bissau, Portuguese Guinea (VILELA, 1949); Rio Grande, Bambaia, Portuguese Guinea (VILELA, 1949); Ilha de Pecixe, canal de Mantambua, porto de Passo, Portuguese Guinea (VILELA, 1949); Guinea (USCHAKOV, 1970); Guinea, 18–30 m (MANNING, 1974a); Sierra Leone (CALMAN, 1916; MONOD, 1925); Sierra Leone River (LONGHURST, 1957); Scarcies River, Sierra Leone (LONGHURST, 1958); Liberia (BÜTTIKOFER, 1890; JOHNSTON, 1906; HOLTHUIS, 1941); Monrovia, Liberia (BALSS, 1916); Ivory Coast (LE LOEUFF & INTES, 1968); Ivory Coast, 22 m (VOSS, 1966; MANNING, 1970d); Ivory Coast, 30 m (MANNING, 1974a); Accra, Ghana (IRVINE, 1947); Accra, Ghana, in 5–15 m (BUCHANAN, 1958); Dahomey (OSORIO, 1887, 1898); Lac d'Ajuda, Dahomey (OSORIO, 1889); Bight of Biafra, 0–44 m (LONGHURST, 1958); off Niger River, 24–30 m (MANNING, 1974a); Lagos, Nigeria (CALMAN, 1916; MONOD, 1925); Lagos harbour, surface (MANNING, 1970d); Bugoma, Nigeria, in a stream (BALSS, 1916); Nigeria, surface (MANNING, 1970d); Nigeria, 30 m (MANNING, 1974a); Cameroon, 0–30 m (CROSNIER, 1964); Cameroon, beach (MANNING, 1974a); Douala, Cameroon (BALSS, 1916); Sao Tomé (OSORIO, 1889, 1898); S. Joao dos Angulares, Sao Tomé (OSORIO, 1889); Isla Elobey, Rio Muni (BALSS, 1916); Gabon (MIERS, 1880; CALMAN, 1916; BALSS, 1916; MONOD, 1925; GRAVIER, 1927); Congo (MONOD, 1925); Vista, Congo (DARTEVELLE, 1951); Moanda, Congo (DARTEVELLE, 1951); mouth of the Congo River (JURICH, 1904); Angola (OSORIO, 1887, 1898).

Squilla cadenati Manning, 1970

(Figs 47, 57)

Squilla intermedia. — INGLE, 1960, p. 573, figs 11–12. — CROSNIER, 1964, pp. 34, 35, 38 [not *Squilla intermedia* Bigelow, 1893(b)].

Squilla mantis. — VOSS, 1966, p. 17 [not *Squilla mantis* (Linnaeus, 1758)].

Squilla. — VOSS, 1966, pp. 19 [part], 22.

Squilla sp. nov. — LE LOEUFF & INTES, 1968, pp. 36, 38, 72, figs 46, 63, tables 1–3.

Squilla cadenati Manning, 1970d, p. 267, fig. 3; 1974a, p. 20.

Material:

IFAN: South of Saint Louis, Sénégal, 100–300 m, “Gerard Treca”, 6–8.9.1955, 4♂ 115.5–132 mm.

Off Sénégal, 14°49'N, 17°33'W, 125–145 m, “Gerard Treca” St. 58.5.25, 1♂ 115 mm.

Off Sénégal, 15°05'N, 180–200 m, “Gerard Treca”, 14.9.1955, 2♂ 151–166 mm.

Sénégal, between Kayar and 15°30'N, 150 m, “Gerard Treca”, 26.10.1955, 5♂ 134–162 mm, 2♀ 101–156.5 mm (1♂, 1♀ Mus. Paris).

Fosse de Kayar, Sénégal, 290–300 m, A.Cm. & E.P., 1♀ 138 mm.

Kayar, Sénégal, 280–300 m, A.Cm. & E.P., 1♀ 140 mm.

Kayar, Sénégal, 85–660 m, “Gerard Treca”, 12.5.1954, 1♀ 128 mm.

Pointe-Noire, Congo, C.R., 9.1953, 1♂ 130 mm.

USNM: Sierra Leone, 07°50'N, 14°00'W, 70 m, Guinean Trawling Survey I, Tr. 9, St. 5, 1♀ 137 mm.

Cameroon, 04°08'N, 08°46.5'E, 50 m, black mud, A.C., 7.1.1963, 1♂ 129 mm, 2♀ 108–125 mm.

03°55.5'N, 09°09.5'E, 80–90 m, black mud, 7.1.1963, 2♂ 110–138 mm, 1♀ 50 mm.

03°54'30"N, 08°53'E, 62–64 m, mud, 26.8.1963, 3♂ 114–137 mm, 2♀ 116–130 mm.

03°54'N, 08°50'E, 65–70 m, mud, 25.8.1963, 2♂ 100–132 mm, 2♀ 136–153 mm.

03°50'N, 09°05'E, 48 m, mud, 24.8.1963, 3♂ 97–107 mm, 1♀ 96 mm.

03°27'N, 09°25'E, 50 m, black mud, trawl, 8.1.1963, 4♀ 60–99 mm.

Off Pointe-Noire, Congo, 04°43'S, 11°16'E, 120 m, trawl, A.C., 29.1.1959, 1♂ 94 mm.

04°44'S, 11°14'E, 200 m, mud, trawl, 24.4.1968, 2♀ 86–111 mm.

04°48'S, 11°39'E, 54–56 m, trawl, 23.9.1965, 1♂ 116 mm, 1♀ 92 mm.

04°48'S, 11°43'E, 40 m, trawl, 28–30.9.1965, 1♂ 49.5 mm.

04°48'S, 11°43'E, 40 m, trawl, 21–22.10.1965, 2♂ 39–52 mm, 1♀ 61 mm.

04°52'S, 11°39'E, 70 m, trawl, 21.1.1966, 2♂ 133.5–134 mm, 3♀ 94–119 mm.

- 04°52'S, 11°42'E, 50 m, trawl, 3.1.1964, 1♀ 73 mm.
 04°56'S, 11°30'E, 100 m, trawl, 21.1.1966, 7♂ 99–127 mm, 4♀ 97–135.5 mm.
 04°56'S, 11°31'E, 95–97 m, trawl, 21–22.9.1965, 2♀ 107–133 mm.
 04°58'S, 11°30'E, 100 m, trawl, 11.1.1964, 1♂ 77 mm, 2♀ 59.5–95 mm.
 04°58'S, 11°30'E, 100 m, trawl, 3♂ 50–81 mm, 2♀ 58–70 mm.
 05°02'S, 11°23'E, 200 m, trawl, 26.8.1965, 1♀ 124.5 mm.
 05°04'S, 11°25'E, 200–220 m, trawl, 10.9.1965, 1♂ 75.5 mm.
 Off Pointe Noire, Congo, 80–100 m, A.C., 1.8.1963, 5♂ 73–131 mm, 3♀ 93–119 mm; 65–100 m, trawl, 3.7.1959, 1♂ 110 mm; 100 m, trawl, 23.9.1965, 1♀ 94 mm; 200 m, sandy mud, trawl, 10.1.1967, 2♂ 142–164 mm; 50 m, trawl, 1♀ 48 mm.
 Off Angola, from stomach of *Mustelus*, 1 abdomen.
 CRO, Abidjan: Grand Bassam, Ivory Coast, 05°07.5'N, 03°49.5'W, 40 m, fine sandy oolitic mud, shells, shrimp trawl, L.L. & A.I., 20.10.1967, 1♂ 62 mm, 2♀ 61–64 mm.
 BMNH: Nigeria, 06°08'N, 02°58'E, A.L., 1♀ 118 mm.
 Mus. Tervuren: Between Boma and 2°S, coast, J.M., 7.1968, 1♂ 85 mm, 1♀ 105 mm.
 Angola, between Cap Palmeirinhas and Novo Redondo, 50–100 m, J.M., 9.1964–3.1965, 4♂ 99–139 mm, 3♀ 61–97 mm.
 Angola, between Luanda and Novo Redondo, 80–100 m, J.M., 1.1966, 1♂ 123 mm.
 Mus. Brussels: Ghana, 06°00'N, 01°33'E, 70 m, Guinean Trawling Survey II, "Thierry", Tr. 34, St. 5, 23.2.1964, 1♂ 124 mm.
 Angola, Cap Morrho Sud, 10°50'S, 13°30'E, Mission Peche, 25.5.1956, 1♀ 157 mm.

Description: Eye (Fig. 47a) large; cornea bilobed, set very obliquely on stalk; eyes not extending beyond end of first segment of antennular peduncle; ocular scales acute or rounded laterally; anterior margin of ophthalmic somite with median emargination; corneal indices 300–471 (Table 4).

Antennular peduncle as long as or slightly shorter than carapace; antennular processes produced into acute lobes directed anterolaterally.

Antennal scale more than half as long as carapace; antennal peduncle extending to or slightly beyond anterior edge of eye.

Rostral plate (Fig. 47a) rounded anteriorly, broader than long; upturned lateral margins sinuous; median carina present, extending almost to anterior margin.

Median carina of carapace (Fig. 47a) with well-marked, entire anterior bifurcation, distance from dorsal pit to bifurcation less than distance from bifurcation to anterior margin (incorrectly shown on figure); intermediate carinae extending almost to anterior margin; anterior margin of each lateral plate concave; anterolateral spines not extending to base of rostral plate, margin of carapace

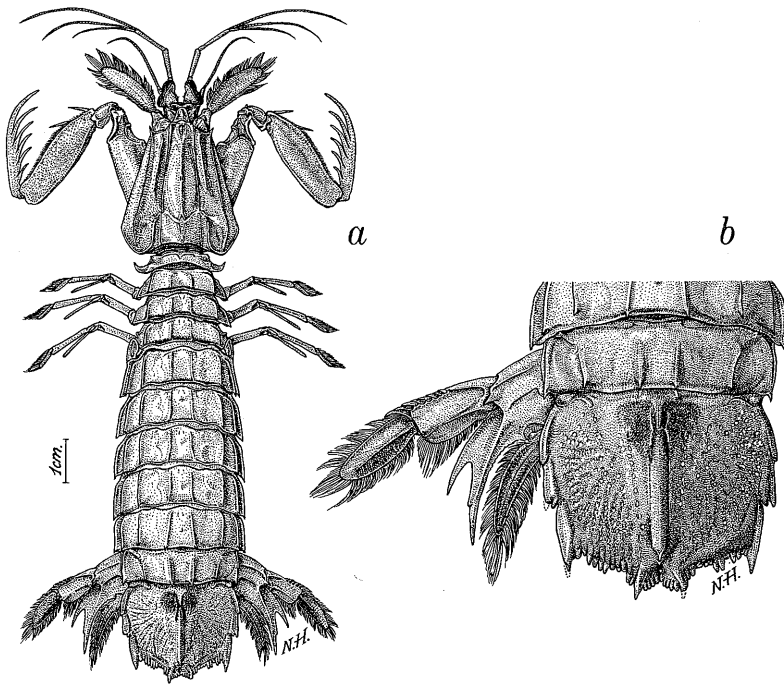


Fig. 47. *Squilla cadenati* Manning, Sénégal (not seen): a, dorsal view; b, posterior portion of body.

under each spine angled; posterolateral margin with obtusely angled projection anteriorly.

Raptorial claw (Fig. 47a) large; dactylus with 6 teeth, outer margin of dactylus rounded or slightly flattened; dorsal ridge of carpus with 2–3, usually 2, sharp tubercles; basal segment unarmed.

Mandibular palp and 5 epipods present.

Lateral process of fifth thoracic somite a slender, sharp spine, directed anterolaterally or almost anteriorly; lateral process of sixth thoracic somite bilobed, anterior lobe a tubercle, posterior lobe much larger, triangular, apex sharp; lateral process of seventh thoracic somite not markedly bilobed, angled anterolaterally, sharp posterolaterally; fifth somite with median tubercle; posterior 3 thoracic somites with well-marked, unarmed submedian and intermediate carinae; ventral keel of eighth somite rounded.

Abdomen strongly carinate, submedian carinae subparallel or slightly divergent on posterior somites; second to fifth somites with interrupted median carinule; second to fourth somites with anterior tubercle between intermediate and lateral carinae; lateral carinae of second to fifth somites bicarinate; abdominal carinae spined as follows in adults: submedian 5–6, intermediate 2–6, lateral 1–6, marginal 1–5; marginal spine of first somite deflected ventrally; sixth somite with small, sharp spine in front of articulation of each uropod.

Telson (Fig. 47b) broader than long, with 3 pairs of marginal teeth, prelateral lobes present; median carina convex anteriorly, straight or concave posteriorly, flanked posteriorly by prominent tubercle; dorsal surface of telson smooth, marked only by curved rows of pits; denticles small, 2-6, 10-13, 1, usually 4-5, 10-11, 1; ventral surface with short, irregular, postanal keel; margin of telson noticeably inflated in adult males.

Proximal segment of uropodal exopod (Fig. 47b) with 8-10, usually 8-9, movable spines on outer margin, distalmost short, not extending to midlength of distal segment; basal prolongation of uropod with low, inconspicuous lobe, margin slightly concave, on outer margin of longer inner spine; inner margin of basal prolongation irregularly tuberculate.

