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DESCRIPTIONS OF STOMATOPOD LARVAE FROM THE ARABIAN SEA WITH A LIST OF STOMATOPOD LARVAE AND ADULTS FROM THE INDIAN OCEAN AND A KEY FOR THEIR IDENTIFICATION PART I*

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ABSTRACT

Our knowledge of stomatopod larvae from the seas around India mainly stems from the extensive recent studies which have thrown important light as to the diversity of larvae and the adults to which they belong. Taking into account the number of species known, larvae of a large number of species are yet to be identified and described from the area.

With this objective in view and for a better understanding of the stomatopod larvae from this region, detailed studies were undertaken on the subject. As many as 587 plankton collections taken by R. V. "Varuna" during the cruises 1–3 and 7–22 between January 1962 and January 1963 along the west coast of India were analysed. Only larvae in the advanced stage of development were chosen and studied as they only were found to throw some light on the characteristics of adults to which they belong. The studies revealed that the collections contained larvae of 24 species of which 9 have not been described hitherto. All larvae were studied in great detail, for which measurements of body parts, descriptions and figures are given. Wherever larvae have been definitely correlated to their adults, the species names have been used.

The paper also includes a check list of larvae known from Indian Ocean. All the 86 species for which larvae are known so far from the region have been listed and under each, synonymies and details of distribution have been provided. This is the first attempt to list all the species of stomatopods for which larvae are known from Indian Ocean with detailed synonymies and distributional records.

INTRODUCTION

THE MAJOR contributions which have enriched our knowledge on stomatopod larvae in the early days are those of Milne-Edwards (1837), Eydoux and Souleyet (1841), Guérin-Méneville (1857), Claus (1871), Brooks (1886), Hansen (1895) and Jurich (1904). These contributions helped to a great extent in increasing the number of species for which larvae are known. Even though very few larvae were traced to their adults the studies indicated the diversities amongst larvae and a classification of larvae emerged from these studies. The problem of correlation of larvae to their adults was confronted by workers studying preserved plankton material and this brought out the need to study the complete life histories from eggs hatched in the laboratory. Efforts were made towards this end and Komai (1924) studied the development of *Oratosquilla oratoria* from Japan from eggs reared in the laboratory.

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The studies on preserved plankton material continued which have contributed substantially to our knowledge of the group. The stomatopod larvae collected by Siboga Expedition were reported by Hansen (1926). Komai and Tung (1929) examined the stomatopod larvae that occur in Japanese waters. The Great Barrier Reef Expedition collected 7 species and these were reported by Foxon (1932). From their studies on the plankton of the Australian coastal waters off New South Wales, 3 species were reported by Dakin and Colefax (1940). A very important contribution on stomatopod larvae came from Gurney (1946) when he reported larvae from Bermuda and listed all the stomatopod larvae known till that period. Townsley (1953) reported larvae of 10 species from Hawaii. The larvae of *Pterygosquilla armata* were studied from Benguela current by Lebour (1954). Serène (1954) made some observations on the biology of stomatopods from Viet Nam and he reported some stomatopod larvae which have been hatched from eggs. Manning and Provenzano (1963) studied the larval development of *Gonodactylus oerstedii* from Florida.

The important contributions from the Indian Ocean region which have advanced our knowledge on stomatopod larvae are those of Lanchester (1903) from Maldive and Laccadive Archipelago wherein he reported larvae of 4 species of which 2 were new; Tattersall (1906) reported 10 species of which 7 were new to science from Sri Lanka and Borradiale (1907) from the Western Indian Ocean reported 11 species of which 4 were new.

Our knowledge of stomatopod larvae from the seas around India is mostly based on a series of excellent contributions by Alikunhi from India (Alikunhi and Aiyar, 1942; 1943; Alikunhi, 1944; 1944a; 1947; 1948; 1950; 1952; 1958 and 1967). His studies paved a way for the correlation of several larvae to their adults. He reared the advanced larvae taken from plankton and identified the post larvae. He reported larvae of 17 species from Madras Coast which were correlated to their adults and included notes on larvae of 11 species which he designated by numbers (Alikunhi, 1952). He reported larvae of 12 species from the Mahanadi Estuary, east coast of India (Alikunhi, 1958). In his latest contribution (Alikunhi, 1967), he reported the post larvae of 18 species. The extensive studies mainly pertain to the detailed description of post-larval stages, frequency of moults, growth and age at different sizes. The studies also include observations on shrinkage in length during metamorphosis, relative sizes of adults and post-larvae, the post-larval characters and their relation to adult characters, relative growth during post-larval stages, duration of post-larval stages and inter-generic relationships in stomatopods.

From Bombay, Lele (1937) reported the larva of *Oratosquilla interrupta*. Gurney (1937) reported larvae of 2 species from Red Sea. He reared the eggs of *Gonodactylus falcatus* and obtained larvae which moulted till some stages. The John Murray Expendition collected 8 species which were reported by Foxon (1939). From South Africa, Barnard (1950) reported larvae of 4 species. The development of *Oratosquilla nepa* and *Gonodactylus chiragra* were reported from Madagascar by Fourmanoir (1953). Gohar and Al-Kholy (1957) studied the larvae from Red Sea and they reported 3 species and made some detailed studies on their appendages.

Taking into account the number of species known from the Arabian Sea, larvae of a large number of species are yet to be identified and described from the area. With this objective in view detailed studies were undertaken on the subject. The studies revealed that the plankton collections which were examined, contained larvae of 24 species of which 9 have not been described hitherto.

In the check-list of larvae known from the Indian Ocean, all the 86 species for which larvae are known so far from the region have been listed and under each, synonymies and distribution have been provided.

I am very grateful to Dr. S. Jones, former Director of the Central Marine Fisheries Research Institute, Mandapam Camp for his encouragement and guidance during the course of this study. I wish to express my sincere thanks to Dr. M. J. George, Scientist, C. M. F. R. Institute, Cochin for making corrections and critically going through the manuscript. I am thankful to Dr. P.S.B.R. James, Fisheries Officer, Fisheries College, Mangalore for his valuable suggestions. I wish to thank the Ministry of Education, Government of India for the award of a Senior Research Training Scholarship during the tenure of which this study was made.

MATERIAL AND METHOD

The studies are based on the larvae examined from 587 plankton collections taken by R. V. *Varuna* during the cruises 1-3 and 7-22 between January 1962 and January 1963 along the west coast of India and deposited at the Central Marine Fisheries Research Institute, Cochin. The area covered is roughly from 69°E to 80°E and 22°N to 1°S. The place of collection and all other details have been given under each larva which was examined. The gear used is Mosquito net with ½ m diameter ring, filtering part made of mosquito netting and Argo net supplied by the U.S. Research Ship *Argo*, 1m diameter ring, filtering portion made of synthetic fibre. The nature of haul is indicated by (H) for horizontal and (V) for vertical. Only larvae in the advanced stage of development were chosen and studied as they only were found to throw some light on the characteristics of adults to which they belong.

Measurements of body parts, descriptions and figures of the larvae are given. The total length was measured from the tip of the rostrum to the median posterior margin of telson and carapace length from the base of the rostrum to the posterior margin of carapace. The anterior breadth of carapace was measured just behind the anterolateral spines and the posterior breadth just in front of posterolateral spines. The length of telson does not include the 6th abdominal somite and the breadth is always the greatest breadth excluding the marginal spines. The breadth of propodus of raptorial claw is always the greatest breadth. In the larvae where the lateral margins are flexed the greatest breadth of carapace was measured from dorsal view and not the actual breadth as the larvae are highly elevated and variously folded. Every effort has been made to sketch the drawings to give as correct a picture as possible. The parts of body which are of little taxonomic importance have been omitted. The sketches were made by camera lucida using a binocular microscope. Wherever larvae have been definitely correlated to their adults, the species names have been used.

Abbreviations used in this paper

Stn	:	Station number	Lat	:	Lattitude
Long	:	Longtitude	D	:	Depth of haul
(H)	:	Horizontal haul	(V)	:	Vertical haul
D. Stn	:	Depth at Station	M	:	Mosquito net
A	:	Argo net	TL	:	Total length
LR	:	Length of rostrum	CL	:	Carapace length
ABC	:	Anterior breadth of carapace	PBC	:	Posterior breadth of carapace
GBC	:	Greatest breadth of carapace	LAS	:	Length of anterolateral spine

LLS	:	Length of lateral spine	LPS	:	Length of posterolateral spine
LDS	:	Length of dorsal spine	LES	:	Length of eye stalk
LC	:	Length of cornea	BC	:	Breadth of cornea
LI	:	Length of ischium of raptorial claw	LM	:	Length of merus of raptotial claw
LP	:	Length of propodus of raptorial claw	BP	:	Greatest breadth of propodus of raptorial claw
BT	:	Breadth of telson			
LD	:	Length of dactylus of raptorial claw	LT	:	Length of telson
DLA	:	Distance between tip of labrum and tip of antennular somite			

Gonodactylus chiragra (Fabricius) 1781 (Fig. 1 a, b)

Gonodactylus chiragra Fourmanoir, 1953, p. 157, figs. 9–13.

Locality: Stn. 1256; Lat. 03°00′ N; Long. 74°05′ E; Date 13–10–1962; Time 0110 to 0300 hrs; D. haul 0 (H); D. stn 2420 m; M. net.

Measurements (mm): TL: 10.7; LR: 2.6; CL: 3.0; ABC: 1.1; PBC: 1.2; GBC: 1.6; LAS: 0.1; LPS: 1.7; LES: 0.1; LC: 0.7; BC: 0.7; LI 0.7; LM: 1.0; LP: 1.3; BP: 0.3; LD: 1.1; LT: 1.4; BT: 1.4; DLA: 0.7.

Description: Larva short, broad; with a narrow, not much elongated, carapace and long posterolateral spines. Carapace broadest mid-laterally with same anterior and posterior breadth; lateral margin flexed; extending posteriorly till last thoracic somite. Rostrum long, well developed; 2/5 longer than posterolateral spines and bears 7 ventral spinules. Anterolaterals short, stout but pointed. Posterolaterals protrude above and run parallel to margin of abdominal somites and extend till 2nd somite. Dorsal spine absent. Single spinule present on lateral margin of carapace ventrally directed, near base of posterolateral spine.

Antennular flagellum extends to little more than 1/3 rostrum; peduncular segments decrease in length; second flagellum bears 4 groups of sensory hairs. Endopod and exopod of antenna of same length. Raptorial claw well developed; propodus bears a single short stout spinule at base and many pectinations on inner margin, dactylus without any free spines besides terminal. Other thoracic appendages well developed and propodus of 4th very broad, flat and leaf like. Five epipods present of which first is larger than others. Last three thoracic somites increase in length posteriorwards of which the last is 3 times broader than long and they bear well developed, biramous appendages. Eyes large, globular with very short stalks; cornea slightly longer than broad. Abdominal somites very broad; 4th somite twice as broad as long and 6th is 2/7 as long as broad. Posterolateral corners of first 5 somites end in short, stout but acute spines. Sixth somite bears submedian spines and anterolateral corners produced into ventrally directed stout spines.

Telson as long as broad; parallel-sided with 3 spines of equal length on each side. Submedian spines with 27 denticles of equal length with minute serrations inbetween. Posterior margin of telson concave. Uropod extends till 3/4 distance on telson; basal prolongation ends in two large spines of which inner 2/3 as long as outer. Endopod as long as outer spine of basal prolongation; exopod, longest, bears 3 spines on outer margin of basal segment; slightly extends beyond 2nd lateral spine of telson.

Remarks: The larva agress in almost all essential characters to the larva of *G. chiragra* as described by Fourmanoir (1953). In that larva the carapace

covers the first abdominal somite and telson bears 32 denticles; while in the present larva, carapace covers till last thoracic somite and telson bears 27 denticles.

Gonerichthus a Tattersall, 1906 (Fig. 1 c, d)

Gonerichthus a Tattersall, 1906, 183, pl. III, fig. 42.

Locality: Stn. 1258; Lat. 04° 00′ N; Long. 74° 12′ E; Date 13-10-1962; Time 1020 to 1215 hrs. D. haul; 150 (H); D. Stn. 2530 m; M. net.

Measurements (mm): TL: 10.2; LR: 1.4; CL: 3.4; ABC: 1.2; PBC: 1.4; GBC: 1.8; LAS: 0.3; LPS: 1.2; LES: less than 0.3; LC: 0.9; BC: 0.9; LI: 0.8; LM: 1.6; LP: 1.9; BP: 0.7; LD: 1.6; LT: 1.5; BT: 1.6; DLA: 0.8.

Description: Larva broad, opaque, with abdomen relatively long and broad than carapace. Posterior breadth of carapace more than anterior while the greatest breadth in the region of raptorial claw nearly 1/5 more than posterior breadth. Carpace covers till middle of last thoracic somite. Rostrum well developed; 1/7 times longer than posterolateral with 3 ventral spinules of same size and ventral tip bearing serrations. Anterolateral spine short, pointed and nearly 1/4 the posterolateral. Dorsal spine situated on median posterior margin of carapace is small, pointed and shorter than anterolateral. Posterolaterals diverge very slightly and extend till 1/4 of second abdominal somite. Lateral margin of carapace with a minute spinule near the base of posterolateral spine.

Tip of antennular flagellum surpasses rostrum while peduncle extends nearly to middle; the second and third segments of peduncle of same length while first is twice their length and second flagellum bears 5 group of sensory hairs. Eyes large, with very short stalks and cornea as long as broad. Segments of antennal peduncle of same length; first segment of endopod longer than second and endopod extends to about 2/3 exopod. Protopod of raptorial claw without spinule; propodus extraordinarily broad with a stout basal spine and pectinations; dactylus without any free spines besides terminal. Propodus of fourth maxilliped of normal size. Five epipodites present of which second is largest. Walking legs well developed and biramous. Abdominal somites broad and well developed; first 3 decrease in length; third 3/8 as long as broad; fourth and fifth of same length and sixth is only ½ their length; fifth nearly 2/5 as long as broad and 6th more than 4 times as broad as long. Posterolateral corners of first five end in spines of increasing size. Sixth with submedian spines and antero-lateral corners produced into ventrally directed spines.

Telson slightly broader than long with lateral and intermediate spines of same size and submedians larger. Denticles one lateral, 2 intermediate and 13 submedian on each side. Basal prolongation of uropod ends in two spines without bulgings at base; the inner nearly four times longer than outer and tip of inner surpasses endopod and exopod and reaches till intermediate spine of telson. Endopod and exopod nearly of same length and extend till outer spine of basal prolongation. Inner margin of basal prolongation bears 3 spines. Outer margin of exopod bears two spines, the tip of larger does not extend till tip of exopod.

Remarks: The larva agrees well with the description of *Gonerichthus a* as given by Tattersall. Minor characters in which it differs are in the length of the rostrum and the length of the posterolateral spines of carapace.

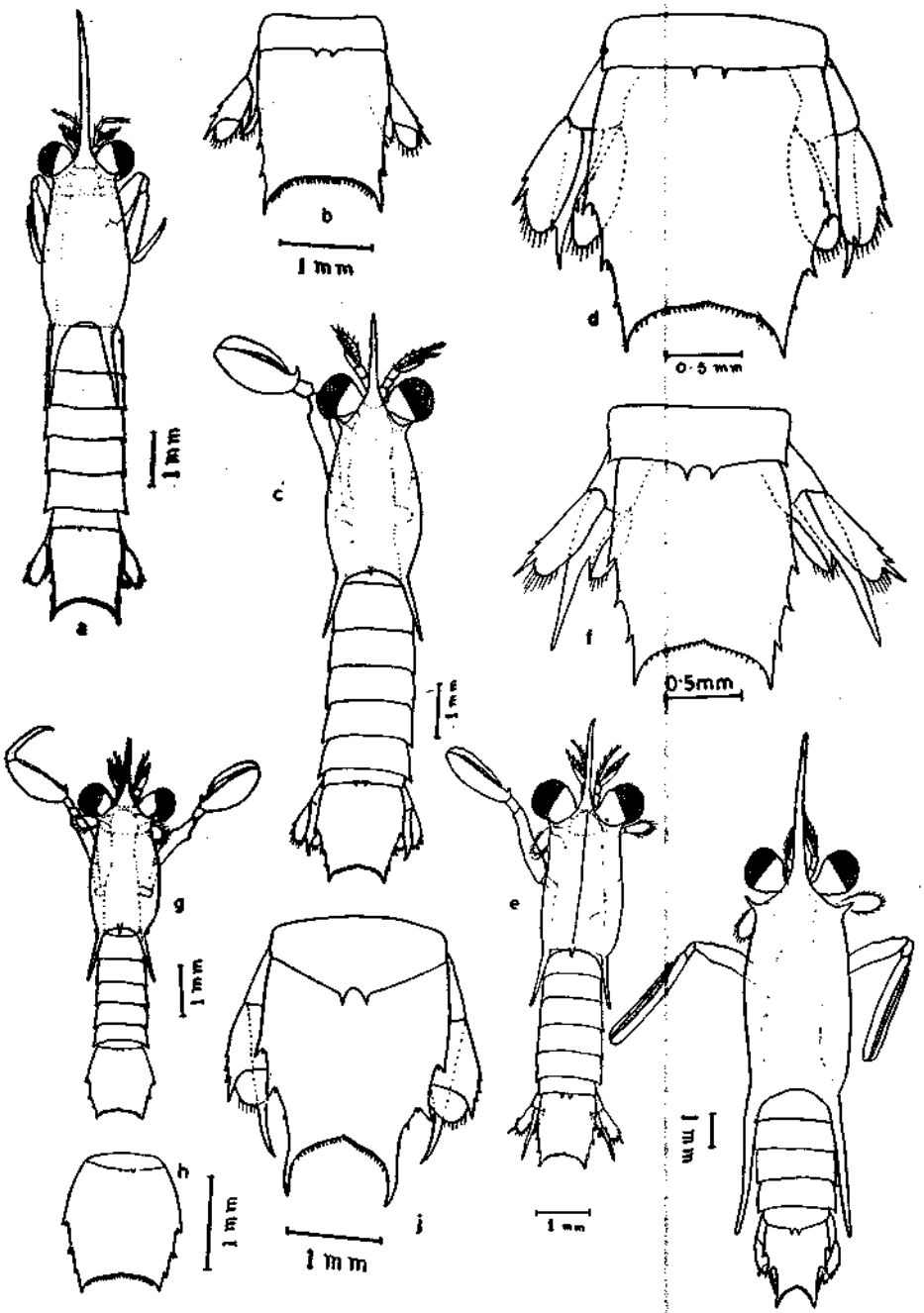

Fig. 1: a, b. *Gonodactylus chiragra*; c, d. *Gonerichthus* a; e, f. *Gonodactylus* sp. A; g, h. *Gonodactylus* sp. B; and i, j. *Gonodactylus* sp. C.

