

Stomatopod Crustacea Collected  
by the *Galathea* Expedition, 1950–1952,  
with a List of Stomatopoda Known  
from Depths below 400 Meters

RAYMOND B. MANNING

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 521

## SERIES PUBLICATIONS OF THE SMITHSONIAN INSTITUTION

Emphasis upon publication as a means of "diffusing knowledge" was expressed by the first Secretary of the Smithsonian. In his formal plan for the Institution, Joseph Henry outlined a program that included the following statement: "It is proposed to publish a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge." This theme of basic research has been adhered to through the years by thousands of titles issued in series publications under the Smithsonian imprint, commencing with *Smithsonian Contributions to Knowledge* in 1848 and continuing with the following active series:

*Smithsonian Contributions to Anthropology*  
*Smithsonian Contributions to Astrophysics*  
*Smithsonian Contributions to Botany*  
*Smithsonian Contributions to the Earth Sciences*  
*Smithsonian Contributions to the Marine Sciences*  
*Smithsonian Contributions to Paleobiology*  
*Smithsonian Contributions to Zoology*  
*Smithsonian Folklife Studies*  
*Smithsonian Studies in Air and Space*  
*Smithsonian Studies in History and Technology*

In these series, the Institution publishes small papers and full-scale monographs that report the research and collections of its various museums and bureaux or of professional colleagues in the world of science and scholarship. The publications are distributed by mailing lists to libraries, universities, and similar institutions throughout the world.

Papers or monographs submitted for series publication are received by the Smithsonian Institution Press, subject to its own review for format and style, only through departments of the various Smithsonian museums or bureaux, where the manuscripts are given substantive review. Press requirements for manuscript and art preparation are outlined on the inside back cover.

Robert McC. Adams  
*Secretary*  
Smithsonian Institution

Stomatopod Crustacea Collected  
by the *Galathea* Expedition, 1950–1952,  
with a List of Stomatopoda Known  
from Depths below 400 Meters

*Raymond B. Manning*



SMITHSONIAN INSTITUTION PRESS

Washington, D.C.

1991

## ABSTRACT

Manning, Raymond B. Stomatopod Crustacea Collected by the *Galathea* Expedition, 1950–1952, with a List of Stomatopoda Known from Depths below 400 Meters. *Smithsonian Contributions to Zoology*, number 521, 18 pages, 12 figures, 1991.—Thirty-five species taken by the *Galathea* expedition are reported, most from shallow water stations. The seventeen species of Stomatopoda known with certainty to live in depths greater than 400 meters are listed. *Acaenosquilla*, new genus, is recognized for two species previously placed in *Heterosquilloides*, *A. brazieri* (Miers, 1880) and *A. latifrons* (De Haan, 1844). The collection includes a late larva of *Bathysquilla crassispinosa* (Fukuda, 1909), the first known larva of a bathysquillid. Five species are synonymized: *Clorida javanica* Moosa, 1974, with *C. latreillei* (Eydx and Souleyet, 1842), *Clorida merguensis* (Tiwari and Biswas, 1952) with *C. verrucosa* (Hansen, 1926), *Gonodactylus childi* Manning, 1971, with *G. incipiens* Lanchester, 1903, *Heterosquilla (Heterosquilloides) zarenkovi* Makarov, 1978, with *Heterosquilloides insignis* (Kemp, 1911), and both *Squilloides latus spinosus* Blumstein, 1970, and *Squilloides espinosus* Blumstein, 1974, with *Lenisquilla lata* (Brooks, 1886).

OFFICIAL PUBLICATION DATE is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, *Smithsonian Year*. SERIES COVER DESIGN: The coral *Montastrea cavernosa* (Linnaeus).

---

### Library of Congress Cataloging-in-Publication Data

Manning, Raymond B.

Stomatopod Crustacea collected by the *Galathea* Expedition, 1950–1952, with a list of Stomatopods known from depths below 400 meters / Raymond B. Manning.

p. cm. - (Smithsonian contributions to zoology ; no. 521)

Includes bibliographical references.

1. Stomatopoda—Catalogs and collections—Denmark—Copenhagen. 2. *Galathea* Expedition (1950–1952) 3. København Universitet. Zoologisk museum—Catalogs. I. Title. II. Series.

[QL444.M375] 591 s—d20 [595.3'82'0748913] 91-23081 CIP

Ⓢ The paper used in this publication meets the minimum requirements of the American National Standard for Permanence of Paper for Printed Library Materials Z39.48—1984.

# Contents

	<i>Page</i>
Introduction . . . . .	1
Acknowledgments . . . . .	1
Superfamily BATHYSQUILLOIDEA Manning, 1967 . . . . .	1
Family BATHYSQUILLIDAE Manning, 1967 . . . . .	1
<i>Bathysquilla crassispinosa</i> (Fukuda, 1909) . . . . .	1
Superfamily GONODACTYLOIDEA Giesbrecht, 1910 . . . . .	3
Family EURYSQUILLIDAE Manning, 1977 . . . . .	3
<i>Eurysquilla galathea</i> Manning, 1977 . . . . .	3
Family GONODACTYLIDAE Giesbrecht, 1910 . . . . .	3
<i>Gonodactylus chiragra</i> (Fabricius, 1781) . . . . .	3
<i>Gonodactylus falcatus</i> (Forskål, 1775) . . . . .	3
<i>Gonodactylus incipiens</i> Lanchester, 1903 . . . . .	3
<i>Gonodactylus lanchesteri</i> Manning, 1967 . . . . .	4
<i>Gonodactylus mutatus</i> Lanchester, 1903 . . . . .	4
<i>Gonodactylus smithii</i> Pocock, 1893 . . . . .	4
<i>Gonodactylus viridis</i> Serène, 1954 . . . . .	4
<i>Mesacturoides fimbriatus</i> (Lenz, 1905) . . . . .	4
Family ODONTODACTYLIDAE Manning, 1980 . . . . .	4
<i>Odontodactylus brevirostris</i> (Miers, 1884) . . . . .	4
<i>Odontodactylus cultrifer</i> (White, 1850) . . . . .	5
Family PROTOSQUILLIDAE Manning, 1980 . . . . .	5
<i>Chorisquilla spinosissima</i> (Pfeffer, 1888) . . . . .	5
<i>Protosquilla calypso</i> Manning, 1974 . . . . .	5
Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910 . . . . .	6
Family LYSIOSQUILLIDAE Giesbrecht, 1910 . . . . .	6
<i>Acaenosquilla</i> , new genus . . . . .	6
<i>Acaenosquilla brazieri</i> (Miers, 1880), new combination . . . . .	6
<i>Heterosquilloides insignis</i> (Kemp, 1911) . . . . .	6
<i>Lysiosquilla hoevenii</i> (Herklots, 1851) . . . . .	7
<i>Lysiosquilla maculata</i> (Fabricius, 1793) . . . . .	7
Family NANNOSQUILLIDAE Manning, 1980 . . . . .	7
<i>Acanthosquilla derijardi</i> Manning, 1970 . . . . .	7
<i>Austrosquilla vercoi</i> (Hale, 1924) . . . . .	7
<i>Nannosquilloides occultus</i> (Giesbrecht, 1910) . . . . .	8
Superfamily SQUILLOIDEA Latreille, 1803 . . . . .	8
Family HARPIOSQUILLIDAE Manning, 1980 . . . . .	8
<i>Harpiosquilla harpax</i> (De Haan, 1844) . . . . .	8
Family SQUILLIDAE Latreille, 1803 . . . . .	8
<i>Anchisquilla fasciata</i> (De Haan, 1844) . . . . .	8
<i>Carinosquilla multica rinata</i> (White, 1847) . . . . .	8
<i>Clorida gaillardii</i> Moosa, 1986 . . . . .	9
<i>Clorida latreillei</i> (Eydoux and Souleyet, 1842) . . . . .	9
<i>Clorida verrucosa</i> (Hansen, 1926) . . . . .	10
<i>Cloridopsis immaculata</i> (Kemp, 1913) . . . . .	10
<i>Lenisquilla lata</i> (Brooks, 1886) . . . . .	10
<i>Lophosquilla tiwarii</i> Blumstein, 1974 . . . . .	11

<i>Oratosquilla nepa</i> (Latreille, 1828) . . . . .	12
<i>Oratosquilla turbata</i> Manning, 1978 . . . . .	12
<i>Oratosquilla woodmasoni</i> (Kemp, 1911) . . . . .	12
<i>Rissoides africanus</i> (Manning, 1974) . . . . .	13
<i>Squilla biformis</i> Bigelow, 1891 . . . . .	13
Stomatopoda from Depths Greater than 400 Meters . . . . .	13
Discussion . . . . .	15
Literature Cited . . . . .	16

# Stomatopod Crustacea Collected by the *Galathea* Expedition, 1950–1952, with a List of Stomatopoda Known from Depths below 400 Meters

*Raymond B. Manning*

## Introduction

This report is based on the Stomatopoda collected during the voyage of the Danish vessel *Galathea* around the world between 1950 and 1952. Station data for the collections of the *Galathea* have been given by Bruun (1959), who listed the stations from below 400 meters, and by Wolff (1964), who provided data for the shallower stations. Five West African species taken by the *Galathea*, *Eurysquilla galathea* Manning, 1977, *Lysiosquilla hoevenii* (Herklots, 1851), *Nannosquilloides occultus* (Giesbrecht, 1910), *Protosquilla calypso* Manning, 1974, and *Rissoides africanus* (Manning, 1974), were reported by Manning (1977), and the single Eastern Pacific species taken by the expedition, *Squilla biformis* Bigelow, 1891, was reported by Manning (1974b).

The majority of the stomatopods collected by the *Galathea* were taken in depths shallower than 400 meters. Only two species, *Heterosquilloides insignis* (Kemp, 1911) from 445 to 460 meters and *Squilla biformis* Bigelow, 1891, from 450 to 500 meters, were taken with certainty from below 400 meters. One specimen of the shallow-water *Austrosquilla vercoi* (Hale, 1924), was labelled as having been collected in 875 or 950 meters, but the station data accompanying the specimen are certainly erroneous.

The measurement given after the number of specimens taken at each station is total length (TL) in millimeters (mm), measured from the anterior edge of the rostral plate to a line drawn between the apices of the submedian spines of the telson. In the "Material" section, meters is abbreviated to m. Data given for each station are from the station data in Wolff (1964);

---

*Raymond B. Manning, Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.*

*Reviewers: Marjorie L. Reaka, University of Maryland; and David K. Camp, Florida Marine Research Institute.*

if the depth on the specimen label is different, it, too, is given. All specimens are in the collections of the Zoological Museum, Copenhagen. Coordinates added by me are enclosed in parentheses and are from gazetteers of the United States Board on Geographic Names.

ACKNOWLEDGMENTS.—I thank Torben Wolff and Poul Chr. Jeppesen, Zoological Museum, Copenhagen, for much help during the course of this study.

A visit to the Zoological Museum in 1988 was supported by the Suzanne Liebers Erickson Exchange Program of the Smithsonian Institution. This research also was supported in part by the Smithsonian through the Scholarly Studies Program and former Secretary S. Dillon Ripley's Fluid Research Fund; that support is gratefully acknowledged.

I thank Roy K. Kropp, Battelle Ocean Sciences, Rafael Lemaitre, Smithsonian Oceanographic Sorting Center, Marjorie L. Reaka, University of Maryland, and especially David K. Camp, Florida Marine Research Institute, for reviewing the manuscript; Camp caught many inconsistencies and errors in a late draft of the manuscript, and his efforts materially improved this report.

The illustrations were prepared by my wife Lilly.

## Superfamily BATHYSQUILLOIDEA Manning, 1967

### Family BATHYSQUILLIDAE Manning, 1967

BATHYSQUILLIDAE Manning, 1967a:238.

#### *Bathysquilla crassispinosa* (Fukuda, 1909)

FIGURES 1, 2

*Lysiosquilla crassispinosa* Fukuda, 1909:61; 1910:146, pl. 10: fig. 4.—Kemp, 1913:117.

*Bathysquilla crassispinosa*.—Moosa, 1986:371, pl. 1: fig. a,b.—Bruce,

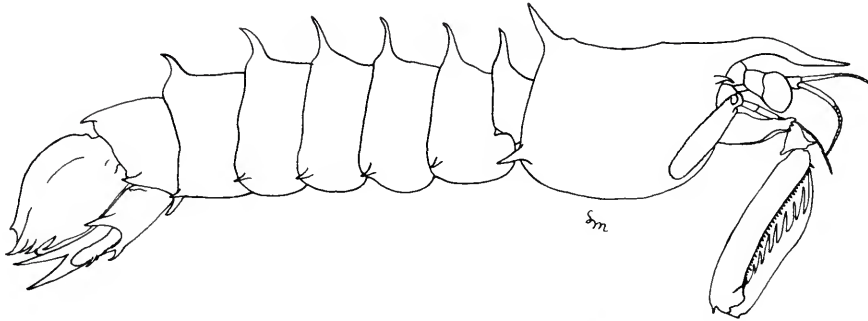


FIGURE 1.—*Bathysquilla crassispinosa* (Fukuda, 1909); lateral view of larva, TL 40 mm, sta 200.

