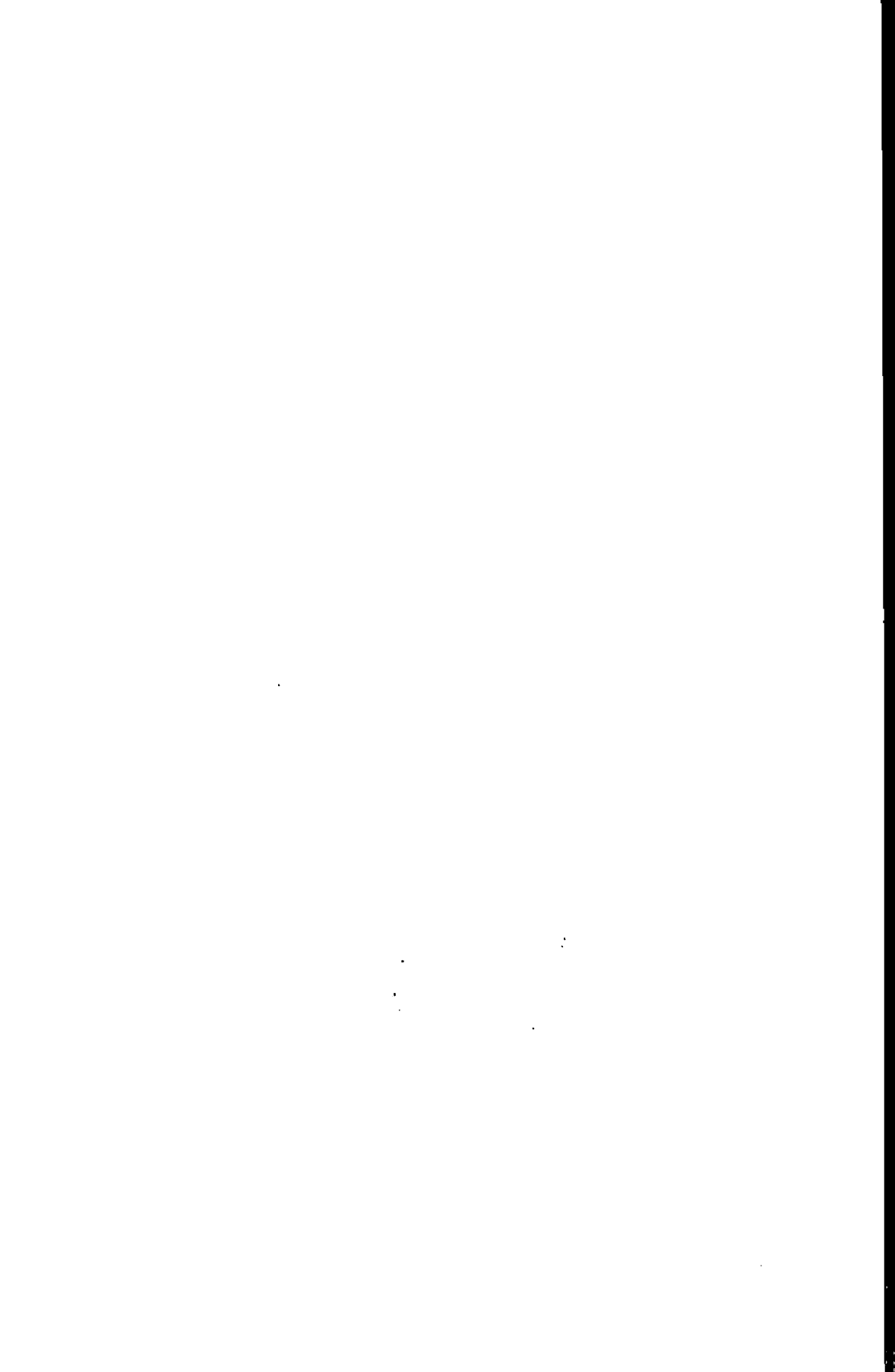


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ANNALS  
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*VOLUME XXXVIII*



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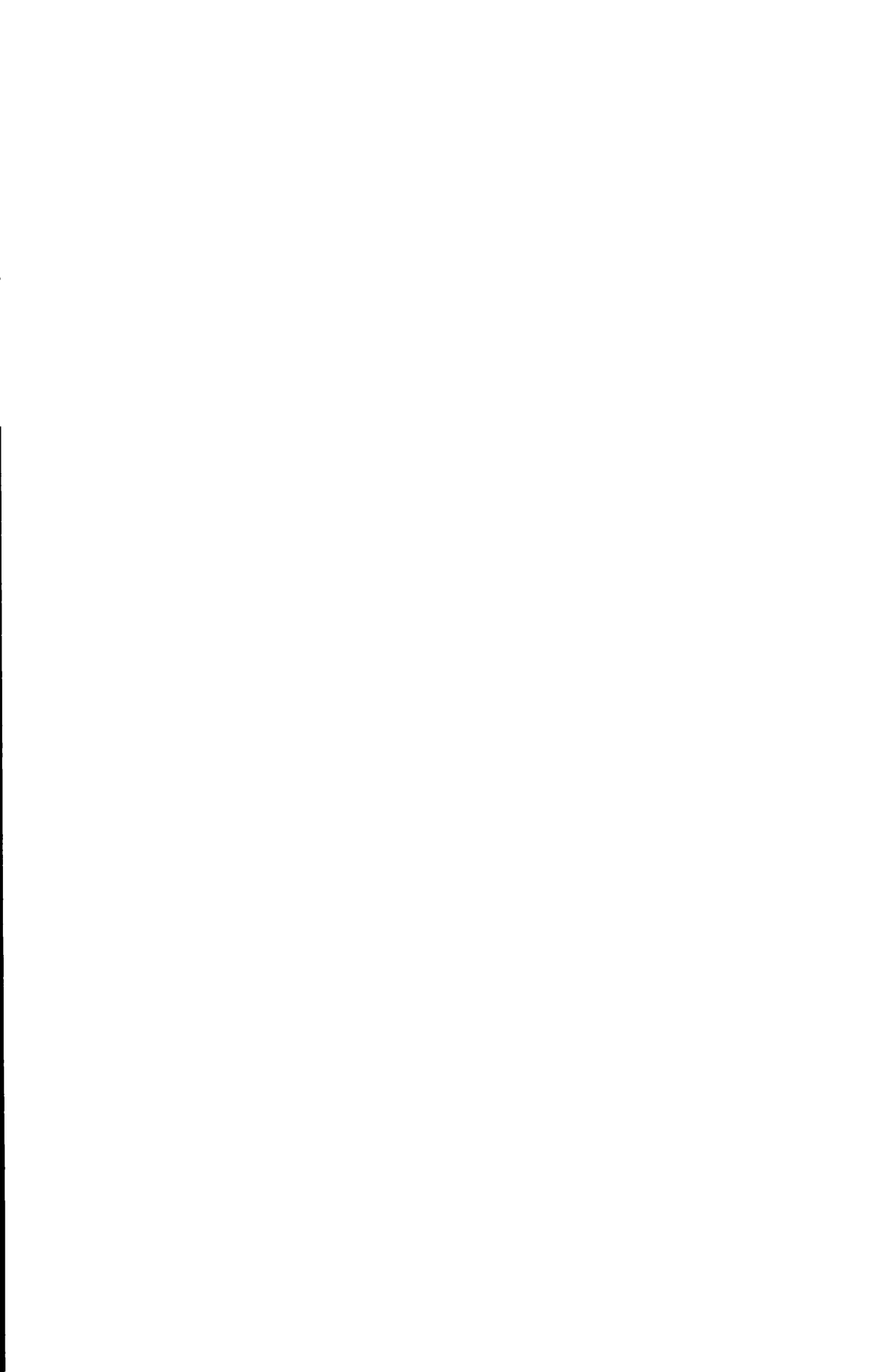
VOLUME XXXVIII



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# ANNALS OF THE SOUTH AFRICAN MUSEUM

VOLUME XXXVIII.

*Descriptive Catalogue of South African Decapod Crustacea (Crabs and Shrimps).*—By K. H. BARNARD, D.Sc., F.L.S. (With 154 Text-figures.)