Gonodactylus sp. A; Hansen, 1926 (Fig. 1e, f)

Gonodactylus sp. Hansen, 1926, p. 46, fi. pl. II, figs. 10 a–11 c.

Locality: Stn. 1256; Lat. 03°00′N; Long. 74°05′E; Date 13-10-1962; Time 0110 to 0300 hrs; D. haul 150 (H); D. stn. 2420 m; M. net.

Measurements (mm): TL: 8.6; LR: 1.7; CL: 2.7; ABC: 1.3; PBC: 1.3; GBC: 1.5; LAS: 0.13; LPS: 1.0; LES: 0.13; LC: 0.8; BC: 0.8; LI: 0.5; LM: 1.3; LP: 1.5; BP: 0.3; LD: 1.2; LT: 1.0; BT: 1.2; DLA: 0.5.

Description: Larva short, broad and slightly opaque. Carapace not very elongated; broadest at the 4th thoracic segment region and posteriorly covers all thoracic segments. Rostrum slender, elongated; 2/5 longer than posterolateral; with 4 ventral spinules of decreasing size and tip with minute ventral serrations. Anterolateral spines short, stout, pointed and are as long as dorsal spine which is short, stout and pointed. From dorsal spine a carina runs mid-dorsally on carapace to base of rostrum. Posterolaterals slender, elongated; run nearly parallel to abdominal somites and extend till 2nd somite. Lateral margin of carapace with a small spinule near the base of posterolateral spine.

Antennular flagellum inferior to tip of rostrum; peduncle extends to more than 1/3 length; the length of peduncular segments decreases from first to third and the second flagellum bears 3 groups of sensory hairs. Eyes large with short stalks; cornea as long as broad. Segments of antennal peduncle of same length; first segment of endopod nearly twice the length of second and endopodal tip slightly exceeds tip of exopod. Protopod of raptorial claw without spine; ischium not very elongated; propodus with one basal spine and pectinations; dactylus without free spines besides terminal. Epipods present. Walking legs well developed and biramous. Propodus of 4th maxilliped of normal size. Abdominal somites broad and well developed; 5th somite nearly 2/5 and last one 3/10 as long as broad. Submedian spines on last somite present. Posterolateral corners of first five somites end in minute spines. Anterolateral corners of last somite end in ventrally directed broad spines.

Telson parallel sided, slightly broader than long with 3 lateral spines of same length on each side. Submedian spines long, well developed with 12 denticles on each side. Uropod well developed; basal prolongation ends in two spines of which the outer very long and more than 3 times longer than inner. Tip of outer reaches to the submedian and tip of inner to the base of 2nd lateral spine of telson. Endopod as long as inner spine. Expod longer than endopod and bears 3 spines on outer margin of which the largest pointed, well developed and surpasses scale like part of exopod.

Remarks: Larva agrees well with the description given by Hansen (1926). He reported 2 or 3 spines on rostrum but the present larva has 4. The slight curvature of outer spine of basal prolongation of uropod as shown in fig. 11a by Hansen (1926) is absent in present larva. The larva also resembles *Gonerichthus* briefly described by Tattersall (1906).

Gonodactylus sp. B; n. sp. (Fig. 1g, h)

Locality: Stn. 1413; Lat. 16°02′N; Long. 71°22′E; Date 7–1–1963; Time 1250 to 1452 hrs; D. haul 200-0 (V); D. stn 2200 m; A. net.

Measurements (mm): TL: 7.16; LR: 1.07; CL: 2.54; ABC: 0.93; PBC: 0.93; GBC: 1.34; LAS: 0.2; LPS: 0.93; LES: less than 0.2; LC: 0.73; BC: 0.6; LI: 0.67; LM: 1.13; LP: 1.34; BP: 0.46; LD: 1.13; LT: 1.17; BT: 1.21; DLA: 0.6.

Description: Larva opaque, quite elongated. Carapace with same anterior and posterior breadths; anterior slightly more than 2/3 the greatest breadth; and covers 3/4 of last thoracic somite. Rostrum broad, well developed, nearly 5 times longer than anterolateral and bears 4 ventral spinules. Anterolaterals short, stout, pointed and 2/7 as long as posterolaterals. Dorsal spine short, pointed and nearly as long as anterolateral. Median posterior region of carapace not highly elevated. Posterolateral spines well developed, slightly more than 3/4 as long as rostrum; diverge slightly; run close to margin of abdominal somites and extend till second abdominal somite. On lateral margin of carapace single spinule present near base of posterolateral spine.

Tip of antennular flagellum inferior to tip of rostrum; peduncle extends to about 2/5; first segment of peduncle twice as long as second; third slightly longer than second and second flagellum bears about 4 groups of sensory hairs. Eyes large with short stalks; cornea longer than broad. Peduncular segments of antenna nearly of same length; endopod extends nearly to 1/5 of exopod. Frontal spine absent. Protopod of raptorial claw without spinule; propodus extraordinarily broad with a stout basal spine and pectinations; dactylus without free spines besides terminal. Other maxillipeds not fully developed. Walking legs in bud condition. Epipods of last three maxillipeds rudimentary. Abdominal segments broad, well developed, first two of same length and others decrease in length posteriorwards. Third segment 2/5; fifth segment 1/3; sixth segment 1/5 as long as broad and sixth half the length of fifth. Posterolateral corners of first 5 somites end in subacute spines which increase in length. Submedian spines on 6th somite present.

Telson slightly broader than long; lateral and intermediate spines small and of same size; submedians slightly longer. Denticles number, one lateral; 2 intermediate and 11 submedians on one side and 12 on other. Minute serrations in between submedian denticles present. Uropod rudimentary; extends nearly to half the distance to lateral spine. Exopod and endopod extend to same level and outer margin of exopod bears a single spine which does not extend till tip of exopod.

Remarks: Larva resembles *Gonodactylus* sp. Hansen in most characters. It varies in the following characters. Endopod of antenna extends nearly to 1/5 of exopod. Propodus of raptorial claw extraordinarily broad in present larva while of normal shape in *G.* sp. Telson with submedian spines long and denticles number one lateral and two intermediate. Exopod and endopod of same length in uropod in the present larva. The characters indicate that the present larva belongs to a closely allied species.

Gonodactylus sp. C; n. sp. (Fig. 1 i, j)

Locality: Stn. 1237; Lat. 06°00′N; Long. 71°02′E; Date 6-10-1962; Time 0700 to 1000 hrs; D. haul 75–0 (V); D. stn. 3920 m; A. net.

Measurements (mm): TL: 16.3; LR: 4.3; CL: 6.1; ABC: 2.4; PBC: 2.6; GBC: 3.0; LAS: 0.7; LPS: 4.3; LES: 0.3; LC: 1.4; BC: 1.3; LI: 0.7; LM: 2.3; LP: 3.4; BP: 0.3; LD: 3.0; LT: 1.7; BT: 2.0; DLA: 1.6.

Description: Larva opaque, carapace narrow, very much elongaed, boat shaped with long and well developed rostrum and posterolateral spines. It is broadest mid-laterally with anterior breadth slightly less than posterior breadth. Rostrum nearly as long as posterolateral with 3 well developed ventral spinules. Anterolaterals short, stout, pointed, 1/7 length of rostrum. Carapace flexed laterally and posteriorly covers till first abdominal somite and bears a median dorsal carina. Posterolaterals long, diverge slightly from margin of abdominal somites and extend till half the distance to the lateral spines of telson. Dorsal spine absent. On lateral margin of carapace near the base of posterolateral a small spinule is present.

Antennular flagella extends nearly to half the length of rostrum. Second flagellum bears 9 groups of sensory hairs. Peduncle with 2nd and 3rd segments of same length while first is longer. Eyes large, globular with short stalks and cornea slightly longer than broad. In the antennal peduncle and endopodite, first segment longer than second. In raptorial claw ischium short, propodus very narrow, elongated, without basal spines, with pectinations throughout; dactylus without free spines besides terminal. Propodus and dactylus very slender and very much elongated. Other thoracic appendages not well developed. Propodus of 4th maxilliped normal. Epipods on first five maxillipeds present and their size decreases posteriorwards. Abdominal somites very broad and posterolateral corners of 4th and 5th end in short spines. Fourth somite 3 times broader than long and last one 2/7 as long as broad with well developed submedian spines and anterolateral corners produced into ventrally directed large acute spines.

Telson 4/5 as long as broad with well developed spines of which submedians very long. Denticles, one lateral, two intermediate and 14 submedians on one side and 16 on other. Uropods very well developed extending till base of submedian spine. Outer spine of basal prolongation very long, well developed nearly 5 times as long as inner spine and takes a curving path inwards. Endopod and exopod of same length and extend beyond inner spine of basal prolongation. Basal segment of exopodite bears 4 spines on outer terminal margin.

Remarks: Larva resembles *Gonodactylus (Gonerichthus)* sp. (Alikunhi, 1952) and may belong to a closely related species. It varies from the same in the following characters, namely, the posterolateral spines of carapace extend only till half the distance to the lateral spines of telson, second antennular flagella with 9 groups of sensory hairs and the exopod of uropod with 4 spines. The shape of telson is also strikingly different. The larva resembles some of the *Pseudosquilla* larvae by the presence of long, slender propodus and dactylus on raptorial claw.

Pseudosquilla ciliata (Fabricius), 1787 (Fig. 2 a, b)

Pseuderichthus communis Hansen, 1985, p. 84–86, Taf. VIII, figs 5–5 b; Jurich, 1904, p. 395, Taf. XXIX, fig. 1; Tattersall, 1906, p. 183; Hansen, 1926, p. 42; Gurney, 1946, p. 152.

Pseudosquilla ciliata Foxon, 1939, p. 260; Barnard, 1950, p. 854; Townsley, 1953, p. 428, fig. 23.

Locality: Stn. 1245; Lat. 02°00′N; Long. 71°00′E; Date 7–10–1962; Time 2330 to 0230 hrs; D. haul 0 (H); D. stn. 3840 m; M. net.

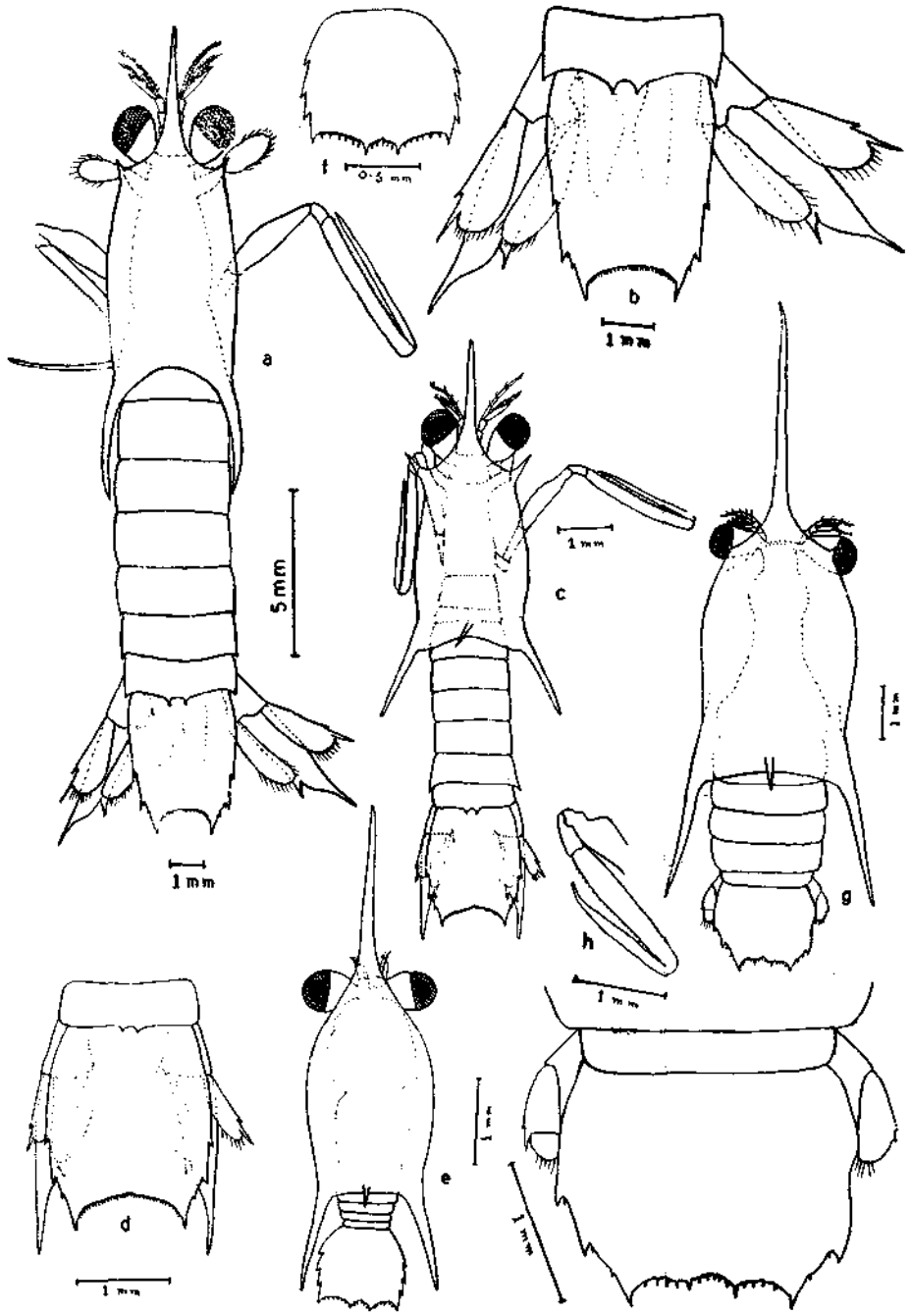

Fig. 2: a, b. *Pseudosquilla ciliata*; c, d. *Pseuderichthus distinguendus*; e, f. *Acanthosquilla acanthocorpus* and g – i *Acanthosquilla multifasciata*.

Measurements (mm): TL: 23.0; LR: 3.5; CL: 6.5; ABC: 2.9; PBC: 3.6; GBC: 3.7; LAS: 0.4; LPS: 2.9; LES: 0.3; LC: 1.5; BC: 1.4; LI: 1.4; LM: 2.8; LP: 4.8; BP: 0.4; LD: 4.5; LT: 3.3; BT: 3.1; DLA: 1.5.

Description: Carapace short, narrow, posteriorly covers the anterior part of last thoracic somite; anterior breadth nearly 4/5 posterior breadth. Rostrum 1/7 longer than posterolaterals; bears an anteriorly directed large spine and 2 spinules. Anterolaterals nearly 1/9 of rostrum; posterolaterals run almost parallel and extend till middle of second abdominal somite; dorsal spine absent. Lateral margin without spinules.

Antennular flagellum extends nearly to tip of rostrum; second flagellum bears 9 groups of hairs. Cornea slightly longer than broad. Endopod of antenna as long as exopod. Propodus of raptorial claw slender bears pectinations throughout its length; dactylus does not bear any free spines besides terminal. Five epipods present. Fifth abdominal somite more than twice as broad as long and sixth three times broader than long. Posterolateral corners of last three somites end in spines. Last segment bears submedian spines; anterolateral corners produced into ventrally directed spines.

Telson 5/6 as broad as long; posterior margin concave with 35 denticles; lateral with one and intermediate with 2 denticles on each side. Uropod well developed; endopod extends till intermediate spines of telson; exopod a single lobe with 2 outer spines. Outer spine of basal prolongation nearly 3 times longer than inner and extends beyond tip of telson; basal outer margin of inner spine and basal inner margin of outer spine possess bulgings.

Distribution: This common larva has been reported from many localities. Indian equatorial current, Sri Lanka, Chagos Archipelago, Alphonse Is., Amirante group, Providence Is., between Mauritius and Cargados, Sargasso Sea, N. equatorial current, Red Sea, Hawaii and South Africa.

Pseuderichthus distinguendus Hansen, 1895 (Fig. 2 c, d)

Pseuderichthus distinguendus Hansen, 1895, p. 86; Jurich, 1904, p. 394, Taf. XXVIII, fig. 5; Borradaile, 1907, p. 215.

Pseudosquilla sp. [? *oculta* (Brullé)] Foxon, 1939, p. 260.
Pseudosquilla oculata Gurney, 1946, p. 153.

Locality: Stn. 1385; Lat. 14°25′N; Long. 70°00′E; Date 15-12-1962; Time 0335 to 0640 hrs; D. Haul 100 (H); D. stn. 3580 m; M. net.

Measurements (mm): TL: 10.6; LR: 2.0; CL: 3.4; ABC: 1.8; PBC: 2.0; GBC: 2.2; LAS: 0.5; LPS: 1.5; LES: 0.2; LC: 0.9; BC: 0.7; LI: 0.7; LM: 1.6; LP: 2.3; BP: 0.2; LD: 2.1; LT: 1.8; BT: 1.8; DLA: 0.7.

Description: Larva relatively short; semitransparent with a large carapace. Carapace fairly long; broadest little posterior to midlateral region; posterior breadth slightly more than anterior; and covers till middle of first abdominal somite. Rostrum elongated, fairly broad; nearly 1/4 longer than posterolateral spine; 3 times the dorsal spine; with serrations on ventral tip and bears a large ventral spine and a minute ventral spinule. Anterolaterals fairly elongated, pointed; nearly 1/3 the posterolaterals and shorter than dorsal spine. Dorsal spine long, pointed and

situated on posteromedian region of carapace. A carina runs from dorsal spine to rostrum. Posterolaterals narrow, elongated; diverge greatly from abdominal margin and extend till third abdominal somite. Lateral margin of carapace without any spinule.