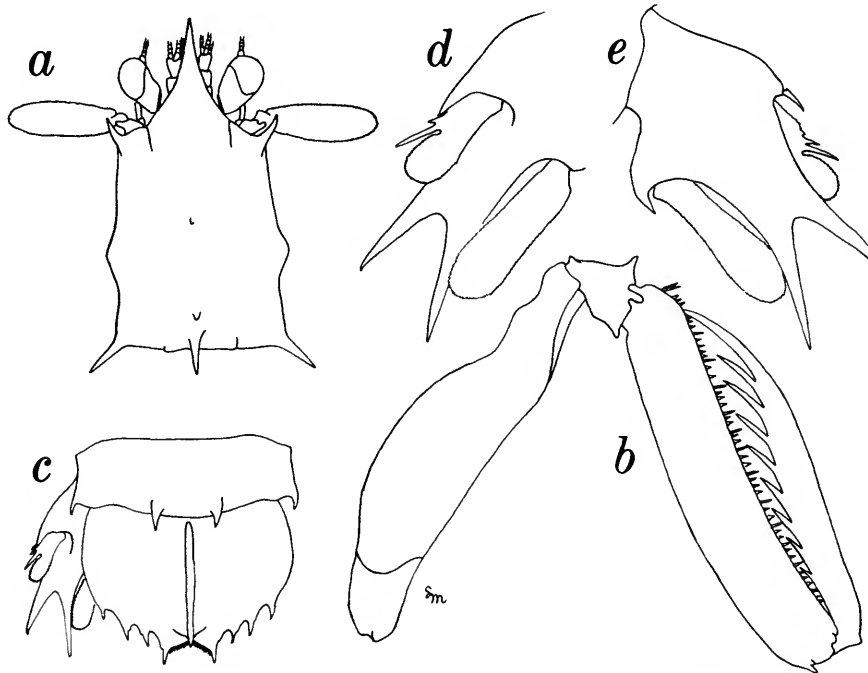


FIGURE 2.—*Bathysquilla crassispinosa* (Fukuda, 1909); larva, TL 40 mm, sta 200: a, carapace; b, raptorial claw; c, sixth abdominal somite, telson, and uropods; d, uropod; e, uropod, ventral view.

1988:87, figs. 1A-C, 2, 3A-H, 4A, 5, Frontispiece A [in color].—Manning, Kropp, and Dominguez, 1990:312.

**MATERIAL.**—Sta 200, off Natal, South Africa, 29°39'S, 37°01'E, dip net at lantern light in about 5000 m, 18 Feb 1951: 1♂ larva, 40 mm.

**REMARKS.**—This is the first record of the larva of a bathysquillid. The presence of four pairs of marginal teeth on the telson and the pectinate propodus of the raptorial claw allow its identification as a bathysquillid. The specimen has the broad

telson characteristic of *Bathysquilla* rather than the elongate telson found in *Indosquilla*. It is identified with *B. crassispinosa* as that is the only member of the genus known to occur in the area as an adult.

The specimen is a late larva, probably in the last pelagic larval stage preceding the molt to postlarva; the buds of the copulatory tubes are present. Among the features shown by this specimen are two dorsal spines on the carpus of the claw, the proximal very small, nine teeth on the dactylus of the claw, only one exposed thoracic somite, and an unsegmented



uropodal exopod. Adults of *B. crassispinosa* have 9 to 11 teeth on the claw.

Perhaps the most striking feature of this specimen is the unsegmented uropodal exopod, a characteristic of the fossil family Sculdidae (see Manning, Kropp, and Dominguez, 1990), which possibly strengthens the hypothesis that the bathysquillids comprise a very old stock of stomatopods. However, in at least some stomatopod larvae the uropodal exopod is unsegmented in the last larval stage, as shown by the last larva of the lysiosquillid *Heterosquilla tricarinata* (Claus, 1871) (Greenwood and Williams, 1984, fig. 4P). In the last larval stage of squillids the uropodal exopod also may be unsegmented or the two segments are separated by an indistinct suture, as shown by Alikunhi (1952) for various species.

The original account of this species was published by Fukuda in Japanese in 1909, not in 1910 as often cited; the 1910 version is an English translation of the original account.

**DISTRIBUTION.**—Indo-West Pacific, from scattered localities between Japan and South Africa, including Madagascar (Manning, Kropp, and Dominguez, 1990) and in the Coral Sea, off Australia (Bruce, 1988); in slope depths between about 200 and about 400 (350–420) meters.

## Superfamily GONODACTYLOIDEA Giesbrecht, 1910

### Family EURYSQUILLIDAE Manning, 1977

EURYSQUILLIDAE Manning, 1977:33.

#### *Eurysquilla galathea* Manning, 1977

*Eurysquilla galathea* Manning, 1977:35, figs. 4, 5, 53.

**MATERIAL.**—Sta 116, Loanda-Lobito, Angola, 12°13'S, 13°27'E, 100 m, clayey sand, 20 Dec 1950: 1♀, 31 mm (holotype).

**DISTRIBUTION.**—West Africa, from off Angola and off Gambia; sublittoral, in 18–100 meters.

### Family GONODACTYLIDAE Giesbrecht, 1910

GONODACTYLINAE Giesbrecht, 1910:148.

#### *Gonodactylus chiragra* (Fabricius, 1781)

*Squilla chiragra* Fabricius, 1781:515.

*Gonodactylus chiragra*.—Kemp, 1913:155, fig. 2, pl. 9: fig. 107.

**MATERIAL.**—Sta 415, Tubajon Bay, Philippines, 10°20'N, 125°32'E, coral reef, tidal zone; 17–19 Jul 1951: 4♂, 26–83 mm (1, 26 mm, in gastropod shell).

**REMARKS.**—This species was taken with *G. mutatus* and *G. viridis* at sta 415.

**DISTRIBUTION.**—Apparently this species is widely distributed in the Indo-West Pacific region, but most records require verification; shore.

#### *Gonodactylus falcatus* (Forskål, 1775)

*Cancer falcatus* Forskål, 1775:96.

*Gonodactylus falcatus*.—Manning, 1978a:4, figs. 1, 2a, 9.—Moosa, 1984:39.—Manning and Lewinsohn, 1986:7.—Moosa, 1989:224.

**MATERIAL.**—Sta 255, Mombasa, Kenya, 4°05'S, 39°41'E, coral reef, 0 m, 22 Mar 1951: 1♀, 37 mm.

**REMARKS.**—This specimen has a median tubercle on the sixth abdominal somite, sharp central carinae on the telson, and a bilobed knob. It is clearly referable to *G. falcatus*.

This is the second record for this species in the Indian Ocean outside of the Red Sea proper and indicates that this species can be expected to occur elsewhere in the western Indian Ocean. Moosa (1984) reported it from Mauritius.

Moosa (1989) also reported this species from Japan, but as broad distribution patterns in this group of species appear to be the exception rather than the rule (Manning and Lewinsohn, 1986:9), his range extension for this species must be accepted with caution.

This species was taken with *G. smithii* at sta 255.

**DISTRIBUTION.**—Western Indian Ocean, from Mombasa, Kenya, Mauritius, the Red Sea, and, possibly, in the Pacific, from Japan; shore.

#### *Gonodactylus incipiens* Lanchester, 1903

FIGURE 3

*Gonodactylus chiragra* var. *incipiens* a Lanchester, 1903:451, pl. 23: fig. 10.

*Gonodactylus incipiens*.—Manning, 1967b:18, fig. 7.—Budiman and Moosa, 1983:399, 400.

*Gonodactylus childi* Manning, 1971:75, fig. 1 [new synonymy].

**MATERIAL.**—Sta 682, Makaha'a at Nukualofa, Tonga Islands, 21°07'S, 175°10'W, 0.5–1 m, coral reef, 8 Mar 1952: 1♂, 20 mm.

**REMARKS.**—*Gonodactylus incipiens* is one of the most common shore stomatopods in the central Pacific and, like *G. affinis* De Man, 1902, shows a wide range of variation in surface sculpture of the telson (see Moosa and Cleva, 1984a, fig. 2).

*Gonodactylus childi* Manning, 1971, originally described from Enewetak Atoll, is a synonym of *G. incipiens*. A second, similar species also described from Enewetak, *Gonodactylus micronesica* Manning (1971:77, fig. 2) is a distinct species that lives in deeper water, 100 ft (about 30 m) as opposed to shore, and that has much longer accessory median carinae on the telson. In *G. micronesica* the accessory median carinae extend anteriorly beyond the posterior slope of the anterior submedian carinae; in *G. incipiens* they barely reach the posterior edge of the anterior submedian carinae.

**DISTRIBUTION.**—Known with certainty from several localities in the central Pacific, including Guam, Enewetak, the Ellice Islands, the Tuamotu Archipelago, and Australia, and in the Indian Ocean from Sri Lanka; shore.

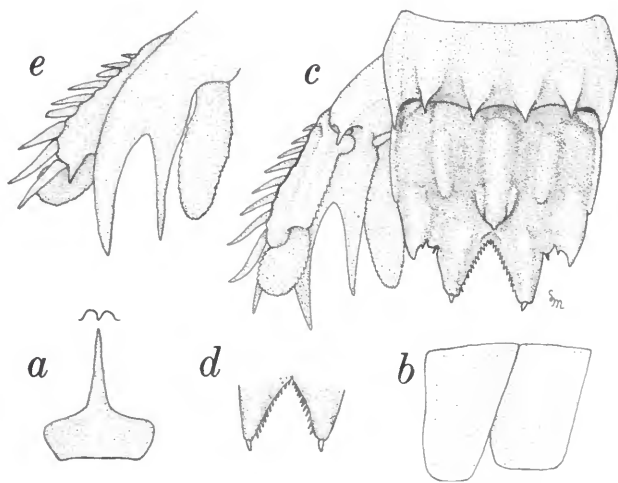


FIGURE 3.—*Gonodactylus incipiens* Lanchester, 1903; male, TL 20 mm, sta 682: a, rostral plate and ocular scales; b, lateral processes of sixth and seventh thoracic somites, right side; c, sixth abdominal somite, telson, and uropod; d, submedian teeth of telson, ventral view; e, uropod, ventral view.

#### *Gonodactylus lanchesteri* Manning, 1967

*Gonodactylus lanchesteri* Manning, 1967b:11, fig. 4.—Manning and Lewinsohn, 1986:10.

MATERIAL.—Sta 224, Bay at Cape Diego (12°15'S, 49°20'E), Diego Suarez, Madagascar, 0.3 m, rocks with corals, 3 Mar 1951: 2♀, 15 and 22 mm.

REMARKS.—There is also a male of this species, TL 27 mm, from the Red Sea at Abu Sardaf, Hurghada (as Ghardaqa, 27°14'N, 33°50'E), Egypt, in the collection of the Zoological Museum, Copenhagen.

DISTRIBUTION.—Western Indian Ocean, from the Red Sea to South Africa; shore.

#### *Gonodactylus mutatus* Lanchester, 1903

*Gonodactylus chiragra* var. *mutatus* Lanchester, 1903:450.  
*Gonodactylus mutatus*.—Manning, 1978a:7, figs. 4, 5, 11.—Budiman and Moosa, 1983:399, 400.

MATERIAL.—Sta 415, Tubajon Bay, Philippines, 10°20'N, 125°32'E, coral reef, tidal zone, 17–19 Jul 1951: 1♂, 31 mm.

REMARKS.—This species was taken with *G. chiragra* and *G. viridis* at sta 415.

DISTRIBUTION.—Western Indian Ocean to eastward to Vietnam, Thailand, and the Philippines; shore.

#### *Gonodactylus smithii* Pocock, 1893

*Gonodactylus Smithii* Pocock, 1893:475, pl. 20B: fig. 1.  
*Gonodactylus smithii*.—Budiman and Moosa, 1983:399, 400.

MATERIAL.—Sta 255, Mombasa, Kenya, 4°05'S, 39°41'E,

coral reef, 0 m, 22 Mar 1951: 1♂, 32 mm.

REMARKS.—This specimen lacks the sharp, spiniform anterolateral angles of the rostral plate characteristic of *G. acutirostris* De Man, 1898 (see Manning and Lewinsohn, 1986, fig. 2a), and so is herein referred to *G. smithii*. Both species occur in the western Indian Ocean.

This species was taken with *G. falcatus* at sta 255.

DISTRIBUTION.—Western Indian Ocean to Vietnam, Indonesia, and Australia; shore.

#### *Gonodactylus viridis* Serène, 1954

*Gonodactylus chiragra* var. *viridis* Serène, 1954:7, 10, 74, 75, 76, fig. 13–3.  
*Gonodactylus viridis*.—Manning, 1978c:4, fig. 2a–c.—Budiman and Moosa, 1983:399, 400.—Moosa, 1989:226.

MATERIAL.—Sta 415, Tubajon Bay, Philippines, 10°20'N, 125°32'E, coral reef, 17–19 Jul 1951: 3♂, 21–33 mm, 2♀, 26–50 mm.

REMARKS.—*Gonodactylus viridis* was taken with *G. chiragra* and *G. mutatus* at sta 415.

DISTRIBUTION.—Previously reported from Phuket Island, Thailand, in the Andaman Sea, and in the Pacific from Vietnam, Indonesia, the Philippines, and the Ryukyu Islands, Japan; shore.