Color: Carinae and grooves of carapace dark; posterior 3 thoracic and all abdominal somites with dark posterior line; second abdominal somite with dusky, rectangular middorsal patch; telson with proximal pair of oval patches; uropodal exopod with distal half of proximal segment and inner half of distal segment dark, distal half of endopod dark.

J. CADENAT included the following notes on color in his manuscript account of the species: "Le telson présente deux taches triangulaires allongées (sombres en liquide, rouge vif sur le vivant) de part et d'autre de la carène médiane; la pointe du triangle dirigée vers l'arrière. Ces deux taches sont reliées par une petite bride passant au dessus de la carène médiane du telson. Alors que les taches arrondies du telson de *S. mantis* sont toujours nettement séparées et restent très apparentes en liquide conservateur; celles de *S. cadenati* ont tendance à s'atténuer rapidement et chez plusieurs individus il ne reste plus bien visibles que la bride sur la carène et une petite bande verticale à droite et à gauche de celle-ci, le tout donnant l'aspect de la letter H. De plus les uropodes présentent une coloration particulière: le premier article de l'exopodite présente une bande longitudinale sombre dans sa partie médiane, et la moitié interne du deuxième article est également foncée; l'endopodite est également sombre sur presque toute sa surface."

Size: Males (54), TL 39-166 mm; females (50), TL 48-157 mm. Males 33-150 mm long and females 30-135 mm long have been recorded in the literature. Other measurements of the male holotype, TL 150 mm: carapace length 33.0; cornea width 7.4; antennular peduncle length 29.8; antennal scale length 21.6; rostral plate length 3.8, width 4.5; telson length 30.5, width 33.1.

Remarks: *S. cadenati* can readily be distinguished from the two other West African species of *Squilla*, *S. aculeata calmani* and *S. mantis*. It differs from *S. a. calmani* in having larger eyes, a more distinct anterior bifurcation on the median carina of the carapace, five rather than four epipods, a tuberculate carpus on the claw, more abdominal carinae ending in spines, and in lacking the basal spine on the claw. It also occurs in deeper water, rarely having been taken in depths

shallower than 40 m. It may occur together with *S. mantis*, but also can be distinguished readily from that species. In *S. cadenati*, the lateral process of the fifth thoracic somite is curved anteriorly, the intermediate carinae of the first abdominal somite are unarmed, the marginal spine on the first abdominal somite is deflected ventrally, the lateral carinae of the abdomen are bicarinate, and there are dark, oval patches rather than dark circles surrounded by a lighter ring on the telson.

S. cadenati is very similar to *S. intermedia* Bigelow, with which it was identified by INGLE (1960), the first to record its occurrence off West Africa. MANNING (1970d) has outlined the differences between *S. cadenati* and several related American species.

The telson margin is very inflated in large males of this species, and the swellings are interrupted at the bases of the marginal teeth. The telson may be swollen in males as small as 115.5 mm in length, and it also was very inflated in the largest female examined, TL 156.5 mm, though not quite to the same extent as in males. The marginal area of the abdomen, submedian carinae of the sixth abdominal somite, and median carina of the telson also may be inflated.

INGLE (1960) reported material of this species from 55 m off Nigeria. CROSNIER (1964) found it off Cameroon on mud or sandy mud in depths greater than 50 m. LE LOEUFF & INTES (1968) included it as a member of the borderline fauna of the continental plateau; off the Ivory Coast they found it between 60 and 200 m. They noted (p. 38) "C'est une espèce d'eaux froides - 19.5°C à 14.4°C - qui occupe donc le rebord du plateau et le début de la pente continentale". MANNING (1970d, 1974a) recorded it from several localities in the Gulf of Guinea between 37 and 220 m. Material reported here was taken between 40 and 300 meters on mud, black mud, or fine oolitic sandy mud with shells; for one record a depth range of 85 to 660 m was given, but the species is not known with certainty to live below 300 m.

Type locality: Off the Ivory Coast, 05°05'N, 04°04.5'W to 05°06'N, 04°06'W, 73-97 m. The holotype and paratypes are in the Division of Crustacea, USNM, Washington, and paratypes are in the Rijksmuseum van Natuurlijke Historie, Leiden.

Distribution (Fig. 57): Off tropical West Africa, from northern Sénégal to between Loanda and Novo Redondo, Angola, from 37 to 300 m. Records in the literature include: Liberia, 70 m (MANNING, 1970d), 70-220 m (MANNING, 1974a); Ivory Coast, 38-97 m (VOSS, 1966), 60-200 m (LE LOEUFF & INTES, 1968), 37-192 m (MANNING, 1970d), 40-100 m (MANNING, 1974a); Ghana, 61-64 m (VOSS, 1966), 49-64 m (MANNING, 1970d), 70 m (MANNING, 1974a); Dahomey, 100-115 m (MANNING, 1974a); off the Niger River, 59-63 m (MANNING, 1970d), 90 m (MANNING, 1974a); off Nigeria, 55 m (INGLE, 1960), 101 m (MANNING, 1970d); Cameroon, more than 50 m (CROSNIER, 1964), 70-72 m (MANNING, 1974a).

It has not been recorded previously from as far north as Sénégal or as far south as Angola.

Squilla mantis (Linnaeus, 1758)

(Figs 48, 57)

Cancer mantis Linnaeus, 1758, p. 633. — HOLTHUIS, 1969, p. 221 [restricted to the Mediterranean by selection of neotype from Adriatic Sea].

Squilla mantis. — BRULLÉ, 1839, p. 18. — KOELBEL, 1892, p. 108. — GIESBRECHT, 1910, pp. 25–34, 125, 134 [juvenile], 56, 87–111 [larvae], text-figs 5–8, 11–12, pl. 1 figs 1–2, 9 [color], pl. 2, pl. 5 figs 43–60, pl. 6 figs 43–58 [juveniles], pl. 9 [larvae] [Gulf of Naples]. — MONOD, 1925, pp. 86, 90 [key], 92 [listed]; 1933, p. 540 [listed]; 1951, p. 143 [key]. — CADENAT, 1950, p. 192. — DARTEVELLE, 1951, p. 1032 [discussion]. — INGLE, 1960, p. 573 [discussion], figs 13–14. — LONGHURST, 1958, pp. 64, 86. — VOSS, 1966, p. 16. — MAURIN, 1968a, p. 41; 1968b, p. 480. — LE LOEUFF & INTES, 1968, pp. 36, 38, 67, 70, figs 46, 62, tables 1–3. — MANNING, 1970b, p. 271, fig. 4. — FOREST, 1973, fig. SQUIL squil 1 [Mediterranean]. — MANNING, 1974a, p. 20.

Material:

IFAN: Coast of Morocco, trawl, Fn., 1.1954, 6♂ 85–150 mm, 4♀ 109–133 mm (1♂, 1♀ Mus. Paris).

Cap de Naze, Sénégal, from stomach of *Trygon marmorata*, 25.4.1954, 1 postlarva 23 mm.

Off Cap de Naze, Sénégal, “Gerard Treca”, 1♀ CL 25.0 mm.

Off Kayar, Sénégal, ca. 50 m, “Gerard Treca”, 26.10.1955, 2♀ 106–128 mm.

North of Dakar, Sénégal, 100 m, E.P., 1949, 1♂ 64 mm.

Gorée, Sénégal, 15 m, J.C., 25.4.1952, 1♂ CL 22.7 mm.

Off Dakar, Sénégal, 30 m, J.C., 1943, 1♂ 124 mm.

Joal, Sénégal, beach seine, A.Cm. & J.C., 1943, 2♂ 115–124 mm; J.C., 1943, 1♀ 117 mm.

USNM: Togo, 06°N, 01°20'E, 45–50 m, very sandy mud, A.C., 18.10.1963, 1♀ 144 mm.

Dahomey, 06°04'N, 01°38'30"E, 48 m, mud, A.C., 17.10.1963, 1♂ 142.5 mm, 3♀ 123–153.5 mm.

Dahomey, 06°07'N, 01°53'E, 50–55 m, sandy mud, A.C., 23.7.1964, 1♀ 120 mm.

Dahomey, 06°10'40"N, 02°02'E, 35 m, muddy sand, A.C., 22.7.1964, 1♂ 130 mm.

Cameroon, 03°50'N, 09°05'E, 48 m, mud, A.C., 24.8.1963, 1♀ 51.5 mm.

Gulf of Guinea, Guinean Trawling Survey I, Tr. 2, “La Rafale”, caught in surf, 10.12.1963, 1♀ 133 mm.

CRO, Abidjan: Grand Bassam, Ivory Coast, 05°07.5'N, 03°49.5'W, 40 m, fine sandy oolitic mud, shells, temp. 17.2°C, sal. 35.70‰, shrimp trawl, L.L. & A.I., 10.10.1967, 1♂ 85 mm, 2♀ 77–88.5 mm.

Mus. Munich: Canary Islands, 1♂ 104 mm, 1♀ 113 mm.

Mus. Vienna: Tenerife, Canary Is., St., 1865, 2♀ 107–117 mm.

Fernando Póo, Gulf of Guinea, 10–15 m, Helgoland Exped., 1♂ 128 mm, 2♀ 125–144 mm.

Mus. Frankfurt: Agadir, Morocco, fish market, M. T., 9.7.1975, 1♀ 141 mm (USNM).

Cap Blanc, Mauritania, 21°20.8'N, 17°29.5'W, 186–247 m, "Meteor" St. M36–105, 28.2.1975, 1♂ 27 mm.

Mus. Brussels: Ghana, 04°27'N, 01°32'W, 70 m, Guinean Trawling Survey II, "Thierry", Tr. 29, St. 5, 11.3.1964, 3♂ 105–142 mm.

Gabon, 04°16'N, 08°13'E, 30 m, Guinean Trawling Survey II, "Thierry", Tr. 45, St. 2, 14.4.1964, 1♂ 123 mm.

Angola, Baie de Tigres, 16°10'S, 11°40'E, Mission Peche, 1♀ 138 mm.

Description: Eye (Fig. 48a) large; cornea bilobed, set obliquely on stalk; eyes extending about to end of first segment of antennular peduncle; ocular scales rounded, inclined laterally; anterior margin of ophthalmic somite with median emargination; corneal indices 381–451 (Table 4).

Antennular peduncle as long as or longer than carapace; antennular processes produced into sharp lobes directed anterolaterally.

Antennal scale more than half as long as carapace. Antennal peduncle not extending beyond eye.

Rostral plate (Fig. 48a) trapezoidal, appearing elongate, usually broader than long; sinuous lateral margins converge at broadened apex; median carina present, not extending to anterior margin.

Median carina of carapace with well-marked anterior bifurcation, distance from dorsal pit to bifurcation less than distance from bifurcation to anterior margin; intermediate carinae extending almost to anterior margin; anterior margin of each lateral plate straight or slightly concave, mesial portions sloping posteriorly; anterolateral spines not extending to base of rostral plate, margin of carapace under each spine rounded; posterolateral margin without well-marked angular projection.

Raptorial claw (Fig. 48a) large; dactylus with 6 teeth, outer margin of dactylus sinuate; dorsal ridge of carpus with 2 sharp tubercles; basal segment unarmed.

Mandibular palp and 5 epipods present.

Lateral process of fifth thoracic somite a short, sharp spine, directed laterally, posterior margin convex; lateral process of sixth somite faintly bilobed, anterior lobe at most a rounded tubercle, posterior lobe much larger, triangular, apex spiniform, posterior margin convex; lateral process of seventh somite not noticeably bilobed, anterior margin irregular, posterior margin convex, apex spiniform;

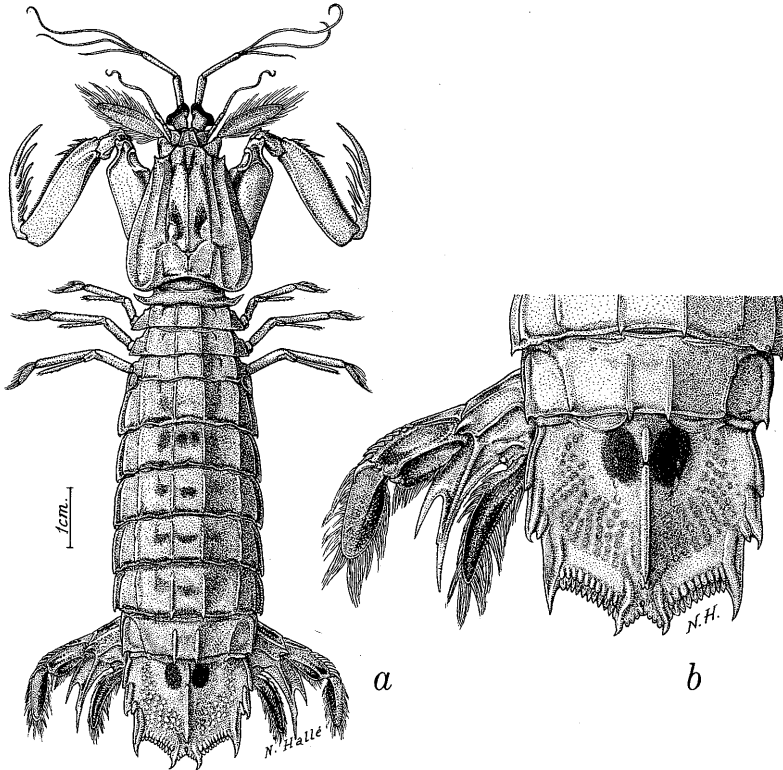


Fig. 48. *Squilla mantis* (Linnaeus), male, TL 113 mm, Sénégal (not seen): *a*, dorsal view; *b*, posterior portion of body.

posterior 3 thoracic somites with well-marked, unarmed submedian and intermediate carinae; ventral keel of eighth somite triangular, rounded.