Antennular flagellum much inferior to tip of rostrum; peduncle extends to about 1/3 the length; first segment of peduncle relatively long and others decrease in length; second flagellum bears 3 groups of sensory hairs. Eyes large with short stalks; cornea nearly 2/3 as broad as long. First segment of antennal peduncle longer than second; first segment of endopod longer than second and tip of endopod extends to about 1/3 scale. Protopod of raptorial claw without spine; propodus very narrow elongated without basal spine; pectinations present throughout inner margin; dactylus slender elongated without free spines besides terminal. Other maxillipeds rudimentary. Five epipodites present and they decrease in size posteriorwards. Propodus of fourth maxilliped normal in size. Walking legs in bud condition. Abdominal somites broad; well developed;3rd, 4th and 5th nearly twice as broad as long. The 6th nearly 3 times broader than long; bears submedian spines; anterolateral corners produced into ventrally directed spines. Only on 5th somite the posterolateral corners produced into short spines.

Telson as long as broad; lateral, intermediate and submedian spines increase in size with one lateral, 3 intermediate and 18 submedian denticles on each side. Uropods well developed; basal prolongation ends in two spines of which outer 4 times longer than inner; tip of outer surpasses telson and tip of inner extends till intermediate spine. Basal inner margin of outer spine possesses bulging. Endopod extends to base of inner spine of basal prolongation and exopod smaller and does not extend till tip of endopod. Exopod in the form of a single lobe; bears two spines on outer margin; the second being long, pointed surpasses tip of scale like part which is slightly superior to lateral spine of telson.

Remarks: Larva agrees well with earlier descriptions. Jurich (1904) has given a fine figure of this larva in which the carapace covers half of last thoracic somite; posterolateral spines do not diverge much and extend till 1/4 of 2nd abdominal somite. In the present larva carapace covers till middle of first abdominal somite and posterolateral spines extend till 3rd abdominal somite. Foxon (1939) has reported that in some larvae pectinations on propodus of raptorial claw are absent.

Distribution: Red Sea, Gulf of Oman, Arabian Sea, Indian Ocean.

Acanthosquilla acanthocarpus (Miers) 1880 (Fig. 2 e, f)

Lysiosquilla acanthocarpus Alikunhi, 1952, p. 293, fig. 21 c.
Acanthosquilla acanthocarpus Alikunhi, 1967.

Locality: Stn. 1400; Lat. 14°49′N; Long. 74°00′E; Date 17-12-1962; Time 0305 to 0340 hrs; D. haul 0 (H); D. stn. 19 m; M. net.

Measurements (mm): TL: 5.89; LR: 1.74; CL: 2.42; ABC: 1.27; PBC: 1.4; GBC: 1.8; LPS: 1.13; LDS: 0.2; LES: 0.13; LC: 0.6; BC: 0.46; LT: 0.87; BT: 0.93.

Description: Larva with large carapace; long rostrum and posterolateral spines. Carapace broadest mid-laterally with flexed lateral margins; posteriorly

covers till 3/4 of second abdominal somite and bears a single spinule on posterolateral margin near the base of posterolateral spine. Rostrum long, well developed; 1/3 longer than posterolateral spine; with 3 small ventral spinules and tip with ventral serrations. Anterolateral spines absent. Dorsal spine situated on posteromedian region and is 1/5 as long as posterolateral. Posterolaterals long, well developed; diverge slightly from margin of abdominal somites and extend till intermediate spines of telson.

Antennules short; do not extend even to 1/4 of rostrum; peduncular segments rudimentary and second flagellum bears 4 groups of sensory hairs. Eyes with very short stalks and cornea longer than broad. Antennae rudimentary. Raptorial claw not fully developed. Third and fourth maxillipeds not developed. Last three thoracic somites bear bilobed appendages. Abdominal somites very broad and short; posterolateral corners smooth; 4th somite nearly 3 times broader than long and 6th not clearly demarcated.

Telson slightly broader than long with 3 spines on lateral margin and submedians at apex all of same length. Submedian denticle formula 6+1+5+1+6 with the result there are 10 denticles on one side and 9 on the other. Minute serrations present in between some adjacent submedian denticles. Uropods rudimentary.

Remarks: This *Erichthoidina* type of larva agrees well with the larva described by Alikunhi (1952) as *Erichthoidina*. The only difference noticed is that in the present larva the submedian denticle formula is 6+1+5+1+6 while it is 6+1+6+1+6 in the other larva. Alikunhi reported that anterolateral spines which are absent in earlier stages, develop at a later stage.

Distribution: Madras.

Acanthosquilla multifasciata (Wood-Mason), 1895 (Fig. 2 g, h, i)

Erichthoidina brevispinosa Claus, 1871, pl. i, fig. 4, pl. ii, fig. 5; Gurney, 1946, p.147, 162, fig. 9.
Lysierichthus sp. Komai and Tung, 1929, pl. vii, figs 13–19, pl. viii, figs. 1–9.
Lysiosquilla multifasciata Alikunhi and Aiyar, 1943, pp. 80–82; Alikunhi, 1952, p. 289, fig. 19.
Acanthosquilla multifasciata Alikunhi, 1967, p. 915, figs. 174–185.

Locality: Stn. 940; Lat. 15°17′N; Long. 73°11′E; Date 2-4-1962; Time 1630 to 1700 hrs; D. haul 80-0 (V); D. stn. 86 m.

Measurements (mm): TL: 12.2; LR: 3.8; CL: 4.8; ABC: 2.1; PBC: 3.0; GBC: 3.0; LAS: 0.2; LPS: 2.5; LES: 0.1; LC: 1.2; BC: 0.7; LI: 0.6; LM: 1.3; LP: 1.6; BP: 0.3; LD: 1.5; LT: 1.2; BT: 2.7; DLA: 0.6.

Description: Larva with a large carapace, rostrum and posterolateral spines. Carpace broadest in the middle; posteriorly covers 3/4 of 2nd abdominal somite; posterolateral margin flexed with a single spinule near the base of posterolateral spine. Rostrum broad, long, well developed; little more than 2/3 longer than posterolateral with 4 ventral spinules of which last one is minute. Anterolaterals short and are nearly twice the lateral spinules. Dorsal spine 3 times longer than anterolateral. Posterolaterals long, well developed; diverge slightly and extend till 1/3 distance between base and lateral spines of telson.

Antennules small; do not reach to 1/3 rostrum; peduncles with second and third segments of same size while first longer; second flagellum bear 4 groups of

sensory hairs. Eye with short stalk; cornea longer than broad. Protopod of raptorial claw without any spine; propodus with pectinations but without basal spine; dactylus does not bear any free spines besides terminal. Other maxillipeds crowded in labral region. Last three thoracic somites become broader posteriorwards and bear bilobed appendages. Abdominal somites very broad, short; posterolateral corners smooth; and 4th somite nearly 3 times as broad as long.

Telson 3/5 as long as broad; lateral and intermediate spines of same length while submedians longer with one lateral, 2 intermediate and 7 submedian denticles on one side and 8 on other. Fifth submedian denticle on each side large; size 1/2 of submedian spine to form the formula 4+1+5+1+4. Telson deformed on one side in present larva. Varying number of serrations present in between submedian denticles. Inner margin of intermediate spine serrated, but lateral without such serrations. Uropods reach till lateral spines; basal prolongation ends in two spines of which outer twice as long as inner and reaches till 3/4 of endopod; exopod with 3 spines and reaches beyond spines of basal prolongation.

Remarks: Larva agrees well in most characters with the description by Alikunhi (1952). In a 15 mm long larva he reported that the rostrum is almost equal to median length of carapace but in the present larva the median length of carapace is much more; the submedian denticles number 4+1+4+1+4 but in present larva they number 4+1+5+1+4. The larva differs from *Lysiosquilla* sp. IV described by Alikunhi (1952) by the presence of a prominent dorsal spine.

Distribution: Japan, Bermuda, Madras.

Lysierichthus duvaucelli (Guérin), 1857 (Fig. 3 a, b, c, d)

Erichthus duvaucellii Guérin, 1857, Pl. XXIV, fig. 3.

Erichthus duvaucelli Claus, 1871, p. 26, Taf. IV, fig. 16; Brooks, 1886, p. 110, pl. X, fig.7, Pl. XI, fig. 4.
Lysierichthus duvaucelli Jurich, 1904, p. 393, Taf. XXVI (II), fig. 7; Borradaile, 1907, p. 215; Hansen, 1926, p. 40.

Lysioerichthus duvaucellii Tattersall, 1906, pt. 5, p. 179.
Lysiosquilla (Lysierichthus) maculata Foxon, 1939, p. 261.

Lysiosquilla maculata Barnard, 1950, p. 856, fig. 4 c, d.

Locality: Stn. 1389; Lat. 14°49′N; Long. 70°40′E; Date 15-12-1962; Time 1740 to 2020 hrs; D. haul 50 (H); D. stn. 3000 m; M. net.

Measurements (mm): TL: 14.5; LR: 1.7; CL: 7.6; ABC: 3.7; PBC: 5.9; GBC: 6.5; LAS: 0.5; LPS: 1.5; LLS: 0.7; LDS: 0.7; LES: 0.4; LC: 1.7; BC: 1.3; LI: 1.3; LM: 2.0; LP: 3.6; BP: 0.3; LD: 3.3; LT: 2.9; BT: 4.3; DLA : 3.0.

Description: Larva very broad with a large convex shaped carapace which extends till 1/4 of third abdominal somite. Carapace flexed laterally and broadest midlaterally. Rostrum slightly longer than posterolaterals and nearly four times longer than anterolaterals bears a single minute ventral spinule and tip serrated dorsally and ventrally. Lateral spines broad, well developed nearly twice as long as anterolaterals and less than 1/2 the rostrum. Anterolaterals short, stout and pointed nearly 1/3 the posterolaterals. Posterolaterals stout, well developed, diverge slightly from margin of abdominal somites and extend till about 3/4 fourth somite. Apart from lateral spine, the lateral margin of carapace bears a stout, short blunt

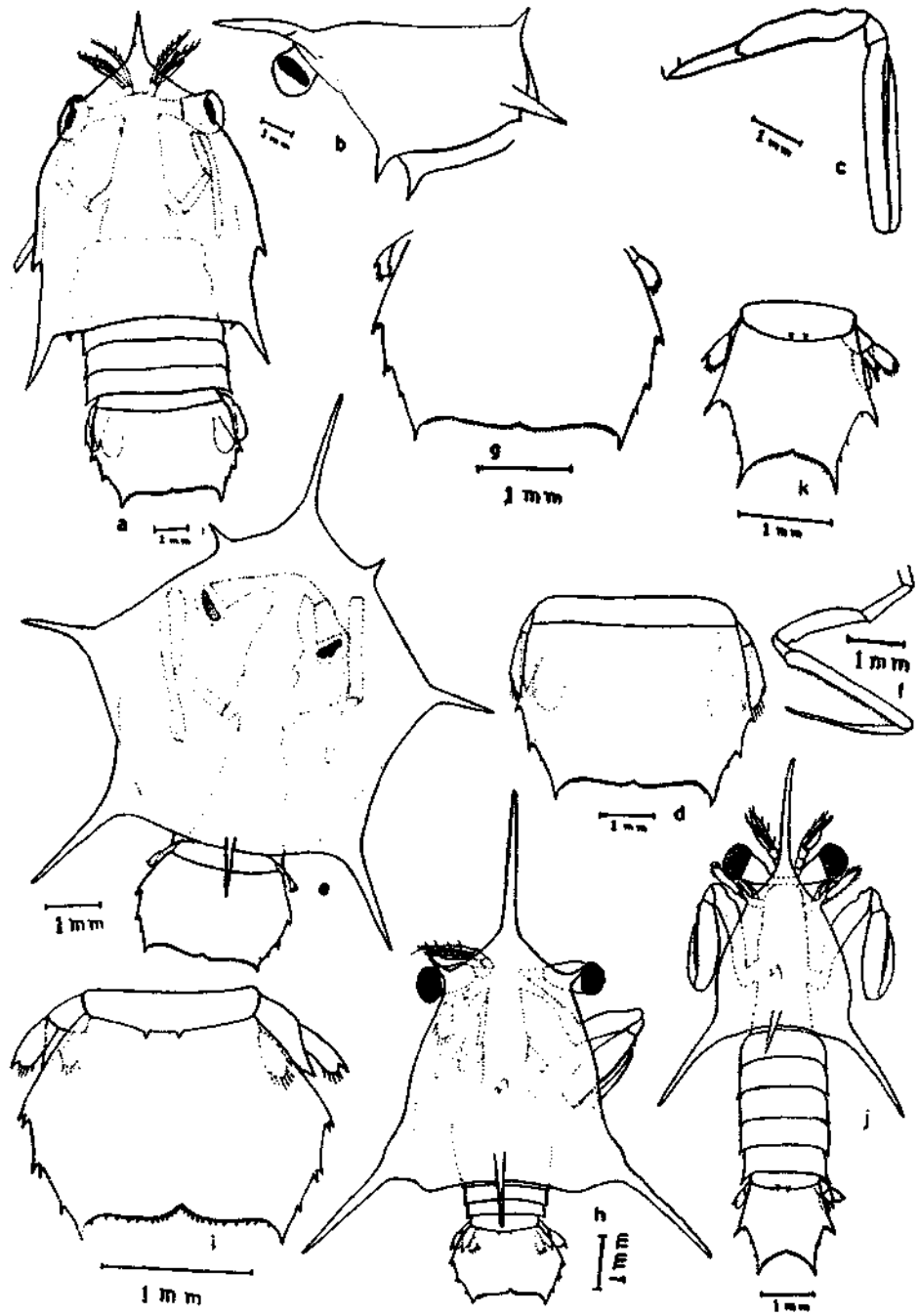

Fig. 3: a – d. *Lysierichthus duvaucelli*; e – g. *Lysierichthus* sp. A; h, i, *Coroniderichthus bituberculatus* and j, k. *Coroniderichthus* sp. A. n. sp.

spine near the base of posterolateral. Dorsal spine slightly shorter than lateral spine, is situated on elevated posteromedian region of carapace.

Antennular flagellum extends beyond tip of rostrum, peduncle extends beyond middle; basal segment of peduncle longer while the other two are of same size; second flagellum bears 8 groups of sensory hairs. In the antennular peduncle the two segments are of same size; first segment of endopod longer than second and endopod extends to about 1/4 scale. Peduncular segment of raptorial claw without any spinule, propodus narrow, elongated without any basal spines but with the basal inner region swollen and bears pectinations throughout its length; dactylus narrow: elongated without any free spines besides terminal. Propodus of 4th maxiliped of normal shape. Five epipodites present on maxillipeds which decrease in size posteriorwards. Last three thoracic somites become broader posteriorwards and bear bilobed short appendages. Abdomen very broad; posterolateral corners of first 5 somites end in acute spines; 4th and 5th somites nearly 5 times broader than long; last somite nearly 8 times broader than long without any submedian spines but the anterolateral corners produced into ventrally directed spines.

Telson broad and well developed; nearly 2/3 as long as broad; lateral and intermediate spines of same size while submedians are longer. Denticles small; one lateral, two intermediate on each side; 35 submedians on one side and 39 on the other with varying numbers of minute serrations inbetween. Uropod reaches till lateral spine of telson; basal prolongation ends in two spines, inner nearly four times longer than outer and tip of inner reaches to base of lateral spine. Single lobed exopod as long as inner spine of basal prolongation, outer terminal margin bears 2 spines which are small and inferior to scale like part. Endopod longest and broadest lobe in uropod and extends beyond tip of lateral spine of telson.

Remarks: Larva agrees well with the description of *Lysierichthus duvaucelli.* It has been reported many times that under this name more than one species are mixed up. The present larva possesses both zoel and lateral spines. Hansen (1926) has remarked that the figure provided by Jurich (1904) shows the zoel spine anteriorly placed and the present larva exhibits the same feature. In other characters also the larva agrees well with the figures of Claus (1871) and Jurich (1904).

Distribution: Indo-Pacific.

Lysierichthus sp. A; n. sp. (Fig. 3 e, f, g)

Locality: Stn. 1423; Lat. 17°00′N; Long. 71°01′E; date 9–1–1963; time 0100 to 0330 hrs; D. haul 50 (H); D. stn. 2520 m; M. Net.

Measurements (mm): TL: 11.1; LR: 2.3; CL: 6.2; ABC: 2.9; PBC: 4.8; GBC: 5.6; LAS: 0.5; LPS: 2.2; LDS: 1.4; LLS: 1.1; LES: 0.5; LC: 1.3; BC: 0.7; LI: 1.2; LM: 1.7; LP: 2.5; BP: 0.2; LD: 2.3; LT: 1.8; BT: 2.8; DLA: 1.5.

Description: Larva very broad with large convex shaped carapace posteriorly extending till about 4th abdominal somite. Rostrum slightly longer than posterolateral spines with tip minutely serrated on both aspects and bears two minute ventral spinules. From the broadest midlateral region of carapace arises large well developed lateral spine which is 1/2 the rostrum. Anterolateral spines short and nearly 1/5 rostrum. Posterolaterals large; diverge from abdominal margin

and extend nearly till intermediate spines of telson. Posterolateral margin of carapace flexed laterally and bears a small spinule at the base of posterolateral spine. Dorsal spine large, well developed situated on elevated posteromedian region and is 4/7 as long as rostrum. Abdomen which is broad, kept folded beneath carapace due to preservation.

Antennular flagellum very short, does not extend to tip of rostrum; basal segment of peduncle longer while the other two of same size; second flagellum bears 5 groups of sensory hairs. First segment of antennal peduncle longer than second; endopod in bud condition. Raptorial claw slender, elongated; peduncle without any spine; propodus with only pectinations and without basal spines; dactylus without any free spines besides terminal. Abdomen very broad; posterolateral corners of first five somites end in short acute spines; fifth and sixth somites nearly 4 times broader than long and sixth without submedian spines.