#### *Mesacturoides fimbriatus* (Lenz, 1905)

*Gonodactylus fimbriatus* Lenz, 1905:388, pl. 47: fig. 11.—Kemp, 1913:175.—Manning, 1962:8.  
*Mesacturoides raymondi* Tirmizi and Kazmi, 1980:61, figs. 1, 2.  
*Mesacturoides fimbriatus*.—Manning, 1990:99.

MATERIAL.—Sta 256, Mombasa, Kenya, 4°05'S, 39°41'E, 1–2 m, corals, 22 Mar 1951: 1♂, 17 mm, 1♀, 12 mm.

REMARKS.—Manning (1990) showed that *M. raymondi* Tirmizi and Kazmi was a synonym of *M. fimbriatus*.

This species was taken with *Chorisquilla spinosissima* at sta 256.

DISTRIBUTION.—Western Indian Ocean, from Zanzibar, the Seychelles, Pakistan, and now from Mombasa, Kenya; shore.

#### Family ODONTODACTYLIDAE Manning, 1980

ODONTODACTYLIDAE Manning, 1980:366.

#### *Odontodactylus brevirostris* (Miers, 1884)

*Gonodactylus brevirostris* Miers, 1884:567, pl. 52: fig. C.  
*Odontodactylus brevirostris*.—Kemp, 1913:143.—Manning, 1967c:22, figs. 6–8.

MATERIAL.—Sta 675, Raoul Island, Kermadec Islands, 29°13'S, 177°57'W, 60 m, stones, 3 Mar 1952: 1♀, 29 mm.

DISTRIBUTION.—Western Atlantic and Indo-West Pacific, from the western Indian Ocean to Hawaii; sublittoral, in about 40 to 73–424 meters, usually in less than 100 meters. Juveniles have been taken at the surface.

***Odontodactylus cultrifer* (White, 1850)***Gonodactylus cultrifer* White, 1850:96, pl. 16: figs. 1, 2.*Odontodactylus cultrifer*.—Kemp, 1913:137.—Manning, 1967c:18, fig. 5.

MATERIAL.—Sta 428, Candos Bay, Mindanao, Philippines, 9°36'N, 125°46'E, dip net at lantern light in 22 m, 30 Jul 1951: 1♀, 74 mm.

DISTRIBUTION.—Western Pacific Ocean, from Australia and New Guinea northward to Japan; shallow sublittoral.

REMARKS.—There are also two males, one TL 20 mm, taken at *Dana* sta 3742 (anchorage at Biaro, Indonesia, 2°08.6'N, 125°21.7'E, 11 m, 6 Jul 1929), and a second, TL 21 mm, taken from reefs at the Murray Islands (9°55'S, 144°05'E) in 1888, in the Zoological Museum, Copenhagen.

This species was taken with *Mesacturoides fimbriatus* at sta 256.

DISTRIBUTION.—Indo-West Pacific, from the western Indian Ocean to Japan; shore to about 90 meters, usually in shallow water.

**Family PROTOSQUILLIDAE Manning, 1980**

PROTOSQUILLIDAE Manning, 1980:366.

***Chorisquilla spinosissima* (Pfeffer, 1888)***Gonodactylus spinosissimus* Pfeffer, 1888:35.—Kemp, 1913:191, pl. 10: figs. 124, 125.

MATERIAL.—Sta 256, Mombasa, Kenya, 4°05'S, 39°41'E, 1–2 m, corals, 22 Mar 1951: 1♂, 22 mm.

***Protosquilla calypso* Manning, 1974***Protosquilla calypso* Manning, 1974a:8, fig. 1; 1977:50, figs. 10, 11, 53.

MATERIAL.—Sta 50, Islas das Rôlas, São Tomé, 00°00'N, 06°32'E, 5–8 m, coral, 29 Nov 1950: 3♂, 17–20 mm, 8♀, 11–23 mm.

DISTRIBUTION.—West Africa, from the offshore islands of the Gulf of Guinea; shore to about 69 (9–69) meters.

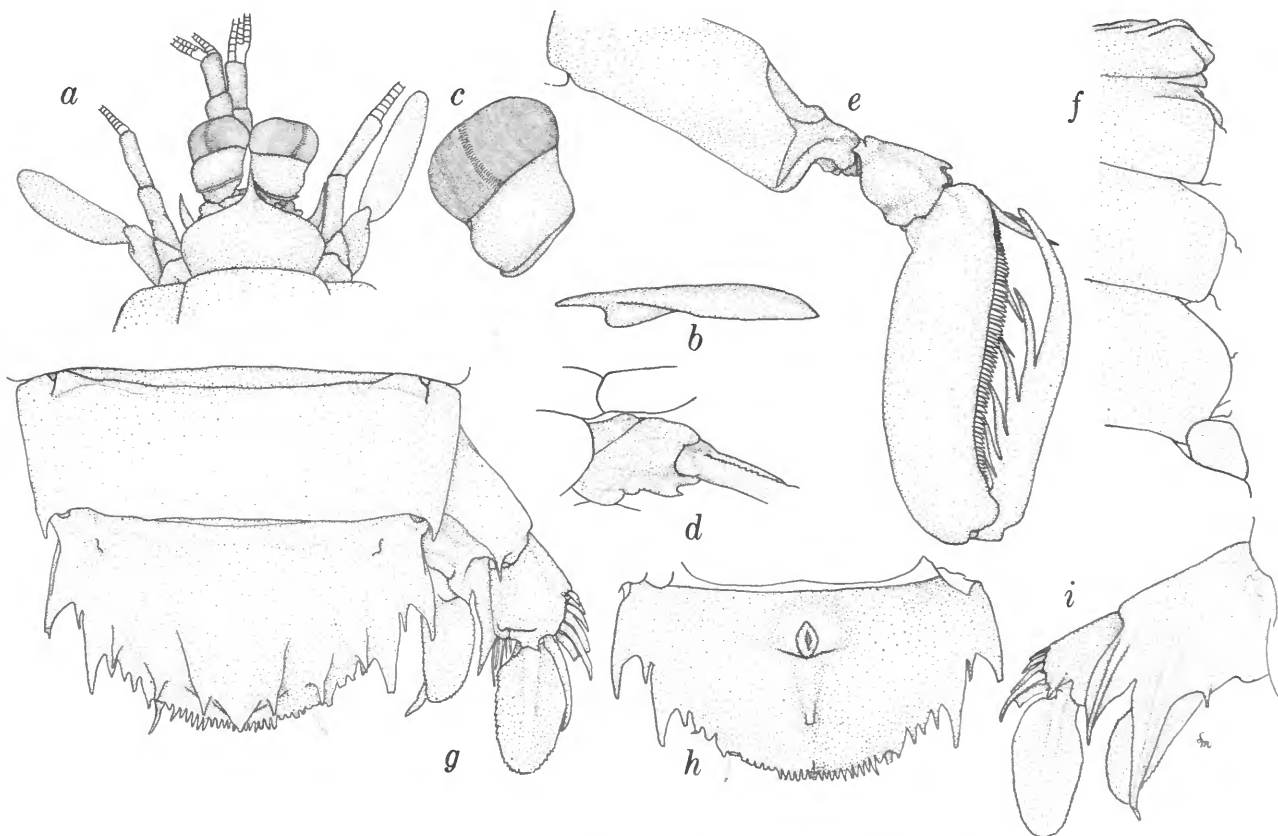


FIGURE 4.—*Acaenosquilla latifrons* (De Haan, 1844); female, TL 63 mm, Nagasaki, Japan (specimen in collection of the National Museum of Natural History, Smithsonian Institution): a, front; b, rostral plate, lateral view; c, eye; d, basal antennal segment, lateral view; e, raptorial claw; f, lateral processes of exposed thoracic somites; g, sixth abdominal somite, telson, and uropod; h, telson, ventral view; i, uropod, ventral view, inner stiff setae omitted.

## Superfamily LYSIOSQUILLOIDEA Giesbrecht, 1910

## Family LYSIOSQUILLIDAE Giesbrecht, 1910

LYSIOSQUILLINAE Giesbrecht, 1910:148.

*Acaenosquilla*, new genus

DEFINITION.—A lysiosquillid of moderate to large size, maximum length about 100 mm. Cornea bilobed. Rostral plate broader than long, with subapical ventral keel fitting between separate ocular scales. Antennal protopod with 1 ventral papilla. Claw with 6 or 7 (usually 6) teeth on dactylus and 4 movable teeth on propodus. Mandibular palp and 5 epipods present. Telson with 3-spined median elevation and 3 pairs of dorsal carinae; marginal armature consisting of row of small submedian denticles, 1 movable submedian tooth, 4 intermediate denticles, 1 intermediate tooth, 1 lateral denticle, and 1 lateral tooth. Ventral surface of telson with strong postanal tooth. Uropodal endopod lacking strong proximal fold on outer margin.

TYPE SPECIES.—*Lysiosquilla latifrons* De Haan, 1844 (Figure 4). The genus includes *Acaenosquilla latifrons* from Japan and *A. brazieri* (Miers, 1880) from Australia and New Zealand (see accounts of these species in Stephenson, 1962:38, 39).

ETYMOLOGY.—From the Greek, *akaina* (thorn) and the generic name *Squilla*, alluding to the postanal spine present in members of the genus. The gender is feminine.

REMARKS.—The combination of the ventrally-keeled rostral plate and the postanal spine will distinguish this genus from all other genera in the family.

*Heterosquilloides insuetus* Manning (1970b:81, fig. 2) from Australia and *H. philippinensis* Moosa (1986:386, fig. 5) from the Philippines also have a strong postanal spine but both species lack the ventral keel on the rostral plate and the antennal papillae; both species have a longer rostral plate and more dorsal spines on the telson. They should be referred to a new genus.

*Acaenosquilla brazieri* (Miers, 1880), new combination*Lysiosquilla Brazieri* Miers, 1880:11, 125, pl. 1: figs. 3–6.*Heterosquilla (Heterosquilloides) brazieri*.—Manning, 1966:125.

MATERIAL.—Sta 539, Coral Sea, 26°33'S, 153°31'E, 55 m (86 m on label), gravel, 5 Nov 1951: 1♀, 23 mm.

REMARKS.—This small specimen is in very poor condition. The carinae that flank the median prominence of the telson in adults are not visible. There are 6 teeth on the claw, the penultimate smaller than the antepenultimate. The uropodal exopod has 6 outer spines and 7 inner stiff setae distally on the proximal segment.

DISTRIBUTION.—Previously recorded from localities in Australia and New Zealand; sublittoral, in depths of less than 100 meters.

*Heterosquilloides insignis* (Kemp, 1911)

FIGURE 5

*Lysiosquilla insignis* Kemp, 1911:94; 1913:126, pl. 9: figs. 99–102.*Heterosquilla (Heterosquilloides) zarenkovi* Makarov, 1978:179, fig. 2 [new synonymy].*Heterosquilloides insignis*.—Moosa, 1986:386, pl. 1: fig. c.

MATERIAL.—Sta 196, off Durban, South Africa, 29°55'S, 30°20'E, 445–460 m, sandy mud, 13–14 Feb 1951: 1♂, 42 mm.

REMARKS.—I can see no differences between *H. zarenkovi* Makarov from Vietnam and *H. insignis*, which has been recorded from the Philippines by Moosa (1986), so I consider Makarov's species to be a synonym of the latter. Even the sculpture of the telson in Makarov's species appears to be identical with that shown here.

DISTRIBUTION.—Indian Ocean, from South Africa and the Andaman Islands, and Pacific Ocean from the Philippines and Vietnam; in depths between 275 and 415–510 meters.

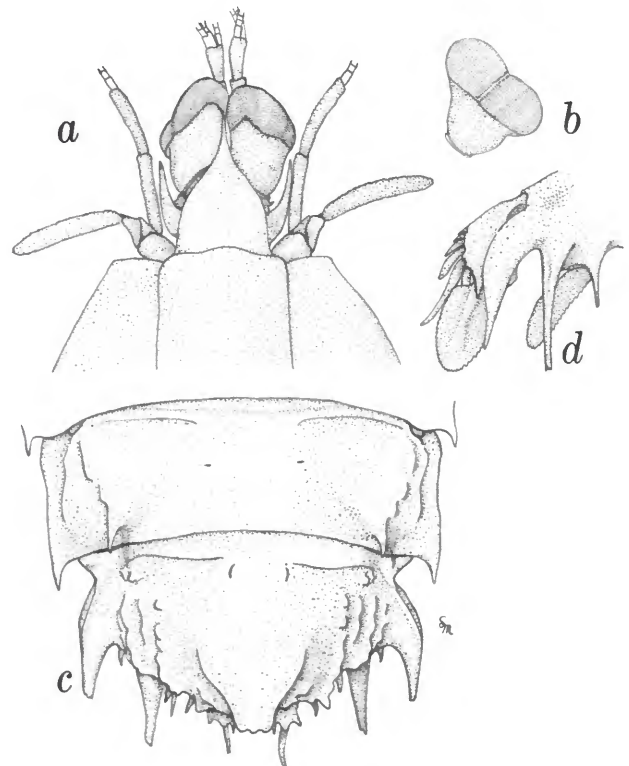


FIGURE 5.—*Heterosquilloides insignis* (Kemp, 1911); male, TL 42 mm, sta 196: a, front; b, eye; c, sixth abdominal somite and telson; d, uropod, ventral view.

