RAYMOND B. MANNING

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ABSTRACT

A small collection of stomatopods taken during the course of an ecological survey by the University of Capetown has provided the author the opportunity of redescribing the rare *Lysiosquilla capensis* Hansen, a species restricted to southern African waters. Analysis of the large series of *Pterygosquilla armata* (H. Milne-Edwards), which also has populations off South America and New Zealand, supports an earlier suggestion that the three populations are subspecifically distinct. The collection also includes several new records for southern African waters.

This paper is based primarily on a small collection of stomatopods obtained during an ecological survey of southern African waters under the direction of Professor John H. Day of the CSIR Institute of Oceanography, University of Cape Town. Some of the samples from off Natal and Moçambique were obtained on Cruise VII of the R/V *Anton Bruun* as part of the U.S. Program in Biology, International Indian Ocean Expedition.

The collection includes two new distribution records; representatives of *Squilloides lata* (Brooks) from off southern Moçambique and of *Oratosquilla mikado* (Kemp and Chopra) from off Durban, South Africa, were taken during the survey. *Lysiosquilla capensis* Hansen is redescribed, and analysis of a large series of *Pterygosquilla armata* (H. Milne-Edwards) supports the suggestion made by me in 1966 that a distinctive subspecies occurs off South Africa.

A single specimen of *Lysiosquilla tredecimdentata* Holthuis from the collection of the U.S. National Museum is reported herein; it constitutes the first record of the species from South Africa.

In his survey of the South African fauna, Barnard (1950) recorded 17 species, including 9 species of *Squilla,* 1 of *Pseudosquilla,* 4 of *Lysiosquilla,* and 3 of *Gonodactylus.* He also suggested that other Indo-West Pacific species, including *Squilla mikado* Kemp and Chopra, could be expected to occur off the southern African coast.

Millard and Harrison (1954) reported *S. raphidea* from Richard's Bay, a record that probably was based on the specimen of *Harpiosquilla harpax* reported herein.

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In 1955, Barnard corrected his identification of *Squilla raphidea* Fabricius to *Squilla harpax* de Haan after the distinctive features of the latter species had been outlined by Tiwari and Biswas (1952).

Day and Morgans (1956) listed *Squilla latreillei* and *S. raphidea* Fabricius from Durban Bay; the latter record is probably referrable to *H. harpax.*

Ingle (1958) pointed out that Barnard's *Squilla hieroglyphica* was actually *Squilla alba* Bigelow and provided a detailed account of the species.

In three papers on the fauna of southern Moçambique, Kalk (1958) reported *Pseudosquilla ciliata* (Fabricius), *Squilla nepa* Latreille, *Lysiosquilla maculata* (Fabricius), *Gonodactylus glabrous* Brooks [= *G. falcatus* (Forskål)], and *Odontodactylus scyllarus* (Linnaeus) from Inhaca Island; Barnard (1958) described *Lysiosquilla hystricotelson* and recorded *O. scyllarus* from Delagoa Bay, Moçambique; and in 1962, Barnard recorded specimens of *L. acanthocarpus* Claus and *Squilla woodmasoni* Kemp from Inhaca Island. Any of these species could be expected to occur off the eastern coast of South Africa proper.

Synonymies include references to Kemp (1913) and Barnard (1950) where applicable and to other more recent papers that relate to the area or to the species treated. Measurements are in millimeters. Total length (TL), to the nearest millimeter, is measured along the midline from the anterior margin of the rostral plate to the posterior apices of the submedian teeth of the telson; carapace length (CL) is measured on the midline. Corneal index is referred to as CI.

Most of the collection has been returned to the University of Cape Town; a few lots have been deposited in the U.S. National Museum (USNM).

TABLE 1.—*Station data*

Sample number	*Location*	*Coordinates*	*Depth (in m)*	*Substratum*	*Date*	*Species*
11	Inhassaro, Moçambique	–	shore	–	1965	*Odontodactylus scyllarus*
12	Inhassaro, Moçambique	–	shore	–	1965	*Gonodactylus falcatus*
CP 322 A	Cape Peninsula	34°S, 18°E	shore	sand	20 Feb. 1960	*Pterygosqulla armata capensis*
KNY 223 Q	Knysna estuary	34°S, 23°E	shore	sand	30 Dec. 1960	*Lysiosquilla capensis*
M 6 H	Mtwalume River estuary	30°S, 30°E	shore	–	26 Dec. 1938	*Gonodactylus chiragra*
NAD 31 J	off Durban	29°37.5′S, 31°33′E	175–200	sand, mud	8 Sept. 1964	*Meiosquilla desmarestii*
NAD 40 P	off Durban	29°34′S, 31°39′E	118	soft mud	9 Sept. 1964	*Oratosquilla gonypetes* *Oratosquilla holoschista* *Oratosquilla mikado*
NAD 75 Q	off Durban	29°19.8′S, 31°26.2′E	38	coarse sand	10 Sept. 1964	*Clorida latreillei*
PED 19 C	Moçambique	25°07′S, 34°34′E	112	dark soft mud	10 Aug. 1964	*Squilloides lata*
RHB 57	Richards Bay estuary	28°S, 32°E	shore	sand	–	*Harpiosquilla harpax*
SB 242 V	off Saldanha Bay	33°03.6′S, 17°55.5′E	44	khaki sand	5 May 1960	*Pterygosquilla armata capensis*
SCD 269 Q	off Algoa Bay	34°23′S, 25°54′E	182	khaki sand, brown shell	19 July 1961	" " "
SWD 5 Q	SW coast, South Africa	26°30′S, 14°43′E	180	rock	10 Feb. 1963	" " "
SED 59 A	off Orange River mouth	28°46′S, 15°42′E	170	mud	9 Feb. 1963	" " "
WCD 4 R	off Cape Peninsula	34°09′S, 18°14.8′E	110	black sandy mud	25 Feb. 1959	" " "
WCD 15 N	off Saldanha Bay	33°04.3′S, 17°54.7′E	51	khaki mud	28 Apr. 1959	" " "
WCD 44 XY	off Saldanha Bay	33°06.4′S, 17°55.6′E	62	khaki sand	3 May 1960	" " "
WCD 62 F	SW coast, South Africa	32°05′S, 18°06′E	108	green mud	21 Sept. 1960	" " "
WCD N	off Saldanha Bay	33°06.4′S, 17°44.9′E	146	green, black mud	3 July 1961	" " "
WCD 102 F	W coast, South Africa	32°05.3′S, 18°15.8′E	54	khaki mud	2 July 1961	" " "
WCD 111 F	off Saldanha Bay	33°06.4′S, 17°47.2′E	141	dark green mud	3 July 1961	" " "
WCD 117 S	off Saldanha Bay	33°06.4′S, 17°44.9′E	146	green, black mud	3 July 1961	" " "
WCD 125 Q	off Saldanha Bay	33°08′S, 17°46.4′E	157	green mud	23 Apr. 1962	" " "
WCD 128 K	off Saldanha Bay	33°08.7′S, 17°46.4′E	157	green mud	23 Apr. 1962	" " "
WCD 137 G	off Cape Peninsula	34°05.3′S, 18°17.5′E	84	fine khaki, sandy mud	11 July 1962	" " "
WCD 142 A	off Saldanha Bay	33°07.3′S, 17°55.6′E	26	fine, white sand	24 Apr. 1962	" " "
WCD 146 A	off Saldanha Bay	33°05′S, 17°45′E	142	dark green mud	8 Feb. 1963	" " "

I would like to thank John Field of the University of Cape Town for making the collection available for study. The illustrations were prepared by my wife Lilly. Support of this study by the Smithsonian Institution through its Research Awards program is gratefully acknowledged.

Taking into account the records in the literature, the species reported herein (indicated below with parentheses), and recent changes in generic nomenclature, the following stomatopods are known to occur off South Africa and adjacent southern Moçambique (Inhaca Island; Delagoa Bay):

	Moçambique	*South Africa*
Acanthosquilla acanthocarpus (Claus)	+	−
Alima hyalina Leach	+	−
Bathysquilla crassispinosa (Fukuda)	−	+
Clorida latreillei Eydoux and Souleyet	+	(+)
Gonodactylus chiragra (Fabricius)	+	(+)
Gonodactylus falcatus (Forskål)	(+)	−
Gonodactylus lanchesteri Manning	+	−
Harpiosquilla harpax (de Haan)	−	(+)
Heterosquilla insignis (Kemp)	−	+
Lysiosquilla capensis Hansen	−	(+)
Lysiosquilla maculata (Fabricius)	+	+
Lysiosquilla tredecimdentata Holthuis	−	(+)
Meiosquilla desmarestii (Risso)	−	(+)
Nannosquilla hystricotelson (Barnard)	+	−
Odontodactylus scyllarus (Linnaeus)	(+)	−
Oratosquilla gonypetes (Kemp)	−	(+)
Oratosquilla holoschista (Wood-Mason)	−	(+)
Oratosquilla investigatoris (Lloyd)	−	+
Oratosquilla mikado (Kemp and Chopra)	+	(+)
Oratosquilla nepa (Latreille)	+	+
Oratosquilla woodmasoni (Kemp)	+	−
Pseudosquilla ciliata (Fabricius)	+	−
Pterygosquilla armata capensis, new subspecies	−	(+)
Squilloides lata (Brooks)	(+)	−

In April 1967, during a visit to the British Museum (Natural History), I examined some stomatopods from South African waters that were among the specimens reported in various papers by T. R. R. Stebbing. Among the specimens examined was a typical example of *Lysiosquilla maculata* (Fabricius), which substantiates records of this species from South Africa in the literature; some other records of *L. maculata* from the western Indian Ocean proved to be based on specimens of *L. tredecimdentata* Holthuis (see Manning, 1968a; Tirmizi and Manning, 1968).