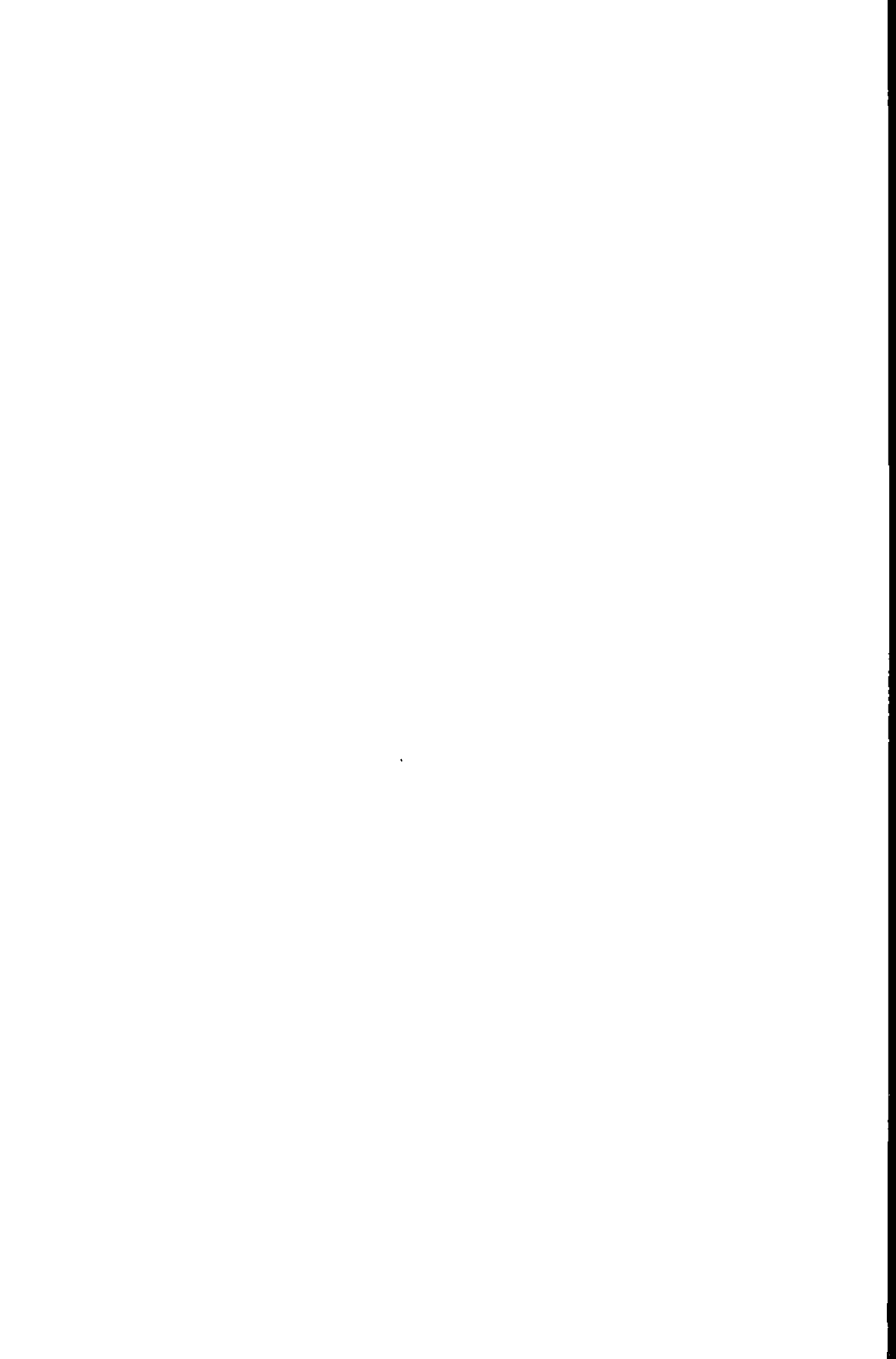
*Addenda.*

*Descriptive List of South African Stomatopod Crustacea (Mantis Shrimps).*—By K. H. BARNARD, D.Sc., F.L.S. (With 4 Text-figures.)



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## DATE OF PUBLICATION

MARCH 1950.

The Trustees express their acknowledgments to the Council for Scientific and Industrial Research for a grant-in-aid covering the major part of the cost of publication of this monograph.



*Descriptive List of South African Stomatopod Crustacea (Mantis Shrimps).*—By K. H. BARNARD, D.Sc., F.L.S.

(With 4 Text-figures.)

THIS paper contains no new researches, and is merely for the purpose of bringing up to date the list of species recorded from South Africa, and facilitating the identification of specimens.

All the species are represented in the South African Museum collection except *Lysiosquilla insignis*. The Museum has to thank Dr. C. von Bonde, Director of the Fisheries Survey, for presenting a magnificent male specimen of *L. crassispinosa*. I am indebted to Dr. C. J. van der Horst (Witwatersrand University) and the Lourenzo Marques Museum for submitting material for identification from Delagoa Bay, and to Professor T. A. Stephenson (formerly of the University of Cape Town) for material from Natal.

Beyond quoting Bigelow's key for identification purposes, no account of the larval forms is given here.

The limits of the South African faunal region for purposes of this paper are reckoned as extending north to 15° S. lat. on both the west and east coasts.

## STOMATOPODA.

1893. Stebbing, History of Crustacea, pp. 279–290.  
1909. Calman in Lankester's Treatise Zool. Crust., p. 319.  
1910. Stebbing, Gen. Cat. S. Afr. Crust. (Ann. S. Afr. Mus., vi), p. 404.  
1913. Kemp, Mem. Ind. Mus., iv, pp. 1 *sqq.*  
1926. Hansen, Siboga Exp. Monogr., xxxv, pp. 1–48, 2 pls.  
1927. Hale, S. Austral. Crust., pt. 1, p. 27.  
1938. Balss, Bronn's Klass. Ordnung. Tierreich., v, Abt. 1, Book 6, pt. 2.

[Not seen; quoted from Schmitt, 1940.]

Body more or less flattened dorso-ventrally. Carapace relatively small, anteriorly not covering the two movable segments which carry the stalked eyes and the antennules, and posteriorly leaving exposed at least the last four thoracic segments. A small movable rostrum overlies the antennular segment. Antennule (1st antenna) with

3 flagella; antenna (2nd) with an elongate oval scale on the outer branch, and one flagellum on inner branch. First 5 pairs of thoracic limbs similar in structure, each consisting of only 6 joints, the terminal one (dactylus) folding against the penultimate (propodus) to form a prehensile "hand" or subchela; the 1st limb is very slender, the 3rd-5th more robust, and the 2nd is greatly enlarged, forming the characteristic Mantis-like, raptorial limb. Epipods present (usually) on basal joints of all 5 limbs. Last 3 pairs of limbs (6th-8th) slender, biramous. Abdomen large; pleopods biramous, and carrying tufts of branchial filaments; uropods and telson forming a tail-fan. In the ♂ there is a slender penial process at base of each of the last (8th) pair of thoracic limbs, and the inner branch of the 1st pleopod is modified. Genital openings of ♀ on the 6th thoracic segment on either side of a pocket (*receptaculum seminis*). Eggs very small, cemented together into a mass which either lies free in the burrow inhabited by the female, or is attached to the 3rd-5th pairs of thoracic limbs. Larval development pelagic (see p. 864). Exclusively marine. Most Mantis shrimps live in burrows, but they may hunt for prey far from their burrows. Their bodies are rarely covered with barnacles, Hydroids or other foreign bodies.

List of South African species, with the number of teeth (incl. the terminal one) on the dactylus of the raptorial claw as a preliminary aid to identification.

<i>Squilla desmarestii</i>	. . . . .	5
<i>latreillei</i>	. . . . .	(4) 5
<i>hieroglyphica</i>	. . . . .	6
<i>armata</i>	. . . . .	(6) 7 (8)
<i>nepa</i>	}	. . . . . 6
<i>holoschista</i>		
<i>mikado</i>		
<i>raphidea</i>	. . . . .	8 (9)
<i>investigatoris</i>	. . . . .	(10) 13-16 (18)
<i>Pseudosquilla ciliata</i>	. . . . .	3
<i>Lysiosquilla maculata</i>	. . . . .	9-11
<i>capensis</i>	. . . . .	15-16
<i>insignis</i>	. . . . .	7-8
<i>crassispinosa</i>	. . . . .	(10) 11
<i>Gonodactylus chiragra</i>	}	. . . . . none
<i>demanii</i>		
<i>glabrous</i>		

## FAMILY SQUILLIDAE.

1910. Stebbing, *l. c.*, p. 405.*Key to the South African Genera.*

- I. Articulation of ischium and merus (*i.e.* 2nd and 3rd visible joints) of raptorial claw terminal; merus grooved ventrally throughout its length.
- A. Carapace with well-marked keels.\* Cervical groove defined across dorsum of carapace. Raptorial dactylus not inflated . . . . . *Squilla*.
- B. Carapace without keels. Cervical groove not extending across dorsum. Raptorial dactylus not inflated.
1. Abdomen compressed. Raptorial dactylus with 2 (rarely 3) teeth in addition to the terminal one. Telson with median keel . . . . . *Pseudosquilla*.
2. Abdomen depressed. Raptorial dactylus with at least 4 teeth in addition to the terminal one. Telson without median keel . . . . . *Lysiosquilla*.
3. Abdomen depressed. Raptorial dactylus inflated at base, with 3 teeth in addition to the terminal one. Telson closely studded with fine spinules or large tubercles, with or without a pair of submedian keels . . . . . [*Coronida*].†
- II. Ischio-meral articulation in front of proximal end of latter, which thus projects backwards; merus grooved ventrally for not more than three-quarters of its length. Raptorial dactylus inflated at base.
- A. Raptorial dactylus without teeth on its inner margin *Gonodactylus*.
- B. Raptorial dactylus with 2-9 teeth on its inner margin [*Odontodactylus*].†

## Gen. SQUILLA Fabr.

1910. Stebbing, *l. c.*, p. 405.
1913. Kemp, *l. c.*, p. 16.
1917. Calman, Brit. Antarct. Exp. Zool., iii, p. 141.
1921. Kemp and Chopra, Rec. Ind. Mus., xxii, p. 297.
1926. Hansen, *l. c.*, p. 3.
1931. Bigelow, Bull. Mus. Comp. Zool. Harv., lxxii, p. 174.
1939. Chopra, John Murray Exp., vi, p. 141.
1939. Foxon, *ibid.*, vi, p. 255 (larval forms).

\* Except *S. desmarestii*, where they are very feeble or even untraceable. This species has 5 teeth on raptorial dactylus (incl. terminal one).

† Species recorded from Mauritius, and likely to occur on the South African coast, are put in square brackets.

*Coronida trachurus* (von Martens) from Mauritius, Red Sea, etc.

*Odontodactylus scyllarus* (Linn.) from Mauritius, Zanzibar, Madagascar, etc.

1940. Schmitt, Allan Hancock Pac. Exp., v, no. 4, p. 139 (key to Pacific American species).

1941. Nair, Proc. Ind. Ac. Sci., xiv, p. 543 (embryology).

1945. Opinion 186, Intern. Comm. Zool. Nomencl. (retention of name).

Carapace with conspicuous gastric and cervical grooves, the latter groove continuous across the mid-dorsal area; longitudinal keels usually distinct, never completely absent; antero-lateral angle usually sharply pointed. Cornea of eyes bilobed, narrow or very wide. Mandibular palp, when present, 3-jointed. Epipods present on all of the first 5 thoracic limbs, or absent from some of the hinder ones. Ventral process of uropod ending in 2 sharp spines. Telson with median keel, and 3 pairs of strong marginal teeth, the submedian pair with or without movable tips.