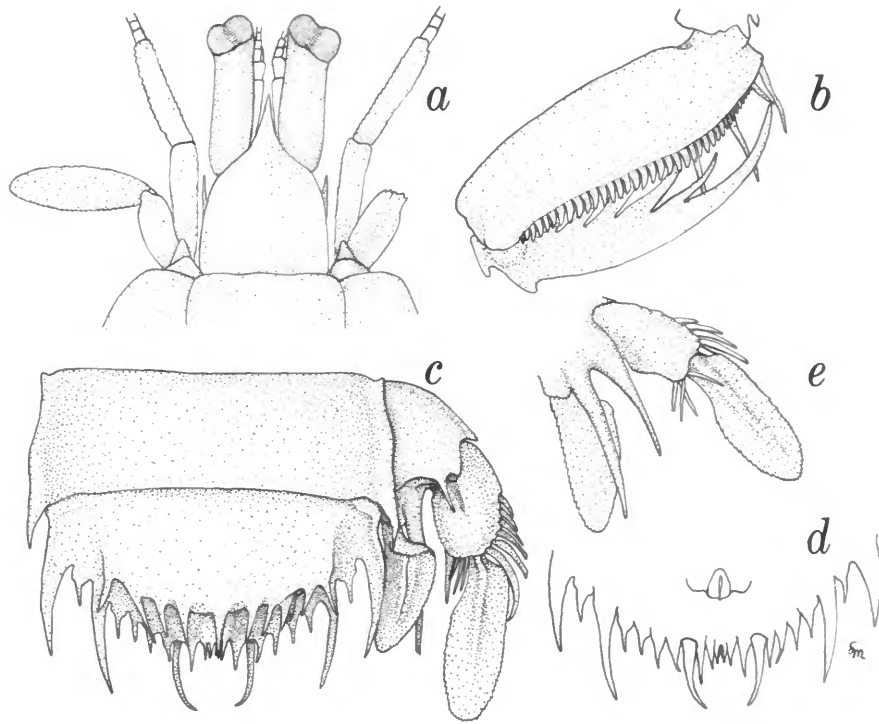


FIGURE 6.—*Acanthosquilla derijardi* Manning, 1970; female, TL 21 mm, sta 454: *a*, front; *b*, propodus and dactylus of raptorial claw; *c*, sixth abdominal somite, telson, and uropod; *d*, telson, ventral view; *e*, uropod, ventral view.

*Lysiosquilla hoevenii* (Herklots, 1851)

*Squilla Hoevenii* Herklots, 1851:17, 26, pl. 1: fig. 11.

*Lysiosquilla hoevenii*.—Manning, 1977:74, figs. 20, 21, 26a-c, 54.

MATERIAL.—Sta 48, São Tomé, 00°22'N, 06°46'E, 10 m, anchorage, 28 Nov 1950: 3♂, 106–118 mm.

DISTRIBUTION.—West Africa, from the Cape Verde Islands to Angola; shallow water to 30 meters.

*Lysiosquilla maculata* (Fabricius, 1793)

*Squilla maculata* Fabricius, 1793:511.

*Lysiosquilla maculata*.—Kemp, 1913:111, pl. 8: figs. 86–91.—Manning, 1978b:3, figs. 1–3, 9.

MATERIAL.—Sta 269, Port Victoria (4°37'S, 55°27'E), Mahé, Seychelles, anchorage, dip net at lantern light in 28 m, 29 Mar 1951: 2♂, 146–167 mm, 1♀, 140 mm.

DISTRIBUTION.—Widely distributed in the Indo-West Pacific, from the western Indian Ocean to Japan; shallow water.

Family NANNOSQUILLIDAE Manning, 1980

NANNOSQUILLIDAE Manning, 1980:368.

*Acanthosquilla derijardi* Manning, 1970

FIGURE 6

*Acanthosquilla derijardi* Manning, 1970a:1430, 1434, fig. 2.—Moosa, 1973:14; 1975:8.—Holthuis, 1975:309.

(?)*Acanthosquilla derijardi*.—Moosa and Cleva, 1984a:427.

MATERIAL.—Sta 454, Java Sea, 5°23'S, 116°02'E, 60 m, coral-clay, 25 Aug 1951: 1♀, 21 mm.

REMARKS.—This species was taken with *Lenisquilla lata* at Sta 454.

Moosa and Cleva (1984) questioned their record of this species from the Seychelles as their specimen was in poor condition.

DISTRIBUTION.—Known from scattered localities between the Red Sea and the Caroline Islands, including Madagascar and the Seychelles in the Indian Ocean, and from Borneo, Indonesia, the Philippines, and the Caroline Islands in the Pacific; shore to 60 meters.

*Austrosquilla vercoi* (Hale, 1924)

FIGURE 7

*Lysiosquilla vercoi* Hale, 1924:499, fig. 383, pl. 33: fig. 2.

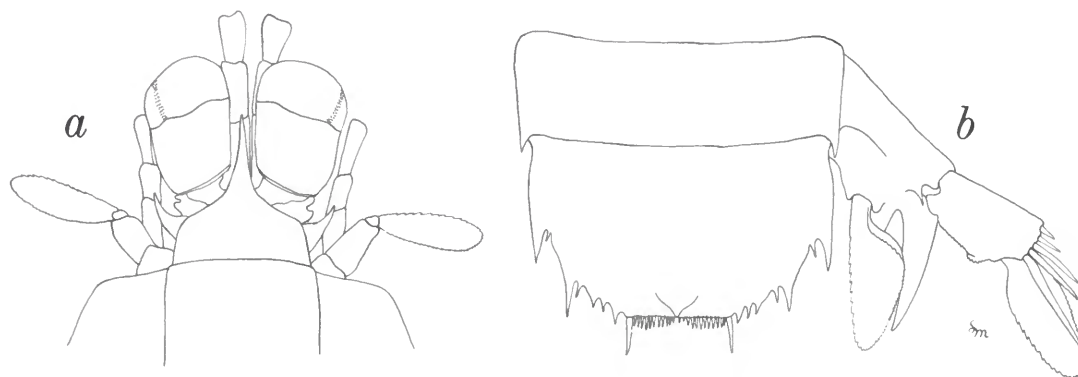


FIGURE 7.—*Austrosquilla vercoi* (Hale, 1924); female, TL 22 mm, sta 555: a, front; b, sixth abdominal somite, telson, and uropod.

*Heterosquilla* (*Austrosquilla*) *vercoi*.—Manning, 1966:130, fig. 10.

**MATERIAL.**—Sta 555, Great Australian Bight, 37°31'S, 138°44'E, 875 m (950 m on label), sand, a little clay, 6 Dec 1951: 1♂, 22 mm.

**REMARKS.**—This small specimen is clearly referable to *A. vercoi* but differs from adults in several features: the eye is broader, the antennal papillae are scarcely visible, the rostral spine is longer, the distal segment of the uropodal exopod is longer, and there are fewer stiff setae on the inner margin of the proximal segment of the uropodal exopod.

This species generally occurs in shallow water. The label data for both locality and depth certainly are erroneous.

**DISTRIBUTION.**—Australia and Tasmania; shore and shallow sublittoral.

#### *Nannosquilloides occultus* (Giesbrecht, 1910)

*Lysiosquilla occultus* Giesbrecht, 1910:3, 45, 52, 58–75, 125, 127, 131, pl. 6: figs. 1–3, 14, 17–20, 22–29, 33–35, 38, 39, pl. 7, pl. 8: figs. 1–39.

*Nannosquilloides occultus*.—Manning, 1977:91, figs. 27, 54.

**MATERIAL.**—Sta 89, off Congo River, 06°26'S, 11°56'E, 100 m, 9 Dec 1950: 1♂, 15.5 mm.

Sta 115, Loanda-Lobito, Angola, 12°14'S, 13°25'E, 200 m, clayey sand, 20 Dec 1950: 1♀, 15 mm.

**DISTRIBUTION.**—Mediterranean Sea and off West Africa, from Senegal to Angola; sublittoral.

### Superfamily SQUILLOIDEA Latreille, 1803

#### Family HARPIOSQUILLIDAE Manning, 1980

HARPIOSQUILLIDAE Manning, 1980:367.

#### *Harpiosquilla harpax* (De Haan, 1844)

*Squilla harpax* De Haan, 1844: atlas, pl. 51: fig. 1; 1849:222.—Tiwari and

*Harpiosquilla harpax*.—Manning, 1969b:25, figs. 28–38.—Moosa, 1986:390.

**MATERIAL.**—Sta 305, Bay of Bengal, Ceylon-Calcutta, 20°51'N, 87°58'E, 43–52 m, mud, 26 Apr 1951: 5♂, 70–105 mm, 3♀, 77.5–98 mm.

**REMARKS.**—This species was taken with *Lophosquilla tiwarii* at sta 305.

**DISTRIBUTION.**—Widely distributed in the Indo-West Pacific region, from the western Indian Ocean to Japan; sublittoral, in depths of less than 100 m.

### Family SQUILLIDAE Latreille, 1803

SQUILLARES Latreille, 1803:36.

#### *Anchisquilla fasciata* (De Haan, 1844)

*Squilla fasciata* De Haan, 1844: atlas, pl. 51: fig. 4; 1849:224.—Kemp, 1913:34, pl. 1: figs. 21–23.

*Anchisquilla fasciata*.—Moosa, 1986:390.

**MATERIAL.**—Sta 451, Makassar Strait, 01°25'S, 117°05'E, 50–60 m, mud with shells, 23 Aug 1951: 2 damaged specimens.

Sta 531, 1 sea mile S of Port Moresby, New Guinea (9°30'S, 147°07'E), 30 m, mud, gravel, 25 Oct 1951: 1♂, 24 mm.

**DISTRIBUTION.**—Known from scattered localities in the Indo-West Pacific, from the Red Sea to Japan; sublittoral, usually in depths shallower than 100 m.

#### *Carinosquilla multicarinata* (White, 1847)

*Squilla multicarinata* White, 1847:144, pl. 6: fig. 1.—Kemp, 1913:86, pl. 6: figs. 73–76.

**MATERIAL.**—Sta 360, 300 m W of Sultan Shoal Lighthouse (Sultan Shoal = 1°15'N, 103°39'E), Singapore, 25 m, muddy sand with fragments of corals and shells, 31 May 1951: 1♀,

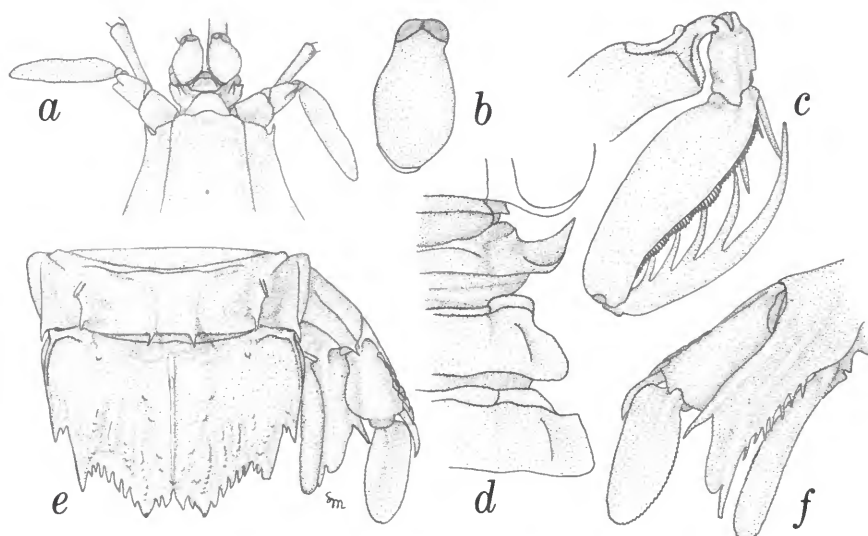


FIGURE 8.—*Clorida gaillardii* Moosa, 1986; female, TL 41 mm, sta 380: a, front; b, eye; c, raptorial claw; d, lateral processes of fifth to seventh thoracic somites; e, sixth abdominal somite, telson, and uropod; f, uropod, ventral view.

REMARKS.—Naiyanetr (1983:399) has provided keys to the species of *Carinosquilla*.

DISTRIBUTION.—Pacific Ocean, from Japan to Australia; sublittoral.

### *Clorida gaillardii* Moosa, 1986

#### FIGURE 8

*Clorida gaillardii* Moosa, 1986:396, fig. 9.

MATERIAL.—Sta 380, off Kerteh, Trengganu, Malaysia, 04°43'N, 103°43'E, 48 m, 7 Jun 1951: 1♀, 41 mm.

REMARKS.—This specimen agrees well with the original account of this species by Moosa. This species could easily be confused with *Clorida latreillei* (Eydoux and Souleyet, 1842), also taken by the *Galathea*, but differs in having a much larger lateral process on the fifth thoracic somite, more spines on abdominal carinae, less ornamentation on the telson, and a larger lobe between the spines of the basal prolongation of the uropod.

*Clorida gaillardii* was taken with *C. verrucosa* at sta 380.

DISTRIBUTION.—Previously known only from the Philippines and now from Malaysia; sublittoral, in 36–37 and 41 meters.