I have included *Oratosquilla woodmasoni* in the list of species recorded from the South Africa region, but it is possible that record is based on a specimen of *O. hesperia* (Manning), a similar species that has a wide distribution in the western Indian Ocean (Manning, 1968a; Tirmizi and Manning, 1968).

Of the 24 species of stomatopods recorded from off the coasts of southern Africa, one, *Meiosquilla desmarestii*, is an Atlantic immigrant, two, *Pterygosquilla armata capensis* and *Lysiosquilla capensis*, are endemic, and two, *Alima hyalina* and *Pseudosquilla ciliata*, are widely distributed in the Atlantic and Indo-West Pacific regions. The remaining 19 species are known only from the Indo-West Pacific region. There is a sharp drop in numbers of species in the South African area, for over 50 species have been recorded from the western Indian Ocean south of the Arabian Sea (Manning, 1968a).

Key to Stomatopoda from South Africa and Adjacent Southern Moçambique

1. Telson lacking sharp median carina (family Lysiosquillidae)....2
   Telson with sharp median carina....7
2. Entire dorsal surface of telson covered with small spinules....*Nannosquilla hystricotelson*
   Dorsal surface of telson not covered with small spinules....3
3. Dorsal surface of telson with fan-shaped row of 5 spines....*Acanthosquilla acanthocarpus*
   Dorsal surface of telson lacking fan-shaped row of 5 spines....4
4. Sixth abdominal somite with sharp posterolateral angles and 1 pair of posterior spines....*Heterosquilla insignis*
   Sixth abdominal somite unarmed....5
5. Antennal scale oval, less than twice as long as broad; anterior margin of antennal protopod lacking projection; ventral keel of 8th thoracic somite rounded....*Lysiosquilla maculata*
   Antennal scale slender, elongate, more than twice as long as broad; anterior margin of antennal protopod with projection; ventral keel of 8th thoracic somite acute, sharp posteriorly.... 6
6. Rostral plate lacking median carina; ventral surface of uropodal protopod with slender spine at articulation of endopod.... 1. *Lysiosquilla capensis*
   Rostral plate with median carina; ventral surface of uropodal protopod lacking spine at articulation of endopod.... 2. *Lysiosquilla tredecimdentata*

Key to Stomatopoda from South Africa and Adjacent Southern Moçambique—Continued

7. All 4 pairs of marginal teeth of telson with movable apices (family Bathysquillidae)..... *Bathysquilla crassispinosa*
   No more than 1 pair of marginal teeth of telson with movable apices..... 8
8. Telson with no more than 2 intermediate marginal denticles (family Gonodactylidae).....9
   Telson with 4 or more intermediate marginal denticles (family Squillidae).....13
9. Rostral plate unarmed anteriorly; dactylus of claw with teeth on inner margin.....10
   Rostral plate with anterior spine; dactylus of claw unarmed.....11
10. Dactylus of claw inflated basally; eyes subglobular, cornea broader than stalk; telson with 5 pairs of dorsal carinae in addition to median carina.....3. *Odontodactylus scyllarus*
    Dactylus of claw not inflated; eyes slender, cornea not noticeably expanded; telson with 3 pairs of carinae in addition to median carina..... *Pseudosquilla ciliata*
11. Dorsal surface of telson covered with numerous small tubercles and spinules..... *Gonodactylus lanchesteri*
    Dorsal surface of telson with at most 1 posterior spinule on each dorsal carina.....12
12. Dorsal surface of telson with 3 central carinae; no angular lobe present between spines of basal prolongation of uropod..... 4. *Gonodactylus chiragra*
    Dorsal surface of telson with 5 central carinae; angular lobe present between spines of basal prolongation of uropod..... 5. *Gonodactylus falcatus*
13. Carapace deeply excavate posterolaterally; raptorial claw with erect spines on propodus..... 6. *Harpiosquilla harpax*
    Carapace rounded posterolaterally; propodus of raptorial claw pectinate..... 14
14. Eyes very small, cornea not as broad as stalk; ocular scales fused medially.. 7. *Clorida latreillei*
    Eyes large or small, cornea broader than stalk; ocular scales separate..... 15
15. Ocular scales each produced into an erect dorsal spine..... 8. *Pterygosquilla armata capensis*, new subspecies
    Ocular scales not produced into an erect dorsal spine..... 16
16. Lateral process of 5th thoracic somite a single spine.....17
    Lateral process of 5th thoracic somite bilobed.....18
17. Submedian teeth of telson with movable apices; dactylus of claw with 4 teeth..... 9. *Meiosquilla desmarestii*
    Submedian teeth of telson with fixed apices; dactylus of claw with 6 teeth...10. *Squilloides lata*
18. Lateral process of 5th thoracic somite with posterior lobe broadly rounded; 2 rounded lobes present between spines of basal prolongation of uropod..... *Alima hyalina*
    Lateral process of 5th thoracic somite with posterior lobe acute or spiniform, not broadly rounded; no more than 1 rounded lobe present between spines of basal prolongation of uropod.....19
19. Cornea set transversely on stalk.....20
    Cornea set obliquely on stalk.....21
20. Median carina of carapace simple; submedian carinae of 4th abdominal somite terminating in spines..... *Oratosquilla nepa*
    Median carina of carapace finely bicarinate; submedian carinae of 4th abdominal somite unarmed..... 11. *Oratosquilla holoschista*
21. Lateral process of 5th thoracic somite composed of 2 sharp spines; lateral carinae of abdomen bicarinate..... 12. *Oratosquilla mikado*
    Lateral process of 5th thoracic somite not composed of 2 sharp spines; lateral carinae of abdomen not bicarinate..... 22
22. Dactylus of raptorial claw with 10–18 teeth; cornea width one-third length of carapace..... *Oratosquilla investigatoris*
    Dactylus of claw with no more than 6 teeth; cornea width less than one-third length of carapace..... 23
23. Anterior width of carapace more than one-half median length; anterior bifurcation of median carina of carapace obsolete; dactylus of claw with 6 teeth..... *Oratosquilla woodmasoni*
    Anterior width of carapace less than one-half median length; anterior bifurcation of median carina of carapace well formed; dactylus of claw with 5 teeth..... 13. *Oratosquilla gonypetes*

1. *Lysiosquilla capensis* Hansen, 1895

FIGURE 1

Lysiosquilla capensis Hansen, 1895, p. 74.—Stebbing, 1910, p. 406.—Kemp, 1913, p. 117.—Parisi, 1922, p. 105, fig. 3.—Barnard, 1950, p. 856, fig. 4e [larva].—Manning, 1963, p. 317 [listed].—Holthuis, 1967, p. 15 [references].—Manning, 1968a, p. 36 [key].

MATERIAL.—1 ♂, 104 mm; Knysna Estuary; Sta. KNY 223 Q.

DESCRIPTION.—Eye small, cornea bilobed, set almost transversely on stalk; CI 394; eyes extending beyond end of 2nd segment of antennular peduncle; ocular scales produced into slender spines directed anteriorly.