(Characters already given in the key to genera are not as a rule repeated in the generic diagnoses.)

*Key to the South African Species.*

- I. Upper edge of propodus of raptorial claw with fine close-set and even pectinations, a few movable spines at base on inner side (fig. 1, f).
  - A. Antero-lateral angle of carapace rounded-quadrate . . . *desmarestii*.
  - B. Antero-lateral angle produced in a sharp point.
    - 1. Lateral margin of 5th thoracic segment in dorsal view with a single acute process.
      - a. Cornea of eye very small, width less than width of stalk. Mandibular palp present . . . . . *latreillei*.
      - b. Cornea much wider than stalk. Mandibular palp absent.
        - i. Longitudinal keels on either side of median keel on telson . . . . . [*fallax* \*].
        - ii. No keels on either side of median keel . . . . . *armata*.
    - 2. Lateral margin of 5th thoracic segment with 2 processes on same level, the anterior one acute and antrorse.
      - a. Lateral margin of 6th thoracic segment not bilobed. Mandibular palp absent . . . . . *hieroglyphica*.

---

\* *S. fallax* Bouvier, 1915, Bull. Sci. Fr. Belg., xlviii, p. 308, figs. 39-42. Mauritius.

A small species (up to 19 mm.), *Squilla schmeltzii* M. Edw., is also recorded from Mauritius (Richters, 1880; Miers, 1884). Miers (1880) created the genus *Leptosquilla* for it. Kemp (1913, p. 93) considered it a post-larval form of a species of *Squilla*. Holthuis (1941, Temminckia, vi, p. 257, fig. 2) on 3 ♂♂ and 4 ♀♀ considers it an adult and valid species.

- b.* Lateral margin of 6th thoracic segment bilobed. Mandibular palp present.
- i.* Raptorial dactylus with 6 teeth (incl. terminal one).
- a.* Cornea transverse on stalk.  
Surface of body pitted or rugulose.
- \* Posterior half of median keel in front of cervical groove on carapace simple (fig. 2, *a*). Submedian keels on 4th abdominal segment ending in spines . . . *nepa*.
- \*\* Posterior half of keel double (fig. 2, *b*). Submedian keels on 4th abdominal segment not ending in spines . . . *holoschista*.
- β.* Cornea very oblique on stalk.  
Surface smooth and polished. Anterior bifurcation of median keel on carapace faint or obsolete. *woodmasoni*.
- ii.* Raptorial dactylus with 13-16 (10-18) teeth . . . *investigatoris*.
3. Lateral margin of 5th thoracic segment with 2 processes, both acute, but the anterior one at a lower level (subventral). Lateral keels (submarginal, not the actual marginal keels) of abdominal segments 1-5 bicarinate *mikado*.\*
- II. Upper edge of propodus of raptorial claw with stiff spines, large and small ones alternating (fig. 1, *g*) . . . *raphidea*.

*Squilla desmarestii* Risso

Fig. 1, *a*.

1895.† Bigelow, Proc. U.S. Nat. Mus., xvii, p. 515.

1910. Giesbrecht, Faun. Flora Golf. Neapel., xxxiii, pp. 25 *sqq.*, pp. 87 *sqq.*, pp. 138 *sqq.*, pl. 1, figs. 6, 7, pl. 6, figs. 59-68 (juv.), pl. 10, figs. 1-99 (pelagic stages).

\* *Squilla mikado* Kemp and Chopra, 1921, Rec. Ind. Mus., xxii, p. 301, fig. 2. A specimen of this Japanese species, caught off the coast of Portuguese East Africa, submitted by the Lourenço Marques Museum, 1949.

† Stebbing (1910), Kemp (1913), and Bigelow himself (1931) quote the date of Bigelow's paper as 1894. The table of contents of vol. xvii gives the date of publication as "February 5, 1895."

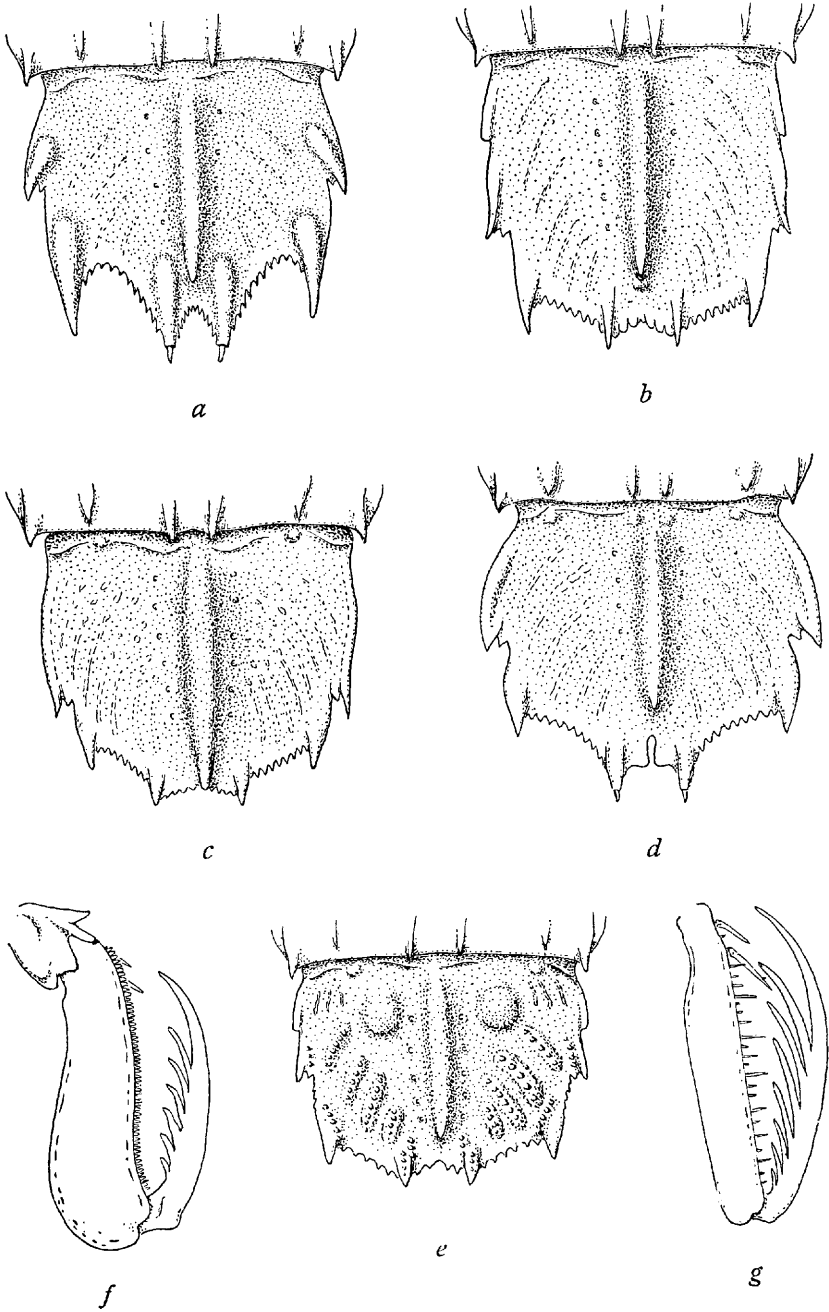


FIG. 1.—*a*, *Squilla desmarestii* Risso, telson. *b*, *S. nepa* Latr., telson. *c*, *S. raphidea* Latr., telson. *d*, *S. armata* M. Edw., telson. *e*, *S. latreillei* (E. & S.), telson. *f*, *S. armata* M. Edw., raptorial claw. *g*, *S. raphidea* Latr., raptorial claw.



Rostrum as long as basal width, triangular, sides gently tapering to a rounded apex. Carapace smooth, without keels, only the reflexed portion of the marginal keel developed. Lateral margin of 5th thoracic segment, viewed dorsally, with a subacute twisted process projecting laterally; when viewed from side a sinuous edge runs down almost to the sharp spine on ventral surface. Segments 6 and 7 laterally rounded. On segments 6-8 only the intermediate keels developed. On abdomen, submedian keels on segment 6 ending in spines; intermediate, lateral and marginal keels on all segments, all 3 pairs of keels ending in spines on segment 5, the intermediate and lateral ones ending in spines on segment 6. Telson broader than long, with strong median keel ending in a sharp point; submedian teeth ending in movable spines; 5-6 submedian, 11 intermediate denticles and 1 lateral one, all rather long and spiniform. Cornea oblique to axis of peduncle, its width about equal to length of peduncle. Peduncle of antennule longer than the longest flagellum, 1st peduncular joint subequal to 2nd or 3rd, middle joints of the sensory flagellum twice as long as broad, the portion bearing sensory setae nearly half the total length of the flagellum. Mandibular palp absent. Raptorial dactylus with 5 teeth including the terminal one. Epipods on first 4 pairs of thoracic legs only. Inner margin of bifurcate process of uropod crenulate or feebly serrulate. Spinous process (coupling-hook) on endopod of 1st abdominal appendage of ♂ shorter than the tubular process (Röhrenfortsatz).

Length up to 100 mm. Brownish, more or less mottled and speckled (Giesbrecht, pl. 1, figs. 6, 7).

*Locality*.—12½ miles off Cape Natal (Durban), 85 fathoms, 1 ♂ 31 mm. (s.s. *Pieter Faure*, December 1900).

This small specimen agrees in all respects with Giesbrecht's description, and with an actual Mediterranean specimen, except in the relative lengths of the antennular peduncle and its longest flagellum, the length of the joints of the sensory flagellum, and the relative lengths of the two processes on the endopod of 1st abdominal appendage in ♂; in these characters the specimen resembles *pallida*.