Telson nearly 2/3 as long as broad; lateral, intermediate and submedian spines of same size; denticles one lateral, 2 intermediate and 32 submedian on each side. Uropod reaches to about 3/4 lateral spine; basal prolongation ends in two spines of which inner nearly 4 times longer than outer. Exopod in the form of a single lobe is as long as inner spine of basal prolongation and bears a single spine on the outer margin. Endopod longer and superior to exopod.

Remarks: This *Lysierichthus* larva is quite interesting in possessing a large convex carapace with well developed long rostrum, dorsal, lateral and posterolateral spines. Its closest relative is *Lysierichthus edwardsi*.

Coronid erichthus bituberculatus Hansen, 1895 (Fig. 3 h, i)

Coronid erichthus bituberculatus Hansen, 1895, p. 83; Lanchester, 1903, p. 458; Jurich, 1904, p. 394, Taf. XXVIII, fig. 3; Hansen, 1926, p. 41.
Erichthus armatus Claus, 1871, p. 25 (part).
Coronida sp. (*?trachurus*, V. Martens) Foxon, 1939, p. 264, fig. 4.

Locality: Stn. 1385; Lat. 14°25′N; Long. 70°00′E; Date 15–12–1962; Time 0335 to 0640 hrs; D. haul 100 (H); D. stn. 3580 m; M. net.

Measurements (mm): TL: 9.8; LR: 2.5; CL: 4.6; ABC: 2.3; PBC: 4.4; GBC: 4.4; LAS: 0.5; LPS: 2.3; LDS: 2.0; LES: 0.4; LC: 1.2; BC: 0.7; LI: 0.8; LM: 1.4; LP: 2.0; BP: 0.4; LD: 1.7; LT: 1.3; BT: 2.0; DLA : 0.9.

Description: Carapace broad, triangular; posteriorly covers till middle of third abdominal somite. Rostrum long, Pointed; longer than posterolateral; nearly 5 times longer than anterolateral; bears 4 minute ventral spinules with 4 buds inside cuticle; tip with minute ventral serrations. Dorsal spine long, well developed, situated on highly elevated posteromedian region of carapace. Posterolaterals nearly 4½ times longer than anterolateral; diverge greatly and reach till lateral spines of telson. Lateral margin of carapace with a spinule on the flexed posterolateral corner.

Antennular flagellum does not extend to tip of rostrum; second flagellum bears 5 groups of hairs. Cornea nearly 1/2 as broad as long. Protopod of raptorial claw without spine; propodus bears short broad basal spine and pectinations; dactylus without any free spines besides terminal. Abdominal somites broad; 4th and 5th more than three times, 6th nearly 4 times broader than long which bears

submedian spines and anterolateral corners not spinous. Posterolateral corners of 3rd to 5th somites end in small spines.

Telson nearly 4/9 broader than long; submedian spines long; denticles one lateral, two intermediate and 13 submedian which have varying number of serrations inbetween. Uropod reaches till 3/4 lateral spine; outer spine of basal prolongation nearly 4 times longer than inner and bears bulging on inner basal margin. Exopod longer than endopod; extends till tip of outer spine of basal prolongation; bears a large outer spine. Tip of endopod extends beyond inner spine of basal prolongation.

Remarks: Larva resembles well with the figure given by Claus (1871) particularly in the elevated carapace, long rostrum with ventral spinules and well developed dorsal and posterolateral spines. In the figure given by Jurich (1904) the dorsal spine is short but in other characters the larva agrees well with the figure. The larva described by Foxon (1939) varies by the absence of ventral spinules on rostrum.

Distribution: Indian North Equatorial current, Philippines, Gulf of Aden, Arabian Sea.

Coronideichthus sp. A; n. sp. (Fig. 3 j, k)

Locality: Stn. 1409; Lat. 16°00′N: Long. 72°43′ E; Date 6–1–1963; Time 2305 hrs; D. haul: Surface (H); D. stn. 125 m; M. net.

Measurements (mm): TL: 9.00; LR: 2.01; CL: 3.01; ABC: 1.4; PBC: 2.54; GBC: 2.61; LAS: 0.4; LPS: 1.74; LDS: 0.8; LES: 0.26; LC: 0.93; BC: 0.67; LI: 0.6; LM: 1.47; LP: 1.67; BP: 0.46; LD: 1.4; LT: 1.27; BT: 1.6; DLA: 0.8.

Description: Larva elongate, slightly opaque. Carapace broad and triangular broadest slightly above posterolateral corners with long rostrum and well developed posterolateral spines. Carapace covers all thoracic segment. From base of dorsal spine a ridge runs till base of rostrum. Rostrum long, well developed, 1/5 times longer than posterolateral with 4 ventral spinules of which 2nd is largest and tip bears minute ventral serrations. Anterolaterals well developed, pointed, nearly 1/2 the dorsal spine and 1/4 the posterolaterals. On elevated posteromedian region of carapace well developed dorsal spine present which is slightly less than 1/2 the posterolaterals. Posterolaterals well developed, diverge greatly from margin of abdominal somites and extend till middle of 3rd abdominal somite. Carapace with posterolateral margins flexed laterally with a spinule at the base of posterolateral spine.

Tip of antennular flagellum extends nearly till 2/3 distance and peduncle till little more than 1/4 distance below rostrum. Second and third segment of peduncle of same length while first nearly twice their length. Second antennular flagellum bears 4 groups of sensory hairs. Eyes large with short stalks, corneal portion longer than broad. A small frontal spine present. Second segment of antennal peduncle as long as first but with an anterolateral spine. Endopodite with basal longer segment and tip of terminal extends till 1/2 of exopodite. Second maxilliped without a spinule on protopodite; propodus of normal shape with one basal spine and many pectinations; dactylus without free spines besides the terminal. Propodus of 3rd & 4th maxillipeds of normal shape. Five epipodites present of which 2nd is largest. Walking legs stumpy and biramous. Abdominal somites broad and well developed of which the first 4 are of same length and breadth, the breadth

being 3 times the length. Fifth segment is narrower than the preceding four but is nearly 3 times broader than long. Last segment nearly 4 times broader than long, with prominent submedian spines. Posterolateral corners of first 5 segments end in acute spines which increase in size posteriorwards. Anterolateral corner of last somite does not end as a spine but as a ventrally directed projection.

Telson 3/4 as long as broad, with long and well developed submedian spines. On lateral margin; only a single large spine which is as long as submedian present with 3 denticles between it and submedian. Submedian denticles number 13 on each side. Uropods rudimentary, do not reach till middle of telson. Basal prolongation ends in two spines of which inner more than 4 times longer than outer. Tip of inner extends till tip of exopodite. Outer margin of exopodite bears a single spine which extends to tip of scale like part. Endopodite slightly longer than basal prolongation and exopodite.

Remarks: The larva resembles the illustration of *Coronideriehthus bituberculatus* by Jurich (1904). It varies in some important characters like the carapace extending only till last thoracic somite; the posterolateral spines of carapace extending till middle of 3rd abdominal somite and long marginal spines on telson.

Alima hieroglyphica (Kemp), 1911 (Fig. 4 a, b)

Squilla (Alima) hieroglyphica Alikunhi, 1944, p. 237, figs. 1 a–d; 1958, p. 135, fig. 14.

Squilla hieroglyphica Alikunhi, 1947, p. 829; 1952, p. 264, fig. 8; 1967, p. 878, figs 109–113.

Locality: Stn. 1231; Lat. 07°33′N; Long. 73°07′E; Date 5–10–1962; Time 0110 to 0320 hrs; D. haul 100 (H); D. stn. 1780 m; M. net.

Measurements (mm): TL: 22.7; LR: 3.0; CL: 9.3; ABC: 3.0; PBC: 5.0; GBC: 5.5; LAS: 0.9; LPS: 2.9; LES: 1.0; LC: 1.5; BC: 1.4; LI: 3.3; LM: 3.5; LP: 4.6; BP: 1.2; LD: 3.2; LT: 3.1; BT: 2.9; DLA: 6.2.

Description: Larva in general appearance looks elongated and fairly broad. Carapace large, broad; anterior breadth 3/5 the posterior breadth; greatest breadth at 3rd thoracic somite; posteriorly extends till 1/4 of seventh thoracic somite. Rostrum slender elongated; without ventral spinules and slightly longer than posterolateral spines. On the lateral margin of carapace there are 3 spinules; first one small near base of anterolateral spine; second at the level of junction between 5th and 6th thoracic somites and last near posterolateral corner. Anterolateral spines pointed and 1/3 the posterolaterals. Posterolateral spines have ventral spinules at 1/4 distance from base; diverge slightly at tip from abdominal margin and extend till end of 2nd abdominal somite. Dorsal spine more than 2/3 the anterolaterals is situated on elevated posteromedian region.

Antennular peduncle does not extend beyond tip of rostrum; second and third segments of same length while first is slightly longer; second flagellum bears 11 groups of sensory hairs. Peduncular segments of antenna of same length; first segment of endopod twice as long as second; endopodal tip reaches to middle of exopod. Eye stalk 3/4 as long as cornea. Antennular somite with a small frontal spine. Labral tip with small blunt projection. Protopod of raptorial claw with a ventrally directed terminal spine; propodus relatively broad with three basal spines of which first is longest and pectinations on inner margin; dactylus without free

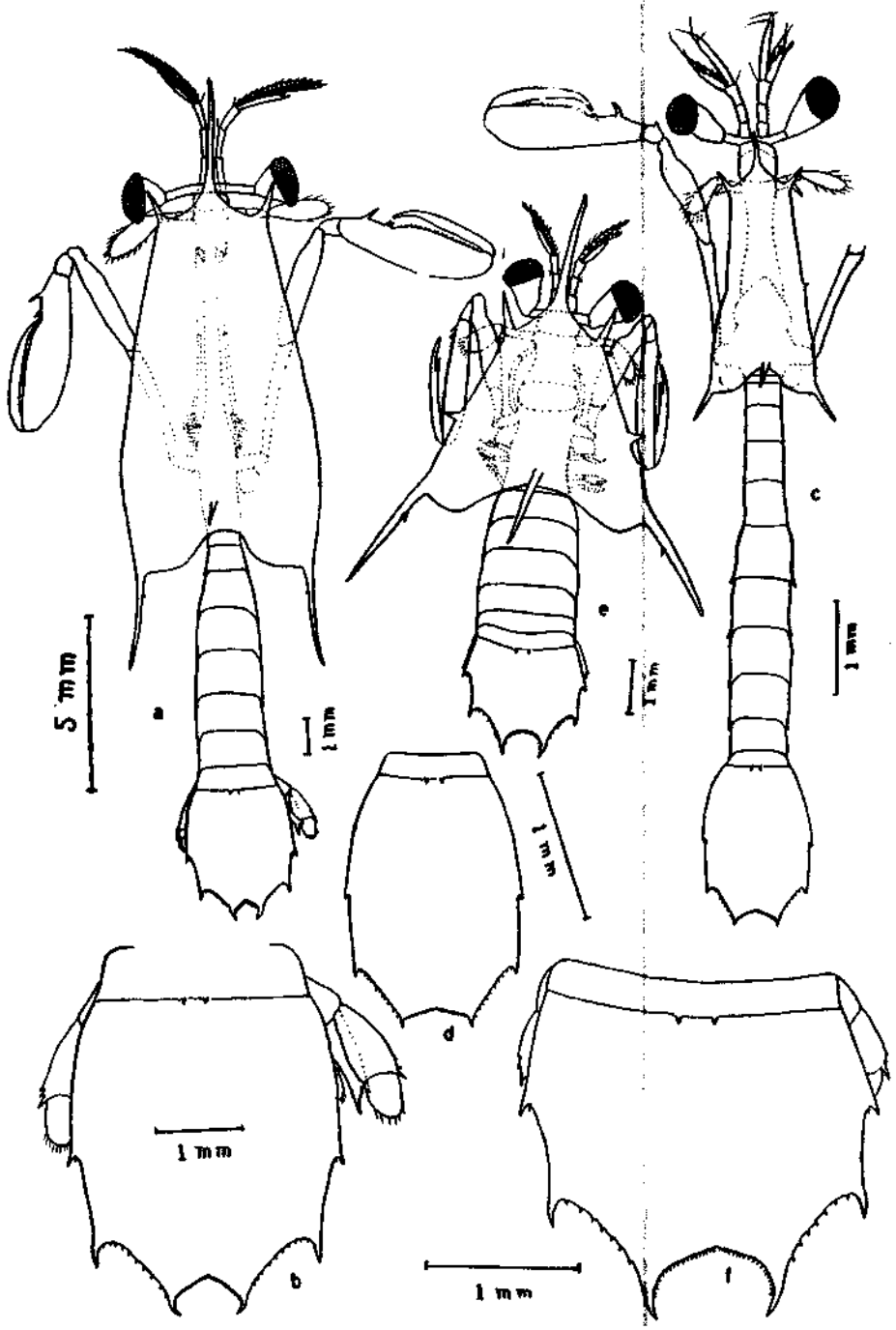

Fig. 4: a, b. *Alima hieroglyphica*; c, d. *Alima* sp. A, n. sp. and e, f. *Clorida latertlli*.

spines besides terminal. Other maxillipeds have developed. Last three thoracic somites increase in length posteriorwards; bear bilobed appendages; length of last somite slightly less than 2/3 of its breadth. Posterolateral corners of first 5 abdominal somites end in acute spines; 4th somite 4/7 as long as broad; sixth 1/3 as long as broad and bears submedian spines and ventrally directed anterolateralspines.

Telson slightly longer than broad; intermediate, submedian spines well developed; denticles one lateral, 10 intermediate and 16 submedians on each side. Uropods reach till lateral spines of telson; basal prolongation ends in two spines, inner twice as long as outer; basal outer margin of inner spine with a slight bulging; endopod reaches to level of outer spine of basal prolongation; basal segment of exopod with 3 outer terminal spines.

Remarks: Alikunhi (1944) reported a larva of 30 mm with 8+3 spinules on lateral margin of carapace but present specimen has only 3 spinules. He reported 11 intermediate and 18 submedian denticles on telson while present specimen has 10 and 16 respectively. In other characters larva agrees well with the description provided by Alikunhi (1944). In a larva from Mahanadi Estuary, Alikunhi (1958) reported 14 groups of sensory hairs on second antennular flagellum.

Distribution: Bay of Bengal, Arabian Sea.

Alima sp. A; n. sp. (Fig. 4 c, d)

Locality: Stn. 1258; Lat. 04°00′N; Long: 74°12′E; Date 13-10-1962; Time 1020 to 1215 hrs; D. haul 100 (H); D. stn. 2530 m; M. net.

Measurements (mm): TL: 8.2; LR: 0.3; CL: 2.0; ABC: 0.6; PBC: 1.0; GBC: 1.0; LAS: 0.2; LPS: 0.3; LES: 0.2; LC: 0.8; BC: 0.5; LI: 1.3; LM: 1.2; LP: 1.8; BP: 0.5; LD: 1.2; LT: 1.5; BT: 1.2; DLA: 1.4.

Description: Larva in general appearance looks narrow and elongated. Carapace also very narrow and elongated; anterior breadth slightly less than 2/3 greatest breadth which is slightly in advance of posterolateral corners; posteriorly covers only three thoracic somites. Rostrum very small, slightly extends beyond ophthalmic somite; little shorter than posterolateral spines; without ventral spinules and extends nearly to middle of first segment of antennular peduncle. Anterolateral spines broad and are 3/4 as long as rostrum. Dorsal spine long, well developed; as long as anterolaterals and situated on the elevated posteromedian region of carapace. Posterolateral spines short; diverge from the margin of thoracic somites; extend till middle of 6th thoracic somite and bear large well developed ventral spinules near the junction with carapace. Lateral margin with a single spinule at the level of labrum.

First segment of antennular peduncle longest and second shortest; second flagellum bears 4 groups of sensory hairs. Ophthalmic somite large, greatly elongated; about 5/7 as long as cornea. Eyes large, well developed with short stalks. Second segment of antennal peduncle longer than first and endopod reaches to middle of scale. Frontal spine large and well developed. Tip of labrum without any projection. Protopod of raptorial claw with a large ventral distal spinule and a dorsal blunt spine; propodus bears 3 basal spines of which first is largest and many pectinations on the inner margin; dactylus without free spines besides terminal. Other thoracic appendages rundimentary. Last four thoracic somites increase in

length posteriorwards; 6th somite slightly broader than long; 7th slightly longer than broad; 8th nearly 4/5 as broad as long. First three abdominal somites of same length and slightly broader than long; fourth 5/6 as long as broad; fifth 1½ times broader than long; posterolateral corners of first 5 somites end in acute spines Last somite more than 2½ times broader than long and bears submedian spines.

Telson nearly 2/3 as broad as long; intermediate spines larger than submedian; denticles number one lateral, 8 intermediate on one side and 10 on other with minute 4-5 denticles in between. Submedian denticles 10 on each side with nearly 5 minute denticles inbetween. Uropods small, bilobed without greater differentiation.

Remarks: Larva resembles *Alima gracillima* Borradaile, in having an elongated body, large ophthalmic somite, narrow carapace and the exposure of more than 3 thoracic somites. *A. gracillima* differs from the present larva in rostrum extending only till 1/3 distance on ocular somite; posterolateral spines very minute; dorsal spine not prominent; telson shape different with lateral spines considerably posteriorly situated. *Alima hyalina* also resembles present larva but differs in possessing a long rostrum extending beyond second segment of antennular peduncle; ocular segment normal and not very elongated; labrum with anterior spine; short dorsal spine; many spinules on lateral margin of carapace and the shape of telson. *Alima lebouri* Gurney differs from the present larva in possessing a long rostrum; not very large ocular somite and a short dorsal spine.

Clorida latreilli Eydoux and Souleyet, 1841 (Fig. 4 e, f)

Alimerichthus a Tattersall, 1906, p. 177, figs. 27–29.