Antennular peduncle short, about half as long as

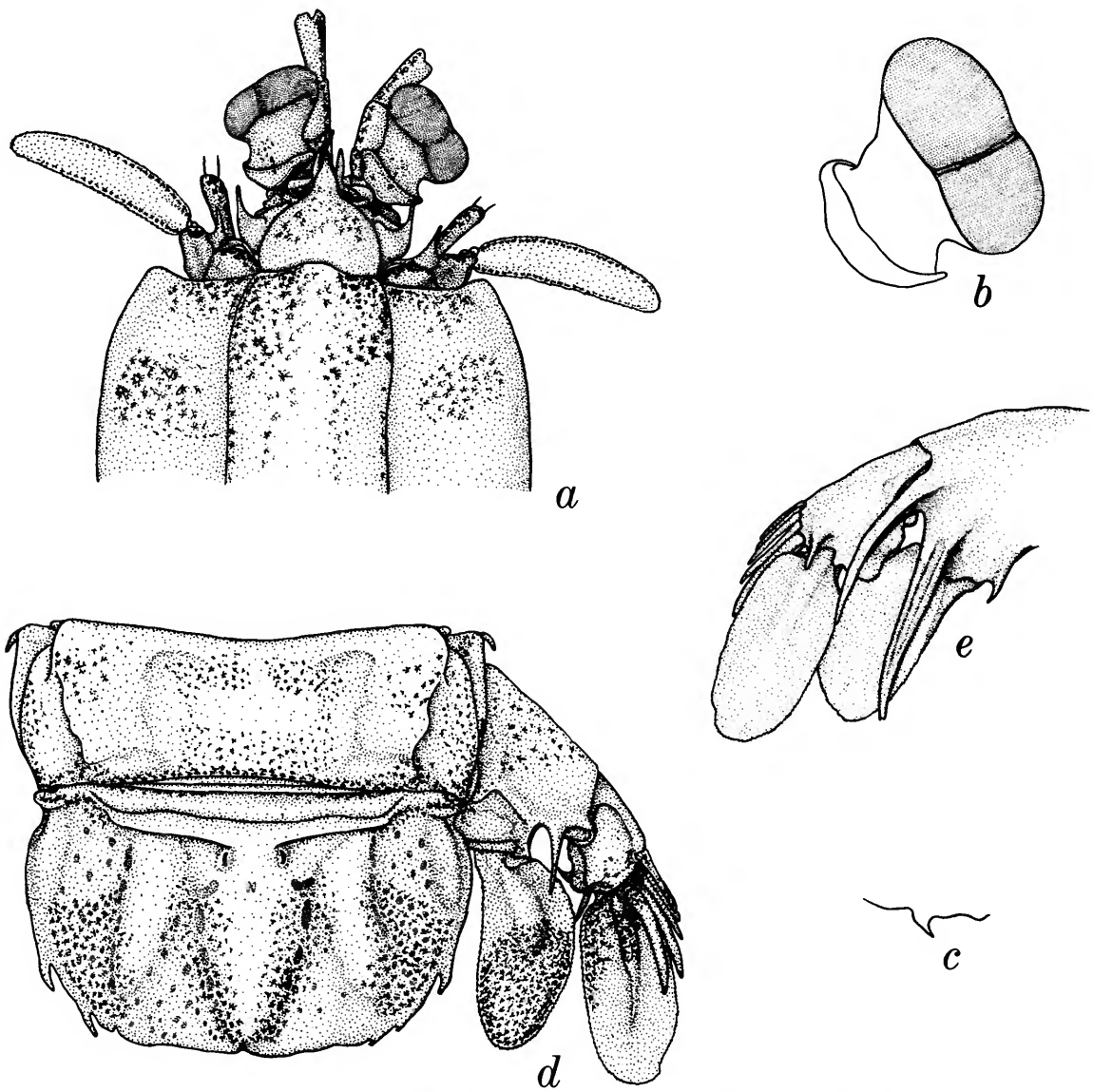

FIGURE 1.—*Lysiosquilla capensis* Hansen, male, TL 104 mm: *a*, anterior portion of body; *b*, eye; *c*, ventral keel of eighth thoracic somite, lateral view; *d*, last abdominal somite, telson, and uropod; *e*, uropod, ventral view. (Setae omitted.)

carapace; dorsal processes of antennular somite visible lateral to rostral plate as slender, anteriorly directed spines.

Antennal scale slender, curved, about 3 times as long as broad; antennal peduncle not extending beyond eye; antennal protopod with dorsal, anteriorly directed spine above peduncle of flagellum, and with 3 papillae, 1 mesial, 2 ventral.

Rostral plate as long as broad, cordiform, with long apical projection; median carina absent.

Raptorial claw with 15–17 teeth on dactylus, outer margin of dactylus faintly sinuate or flattened; dorsal ridge of carpus terminating in slender spine.

Mandibular palp and 5 epipods present.

Ventral keel of 8th thoracic somite a posteriorly curved spine.

Abdomen smooth, unarmed, 6th somite with irregular, longitudinal, lateral swellings and with ventrolateral spine in front of articulation of each uropod.

Telson much broader than long, smooth, with low median and 2 low submedian longitudinal bosses; posterior margin smooth, with median indentation; posterolateral margin with 3 projecting teeth.

Basal segment of uropod with dorsal spine; proximal segment of exopod with 8 slender movable spines, last extending about to midlength of distal segment; distal segment of exopod longer than proximal; endopod broad, triangular, less than 2 times as long as wide; basal prolongation composed of 2 slender spines, trefoil in cross section, inner much the longer; slender, fixed spine present on ventral surface at articulation of endopod.

Color.—Almost completely faded, but each somite with trace of dark posterior line; antennal scale outlined in dark pigment; merus of claw with distal, vertical bar on outer face; telson with median and 2 lateral patches of dark pigment; endopod of uropod dark, with clear margin.

Size.—Only specimen, male, TL 104 mm. Specimens of TL 40–96 mm have been recorded in the literature. Other measurements: carapace length 19.4; cornea width 4.9; rostral plate length 4.8, width 5.0; antennal scale length 9.1, width 3.2; telson length 12.2, width 19.4; uropodal endopod length 8.4, width 4.7.

Discussion.—The large number of teeth on the claw, 15–17, will immediately distinguish *L. capensis* from other species of the genus. *Lysiosquilla maculata* (Fabricius) has a shorter rostral plate with a median carina, a broader, ovate antennal scale, no projection on the antennal protopod, and a rounded ventral keel on the eighth thoracic somite; it lacks a ventral spine on the uropod at the articulation of the endopod.

Lysiosquilla sulcirostris Kemp has only eight teeth on the claw and has a triangular, tapered rostral plate. *Lysiosquilla tredecimdentata* Holthuis has 10–13 teeth on the claw, a much broader rostral plate, and blunt ocular scales. It agrees with *L. capensis* in having a dorsal projection on the antennal protopod and a slender antennal scale.

Lysierichthus pulcher Hansen has been identified as the larval form of *Lysiosquilla capensis;* Holthuis (1967) summarized the references to the larval form.

Distribution.—Known only from South African waters, from the shore to 48 fms. It has been recorded from Port Elizabeth (Hansen), Agulhas Bank in 40 fms (Parisi), from False Bay, Agulhas Bank, to Algoa Bay, 10–48 fms (Barnard), and the Knysna Estuary.

2. *Lysiosquilla tredecimdentata* Holthuis, 1941

Lysiosquilla tredecimdentata Holthuis, 1941, p. 273, fig. 6; 1967, p. 23 [references].—Manning, 1968a, p. 38, fig. 13.

Material.—1 ♂, 138 mm; Durban, Natal, South Africa; 7–8 May 1937; Herre, col.; USNM.

Diagnosis.—Rostral plate cordiform, broader than long, with median carina; antennal scale more than 3 times as long as wide, outlined in black; claw lacking prominent dark bars, dactylus with 10–13 teeth, dorsal tooth of carpus deflexed mesioventrally; ventral keel of 8th thoracic somite produced into a posteriorly directed spine; basal segment of uropod lacking spine at articulation of endopod.

Remarks.—This specimen was found among the unidentified collections in the U.S. National Museum; it agrees well with the specimen from Madagascar reported by Manning (1968a). The record is included herein because of the extension of range from Madagascar to the South African coast.

Distribution.—Western Indian Ocean, from Aden, Madagascar, and now South Africa.

3. *Odontodactylus scyllarus* (Linnaeus, 1758)

Odontodactylus scyllarus.—Barnard, 1958, p. 22.—Kalk, 1958, pp. 75, 83, 126.—Manning, 1967, p. 10, fig. 3 [references].

Material.—1 ♂, 135 mm; Inhassaro, Moçambique; shore; 1965.

Remarks.—This specimen has been reported by

Manning (1967), who erroneously listed it as a female. The copulatory tubes are broken, but present.

DISTRIBUTION.—Widely distributed in the Indo-West Pacific region. It has not been recorded from South Africa proper although Barnard (1950, p. 840, ftn.) suggested that it might occur there. In 1958, both Barnard and Kalk recorded it from Delagoa Bay, Moçambique.

4. *Gonodactylus chiragra* (Fabricius, 1781)

Gonodactylus chiragra.—Kemp, 1913, p. 155, fig. 2, pl. 9: fig. 107 [older references].—Barnard, 1950, p. 861.

MATERIAL.—1 ♂, 25 mm; Mtwalume River Estuary; Sta. M.6.H.

REMARKS.—The specimen is immature, for the copulatory tubes are poorly developed, scarcely meeting at the midline. The carinae of the telson are well developed.

This may be the specimen reported by Barnard (1950) from Umtwalumi, Natal.

The species is apparently rare off South Africa, for only four specimens have been collected there.

DISTRIBUTION.—Indo-West Pacific region.

5. *Gonodactylus falcatus* (Forskål, 1775)

Gonodactylus glabrous.—Kemp, 1913, pp. 167, 197, fig. 2 on p. 170, pl. 9: fig. 113 [older references].—Barnard, 1950, p. 863, fig. 3f.—Kalk, 1958, pp. 75, 83, 126, fig. 19b.

MATERIAL.—1 ♀, 60 mm; Inhassaro, Moçambique.

DISTRIBUTION.—Widely distributed in the Indo-West Pacific region. It was recorded from Delagoa Bay by Barnard (1950) and from Inhaca Island by Kalk (1958).

6. *Harpiosquilla harpax* (de Haan, 1844)

Squilla raphidea.—Barnard, 1950, p. 851, figs. 1c, g.—Millard and Harrison, 1954, p. 176 [listed].—Day and Morgans, 1956, p. 306 [listed; not *S. raphidea* Fabricius].
Squilla harpax.—Barnard, 1955, p. 49.
Harpiosquilla harpax.—Manning, 1968a, p. 15, fig. 4 [references].

MATERIAL.—1 ♂, 134 mm; Richards Bay Estuary; Sta. RhB 57.

REMARKS.—The specimen agrees well with accounts in the literature.

DISTRIBUTION.—Indo-West Pacific, from the western Indian Ocean to Japan. It was recorded from Durban by Barnard (1950, 1955) and by Day and Morgans (1956), and Millard and Harrison (1954) recorded a specimen from Richards Bay.

7. *Clorida latreillei* Eydoux and Souleyet, 1842

Squilla latreillei.—Kemp, 1913, p. 24, pl. 1: figs. 1–4 [older references].—Barnard, 1950, p. 845, fig. 1e.—Serène, 1952, pp. 9, 10 [and in text], figs. 1–2, 5–8, 14–15, 19 [part?].—Day and Morgans, 1956, p. 306 [listed].—Ingle, 1963, p. 14, figs. 2, 33.—Manning 1968a, p. 5 [key].