It is impossible to say whether this one specimen was a chance importation by ship from Europe. *S. pallida*, which in spite of the small differences from *desmarestii* seems to be a good species, is recorded from the coast of Morocco and Mauretania, as well as the Mediterranean and English Channel (Monod, Bull. Soc. Sci. Nat. Maroc., v, p. 87, 1925).

*Squilla latreillei* (Eyd. & Soul.)

Fig. 1, *e*.

1913. Kemp, *l. c.*, p. 24, pl. 1, figs. 1-4.  
1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.  
1934. Chopra, Rec. Ind. Mus., xxxvi, p. 20.  
1938. Gravier, Mem. Inst. d'Egypte, xxxvii, p. 164, fig. A (carapace).  
1938. Dollfus, *ibid.*, p. 194, fig. 4 (telson).

Rostrum twice as broad at base as median length, margins slightly raised, apex rounded. Cornea of eyes very small, width less than width of peduncle. Mandibular palp present. Lateral margin of 5th thoracic segment, viewed dorsally, produced in a slightly forwardly directed point, of segments 6 and 7 rounded, of 8 anteriorly subacute; no pair of spines on ventral surface of 5th segment. First 5 abdominal segments with faint but distinct submedian keels; the 6 keels on 6th segment swollen in adult ♂; a small transversely grooved medio-dorsal tubercle on each of segments 2-5. Telson broader than long, median keel and bases of marginal teeth swollen in adult ♂, prelateral tooth present; 2 submedian, 4-7 intermediate denticles, and 1 lateral one; ventral surface smooth on either side of post-anal keel. Raptorial dactylus with 5 (sometimes 4) teeth, including the terminal one. Inner margin of bifurcate process of uropod with several spines.

Length up to 71 mm. Brownish or pinkish, a dark dot on the eye-stalk touching the cornea. Kemp says the hind margins of last 3 thoracic and first 5 abdominal segments are narrowly bordered with black.

*Locality*.—Delagoa Bay (Barnard).

*Distribution*.—Gulf of Suez, Persian Gulf, Indian coast, Singapore, Japan.

*Squilla armata* M. Edw.

Fig. 1, *d, f*.

1895. Bigelow, Proc. U.S. Nat. Mus., xvii, p. 515, figs. 9, 10.  
1902. Stebbing, Mar. Invest. S. Afr., ii, p. 45.  
1910. *Id.*, *l. c.*, p. 405.  
1913. Kemp, *l. c.*, p. 41, pl. 2, figs. 28, 29.  
1914. Stebbing, Trans. Roy. Soc. Edin., 50, p. 257.  
1916. Balss, Beitr. Kenntn. Meeresf. Westafr., ii, p. 51.  
1940. Schmitt, *l. c.*, p. 150, fig. 4 (after Bigelow).

Rostrum tapering to a rounded apex, without medio-dorsal keel. Cornea of eyes greatly expanded, breadth equal to (or nearly) length

of whole organ. Mandibular palp absent. Ocular segment with a pair of sharp, forwardly directed spines. Antennular segment with a sharp, forwardly curving spine on each side. Fifth thoracic segment with a sharp, laterally directed process; 6th and 7th segments laterally rounded in front and produced in a point posteriorly (feeble in juv. up to 80 mm.). Abdominal segments with the submedian keels obsolete in adults, except on segment 6, where they end in spines. No spines between the submedian and intermediate keels on hind margin of segment 5 (in this respect the Cape specimens differing from those described by Bigelow and Kemp, who mention a group of 1-4 spines). Telson with 6 marginal teeth, the submedian pair ending in movable spines; between these there are two rounded lobes separated by a narrow slit; 8-12 intermediate denticles and 1 lateral one. Wrist of raptorial claw with a dorsal keel ending in a spine; dactylus with 7 (rarely 6 or 8) teeth, including the terminal one. Epipods on first 4 thoracic legs only. Inner margin of bifurcate process of uropod finely serrulate, outer edge of inner spine with a rounded tooth beyond the middle.

Length up to 170 mm. A living specimen was horny-amber, the hind margins of the abdominal segments red, more intense posteriorly, a squarish purplish 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.

*Localities.*—Off Cape Point and off Dassen Island (Stebbing); Luderitzbucht (Balss); Table Bay harbour, Saldanha Bay, Luderitzbucht, 0-45 fathoms (S. Afr. Mus.). Numerous young specimens from Cape Point to Paternoster Point (Saldanha Bay), 27-100 fathoms (S. Afr. Mus.).

*Distribution.*—Chile and Patagonia; New Zealand; New South Wales.

*Squilla hieroglyphica* Kemp

Fig. 2, c, d, e.

1911. Kemp, Rec. Ind. Mus., vi, p. 96.

1913. *Id.*, l. c., p. 51, pl. 3, figs. 38-41.

Rostrum as long as basal width, triangular. Anterior width of carapace half the (median) length (excl. rostrum), smooth, median keel without anterior bifurcation. Lateral margin of 5th thoracic segment bilobed, anterior lobe forming a strong antrorsely curved

spine, the posterior lobe rounded. No spines on ventral surface of 5th segment. Segments 6 and 7 laterally not-bilobed; segment 8 with sharp, but small, antero-lateral point. Segments 6-8 with submedian, intermediate and lateral keels. On abdomen submedian and marginal keels ending in spines on segment 6; intermediate and lateral keels ending in spines on segments 5 and 6. Telson slightly broader than long, with median keel ending in a sharp point; no movable spines; 5 or 6 submedian denticles, 11 or 12 intermediate, and 1 lateral, all spiniform. No prelateral denticle. No sharp post-anal keel on ventral surface. Cornea oblique to axis of stalk (as in *laevis*). Ophthalmic segment not projecting prominently between bases of eye-stalks. Mandibular palp absent. Raptorial dactylus with 6 teeth (incl. terminal one) (as in *laevis*); propodus without tooth at lower distal corner. Epipods on first 4 thoracic limbs only. Inner margin of bifurcate process of uropod feebly crenulate, distal margin between the spines with 2 rounded lobes; outer margin of basal joint of exopod with 5 (left) or 6 (right) movable spines.

Length 40 mm. Creamy-white, with scattered black chromatophores arranged more or less in longitudinal series on carapace and abdominal segments, but on the latter also transversely; a black median line on rostrum; a line of chromatophores on upper apical margin of 4th joint of 1st leg; one dot in middle of antennal scale, 2 on upper surface of eye-stalk and a third on lower surface; scattered chromatophores on uropods, chiefly along inner margin of 2nd joint of exopod; on telson as in fig. 2, *c*.

*Locality*.—Delagoa Bay (Dr. C. J. van der Horst, Witwatersrand University, 1939. 1 immature.)

*Remarks*.—The type and hitherto only known specimen of *hieroglyphica* (♀ 53 mm.) was from an unknown locality, but assumed to be most probably Indo-Pacific. The present specimen agrees more closely with it than with any other species, although it differs in having two features found in *laevis*: the setting of the cornea on the eye-stalk, and the number of teeth on the raptorial dactylus. There are certain other minor differences between it and Kemp's specimen.

*Squilla nepa* Latr.

Figs. 1, *b*, 2, *a*.

? 1869. Bianconi, Spec. Zool. Mosamb., p. 344. ("*Squilla mantis* Rond."; see note in Kemp, *l. c.*, 1913, p. 205. The date in Kemp's

work is typ. err. Bianconi's work first appeared in Mem. Ac. Bologna, with different pagination.)

1895. Bigelow, Proc. U.S. Nat. Mus., xvii, p. 535, fig. 21.

? 1908. Stebbing, Ann. S. Afr. Mus., vi, p. 44.

? 1910. *Id.*, l. c., p. 405.

1913. Kemp. *l. c.*, pp. 60, 195, pl. 4, fig. 49.

1917. Stebbing, Ann. Durban Mus., ii, p. 28.

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1934. Chopra, Rec. Ind. Mus., xxxvi, p. 23.

1941. Holthuis, Temminckia, vi, p. 245 (references).

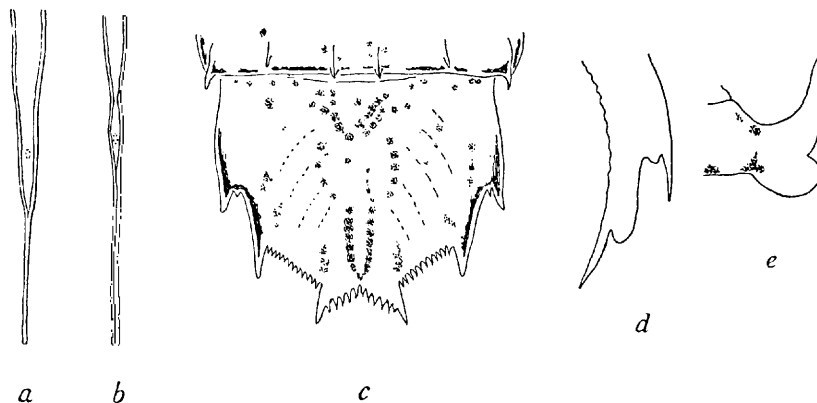


FIG. 2.—*a*, *S. nepa* Latr. and *b*, *S. holoschista* Kemp, median keel in front of cervical groove on carapace. *c*, *S. hieroglyphica* Kemp, telson. *d*, right uropodial process. *e*, right lateral process of 5th thoracic segment.

Rostrum triangular. Cornea of eyes at right angles to peduncle, width less than length of whole organ. Mandibular palp present. Median keel of carapace distinct, bifurcate in front for half or a little more than half its length anterior to the cervical groove. Lateral margins of 5th–7th thoracic segments bilobed, the anterior process on 5th segment acute and curving forwards, the anterior process on 7th segment much smaller than the posterior process. Submedian keels on 4th abdominal segment ending in spines. Telson with median keel ending in a spine which overhangs a blunt tubercle; prelateral tooth present; 3–4 submedian, 7–9 intermediate denticles, 1 lateral one. Epipods on first 4 pairs of thoracic legs only. Raptorial dactylus with 6 teeth including the terminal one, the outer margin sinuous in both sexes.