Squilla microphthalma Alikunhi and Aiyar, 1942, p. 56–58, Pl. 1, 2.

Squilla latreillei Alikunhi, 1952, p. 273, figs. 11–13; 1958, p. 124; 1967 p. 883, figs. 132–145.

Locality: Stn. 971; Lat. 17°20′N; Long. 72°51′E; Date 13–5–1962; Time 0820 to 0835 hrs; D. haul 50–0 (V); D. stn. 56 m.

Measurements (mm): TL: 10.1; LR: 2.0; CL: 3.6; ABC: 1.9; PBC: 4.4; GBC: PBC; LDS: 1.3; LAS: 0.6; LPS: 2.1; LES: 0.4; LC: 1.1; BC: 0.8; LI: 0.8; LM: 2.0; LP: 2.3; BP: 0.4; LD: 2.0; LT: 1.4; BT: 2.2; DLA: 0.8.

Description: Larva in general appearance looks short and broad. Carapace nearly triangular; extends till middle of 8th thoracic somite and bears 4 spinules on lateral margin of which first one small directed ventrolaterally situated at base of anterolateral spine; second large pointed, well developed, directed laterally, situated below midlateral margin and last 2 spinules small directed ventrally situated near posterolateral spine. Dorsal median carina on carapace present running from base of rostrum to base of dorsal spine. Rostrum broad, well developed; nearly as long as posterolateral spines; tip serrated and bears two ventral spinules of which one large and other minute. Anterolateral spines pointed; 2/7 as long as posterolaterals and little less than half of dorsal spine. Dorsal spine very well developed, large, prominent and situated on the elevated posteromedian region of carapace. Posterolaterals well developed with a ventral spinule 1/4 distance from base; diverge greatly from abdominal margin and extend till about 4th to 5th abdominal somite.

Antennular peduncle slightly inferior to half the length of rostrum; second and third segments of same length while first is longer; second flagellum bears 4 groups of sensory hairs. Eyes fairly large with short stalks and cornea is longer than broad. Protopod of raptorial claw without spinule; propodus bears 3 basal spines and many pectinations; dactylus bears one free spine besides terminal. Last 3 thoracic somites very much broader than long and bear bilobed appendages. Abdominal somites relatively broad; second somite nearly 3 times as broad as long; posterolateral corners of first 5 somites end in spines; sixth somite nearly 8 times broader than long with a pair of submedian spines and anterolateral corners produced into ventrally directed stout spines.

Telson nearly 2/3 as long as broad; broadest near lateral spines; intermediate, submedian spines well developed; denticles number one lateral, 7 intermediate on each side. Submedian denticles of unequal size 19 on one side and 20 on other. Uropods extend halfway between lateral and intermediate spines; basal segment bears 3 spines; inner spine of basal prolongation nearly twice as long as the outer; slightly inferior to tip of endopod and has a smooth outer margin. Exopod extends beyond other lobes of uropod.

Remarks: Larva agrees well with earlier descriptions in most characters. In a 12.6 mm long larva Alikunhi (1952) reported 3 spinules on lateral margin of carapace; first situated at base of anterolateral spine and other two situated near posterolateral corner while in the present specimen there are 4 spinules; first near anterolateral; second large, laterally directed and remaining two situated near posterolateral corner. Even though the larva resembles the larva of *Anchisquilla fasciata* (de Haan) it is easily distinguished by the presence of 4 groups of sensory hairs on second flagellum of antennule.

Distribution: Sri Lanka, Madras.

Harpiosquilla harpax (de Haan) 1844 (Fig. 5 a, b)

Squilla raphidea Alikunhi, 1952, p. 267 (Atypical type).

Squilla harpax (?) Alikunhi, 1958, p. 132, fig. 13.

Harpiosquilla raphidea Alikunhi, 1967, p. 894, figs 114–125.

Locality: Stn. 1031; Lat. 06° 53′N; Long. 77° 30′E; Date 13–6–1962; Time 0215 to 0410 hrs; D. haul 200-0 (V); D. stn. 1800 m.

Measurements (mm): TL: 14.7; LR: 2.5; CL: 6.3; ABC: 3.5; PBC: 6.3; GBC: PBC; LAS: 1.0; LPS: 2.7; LES: 1.0; LC: 1.5; BC: 1.2; LI: 1.3; LM: 3.0; LP: 3.7; BP: 0.8; LD: 3.0; LT: 2.5; BT: 3.4; DLA: 2.3.

Description: Larva in general appearance looks short, broad with a large broad carapace and relatively stout abdomen. Carapace extends till middle of first abdominal somite and on lateral margin bears 3+3 spinules; first near base of anterolateral spine directed ventrally, second situated little posterior but of same size and directed ventrally; third large and stout situated midlaterally and directed laterally, remaining three spinules situated posterolaterally and directed ventrally with the distance between them almost same. Rostrum welll developed, slightly shorter than posterolaterals and without ventral spinules. Anterolateral spines as long as dorsal spine and 2/5 as long as posterolaterals. Posterolateral spines

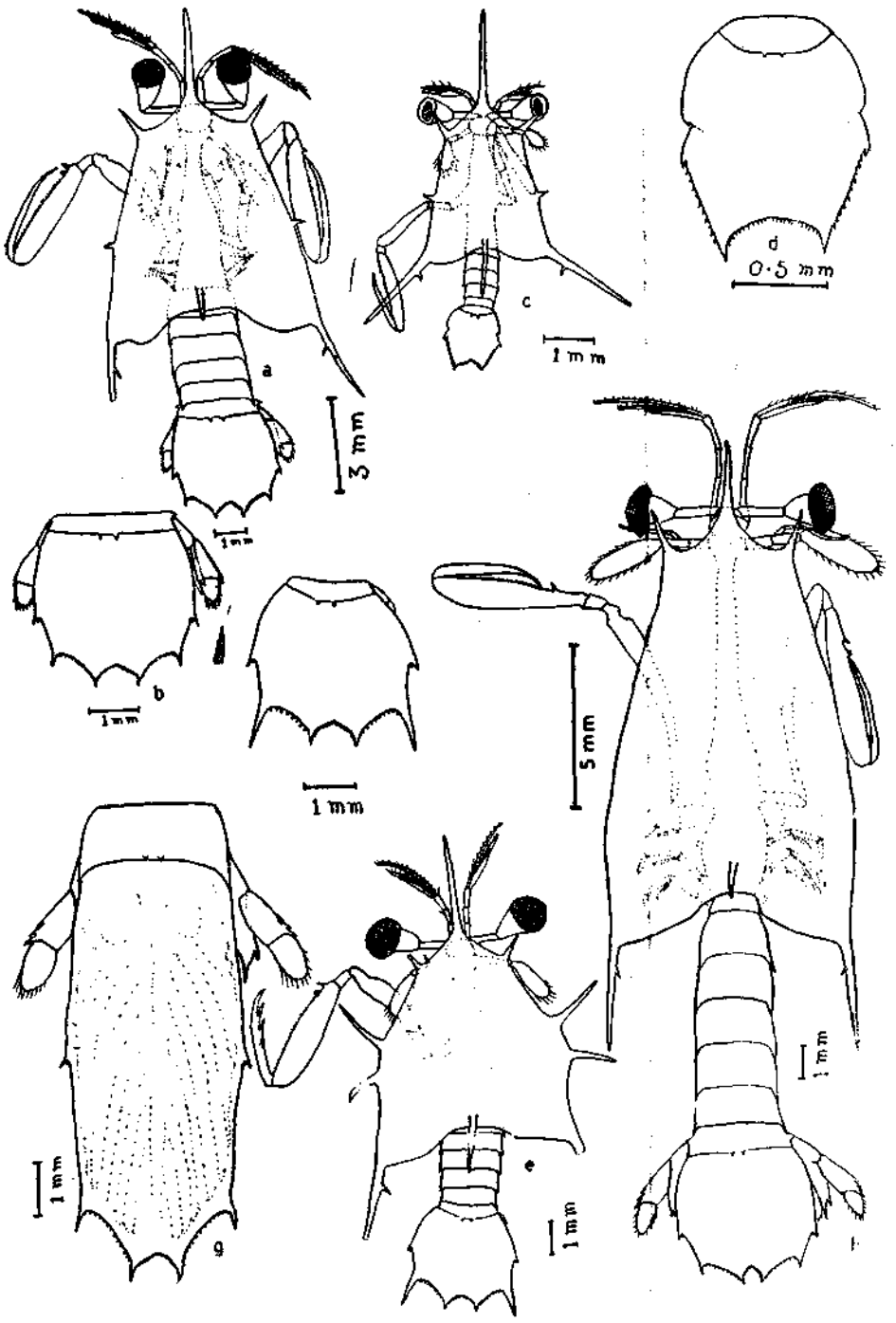

Fig. 5: a, b. *Harpiosquilla harpax*; c, d. *Harpiosquilla* sp. A ("*Alimerichthus*" type) n. sp.; e, f. *Alimerichthus* sp. A, n. sp; g. *Oratosquilla gonypetes* and h. *O. nepa.*

reach till 6th abdominal somite with the ventral spinules well developed and situated little more than 1/3 distance from base.

Antennular peduncle does not extend to rostrum; first segment of peduncle longest; second and third of same size; second flagellum bears 7 groups of sensory hairs. Endopod of antenna reaches till about middle of scale; first segment of endopod twice as long as second. Raptorial claw without any spine on basal segment; propodus with 3 basal spines and many pectinations; dactylus without any free spines besides terminal. Other maxillipeds have developed. Walking legs biramous. Thoracic somites increase in length. Abdominal somites broader than thoracic; posterolateral corners of first five somites end in acute spines and anterolateral corners of 6th somite end in blunt stout spines directed ventrolaterally. Second abdominal somite three times as broad as long. Submedian spines present on sixth somite.

Telson 2/3 as long as broad; lateral, intermediate and submedian spines well developed; denticles number one lateral, 12 intermediate on one side and 13 on other and 18 submedian on one side and 22 on the other. Uropods reach till base of lateral spines; basal prolongation ends in two spines; inner twice as long as outer and tip of inner does not extend to endopod; outer terminal margin of basal segment of exopod bears two spines of unequal size.

Remarks: The larva differs in the following characters from the 18.2 mm long larva described by Alikunhi (1952). He reported 4+3 marginal spinules on carapace, of which first 2 directed ventrally; third ventrolaterally and fourth laterally while in the present specimen there are 3+3 spinules of which the first 2 are directed ventrally and third laterally. He reported the rostrum with a weak ventral spinule which is absent in present material. Posterolateral spines extend till 4th abdominal somite in the larva from Madras but in the present material extends till 6th somite. Out of 10 groups of hairs on second antennular flagellum reported by him, the present specimen has only 7. Number of denticles on telson 1, 11, and 21 but the present specimen has 1, 12 & 13 and 18 & 22.

Alikunhi (1958) reported that the rostrum bears 2 ventral spinules; posterolateral spines reach till 4th abdominal somite; 2nd antennular flagellum with 5 groups of sensory hairs and denticles on telson 1 lateral, 10 intermediate and 13 submedian.

Distribution: Bay of Bengal.

Harpiosquilla sp. A ("*Alimerichthus*" type) n. sp. (Fig. 5 c, d)

Locality: Stn. 1103; Lat. 12°20′N; Long. 74°58′E; Date 18-7-1962; Time 0600 to 0610 hrs; D. haul 0 (H); D. stn. 52 m; M. net.

Measurements (mm): TL: 7.0; LR: 1.9; CL: 2.7; ABC: 1.5; PBC: 2.4; GBC: PBC; LAS: 0.5; LPS: 1.9; LDS: 1.9; LES: 0.5; LC: 0.7; BC: 0.6; LI: 0.5; LM: 1.2; LP: 1.6; BP: 0.26; LD: 1.2; LT: 1.2; BT: 1.0; DLA: 0.9.

Description: Larva broad, short with long rostrum, postero-lateral and dorsal spine. Carapace nearly triangular; anterior breadth 2/3 of posterior breadth and posteriorly extends till first abdominal somite. Rostrum slender, long; nearly as long as posterolaterals, more than 3 times longer than anterolaterals and does

not bear any ventral spinules. Anterolaterals pointed; 2/7 as long as posterolaterals and dorsal spine which is long, well developed nearly as long as rostrum and posterolaterals and situated on highly elevated posteromedian region of carapace from which a median dorsal carina runs to base of rostrum. Posterolaterals long, well developed; diverge greatly from abdominal margin with ventral spinules situated 1/4 distance from base and extend nearly to middle of telson. Lateral margin of carapace bears 6 spinules; first 2 situated near anterolateral and directed ventrally; third is large situated on midlateral margin and directed laterally; the remaining 3 situated on posterolateral corner directed ventrally of which 2 are well developed and third is minute.

Antennular flagellum extends little beyond half of rostrum while peduncle extends to about 1/4 distance; first segment of peduncle longest and second shortest of the three; second flagellum bears 4 groups of sensory hairs. Peduncular segments of antenna are of same size and endopod in bud condition. Eyes large and corneal portion longer than broad. Protopod of raptorial claw without spinule; propodus bears two basal spines and many pectinations; dactylus without free spines besides terminal. Other maxillipeds rudimentary. Abdominal somites broader than thoracic. Last somite demarcated and it bears a pair of submedian spines. Posterolateral corners of abdominal somites subacutely pointed.

Telson longer than broad; lateral, intermediate and submedian spines rather small; denticles number 10 intermediate and 12 submedians on each side are of two sizes, the larger and smaller alternating with each other. Uropods rudimentary. Due to preservation the abdomen and telson are folded.

Remarks: This Alimerichthus type of larva closely resembles *Squilla harpax* (?) Alikunhi (1958) but differs in the following characters. In *S. harpax*, rostrum bears 2 ventral spinules; posterolateral spines extend till 4th abdominal somite; the lateral margin of carapace bears 7 spinules. Tip of antennular flagella reaches nearly to tip of rostrum and second flagellum bears 5 groups of hairs in *S. harpax* while the tip of flagella extends little beyond 1/2 of rostrum and 2nd flagellum bears 4 groups of sensory hairs in the present larva.

Larva differs from *Harpiosquilla harpax* of present studies in the following characters. Dorsal spine as long as anterolateral spine in *H. harpax* but nearly as long as rostrum and posterolateral in the present larva. Length of antennular peduncle markedly different, second antennular flagellum bears 7 groups of hairs in *H. harpax* while only 4 in the present one. Intermediate denticles on telson number 12 & 13 and submedian 18 & 22 in *H. harpax*.

Alimerichthus sp. A; n. sp. (Fig. 5 e, f)

Locality: Stn. 1415; Lat. 16°00′N; Long. 70°40′E; Date 7-1-1963; Time 1940 to 2225 hrs; D. haul 50 (H); D. stn. 3350 m; M. net.

Measurements (mm): TL: 13.6; LR: 3.0; CL: 5.5; ABC: 2.6; PBC: 5.7; GBC: 5.7; LAS: 0.8; LPS: Broken (2.5); LDS: 3.3; LES: 0.9; LC: 1.6; BC: 1.3; LI: 1.4; LM: 2.6; LP: 3.6; BP: 0.9; LD: 2.9; LT: 2.1; BT: 3.1; DLA: 1.8; Length of 1st lateral spine 1.8; Length of 2nd lateral spine: 1.3.

Description: In general appearance the larva is short, broad with long rostrum, posterolateral, dorsal and lateral spines. Carpace broad, triangular, anterior

breadth little more than 2/5 the posterior breadth; breadth at midlateral region same as posterior breadth and posteriorly extends till middle of first abdominal somite. Rostrum slender, elongated; slightly shorter than dorsal spine; nearly four times longer than anterolaterals and bears 3 ventral spinules. Anterolaterals slender, pointed and are nearly 1/2 the first lateral spines. Both posterolaterals broken in the present specimen; on one side 3/4 of the spine present which extends to lateral spine of telson and bears a well developed ventral spinule 1/4 the distance from base. Dorsal spine stout, long, well developed situated on highly elevated posteromedian region from the base of which a carina runs towards rostrum. On the anterolateral margin of carapace near base of anterolateral spine, a small ventrally directed spine present; on midlateral margin two long, well developed laterally directed spines present of which the first is little more than 1/2 the rostrum and second little less than 1/2 the rostrum. Posterolateral margin slightly flexed ventrally and bears 6 spinules.

Antennular flagellum extends beyond rostrum; peduncle extends till middle; first segment of peduncle longest and second shortest of the three. Second flagellum bears 6 groups of sensory hairs. In antennal peduncle second segment longer than first. Frontal spine absent. Labrum smooth. Protopod of raptorial claw without spinule; propodus with three basal spines and many pectinations; dactylus with 2 free spines besides terminal and one more could be distinguished beneath its skin. Other maxillipeds and walking legs developed. Abdominal somites short, broad; posterolateral corners end in sub-acute spines; 3rd to 5th somites nearly 1/3 as long as broad; 6th somite nearly 1/5 as long as broad and bears dorsal submedian spines.

Telson little more than 3/5 as long as broad; intermediate spines extraodinarily large and well developed; three times longer than submedians. Denticles number one lateral; 8 intermediate on one side and 9 on other; 19 submedians on one side and 20 on the other. Urpood extends nearly to 3/4 distance to lateral spine; basal prolongation ends in two spines of which inner slightly longer than outer and endopod extends to inner spine. Exopod bears 3 outer spines; scale surpasses inner spine of basal prolongation.

Remarks: The larva exhibits many interesting characters and it does not seem to have been described before. The extraordinarily long, well developed laterally directed spines are unique and even rostrum, dorsal and posterolateral spines are very long and well developed. Another interesting feature is the extra-ordinarily large intermediate spines on telson.

Oratosquilla gonypetes (Kemp) 1911, (Fig. 5 g, 6 a)

Squilla (Alima) sp. (*"nepa"* group) Foxon, 1939, p. 256, fig. 1.
Squilla gonypetes Alikunhi, 1951, p. 262, fig. 7; 1967, p. 871, figs. 90–100.

Locality: Stn. 1235; Lat. 06° 38′N; Long. 71°21′E; Date:5–10–1962. Time 2120 to 0025 hrs; D. haul 0 (H); D. stn. 3920 m; M. net.