MATERIAL.—1 ♀, 24 mm; off Durban; Sta. NAD 75 Q.

DESCRIPTION.—Eye small, extending about to middle of 1st segment of antennular peduncle; stalk inflated, maximum breadth about three-fourths length of eye; cornea small, bilobed, half as broad as stalk; ocular scales low, rounded, fused along midline.

Antennular peduncle elongate, slightly longer than carapace; dorsal processes of antennular somite visible lateral to rostral plate as broad, triangular, anteriorly directed projections.

Antennal peduncle elongate, 1st segment extending beyond eye; antennal scale short, less than half as long as carapace.

Rostral plate small, smooth, rounded anteriorly, broader than long.

Carapace strongly narrowed anteriorly, lateral margins concave; median and intermediate carinae absent; posterior fourth of carapace with reflected marginal carinae and short portion of each lateral carina; anterolateral margins slope posterolaterally to small anterolateral spines, which do not extend to base of rostral plate.

Raptorial claw stout; dactylus with 5 teeth, proximal not markedly reduced in size; outer margin of dactylus faintly sinuate; dorsal ridge of carpus undivided, terminating in a blunt lobe.

Mandibular palp and 4 epipods present.

Low submedian carinae present on 7th and 8th thoracic somites, low intermediates present on 6th, 7th, and 8th somites; lateral process of 5th somite produced into a slender, sharp spine, directed anterolaterally and with spiniform ventrolateral projections; lateral processes of 6th and 7th thoracic somites unarmed anterolaterally and posterolaterally; process of 6th somite obliquely truncate, flattened laterally, process of 7th somite more rounded laterally; ventral keel of 8th somite a rounded, oval ridge.

Abdomen broad, depressed, with low, divergent sub-

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median carinae on first 5 somites; dorsal surface of 6th somite smooth lateral to submedian carinae; abdominal carinae spined as follows: submedian 6; intermediate 5–6; lateral 5–6; marginal 5; 6th somite lacking sharp ventral spine in front of articulation of each uropod.

Telson broader than long, with 3 pairs of sharp marginal teeth, submedians with movable apices; prelateral lobes formed dorsally, not markedly projecting laterally; carinae of submedian teeth tuberculate dorsally, carinae of other marginal teeth smooth; dorsal surface of telson tuberculate, with 1 row of tubercles on each side of median carina converging under its apex, and 4–5 rows of tubercles present between submedian and intermediate teeth; inner submedian denticles blunt, remainder of denticles spiniform, 3, 8, 1; ventral surface of telson smooth on either side of low, short median carina.

Outer margin of proximal segment of uropodal exopod with 7–8 movable spines, last extending about to midlength of distal segment; endopod slender, curved; basal prolongation with 5–6 slender spines on inner margin and broad, rounded lobe on outer margin of inner spine.

COLOR.—Faded.

MEASUREMENTS.—Carapace length 4.7; cornea width 0.5; stalk width 1.0; eye length 1.3; rostral plate length 0.6, width 1.0; fifth abdominal somite width 5.8; telson length 3.6, width 5.3.

REMARKS.—The small specimen differs from published accounts of the species in several features: (1) the lateral spine of the fifth thoracic somite is directed anterolaterally and there is a pair of small ventral spines on the fifth somite; (2) the proximal tooth on the dactylus of the claw is not reduced in size; (3) the marginal teeth and denticles of the telson are not markedly serrate dorsally; and (4) the marginal carinae of the first four abdominal somites are unarmed.

Serène (1952) indicated that in some of his specimens the lateral processes of the sixth and seventh thoracic somites were armed posteriorly with a small spinule; these processes are unarmed in the present specimen. Serène's material may be referable to *C. bombayensis,* described from Bombay by Chhapgar and Sane (1967).

DISTRIBUTION.—Indo-West Pacific, from scattered localities between the western Indian Ocean and Japan. Barnard (1950) recorded a specimen from Delagoa Bay, and Day and Morgans (1956) recorded one from Durban.

8. *Pterygosquilla armata capensis,* new subspecies

FIGURES 2, 3

Squilla armata.—Stebbing, 1902, p. 45; 1910, p. 405.—Tattersall, 1913, p. 879.—Balss, 1916, p. 51.—Calman, 1923, p. 1.—Barnard, 1950, p. 845, figs. 1d, f.—Lebour, 1954, p. 231, fig. 6 [larvae].

Squilla armatus.—Stebbing, 1914, pp. 257, 300.

HOLOTYPE.—1 ♂, 89 mm; off southwestern coast of South Africa; 26°30′S, 14°43′E; 180 m; rock; Sta. SWD 5 Q; 10 February 1963.

PARATYPES.—8 ♂, 31–106 mm; 8 ♀, 24–63 mm; 1 young specimen, damaged; data as in holotype; USNM 124698. 4 ♂, 47–72 mm; off southwestern coast of South Africa; Sta. WCD 62 F. 9 ♂, 32–70 mm; 6 ♀, 47–74 mm; 8 young specimens; off Saldanha Bay; Sta. WCD 146 A; USNM 124702.

OTHER MATERIAL.—1 ♂, 122 mm; 1 ♀, 104 mm; off Cape Peninsula; Sta. CP 322 A; USNM. 1 ♂, 37 mm; 1 postlarva, 22 mm; off Saldanha Bay; Sta. SB 242 V. 1 ♀, 58 mm; 1 damaged specimen; off Algoa Bay; Sta. SCD 269 Q. 2 ♂, 70–84 mm; off Orange River Mouth; Sta. SWD 59 A. 1 ♂, 67 mm; 1 ♀, 62 mm; off Cape Peninsula; Sta. WCD 4 R; USNM. 2 ♂, 19–24 mm; 2 ♀, 22–39 mm; off Saldanha Bay; Sta. WCD 15 N; USNM. 2 ♀, CL 5.7–16.4 mm; off Saldanha Bay; Sta. WCD 44 XY. 1 ♂, 24 mm; 3 ♀, 28–58 mm; 1 postlarva, 20 mm; off Saldanha Bay; Sta. WCD 84 N. 1 broken ♀; 1 postlarva, 22 mm; off western coast of South Africa; Sta. WCD 102 F; USNM. 1 ♂, 31 mm; off Saldanha Bay; Sta. WCD 111 F. 1 ♀, 64 mm; 1 postlarva, 17 mm; off Saldanha Bay; Sta. WCD 117 S; USNM. 3 ♀, 36–59 mm; off Saldanha Bay; Sta. WCD 125 Q. 2 ♂, 35–39 mm; off Saldanha Bay; Sta. WCD 128 K. 1 ♂, 24 mm; off Cape Peninsula; Sta. WCD 137 G. 1 ♂, 38 mm; off Saldanha Bay; Sta. WCD 146 A. 1 ♀, 77 mm; South Africa; South African Museum (SAM) Reg. No. A 1318. 1 ♂, 168 mm; same; SAM Reg. No. A 1343. 1 ♀, 135 mm; same; SAM Reg. No. A 8217. 1 ♀, 105 mm; off Natal coast; G. Pace, col.; August 1921; British Museum (Natural History) Reg. No. 1928.12.1.440. 1 ♂, 121 mm; 25°35′S, 14°27′E to 25°36′S, 14°24′E; *Discovery* Sta. WS 990; 128 m; 11 April 1950; BMNH 1953.5.18.1. 1 ♂, 83 mm; 1 ♀, 81 mm; ¾ mi off Cape Point lighthouse; 45 fms; Stebbing collection; BMNH 1928.12.1.439. 2 ♂, 57–75 mm; 4 ♀, 57–75 mm; off South Africa; 32°26′ to 33°08′15″S, 17°22′ to 17°44′30″E; Stas. UL. U 154, U 332, U 352; BMNH 1935.6.14.17–19.

DIAGNOSIS.—Body rough, covered with minute tubercles; antennular peduncle about as long as carapace; eyes of moderate size, set obliquely on stalk, CI 318–495; ocular scales produced into erect spines; anterior margin of ophthalmic somite projecting anteriorly, bituberculate; rostral plate triangular, lateral margins sinuous, apex rounded; carapace without median carina, other carinae reduced, only reflected marginals and short laterals present, laterals extending just anterior to cervical groove; dactylus of raptorial claw with 6–8 teeth, outer margin flattened or faintly sinuate; dorsal ridge of carpus undivided, terminating in strong tooth; merus unarmed inferodistally; mandibular palp absent; 4 epipods present; lateral process of 5th thoracic somite a sharp spine directed laterally, ventral spines of 5th somite absent or reduced to blunt lobes; lateral processes of 6th and 7th thoracic somites rounded laterally, spined posteriorly; distance between