Length up to 166 mm. A living specimen was pale biscuit-colour,

keels on carapace, abdomen and telson orange-red, distal parts of uropods blackish, outer margin of the exopod bluish.

*Localities.*—Durban (Stebbing); Delagoa Bay (Barnard).

*Distribution.*—Indo-Pacific.

*Remarks.*—As Kemp (p. 61) points out, there is a possibility of confusion with *holoschista* in Stebbing's 1908 record, as at that date the latter species had not been distinguished from *nepa*. The same applies to the 1910 catalogue reference, and probably also to Stebbing's 1917 record.

A Durban specimen in the South African Museum may be this species, but the critical features are damaged.

*Squilla holoschista* Kemp.

Fig. 2, b.

1911. Kemp, Rec. Ind. Mus., vi, p. 97.

1913. *Id.*, l. c., p. 64, pl. 4, figs. 50–53.

1921. Kemp and Chopra, Rec. Ind. Mus., xxii, p. 301.

1934. Chopra, *ibid.*, xxxvi, p. 23.

1941. Holthuis, Temminckia, vi, p. 246.

Distinguished from *nepa* as follows: the median carina on carapace in front of cervical groove is bifurcate anteriorly for less than a third of its length, and is finely bicarinate (double) throughout the greater part of its length; the submedian keels of the 4th abdominal segment do not end in spines.

Kemp mentions other differences which are more easily appreciated if actual specimens are at hand. The dark patches on the 2nd and 5th abdominal segments, which are frequently found in *nepa*, are always absent in *holoschista*.

*Locality.*—Off Tugela River mouth, 12–14 fathoms (S. Afr. Mus.).

*Distribution.*—East coast of India to Ceylon; Sunda Straits.

*Remarks.*—The single specimen, 60 mm. in length, was taken by the Cape Government trawler s.s. *Pieter Faure* in January 1901.

*Squilla investigatoris* Lloyd

1907. Lloyd, Rec. Ind. Mus., i, p. 10.

1908. *Id.*, *ibid.*, ii, p. 29, pls. 2, 3.

1913. Kemp, l. c., p. 80, pl. 6, figs. 67, 68.

1921. Kemp and Chopra, l. c., p. 298.

1939. Chopra, John Murray Exp., vi, p. 151, fig. 6 (telson).

Rostrum as long as basal width, lateral margins very slightly

converging to broadly rounded apex. Anterior width of carapace half the median length (excl. rostrum), smooth, anterior half of median keel very feeble or obsolete, 2 feeble ridges near anterior margin. Lateral margin of 5th thoracic segment bilobed, anterior lobe forming an antrorse curved spine, the posterior small, acute. Lateral margin of 6th segment bilobed, anterior lobe acute, much smaller than posterior lobe; anterior lobe of 7th segment also acute, smaller than that of 6th segment; antero-lateral lobe of 8th segment square (not acute). Segments 6-8 with submedian, intermediate and lateral keels, the submedian ones feeble on segment 6, and obsolete on segment 5. Abdominal segments 1-5 with 8 keels, segment 6 with 6; keels ending in spines as described by Kemp. Telson with median keel notched near base, intermediate marginal teeth slightly inturned; (3) 4-5 submedian denticles, 8-11 (12) intermediate, and 1 lateral; pre-lateral lobe distinct. Post-anal ventral keel not strong, slightly denticulate proximally. Cornea wide, one-third median length of carapace, slightly oblique to axis of stalk. Mandibular palp present. Raptorial dactylus with 11-18 teeth (incl. the terminal one) (S. African specimens). Epipods on first 4 thoracic appendages only. Inner margin of bifurcate process of uropod feebly crenulate, outer margin of the longer spine with one rounded lobe.

Length up to 94 mm. (tip of rostrum to hind margin of telson) (up to 105 mm. Chopra, 1939). Greyish, the keels slightly darker, telson darker brownish, hind margin paler; endopod, bifurcate process, basal joint and proximal half of 2nd joint of exopod dark brownish or blackish, distal half of 2nd joint of exopod (and less noticeably the extreme tip of endopod) pale ochraceous (possibly reddish when alive).

*Locality.*—North-west of Table Bay (stockfish grounds), 28th December 1944 (Drs. Molteno and Roux, Vitamin Oils Ltd., Cape Town). The skipper of the vessel reported that "during darkness the surface was swarming with them." 3 ♂♂, 5 ♀♀ were preserved.

*Distribution.*—South coast of Arabia, 110 fathoms; Persian Gulf; Gulf of Aden, 183-220 metres.

*Remarks.*—These eight specimens have been compared with Kemp's detailed description, and no specific differences can be found. If this really is a case of specific identity, the geographical distribution is remarkable; at least it seems so at present; there is always the possibility of this species being discovered at some intermediate locality.

The remarkable feature of *investigatoris*, as discussed by Lloyd, Kemp, and Chopra, is the variation in the number of teeth on the raptorial claw; in other species of the genus exceptions to the specifically characteristic number are very rare. Chopra, using material from the Indian Museum and the John Murray Expedition, tabulated the variation in 68 claws, and found that the number varied between 10 and 18. In three-quarters of the examples the number ranged between 13 and 16, and a few examples showed asymmetry. Among the 8 South African specimens the ♂♂ are asymmetrical, having 15/16, 17/16, and 18/16 teeth on the left and right dactyli respectively, while all 5 ♀♀ are symmetrical (11, 16, 16, 16, and 17).

*Squilla raphidea* Latr.

Fig. 1, c, g.

1910. Balss, Abh. Bayer Ak. Wiss., Suppl., Bd. II, p. 8, fig. 2, a-b (and var. *africana*).

1913. Kemp, *l. c.*, p. 88, pl. 7, fig. 77.

1934. Chopra, Rec. Ind. Mus., xxxvi, p. 27.

1939. *Id.*, John Murray Exp., vi, p. 158.

1941. Holthuis, Temminckia, vi, p. 256 (references).

Rostrum rather variable, triangular, tapering to an acute apex, lateral margin thickened and raised. Cornea of eyes at right angles to peduncle, wider than length of whole organ. Mandibular palp present. Lateral margin of carapace with angular lobe in the hinder third of its length. Fifth thoracic segment laterally obtuse; 6th and 7th segments with an acute point on postero-lateral corner. Submedian keels of 5th abdominal segment (if visible) not ending in spines. Telson thick, margins often inflated in large specimens of both sexes, the strong median keel ending in a spine (often worn away), and projecting beyond as a median tubercle on hind margin; 4-6 submedian, 7-13 intermediate denticles, one lateral one. Raptorial dactylus with 8 (rarely 9) teeth including the terminal one. Epipods on first 5 pairs of thoracic legs.

Length up to 335 mm. A narrow blackish transverse line on hind margins of 6th thoracic to 6th abdominal segments inclusive; usually 2 black spots on upper margin of merus of raptorial claw, a spot on either side of propodus at distal end, and a round spot on either side of median keel on telson at base; ends of uropods suffused with black, the black coloration on the 2nd joint of exopod being confined to the inner longitudinal half.



*Locality*.—Durban (S. Afr. Mus.).

*Distribution*.—East coast of Africa; Indo-Pacific.

Gen. PSEUDOSQUILLA Dana

1913. Kemp, *l. c.*, p. 94.

1940. Schmitt, Allan Hancock Pac. Exp., v, p. 170.

Carapace with gastric grooves, but cervical groove usually absent, never visible mid-dorsally; antero-lateral angles rounded. Cornea rarely bilobed. Mandibular palp 3- (rarely 2-) jointed. Epipods present on first 5 thoracic limbs. Upper margin of propodus of raptorial claw finely pectinate. First 5 abdominal segments without keels. Ventral process of uropod ending in 2 spines, with or without additional spines on inner margin. Telson with median keel, and 3 pairs of strong marginal teeth, the submedian pair with movable tips.

*Key to South African and [Mauritian] Species.*

Basal process of uropod ending in 2 large spiniform teeth, its inner margin smooth.

1. Telson with 3 (incl. the marginal) keels on either side of median keel.
  - a. Eyes long, cylindrical, cornea set obliquely. Upper surface of process at base of antenna flat. Inner tooth of uropodal process slightly longer than outer . . . . . *ciliata*.
  - b. Eyes short, flattened, cornea set transversely. Upper surface of antennal process deeply channeled . . . . . [*ornata*].
2. Telson with 4 (incl. marginal) keels on either side of median keel . . . . . [*oculata*].

*Pseudosquilla ciliata* (Fabr.)

Fig. 3, a.