Abdomen (Fig. 48*a*) strongly carinate, submedians subparallel or slightly divergent on posterior somites; second to fifth somites with interrupted median carinule and anterior tubercle between intermediate and lateral carinae; abdominal carinae spined as follows in adults: submedian (3-4)5-6, intermediate (1)2-6, lateral 1-6, marginal 1-5, usually submedian 4-6, intermediate 1-6; sixth somite with sharp spine in front of articulation of each uropod.

Telson (Fig. 48*b*) as broad as or slightly broader than long, with 3 pairs of marginal teeth, prelateral lobes present; dorsal surface of telson smooth, marked only by curved rows of pits; denticles spiniform in young, triangular in adults, 3-5, 8-11, 1; ventral surface with short postanal keel.

Proximal segment of uropodal exopod (Fig. 48*b*) with 7-9, usually 8, movable spines on outer margin, distalmost short, not extending to midlength of distal segment; basal prolongation of uropod with low lobe, margin concave, on outer margin of longer inner spine; inner margin of basal prolongation irregularly tuberculate.

Color: Posterior 3 thoracic and anterior 5 abdominal somites each with dark posterior line; second abdominal somite with dark, rectangular dorsal patch; telson with pair of large, dark circles anteriorly; uropodal exopod with distal half of proximal segment and inner half of distal segment dark; most of uropodal endopod dark.

MANNING (1970d, p. 273) gave the following description of live specimens: "claw light, distal portions of propodus and carpus and meral ridges yellow; dorsal patch on second abdominal somite maroon; third to fifth abdominal somites with median and submedian spots connected by maroon bar; spines and articular surface of sixth abdominal somite, telson and uropods yellow; eyespots on telson deep maroon, surrounded by a white ring".

GIESBRECHT (1910) gave three colored figures of this species.

Size: Males (21), TL 27–150 mm; females (24), TL 51.5–153.5 mm; postlarva (1), TL 23 mm. Males 26–150 mm long and females 25–136 mm long have been recorded in the literature from West African localities. Other measurements of a female, TL 126 mm: carapace length 27.7; cornea width 6.5; antennular peduncle length 29.7; antennal scale length 19.2; rostral plate length 4.0, width 4.9; telson length 25.8, width 26.6.

Remarks: Judging from accounts in the literature as well as from the amount of material available for study, *S. mantis* is the least abundant of the three West African species of *Squilla*. Differences between it and the other two species are discussed in the accounts of those species, given above.

Off West Africa, *S. mantis* appears to live between the inshore *S. aculeata calmani* and the offshore *S. cadenati*; it has been collected together with the latter species on several occasions. LE LOEUFF & INTES (1968) characterize *S. mantis* as a subcoastal, mud-inhabiting species; they found it in depths of 30–60 m off the Ivory Coast. They commented (p. 38): "nous l'avons rencontré dans des eaux en général plus froides – entre 24°C et 17°C – et plus salées – de 35.70‰ à 35.40‰ – toujours sur de vases sableuses à taux d'éléments fins compris entre 25 et 80%". MONOD (1925) recorded specimens from off Morocco in 38 m on slightly muddy grey sand. LONGHURST (1958) found the species in the Bight of Biafra on sandy mud between 36 and 113 m. It also was found by MAURIN (1968a, b) off Cap Juby on muddy sand or on mud and shell in 40–50 m. MANNING (1974a) reported the species from off Gambia on mud, stones, calcareous algae, sand, and foraminiferans in 51–55 m, off Guinea on mud and shell in 60–73 m, and off the Ivory Coast in 21–50 m on muddy sand and foraminiferans. Apparently off West Africa this species inhabits moderate depths on the continental shelf; few of the specimens reported here were collected from the shore.

The specimens examined are very uniform in basic facies. Most have the submedian carinae of the fourth abdominal somite and intermediate carinae of the first abdominal somite spined; the presence of spines on the submedian carinae of

the fourth somite did not appear to be correlated with any other character. Two specimens have accessory spines on the fifth abdominal somite between the submedian and intermediate carinae.

The single postlarva examined, 10 mm larger than the postlarva of *S. aculeata calmani*, lacks anterolateral spines on the carapace, has movable apices on the submedian teeth of the telson, and has the following spines on the abdominal carinae: submedian 6, intermediate 6, lateral 4–6. The dark circles on the telson and dark pattern on the uropods are similar to those found in the adult.

Comparison of specimens from West Africa with others from the Mediterranean revealed no marked differences. The lateral processes of the sixth and seventh thoracic somites appeared to be slenderer and more elongate in the West African specimens.

KOELBEL (1892) noted that the local name for the species in the Canary Islands is "cienpies del mar".

In the synonymy I have included references to the selection of a neotype by HOLTHUIS (1969) as well as to the account given by FOREST (1973) who published the best overall figure of the species.

Type locality: Restricted to between Split and Trogir, Dalmatian coast of Yugoslavia, Adriatic Sea, by selection of a neotype by HOLTHUIS (1969). The neotype is in the Rijksmuseum van Natuurlijke Historie, Leiden.

Distribution (Fig. 57): Mediterranean Sea and Atlantic coast of southern Europe; West African coast from Morocco to southern Angola, including the Canary Islands, from shore to 186–247 m, usually in 120 m or less. Records in the literature include: Canary Is. (BRULLE, 1839); Valle Bufadero, Santa Cruz de Tenerife and Las Palmas, and Telde, Grand Canary Is., Canary Is., 50–100 m (KOELBEL, 1892); off Cap Juby, Morocco, 40–50 m (MAURIN, 1968a, 1968b); off Morocco, 33°36'30"N, 07°49'W, 38 m (MONOD, 1925); Rabat, Morocco, 120 m (MONOD, 1925); Casablanca, Morocco, 100–110 m (MONOD, 1925); Cap Blanc, Mauritania, 18 m (MONOD, 1925); SE of Dakar, Sénégal, 25–30 m (CADENAT, 1950); Joal, Sénégal, 10 m (CADENAT, 1950); Gambia, 51–55 m (MANNING, 1974a); Guinea, 60–73 m (MANNING, 1974a); Sierra Leone (INGLE, 1960), in 40 m (MANNING, 1974a); Ivory Coast, 30–60 m (LE LOEUFF & INTES, 1968), in 37–42 m (MANNING, 1970d), in 21–50 m (MANNING, 1974a); Ghana, 27 m (VOSS, 1966), in 27–48 m (MANNING, 1970d), in 35–37 m (MANNING, 1974a); Bight of Biafra, 36–113 m (LONGHURST, 1958); Gabon, 41 m (MANNING, 1974a); Congo, 50 m (MANNING, 1974a).

LARVAL STOMATOPODA REPORTED FROM WEST AFRICA

An annotated list of the larval stomatopods from West African waters, including several references to larvae from the Atlantic in general, is included here as a companion to the main part of this work on adults. Many larval forms have been named from off West Africa, yet to date none have been identified with their corresponding adult (other than *Alima hyalina*; that work was carried out elsewhere). The larval stomatopods are important components of tropical plankton and are widely used by tunas as food (DRAGOVICH, 1969, 1970; DRAGOVICH & POTTHOFF, 1972). Hopefully this list will aid those initiating studies on larval forms from the area.

In the list given below the entries have been cross-referenced, so that a reference may be located by using either the original name cited, the combination in current use today, or, where applicable, the name used for the adult; names considered to be synonyms also are cross-referenced. Although I have tried to include all original citations, I have not attempted to trace all of the names through early encyclopedic works on crustaceans, including many of the older accounts by LAMARCK, LATREILLE, and H. MILNE-EDWARDS. The list is reasonably complete for tropical waters, but I made no effort to trace early papers dealing with larvae found off northern Europe (largely summarized by VAN DER BAAN & HOLTHUIS, 1966, with comments by VERWEY, 1966) and the Mediterranean, where early records have been summarized by GIESBRECHT (1910). For anyone attempting to work on larval forms from the area, the papers by CLAUS (1871), BROOKS (1886b), HANSEN (1895), JURICH (1904), and GIESBRECHT (1910), will be indispensable. GURNEY (1946) has compiled a list of names applied to larvae and is an invaluable source.

Seventeen generic names based on larval stomatopods have been introduced into the literature. These are summarized in Table 5.

In the list that follows, names applied to adults are in capital letters, those applied to larvae are in the usual italics. References to *Lysierichthus* and *Lysioerichthus* are listed together in the form cited by each author. The locality for the larvae is given in the list for each reference.

Alima Brooks, 1886b, p. 89, pl. 7 fig. 7, pl. 8 fig. 7 [west coast of Africa; Sierra Leone].

Alima angusta — see *Alima hyalina*.

Alima bigelowi Hansen, 1895, p. 93, pl. 8 figs 9–10 [South Equatorial Current near Fernando Noronha] [identified with the western Atlantic *MEIOSQUILLA QUADRIDENS* (Bigelow) by HANSEN].

Alima dilatata Hansen, 1895, p. 95, pl. 8 figs 12–13 [South Equatorial Current]. — CALMAN, 1917, p. 142 [South Atlantic].

Alima gracilis — see *Alima hyalina*.

Alima hyalina Leach, in TUCKEY, 1817, figure on unnumbered plate; in TUCKEY, 1818a, p. 416; 1818b, p. 305, fig. 7 [Porto Praya, Cape Verde Is. and 07°37'N,

- 17°34'15"W]. — DESMAREST, 1825, p. 253 [Porto Praya, Cape Verde Is.]. — H. MILNE-EDWARDS, 1837, p. 507. — WHITE, 1847, p. 83 [LEACH's material listed: Atlantic, Congo Exp.]. — HERKLOTS, 1851, p. 26 [listed from Cape Verde and Sénégal]. — BATE, 1868, pp. 443, 446 [Atlantic]. — CUNNINGHAM, 1871, p. 497 [south of Cape Verde Is.]. — HANSEN, 1895, p. 92, pl. 8 fig. 8 [North Equatorial Current]. — JURICH, 1904, p. 25 [Guinea Current, NE of Sao Tomé]. — MONOD, 1970, p. 66 [re-examination of LEACH's material].
- Alima angusta* Dana, 1852, p. 631; atlas, 1855, pl. 42 fig. 2a-f [Atlantic, 02.5°N, 17.25°W].
- Alima gracilis*. — CLAUS, 1871, pl. 8 fig. 35.
- Squilla (Alima) gracilis*. — BROOKS, 1886b, p. 84, pl. 4 figs 4-6, pl. 5 fig. 3, pl. 6 figs 3-5, pl. 8 figs 5-6 [St. Vincent, Cape Verde Is. and west coast of Africa].
- Alima latior* Giesbrecht, 1910, pp. 51, 111 [Gulf of Naples].
- Alima longicauda* Jurich, 1904, p. 26, pl. 3 fig. 8-8a [Benguela Current] [GURNEY, 1946, p. 159, suggests that this is synonymous with *Alima bidens* Claus, 1871, from an unknown locality].
- Alima punctifera* Jurich, 1904, p. 28, pl. 4 fig. 1-1a [Guinea Current].
- Alima subtruncata* Jurich, 1904, p. 24, pl. 3 fig. 4 [Guinea Current, 29°20'S].
- Alima triangularis* Jurich, 1904, p. 29, pl. 3 fig. 7-7a [Nisida, Bay of Naples] [GIESBRECHT, 1910, p. 48 identifies this as the seventh pelagic stage of *MEIOSQUILLA DESMARESTI*].
- Alima trivialis* Hansen, 1895, p. 95, pl. 8 fig. 11 [South Equatorial Current].
- Astacus vitreus* — see *Lysioerichthus vitreus*.
- CORONIDA BRADYI* — see *Smerdis armata*.
- Coroniderichthus armatus* — see *Smerdis armata*.
- Coronis (Erichthus) minutus* — see *Lysioerichthus minutus*.
- Erichthalima synthetica* Brooks, 1886b, p. 111 [established for the larva of *CORONIDA*].
- Squillerichthus*. — CLAUS, 1871, pl. 3 fig. 14 [Atlantic].
- HANSEN (1895) considered *Erichthalima* to represent a new genus, and GIESBRECHT (1910) thought it could be an *Alima* or a new genus.
- Erichthoid larva. — CLAUS, 1871, pl. 1 fig. 1 [Messina] — see also *NANNOSQUILLOIDES OCCULTA*.
- Erichthoidina armata* — see *Lysioerichthus edwardsii*.
- Erichthoidina gracilis* Claus, 1871, p. 12, pl. 1 fig. 2 [Atlantic].
- Erichthoidina spinosa* — see *PLATYSQUILLA EUSEBIA*.
- Erichthoidina (Gonodactylus)*. — BROOKS, 1886b — see *PROTOSQUILLA FOLINI*.
- Erichthus*
- Sehr junge Erichthus-formen. — JURICH, 1904, p. 41, pl. 4 fig. 7 [Kanarische Strömung].
- Erichthus aculeatus* H. Milne-Edwards, 1837, p. 501, pl. 28 fig. 10 [southern