### *Clorida latreillei* (Eydoux and Souleyet, 1842)

#### FIGURE 9

*Clorida latreillei* Eydoux and Souleyet, 1842:265, pl. 5: figs. 2–5.  
*Squilla latreillei*.—Kemp, 1913:24, pl. 1: figs. 1–4.

*Clorida javanica* Moosa, 1974:76, figs. 2, 3 [new synonymy].

MATERIAL.—Sta 225, Bay at Cape Diego (12°15'N, 49°20'E), Diego Suarez, Madagascar, 6–8 m, sand with mud and stones, 3 Mar 1951: 1♀, 57 mm.

REMARKS.—I believe that the features of *Clorida javanica* Moosa fall within the range of variation of characters of *C. latreillei* and that these taxa are synonymous. Moosa (1974:79) noted that *C. javanica* keyed out to *C. latreillei* in the key given by Manning (1968a:4–5). He also noted that *C. javanica* differed from *C. latreillei* in several features, as follows: the shape of the lateral process of the fifth thoracic somite; the lack of spines on the marginal carinae of the abdomen, except for that on the fifth somite; the absence of a postanal keel; and the color pattern.

The shape of the lateral process of the fifth thoracic somite and the numbers of spined marginal carinae on the abdomen are both variable features; the latter may differ from side to side in this species. Color pattern in preserved specimens may also be variable and is dependent at least in part on method of preservation.

This leaves the presence or absence of a postanal keel as the main character separating these two species. When present, the keel may be well developed and rather long or it may be low and short (Manning, 1969a:8). Numerous features of members of *Clorida* have proven to be variable, including presence or absence of a structure within a given species (see below, under *C. verrucosa*), and variability may be the rule rather than the exception in *Clorida*.

DISTRIBUTION.—Widely distributed in the Indo-West Pa-

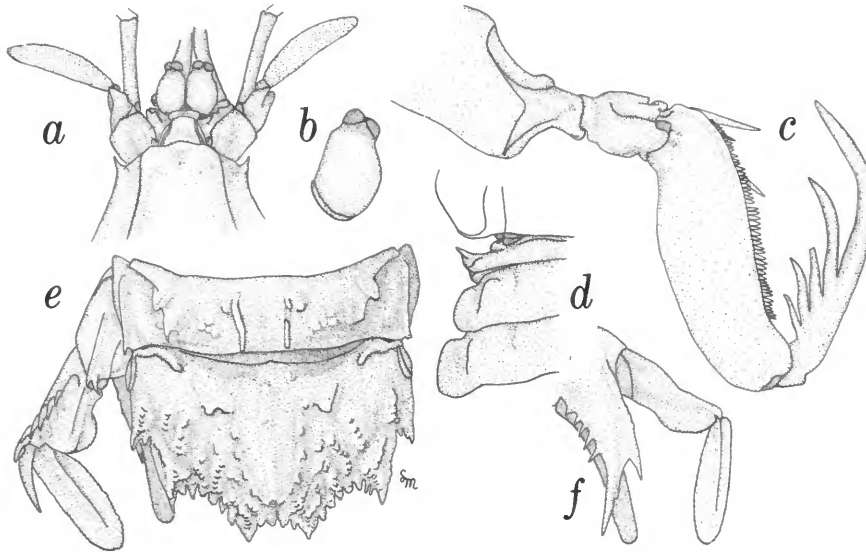


FIGURE 9.—*Clorida latreillei* (Eydoux and Souleyet, 1842); female, TL 27 mm, sta 225: a, front; b, eye; c, raptorial claw; d, lateral processes of fifth to seventh thoracic somites; e, sixth abdominal somite, telson, and uropod; f, uropod, ventral view.

cific, from the western Indian Ocean to Japan; sublittoral.

### *Clorida verrucosa* (Hansen, 1926)

FIGURES 10, 11

*Squilla microphthalmalms*.—Kemp and Chopra, 1921:299 [part; not *S. microphthalmalms* H. Milne Edwards, 1837].

*Squilla verrucosa* Hansen, 1926:3, pl. 1: fig. 1.—Manning, 1968b:124.

*Squilla merguensis* Tiwari and Biswas, 1952:350, fig. 1a.—Manning, 1968b:124 [new synonymy].

*Clorida verrucosa*.—Manning, 1968a:5 [key].—Anonymous, 1972:27.—Blumstein, 1974:116, fig. 5.—Manning, 1976:10, fig. 5.—Makarov, 1979:42, fig. 2.

*Clorida merguensis*.—Manning, 1968a:5 [key].—Blumstein, 1974:116, fig. 4.—Manning, 1976:8, fig. 4.—Makarov, 1979:44, fig. 3.—Moosa, 1986:400 [new synonymy].

**MATERIAL.**—Sta 294, off Tranquebar, India, 11°10'N, 79°59'E, 50 m, coarse sand and mud, 22 Apr 1951: 1♀, 32 mm.

Sta 380, off Kerteh, Trengganu, Malaysia, 4°43'N, 103°43'E, 48 m, 7 Jun 1951: 1♂, 16 mm.

Sta 381 IX, Gulf of Thailand, 7°00'N, 103°18'E, 55 m, mud, a little sand and shells, 8 Jun 1951: 1♂, 17 mm.

**REMARKS.**—These three specimens exhibit so much variability in characters that until now were considered to be diagnostic in members of this genus that I am convinced that *Clorida verrucosa* and *Clorida merguensis* are synonyms. The two smaller specimens lack a mandibular palp, but it is clearly present in the larger female, as reported by Makarov (1979) in material from the Bay of Tonkin. The rostral carina is absent in

two specimens, present in the male from the Gulf of Thailand. The postanal keel is well developed in the larger specimen, indistinct in the smaller ones. The larger specimen lacks submedian abdominal carinae, but they are present on the fifth and sixth somites in the adult male from sta 381 IX. The submedian carinae are spined only on the sixth somite in all specimens. I can find no characters that can be used to separate *C. merguensis* from *C. verrucosa*.

*Clorida verrucosa* was taken with *C. gaillardi* at sta 380.

**DISTRIBUTION.**—Indo-West Pacific, from Malaya, Indonesia, the Philippines, Vietnam, and the Gulf of Siam in the Pacific, and from the Mergui Archipelago and southern India in the Indian Ocean; sublittoral, in depths between 13–31 and 70–140 meters.

### *Cloridopsis immaculata* (Kemp, 1913)

*Squilla scorpio* var. *immaculata* Kemp, 1913:45, pl. 2: fig. 31.

**MATERIAL.**—Sta 344, Singapore Island (1°22'N, 103°48'E), traps in prawn ponds in mangrove swamps, tidal zone, mud, 22 May 1951: 3, 82–86 mm.

**DISTRIBUTION.**—Indo-West Pacific, from Pakistan and India, and now from Singapore; shore.

### *Lenisquilla lata* (Brooks, 1886)

FIGURE 12

*Squilla lata* Brooks, 1886:34, pl. 3: figs. 1–3.—Kemp, 1913:37, pl. 2: fig. 24. *Squilloides lata*.—Manning, 1969a:13, fig. 4.



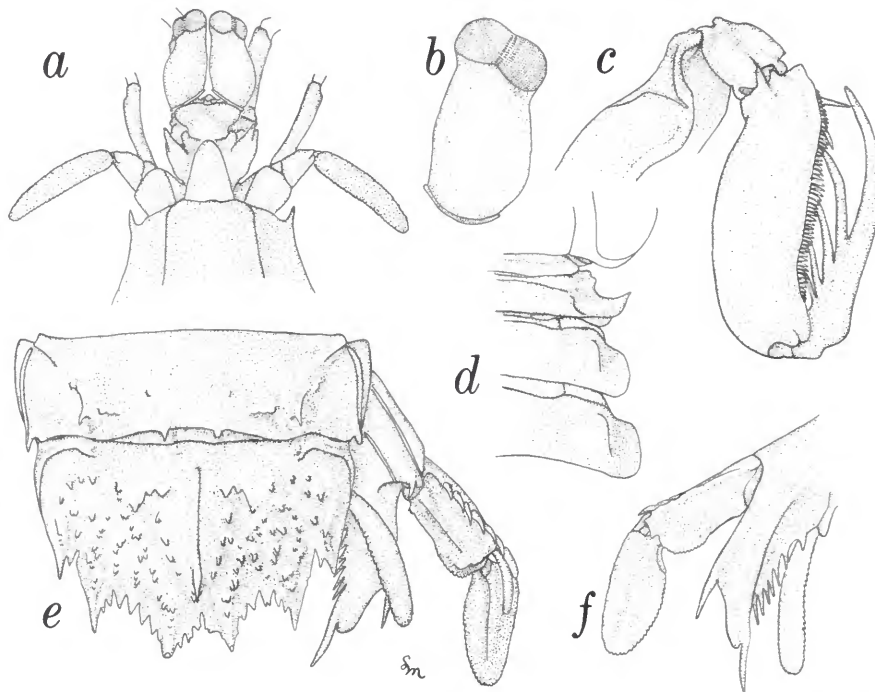


FIGURE 10.—*Clorida verrucosa* (Hansen, 1926); female, TL 32 mm, sta 294: a, front; b, eye; c, raptorial claw; d, lateral processes of fifth to seventh thoracic somites; e, sixth abdominal somite, telson, and uropod; f, uropod, ventral view.

*Squilloides latus spinosus* Blumstein, 1970:223, figs. 4, 5 [new synonymy].

*Squilloides espinosus* Blumstein, 1974:121, fig. 7 [new synonymy].

*Squilloides latus*.—Blumstein, 1974:123.

*Lophosquilla tiwarii*.—Moosa and Cleva, 1984b:78 [error for *Lenisquilla lata*].

*Lenisquilla spinosa*.—Moosa, 1986:403.

MATERIAL.—Sta 454, Java Sea, 05°23'S, 116°02'E, 60 m, coral-clay, 25 Aug 1951: 1 damaged, carapace length 6.4 mm.

REMARKS.—In his account of this species, Kemp (1913:38) reported on material from Burma, pointed out differences between that material and Brooks' original description, and suggested that his Burmese specimens might belong to a distinct species. The differences discussed by Kemp included the apparent lack of a distal spine on the basal segment of the uropods and the presence of more spines on the abdominal carinae in Brooks' material. Blumstein (1970) considered material from the Gulf of Tonkin to be conspecific with Kemp's material from Burma and subspecifically distinct from Brooks' species.

I examined the types of *Squilla lata* Brooks at The Natural History Museum, London (formerly British Museum (Natural History)), a male TL 74 mm (Figure 12) and a female TL 75 mm. The differences pointed out by Kemp are due to errors in Brooks' original account. The types have a distinct distal spine on the basal segment of the uropod (not illustrated here), and

have the following abdominal carinae armed with spines: submedian 6, intermediate 3–6, lateral 2–6, and marginal 1–5.

I consider *Squilloides latus spinosus* Blumstein, 1970 to be a synonym of *Lenisquilla lata* (Brooks, 1886). Moosa (1986:404) already pointed out that *Squilloides espinosus* Blumstein, 1974, is based on a juvenile of *Lenisquilla lata*.

The synonymy given under the first reference to *Lophosquilla tiwarii* in Moosa and Cleva (1984b) makes it clear that they were dealing with *Lenisquilla lata*.

*Lenisquilla lata* was taken with *Acanthosquilla derijardi* at Sta 454.

DISTRIBUTION.—Indo-West Pacific, from the Arafura Sea, the Java Sea, Indonesia, Vietnam, Mozambique, and the Red Sea; sublittoral, in 60 to 150 meters.

#### *Lophosquilla tiwarii* Blumstein, 1974

*Squilla costata*.—Kemp, 1913:84, pl. 6: figs. 70–72 [part, specimen from Burma; not *Squilla costata* De Haan, 1844].

*Lophosquilla tiwarii* Blumstein, 1974:123, fig. 8.—Moosa, 1986:404.

MATERIAL.—Sta 305, Bay of Bengal, Ceylon-Calcutta, 20°51'N, 87°58'E, 43–52 m, mud, 26 Apr 1951: 1♂, 50 mm, 1♀, 51.5 mm.

REMARKS.—This species was taken with *Harpiosquilla*

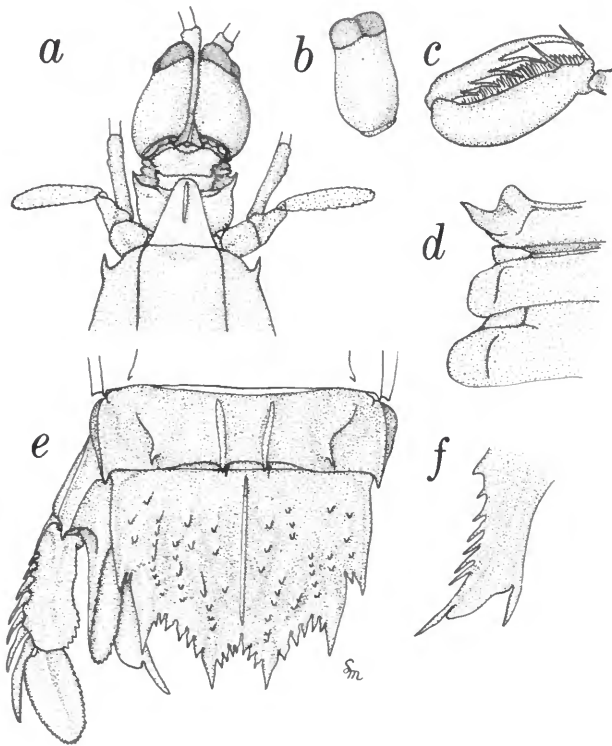


FIGURE 11.—*Clorida verrucosa* (Hansen, 1926); male, TL 17 mm, sta 381 IX: a, front; b, eye; c, propodus and dactylus of raptorial claw; d, lateral processes of fifth to seventh thoracic somites; e, sixth abdominal somite, telson, and uropod; f, basal prolongation of uropod, ventral view.