1869. Clark, Proc. Zool. Soc. Lond., p. 3 (colour, habits, etc.) (*S. stylifera*).

1913. Kemp, *l. c.*, pp. 96, 196 (references).

1926. Barnard, Trans. Roy. Soc. S. Afr., xiii, p. 121.

1926. Hansen, *l. c.*, p. 17.

1931. Bigelow, Bull. Mus. Comp. Zool., lxxii, p. 152, figs. 5, 6 (references).

1934. Chopra, Rec. Ind. Mus., xxxvi, p. 39.

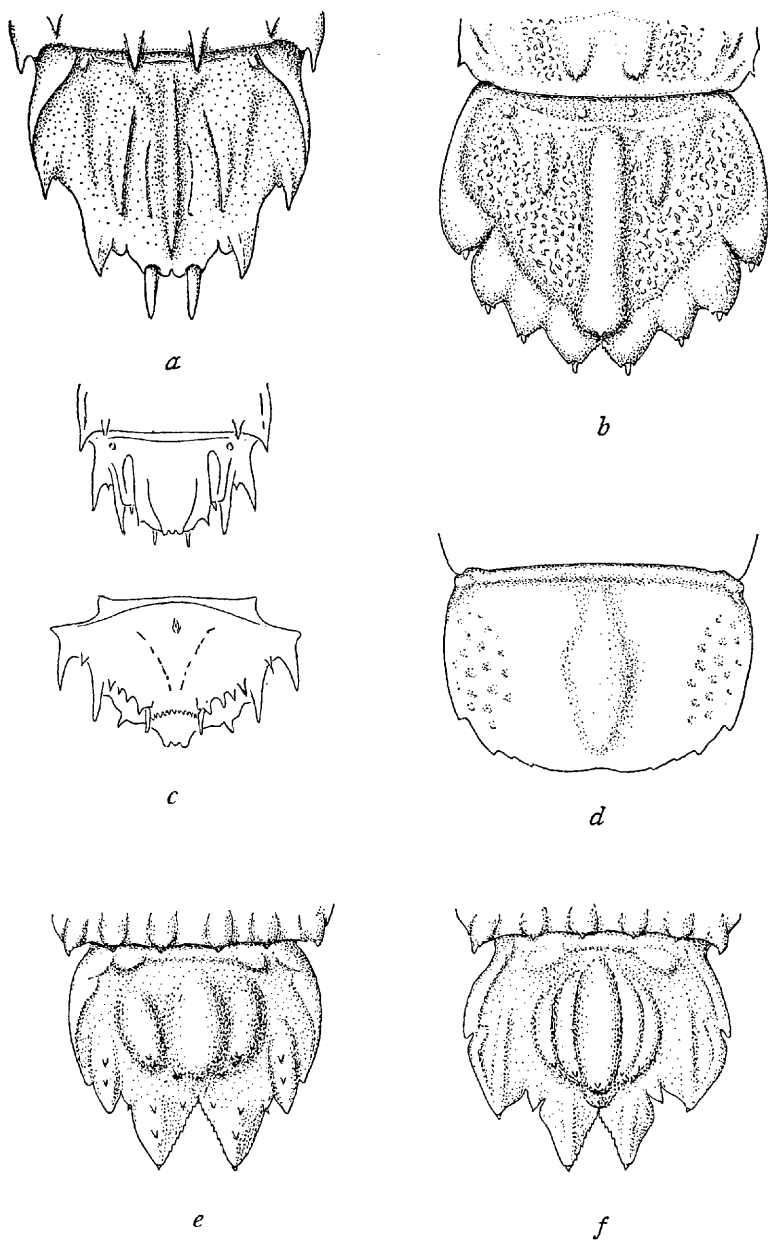


FIG. 3.—*a*, *Pseudosquilla ciliata* (Fabr.), telson. *b*, *Lysiosquilla crassispinosa* Fukuda, telson. *c*, *L. insignis* Kemp, last abdominal segment and telson in dorsal view, and ventral view of telson (after Kemp). *d*, *L. maculata* (Fabr.), telson. *e*, *Gonodactylus demanii* Hend., telson. *f*, *G. glabrous* Brooks, telson.

*Larval Form.*

1895 Hansen, Plankton Exp., II, G.c., p. 84, pl. 8, figs. 5, 5, *b* (*Pseuderichthus communis*).

1926. *Id.*, *l. c.*, p. 42.

1938. Dollfus, Mem. Inst. d'Egypte, xxxvii, p. 198, fig. 8 (telson).

1939. Chopra, John Murray Exp., vi, p. 160 (*monodactyla* stage).

1939. Foxon, *ibid.*, vi, p. 260.

1941. Holthuis, Zool. Meded., xxiii, p. 35 (references).

1941. *Id.*, Temminckia, vi, p. 261 (references).

Antero-lateral angle of carapace rounded. Rostrum much broader than long, broadly rounded in front. Eyes cylindrical, cornea set very obliquely on, and scarcely wider than, peduncle. Basal joint of antenna with an acute process, flat dorsally, its lower keel concave in lateral view. 5th thoracic segment with deep groove laterally; 6th and 7th thoracic segments laterally rounded-truncate; 8th narrowly rounded, with apical notch. Submedian, intermediate, and lateral keels on 6th abdominal segment ending in spines, the submedian and lateral ones especially strong. Postero-lateral angle of 4th abdominal segment usually not spinous in Indo-Pacific specimens; of 5th segment always ending in a sharp point, with a notch above it. Telson with strong median keel, submedian feeble (especially in juv.), intermediates slightly divergent, laterals oblique; submedian teeth ending in strong movable spines. Raptorial dactylus with 3 teeth including the terminal one.

Length up to 87 mm. Gamboge yellow, uniform, or greenish with a grey medio-dorsal stripe, and sides of carapace and abdomen speckled with grey; a dark spot laterally on 2nd free segment behind carapace, 1st abdominal segment, and at base of telson.

*Locality.*—Delagoa Bay (Barnard; also Dr. C. J. van der Horst, and Lourenzo Marques Museum).

*Distribution.*—Red Sea, Indo-Pacific; south-east coast of United States, Bahamas, Bermuda, West Indies, Brazil.

Gen. *LYSIOSQUILLA* Dana

1910. Stebbing, *l. c.*, p. 406.

1913. Kemp, *l. c.*, p. 109.

1926. Hansen, *l. c.*, p. 18.

1937. Gurney, Proc. Zool. Soc. Lond., ser. B, pp. 323-326, figs. (larval stages).

1940. Schmitt, Allan Hancock Pac. Exp., v, p. 184 (Key to Pacific American species).

Carapace with gastric grooves, but cervical groove absent (or scarcely traceable); without longitudinal keels; antero-lateral angles rounded. Cornea either small or considerably expanded. Mandibular palp 3-jointed. Epipods on first 5 thoracic limbs. Thoracic and abdominal segments depressed, without keels. Ventral process of uropod with 2 large spines, the inner longer than the outer. Telson with hind margin either nearly smooth with small blunt teeth, or with large sharp spines.

*Key to the South African Species.*

1. Upper margin of propodus of raptorial claw with close-set and even pectination, no long spines (except the 4 movable ones at base). Cornea bilobed.
  - a. Telson dorsally smooth, without strong marginal teeth.
    - i. Raptorial claw with 9-11 teeth including the terminal one. Body with black cross-bands . . . . . *maculata.*
    - ii. Raptorial claw with 15-16 teeth including the terminal one. No cross-bands . . . . . *capensis.*
  - b. Telson with dorsal keels, and a median lobe, 2 pairs of strong marginal teeth . . . . . *insignis.*
2. Upper margin of propodus of raptorial claw with numerous spinules not closely set, and with 10 or more stiff spines. Cornea subglobular . . . . . *crassispinosa.*

*Lysiosquilla maculata* (Fabr.)

Fig. 3, *d.*

1902. de Man, Abh. Senckenb. Ges., xxv, p. 910.

1910. Stebbing, *l. c.*, 406.

1913. Kemp, *l. c.*, p. 111, pl. 8, figs. 86-91.

1931.\* Bigelow, Bull. Mus. Comp. Zool., lxxii, p. 169, fig. 9.

1934. Chopra, Rec. Ind. Mus., xxxvi, p. 28.

1939. *Id.*, John Murray Exp., vi, p. 161.

\* Quoted throughout Chopra's 1934 paper as issued in "1932." Part 4 of vol. 72, Bull. Mus. Comp. Zool., bears date "September 1931."

*Larval Form.*

## Fig. 4, c, d.

1895. Hansen, Plankton Exp., II, G.c., pp. 65, 74 (*Lysierichthus duvaucellii*).

1904. Jurich, Wiss. Erg. D. Tiefsee Exp., vii, p. 393, pl. 26 (2), fig. 7.

1910. Stebbing, *l. c.*, p. 408.

1926. Hansen, *l. c.*, p. 40.

1939. Chopra, John Murray Exp., vi, p. 161.

1939. Foxon, *ibid.*, p. 261.

1940. Schmitt, *l. c.*, p. 190, fig. 21.

1941. Armstrong, Amer. Mus. Novit., no. 1137, p. 14.

1941. Holthuis, Temminckia, vi, p. 269, fig. 5 (abnormal carapace) (references).

Rostrum cordiform, usually widest just in front of its base, sides sinuous, apex more or less acute. Cornea as wide as whole length of ocular organ, very oblique. Ocular segment with a pair of blunt lobes upstanding one on either side of rostral point, and a ventral keel ending in a sharp point anteriorly. Shorter ramus of the last 3 pairs of thoracic legs linear. Telson broader than long, a feeble medio-dorsal swelling, laterally with large shallow foveoles or pits, postero-lateral margin with 2, 3, or more usually 4 small blunt lobes (sharper in juv. than adult). Ventral process of uropod with the inner spine much longer than the outer.

Length up to 300 mm. Whole body with black or bluish-black cross-bands, the bands usually broad, but somewhat variable; bands usually remain distinct in spirit specimens for a long time.

*Localities.*—Durban (Stebbing); Natal coast, and Delagoa Bay (S. Afr. Mus.); *L. duvaucellii*, Bathurst coast (S. Afr. Mus.).

*Distribution.*—Indo-Pacific to Equador. West Indies (but see footnote by Kemp, *l. c.*, p. 116, also Schmitt, *l. c.*, p. 191).

*Remarks.*—Armstrong records a ♂ (155 mm.) taken at surface near a submerged light at 8 p.m. at Penrhyn Island (Central Pacific).