TABLE 5. The status of generic names applied to larval forms of Stomatopoda. *Erichthus*, *Smerdis*, *Coroniderichthus*, *Pseuderichthus*, and *Alimerichthus* Claus have been suppressed by the International Commission on Zoological Nomenclature. For all but *Alima*, the source of action listed in the right column is HOLTHUIS & MANNING (1969)

Name	Identified as the larva of	Nomenclatural status
<i>Alima</i> Leach, 1817	squillids	Recognized as a genus of adults, <i>Alima</i> (MANNING, 1968, 1969a).
<i>Smerdis</i> Leach, 1817	lysiosquillids	Synonymized with <i>Lysiosquilla</i> Dana, 1852.
<i>Erichthus</i> Latreille, 1817	gonodactylids, lysiosquillids, pseudosquillids	Synonymized with <i>Lysiosquilla</i> Dana, 1852.
<i>Squillerichthus</i> H. Milne-Edwards, 1837	squillids	Synonymized with <i>Squilla</i> Fabricius, 1787.
<i>Alimerichthus</i> Guérin, in SAGRA, 1855	<i>Pseudosquilla</i>	Synonymized with <i>Pseudosquilla</i> Dana, 1852.
<i>Halimonectes</i> Guérin, in SAGRA, 1855	squillids	Synonymized with <i>Squilla</i> Fabricius, 1787.
<i>Hyalopelta</i> Guérin, in SAGRA, 1857	squillids	Synonymized with <i>Squilla</i> Fabricius, 1787.
<i>Lampropelta</i> Guérin, in SAGRA, 1857	lysiosquillids	—
<i>Pontiobius</i> Guérin, in SAGRA, 1857	lysiosquillids	Synonymized with <i>Lysiosquilla</i> Dana, 1852.
<i>Alimerichthus</i> Claus, 1871	squillids	Synonymized with <i>Harpio-squilla</i> Holthuis, 1964.
<i>Erichthoidina</i> Claus, 1871	lysiosquillids	Synonymized with <i>Lysiosquilla</i> Dana, 1852.
<i>Erichthalima</i> Brooks, 1886a	doubtful affinity; named for <i>Coronida</i>	—
<i>Gonerichthus</i> Brooks, 1886a	gonodactylids (probably <i>Protosquilla</i>)	Synonymized with <i>Gonodactylus</i> Berthold, 1827.
<i>Lysioerichthus</i> Brooks, 1886a	lysiosquillids	Synonymized with <i>Lysiosquilla</i> Dana, 1852.
<i>Pseuderichthus</i> Brooks, 1886a	pseudosquillids	Synonymized with <i>Pseudosquilla</i> Dana, 1852.
<i>Odontoerichthus</i> Bigelow, 1894	<i>Odontodactylus</i>	Synonymized with <i>Odontodactylus</i> Bigelow, 1894.
<i>Coroniderichthus</i> Hansen, 1895	<i>Coronida</i>	Synonymized with <i>Coronida</i> Brooks, 1886a.

- Atlantic]. — HANSEN, 1895, p. 76 [= *Lysierichthus*, probably *L. edwardsii*, according to HANSEN].
- Erichthus armatus* (various authors, not EYDOUX & SOULEYET, 1842) – see *Smerdis armata*.
- Erichthus edwardsii* – see *Lysioerichthus edwardsii*.
- Erichthus guerinii*. — CLAUS, 1871 – see *Lysioerichthus edwardsii*.
- Erichthus latreillei*. — CLAUS, 1871 – see *Lysierichthus pulcher*.
- Erichthus leachii* – see *Lysioerichthus vitreus*.
- Erichthus minutus* – see *Lysioerichthus minutus*.
- Erichthus palliatus* – see *Lysioerichthus edwardsii*.
- Erichthus pygmaeus* Jurich, 1904, p. 40, pl. 4 fig. 6–6a [Kanarische Strömung].
- Erichthus pyramidatus* – see *Smerdis armata*.
- Erichthus spiniger* – see *Lysioerichthus spiniger*.
- Erichthus spiniventris* Guérin-Ménéville, in SAGRA, 1875, p. lx, pl. 3 fig. 9 [Atlantic, between Cadiz and Rio de Janeiro].
- Erichthus spinosus* – see *Smerdis armata*.
- Erichthus vestitus* – see *Lysioerichthus vitreus*.
- Erichthus vitreus* – see *Lysioerichthus vitreus*.
- Gonerichthus* Brooks, 1886b – see *PROTOSQUILLA FOLINI*.
- Gonodactylus* Claus, 1871 – see *PROTOSQUILLA FOLINI*.
- Gonodactylus (Gonerichthus)* Brooks, 1886b – see *PROTOSQUILLA FOLINI*.
- GONODACTYLUS FALCATUS** (Forskål, 1775)
- Gonodactylus glabosus*. — BACESCU & MAYER, 1961, p. 195 [37°40.8'N, 23°45.9'E].
- Gonodactylus folinii* – see *PROTOSQUILLA FOLINI*.
- Gonodactylus glabosus* – see *GONODACTYLUS FALCATUS*.
- Heterosquilla eusebia* – see *PLATYSQUILLA EUSEBIA*.
- Lysioerichthus edwardsii* (Eydoux & Souleyet, 1842)
- Erichthus edwardsii* Eydoux & Souleyet, 1842, p. 260, pl. 5 figs 39–54 [Atlantic].
- Erichthus palliatus* Dana, 1852, p. 626; atlas, 1855, pl. 41 fig. 6a–e [Atlantic, 06°S, 24°W] [synonymized with *L. edwardsii* by HANSEN, 1895].
- Erichthoidina armata* Claus, 1871, p. 13, pl. 1 fig. 3, pl. 2 figs 7–8 [no locality] [identified by GURNEY (1946) with *L. edwardsii* and the western Atlantic *LYSIOSQUILLA GLABRIUSCULA* (Lamarck)].
- Erichthus guerinii*. — CLAUS, 1871, p. 27, pl. 4 fig. 17 [no locality] [identified with *L. edwardsii* by HANSEN, 1895].
- Lysierichthus edwardsii*. — HANSEN, 1895, p. 75, pl. 7 figs 4–5 [South Equatorial Current, Guinea Current].
- Lysioerichthus edwardsii*. — STEBBING, 1914, p. 300, pl. 25B [19°59'N, 22°34'W].
- Lysiosquilla glabriuscula (Lysierichthus edwardsii)*. — CALMAN, 1917, p. 143 [Atlantic, on Equator, 25°15'W].

Lysioerichthus edwardsii was identified by HANSEN (1895) as the larval form of the western Atlantic *LYSIOSQUILLA GLABRIUSCULA* (Lamarck); he also tentatively synonymized *L. edwardsii* with *Erichthus aculeatus* H. Milne-Edwards, 1837. As many of the larvae identified with *L. edwardsii* have been taken outside of the range of *L. GLABRIUSCULA* (see MANNING, 1969a), it seems likely that *L. edwardsii* is the larva of another lysiosquillid or that the larvae of several species have been identified with it.

Lysierichthus latreillei. — GURNEY, 1946, p. 151, fig. 11E-E' [South Atlantic].

This species was originally described by GUÉRIN-MÉNÉVILLE (1830) from Timor and nearby islands.

Lysioerichthus minutus Brooks, 1886b

Coronis (Erichthus) minutus Brooks, 1886b, p. 105, pl. 13 figs 1–8, 11 [St. Vincent, Cape Verde Is.; also cited as *Erichthus (Coronis) minutus* on p. 105].

Lysiosquilla (Lysioerichthus) minutus Brooks, 1886b, pl. 12 fig. 4 [St. Vincent, Cape Verde Is.].

According to GIESBRECHT (1910), this is the larva of *PSEUDOSQUILLA*, not a lysiosquillid.

Lysierichthus minutus. — HANSEN, 1895, p. 80, pl. 8 fig. 2–2e [North Equatorial Current].

GIESBRECHT (1910) does not consider this to be conspecific with *L. minutus* Brooks.

Lysioerichthus nux (Giesbrecht, 1910)

Lysiosquilla nux Giesbrecht, 1910, pp. 51, 85–87, pl. 10 figs 100–113 [Gulf of Naples and collections of "Washington"].

Lysierichthus ophthalmicus Hansen, 1895, p. 79, pl. 7 fig. 7–7a, pl. 8 fig. 1–1d [South Equatorial Current near Fernando de Noronha].

Lysioerichthus pleuracuta (Giesbrecht, 1910)

Lysiosquilla pleuracuta Giesbrecht, 1910, pp. 51, 80–82, pl. 3 figs 40–44 [Mediterranean?, collected by the "Washington"].

Lysierichthus pulcher Hansen, 1895, p. 74 [32°30'S, 15°E]. — GURNEY, 1946, p. 141, fig. 11A–D [South Atlantic].

Erichthus latreillei. — CLAUS, 1871, p. 28, pl. 4 fig. 18 [no locality; identified with *L. pulcher* by JURICH, 1904].

HANSEN (1895) identified this larva with the South African *LYSIOSQUILLA CAPENSIS* Hansen.

Lysioerichthus spiniger (Dana, 1852)

Erichthus spiniger Dana, 1852, p. 629; atlas, 1855, pl. 62 fig. 1 [South Atlantic].

Lysioerichthus tridens Giesbrecht, 1910, pp. 51, 82–85, pl. 11 figs 86–100 [Mediterranean?, collected by the "Washington"].

Lysioerichthus vitreus (Fabricius, 1775)

Astacus vitreus Fabricius, 1775, p. 417 [Atlantic].

- Erichthus vitreus*. — H. MILNE-EDWARDS, 1837, p. 501 [South Atlantic]. — EYDOUX & SOULEYET, 1842, p. 256, pl. 5 figs 18–25 [Atlantic]. — WHITE, 1847, p. 82 [Atlantic, near African coast and 05°N, 12°W].
- Erichthus leachii* Eydoux & Souleyet, 1842, p. 258, pl. 5 figs 26–31 [Atlantic].
- Erichthus vestitus* Dana, 1852, p. 627; atlas, 1855, pl. 41 fig. 7a–d [South Atlantic, 25°S, 44°W].
- Lysierichthus vitreus*. — HANSEN, 1895, p. 77, pl. 7 fig. 6–6b [South Equatorial Current]. — JURICH, 1904, p. 33, pl. 2 fig. 6–6a [Atlantic South Equatorial Current; Guinea Current; Atlantic].
- Although this species is generally considered to be the larva of the western Atlantic *LYSIOSQUILLA SCABRICAUDA* (Lamarck) (see HANSEN, 1895; HOLTHUIS, 1967b), the occurrence of the larva outside of the range of the adult (MANNING, 1969a) suggests that it should be identified with another taxon (or taxa).
- Lysiosquilla eusebia* – see *PLATYSQUILLA EUSEBIA*.
- Lysiosquilla glabriuscula* – see *Lysioerichthus edwardsii*.
- LYSIOSQUILLA HOEVENII* – see *Smerdis vulgaris*.
- Lysiosquilla (Lysioerichthus) minutus* – see *Lysioerichthus minutus*.
- Lysiosquilla nux* – see *Lysioerichthus nux*.
- Lysiosquilla occulta* – see *NANNOSQUILLOIDES OCCULTA*.
- Lysiosquilla pleuracuta* – see *Lysioerichthus pleuracutus*.
- Lysiosquilla tridens* – see *Lysioerichthus tridens*.
- Lysiosquilla* sp. — BACESCU & MAYER, 1961, p. 195 [35°49'30"N, 28°58'E; said to be an immigrant from Red Sea].
- Lysiosquilla-Coronida* larvae
- Larva α . — HANSEN, 1895, p. 98, pl. 8 fig. 14–14a [South Equatorial Current].
- Larva β . — HANSEN, 1895, p. 98 [Guineabucht].
- MEIOSQUILLA DESMARESTI* (Risso, 1816)
- see *Alima triangularis* Jurich, 1904
- Squilla desmaresti*. — GIESBRECHT, 1910, pp. 56, 87–109, pl. 10 figs 1–99 [Gulf of Naples]. — STEUER, 1911, p. 738 [Adriatic]. — VAN DER BAAN & HOLTHUIS, 1966, p. 3 [North Sea; earlier records summarized].
- NANNOSQUILLOIDES OCCULTA* (Giesbrecht, 1910)
- ? erichthoid larva from Messina. — CLAUS, 1871, pl. 1 fig. 1 [according to GIESBRECHT, 1910].
- Lysiosquilla occulta* Giesbrecht, 1910, pp. 52, 58–75, pl. 7, pl. 8 figs 1–39 [Gulf of Naples]. — STEUER, 1911, p. 738 [Adriatic].
- Odonterichthus* – see squilloid larva.
- ORATOSQUILLA MASSAVENSIS* (Kossmann, 1880)
- Squilla ?massavensis*. — WILLIAMSON, 1967, p. 61, fig. 18 [Natanya, Israel].
- PARASQUILLA FERUSSACI* (Roux, 1830)
- ? squilloid larva. — CLAUS, 1871, pl. 7 fig. 28 [Atlantic] [identified with *P. FERUSSACI* by GIESBRECHT, 1910].