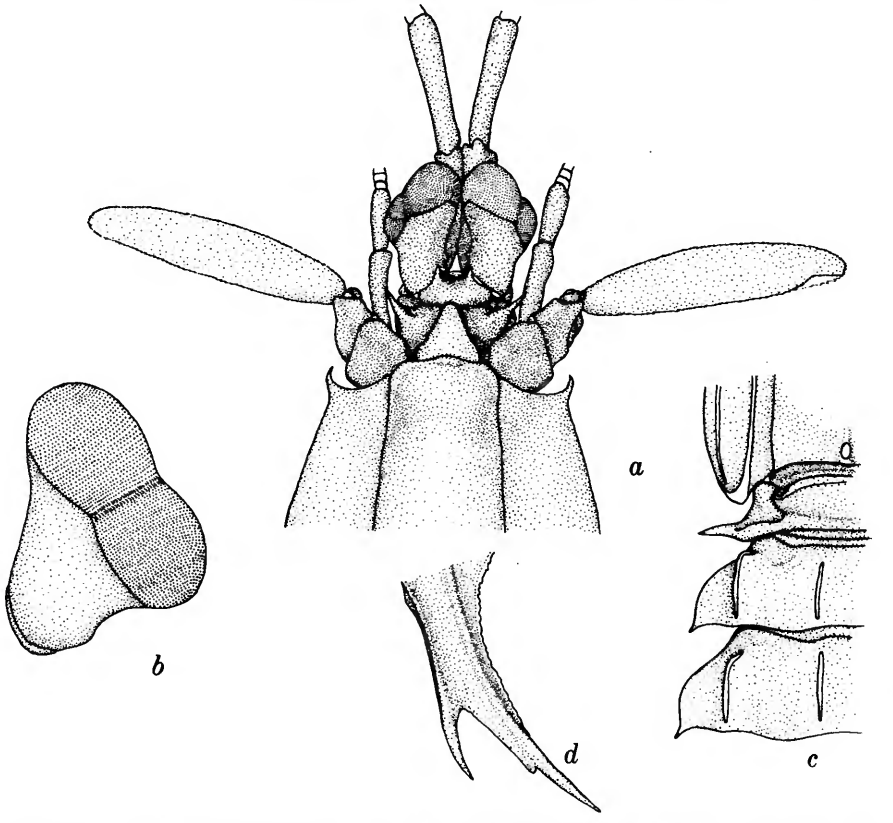

FIGURE 2.—*Pterygosquilla armata capensis,* new subspecies, female paratype, TL 74 mm, Sta. WCD 146 A: *a,* anterior portion of body; *b,* eye; *c,* lateral processes of exposed thoracic somites; *d,* basal prolongation of uropod. (Setae omitted.)

submedian abdominal carinae about one-fourth distance between intermediates; submedian carinae very poorly formed or absent on first 5 somites of adults, occasionally well formed in young specimens; abdominal carinae spined as follows: submedian 6, intermediate (3) 4–6, lateral (3) 4–6, marginal 1–5; 5th somite usually lacking accessory spinules on posterior margin lateral to submedian carinae, at most 4 spinules present on each side; telson with 3 pairs of marginal teeth, submedians with movable apices; prelateral lobes absent; denticles 1+, (8) 9–11 (12–17), 1 (usually 1–8 minute denticles present along single submedian lobe); telson with submedian tubercle on each side of anterior surface; ventral surface of telson with postanal keel; uropod with 6–8 movable spines, last short, on outer margin of penultimate segment of exopod; basal prolongation of uropod with rounded lobe, margin often crenulate, on outer margin of inner spine.

COLOR.—Pattern poorly marked in most specimens; each somite with dark posterior line, line broader and more diffuse along midline; 6th abdominal somite with dark spot lateral to each intermediate carina; line of pits on telson that converge on apex of median carina usually dark, triangular area defined by these pits darker than remainder of telson.

Barnard (1950, p. 846) noted:

A living specimen was horny-amber, the hind margins of the abdominal segments red, more intense posteriorly, a squarish-purple spot on each abdominal segment between the intermediate and lateral keels, telson with orange-red margin, cornea green with black tips, basal margin of wrist of raptorial claw crimson, dactylus white, endopod and 2nd joint of exopod of uropod orange, the row of spines on 1st joint of exopod crimson-orange.

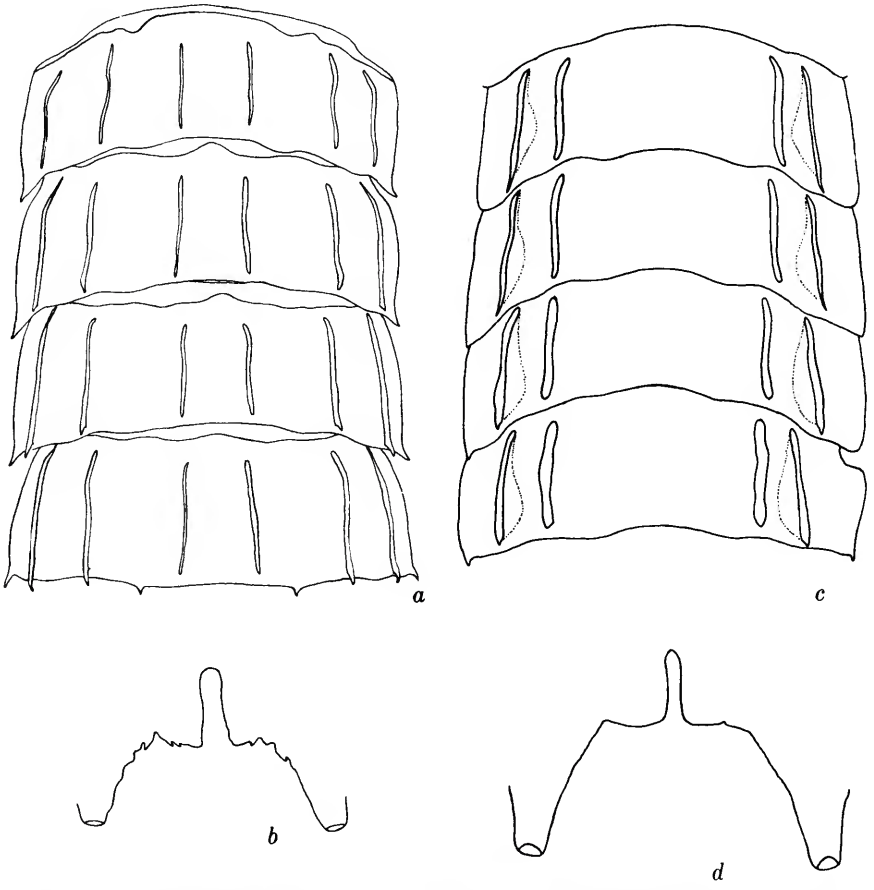

FIGURE 3.—*Pterygosquilla armata capensis,* new subspecies. Female paratype, TL 74 mm, Sta. WCD 146 A: *a,* outline of second to fifth abdominal somites, dorsal view; *b,* outline of submedian denticles of telson, enlarged. Male, TL 122 mm, Sta. CP 322 A: *c,* outline of second to fifth abdominal somites; *d,* outline of submedian denticles of telson, enlarged.

SIZE.—Males, TL 24–168 mm; females, TL 22–135 mm; postlarvae, TL 12–22 mm. Other measurements of male, TL 168 mm: carapace length 32.8; cornea width 5.4; rostral plate length 5.0, width 4.4; telson length 27.3, width 33.6.

DISCUSSION.—In 1966, I suggested that *Pterygosquilla* should be separated from *Squilla,* and in 1968b I recognized the former genus, which contains two species restricted to subantarctic waters: *P. armata* (H. Milne-Edwards) from off South America, New Zealand, and South Africa; and *P. gracilipes* (Miers) from off Chile.

Noting that the New Zealand population of *P. armata* differed in several respects from published accounts of the species, Richardson (1953) provisionally named the New Zealand population *Squilla armata schizodontia.* In 1966, I showed that the features used by Richardson were variable, but suggested that other characters might be used to distinguish the New Zealand population from the Chilean population; no specimens from South Africa were available for study at that time.

The South African population of *Pterygosquilla armata,* although variable in many features, differs in several important respects from the populations off New Zealand and off South America. In my opinion, the South African specimens represent a new subspecies; the three subspecies of *P. armata* can be distinguished by means of the following key, which is based on adults with a total length of 100 millimeters or more.

Key to Subspecies of *Pterygosquilla armata*

1. Lobe between spines of basal prolongation of uropod low, inconspicuous, margin straight or convex (South America)..... *Pterygosquilla armata armata* (H. Milne-Edwards)
   Lobe between spines of basal prolongation of uropod present, well formed, rounded, margin concave..... 2
2. Submedian carinae of abdomen well developed, distance between submedians one-third distance between intermediate carinae; accessory spinules always present on posterior margin of 5th abdominal somite (New Zealand)..... *Pterygosquilla armata schizodontia* (Richardson)
   Submedian carinae of abdomen absent or very inconspicuous; distance between submedians one-fourth distance between intermediate carinae; 5th abdominal somite usually lacking accessory spinules on posterior margin (South Africa).. *Pterygosquilla armata capensis,* new subspecies

In all three populations of *P. armata,* the eyes are large, well developed, with the cornea distinctly bilobed; this feature will distinguish *P. armata* from *P. gracilipes,* for in the latter species the cornea is broader than the stalk but not distinctly bilobed. There are slight differences in the shape of the eyes of the three populations of *P. armata.* In *P. a. armata,* the lobes of the cornea are larger than in either *P. a. schizodontia* or *P. a. capensis* (see figs. 2*b,* 2*e,* in Manning, 1966) ; in *P. a. capensis* the division between the lobes of the cornea is more distinct. These slight differences in eye shape are not reflected in corneal indices (CI) of specimens of two of the three subspecies, as can be seen below. Since only three specimens from New Zealand could be examined, little information is available on the range of eye size in that population.