*harpax* at sta 305.

DISTRIBUTION.—Indo-West Pacific, from the Philippines, Indonesia, Vietnam, Burma, and now from the Bay of Bengal between Ceylon and Calcutta; sublittoral, in 36–37 to 182–187 meters.

#### *Oratosquilla nepa* (Latreille, 1828)

*Squilla nepa* Latreille, 1828:471.—Kemp, 1913:60, pl. 4: fig. 49.  
*Oratosquilla nepa*.—Moosa, 1986:410.

MATERIAL.—Sta 341, Singapore (1°20'N, 103°50'E), bought in market, 21 May 1951: 1♀, 101 mm.

Sta 373, off Kerteh, Trengganu, Malaysia, 4°30'N, 103°28'E, dip net at lantern light in 10 m, 6/7 Jun 1951: 1 broken specimen.

DISTRIBUTION.—Indo-West Pacific, from the western Indian Ocean to Hong Kong, Malaysia, and Vietnam; shallow sublittoral.

#### *Oratosquilla turbata* Manning, 1978

*Oratosquilla turbata* Manning, 1978d:35, fig. 20.

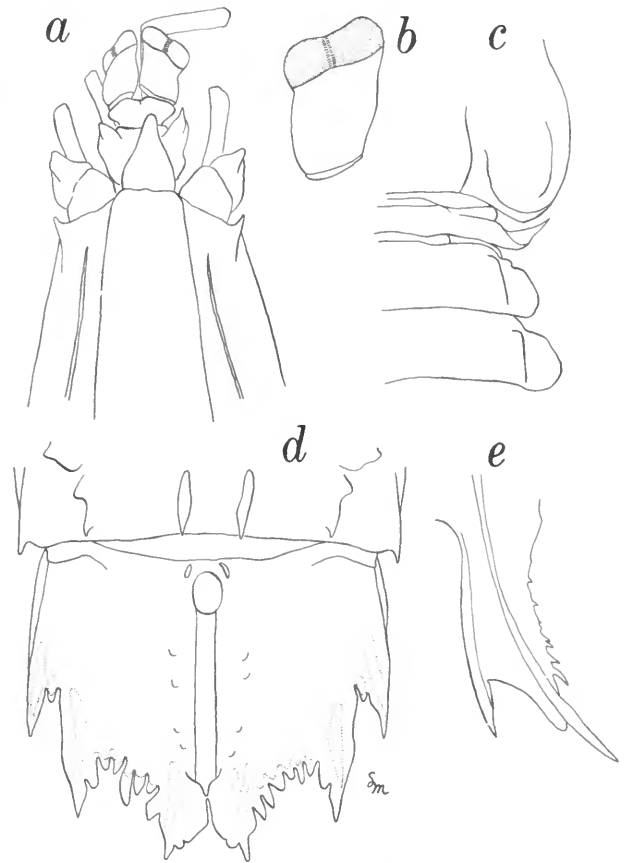


FIGURE 12.—*Lenisquilla lata* (Brooks, 1886); male syntype, TL 74 mm, Arafura Sea (specimen in The Natural History Museum, London): a, front; b, eye; c, lateral processes of fifth to seventh thoracic somites; d, telson; e, basal prolongation of uropod.

MATERIAL.—Sta 258, off Mombasa, Kenya, 4°06'S, 39°43'E, 53 m, coralline gravel with mud and shells, 22 Mar 1951: 1♂, 29 mm.

Sta 259, off Mombasa, Kenya, 4°06'S, 39°43'E, 40 m, coralline sand and gravel with shells and a little mud, 22 Mar 1951: 2♂ (1 fragmented), 27 mm.

DISTRIBUTION.—Western Indian Ocean, from Madagascar and now Kenya; sublittoral, in 16 to 55 meters.

#### *Oratosquilla woodmasoni* (Kemp, 1911)

*Squilla wood-masoni*.—Kemp, 1911:99; 1913:74, pl. 5: figs. 63–65.  
*Oratosquilla woodmasoni*.—Manning, 1978d:36, figs. 21, 22.—Moosa, 1986:410.

MATERIAL.—Sta 347, 1 kilometer E of Tanjong Rhu (1°18'N, 103°52'E), off Singapore, 3 m, gravel and sand with mud, 23 May 1951: 1♀, 80 mm.

DISTRIBUTION.—Widely distributed in the Indo-West Pacific, from the western Indian Ocean to the Philippines; shallow sublittoral.

***Rissoides africanus* (Manning, 1974)**

*Meiosquilla africana* Manning, 1974a:16, fig. 5; 1977:117, figs. 38, 56.

MATERIAL.—Sta 122, NW of lighthouse, Lobito, Angola, 12°20'S, 13°40'E, 20 m, mud with sand and clay, 20 Dec 1950: 1♀, 27 mm.

DISTRIBUTION.—West Africa, from Mauritania to Angola; sublittoral, in 15–100 meters.

***Squilla biformis* Bigelow, 1891**

*Squilla biformis* Bigelow, 1891:94; 1894:532, fig. 20, pl. 21.—Manning, 1974b:108.

MATERIAL.—Sta 741, Gulf of Panama, 07°28'N, 79°36'W, 450 m (500 m on label), 15 May 1952: 3, 51–57 mm.

DISTRIBUTION.—Eastern Pacific, from the Gulf of Califor-

nia, Gulf of Panama, and off Peru.

**Stomatopoda from Depths Greater than 400 Meters**

Records of stomatopods reported from depths exceeding 400 meters that I have been able to find are summarized below. The depth of 400 meters is not considered to be any kind of natural boundary but was chosen to match the depth selected by the editors of the *Galathea Reports* as the upper limit of the deep-sea fauna (see Wolff, 1964).

Not included here are Chopra's (1939) records of *Gonodactylus chiragra* (Fabricius, 1781) and *Natosquilla investigatoris* (Lloyd, 1907) from 1295 meters and the record given above of *Austrosquilla vercoi* from 875 meters, as both of these depths are well beyond the known depth ranges of these species. *Gonodactylus chiragra* and *A. vercoi* are both shore species and *N. investigatoris* is a pelagic species (Losse and Merrett, 1971).

The depth given in brackets following the species name is the overall depth range of the species.

BATHYSQUILLIDAE

- Altosquilla soelae* Bruce, 1985 [396–402 to 456–458 m]  
396–402, 404, 416–420, and 456–458 m Bruce, 1985:469
- Bathysquilla crassispinosa* (Fukuda, 1909) [170–200 to 350–420 m]  
350–420 m Manning, Kropp, and Dominguez, 1990:312
- Bathysquilla microps* (Manning, 1961) [604–769 to 1245–1519 m]  
720–926 m Takeda, 1983:171  
732 and 915–952 m Manning, 1961:693; 1969c:96; Bullis and Thompson, 1965:13  
732–860 m Bullis and Thompson, 1965:13; Manning, 1969c:96  
604–769, 681–769, 723, 731–786, and 1281 m Manning and Struhsaker, 1976:443  
750–925 and 865–866 m Moosa, 1986:371, 373  
622, about 640, 1042–1070, 1245–1519, and 1235–1272 m Manning, Kropp, and Dominguez, 1990:314.
- Indosquilla manihinei* Ingle and Merrett, 1971 [420 to 458–586 m]  
420 m Ingle and Merrett, 1971:193  
458–586 m Manning, Kropp, and Dominguez, 1990:314

EURYSQUILLIDAE

- Eurysquilla chacei* Manning, 1969 [419 m]  
419 m Manning, 1969c:257
- Eurysquilla sewelli* (Chopra, 1939) [695 m]  
695 m Chopra, 1939:166

## LYSIOSQUILLIDAE

- Heterosquilloides insignis* (Kemp, 1911) [275 to 415–510 m]  
 430 m Kemp, 1913:128; Ghosh and Manning, 1988:655  
 415–510 m Moosa, 1986:386  
 445–460 m herein

## ODONTODACTYLIDAE

- Odontodactylus brevirostris* (Miers, 1884) [35 to 426–439 m]  
 426–439 m Bigelow, 1931:150, as *O. hansenii* (Pocock, 1893); Manning, 1967c:23, as 424–73 m, in error

## PSEUDOSQUILLIDAE

- Parasquilla ferussaci* (Roux, 1828) [100 to 505–650 m]  
 252–550 m Figueiredo, 1962:5  
 505–650 m Arena and Li Greci, 1973:166

## SQUILLIDAE

- Fennerosquilla heptacantha* (Chace, 1939) [105 to 458 m]  
 395–404 m Manning, 1969c:171  
 421 m Bullis and Thompson, 1965:13; Manning, 1969c:171  
 439 m Bullis and Thompson, 1965:13; Springer and Bullis, 1956:22; Manning, 1969c:171  
 458 m Bullis and Thompson, 1965:13; Manning, 1969c:173
- Kempina mikado* (Kemp and Chopra, 1921) [58 to 753–804 m]  
 490–588, 740–785, and 753–804 m Manning, 1981:298, as *Kempina zanzibarica* (Chopra, 1939)
- Kempina stridulans* (Wood–Mason, 1894 in Alcock, 1894) [122 to 439 m]  
 439 m Kemp, 1913:80; Ghosh and Manning, 1988:659
- Squilla biformis* Bigelow, 1891 [156 to 474 m]  
 450 m Manning, 1974b:108; herein  
 474 m Bigelow, 1894:534
- Squilla caribaea* Manning, 1969 [190 to 366–439 m]  
 366–439 m Manning, 1969c:235
- Squilla intermedia* Bigelow, 1893 [291 to 659–824 m]  
 366–412, 421, 439, 458, 531, and 659–824 m Bullis and Thompson, 1965:13; Manning, 1969c:229  
 410, 428–473, 464–491, and 546 m Manning, 1969c:229  
 458 m Springer and Bullis, 1956:22; Bullis and Thompson, 1965:13; Manning, 1969c:229  
 619 m Bigelow, 1894:530; Manning, 1969c:228

*Squilloides leptosquilla* (Brooks, 1886) [170–200 to 677–767 m]  
344–403 and 677–767 m Kemp, 1913:48

*Squilloides tenuispinis* (Wood-Mason, 1891 in Wood-Mason and Alcock, 1891) [165 to  
439 m]  
439 m Kemp, 1913:49

DISCUSSION.—Only 17 of about 400 species of Stomatopoda (see Reaka and Manning, 1986) are known to occur in depths exceeding 400 meters, but 13 of the 17 have been taken in depths of less than 400 meters; most of the 17 species are sublittoral species that frequent the outer shelf and upper slope. All four bathysquillids have been taken in depths of more than 400 meters, but even one of these, *B. crassispinosa*, occurs in shallower water, too.

At the family level, representatives of only 6 of the 13 recognized families have been taken in more than 400 meters, the shore-dwelling gonodactylids, protosquillids, and nanosquillids being conspicuously absent from slope habitats. Other than the bathysquillids, 2 of 25 eurysquillids (8%), 1 of 26 lysiosquillids (4%), 1 of 5 odontodactylids (20%), 1 of 20 pseudosquillids (5%), and 8 of 149 squillids (5%) have been

found in more than 400 meters. The low numbers of species living in such deep waters is reflected also at the generic level. Whereas all three bathysquillid genera (100%) are represented in these deep habitats, only 1 of 5 eurysquillid genera (20%), 1 of 5 lysiosquillid genera (20%), 1 of 4 pseudosquillid genera (25%), and 4 of 27 squillid genera (15%) even occur there. As one species of *Odontodactylus* has been taken below 400 meters, 100% of odontodactylid genera are found there.

There appears to be no clear geographic pattern to the occurrence of stomatopods in outer slope habitats. Only 1 of 30 eastern Atlantic (3%), 5 of 77 western Atlantic (6%), 1 of 50 eastern Pacific (2%), and 11 of about 250 Indo-West Pacific (4%) species occur in such depths, reflecting the shallow-water characteristics of the group.