Pseudosquilla ferussaci. — GIESBRECHT, 1910, pp. 57, 120, pl. 11 figs 65–85 [Gulf of Naples].

PLATYSQUILLA EUSEBIA (Risso, 1816)

Erichthoidina spinosa Claus, 1871, p. 12, pl. 2 figs 6–7 [identified with *P. EUSEBIA* by GURNEY, 1946].

Lysiosquilla eusebia. — GIESBRECHT, 1910, pp. 52, 76–80, pl. 8 figs 40–90 [Gulf of Naples]. — STEUER, 1911, p. 738 [Adriatic].

Heterosquilla eusebia. — VAN DER BAAN & HOLTHUIS, 1966, p. 8 [North Sea; earlier records summarized].

Platysquilla eusebia. — VAN DER BAAN & HOLTHUIS, 1969, p. 350 [North Sea].

Protosquilla elongata – see **PROTOSQUILLA FOLINI**.

PROTOSQUILLA FOLINI (A. Milne-Edwards, 1867)

? *Gonodactylus*. — CLAUS, 1871, pl. 5 fig. 20 [Canary Is.] [possibly the larva of *P. FOLINI*].

? squilloid larva. — CLAUS, 1871, pl. 7 fig. 29 [Atlantic] [identified with *GONODACTYLUS* by HANSEN, 1895].

Protosquilla elongata Brooks, 1886b, p. 67, pl. 15 figs 2, 12, pl. 16 fig. 4 [St. Vincent, Cape Verde Is.].

? *Erichthoidina (Gonodactylus?)*. — BROOKS, 1886b, pp. 104, 113, pl. 12 fig. 3 [St. Vincent, Cape Verde Is.].

? *Gonerichthus*. — BROOKS, 1886b, p. 113, pl. 5 fig. 4, pl. 13 fig. 10 [St. Vincent, Cape Verde Is.].

? *Gonodactylus (Gonerichthus)*. — BROOKS, 1886b, p. 113, pl. 12 fig. 5, pl. 13 fig. 9 [St. Vincent, Cape Verde Is.].

Gonodactylus Folinii. — HANSEN, 1895, p. 87, pl. 8 fig. 7–7a [St. Vincent, Cape Verde Is.].

Pseuderichthus Brooks, 1886a, b – see *Pseuderichthus elongatus*.

Pseuderichthus caudatus (Giesbrecht, 1910)

Pseudosquilla caudata Giesbrecht, 1910, pp. 52, 58, 117–119, pl. 4 figs 57–65, pl. 11 figs 46–64 [Gulf of Naples and collections of “Washington”].

Pseuderichthus communis Hansen, 1895, p. 86, pl. 8 fig. 5–5b [Sargasso Sea; North Equatorial Current; St. Vincent, Cape Verde Is.] [identified by HANSEN as the larva of *PSEUDOSQUILLA CILIATA* (Fabricius)].

? squilloid larva. — CLAUS, 1871, pl. 7 figs 26, 27C.

Pseuderichthus constrictus (Giesbrecht, 1910)

Pseudosquilla constricta Giesbrecht, 1910, pp. 51, 57, 112, pl. 11 figs 1–10 [Gulf of Naples; Capri].

GIESBRECHT relates this form to *PARASQUILLA FERUSSACI*, but KOMAI & TUNG (1930) suggest that it is the larva of *PSEUDOSQUILLOPSIS CERISII*.

Pseuderichthus distinguendus Hansen, 1895, p. 86 [Madeira; Guinea; South Equatorial Current; St. Vincent, Cape Verde Is.] [identified by HANSEN as the larva of *PSEUDOSQUILLA OCULATA* (Brullé)]. — JURICH, 1904, p. 36, pl.

- 4 fig. 5 [South Equatorial Current; North Equatorial Current].
 ? squilloid larva. — CLAUS, 1871, pl. 7 fig. 27A–B.
- Pseuderichthus elongatus* Hansen, 1895, p. 86 [Atlantic].
 ? squilloid larva. — CLAUS, 1871, pl. 6 fig. 25.
 ? *Pseuderichthus*. — BROOKS, 1886, p. 112, pl. 6 figs 2, 6, pl. 12 fig. 6, pl. 13 figs 12–14 [between Tenerife and St. Thomas].
- Pseuderichthus mucronatus* (Giesbrecht, 1910)
Pseudosquilla mucronata Giesbrecht, 1910, pp. 52, 58, 113–117, pl. 11 figs 11–45 [Mediterranean?, from “Washington” collection].
- Pseudosquilla caudata* – see *Pseuderichthus caudatus*.
- PSEUDOSQUILLA CILIATA** – see *Pseuderichthus communis*.
- Pseudosquilla constricta* – see *Pseuderichthus constrictus*.
- Pseudosquilla ferussaci* – see **PARASQUILLA FERUSSACI**.
- Pseudosquilla monodactyla* – see **PSEUDOSQUILLA OCULATA**.
- Pseudosquilla mucronata* – see *Pseuderichthus mucronata*.
- PSEUDOSQUILLA OCULATA** (Brullé, 1837)
Pseudosquilla monodactyla A. Milne-Edwards, 1878, p. 232 [Cape Verde Is.].
 see *Pseuderichthus distinguendus*.
- Pseudosquilla-Gonodactylus* larvae
 larva γ . — HANSEN, 1895, p. 99 [South Equatorial Current].
 larva δ . — HANSEN, 1895, p. 99 [South Equatorial Current].
- PSEUDOSQUILLOPSIS CERISII** – see *Pseuderichthus constrictus*.
- PTERYGOSQUILLA ARMATA CAPENSIS** Manning, 1969
Squilla armata?. — LEBOUR, 1954, p. 231, fig. 6 [28°40'S, 15°56'E, 100–0 m; 28°40'S, 16°14'E, 50–0 m].
- Smerdis armata* Leach, in TUCKEY, 1817, unnumbered figure on plate; in TUCKEY, 1818a, p. 415; 1818b, p. 305, fig. 6 [near Cape Palmas, Liberia and off Sao Tomé (see HOLTHUIS, 1967b, p. 6)].
- Erichthus armatus*. — H. MILNE-EDWARDS, 1837, p. 504 [coast of Africa]. — WHITE, 1847, p. 82 [near African coast].
- Erichthus pyramidatus* H. Milne-Edwards, 1837, p. 502 [St. Helena].
- Erichthus spinosus* Eydoux & Souleyet, 1842, p. 251, pl. 5 figs 6–11 [Atlantic] [HANSEN (1895) synonymized this with *Coroniderichthus armatus*, also a synonym of *Smerdis armata*].
- Erichthus spinosus*. — CLAUS, 1871, p. 25 [part, according to HANSEN (1895)].
- Coroniderichthus armatus*. — HANSEN, 1895, p. 81, pl. 8 fig. 3–3d [Guinea Current; South Equatorial Current].
- Smerdis armata* and its synonyms are considered to be the larvae of **CORONIDA BRADYI** (A. Milne-Edwards) by HOLTHUIS (1967b) as well as by several earlier workers. The identification of this larval form with an adult remains to be documented through rearing experiments. GUÉRIN-MÉNÉVILLE (1857) described *Smerdis dorbignyi* from Cuba and CALMAN (1917) recorded *Coroniderichthus armatus* from off Brazil, but there is still no species of **CORONIDA** known to

occur in the western Atlantic. *Smerdis* and *Coroniderichthus* are very likely the larvae of lysiosquillids, but their generic identity remains in doubt.

Smerdis vulgaris Leach, in TUCKEY, 1817, figure on unnumbered plate; in TUCKEY, 1818a, p. 415; 1818b, p. 205, fig. 5 [Gulf of Guinea, near African coast and at 05°N, 12°W (see HOLTHUIS, 1967b, p. 17)].

This is considered to be the larva of *LYSIOSQUILLA HOEVENII* (Herklots) (see HOLTHUIS, 1967b). Some earlier authors considered it to be a synonym of *Astacus vitreus*, generally considered to be the larva of the western Atlantic *LYSIOSQUILLA SCABRICAUDA* (Lamarck).

Squilla armata – see *PTERYGOSQUILLA ARMATA CAPENSIS*.

Squilla desmaresti – see *MEIOSQUILLA DESMARESTI*.

SQUILLA MANTIS (Linnaeus, 1758)

Squilla mantis. — GIESBRECHT, 1910, pp. 56, 87–111, pl. 9 [Gulf of Naples]. — STEUER, 1911, pp. 737, 738 [Adriatic]. — BACESCU & MAYER, 1961, p. 195 [34°17'N, 27°33.5'E]. — WILLIAMSON, 1967, p. 60 [Ashkelon, Israel].

Squilla sp. — STEUER, 1936, p. 17; 1938, p. 13 [both Alexandria, Egypt].

Squilla (Alima) gracilis – see *Alima hyalina*.

Squillerichthus. — CLAUS, 1871 – see *Erichthalima synthetica*.

Squilloid larvae

CLAUS, 1871, pl. 5 fig. 21A [Canary Islands] [identified as an *Odonterichthus* larva by GURNEY (1946). *Odonterichthus* is generally considered to be the larva of *ODONTODACTYLUS* which does not occur in the eastern Atlantic].

CLAUS, 1871, pl. 5 fig. 21B [Madeira] [identified by HANSEN as a *Lysioerichthus*].

CLAUS, 1871, pl. 5 fig. 22A [identified as an *Alima* by GURNEY, 1946].

CLAUS, 1871, pl. 5 fig. 22B [identified as a *PSEUDOSQUILLA* (*PARASQUILLA* or *PSEUDOSQUILLOPSIS*?) by GIESBRECHT, 1910].

CLAUS, 1871, pl. 6 fig. 25 – see *Pseuderichthus elongatus*.

CLAUS, 1871, pl. 7 figs. 26, 27C – see *Pseuderichthus communis*.

CLAUS, 1871, pl. 7 fig. 27A–B – see *Pseuderichthus distinguendus*.

CLAUS, 1871, pl. 7 fig. 28 [Atlantic] [identified as *PARASQUILLA FERUS-SACI* by GIESBRECHT, 1910].

CLAUS, 1871, pl. 7 fig. 29 [Atlantic] [identified with *GONODACTYLUS* by HANSEN, 1895].

ZOOGEOGRAPHIC CONSIDERATIONS

Introduction

Completion of this review of the stomatopod fauna of the Gulf of Guinea, and, to a limited extent, that of the eastern Atlantic, and the earlier publications of reviews of American stomatopods (SCHMITT, 1940; MANNING, 1969a), has produced an unusual situation in the field of marine invertebrate zoology: one group of tropical organisms, though very small, is relatively well-known throughout a large faunal region, in this case the Atlanto-East Pacific region. Thus we can now draw some general conclusions about the relationships not only of the eastern Atlantic stomatopods but also those of the Atlanto-East Pacific, which total 133 species and subspecies, representing 27 genera and 5 families. The Indo-West Pacific fauna now comprises more than 196 species and subspecies in 40 genera.

Stomatopods are basically shallow, tropical, warm-water organisms. The vast majority of genera and species occur on the shelf, usually in littoral habitats. Of 48 genera now recognized, 2, *Hemisquilla* and *Pterygosquilla*, must be considered warm temperate (Fig. 49) rather than tropical. *Hemisquilla* includes 2 species (MANNING, 1969a; STEPHENSON, 1967), *H. braziliensis* (Moreira) from Brazil and *H. ensigera* (Owen), the latter with Californian, Chilean, and Australian subspecies. *Pterygosquilla* also comprises 2 species (MANNING 1969d; SCHMITT, 1940), one, *P. gracilipes* (Miers), occurs off southern Chile, and the other, *P. armata* (H. Milne-Edwards), is represented by subspecies off South America, New Zealand, and southern Africa (MANNING, 1969d). There are other warm-temperate species among the stomatopods, but the remainder of the genera include species which are almost exclusively tropical.

That the tropical warm-water environment is very restricted in the Gulf of Guinea is well-known and the marine fauna there is considered to be an

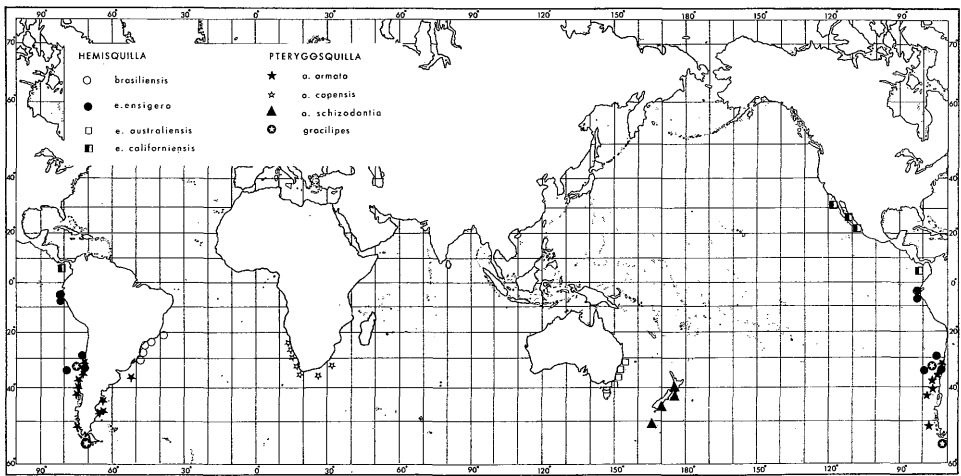


Fig. 49. Distribution of two temperate stomatopod genera, *Hemisquilla* and *Pterygosquilla*. Only *P. armata capensis* occurs off West Africa.

impoverished one, poorer than that found in any other tropical area (EKMAN, 1953; BRIGGS, 1974). The current patterns in the eastern Atlantic, with the cold Canary current flowing toward the equator from the north and the cold Benguela current flowing toward the equator from the south, leave a relatively restricted area where warm, tropical water can be found, that is, only in a narrow belt between the areas where these currents turn westward. Warm water is brought into this area by the eastward flowing Guinea current. This tropical area extends from the vicinity of Cape Verde to the southern Congo or northern Angola, and includes but about 25–30 degrees of latitude. In the western Atlantic, tropical conditions can be found in an area almost twice as large latitudinally.