Measurements (mm): TL: 46.0; LR: 4.5; CL: 15.8; ABC: 3.5; PBC: 5.4; GBC: 5.9; LAS: 1.3; LPS: 2.4; LES: 1.4; LC: 1.4; BC: 1.4; LI: 5.6; LM: 5.2; LP: 5.6; BP: 0.8; LD: 3.6; LT: 7.2; BT: 3.3; DLA: 12.0.

Description: Larva in general appearance looks very slender and highly elongated. Carapace very narrow, long; extends posteriorly till anterior part of

6th thoracic somite; greatest breadth in the region of labrum; anterior breadth about 3/5 greatest breadth. Rostrum narrow, elongated without ventral spinules and 3½ times longer than anterolateral spines. Anterolaterals 1/2 as long as posterolaterals. Dorsal spine very small; 1/4 the anterolaterals and situated on elevated posteromedian region. Posterolateral spine short; (one side broken in present specimen); bears a small ventral spinule 1/3 distance from base; runs almost parallel to body and reaches till middle of last thoracic somite. Lateral margin of carapace with 9+2 spinules of same size; 9th spinule at the level of labral tip with not much gap between 9th and 10th spinule.

Tip of antennular peduncle does not extend to tip of rostrum; first segment is longest while second and third of same size; second flagellum with 12 groups of sensory hairs. Eyes large; cornea as long as broad. Endopod of antenna does not extend to tip of scale; first segment nearly twice as long as second. Protopod of raptorial claw without any spine; other podites highly elongated; propodus bears 3 basal spines of which first largest, second and third situated at equidistance on either side of median axis; pectinations on propodus present; dactylus without free spines besides terminal. Other maxillipeds developed. Frontal spine small; situated on antennular segment. Small spine present on tip of labrum. Last 3 thoracic somites increase in length posteroirwards; last one 2/3 as broad as long. First 5 abdominal somites of same length and longer than broad; posterolateral corners end in acute spines. Sixth somite 3/8 as long as broad; bears a pair of submedian spines and anterolateral corners produced into ventrolaterally directed blunt spines.

Telson more than twice as long as broad; intermediate and submedian spines longer than laterals; denticles number 1 lateral, 13 intermediate and 17 submedian on one side and 18 on other. Uropod does not extend to lateral spine of telson; basal prolongation ends in two spines, the inner, with a slight bulging on its basal outer margin, is twice as large as outer. Proximal segment of exopod with 2 spines on outer terminal margin. Present specimen about to moult and inside cuticle of dactylus 5 spines could be noticed besides terminal.

Remarks: Alikunhi (1952) reported a larva measuring 27.0 mm in the final pelagic stage but the present larva is very long measuring 46.0 mm. According to his description the posterolateral spines reach till hind border of first abdominal somite but in present specimen they reach till middle of last thoracic somite. He reported 6+2 or 3 spinules on lateral margin of carapace; protopod of raptorial claw with a spine; 9 intermediate and 13 submedian denticles on telson, and the tip of exopod of uropod extends beyond lateral spine of telson. In other characters the specimen agrees well. The larva described by Foxon (1939) as *Squilla (Alima)* sp. (*"nepa"* group) appears to belong to *O. gonypetes*.

Distribution: Red Sea, Gulf of Aden, Gulf of Oman, Arabian Sea, Maldive area, Madras.

Oratosquilla nepa (Latreille), 1825 (Fig. 5 h, 7 a)

Squilla nepa Alikunhi and Aiyar, 1942, p. 56, pl. 5 & 6; 1952, p. 245, fig. 1. Fourmanoir, 1953, p. 153–157, figs. 1–7; Alikunhi, 1958, p. 141; 1967, p. 826–836, figs. 1–22.

Locality: Stn. 1039; Lat. 08°32′N; Long 76° 49′ E; Date 14-6-1952; Time 0825 to 0845 hrs; D. haul 28-0 (V) ; D. stn. 34 m.

Measurements (mm): TL: 25.4; LR: 2.2; CL: 11.6; ABC: 4.0; PBC: 7.5; GBC: 7.7; LAS: 1.3; LPS: 3.5; LES: 1.3; LC: 1.5; BC: 1.6; LI: 3.0; LM: 3.8; LP: 4.9; BP: 0.9; LD: 3.4; LT: 3.6; BT: 4.2; DLA: 6.8.

Description: Carapace large, broad; extends posteriorly till middle of last thoracic somite. Rostrum short; 3/5 as long as posterolateral; extends little beyond middle segment of antennular peduncle and does not bear ventral spinules. Lateral margin of carapace with 8+4 spines. Anterolateral spines half as long as rostrum. Posterolaterals diverge slightly; bear a well developed ventral spinule at nearly 1/3 distance and reach till anterior part of 4th abdominal somite. Dorsal spine shorter than anterolateral.

Second antennular flagellum bears 10 groups of hairs. Endopod of antenna reaches to middle of scale. Protopod of raptorial claw with a distal ventral spine; propodus bears 3 basal spines and pectinations; dactylus without free spines besides terminal. Seventh thoracic somite 4/7 as long as broad. First 3 abdominal somites increase and last 3 decrease in length; fifth somite twice as broad as long; posterolateral corners of first 5 produced into acute spines. Last somite with submedian spines and anterolateral corners produced into laterally directed spines.

Telson 3/4 as long as broad; lateral, intermediate and submedian spines of same size; denticles number one lateral, 9 intermediate and 14 submedian on one side and 16 on other. Uropods reach halfway between lateral and intermediate spines; inner spine of basal prolongation twice as long as outer and tip surpasses endopod. Outer margin of proximal segment ofexopod bears 4 spines which increase in length and 3 buds inside cuticle.

Remarks: Larva agrees well with the description provided by Alikunhi (1952). In general appearance larva resembles *Alima dilatata* (Hansen) and *Alima subtruncata* (Jurich) but the shape of telson in the latter is entirely different as the intermediate spines of telson are in level with the submedian. Larva is very common in seas around India and large swarms are being caught by the shore-sienes in the Vizhinjam region near Trivandrum during December–January every year.

Distribution: Madras, Madagascar.

Oratosquilla woodmasoni (Kemp) 1911, (Fig. 6 b, 7 b)

Alima emarginata Claus, 1871, (?), Pl. VIII,fig. 33; Komai and Tung, 1929, Pl. V. figs. 16–22, Pl. VI, figs 1–15; Pl. VII, figs 1–3; Foxon, 1932; Gurney, 1946, p. 158.

Alima trivialis Hansen, 1895, Pl. VIII, fig. 11.

Squilla woodmasoni Nair, 1941, p. 543–576, pls 29–30, figs. 1–32; Alikunhi and Aiyar, 1942, p. 56–58, Pl. 9 & 10; Alikunhi, 1952, p. 251, fig. 3; 1967, p. 847, figs. 40–58.

Locality: Stn; 1245; Lat. 02°00'N; Long. 71°00'E; Date 7–10–1962; Time 2330 to 0230 hrs; D. haul 0 (H); D. stn. 3840 m; M. net.

Measurements (mm): TL: 42.3; LR: 4.2; CL: 17.4; ABC: 5.3; PBC: 8.5; GBC: 9.7; LAS: 1.5; LPS: 2.8; LES: 2.0; LC : 2.2; BC: 1.8; LI: 5.7; LM: 6.0; LP: 8.0; BP: 1.9; LD: 5.8; LT: 5.7; BT. 5.7; DLA: 11.4.

Description: Larva in general appearance looks fairly broad and elongated. Carapace large, broad, well developed; broadest in the third maxilliped region which is more than 1½ times the anterior breadth; posteriorly extends till 6th thoracic

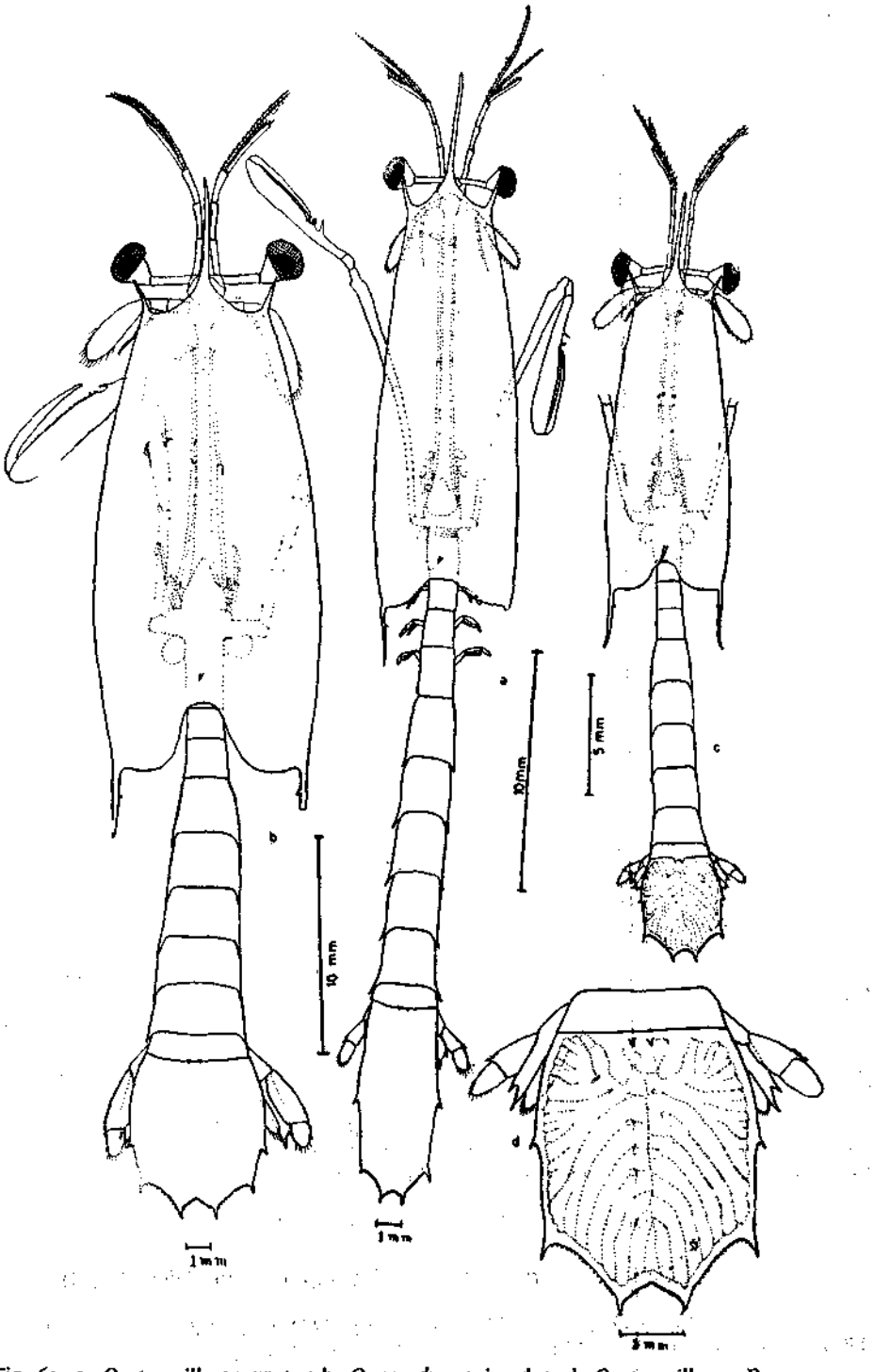

Fig. 6: a. *Oratosquilla gonypetes*; b. *O. woodmasoni* and c, d. *Oratosquilla* sp. B, n. sp.

somite. Rostrum relatively slender for a large carapace; without ventral spinules; does not extend to antennular peduncle and nearly 3 times the anterolateral spines. Dorsal spine small; less than 1/3 the anterolaterals and situated on the elevated posteromedian region. Posterolaterals short, stout; twice as long as anterolaterals; with ventral spinules at 1/3 distance; run parallel to body and extend till posterior margin of first abdominal somite. Lateral margin of carapace with 12 + 5 spinules; first fairly large situated at base of anterolateral; second situated quite away from first; 2nd to 12th spinules very small; last 5 situated on the posterolateral margin.

Segments of antennular peduncle decrease in length from first to third; second flagellum bears 18 groups of sensory hairs. Eyes fairly large, cornea slightly longer than stalk. Protopodal segments of antenna of same length; first segment of endopod nearly twice the second; endopod extends till 3/4 scale. Frontal spine well developed. Labral tip with a small blunt projection. Protopod of raptorial claw with well developed, ventrally directed stout spine; propodus with 3 basal spines of which first is largest; pectinations present; dactylus without free spines besides terminal. Other maxillipeds developed and walking legs short, bilobed. Last three thoracic somites increase in length posteriorwards; last somite 4/5 as long as broad. First 4 abdominal somites of same length; second nearly 2/3 as long as broad; fourth 3/5 as long as broad; fifth twice as broad as long and posterolateral corners of first 5 end in acute spines. Last somite 4 times broader than long; bears submedian spines; anterolateral corners produced into ventrally directed stout spines.

Telson as long as broad; intermediate, submedian spines large and well developed; denticles number 1 lateral, 10 intermediate and 19 submedians on one side and 20 on the other. Uropods reach little beyond lateral spines of telson; basal prolongation ends in two spines of which inner is longer than outer and outer basal margin of inner takes a slight curving path. Basal segment of exopod with 7 spines of which proximal ones are minute. Endopod does not extend to inner spine of basal prolongation.

Remarks: In a larva measuring 35.5 mm Alikunhi (1952) reported the anterolateral spines about twice the dorsal spine but in the present larva they are more than 3 times the size. He described the lateral margin of carapace with 12 + 4 spinules and denticles on telson one lateral, 11 intermediate and 20–21 submedian. In other characters the larva agrees well with the description provided by him. In general appearance the larva resembles *Alima emarginata* (Claus) and *Alima trivialis* (Hansen). The larva described by Jurich (1904) as *Alima robusta* seems to be different as the carapace is more narrower at anterolateral corners; tip of rostrum extending much beyond antennular peduncle and tip of posterolaterals extend till posterior margin of second abdominal somite. The larva *Alima* described by Tattersall (1906) though resembles the larva of *O. woodmasoni*, differs in the following characters. Posterolateral spines reach to junction of 2nd and 3rd abdominal somites; last 3 thoracic somites exposed by carapace; and outer basal aspect of inner spine of basal prolongation of uropod without any bulging.

Distribution: Japan, Australia, Sri Lanka, Madras.

Oratosquilla sp. A (*"quinquedentata"* group?) n. sp. (Fig. 7 c, d)

Locality: Stn. 1393; Lat. 14°49′N; Long. 72°20′E; Date 16-12-1962; Time 0800 to 1030 hrs; D. haul 200 (H); D. stn. 2020 m; M. net,.

Measurements (mm): TL: 26.6; LR: 2.6; CL: 9.7; ABC: 2.7; PBC: 4.1; GBC: 4.5; LAS: 0.9; LPS: 2.3; LES: 0.9; LC: 1.5; BC: 1.3; LI: 3.8; LN: 4.2; LP: 5.2; BP: 1.0; LD: 3.9; LT: 2.9; BT: 3.0; DLA: 6.5.

Description: Larva in general appearance looks elongated with a long narrow carapace. Anterior breadth of carapace 3/5 greatest breadth which is in the region of raptorial claw and posteriorly carapace extends till 5th thoracic somite. Rostrum very slender, elongated, does not extend to tip of antennular peduncle; three times the anterolateral spines and without ventral spinules. Dorsal spine small, slightly less than 1/2 the anterolaterals and situated on the median posterior elevated region. Anterolateral spines pointed and 2/5 as long as posterolaterals. Posterolaterals shorter than rostrum; bear ventral spinules at 1/3 distance from base; diverge slightly near tip from body and extend till 1/4 of first abdominal somite. On lateral margin of carapace there are 8+2 or 3 spines (2 on one side and 3 on other); first situated near base of anterolateral; second situated with a large gap from first and last two or three spinules situated near posterolateral.

Segments of antennular peduncle decrease in length from first to third; second flagellum bears 10 groups of sensory hairs. Eyes large with stalks 3/5 as long as corneal length. Frontal spine small. First segment of antennal peduncle shorter than second; first segment of endopod twice that of second and tip of endopod extends till 3/4 of scale. Labral tip with a minute blunt projection. Protopod of raptorial claw with a well developed ventral spinule; propodus bears 3 basal spines of equal length of which second and third situated at equidistance from first on either side; large number of pectinations on propodus present; dactylus without free spines besides terminal. Other maxillipeds well developed. Last 3 thoracic somites broader than long; increase in length posteriorwards and seventh nearly 4/5 as long as broad. First 3 abdominal somites of same length but broader than long; fourth 4/7 as long as broad; posterolateral corners of first 5 somites end in acute spines. Last somite more than 3 times broader than long; bears submedian spines and anterolateral corners produced into ventrally directed large broad spines.

Telson slightly longer than broad; intermediate spines longer than submedian; denticles number 1 lateral, 14 intermediate, 16 submedian on one side and 17 on other. Uropod extends till base of intermediate spine; basal prolongation ends in 2 acute spines, the outer 2/3 as long as inner, the basal outer margin of which has got a bulging. Endopod extends beyond outer but does not extend to inner spine. Exopod slightly extends beyond inner spine; proximal segment with 4 outer terminal spines and two more could be distinguished inside the cuticle.

Remarks: In many respects the larva resembles *Squilla* sp. III (*"quinquedentata"* group?) described by Alikunhi (1951). The points of difference are that in the larva from Madras, the carapace had 6+2 lateral spinules; 8 intermediate and 10 submedian denticles on telson while in the present larva there are 8+2 or 3 lateral spinules on carapace and 14 intermediate and 16–17 submedian denticles on telson.

The larva also has some resemblance to the larva of *Squilla massavensis* Gohar and Al-Kholy (1957) but differs in important characters like the length of rostrum in relation to antennular peduncle and number of intermediate denticles on telson.