## Literature Cited

- Alcock, A.  
1894. On the Results of the Deep-Sea Dredging during the Season 1890-91 (Concluded). In Natural History Notes from H.M. Indian Marine Survey Steamer "Investigator," Commander R.F. Hoskyn, R.N., Late Commanding, Series 2, Number 1. *Annals and Magazine of Natural History*, series 6, 13:400-411.
- Alikunhi, K.H.  
1952. An Account of the Stomatopod Larvae of the Madras Plankton. *Records of the Indian Museum*, 49(3-4):239-319.
- Anonymous  
1972. Biological and Hydrological Observations in the Piru Bay, Ambon Bay and Buton Strait by R.V. Samudera. *Oceanographical Cruise Report, Institute of Marine Research, Jakarta*, 7:1-27.
- Arena, P., and F. Li Greci  
1973. Indagine sulle condizioni faunistiche e sui rendimenti di pesca dei fondali batiali della Sicilia occidentale e della bordura settentrionale dei banchi della soglia Siculo-Tunisina. *Quaderni del Laboratorio di Tecnologia della Pesca, Ancona*, Anno 4, 1(5):157-201, plates 1-4.
- Bigelow, R.P.  
1891. Preliminary Notes on Some New Species of Squilla. *Johns Hopkins University Circulars*, 10:93-94.  
1893. Preliminary Notes on the Stomatopoda of the Albatross Collections and on Other Specimens in the National Museum. *Johns Hopkins University Circulars*, 12(106):100-102.  
1894. Report upon the Crustacea of the Order Stomatopoda Collected by the Steamer Albatross between 1885 and 1891, and on Other Specimens in the U.S. National Museum; Scientific Results of Explorations by the U.S. Fish Commission Steamer Albatross, 32. *Proceedings of the United States National Museum*, 17:489-550.  
1931. Stomatopoda of the Southern and Eastern Pacific Ocean and the Hawaiian Islands. *Bulletin of the Museum of Comparative Zoology*, 72(4):105-191, plates 1, 2.
- Blumstein, R.  
1970. New Stomatopod Crustaceans from the Gulf of Tonkin, South China Sea. *Crustaceana*, 18(2):218-224.  
1974. Stomatopod Crustaceans from the Gulf of Tonkin with the Description of New Species. *Crustaceana*, 26(2):113-126.
- Brooks, W.K.  
1886. Report on the Stomatopoda Collected by H.M.S. Challenger during the Years 1873-76. *The Voyage of H.M.S. Challenger, Zoology*, 16:1-116, plates 1-16.
- Bruce, A.J.  
1985. *Altosquilla soelae*, New Genus, New Species, a Bathysquillid Stomatopod from the Australian Northwest Shelf. *Journal of Crustacean Biology*, 5(3):468-475.  
1988. Two Mantis Shrimps New to the Australian Fauna (Crustacea: Stomatopoda: Bathysquillidae). *The Beagle, Records of the Northern Territory Museum of Arts and Sciences*, 5(1):87-95, frontispieces A and B in color at beginning of volume.
- Bruun, A.F.  
1959. General Introduction to the Reports and List of Deep-Sea Stations. *Galathea Report*, 1:7-48.
- Budiman, A., and M.K. Moosa  
1983. Notes on *Caledoniella montrouzieri* Soubervie, 1869, from Indonesia (Gastropoda: Caledoniellidae). *The Veliger*, 25(4):399, 400.
- Bullis, H.R., Jr., and J.R. Thompson  
1965. Collections by the Exploratory Fishing Vessels Oregon, Silver Bay, Combat, and Pelican Made during 1956-1960 in the Southwestern North Atlantic. *Special Scientific Report—Fisheries, U.S. Fish and Wildlife Service*, 510: iii + 130 pages.
- Chace, F.A., Jr.  
1939. Preliminary Descriptions of One New Genus and Seventeen New Species of Decapod and Stomatopod Crustacea; Reports on the Scientific Results of the First Atlantis Expedition to the West Indies, under the Joint Auspices of the University of Havana and Harvard University. *Memorias de la Sociedad Cubana de Historia Natural*, 13(1):31-54.
- Chopra, B.  
1939. Stomatopoda. *Scientific Reports, The John Murray Expedition 1933-34*, 6(3):137-181.
- Claus, C.  
1871. Die Metamorphose der Squilliden. *Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen*, 16:111-163, plates 1-8.
- Eydoux, F., and L.F.A. Souleyet  
1842. Crustacés. *Voyage autour du Monde exécuté pendant les Années 1836 et 1837 sur la Corvette La Bonite Commandée par M. Vaillant, Capitaine de Vaisseau, Zoologie*, 1:219-272, plates 1-5. Paris.
- Fabricius, J.C.  
1781. *Species insectorum exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosin adiectis observationibus, descriptionibus*, 1: viii + 552 pages. Hamburgii et Kilonii.  
1793. *Entomologia systematica emendata et aucta, secundum classes, ordines, genera, species, adjectis synonymis, locis, observationibus, descriptionibus*, 2: vii + 519 pages. Hafniae.
- Figueiredo, M.J.  
1962. Un stomatopode nouveau pour la faune portugaise et pour l'Océan Atlantique, *Pseudosquilla ferussaci* (Roux). *Notas e Estudos do Instituto de Biologia Marítima, Lisboa*, 25:5-9, plates 1-5.
- Forskål, P.  
1775. *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium*. 19 + xxxii + 164 pages. Copenhagen.
- Fukuda, T.  
1909. The Stomatopoda of Japan. *Dobutsugaku Zasshi*, 21:54-62, plate 4. [In Japanese.]  
1910. Report on Japanese Stomatopoda with Descriptions of Two New Species. *Annotationes Zoologicae Japonenses*, 7(3):139-152, plate 4.
- Ghosh, H.C., and R.B. Manning  
1988. Types of Stomatopod Crustaceans in the Zoological Survey of India. *Proceedings of the Biological Society of Washington*, 101(3):653-661.
- Giesbrecht, W.  
1910. Stomatopoda, Erster Theil. *Fauna und Flora des Golfes von Neapel*, 33: vii + 239 pages, plates 1-11.
- Greenwood, J.G., and B.G. Williams  
1984. Larval and Early Post-Larval Stages in the Abbreviated Development of *Heterosquilla tricarinata* (Claus, 1871) (Crustacea, Stomatopoda). *Journal of Plankton Research*, 6(4):615-635.
- Haan, W. de  
1833-1850. Crustacea. In P.F. von Siebold, *Fauna japonica sive descriptio animalium, quae in itinere per japoniam, jussu et auspiciis superiorum, qui summum in India batava imperium tenent, suscepto, annis 1823-1830 collegit, notis, observationibus et adumbrationibus*

- bus illustravit*, pages i–xvii, i–xxxi, ix–xvi, 1–243, plates A–J, L–Q, 1–55, circ. tab. 2. Lugduni-Batavorum [Leiden].
- Hale, H.M.  
1924. Notes on Australian Crustacea, 1: Family Squillidae. *Records of the South Australian Museum*, 2(4):491–502, plates 32, 33.
- Hansen, H.J.  
1926. The Stomatopoda of the Siboga Expedition. *Siboga Expeditie*, 35:1–48, plates 1, 2.
- Herklots, J.A.  
1851. *Additamenta ad faunam carcinologicam Africae Occidentalis, sive descriptiones specierum novarum e crustaceorum ordine, quas in Guinea collegit vir strenuus H.S. Pel, praefectus residentis in litore Guinea*, 28 pages, 2 plates. Lugduni-Batavorum [Leiden].
- Holthuis, L.B.  
1975. *Acanthosquilla derijardi* Manning, 1970, a Stomatopod New to the Fauna of the Red Sea. *Crustaceana*, 29(3):309, 310.
- Ingle, R.W., and N.R. Merrett  
1971. A Stomatopod Crustacean from the Indian Ocean, *Indosquilla manihinei* gen. et sp. nov. (Family Bathysquillidae) with Remarks on *Bathysquilla crassispinosa* (Fukuda, 1910). *Crustaceana*, 20(2):192–198, plate 1.
- Kemp, S.  
1911. Preliminary Descriptions of New Species and Varieties of Crustacea Stomatopoda in the Indian Museum. *Records of the Indian Museum*, 6(2):93–100.  
1913. An Account of the Crustacea Stomatopoda of the Indo-Pacific Region, Based on the Collection in the Indian Museum. *Memoirs of the Indian Museum*, 4:1–217, plates 1–10.
- Kemp, S., and B. Chopra  
1921. Notes on Stomatopoda. *Records of the Indian Museum*, 22:297–311.
- Lanchester, W.F.  
1903. Marine Crustaceans, VIII: Stomatopoda, with an Account of the Varieties of *Gonodactylus chiragra*. In J.S. Gardiner, *The Fauna and Geography of the Maldive and Laccadive Archipelagoes; Being the Account of the Work Carried on and of the Collections Made by an Expedition during the Years 1899 and 1900*, 1:444–459.
- Latreille, P.A.  
1803. *Histoire Naturelle, Générale et Particulière, des Crustacés et des Insectes*, 3: 467 pages. Paris.  
1828. Squille, *Squilla*. Entomologie ou histoire naturelle de crustacés, arachnides et des insectes. In *Encyclopédie Méthodique*, 10:467–475. Paris.
- Lenz, H.  
1905. Ostafrikanische Dekapoden und Stomatopoden gesammelt von Herrn Prof. Dr. A. Voeltzkow. In A. Voeltzkow, *Wissenschaftliche Ergebnisse der Reisen in Madagaskar und Ostafrika in den Jahren 1889–95*, volume 3. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 27:341–392, plates 47, 48.
- Lloyd, R.E.  
1907. Contributions to the Fauna of the Arabian Sea, with Descriptions of New Fishes and Crustacea. *Records of the Indian Museum*, 1:1–12.
- Losse, G.F., and N.R. Merrett  
1971. The Occurrence of *Oratosquilla investigatoris* (Crustacea: Stomatopoda) in the Pelagic Zone of the Gulf of Aden and the Equatorial Western Indian Ocean. *Marine Biology*, 10(3):244–253.
- Makarov, R.R.  
1978. New Data on Crustaceans of the Families Lysiosquillidae and Gonodactylidae (Crustacea, Stomatopoda) from the Tonkin Bay (Vietnam). *Zoologicheskij Zhurnal* (Moscow), 57:176–189. [In Russian.]  
1979. A Collection of Stomatopod Crustaceans of the Genus *Clorida* Eydoux & Souleyet, 1842, from Tonkin Bay, Vietnam. *Crustaceana*, 37(1):39–56.
- Man, J.G., de  
1898. Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden, sechster (schluss-) Theil. In *Zoologische Jahrbücher, Abtheilung für Systematik, Geographie und Biologie der Thiere*, 10:677–708, plates 28–38.  
1902. Die von Herrn Professor Kükenthal im Indischen Archipel gesammelten Dekapoden und Stomatopoden. In Kükenthal, *Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 25:467–929, plates 19–27.
- Manning, R.B.  
1961. A New Deep-Water Species of *Lysiosquilla* (Crustacea, Stomatopoda) from the Gulf of Mexico. *Annals and Magazine of Natural History*, (13)3:693–697, plates 10, 11.  
1962. Stomatopod Crustacea Collected by the Yale Seychelles Expedition, 1957–1958. *Postilla*, 68:1–15.  
1966. Notes on Some Australian and New Zealand Stomatopod Crustacea, with an Account of the Species Collected by the Fisheries Investigation Ship *Endeavour*. *Records of the Australian Museum*, 27(4):79–137.  
1967a. Preliminary Account of a New Genus and a New Family of Stomatopoda. *Crustaceana*, 13(2):238, 239.  
1967b. Notes on the *demanii* Section of Genus *Gonodactylus* Berthold with Descriptions of Three New Species. *Proceedings of the United States National Museum*, 123:1–27.  
1967c. Review of the Genus *Odontodactylus* (Crustacea: Stomatopoda). *Proceedings of the United States National Museum*, 123:1–35.  
1968a. Stomatopod Crustacea from Madagascar. *Proceedings of the United States National Museum*, 124:1–61.  
1968b. A Revision of the Family Squillidae (Crustacea, Stomatopoda), with the Description of Eight New Genera. *Bulletin of Marine Science*, 18(1):105–142.  
1969a. Notes on Some Stomatopod Crustacea from Southern Africa. *Smithsonian Contributions to Zoology*, 1: 17 pages.  
1969b. A Revision of the Genus *Harpisquilla* (Crustacea, Stomatopoda), with Descriptions of Three New Species. *Smithsonian Contributions to Zoology*, 36: iii + 41 pages.  
1969c. Stomatopod Crustacea of the Western Atlantic. *Studies in Tropical Oceanography, Miami*, 8: viii + 380 pages.  
1970a. Some Stomatopod Crustaceans from Tuléar, Madagascar. *Bulletin du Muséum National d'Histoire Naturelle, Paris*, series 2, 41(6):1429–1441.  
1970b. Two New Stomatopod Crustaceans from Australia. *Records of the Australian Museum*, 28(4):77–85.  
1971. Two New Species of *Gonodactylus* (Crustacea, Stomatopoda) from Eniwetok Atoll, Pacific Ocean. *Proceedings of the Biological Society of Washington*, 84:73–80.  
1974a. Campagne de la *Calypso* dans le Golfe de Guinée et aux Iles Principe, São Tomé et Annobon (1956), et campagne aux Iles du Cap Vert (1959) (suite), 21: Stomatopod Crustacea. In *Résultats scientifiques de les campagnes de la "Calypso," fascicule 10. Annales de l'Institut Océanographique, Paris*, 49 (supplement):1–22.  
1974b. Stomatopods Collected by Th. Mortensen in the Eastern Pacific Region (Crustacea, Stomatopoda). *Steenstrupia*, 3(11):101–109.  
1976. Redescriptions of *Oratosquilla indica* (Hansen) and *Clorida verrucosa* (Hansen), with Accounts of a New Genus and Two New Species (Crustacea, Stomatopoda). *Beaufortia*, 25(318):1–13.  
1977. A Monograph of the West African Stomatopod Crustacea. *Atlantide Report*, 12:25–181.  
1978a. Notes on Some Species of the *Falcatus* Group of *Gonodactylus* (Crustacea: Stomatopoda: Gonodactylidae). *Smithsonian Contributions to Zoology*, 258: iii + 15 pages.