*Lysiosquilla capensis* Hansen

1895. Hansen, *l. c.*, p. 74.

1910. Stebbing, *l. c.*, p. 406.

1913. Kemp, *l. c.*, p. 117.

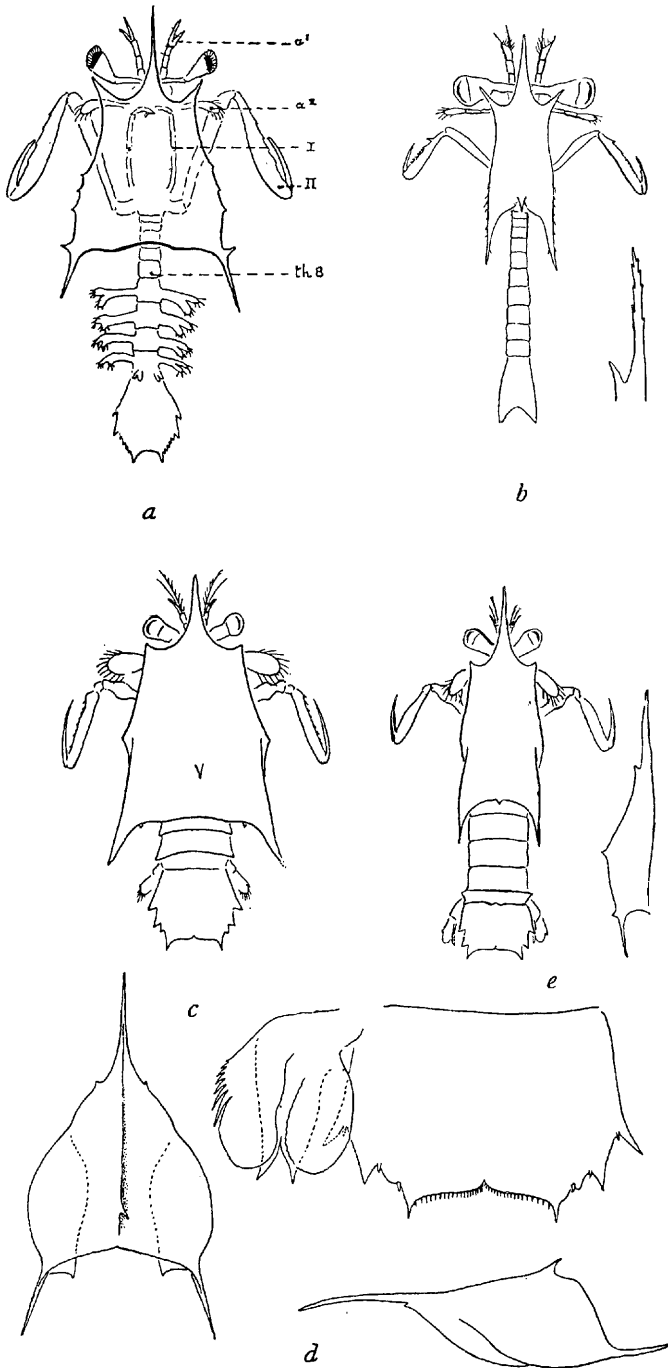


FIG. 4.—*a*, *Alima*. *b*, *Alima paradoxa* Jurich, Agulhas Bank, 57 mm. *c*, *Lysierichthys duvaucellii* (Guerin), median length of carapace 85 mm. *d*, *L. duvaucellii*, specimen in South African Museum, median length of carapace 28 mm., with lateral view of carapace, telson and uropod. *e*, *L. pulcher* Hansen, median length of carapace 15 mm., with lateral view of carapace.

(*a*, after Calman; *b*, *c*, *e*, after Jurich.)

*Larval Form.*Fig. 4, *e*.1895. Hansen, *l. c.*, p. 74 (*Lysierichthus pulcher*, sine descr.).1904. Jurich, *Wiss. Erg. D. Tiefsee Exp.*, vii, p. 390, pl. 29 (5), figs. 2, 2, *a, b*.1910. Stebbing, *l. c.*, p. 409.

Rostrum cordiform, as wide as median length, the sinuous margins converging to a sharp median point in front, dorsally smooth. Cornea as wide as whole length of ocular organ. Ocular segment with a pair of sharp, forwardly directed spines (very similar to those in *S. armata*), and a ventral keel ending in a sharp point anteriorly and posteriorly. Three soft, pointed, subequal papillae on basal joint of antenna (as in *maculata*). Shorter ramus of last 3 pairs of thoracic legs narrow-oval (length nearly thrice width). Postero-lateral angles of abdominal segments rounded. Telson twice as wide as median length, similar to that of *maculata*, dorsally very convex, with very slight triangular swelling medianly and very shallow foveoles laterally, outermost 2 teeth distinct and sharply pointed. Ventral process of uropod with inner spine considerably longer than outer one.

Length up to 96 mm. As preserved uniform buff or pinkish, without any trace of cross-bands.

*Localities*.—Port Elizabeth (Hansen); False Bay and Agulhas Bank to Algoa Bay, 10–48 fathoms (S. Afr. Mus.).

*Remarks*.—All the smaller examples (40–51 mm.) have a distinct tooth or a small denticle at the base of the raptorial claw, making the total number of teeth 16. In the largest specimen (96 mm.) the rostrum is semicircular, twice as wide at base as median length, without any median point; although showing no sign of injury, it would appear to be abnormal; Hansen would certainly have noticed and mentioned it if the type specimen had a semicircular rostrum.

Genital opening ♀ as in *maculata*; a short more or less sharp median longitudinal ridge on sternum of 8th thoracic segment in both sexes, and no spinous process on hind margin of sternum of 6th segment.

*Lysiosquilla insignis* KempFig. 3, *c*.1911. Kemp, *Rec. Ind. Mus.*, vi, p. 94.1913. *Id.*, *l. c.*, p. 126, pl. 9, figs. 99–102.1929. Gordon, *Ann. Mag. Nat. Hist.* (10), iv, p. 462.

Rostrum narrowly triangular, the feebly sinuous margins converging to a very finely pointed apex. Cornea oblique, width about equal to length of whole eye. Raptorial claw with 7-8 teeth, including the terminal one, the penultimate tooth distinctly shorter than the antepenultimate, outer margin with an acute tooth at base; propodus with 4 movable spines on inner (upper) edge. Shorter ramus of 6th thoracic limb broadly oval, those of 7th and 8th limbs successively narrower. Postero-lateral angles of abdominal segments 4-6 acute. Telson not quite twice as broad as long, with 4 pairs of keels, the outermost pair bifurcated proximally; a trilobed median prominence, a sharp intermediate spine and an angular lateral lobe, connected by a sharp transverse ridge; on the margin the intermediate and lateral teeth very large, 2 movable submedian spines, and between the latter 6 pairs of denticles; 4 short spines between the movable one and the intermediate tooth, and one between the latter and the lateral tooth. Ventral process of uropod with outer spine not much shorter than the inner one.

Length up to 52 mm.

*Locality.*—North of Durban, 150 fathoms (Gordon).

*Distribution.*—Andaman Is., 235 fathoms.

*Remarks.*—Besides the type only the single Natal specimen is known. Both are males.

*Lysiosquilla crassispinosa* Fukuda

Fig. 3, b.

1910. Fukuda, *Annot. Zool. Jap.*, vii, p. 146, pl. 4, figs. 4, 4, a.

1913. Kemp, *l. c.*, p. 117.

1927. Komai, *Mem. Coll. Sci. Kyoto Univ.*, B, iii, p. 331.

1929. Gordon, *Ann. Mag. Nat. Hist.* (10), iv, p. 462, figs. 1, 2.

1932. von Bonde, *Fish. Mar. Biol. Surv.*, Rep. 9, p. 62 (locality record).

Rostrum triangular, median length greater than basal width, sinuous margins converging to a long slender apical point, dorsal surface medianly concave. Cornea subglobular, oblique, width subequal to length of outer margin of peduncle. Ocular segment without dorsal spines, ventrally with a (subacute) spinous process. No papillae on basal joint of antenna. Propodus of raptorial claw with numerous spinules on upper outer edge, each pair separated by a distance



about equal to the length of the spinules; on inner edge 3 movable spines and a jointed, but immovable, one proximally, followed by 9-10 (or more) stiff upstanding immovable spines; lower distal corner of propodus with a subacute denticle; dactylus with (10) 11 teeth including the terminal one (the proximal one being very small in the ♂ specimen). Shorter ramus of last 3 pairs of thoracic legs linear. Postero-lateral angles of all abdominal segments with sharp points. A prominent spine on the hind margins of the sterna of 8th thoracic and 1st-5th abdominal segments in male. Ventral process of uropod with inner spine much longer than outer. Telson, see fig. 3, *b*.

Length up to 297 mm.

*Localities.*—North of Durban, 150 fathoms (Gordon); off Durban (Fish. Surv. St., 67 A, 29° 42' S., 31° 29' E.), 132 fathoms (S. Afr. Mus. don. Fish. Survey).

*Distribution.*—Japan.

*Remarks.*—The specimen (245 mm.) in the South African Museum is a ♂, both the type (297 mm.) and the Natal specimen (200 mm.) being females.

The "jointed" spines on the propodus of raptorial claw are jointed in the sense that they are not non-articulated spinous projections of the integument; they are not, however, movable like the large proximal spines, though possibly they may be in young specimens.

The South African Museum specimen has several sessile catenulate Polyzooan colonies on the telson and 6th abdominal segment.

#### Gen. GONODACTYLUS Latr.

1910. Stebbing, *l. c.*, p. 406.

1913. Kemp, *l. c.*, p. 145.

1923. Odhner, *Medd. Göteb. Mus.*, xxx, pp. 8 *sqq.*

1926. Hansen, *l. c.*, p. 24, and (larval stages), p. 46.

1940. Schmitt, *Allan Hancock Pac. Exp.*, v, p. 208 (key to Pacific American species).

Carapace without longitudinal keels, cervical groove completely absent. Cornea of eyes sometimes indistinctly bilobed. Mandibular palp present (2- or 3-jointed) or absent. Epipods present on all of the 1st-5th thoracic legs. Ventral process of uropod ending in 2 spines, the inner usually shorter than the outer. Telson with variable sculpturing.

Key to the South African Species.