	P. armata armata (South America)			*P. armata capensis* (South Africa)		
CL	*No.*	*CI range*	*CI mean*	*No.*	*CI range*	*CI mean*
5–8	1	–	379	6	318–371	342
9–12	3	384–432	413	9	348–403	375
13–16	5	391–464	420	15	354–408	382
17–20	9	441–495	462	4	415–495	442
21–24	11	446–518	490	1	–	485
25–28	3	488–506	497	1	–	489

The submedian carinae of the first five abdominal somites are very poorly developed in adult specimens of *P. a. capensis.* The development of these carinae is variable in juveniles and young adults TL 30–90 mm, but in adults TL 90 mm or more the carinae are very low, and in large specimens they are completely absent (examples of both conditions are shown in Figures 3*a, c*). Specimens of *P. a. armata* may resemble *P. a. capensis* in having these carinae poorly developed, but the former subspecies may always be distinguished by the poorly developed lobe between the spines of the basal prolongation of the uropod. The submedian carinae of the abdomen are well developed in adults of *P. a. schizodontia.*

The variation of development of these carinae with size is as follows (numerals indicate number of specimens) :

TL	*Carinae absent or very low*	*Carinae moderately or well developed*
<30 mm	2	2
31–50 mm	3	6
51–70 mm	10	11
71–90 mm	3	3
91–110 mm	2	0
>111 mm	5	0

Pterygosquilla a. capensis differs from both other subspecies in having fewer abdominal carinae armed

with spines; distribution of spines on the intermediate and lateral abdominal carinae of the third somite is as follows (the intermediate and lateral carinae of the first and second somites are unarmed in all specimens):

TL	Carinae unarmed	Third somite	
		intermediate	lateral
<30 mm	3	0	0
31–50 mm	9	0	0
51–70 mm	14	5	5
71–90 mm	5	2	2
91–110 mm	2	1	1
>111 mm	4	0	0

In six specimens, TL 67–106 mm, the intermediate and lateral carinae of the third abdominal somite were armed posteriorly; in the remainder of the specimens in which the third somite was armed, only one pair of carinae, usually the intermediates, was armed. In adult specimens of *P. a. armata,* the intermediate and lateral carinae of the second abdominal somite are always armed posteriorly, and the same carinae on the first somite are usually armed too. In *P. a. schizodontia,* the intermediate and lateral carinae of the third abdominal somite usually are armed, and the same carinae on the first two somites may also be armed.

In general, specimens of *P. a. capensis* lack the accessory spinules of the fifth abdominal somite lateral to the submedian carinae (Figure 3*d*); these spinules are always present in *P. a. schizodontia* and are usually present, at least on one side, in *P. a. armata.* Of 56 specimens of *P. a. capensis* in which this feature could be determined, only 6 had any spinules at all and only 4 had more than one.

The distribution of these spinules, by size, is as follows (numerals in the table indicate number of specimens):

TL	Numbers of accessory spinules					
	0–0	0–1	1–1	1–2	2–3	2–4
<30 mm	5	0	0	0	0	0
31–50 mm	13	0	0	1	0	0
51–70 mm	20	1	0	0	0	1
71–90 mm	7	1	0	0	0	0
91–110 mm	1	0	0	1	1	0
>111 mm	4	0	0	0	0	0

One of the characters used to distinguish *P. armata* from *P. gracilipes* is the number of submedian denticles on the telson. This feature was used by Schmitt (1940) in his key to the species of *Squilla* from western America. In that key, the denticle formula for *P. armata* was given as 0, 1–11, 1, whereas the denticle formula for *P. gracilipes* was 18±, 13±, 1. The single denticle in *P. armata* is an angular lobe on the inner margin of each submedian tooth. In *P. a. capensis,* most specimens had one or more small, sharp denticles present on this angular lobe (Figure 3*b*). As in some other features, juveniles and young adults exhibit more variation than do adults; in general, the number of submedian denticles decreases with increasing size. Variation in numbers of denticles is summarized as follows:

TL	(0–0)— (0–3)	(1–1)— (1–4)	(2–3)— (3–5)	(4–4)— (5–7)	(6–6)— (8–8)
<30 mm	0	0	0	0	3
31–50 mm	0	0	2	5	5
51–70 mm	7	0	5	7	2
71–90 mm	4	0	0	2	0
91–110 mm	1	0	0	0	0
>111 mm	1	1	2	0	0

The number of intermediate denticles on the telson of *P. a. capensis* is extremely variable; observed numbers of denticles in 51 specimens are as follows:

Number of denticles	Number of specimens	Number of denticles	Number of specimens
7–8	1	11–14	1
8–9	1	12–13	2
8–10	3	12–15	1
9–10	4	12–17	1
9–11	2	13–13	1
9–13	1	13–14	3
10–10	2	13–15	1
10–11	4	13–16	1
10–12	3	14–15	3
10–13	1	14–16	1
11–11	4	14–18	1
11–12	6	15–16	2
11–13	1		

Most specimens had at least one intermediate denticle with a bifurcate apex; some specimens had up to seven of the denticles apically bifurcated. A similar variation was noted in specimens of *P. a. schizodontia* by Richardson (1953); *P. a. armata* shows less tendency towards bifurcation, but the bifurcate denticles are often present. Specimens TL 30–70 mm, juveniles and young adults, exhibited the greatest variation.

The lobe between the spines of the basal prolongation of the uropod in *P. a. capensis* is intermediate in shape to the lobe in the other two subspecies. In *P. a. schizodontia* the lobe is large, rounded, with a concave margin. In *P. a. capensis* the lobe is rounded, its mar-

gin concave, but it is not so large as in *P. a. schizodontia* and never so poorly formed as in *P. a. armata*. The lobe was illustrated by both *P. a. armata* and *P. a. schizodontia* by Manning (1966).

Large males, TL ca. 90 mm or more, show secondary sexual characteristics. The margins of the telson and of the abdominal pleura between the intermediate and lateral carinae are inflated, and the propodus of the claw becomes broader, appearing shorter than in females of similar size.

Specimens from stations CPP 322 A and SWD 5 Q had small bivalves attached to various parts of the body.

DISTRIBUTION.—*Pterygosquilla a. capensis* is known only from off South Africa, usually in depths of 26–183 meters. One of the lots recorded herein was taken at a shore station (?), but the species usually occurs offshore. On the west African coast it occurs to 26 degrees south latitude. It does not occur north of South Africa proper on the east coast. Records for the New Zealand subspecies are summarized by Manning (1966), and Schmitt (1940) and Manning (1969) provide records for the American subspecies.

9. *Meiosquilla desmarestii* (Risso, 1816)

Squilla desmarestii.—Barnard, 1950, p. 842, fig. 1a.

MATERIAL.—1 ♂, 26 mm; 1 juvenile, 15 mm; 1 fragment, CL 6.4 mm; off Durban; Sta. NAD 31 J. 1 ♀, 27 mm; same; USNM.

REMARKS.—These specimens agree with Barnard's account except that both the lateral and reflected marginal carinae are visible on the posterior fourth of the carapace, and there are 7–8 rather than 5–6 submedian denticles present on the telson. I can find no differences between these specimens and those from the Mediterranean Sea.

DISTRIBUTION.—Mediterranean Sea and off South Africa. Barnard recorded one specimen taken in 85 fathoms off Cape Natal.

10. *Squilloides lata* (Brooks, 1886)

FIGURE 4

Squilla lata.—Kemp, 1913, p. 37, pl. 2: fig. 24.—Chopra, 1934, p. 22 [discussion].—Manning, 1965, p. 262.

MATERIAL.—1 ♂, 37 mm; Moçambique; Sta. PED 19 C. 1 ♀, 27 mm; same; USNM.

DESCRIPTION.—Eye elongate, stalk faintly dilated, cornea small, set obliquely on stalk; rostral plate elongate, triangular, sinuous lateral margins converging on rounded apex, median carina absent; carapace strongly narrowed anteriorly, lacking median carina, short, faint intermediate carinae present on lateral plates; posterior fourth of carapace with reflected marginal carinae and posterior portion of lateral carinae; anterolateral spines of carapace strong but not extending to base of rostral plate; mandibular palp and 4 epipods present; dactylus of claw with 6 teeth; thoracic somites lacking submedian carinae, intermediates present on first 3 somites; lateral process of 5th thoracic somite a slender spine directed anterolaterally; 1 pair of ventral spines also present on 5th somite; lateral processes of 6th and 7th thoracic somites rounded anterolaterally and posterolaterally; abdomen lacking distinct submedian carinae on first 5 somites; abdominal carinae armed as follows: submedian 5; intermediate 4–6; lateral 4–6; marginal 3–5; telson with 3 pairs of slender marginal teeth, prelateral lobes absent; carinae of marginal teeth short, sharp; denticles 2–3, 6–9, 1, inner submedians large, truncate, outermost intermediate more rounded than remainder; telson with short postanal keel; inner margin of basal prolongation of uropod with row of slender spines, increasing in size distally; proximal segment of uropodal exopod with 8–9 short, movable spines; basal prolongation with prominent rounded lobe on outer margin of inner spine.

COLOR.—Completely faded in both specimens.

SIZE.—Male, TL 37 mm; female, TL 27 mm. Brooks and Kemp's specimens ranged from 64 to 82 mm TL.

DISCUSSION.—These two small, immature specimens agree with accounts in the literature except that there is no trace of submedian carinae on the first five abdominal somites and fewer abdominal carinae are armed with spines. The latter discrepancy can be explained by age differences, for the specimens recorded here are about half as large as those previously recorded.