Oratosquilla sp. B; n. sp. (Fig. 6 c, d, 7 e)

Locality: Stn. 1235; Lat. 06°38′N; Long. 71°21′E; Date 5–10–1962; Time 2120 to 0025 hrs; D. haul 0 (H); D. stn. 3920 m; M. net.

Measurements (mm): TL: 31.8; LR: 3.3; CL: 12.1; ABC: 3.3; PBC: 4.9; GBC: 5.3; LAS: 1.0; LPS: 2.5; LFS: 1.2; LC: 1.5; BC: 1.4; LI: 4.9; LM: 4.7; LP: 5.8; BP: 1.2; LD: 4.0; LT: 3.8; BT: 3.5; DLA: 8.4.

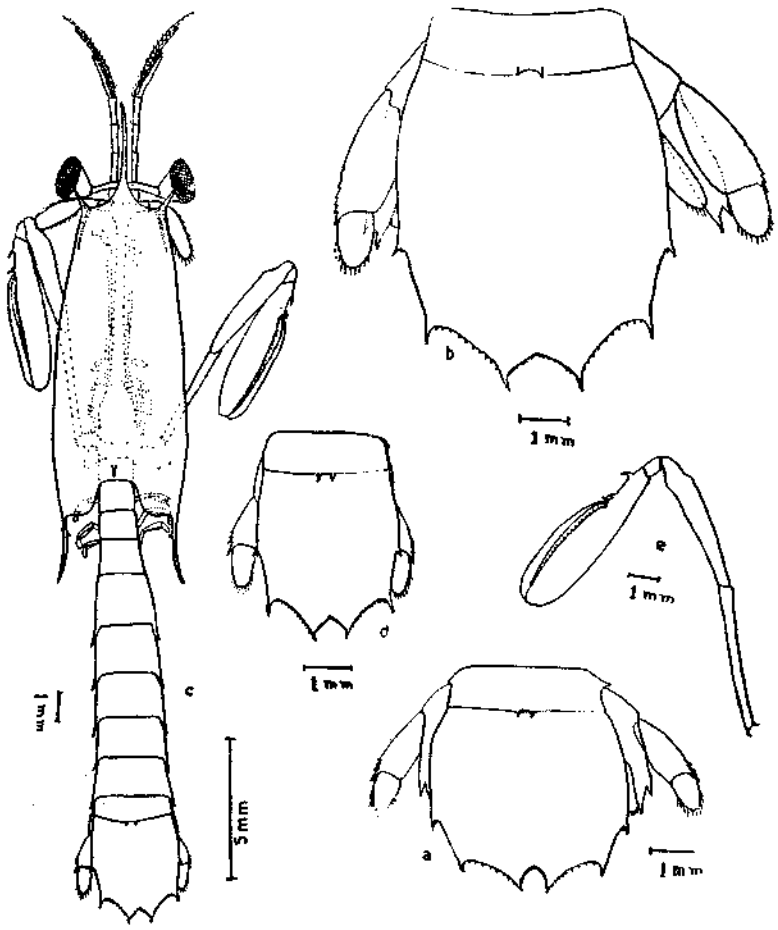

Fig. 7 : a. *Oratosquilla nepa*; b. *O. woodmasoni*; c, d. *Oratosquilla* sp. A ("*quinquedentata*" group) n. sp. and e. *Oratosquilla* sp. B; n. sp.

Description: In general appearance larva looks elongated. Carapace narrow, long; extends till anterior part of 6th thoracic somite; greatest breadth at raptorial claw region which is little more than 1½ times the anterior breadth. Rostrum well developed; without ventral spinules; as long as antennular peduncle and 4 times the anterolateral spines. Anterolateral spines are pointed 3/8 as long as posterolaterals. Dorsal spine about 1/2 of anterolaterals and situated on the elevated posteromedian region. Posterolateral spines run parallel to body diverging slightly at tip; reach till middle of first abdominal somite and bear ventral spinules at little less than 1/3 distance from base. Lateral margin of carapace with

10+2 spinules with varying distance between them and tenth spinule situated at the levelof labrum.

First segment of antennular peduncle slightly longer than second and third which are of same length; second flagellum bears 16 groups of sensory hairs. Frontal spine present on antennular somite. Cornea slightly longer than stalk. Endopod of antenna reaches till middle of scale; second segment of endopod 2/3 as long as the first. Labral tip with a minute spine. Protopod of raptorial claw bears a ventrally directed terminal spine; propodus with 3 basal spines of equal size of which second and third situated at equidistance from first on either side; pectinations present on inner side of propodus; dactylus without free spines besides terminal. Other maxillipeds developed. Last 3 thoracic somites increase in length posteriorwards; seventh 5/6 as broad as long. Walking legs short but biramous. First 5 abdominal somites of same length; posterolateral corners end in acute spines; second somite as long as broad; fourth broader than long and sixth 3 times as broad as long bears prominent submedian spines and anterolateral corners produced into ventrally directed blunt spines.

Telson longer than broad; intermediate, submedian spines pointed and longer than laterals; denticles 1 lateral, 17 intermediate, 16 submedian on one side and 17 on the other. Uropods reach near base of lateral spines; basal prolongation ends in two spines of which inner without any bulging at base is twice as large as outer and the tip extends beyond endopod, basal segment of exopod bears 3 spines on outer distal margin.

Remarks: Larva closely related to the larva of *Oratosquilla woodmasoni* but differs from it in the following characters. In *O. woodmasoni* the rostrum nearly 3 times the length of anterolaterals; lateral margin of carpace with 12+4 or 12+5 spinules; second antennular flagellum with 18 groups of hairs; telson as long as broad with 10–11 intermediate and 19–21 submedian denticles and bulging on outer basal margin of inner spine of uropod. In the present larva rostrum 4 times the anterolaterals; lateral margin of carapace with 10+2 spinules; second flagellum with 16 groups of hairs; telson longer than broad with 17 intermediate and 16–17 submedian denticles; and absence of bulging on inner spine of uropod.

Larva also resembles the larva of *O. interrupta* but in that the rostrum bears ventral spinules; lateral margin of carapace with 7+3 spinules and 9–10 intermediate denticles on telson.

CHECK LIST OF STOMATOPOD LARVAE KNOWN FROM INDIAN OCEAN

(1) *Gonodactylus chiragra* (Fabricius), 1781
Gonodactylus chiragra Brooks, 1892; Lebour, 1934, p. 15, fig. 5; Gurney, 1946, p. 165; Fourmanoir, 1953, p. 157, figs. 9–13.

Distribution: Madagascar.

(2) *Gonodactylus falcatus* (Forskål), 1775
Gonodactylus glabrous Gurney, 1937, p. 321; 1946, p. 165; Gohar and Al-Kholy, 1957, p. 118–127, figs. 1–50.

Distribution: Red Sea.

(3) *Gonodactylus (Gonerichthus)* sp. (Tattersall) 1906
Gonerichthus B Tattersall, 1906, figs. 43–45 (?).
Gonodactylus (Gonerichthus) sp. Alikunhi, 1951, p. 306, fig. 25.

Distribution: Sri Lanka, Madras.

(4) *Gonerichthus* (Tattersall) 1906
Lysioerichthus a Tattersall, 1906, p. 180, figs. 30–34.
Gonerichthus Alikunhi, 1951, p. 307.

Distribution: Sri Lanka.

(5) *Gonerichthus* a Tattersall, 1906
Gonerichthus a Tattersall, 1906, p. 183, 184, fig. 42.

Distribution: Sri Lanka.

(6) *Gonerichthus* r Tattersall, 1906
Gonerichthus r Tattersall, 1906, p. 185, pl. III, figs. 46, 47.

Distribution: Sri Lanka.

(7) *Odonterichthus tenuicornis* Jurich, 1904
Odonterichthus tenuicornis Jurich, 1904, p. 396, pl. xxviii, fig. 4; Borradaile, 1907, p. 209; Hansen, 1926, p. 43; Gurney, 1946, p. 168.

Distribution: Indian Ocean.

(8) *Pseudosquilla ciliata* (Fabricius) 1787
Pseudosquilla ciliata Milne Edwards, 1877–78, p. 232; Miers, 1880, p. 110, pl. iii, figs. 1, 2 (monodactyla); Hansen, 1895, p. 84; Bigelow, 1902, p. 154; Jurich, 1904, p. 395; Kemp, 1913, p. 108; Verrill, 1923, p. 193, 199; Hansen, 1926, p. 18; Bigelow, 1931, p. 157; Chopra, 1939; Foxon, 1939, p. 260; Gurney, 1946, p. 169.

Distribution: Red Sea, S. Arabia, Indian Ocean.

(9) *Pseudosquilla (Pseuderichthus)* sp. I Alikunhi, 1951
Pseudosquilla (Pseuderichthus) sp. I Alikunhi, 1951, p. 307, 308.

Distribution: Madras.

(10) *Pseudosquilla (Pseuderichthus)* sp. II Alikunhi, 1951
Pseudosquilla (Pseuderichthus) sp. II Alikunhi, 1951, p. 308.

Distribution: Madras.

(11) *Pseuderichthus affinis* Borradaile, 1907
Pseuderichthus affinis Claus, 1871, p. 36; Borradaile, 1907, p. 215; Foxon, 1932, p. 384; 1939, p. 259; Gurney, 1946, p. 169.

Distribution: Barrier Reef, Red Sea.

(12) *Pseuderichthus communis* Hansen, 1895
Alimerichthus cylindricus Guérin-Méneville, 1857, p. lxvi, pl. iii, figs. 12; Claus, 1871, p. 32, figs. 26, 27 c.
Pseuderichthus communis Hansen, 1895, p. 86, figs. 5, 5b, pl. viii; Jurich, 1904, p. 395, pl. xxix,, fig. 1; Tattersall, 1906, p. 183; Borradaile, 1907, p. 214; Calman, 1917, p. 142; Hansen, 1926, pp. 17, 43; Dollfus, 1938, p. 198, fig. 8; Foxon, 1939, p. 260; Chopra, 1939, p. 160; Gurney, 1946, p. 169.

Distribution: Atlantic, Pacific, Indian Ocean, Red Sea, Indian equatorial current; Sri Lanka, Chagos Archipelago, Alphonse Is., Amirante group; Providence Is., between Mauritius and Cargadoes.

13) *Pseuderichthus distinguendus* Hansen, 1895
Pseuderichthus distinguendus Hansen, 1895, p. 84; Jurich, 1904, p. 394, pl. xxviii, fig. 5; Borradaile, 1907, p. 215; Kemp, 1913, p. 102; Bigelow, 1931; Foxon, 1939, p. 260; Gurney, 1946, p. 169.

Distribution: Red Sea, Gulf of Oman, Arabian Sea, Indian Ocean.

(14) *Acanthosquilla acanthocarpus* (Miers) 1880
Lysiosquilla acanthocarpus Alikunhi, 1951, p. 293–295, fig. 21.
Acanthosquilla acanthocarpus (var. *septemspinosa*) Alikunhi, 1967, p. 925–928, figs. 189–194.

Distribution: Madras

(15) *Acanthosquilla multifasciata* (Wood-Mason) 1895
Erichthoidina brevispinosa Claus, 1871, pl. i, fig. 4, pl. ii, fig. 5; Gurney, 1946, fig. 9.
Lysierichthus sp. Komai and Tung, 1929, pl. vii, figs. 13–19, pl. viii, figs. 1–9.
Lysiosquilla multifasciata Alikunhi and Aiyar, 1943, p. 80–82; Alikunhi, 1951, p. 289–291, fig. 19.
Acanthosquilla multifasciata Alikunhi, 1967, p. 915–920, figs. 174–185.

Distribution: Madras, Japan, Bermuda.

(16) *Acanthosquilla tigrina* (Nobili) 1903
Lysiosquilla (Lysierichthus) tigrina Alikunhi, 1944, p. 18, fig. 1.
Lysiosquilla tigrina Alikunhi, 1951, p. 292, fig. 20.
Acanthosquilla tigrina Alikunhi, 1967, p. 920–925, figs. 186–188.

Distribution: Madras.

(17) *Lysiosquilla capensis* Hansen, 1895
Lysiosquilla capensis Hansen, 1895, p. 74 *(Lysierichthus pulcher)*; Stebbing, 1910, p. 406; Kemp, 1913, p. 117; Gurney, 1946, p. 167; Barnard, 1950, p. 856.

Distribution: South Africa.

(18) *Lysiosquilla maculata* (Fabricius), 1793
Lysiosquilla maculata Alikunhi and Aiyar, 1943, p. 80; Alikunhi, 1951, p. 285, fig. 17; 1958, p. 143; 1967, p. 904–910, figs. 158–167.

Distribution: Madras, Mahanadi Estuary.

(19) *Lysiosquilla sulcirostris* Kemp, 1913
Erichthus duvaucellii Milne-Edwards, 1837, p. 505; Guérin-Méneville, 1857; Claus, 1871, pl. iv, fig. 16.

Lysierichthus duvaucellii Tattersall, 1906, p. 179.
Lysiosquilla (Lysierichthus) maculata Foxon, 1939.
Lysiosquilla sulcirostris Alikunhi, 1951, p. 287, fig. 18; 1967, p. 910–915, figs. 168–173.

Distribution: Madras, Sri Lanka, Maldive area, Arabian Sea, Indian Ocean.

(20) *Lysiosquilla* sp. Gurney, 1937
Lysiosquilla sp. Gurney, 1937, p. 325, pl. iii, figs. 49–51, pl. IV f. 52–58.

Distribution: Red Sea.

(21) *Lysiosquilla (Lysierichthus)* sp. I Alikunhi, 1951
Erichthus sp (?) Claus, 1871, pl. v, fig. 19.
Erichthus rostratus (?) Borradaile, 1907.
Lysiosquilla (Lysierichthus) sp. I Alikunhi, 1951, p. 300, fig. 23.

Distribution: Madras, Indian Ocean.

(22) *Lysiosquilla (Lysierichthus)* sp. II Alikunhi, 1951
Lysiosquilla (Lysierichthus) sp. II Alikunhi, 1951, p. 302, fig. 24 b.
Lysiosquilla sp. Alikunhi, 1958, p. 144, figs. 22, 23.

Distribution: Madras, Mahanadi Estuary.

(23) *Lysiosquilla (Lysierichthus)* sp. III Alikunhi, 1951
Lysiosquilla (Lysierichthus) sp. III Alikunhi, 1951, p. 304.

Distribution: Madras.

(24) *Lysiosquilla (Lysierichthus)* sp. IV Alikunhi, 1951
Lysiosquilla (Lysierichthus) sp. IV Alikunhi, 1951, p. 305, fig. 24 c.

Distribution: Madras.

(25) *Lysiosquilla (Lysierichthus)* sp. V Alikunhi, 1951
Lysiosquilla (Lysierichthus) sp. V Alikunhi, 1951, p. 305, fig. 24 d.

Distribution: Madras.

(26) *Coronideríchthus bituberculatus* Hansen, 1895
Coronideríchthus armatus Claus, 1871, fig. 15 (part) (form of *C. armatus* = *Coronida trachura*)
Coronideríchthus bituberculatus Hansen, 1895, p. 83; Lanchester, 1903, p. 458; Jurich, 1904, p. 394, pl. xxviii, fig. 3; Hansen, 1926, p. 41; Foxon, 1939, p. 264, fig. 4, *(Erichthoidina* stage*)*; Gurney, 1946, p. 152, 162.

Distribution: Gulf of Aden, Arabian Sea, Maldives, Indian Ocean.

(27) *Erichthoidina armate* Clause, 1871
Erichthoidina armata Claus, 1871, p. 9, 13, 15, (= *Erichthus edwardsi*); Hansen, 1894, p. 77 (= *L. edwardsi* = *Lysiosquilla glabriuscula*); Jurich, 1904, p. 399; Foxon, 1939, p. 261; Gurney, 1946 p, 162.

Distribution: Indian Ocean.

(28) *Erichthus acer* Jurich, 1904
Erichthus acer Jurich, 1904, p. 399, pl. xxviii; Gurney, 1946, p. 163.

Distribution: Indian Ocean.

(29) *Erichthus affinis* Borradaile, 1907
Erichthus affinis Borradaile, 1907, p. 215, Gurney, 1946, p. 163.

Distribution: Indian Ocean.

(30) *Erichthus duvaucellii* Milne Edwards, 1837
Erichthus duvaucellii Milne Edwards, 1837, p. 505.

Distribution: Bay of Bengal.

(31) *Erichthus longicornis* H. Milne Edwards, 1837
Erichthus longicornis H. Milne Edwards, 1837, ii, p. 502; Guérin-Méneville, 1857, pl. xiv, (*Pontiobius*); Gurney, 1946, p. 163.

Distribution: Indian Ocean.

(32) *Erichthus longispinus* Guérin-Méneville, 1857
Erichthus longispinus Guérin-Méneville, 1857, p. Lx; Gurney, 1946, p. 163.

Distribution: Indian Ocean.

(33) *Erichthus triangularis* H. Milne Edwards, 1837
Erichthus triangularis H. Milne Edwards, 1837, p. 502; Guérin-Méneville, 1857, p. Lxiv, (*Smerdis*); Claus, 1871, p. 23, fig. 13; *(Squillerichthus)*; Brooks, 1886, p. 108 (form is *Coronideríchthus armatus)*; Hansen, 1895, p. 84; Foxon, 1932, p. 385; Gurney, 1946, p. 164.

Distribution: Zanzibar, Indian Ocean.

(34) *Lysioerichthus* B Tattersall, 1906
Lysioerichthus B Tattersall, 1906, p. 180, pl. iii, figs. 35–40.

Distribution: Sri Lanka.

(35) *Lysierichthus duvaucellii* Guérin-Méneville, 1844
Lysierichthus duvaucellii Guérin-Méneville, 1844, p. 19, pl. xxiv, fig. 3; Brooks, 1886, p. 110, pl. x, fig. 7, pl. xi, fig. 4; Hansen 1895, p. 74; Jurich, 1904, p. 383, pl. xxvi, fig. 7; Borradaile, 1907,

p. 215; Hansen, 1926, p. 40; Gurney, 1946, p. 165; Stebbing, 1910, p. 408; Chopra, 1939, p. 161; Schmitt, 1940, p. 190.