In addition, the depth of the tropical surface layer in the Gulf of Guinea is only 30–40 m, whereas off South America this layer may be 130–150 m deep (BRIGGS, 1974). The reduced tropical area, lower water temperatures, and less diverse habitats, especially the lack of coral reefs, all have played a part in restricting the West African tropical fauna. Earlier climatic changes resulting in a deterioration of the tropical climate also certainly played a role (EKMAN, 1953).

Coral reefs are not found in the Gulf of Guinea, but around the offshore islands of Principe, Sao Tomé, and Annobon coralline algae provide, to a limited extent, a habitat supporting a wide variety of invertebrate animals. FOREST (1959, p. 17) noted, "Les formations les plus caractéristiques du plateau littoral, autour des trois îles (Principe, Sao Tomé, Annobon), sont constituées par des algues calcaires agglomérées en boules (pl. 2, fig. 3) qui sont libres sur le fond et qui abritent une abondante faunes d'endobiotés . . .".

EKMAN (1953) distinguished two main warm-water faunal regions, the Indo-West Pacific and the Atlanto-East Pacific, the latter being divided into American and West African subregions. The Indo-West Pacific region was shown to be the richer of the two, and the relative paucity of the Atlanto-East Pacific fauna was attributed to a deterioration of climate during the Tertiary. In EKMAN's words (1953, p. 79), "The unmistakable relationship between the Atlantic and the Indo-West Pacific fauna is undoubtedly due to long-standing communication between the two, but this is not to say that migration took place preponderantly from east to west. The relationship is due rather to the fact that both these faunas are descended from a more or less homogenous Tethys fauna."

The stomatopods provide good examples of Tethyan distribution patterns as described by EKMAN.

In attempting to unravel the relations of stomatopods and to understand their distribution patterns, one must keep in mind that the fossil record of this group is so poor that it has yielded no information of use in these contexts. Most fossils are from early periods and show little relationship to Recent taxa; only three Recent families and three Recent genera are represented by fossils (HOLTHUIS & MANNING, 1969). Further, stomatopods have a complicated life history, and are assumed to have relatively long larval lives, although the duration of larval life is not known for any species. Knowledge of larval development, based on rearing experiments,

would be of great help in understanding distributional patterns of adults. In this group, analyses of distribution patterns must be based on information provided by the occurrence of living species with inferences based on historical information on climate, ocean currents, and suitable habitats.

Information summarized in Table 6 and Figs 49–57 is based on this paper for the eastern Atlantic stomatopods; on the papers of SCHMITT (1940) supplemented by my papers (1970a, 1971, 1972a, 1972b, 1972c, and 1974c); and from the western Atlantic by my papers (1969a, 1970a) and reports by CAMP (1971) and FAUSTO FILHO & LEMOS DE CASTRO (1973). In addition, I have included in the table two undescribed species of *Coronida* from the eastern Pacific, the descriptions of which are in preparation. Data on Indo-West Pacific species is from my manuscript notes.

In using the figures given for Indo-West Pacific genera and species in Table 6, it must be kept in mind that that fauna is still relatively poorly known; in excess of 40 species require description in collections now awaiting study. The generic relationships of Indo-West Pacific stomatopods also require clarification, and it is likely that several additional new genera will have to be recognized as studies progress.

Faunal relationships of Atlanto-East Pacific stomatopods

In Table 6, Atlanto-East Pacific families and genera of stomatopods are listed, and the numbers of species and subspecies in each genus occurring in each of the following geographic areas are given: Mediterranean, eastern Atlantic, western Atlantic, eastern Pacific, Atlanto-East Pacific (a summary), and Indo-West Pacific. The number in parenthesis next to each family name indicates the total number of genera in that family; thus the Eurysquillidae includes four genera, only two of which occur in the Atlanto-East Pacific region, and only one of which occurs in the Americas.

In the Atlanto-East Pacific region, 27 genera of stomatopods occur, and 25 of these are primarily tropical. Only 8 or 30% of the genera are endemic to the region. The Indo-West Pacific region comprises 40 genera, and 20 or 50% of those genera are endemic to that region. Ten or 37% of the 27 genera occurring in the Atlanto-East Pacific region are pantropical; the remainder have more limited distribution patterns. Species of six of the pantropical genera (22%) occur in both Atlanto-East Pacific and Indo-West Pacific regions.

Of the genera shared by the Atlanto-East Pacific and Indo-West Pacific regions, one, *Oratosquilla* (*O. massavensis*), has recently entered and become established in the Mediterranean through the Suez Canal; one, *Meiosquilla barnardi* Manning, 1975(b), has become established off South Africa sufficiently long ago to have differentiated into a separate species; and one, *Nannosquilla*, may have two extra-American species, *N. varicosa* (Komai & Tung, 1930), and *N. hystri cotelson* (Barnard, 1958). Both of these species probably will be transferred to other genera, and they are listed with a question mark in Table 6.

TABLE 6. Numbers of species in Atlanto-East Pacific genera

	Medi- terranean	E. Atl.	W. Atl.	E. Pac.	Atl- E. Pac.	Indo- W. Pac.
BATHYSQUILLIDAE (2)						
<i>Bathysquilla</i>	-	-	1	-	1	1
EURYSQUILLIDAE (4)						
<i>Eurysquilla</i>	-	2	4	2	8	2
<i>Manningia</i>	-	1.	-	-	1	7
GONODACTYLIDAE (10)						
<i>Gonodactylus</i>	-	-	10	7	16	20+
<i>Odontodactylus</i>	-	-	1	-	1	5
<i>Protosquilla</i>	-	2	-	-	2	-
LYSIOSQUILLIDAE (12)						
<i>Acanthosquilla</i>	-	1	2	2	3	8
<i>Allosquilla</i>	-	2	-	-	2	-
<i>Coronida</i>	-	1	-	3	4	1
<i>Coronis</i>	-	-	2	-	2	-
<i>Heterosquilla</i>	-	-	5	3	5	7
<i>Lysiosquilla</i>	-	2	3	2	7	4
<i>Lysiosquilloides</i>	-	1	-	-	1	-
<i>Nannosquilla</i>	-	-	7	6	13	(2?)
<i>Nannosquilloides</i>	1	1	-	-	1	-
<i>Platysquilla</i>	1	1	2	-	3	-
PSEUDOSQUILLIDAE (4)						
<i>Hemisquilla</i>	-	-	1	1	2	1
<i>Parasquilla</i>	1	1	3	1	5	1
<i>Pseudosquilla</i>	-	2	2	1	3	7
<i>Pseudosquillopsis</i>	1	1	-	2	3	1
SQUILLIDAE (16)						
<i>Alima</i>	-	2	2	-	2	4
<i>Cloridopsis</i>	-	-	1	1	1	5
<i>Meiosquilla</i>	2	4	5	3	12	1
<i>Oratosquilla</i>	1	1	-	-	1	25+
<i>Pterygosquilla</i>	-	1	1	2	3	2
<i>Schmittius</i>	-	-	-	2	2	-
<i>Squilla</i>	1	3	19	8	30	-
Totals	8	29	71	46	134	104+

All of the pantropical genera, those with representatives in the Atlantic, eastern Pacific, and Indo-West Pacific, are small genera which contain a few species and which seem to show relict distributional patterns (EKMAN, 1953). Thus *Parasquilla* has one Mediterranean-West African species, three western Atlantic species, one eastern Pacific species, and one species from Japan, and *Pseudosquillopsis* similarly has one species in the Mediterranean-West African area, two eastern Pacific

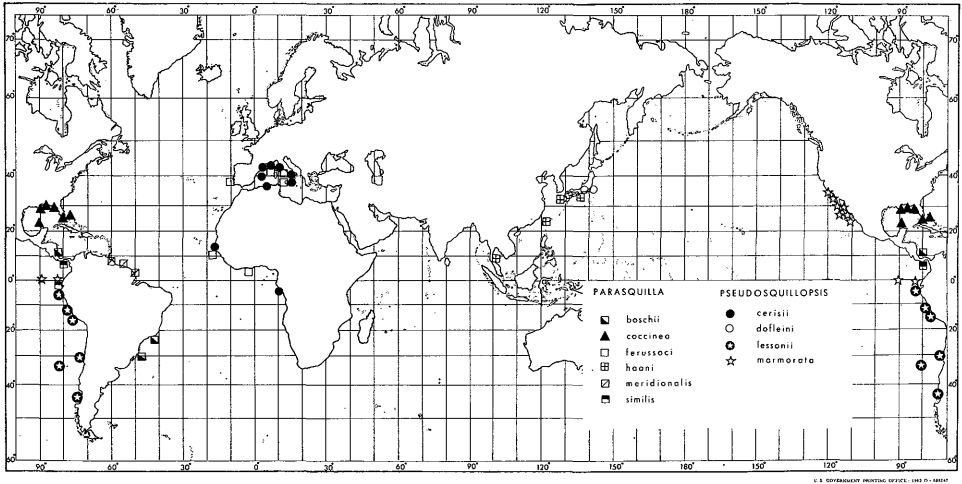


Fig. 50. Relict distribution patterns of *Parasquilla* and *Pseudosquilla*.

species, and one in Japan (Fig. 50). *Eurysquilla* is represented by two West African species, four in the western Atlantic, two in the eastern Pacific, and two in the Indo-West Pacific. These genera appear to be old and conservative, showing relict distributional patterns, and probably are remnants of early, more widely-distributed genera. Speciation apparently has been relatively slow in these genera.

Five genera represented in the Atlantic by a total of eight species are probably of Indo-West Pacific origin (Fig. 51). The genera *Alima* and *Pseudosquilla* each comprise two species which occur on both sides of the Atlantic and are more widely-distributed in the Indo-West Pacific region but do not occur in the eastern Pacific area. Each genus is represented by additional species in the Indo-West Pacific. The occurrence of an *Alima* and two species of *Pseudosquilla* at St. Helena suggests that these species have colonized the Atlantic by coming around South Africa. One may assume that these species have relatively long larval lives, although not long enough, however, to cross the eastern Pacific barrier. *Manningia* includes 1 species from Gulf of Guinea and 7 from the Indo-West Pacific, and *Odontodactylus* represented in the Atlantic by 1 species which also occurs, along with several others, in the Indo-West Pacific. The endemic eastern Atlantic genus *Protosquilla* is clearly related to the Indo-West Pacific genus *Chorisquilla*.

Four of the genera occurring in the Atlanto-East Pacific region are represented by relatively large numbers of species there: *Gonodactylus* (16), *Nannosquilla* (13), *Meiosquilla* (12), and *Squilla* (30). *Gonodactylus* is represented in the Americas and the Indo-West Pacific region by about equal numbers of species; no species occurs in both regions, and all American species can be separated from all Indo-West Pacific species by one character: the presence of a small carina on the inner side of the intermediate carina of the telson. The genus does not occur in the eastern Atlantic. *Nannosquilla* appears to be restricted to the Americas. *Meiosquil-*

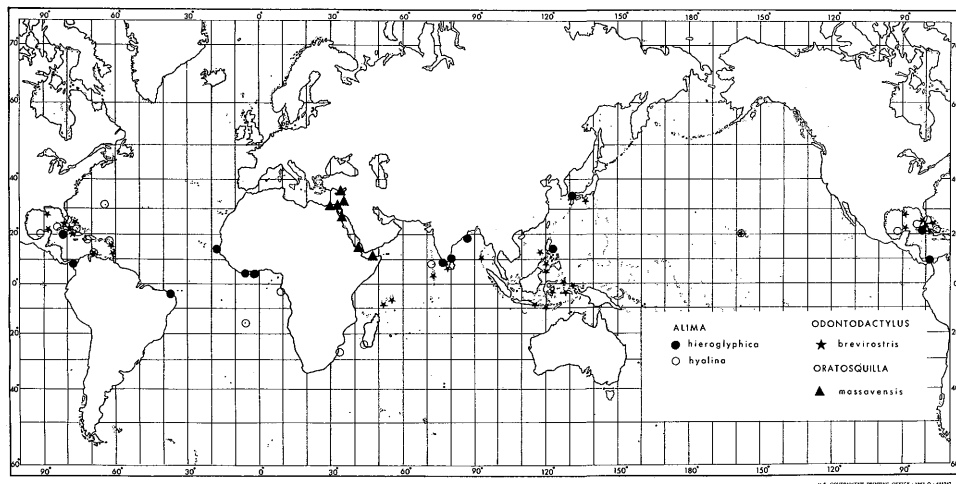


Fig. 51. Distribution patterns of some probable Indo-West Pacific immigrants into the Atlantic and Mediterranean. Both *A. hyalina* and *O. breviostris* are recorded from Hawaii and off Venezuela.

la and *Squilla* occur throughout the Atlanto-East Pacific region. All of the eastern Atlantic species of *Meiosquilla* differ from all American species in having 5 rather than 4 teeth on the dactylus of the claw. One species of *Squilla*, *S. aculeata*, has distinct subspecies in the eastern Pacific and eastern Atlantic, but not in the western Atlantic. No other species of *Nannosquilla*, *Meiosquilla*, or *Squilla* occurs in more than one area in the region. The American populations of these four genera appear to have developed since the breakdown of the Tethys Sea in the Miocene-Pliocene, and these populations have remained isolated from Indo-West Pacific populations since that time. The present representatives of these genera are probably young and vigorous, and have speciated much more actively than those of other genera since the breakdown of the Tethys.