The female has fewer abdominal carinae armed than does the male.

Manning (1965) pointed out differences between the similar species from Japan, *Anchisquilla inermis* (Manning) and *S. lata* (Brooks); he also gave supplemental observations on the syntypes of the latter species.

DISTRIBUTION.—Indo-West Pacific, from the Arafura Sea, the Gulf of Martaban, Burma, and the present

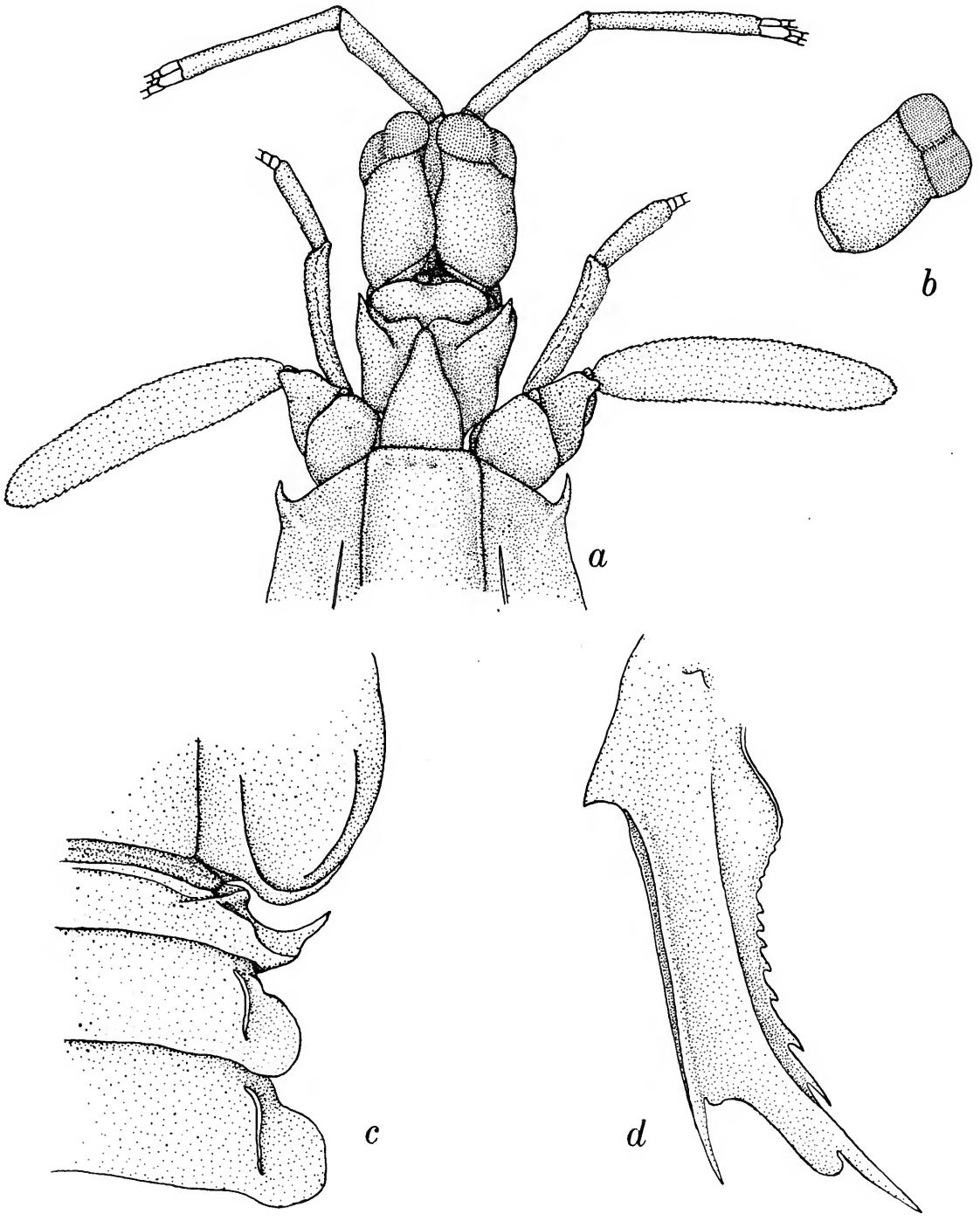

FIGURE 4.—*Squilloides lata* (Brooks), male, TL 37 mm: *a*, anterior portion of body; *b*, eye; *c*, lateral processes of exposed thoracic somites; *d*, basal prolongation of uropod.

record from South Africa, in depths between 90 and 112 meters.

11. *Oratosquilla holoschista* (Kemp, 1911)

Squilla holoschista.—Kemp, 1913, p. 64, pl. 4: figs. 50–53.—Barnard, 1950, p. 849, fig. 2b.
?*Squilla nepa.*—Stebbing, 1917, p. 28.

MATERIAL.—1 ♀, 72 mm; off Durban; Sta. NAD 40 P.

REMARKS.—This specimen differs from Kemp's account of the species in having two tubercules on the carpus of the claw, in having the posterior lobe of the lateral process of the fifth thoracic somite slenderer, directed laterally, and in having the anterior lobe of the lateral process of the sixth thoracic somite more truncate. The eye of this specimen may be larger than in Indian specimens, for the corneal index is 642; Kemp recorded corneal indices of 80–90 (800–900) in slightly larger specimens.

Among the specimens from South Africa in the Stebbing collection at the British Museum (Natural History), is a female *O. holoschista* with a total length of 75 millimeters, which was labelled *Squilla nepa.* The specimen, from off South Head, Tugela River, was probably reported by Stebbing (1917) as *Squilla nepa.*

DISTRIBUTION.—Sunda Straits and Indian Ocean, from the coasts of India, Ceylon, and off South Africa; Stebbing (1917) and Barnard (1950) recorded material from off the Tugela River.

12. *Oratosquilla mikado* (Kemp and Chopra, 1921)

Squilla mikado Kemp and Chopra, 1921, p. 301, fig. 2.—Barnard, 1950, p. 842 [ftn.].—Manning, 1965, p. 257, pl. XII: fig. a.
Squilla zanzibarica Chopra, 1939, p. 143, figs. 2, 4.—Manning, 1965, p. 262.

MATERIAL.—1 ♀, 85 mm; off Durban; Sta. NAD 40 P.

REMARKS.—The specimen is in poor condition, with both raptorial claws missing and the eyes and telson damaged. It agrees with the account of the species given by Manning (1965), differing only in the following minor features: (1) the anterior margin of the ophthalmil somite is emarginate along the midline; (2) the apex of the rostral plate is rounded; and (3) the denticles of the telson are smaller, more numerous, and sharper than in Japanese specimens; the denticular formula is 10, 17, 1.

The only traces of color pattern visible on this specimen are the characteristic dark patches on the second and fifth abdominal somites.

DISTRIBUTION.—Indo-West Pacific, from localities around Japan (Manning, 1965), Zanzibar (Chopra, 1939), Moçambique (Barnard, 1950), and the present record from off Durban, in depths to 136 meters. It has not been recorded from localities between Japan and the western Indian Ocean.

13. *Oratosquilla gonypetes* (Kemp, 1911)

Squilla gonypetes.—Kemp, 1913, p. 54, pl. 4: figs. 42–44.—Ingle, 1963, p. 15, figs. 1, 5, 14.—Manning, 1965, p. 250, pl. XI: fig. a.

MATERIAL.—1 ♂, 52 mm; off Durban; Sta. NAD 40 P.

REMARKS.—The specimen agrees well with the accounts of the species given by Kemp (1913) and Manning (1965), differing only in that the intermediate carinae are armed only on abdominal somites three to six and the lateral carinae are armed only on the second to sixth somites.

The color has largely faded but the dark patches on the second and fifth abdominal somites are visible.

DISTRIBUTION.—Indo-West Pacific, from Japan to the Gulf of Suez, in moderate depths, to 118 meters (Manning, 1965); it has not been recorded previously from South Africa.

Literature Cited

Balss, H.
1916. Stomatopoda. Crustacea III in *Beitrage zur Kenntnis der Meeresfauna Westafrikas, Herausgegeben von W. Michaelsen* (Hamburg), 2:47–52.

Barnard, K. H.
1950. Descriptive List of South African Stomatopod Crustacea (Mantis Shrimps). *Annals of the South African Museum,* 38:838–864, figures 1–4.
1955. Additions to the Fauna-List of South African Crustacea and Pycnogonida. *Annals of the South African Museum,* 43(1):1–107, figures 1–53.
1958. Further Additions to the Crustacean Fauna-List of Portugese East Africa. *Memórias do Museu Dr. Alvaro de Castro,* 4:3–23, figures 1–7.
1962. New Records of Marine Crustacea from the East Africa Region. *Crustaceana,* 3(3):239–245, figures 1–3.

Calman, W. T.
1923. Preliminary Report on Crustacea Procured by the S. S. *Pickle.* Number VI in *Union of South Africa Fisheries and Marine Biological Survey,* Report Number 3, for the year 1922, page 1.

Chhapgar, B. F., and S. R. Sane
1967. Two New Species of *Squilla* (Stomatopoda) from Bombay. *Crustaceana,* 12(1):1–8, figures 1–2.

Chopra, B.
1934. On the Stomatopod Crustacea Collected by the Bengal Pilot Service off the Mouth of the River Hughli, Together with Notes on Some Other Forms. *Records of the Indian Museum,* 36:17–43, figures 1–5.
1939. Stomatopoda. In *The John Murray Expedition, Scientific Reports,* 6(3):137–161, figures 1–13.