1. Median portion of telson with 3 longitudinal keels.
  - a. Median keel on telson not very strongly arched. No spinules on dorsal surface of telson . . . . . *chiragra*.
  - b. Median keel very strongly arched. Dorsal surface with spinules . . . . . *demanii*.
2. Median portion of telson with 5 longitudinal keels . . . . . *glabrous*.

*Gonodactylus chiragra* (Fabr.)

1878. Hilgendorf, M.B. Ak. Wiss. Berlin, p. 846.  
 1902. de Man, Abh. Senckenb. Ges., xxv, p. 912 (with vars.).  
 1903. Lanchester, Fauna Geogr. Mald. Laccad. Archip., i, p. 445, pl. 23, figs. 1-5, 10, 11, 13, 14 (part: varieties).  
 1910. Stebbing, *l. c.*, p. 406.  
 1913. Kemp, *l. c.*, p. 155, pl. 9, fig. 107, and text-figs. 1, 2.  
 1916. Shelford, Naturalist in Borneo, p. 302 (habits).  
 1917. Stebbing, Ann. Durban Mus., ii, p. 28.\*  
 1923. Odhner, *l. c.*, p. 8.  
 1926. Hansen, *l. c.*, p. 24.  
 1931. Bigelow, Bull. Mus. Comp. Zool., lxxii, pp. 107 *sqq.*, pl. 2, fig. 1.  
 1938. Gravier, Mem. Inst. d'Egypte, xxxvii, p. 178.  
 1938. Dollfus, *ibid.*, p. 205, figs. 14, 15 (telson).  
 1939. Chopra, John Murray Exp. Rep., vi, p. 179.  
 1941. Holthuis, Temminckia, vi, p. 277, fig. 7 (abnormal telson) (references).

Antero-lateral angles of carapace in advance of base of rostrum, which has its antero-lateral angles subacutely rounded, and a stout median spine. On the ocular segment 2 large subtriangular processes separated distally by a narrow cleft. Propodus of raptorial claw with a single movable spine at base of inner (upper) edge. 2nd-5th abdominal segments quite smooth, without any pits. Outer spine of ventral process of uropod without a tooth or lobe on its inner margin. Inner ramus of uropod narrow-oval, with fringe of plumose setae around whole margin.

Length up to 105 mm. Colour variable: greenish, yellowish, pinkish, buff, etc. (see also Stebbing, 1917).

*Localities*.—Durban, Natal (Krauss, Stebbing); Mozambique

\* The reference to Kemp is wrongly given as "Trans. Linn. Soc. Lond." instead of "Mem. Ind. Mus."

(Hilgendorf); St. Lucia Bay (S. Afr. Mus.); Umtwalumi, Natal (Professor Stephenson, 1938; specimen seen by me).

*Distribution*.—Mauritius, Zanzibar, Madagascar, Gulf of Suez, Indo-Pacific, Australia.

*Remarks*.—Stebbing (1910) remarks that Krauss' form seems to correspond best with Lanchester's var. *tumidus* (*l. c.*, fig. 1), which according to Bigelow (1931, *l. c.*, pp. 110, 111) is identical with var. *platysoma* Wood-Mason.

Since Krauss' time the only records of this species in South African waters are Stebbing's 1917 record, the St. Lucia Bay specimen, and the specimen taken by Professor Stephenson.

*Gonodactylus demanii* Henderson

Fig. 3, *e*.

1893. Henderson, Trans. Linn. Soc. Lond., zool. 2, v, p. 455, pl. 40, figs. 23, 24.

1913. Kemp, *l. c.*, p. 164, pl. 9, figs. 108–111 (*demani*), with vars. *spinosus* Big. and *espinosus* Borrard.

1921. Tattersall, J. Linn. Soc. Lond., zool., xxxiv, p. 359.

1921. Kemp and Chopra, Rec. Ind. Mus., xxii, p. 309.

1926. Hansen, *l. c.*, p. 26 (as var. of *chiragra*).

1938. Dollfus, Mem. Inst. d'Egypte, xxxvii, p. 213, fig. 16 (*demani*, telson), and fig. 17 (var. *spinosus*, telson).

1939. Chopra, John Murray Exp., vi, p. 172 (*demani* var. *spinosus*) and p. 176 (var. ? *espinosus*).

1941. Holthuis, Temminckia, vi, p. 282, fig. 8 (telson vars.) (references).

Distinguished from *chiragra* by the very small dorsal processes on the ocular segment, the very strongly convex median keel of telson, all the keels on telson being much more swollen and not separated by smooth interspaces, and the presence of small spinules or tubercles in varying number on the telson.

Length up to 40 mm.

*Localities*.—Mozambique Island (Barnard coll. 1912); Delagoa Bay (Lourenzo Marques Mus.).

*Distribution*.—Ibo, Portuguese East Africa (Kemp), Zanzibar, Red Sea, Indian Seas, East Indies.

*Remarks*.—In the Mozambique specimen the inner margin of inner ramus of uropod possesses a fringe of setae, thus agreeing with Kemp's

specimen from Ibo; it also confirms Kemp and Chopra's remarks that this form usually has only a few spinules on the telson. In the typical form as figured by Henderson the inner ramus of uropod has no setae on inner margin.

Hansen, after a lengthy discussion, regards *demanii* as a variety of *chiragra*.

*Gonodactylus glabrous* Brooks

Fig. 3, f.

1886. Brooks, *Challenger* Rep., xvi, p. 62, pl. 14, fig. 5, pl. 15, figs. 7 and 9.

1902. de Man, *Abh. Senckenb. Ges.*, xxv, p. 913, pl. 27, fig. 67.

1903. Lanchester, *Fauna Geog. Mald. Laccad. Archip.*, i, p. 448, pl. 23, figs. 8, 9, 15 (as var. of *chiragra*).

1913. Kemp, *l. c.*, p. 167, pl. 9, fig. 113, and text-fig. 2 on p. 170.

1923. Odhner, *l. c.*, p. 8.

1926. Barnard, *Trans. Roy. Soc. S. Afr.*, xiii, p. 121.

1926. Hansen, *l. c.*, p. 29.

1931. Bigelow, *Bull. Mus. Comp. Zool.*, lxxii, p. 127, fig. 1.

1934. Chopra, *Rec. Ind. Mus.*, xxxvi, p. 40.

1937. Gurney, *Proc. Zool. Soc. Lond.*, ser. B, p. 321, pl. 1, figs. 1-16, pl. 2, figs. 17-26 (larval stages).

1938. Gravier, *Mem. Inst. d'Egypte*, xxxvii, p. 179, figs. D (telson) and 5.

1938. Dollfus, *ibid.*, p. 217, figs. 18, 19 (telson) (*glaber*).

1941. Holthuis, *Temminckia*, vi, p. 284, fig. 9, a (abnormal telson) (references) (*falcatus* Forsk.).

Distinguished from *chiragra* and *demanii* by the 5 keels in the middle of the telson, the absence of the movable spine at base of propodus of the raptorial claw, and the presence of a distinct pit on the sides (dorso-laterally) of each of 2nd-5th abdominal segments, and a small lobe at base of inner margin of outer spine of the ventral uropodial process. The processes on the ocular segment are longer than in *demanii* and much narrower than in *chiragra*.

Length up to 78 mm. Various shades of green or blue-green, uniform or mottled with darker patches on abdomen.

*Locality*.—Delagoa Bay (Barnard; also coll. Dr. C. J. van der Horst, and Lourenzo Marques Mus.).

*Distribution*.—Ibo, Portuguese East Africa (Kemp); east coast of Africa, Red Sea, Indo-Pacific, Australia.

*Larval Forms.*

1886. Brooks, *Challenger* Rep., xvi, pp. 15-20, 81-114.  
 1895. Bigelow, Proc. U.S. Nat. Mus., xvii, p. 543 (key to larvae).  
 1904. Jurich, Wiss. Erg. D. Tiefsee Exp., vii, pp. 377 sqq.  
 1910. Giesbrecht, Fauna Flora Golf. Neapol., xxxiii, pp. 47-231.  
 1910. Stebbing, *l. c.*, p. 407.  
 1926. Hansen, *l. c.*, p. 39.  
 1932. Foxon, Gr. Barrier Reef Exp., iv, p. 375.  
 1937. Gurney, Proc. Zool. Soc. Lond., ser. B, cvii, p. 319, pls. 1-8.  
 1939. Foxon, John Murray Exp., vi, p. 251 (key to adults and larvae).

The larvae are hatched at a stage later than the *Nauplius*. The pelagic larval stages are of considerable duration.

As there is no adequate material in the South African Museum, and as no special studies have been made on the pelagic stages in South African waters, it will suffice to refer to Stebbing's 1910 list of records, adding to his bibliography Bigelow's 1895 paper (containing the key incorporated below), Jurich, 1904; Hansen, 1926; Foxon, 1932 and 1939; Gurney, 1937; and also one species which Stebbing omitted.

*Key to Larval Stages (after Bigelow).*

1. Telson with 4 or more spines (denticles) between the 2nd lateral tooth and the postero-lateral corner (fig. 4, a) . . . . . *Alima*, larva of *Squilla*.
2. Telson with only 1 spine in the above-mentioned position (fig. 4, c).
  - a. Body short, carapace wide with prominent ventral angles, the postero-lateral angles widely separated from the middle line . . . *Lysierichthus*, larva of *Lysiosquilla*.
  - b. Carapace without prominent ventral angles.
    - i. Abdomen very long, telson longer than wide. Carapace short and narrow, rostrum and postero-lateral angles short . *Pseuderichthus*, larva of *Pseudosquilla*.
    - ii. Postero-lateral angles of carapace long . . . *Gonerichthus*, larva of *Gonodactylis*.

*Alima paradoxa* Jurich

Fig. 4, b.

1904. Jurich, *l. c.*, p. 387, pl. 27 (3), figs. 2, 2, a, b.  
 Shallow water, northern part of Agulhas Bank, St. 93 [*sic*, probably should be St. 96].

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