Of the American genera, *Platysquilla* also occurs in the eastern Atlantic and is endemic to the Atlantic. One genus, *Coronis*, is endemic to the western Atlantic and one, *Schmittius*, is endemic to the eastern Pacific. Whereas less than 10% of the American genera are endemic, 24% of those occurring in the eastern Atlantic are found only there.

The eastern Pacific stomatopods are clearly American rather than Indo-West Pacific in nature. Of the 46 species there, only 1 (2%) occurs also in the latter region, and that species also occurs in the Atlantic. No Indo-West Pacific species is known to have crossed the East Pacific barrier to become established in the eastern Pacific (with the possible exception of *Heterosquilla mccullochae*; see below). Eight or 17% of the 46 eastern Pacific species occur in the western Atlantic; the remainder of the eastern Pacific species (83%) are endemic. There are some similarities between Indo-West Pacific species and several species from the eastern Pacific, but the species are distinct. There are several links between the eastern Pacific and eastern Atlantic which will be considered below.

Similarly, the western Atlantic fauna is predominantly American. Seven or 10% of the western Atlantic species also occur in the Indo-West Pacific, and eight (11%) are shared with the eastern Pacific. Four (6%) are shared with the eastern Atlantic, and these four also occur in the Indo-West Pacific region. The western Atlantic lacks two genera that occur in the eastern Atlantic and the eastern Pacific: *Coronida* and *Pseudosquilla*. The majority of western Atlantic species, 82%, are endemic there.

Finally, one species of *Heterosquilla*, *H. mccullochae* (Schmitt) thought to be an American species, has been collected in the Indian Ocean; it is the only pantropical species of stomatopod. SCHMITT (1940) originally described it from the eastern Pacific, and MANNING (1969a) recorded it from the western Atlantic. It was recently described from the Laccadive Islands as *Heterosquilla jonesi* Shanbhogue, 1971.

Although 32% of the genera occurring in the Atlanto-East Pacific region are endemic there, only 8 of 134 species (6%) occurring there also occur in the Indo-West Pacific region, i.e., 94% of the Atlanto-East Pacific species are endemic. Species in pantropical genera represent 45% of the fauna, but species representing

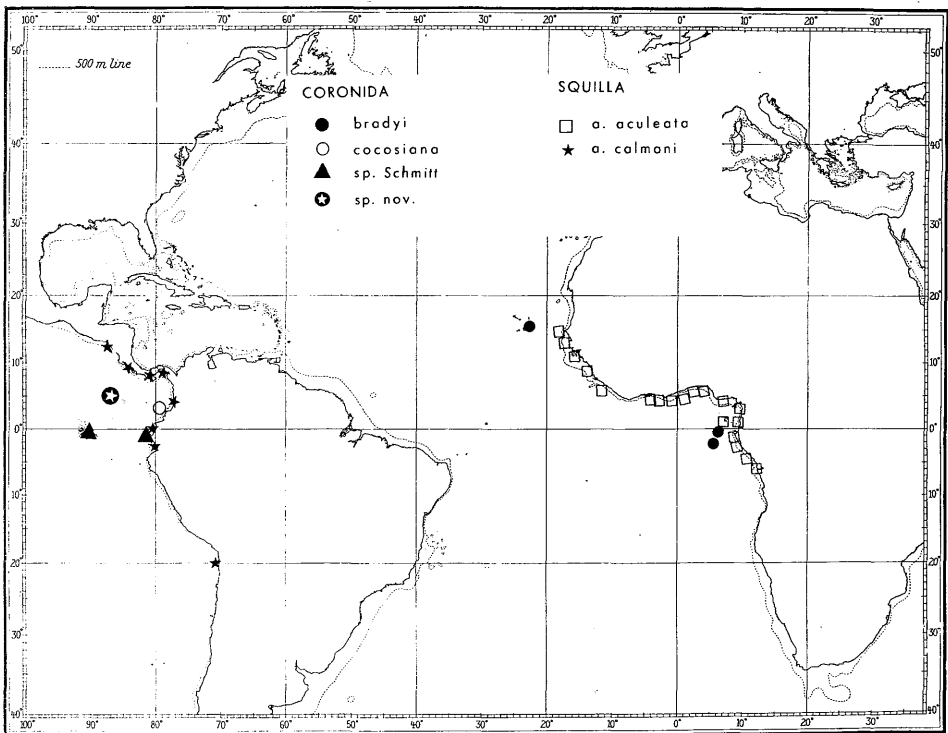


Fig. 52. Disjunct distribution patterns within the Atlanto-East Pacific region. The Atlanto-East Pacific species of *Pseudosquilla* (Fig. 50) exhibit a similar pattern. The northernmost record for *S. a. aculeata*, Teacapan, Sinaloa, Mexico ($22^{\circ}33'N$, $105^{\circ}45'W$), is not shown.

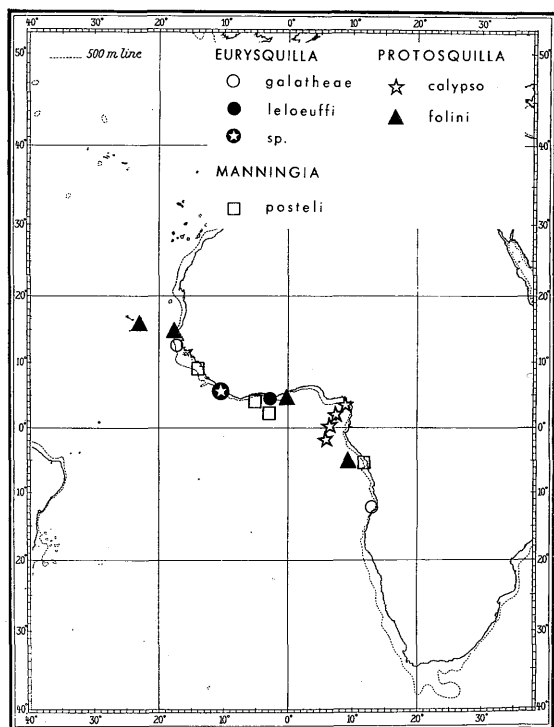


Fig. 53. Distribution of eurysquillids and protosquillids in the eastern Atlantic.

endemic genera or genera originating in the area (e.g., *Meiosquilla*) amount to 51% of the total.

In summary, the Atlanto-East Pacific stomatopods are made up, at the generic level, of about equal portions of endemic genera (30%), pantropical genera (37%), and genera shared with one other area (33%). Endemism is much higher at the species level; 94% of the 134 species occur only there and 6% occur also in the Indo-West Pacific region.

Faunal relationships of eastern Atlantic stomatopods

Representatives of 18 genera are now known to occur in the eastern Atlantic, comprising a total of 28 species. Four of the genera (22%) are endemic to the area. Three genera (17%) show strong Indo-West Pacific affinities; of these *Manningia* and *Oratosquilla* are otherwise known only from that region, while *Protosquilla* is most closely related to the Indo-West Pacific genus *Chorisquilla*. One genus, *Pterygosquilla*, is southern warm-temperate, and the single species occurring off West Africa does not enter tropical waters (Fig. 49). Seven of the genera (39%) are pantropical. One genus, *Alima* (6%), includes widely distributed species which occur in the western Atlantic and the Indo-West Pacific as well but are not pantropic, as they do not occur in the eastern Pacific. Three genera (17%) are

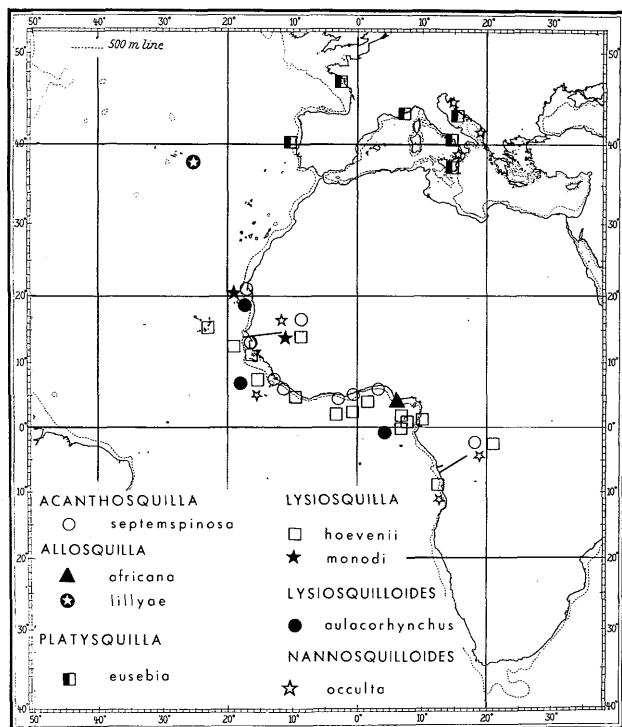


Fig. 54. Distribution of lysiosquillids (other than *Coronida*, Fig. 52) in the eastern Atlantic.

Atlantic or Atlanto-East Pacific. At the generic level, endemism is much higher here than in American stomatopods.

Coronida and *Pseudosquilla* also occur in the eastern Pacific and the Indo-West Pacific but are not found in the western Atlantic (Fig. 52). Representatives of these genera either did not recolonize the latter area or they were excluded or eliminated by competition from more vigorous species (possibly by *Gonodactylus* and *Pseudosquilla* which occur in similar habitats).

Of the 28 species occurring in the eastern Atlantic, 23 (82%) are endemic to that area. Eight (28%) occur in the Mediterranean. The Mediterranean contains neither endemic genera nor endemic species; it has a fauna derived from the Atlanto-East Pacific fauna which includes one recent immigrant from the Red Sea via the Suez, *Oratosquilla massavensis* (Fig. 51). Of the remaining species, *Meiosquilla desmaresti* and *Platysquilla eusebia* extend northward into the Atlantic but are not known to extend southward (Figs 54, 56). *Squilla mantis* and *Parasquilla ferussaci* extend northward and southward into the Gulf of Guinea (Figs 50, 57). The remaining three, *Nannosquilloides occulta*, *Pseudosquilla cerisii*, and *Meiosquilla pallida*, extend southward into the Gulf of Guinea but not northward (Figs 50, 54, 56).

The tropical West African stomatopod fauna, including the fauna of the Azores,

Madeira, the Canary Is., and St. Helena, includes 25 species, of which 21 (84%) are endemic. Five show strong relationships to eastern Pacific species (*Eurysquilla galatheae* and *E. leloeuffi* to *E. solari*; *Coronida bradyi* to *C. glasselli* (MANNING 1976); *Lysiosquilla hoevenii* to *L. desaussurei*; *Squilla aculeata calmani* to *S. a. aculeata*). The two populations of *S. aculeata* are convincing evidence for assuming early faunal links between the two areas (Fig. 52). Four species show western Atlantic affinities (*Acanthosquilla septemspinosa* to *A. biminiensis*; *Parasquilla ferussaci* to *P. meridionalis* and *P. boschii*; *Squilla cadenati* to *S. intermedia*; *S. mantis* to *S. empusa*), and four species, *Alima hyalina*, *A. hieroglyphica*, *Pseudosquilla ciliata*, and *P. oculata*, are shared with the western Atlantic and the Indo-West Pacific as well (Fig. 51).