Day, J. H., and J. F. C. Morgans
1956. The Ecology of South African Estuaries, Part 7: The Biology of Durban Bay. *Annals of the Natal Museum,* 13(3):259–312, figure 1, plate 4.

Hansen, H. J.
1895. Isopoden, Cumaceen und Stomatopoden der Planktonexpedition. In *Ergebnisse der Planktonexpedition der Humboldt-Stiftung,* 2(Gc):1–105, plates 1–8.

Holthuis, L. B.
1941. The Stomatopoda of the *Snellius* Expedition. Number XII in Biological Results of the *Snellius* Expedition. *Temminckia,* 6:241–294, figures 1–9.
1967. Fam. Lysiosquillidae et Bathysquillidae. Stomatopoda I in Gruner and Holthuis, editors, *Crustaceorum Catalogus,* 1 (edition a): 1–28. The Hague: W. Junk.

Ingle, R. W.
1958. On *Squilla alba* Bigelow, a Rare Stomatopod Crustacean New to St. Helena and South Africa. *Annals and Magazine of Natural History,* (13)1: 49–56, figures 1–6.
1963. Crustacea Stomatopoda from the Red Sea and the Gulf of Aden. Number 26 in Contributions to the Knowledge of the Red Sea. *Bulletin of the Sea Fisheries Research Station,* Haifa, 33:1–69, figures 1–73.

Kalk, M.
1958. The Crustacea of Inhaca Shores. In Macnae and Kalk, editors, *A Natural History of Inhaca Island, Moçambique,* vi + 163 pages. Johannesburg: Witwatersrand University Press.

Kemp, S.
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, 10 figures, plates 1–10.

Kemp, S., and B. Chopra
1921. Notes on Stomatopoda. *Records of the Indian Museum,* 22:297–311, figures 1–4.

Lebour, M. V.
1954. The Planktonic Decapod Crustacea and Stomatopoda of the Benguela Current. Part I in First Survey, R.R.S. *William Scoresby,* March 1950, *Discovery Reports,* 27:219–233, figures 1–6.

Manning, Raymond B.
1963. Preliminary Revision of the Genera *Pseudosquilla* and *Lysiosquilla* with Descriptions of Six New Genera (Crustacea: Stomatopoda). *Bulletin of Marine Science of the Gulf and Caribbean,* 13(2): 308–328.
1965. Stomatopod Crustacea from the Collection of His Majesty The Emperor of Japan. *Crustaceana,* 9 (3):249–262, figures 1–2, plates 11–12.
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, figures 1–10.
1967. Review of the Genus *Odontodactylus* (Crustacea: Stomatopoda). *Proceedings of the United States National Museum,* 123(3606):1–35, figures 1–8.
1968a. Stomatopod Crustacea from Madagascar. *Proceedings of the United States National Museum,* 124(3641):1–61, figures 1–16.
1968b. A Revision of the Family Squillidae (Crustacea, Stomatopoda), with the Description of Eight New Genera. *Bulletin of Marine Science,* 18(1): 105–142, figures 1–10.
1969. Stomatopod Crustacea of the Western Atlantic. *Studies in Tropical Oceanography.*

Millard, N. A. H., and A. D. Harrison
1954. The Ecology of South African Estuaries, Part V: Richard's Bay. *Transactions of the Royal Society of South Africa,* 34:157–180, figures 1–2, plates 5–6.

Parisi, B.
1922. Elenco degli stomatopodi del Museo di Milano. *Atti Societá Italiana di Scienze Naturali,* 61:91–114, figures 1–7.

Richardson, L. R.
1953. Variation in *Squilla armata* M. Edw. (Stomatopoda) Suggesting a Distinct Form in New Zealand Waters. *Transactions of the Royal Society of New Zealand,* 81(2):315–317, figures 1–3.

Schmitt, W. L.
1940. The Stomatopods of the West Coast of America Based on Collections Made by the Allan Hancock Expeditions, 1933–1938. *Allan Hancock Foundation Pacific Expeditions,* 5(4):129–225, figures 1–33.

Seréne, R.
1952. Etude d'une collection de stomatopodes de l'Australian Museum de Sydney. *Records of the Australian Museum,* 23(1):1–23, figures 1–33, plates 1–3.

Stebbing, T. R. R.
1902. South African Crustacea, Part II. In *Marine Investigations in South Africa,* II:1–92, plates 5–16.

1908. South African Crustacea, Part IV. *Annals of the South African Museum,* 6:1–96, plates 1–14 (27–40).

1910. General Catalogue of South African Crustacea. Part V in South African Crustacea, for the Marine Investigations in South Africa. *Annals of the South African Museum,* 6(4):281–293, plates 15–22 (41–48).

1914. Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic Expedition. *Transactions of the Royal Society of Edinburgh,* 50, part 2(9):253–307, plates 23–32.

1917. The Malacostraca of Natal, I. *Annals of the Durban Museum,* 2(1):1–33, plates 1–6.

Tattersall, W. M.

1913. The Schizopoda, Stomatopoda, and Non-Antarctic Isopoda of the Scottish National Antarctic Expedition. *Transactions of the Royal Society of Edinburgh,* 49, part 4(16):865–894, unnumbered plate.

Tirmizi, N., and Raymond B. Manning

1968. Stomatopod Crustacea from West Pakistan. *Proceedings of the United States National Museum,* 125(3666):1–48, figures 1–17.

Tiwari, K. K., and Biswas, S.

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, figures 1–5.

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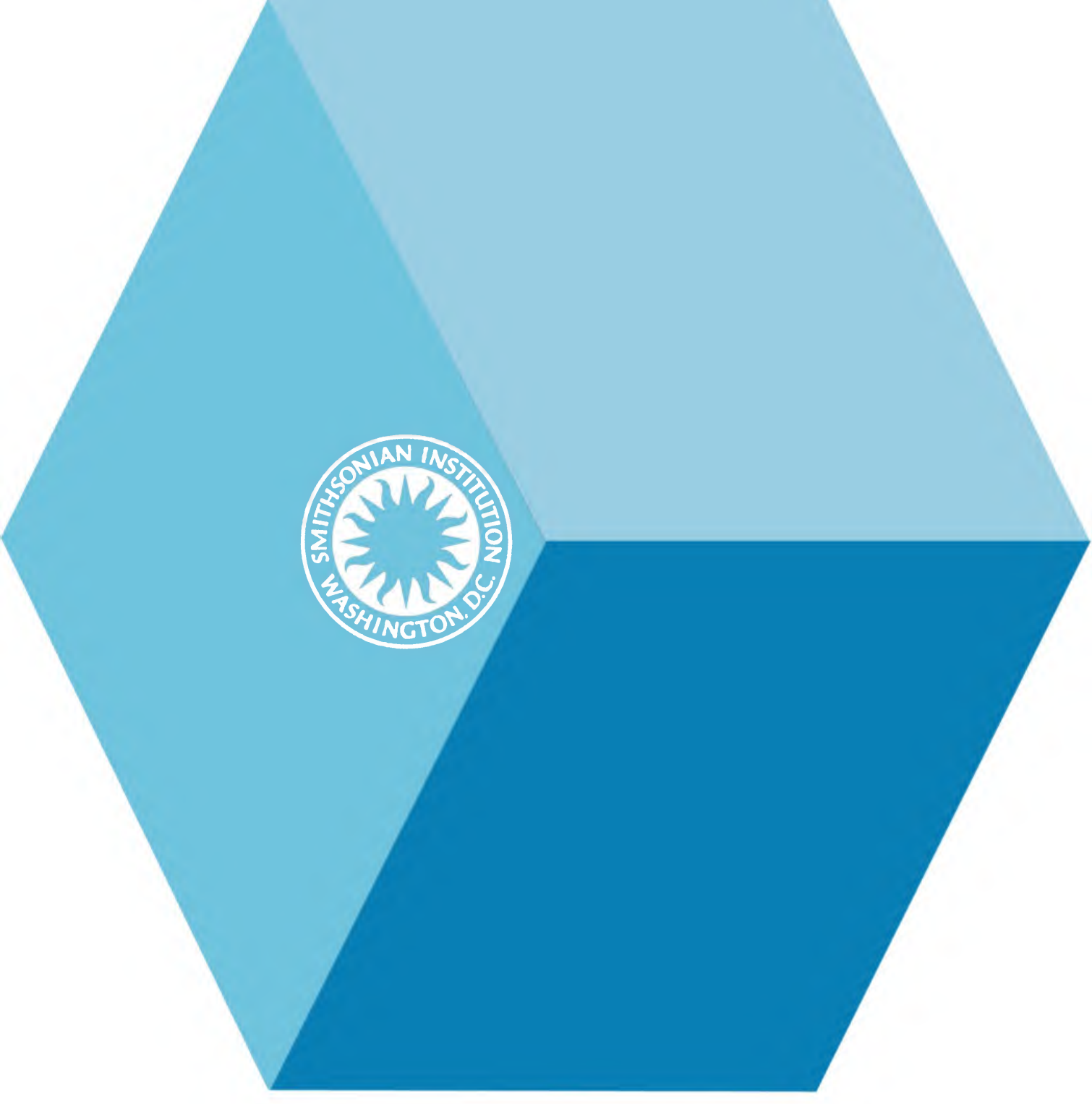
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