- 1978b. Synopses of the Indo-West-Pacific Species of *Lysiosquilla* Dana, 1852 (Crustacea: Stomatopoda: Lysiosquillidae). *Smithsonian Contributions to Zoology*, 259: iii + 16 pages.
- 1978c. New and Rare Stomatopod Crustacea from the Indo-West-Pacific Region. *Smithsonian Contributions to Zoology*, 264: iii + 36 pages.
- 1978d. Further Observations on *Oratosquilla*, with Accounts of Two New Genera and Nine New Species (Crustacea: Stomatopoda: Squillidae). *Smithsonian Contributions to Zoology*, 272: iii + 44 pages.
1980. The Superfamilies, Families, and Genera of Recent Stomatopod Crustacea, with Diagnoses of Six New Families. *Proceedings of the Biological Society of Washington*, 93(2):362-372.
1981. First Record of *Kempina zanzibarica* (Chopra, 1939) from the Red Sea, with Notes on *Lenisquilla gilesi* (Kemp, 1911). *Senckenbergiana Biologica*, 61(3/4):297-303.
1990. Stomatopod Crustacea from the Persian Gulf, with the Description of a New *Manningia*. *Stenstrupia*, 16(6):93-108.
- Manning, R.B., R.K. Kropp, and J. Dominguez  
1990. Biogeography of Deep-Sea Stomatopod Crustacea, Family Bathysquillidae. *Progress in Oceanography*, 24:311-316.
- Manning, R.B., and Ch. Lewinsohn  
1986. Notes on Some Stomatopod Crustacea from the Sinai Peninsula, Red Sea. *Smithsonian Contributions to Zoology*, 433: iii + 19 pages.
- Manning, R.B., and P. Struhsaker  
1976. Occurrence of the Caribbean Stomatopod, *Bathysquilla microps*, off Hawaii, with Additional Records for *B. microps* and *B. crassispinosa*. *Proceedings of the Biological Society of Washington*, 89:439-449.
- Miers, E.J.  
1880. On the Squillidae. *Annals and Magazine of Natural History*, series 5, 5:1-30, 108-127, plates 1-3.  
1884. Crustacea. In *Report of the Zoological Collections Made in the Indo-Pacific Ocean during the Voyage of H.M.S. "Alert," 1881-82*, pages 178-322, 513-575, plates 18-35, 46-52. London: British Museum (Natural History).
- Milne Edwards, H.  
1837. *Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux*, 2: 532 pages. Atlas: 32 pages, plates 1-14, 14bis, 15-25, 25bis, 26-42. Paris.
- Moosa, M.K.  
1973. The Stomatopod Crustacea Collected by the Mariel King Memorial Expedition in Maluku Waters in 1970. *Marine Research in Indonesia*, 13:1-30.  
1974. On a New and Rare Species of Stomatopoda (Crustacea) from Indonesian Waters. *Treubia*, 28(3):73-82.  
1975. Notes on Stomatopod Crustacea from Seribu Islands and Adjacent Waters with a Description of a New Species. *Marine Research in Indonesia*, 15:1-20.  
1984. Notes on Stomatopod Crustacea from La Réunion and Mauritius. *Comité national français des recherches antarctiques*, 55:37-40.  
1986. Résultats du Campagnes MUSORSTOM I & II Philippines, 2: Stomatopod Crustacea. *Mémoires du Muséum National d'Histoire Naturelle, Paris* (series A, Zoology), 133:367-414, plate 1.  
1989. Some Stomatopods (Crustacea: Stomatopoda) from Japanese Waters, with Description of a New Species. *Bulletin of the National Science Museum, Tokyo*, series A (Zoology), 15(4):223-229.
- Moosa, M.K., and R. Cleva  
1984a. Sur une collection des Stomatopodes (Crustacea, Hoplocarida) provenant des îles Seychelles. *Bulletin du Muséum National d'Histoire Naturelle, Paris*, series 4, 6(section A, no. 2):421-429.  
1984b. Stomatopod Crustacea Collected by the Mission Corindon II in the Makassar Strait, Indonesia. *Marine Research in Indonesia*, 24: 73-82.
- Naiyanetr, P.  
1983. Two Stomatopod Crustaceans from the Gulf of Thailand with a Key to the Genus *Carinosquilla* Manning 1968. *Senckenbergiana Biologica*, 63(5/6):393-399.
- Pfeffer, G.  
1888. Übersicht der von Herrn Dr. Franz Stuhlmann in Ägypten, auf Sansibar und dem gegen überliegenden Festlande gesammelten Reptilien, Amphibien, Fische, Mollusken und Krebse. *Jahrbuch der Hamburgischen Wissenschaftliche Anstalten*, 6:28-35.
- Pocock, R.I.  
1893. Report upon the Stomatopod Crustaceans Obtained by P.W. Basset-Smith, Esq., Surgeon, R.N., during the Cruise, in the Australian and China Seas, of H.M.S. "Penguin," Commander W.U. Moore. *Annals and Magazine of Natural History*, series 6, 11:473-479, plate 20B.
- Reaka, M.L., and R.B. Manning  
1987. The Significance of Body Size, Dispersal Potential, and Habitat for Rates of Morphological Evolution in Stomatopod Crustacea. *Smithsonian Contributions to Zoology*, 448: iii + 46 pages.
- Roux, P.  
1828-1830. *Crustacés de la Méditerranée et de son littoral*. iv + 176 unnumbered pages, plates 1-45. Paris and Marseille.
- Serène, R.  
1954. Observations biologiques sur les Stomatopodes. *Mémoires de l'Institut Océanographique de Nhatrang*, 8:1-93, plates 1-10.
- Springer, S., and H.R. Bullis, Jr.  
1956. Collections by the Oregon in the Gulf of Mexico. *Special Scientific Report—Fisheries U.S. Fish and Wildlife Service*, 196:1-134.
- Stephenson, W.  
1962. Some Interesting Stomatopoda, Mostly from Western Australia. *Journal of the Royal Society of Western Australia*, 45(2):33-43.
- Takeda, M.  
1983. Crustaceans. In M. Takeda and T. Okutani, *Crustaceans and Mollusks Trawled off Suriname and French Guiana*, pages 19-185. Tokyo: Japan Marine Fishery Resource Research Center.
- Tirmizi, N.M., and Q.B. Kazmi  
1980. A New Species of *Mesacturoides* from Karachi Waters, with Notes on Its First Larva. *Crustaceana*, 38(1):61-66.
- Tiwari, K.K., and S. Biswas  
1952. On Two New Species of the Genus *Squilla* Fabr., with Notes on Other Stomatopods in the Collections of the Zoological Survey of India. *Records of the Indian Museum*, 49(3-4):349-363.
- White, A.  
1847. Description of Two New Species of Crustacea. *Proceedings of the Zoological Society of London*, 15:144, plate 6.  
1850. Descriptions of Two Species of Crustacea in the British Museum. *Proceedings of the Zoological Society of London*, 18:95-97, plates 15, 16.
- Wolff, T.  
1964. The *Galathea* Expedition 1950-52: List of Benthic Stations from 0-400 Metres, Near-Surface Stations, and Land Stations. *Videnskabelige Meddelelser fra Dansk Naturhistorisk forening, Copenhagen*, 127:195-258.
- Wood-Mason, J., and A. Alcock  
1891. Note on the Result of the Last Season's Deep-Sea Dredging, Natural History Notes from H.M. Indian Marine Survey Steamer "Investigator," Commander R.F. Hoskyn, R.N., Commanding. *Annals and Magazine of Natural History*, series 6, 7:258-272.







## REQUIREMENTS FOR SMITHSONIAN SERIES PUBLICATION

**Manuscripts** intended for series publication receive substantive review (conducted by their originating Smithsonian museums or offices) and are submitted to the Smithsonian Institution Press with Form SI-36, which must show the approval of the appropriate authority designated by the sponsoring organizational unit. Requests for special treatment—use of color, foldouts, case-bound covers, etc.—require, on the same form, the added approval of the sponsoring authority.

**Review** of manuscripts and art by the Press for requirements of series format and style, completeness and clarity of copy, and arrangement of all material, as outlined below, will govern, within the judgment of the Press, acceptance or rejection of manuscripts and art.

**Copy** must be prepared on typewriter or word processor, double-spaced, on one side of standard white bond paper (not erasable), with 1¼" margins, submitted as ribbon copy (not carbon or xerox), in loose sheets (not stapled or bound), and accompanied by original art. Minimum acceptable length is 30 pages.

**Front matter** (preceding the text) should include: **title page** with only title and author and no other information, **abstract page** with author, title, series, etc., following the established format; table of **contents** with indents reflecting the hierarchy of heads in the paper; also, **foreword** and/or **preface**, if appropriate.

**First page of text** should carry the title and author at the top of the page; **second page** should have only the author's name and professional mailing address, to be used as an unnumbered footnote on the first page of printed text.

**Center heads** of whatever level should be typed with initial caps of major words, with extra space above and below the head, but no other preparation (such as all caps or underline, except for the underline necessary for generic and specific epithets). Run-in paragraph heads should use period/dashes or colons as necessary.

**Tabulations** within text (lists of data, often in parallel columns) can be typed on the text page where they occur, but they should not contain rules or numbered table captions.

**Formal tables** (numbered, with captions, boxheads, stubs, rules) should be submitted as carefully typed, double-spaced copy separate from the text; they will be typeset unless otherwise requested. If camera-copy use is anticipated, do not draw rules on manuscript copy.

**Taxonomic keys** in natural history papers should use the aligned-couplet form for zoology and may use the multi-level indent form for botany. If cross referencing is required between key and text, do not include page references within the key, but number the keyed-out taxa, using the same numbers with their corresponding heads in the text.

**Synonymy** in zoology must use the short form (taxon, author, year:page), with full reference at the end of the paper under "Literature Cited." For botany, the long form (taxon, author, abbreviated journal or book title, volume, page, year, with no reference in "Literature Cited") is optional.

**Text-reference system** (author, year:page used within the text, with full citation in "Literature Cited" at the end of the text) must be used in place of bibliographic footnotes in all Contributions Series and is strongly recommended in the Studies Series: "(Jones. 1910:122)" or "... Jones (1910:122)." If bibliographic

footnotes are required, use the short form (author, brief title, page) with the full citation in the bibliography.

**Footnotes**, when few in number, whether annotative or bibliographic, should be typed on separate sheets and inserted immediately after the text pages on which the references occur. Extensive notes must be gathered together and placed at the end of the text in a notes section.

**Bibliography**, depending upon use, is termed "Literature Cited," "References," or "Bibliography." Spell out titles of books, articles, journals, and monographic series. For book and article titles use sentence-style capitalization according to the rules of the language employed (exception: capitalize all major words in English). For journal and series titles, capitalize the initial word and all subsequent words except articles, conjunctions, and prepositions. Transliterate languages that use a non-Roman alphabet according to the Library of Congress system. Underline (for italics) titles of journals and series and titles of books that are not part of a series. Use the parentheses/colon system for volume (number): pagination: "10(2):5-9." For alignment and arrangement of elements, follow the format of recent publications in the series for which the manuscript is intended. Guidelines for preparing bibliography may be secured from Series Section, SI Press.

**Legends** for illustrations must be submitted at the end of the manuscript, with as many legends typed, double-spaced, to a page as convenient.

**Illustrations** must be submitted as original art (not copies) accompanying, but separate from, the manuscript. Guidelines for preparing art may be secured from Series Section, SI Press. All types of illustrations (photographs, line drawings, maps, etc.) may be intermixed throughout the printed text. They should be termed **Figures** and should be numbered consecutively as they will appear in the monograph. If several illustrations are treated as components of a single composite figure, they should be designated by lowercase italic letters on the illustration; also, in the legend and in text references the italic letters (underlined in copy) should be used: "Figure 9b." Illustrations that are intended to follow the printed text may be termed **Plates**, and any components should be similarly lettered and referenced: "Plate 9b." Keys to any symbols within an illustration should appear on the art rather than in the legend.

**Some points of style:** Do not use periods after such abbreviations as "mm, ft, USNM, NNE." Spell out numbers "one" through "nine" in expository text, but use digits in all other cases if possible. Use of the metric system of measurement is preferable; where use of the English system is unavoidable, supply metric equivalents in parentheses. Use the decimal system for precise measurements and relationships, common fractions for approximations. Use day/month/year sequence for dates: "9 April 1976." For months in tabular listings or data sections, use three-letter abbreviations with no periods: "Jan, Mar, Jun." etc. Omit space between initials of a personal name: "J.B. Jones."

**Arrange and paginate sequentially every sheet of manuscript** in the following order: (1) title page, (2) abstract, (3) contents, (4) foreword and/or preface, (5) text, (6) appendixes, (7) notes section, (8) glossary, (9) bibliography, (10) legends, (11) tables. Index copy may be submitted at page proof stage, but plans for an index should be indicated when manuscript is submitted.