Distribution: Atlantic, West Pacific, Indian Ocean, Indo-Pacific to Equador, Penrhyn Island.

(36) *Lysierichthus edwardsi* Eydoux and Souleyet, 1841
Lysierichthus edwardsi Eydoux and Souleyet, 1841, p. 260, pl. v, figs. 39–54; H. Milne Edwards, 1837, p. 501 (*E. aculeatus*); Dana, 1842, p. 626, pl. xLi, fig. 6; Guérin Méneville, 1857, p. Lx; Claus, 1871, p. 15–18, pl. ii, figs. 7, 8, pl. iii, figs. 9–11 (*E. guerini*, p. 27, fig. 17); Hansen, 1895, p. 75, pl. vii, fig. 4; Jurich, 1904, p. 399, pl. xxviii, fig. 7; Giesbrecht, 1910, p. 151; Calman, 1917, p. 143; Gurney, 1946 b, p. 166.

Distribution: Atlantic, Pacific and Indian Ocean.

(37) *Lysierichthus latreillii* Guérin-Méneville, 1830
Lysierichthus latreillii Guérin-Méneville, 1830, p. 42, pl. iv, figs. 5–7; Guérin-Méneville, 1857, Lxiv; Claus, 1871, p. 28, fig. 18; Gurney, 1946, p. 151 & 166, fig. 11 E.

Distribution: Indian and Atlantic Oceans, Timor.

(38) *Lysierichthus pulcher* Hansen, 1895
Lysierichthus pulcher Hansen, 1895, p. 74; Jurich, 1904, p. 390, pl. xxix, figs. 2–2 b; (Claus, 1871, p. 29); Stebbing, 1910, p. 409; Gurney, 1946, p. 151, 152 & 166, fig. 11 A–D; Barnard, 1950, p. 858, fig. 4 e.

Distribution: Agulhas Bank, Atlantic, South Africa.

(39) *Lysierichthus rostratus* Foxon, 1932
Lysierichthus rostratus Foxon, 1932, p. 386; Foxon, 1939, p. 262, fig. 3; Gurney, 1946, p. 166.

Distribution: Arabian Sea, Indian Ocean.

(40) *Lysierichthus tectus* Milne-Edwards, 1837
Lysierichthus tectus Milne-Edwards, 1837, p. 503; Dana, 1852; Guérin-Méneville, 1857, pl. Lx; Foxon, 1932, p. 384, fig. 4; Gurney, 1946, p. 166.

Distribution: Indian Ocean, Barrier Reef.

(41) *Lysierichthus triangularis* Milne-Edwards, 1837
Lysierichthus triangularis Milne-Edwards, 1837, ii, p. 502; Claus, 1871, p. 23, fig. 13; Hansen, 1895, p. 81 & 84; Komai and Tung, 1929, p. 214, pl. viii, figs. 20, 24, pl. ix, figs. 1–8; Foxon, 1932, p. 385; Foxon, 1939, p. 265; Gurney, 1946, p. 167.

Distribution: Zanzibar.

(42) *Alima hieroglyphica* (Kemp) 1911
Squilla (Alima) hieroglyphica Alikunhi, 1944, p. 237, 238, fig. 1 a–d; 1958, p. 135, 136, fig. 14.
Squilla hieroglyphica Alikunhi, 1947, p. 289; 1951, p. 264, 265, fig. 8; 1967, p. 878–881, figs. 109–113.

Distribution: Madras, Mahanadi Estuary (east coast of India).

(43) *Anchisquilla fasciata* (de Haan) 1844
Alimerichthus unidens Lanchester, 1903; Tattersall, 1906, p. 177, fig. 26; Foxon, 1932, p. 282; Gurney, 1946, p. 161.
Alima spinigera Borradaile, 1907, p. 215, fig. 4; Lebour, 1934 (?), p. 12, fig. 1 & 2; Gurney, 1946, p. 159.
Squilla fasciata Alikunhi and Aiyar, 1943 (?), p. 80–82; Alikunhi, 1951, p. 278–280, fig. 14; 1967, p. 889–892, figs. 146–153.

Distribution: Sri Lanka, Maldives, Laccadives, Madras, British East Africa, North New Guinea, Indian Ocean.

(44) *Clorida latreilli* Eydoux and Souleyet, 1841
Alimerichthus a Tattersall, 1906, p. 177–178, figs. 27–29.
Squilla microphthalma Alikunhi and Aiyar, 1942, p. 56–58, photographs 2.
Squilla latreillei Alikunhi, 1951, p. 273–277, figs. 11, 12 and 13; Alikunhi, 1958, p. 124; 1967, p. 883–889, figs. 132–145.

Distribution: Madras; Mahanadi Estuary; Cheval Paar (Sri Lanka).

(45) *Clorida* sp. *(decorata?) (Alimerichthus* type*)* (Alikunhi) 1958
Squilla sp. *(decorata?)* (Larva *Alimerichthus* type) Alikunhi, 1958, p. 124–12.6, Fig. 1-4.

Distribution: Mahanadi Estuary.

(46) *Clorida* sp. (?) (Larva *Alimerichthus* type) (Alikunhi), 1958
Squilla sp. (?) (Larva *Alimerichthus* type) Alikunhi, 1958, p. 126–132, figs. 5–12.

Distribution: Mahanadi Estuary.

(47) *Cloridopsis immaculata* (Kemp) 1913
Squilla scorpio var. *immaculata* Kemp, 1915, p. 195, fig. 2 a-g; Gurney, 1946, p. 160.

Distribution: Chilka Lake (east coast of India).

(48) *Cloridopsis scorpio* (Latreille) 1825
Squilla (Alima) scorpio var. *immaculata* Kemp, 1915, fig. 29 (part).
Squilla (Alima) oratoria Komai and Tung, 1929, pl. ii, fig. 1–26, pl. iii, fig. 7–17 (part).
Squilla scorpio Alikunhi, 1951, p. 269–273, fig. 10.

Distribution: Madras, Chilka Lake, Japan.

(49) *Harpiosquilla harpax* (de Haan), 1844
Squilla harpax (?) Alikunhi, 1958, p. 132–134, fig. 13.
Harpiosquilla raphidea Alikunhi, 1967, p. 894–904, figs. 114–125.

Distribution: Madras, Mahanadi Estuary (east coast of India).

(50) *Harpiosquilla raphidea* (Fabricius), 1798
Alimerichthus Claus, 1871, pl. viii, fig. 30; Lanchester, 1903, p. 457.
Alima pyramidalis Lanchester, 1903; Foxon, 1932, p. 381; Gurney, 1946, p. 159.
Alima multispinus Foxon, 1939, fig. 2 b (Atypical form).
Squilla raphidea Nair, 1941, p. 543-576, pls, 29-30, figs. 1-32; Alikunhi and Aiyar, 1942, p. 56-58, photographs 3, 4; Alikunhi, 1951, p. 265–269, fig. 9, (Typical form).

Distribution: Madras, Barrier reef, Indian Ocean.

(51) *Alimerichthus multispinus* Claus, 1871
Alimerichthus multispinus Claus, 1871, p. 18 and 39 *(Erichthus)*; Borradaile, 1907, p. 215; Foxon, 1939, p. 258; Gurney, 1946, p. 161.

Distribution: Indian Ocean.

(52) *Alimerichthus lucasi* Guérin-Méneville, 1857
Alimerichthus lucasi Guérin-Méneville, 1857, pl. Lxv; Gurney, 1946, p. 161.

Distribution: Indian Ocean.

(53) *Alimerichthus rouxi* Guérin-Méneville, 1857
Alimerichthus rouxi Guérin-Méneville, 1857, p. Lxv; Gurney, 1946, p. 161.

Distribution: Indian Ocean.

(54) *Alimerichthus xyphias* Guérin-Méneville, 1857
Alimerichthus xyphias Guérin-Méneville, 1857, p. Lxv; Gurney, 1946, p. 161.

Distribution: Indian Ocean.

(55) *Oratosquilla gonypetes* (Kemp), 1911
Squilla (Alima) sp. (*"nepa"* group) Foxon, 1939, fig. 1.
Squilla gonypetes Alikunhi, 1951, p. 262–264, fig. 7; 1967, p. 871–876, figs. 90–100.

Distribution: Red Sea, Madras.

(56) *Oratosquilla holoschista* (Wood-Mason) 1895
Alima laticauda Milne Edwards, 1837, p. 507; Claus, 1871, p. 41, fig. 32; Gurney, 1946, p. 158.

Squilla holoschista Alikunhi and Aiyar, 1942, p. 56–58, photographs 7 and 8; Alikunhi, 1951, p. 248–251, fig. 2; Kurian, 1954, p. 86; Alikunhi, 1958, p. 141; 1967, p. 837–847, figs. 23–39.

Distribution: New Guinea, Madras, Mahanadi Estuary, Trivandrum, Indian Ocean.

(57) *Oratosquilla interrupta* (Wood-Mason) 1895
Alima emarginata Lanchester, 1906, fig. 4.
Squilla interrupta Lele, 1937, p. 307; Alikunhi and Aiyar, 1943, p. 80–82; Alikunhi, 1951, p. 254–256 fig. 4; 1958, p. 136–138, fig. 15; 1967, p. 858–864, figs. 59–76.

Distribution: Madras, Bombay, Mahanadi Estuary, off Cape Patani.

(58) *Oratosquilla massavensis* (Kossmann) 1880
Squilla massavensis Gohar and Al-Kholy, 1957, p. 89–106, figs. 1–87.

Distribution: Red Sea.

(59) *Oratosquilla nepa* (Latreille) 1825
Squilla nepa Alikunhi and Aiyar, 1942, p. 56–58, photographs 5, 6; Alikunhi, 1951, p. 245–248, fig. 1; Fourmanoir, 1953, p. 153–157, figs. 1–7; Alikunhi, 1958, p. 141; 1967, p. 826–836, figs. 1–22.

Distribution: Madras, Mahanadi Estuary, Madagascar.

(60) *Oratosquilla quadraticauda* (Fukuda) 1910
Squilla boops Alikunhi, 1951, p. 256–258, fig. 5; Alikunhi, 1967, p. 876–878, figs. 101–108.

Distribution: Madras.

(61) *Oratosquilla quinquedentata* (Brooks) 1885
Squilla quinquedentata Alikunhi and Aiyar, p. 80–82; Alikunhi, 1951, p. 258–262, fig. 6; 1967, p. 864–871, figs. 77–89.

Distribution: Madras.

(62) *Oratosquilla woodmasoni* (Kemp) 1911
Alima emarginata Claus, 1871, p. 42, fig. 33; Komai and Tung, 1929, p. 205; Foxon, 1932, p. 381; Gurney, 1946, p. 158.
Alima trivialis Hansen, 1895, pl. viii, fig. 11.
Alima a Tattersall, 1906, figs. 23–25.
Squilla woodmasoni Nair, 1941, p. 543–576; Alikunhi and Aiyar, 1942, p. 56–58; Alikunhi, 1951, p. 251–254, fig. 3; 1967, p. 847–858, figs. 40–58.

Distribution: Madras, Sri Lanka, Indian Ocean, Barrier reef, Atlantic Ocean.

(63) *Oratosquilla perpensa* (?) (Kemp) 1911
Squilla sp. *(oratoria* var. *inornata ?)* Alikunhi, 1958, p. 138–140, figs. 16–19.

Distribution: Mahanadi Estuary.

(64) *Oratosquilla* spp. *("nepa"* group*)* (Foxon) 1939
Squilla spp. (*"nepa"* group) Foxon, 1939, p. 256–257, fig. 1.

Distribution: Red Sea, Gulf of Oman, Gulf of Aden, Arabian Sea, Maldives.

(65) *Oratosquilla* sp. (Gohar and Al-Kholy) 1957
Squilla sp. Gohar and Al-Kholy, 1957, p. 106–118, figs. 1–67.

Distribution: Red Sea.

(66) *Oratosquilla* sp. (?) (Alikunhi) 1958
Squilla sp. (?) Alikunhi, 1958, p. 141–143, figs. 20–21.

Distribution: Mahanadi Estuary.

(67) *Oratosquilla* sp. I (*"quinquedentata"* group ?) (Alikunhi) 1951
Squilla sp. I (*"quinquedentata"* group?) Alikunhi 1951, p. 296-298 fig. 22 a.

Distribution: Madras.

(68) *Oratosquilla* sp. II (*"quinquedentata"* group ?) (Alikunhi) 1951
Squilla sp. II (*"quinquedentata"* group ?) Alikunhi, 1951, p. 298, 299, fig. 22 b.

Distribution: Madras.

(69) *Oratosquilla* sp. III (*"quinquedentata"* group ?) (Alikunhi) 1951
Squilla sp. I (*"quinquedentata"* group ?) Alikunhi, 1951, p. 299–300, fig. 22 c.

Distribution: Madras.

(70) *Squilloides lata* (Brooks) 1886
Alima sp. Foxon, 1932, figs. 2–3.
Alima bermudensis Gurney, 1946, fig. 6.
Squilla lata Alikunhi, 1951, p. 280–285; 1967, p. 892-893, figs. 154–157.

Distribution: Great Barrier Reef, Bermuda, Madras.

(71) *Alima bidens* Claus, 1871
Alima bidens Claus, 1871, p. 44, fig. 34; Brooks, 1886, p. 90, figs. 1, 2, pl. ix; Lanchester, 1903, p. 457; Gurney, 1946, p. 157.

Distribution: Gulf of Penas, Maldives.

(72) *Alima forceps* Milne Edwards, 1837
Alima forceps H. Milne Edwards, 1837, iii, p. 508; Guérin-Méneville, 1857, p. Lix *(Hyalopelta)*; Gurney, 1946, p. 158.

Distribution: Indian Ocean.

(73) *Alima gracillima* Borradaile, 1907
Alima gracillima Borradaile, 1907, xii, p. 22, fig. 5; Gurney, 1946, p. 158.

Distribution: Indian Ocean.

(74) *Alima gracilis* Milne Edwards, 1837
Alima gracilis H. Milne Edwards, 1837, ii, p. 509; Guérin-Méneville, 1857, p. Lix *(Hyalopelta)*; Gurney, 1946, p. 158.

Distribution: Indian Ocean.

(75) *Alima hyalina* Leach, 1818
Alima hyalina Leach, 1818, p. 305, 416, fig. 7; Desmarest, 1825, p. 253, pl. xLiv, fig. 11; Latreille, 1825, x, p. 475, fig. 8; H. Milne Edwards, 1837, ii, p. 507; Lucas, 1842, p. 208; Dana, 1852, p. 631, pl. xiii, fig. 2; Guérin-Méneville, 1857, p. Lix, *(Hyalopelta)*; Bate, 1868, p. 446; Claus, 1871, p. 45 *(A. gracilis)*; Brooks, 1886, p. 84 *(A. gracilis)*; Hansen, 1895, p. 92, pl. viii, fig. 8; Jurich, 1904, p. 382; Borradaile, 1907, p. 216; Verril, 1923, p. 202; Foxon, 1932, p. 378; Lebour, 1934, p. 14, figs. 3, 4; Gurney, 1946, p. 141–143, 158, fig. 4.

Distribution: Atlantic, Indian and Pacific Oceans, Bermuda, Barrier Reef, New Guinea.

(76) *Alima inermis* Claus, 1871
Alima inermis Claus, 1871, p. 43; Gurney, 1946, p. 158.

Distribution: Indian Seas.

(77) *Alima longirostris* Guérin-Méneville, 1844

Alima longirostris Guérin-Méneville, 1844, pl. xxiv, fig. 4; Guérin-Méneville, 1857, p. Lix, *(Hyalopelta)*; Claus, 1871, p. 40, fig. 31; Gurney, 1946, p. 159.

Distribution: East Indies.

(78) *Alima macrocephala* Jurich, 1904
Alima macrocephala Jurich, 1904, pl. xxvii, fig. 1, 1 c; Gurney, 1946, p. 159.

Distribution: Indian Ocean ?

(79) *Alima monacantha* Jurich, 1904
Alima monacantha Jurich, 1904, p. 385; Gurney, 1946, p. 159.

Distribution: Indian Ocean.

(80) *Alima multispina* (Claus), 1871
Erichthus multispina Claus, 1871, pl. iii, fig. 12.
Alimerichthus multispina Borradaile, 1907, p. 215.
Alima multispina Giesbrecht, 1910, p. 153; Foxon, 1939, p. 258; Gurney, 1946, p. 159.

Distribution: Red Sea, Arabian Sea, Gulf of Oman, Indian Ocean.

(81) *Alima paradoxa* Jurich, 1904
Alima paradoxa Jurich, 1904, p. 387, pl. xxvii, figs. 2, 2 a, b; Gurney, 1946, p. 159; Barnard, 1950, p. 864.

Distribution: South Africa, Atlantic Ocean.

(82) *Alima robusta* Jurich, 1904
Alima robusta Jurich, 1904, p. 379, pl. xxvii, fig. 6; Borradaile, 1907, p. 216; Foxon, 1939, p. 268; Gurney, 1946, p. 159.

Distribution: Arabian Sea, Indian Ocean.

(83) *Alima spinulosa* Claus, 1871
Alima spinulosa Claus, 1871, p. 43; Gurney, 1946, p. 159.

Distribution: Indian Ocean.

(84) *Alima strigosa* Jurich, 1904
Alima strigosa Jurich, 1904, p. 384, pl. xxvii, figs. 3, 3 a; Gurney, 1946, p. 159.

Distribution: South Equatorial current, Gulf of Aden, Indian Ocean.

(85) *Squillerichthe spinosus* Milne Edwards, 1837
Squillerichthe spinosus Milne Edwards, 1837, p. 499.

Distribution: Bay of Bengal.

(86) *Squillerichthe typus* Milne Edwards, 1837
Squillerichthe typus Milne Edwards, 1837, p. 499, pl. 27, fig. 1–8.

Distribution: Indo-Pacific.

TO BE CONTINUED IN VOLUME 17 NO. 3