There is no evidence of an eastern migration of Atlantic species across the mid-Atlantic barrier (BRIGGS, 1974, p. 110) in stomatopods, for no species other than the four listed above occur on both sides of the Atlantic, and those four are widespread species probably originating in the Indo-West Pacific region and subsequently spreading into the Atlantic. In the stomatopods, 4 of 25 tropical species (16%), occur in both sides of the Atlantic. Similarly, 27 of 199 species (14%) of Hippidea and Brachyura (MONOD, 1956) and 9 of 59 littoral carideans (15%) (HOLTHUIS, 1951) from tropical West African waters also occur in the western Atlantic. In contrast, 9 of 31 species of galatheids (29%) reported by

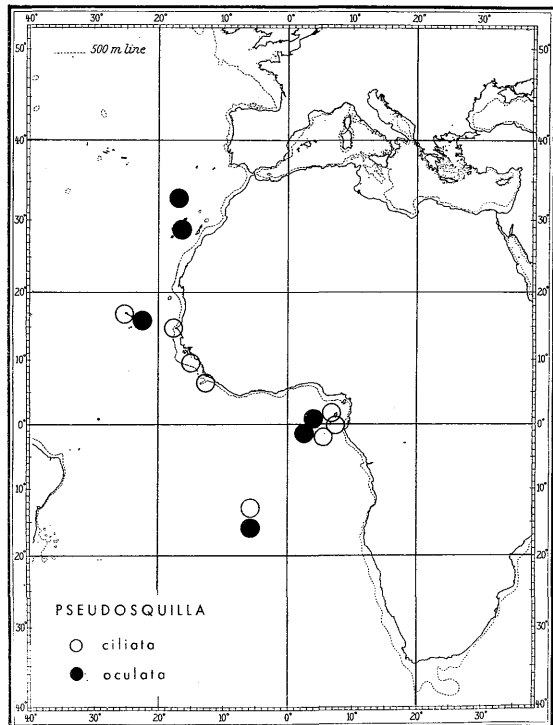


Fig. 55. Distribution of two species of *Pseudosquilla* in the eastern Atlantic.

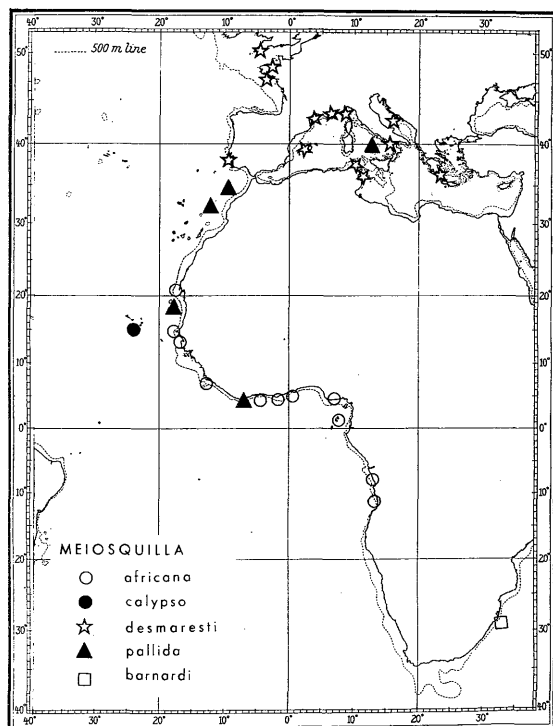


Fig. 56. Distribution of *Meiosquilla* in the eastern Atlantic (some Mediterranean records for *M. desmaresti* may have been overlooked).

MIYAKE & BABA (1970) show amphi-Atlantic connections; this may be a reflection of their occurrence in greater depths.

Latitudinal and vertical distribution patterns of eastern Atlantic stomatopods

Distributional patterns of stomatopods within the eastern Atlantic area are summarized in Table 7 and Figs 49–57. MONOD (1956), using far larger numbers of species of brachyurans, recognized several faunal units: 1, the Atlanto-Mediterranean, containing Lusitanian, Mediterranean, Moroccan, and Mauritanian provinces; 2, a transition zone (Sénégal province) for the Cape Verde Is. and a coastal sector; 3, the Guinean region, subdivided into coastal and insular sections; and 4, the Austro-African section. EKMAN (1953) recognized a Guinean and a Mauritanian component in the West African fauna. BRIGGS (1974) recognized a West African province, for the mainland from Cape Verde and the Cape Verde Is. to Mossamedes, Angola, and a separate province for St. Helena and Ascension, the fauna of which is related to the West African but shows a high degree of endemism. Like BRIGGS, I would consider the Cape Verde Is. an integral part of the West African tropical fauna.

As far as the stomatopods are concerned, most of the species (20) occur

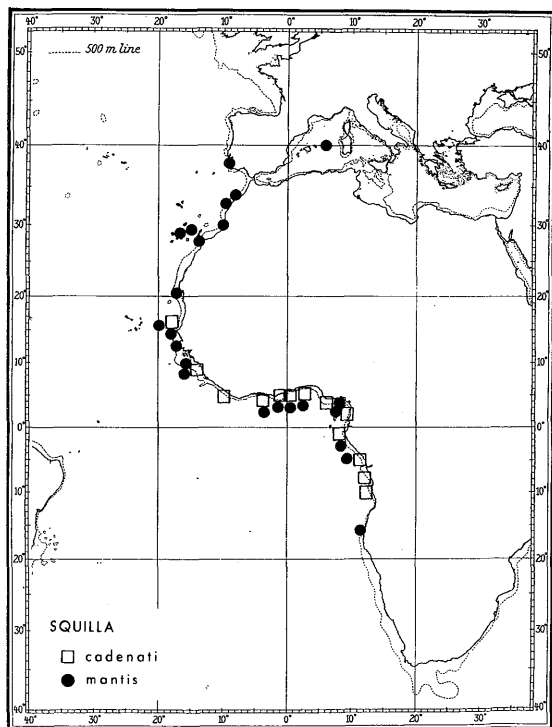


Fig. 57. Distribution of two species of *Squilla* in the eastern Atlantic. The distribution of *S. a. aculeata* is shown in Fig. 52. *Squilla mantis* occurs throughout the Mediterranean and may have a wider range in the Atlantic.

between Sénégal and the Congo; of those 20, eight also occur off Angola, at least as far south as Luanda. Angola has not been well-sampled, so we cannot be certain of the extent of occurrence of stomatopods there. Of the 20 species, four also extend northward into Mauritania, and two (one not known from Mauritania) also are known from Morocco. Three of the 20 species also occur in the Cape Verde Is.; only one species, *Meiosquilla calypso*, is known only from the Cape Verde Is.

The distribution patterns of insular species also are interesting. Off West Africa, *Pseudosquilla oculata* has been collected only from islands: the Azores, Madeira (the only species known there), the Canary Is., the Cape Verde Is., the offshore islands of the Gulf of Guinea, and St. Helena, and *P. ciliata* occurs in the Cape Verde Is., the offshore islands and the mainland in the Gulf of Guinea, and at St. Helena (Fig. 55). *Allosquilla lillyae* is known only from the Azores, and the widespread *Squilla mantis* occurs in the Canary Is., but at none of the other islands. *Coronida bradyi* occurs in the Cape Verde Is. and the offshore islands of the Gulf of Guinea (Fig. 52) but not in between, and whereas *Protosquilla folini* occurs in the Cape Verde Is. and at coastal localities in the Gulf of Guinea, but not the offshore islands, *P. calypso* occurs only in the offshore islands (Fig. 53).

Stomatopods are generally considered to be coastal organisms, but a surprising number of species from tropical West Africa live on the continental shelf or slope

(Table 8). Ten species have been collected at the surface or from shore, and two of these, *Acanthosquilla septemspinosa* and *Squilla aculeata calmani*, also enter estuaries. These ten shore and seven additional species occur on shallower portions of the shelf, in depths usually less than 100 m; only *Squilla mantis*, in the category, exceeds that depth. Seven species occur on the outer part of the shelf and on the slope, to a depth of 400 m, and three of these seven also occur in deep water in the Mediterranean. Both species of the endemic genus *Allosquilla* fall into this category.

TABLE 7. Distribution of stomatopods in the eastern Atlantic

	Azores	Madeira	Canary Is.	Cape Verde Is.	Gulf of Guinea is.	St. Helena	Atlantic N of Mediterranean	Mediterranean	Morocco	Mauritania	Sénégal to Liberia	Ivory Coast to Congo	Zaire-Angola	South West Africa
<i>E. galathea</i>	-	-	-	-	-	-	-	-	-	-	+	-	+	-
<i>E. leloeuffi</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	-
<i>M. posteli</i>	-	-	-	-	-	-	-	-	-	-	+	+	-	-
<i>P. calypso</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-
<i>P. folini</i>	-	-	-	+	-	-	-	-	-	-	+	+	-	-
<i>A. septemspinosa</i>	-	-	-	-	-	-	-	-	-	+	+	+	-	-
<i>A. africana</i>	-	-	-	-	-	-	-	-	-	-	-	+	-	-
<i>A. lillyae</i>	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>C. bradyi</i>	-	-	-	+	+	-	-	-	-	-	-	-	-	-
<i>L. hoevenii</i>	-	-	-	+	+	-	-	-	-	-	+	+	+	-
<i>L. monodi</i>	-	-	-	-	?	-	-	-	-	+	+	-	-	-
<i>L. aulacorhynchus</i>	-	-	-	-	-	-	-	-	-	-	+	-	-	-
<i>N. occulta</i>	-	-	-	-	-	-	-	+	-	-	+	+	+	-
<i>P. eusebia</i>	-	-	-	-	-	-	+	+	-	-	-	-	-	-
<i>P. ferussaci</i>	-	-	-	-	-	-	+	+	-	-	+	+	-	-
<i>P. ciliata</i>	-	-	-	+	+	+	-	-	-	-	+	-	-	-
<i>P. oculata</i>	+	+	+	+	+	+	-	-	-	-	-	-	-	-
<i>P. cerisii</i>	-	-	-	-	-	-	-	+	-	-	-	-	+	-
<i>A. hieroglyphica</i>	-	-	-	-	-	-	-	-	-	-	+	+	-	-
<i>A. hyalina</i>	-	-	-	-	-	+	-	-	-	-	-	+	-	-
<i>M. africana</i>	-	-	-	-	-	-	-	-	-	+	+	+	+	-
<i>M. calypso</i>	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>M. desmaresti</i>	-	-	-	-	-	-	+	+	-	-	-	-	-	-
<i>M. pallida</i>	-	-	-	-	-	-	-	+	+	-	+	+	-	-
<i>P. a. capensis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	+
<i>S. a. calmani</i>	-	-	-	-	-	-	-	-	-	-	+	+	+	-
<i>S. cadenati</i>	-	-	-	-	-	-	-	-	-	-	+	+	+	-
<i>S. mantis</i>	-	-	+	-	-	-	+	+	+	+	+	+	+	-
<i>O. massavensis</i>	-	-	-	-	-	-	-	+	-	-	-	-	-	-
Totals	2	1	2	6	6	3	4	8	2	4	17	15	8	1

TABLE 8. Vertical distribution patterns of West African Stomatopoda (depth not recorded for *Alima hyalina* and *Pseudosquilla cerisii*)

Species occurring in the littoral zone (observed depth range in m)	
<i>Protosquilla calypso</i>	0- 69
<i>Protosquilla folini</i>	0- 25
<i>Acanthosquilla septemspinosa</i>	0- 63
<i>Lysiosquilla hoevenii</i>	0- 30
<i>Lysiosquilla monodi</i>	beach
<i>Pseudosquilla ciliata</i>	0- 73
<i>Pseudosquilla oculata</i>	0- 69
<i>Alima hieroglyphica</i>	0- 20
<i>Squilla aculeata calmani</i>	0- 44
<i>Squilla mantis</i>	0-247
Species occurring sublittorally (shallow shelf species)	
<i>Eurysquilla galathea</i>	18-100
<i>Eurysquilla leloeffi</i>	20- 30
<i>Manningia posteli</i>	10- 40
<i>Coronida bradyi</i>	9- 69
<i>Lysiosquilloides aulacorhynchus</i>	25
<i>Meiosquilla africana</i>	15-100
<i>Meiosquilla calypso</i>	20
Species limited to deep shelf and upper slope	
<i>Allosquilla africana</i>	148-174
<i>Allosquilla lillyae</i>	225-260
<i>Nannosquilloides occulta</i>	30-200
<i>Parasquilla ferussaci</i>	100-220
<i>Meiosquilla pallida</i>	100-400
<i>Pterygosquilla armata capensis</i>	128-380
<i>Squilla cadenati</i>	37-300

SUMMARY

Twentyfive species of stomatopods are now known to occur in tropical waters off West Africa. Illustrations, descriptions, and complete synonymies are provided for each of them. Shorter accounts are given for three species which occur in the Mediterranean but not off tropical West Africa and for one species which occurs south of the tropical region, so that all 29 eastern Atlantic species are reported. Two new families are recognized: Eurysquillidae, for *Eurysquilla* and several related genera, and Pseudosquillidae, for *Pseudosquilla* and its allies. Three new genera of Lysiosquillidae are named: *Allosquilla*, for a new species and a species previously assigned to *Heterosquilla*; *Lysiosquilloides*, for *L. aulacorhynchus*; and *Nannosquilloides*, for the Mediterranean species *N. occulta*, which previously had been assigned to *Lysiosquilla* and *Nannosquilla*. Five species from tropical waters

are described as new: *Eurysquilla galathea*, *Eurysquilla leloeuffi*, *Manningia posteli*, *Allosquilla lillyae*, and *Lysiosquilla monodi*. In addition to the systematic account, an annotated list of stomatopod larvae reported from West Africa is included and there is a short discussion of zoogeography. The West African stomatopod fauna although clearly an integral part of the Atlanto-East Pacific fauna, includes some Indo-West Pacific elements. The only common elements at the species level between the eastern Atlantic and the western Atlantic on one hand and the Indo-West Pacific on the other are species which occur in all three areas. Evidence for an earlier tie with the eastern Pacific is presented.

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